HP ProLiant ML350 Generation 4p Server User Guide

March 2005 (First Edition)
Part Number 382582-001

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Audience Assumptions

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

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Server Component Identification

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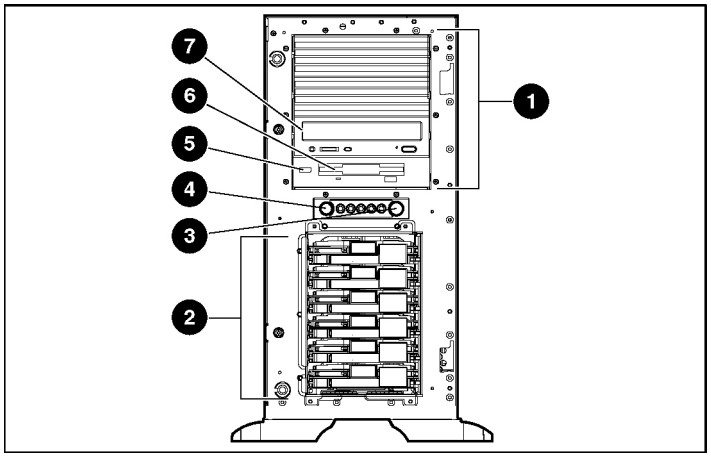
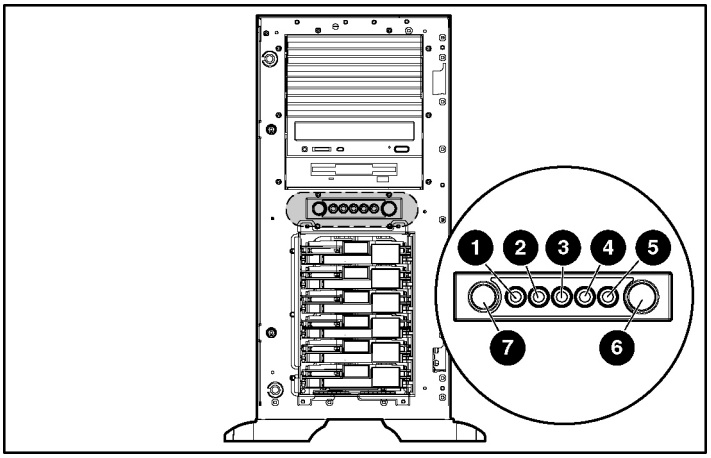
Front Panel Components



Item	Description
1	Removable media bays (4)

Item	Description
2	Hot-plug hard drive bays (6)
3	System power button
4	UID button
5	USB port
6	Diskette drive
7	CD-ROM drive

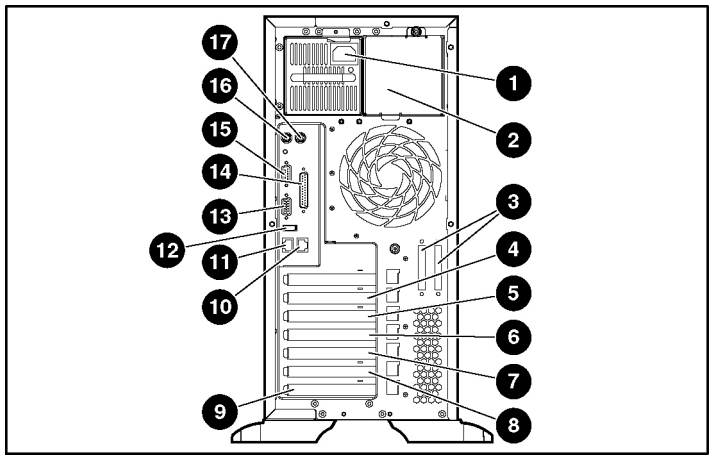
Front Panel LEDs and Buttons



Item	Description	Status
1	UID LED	Blue = Activated Flashing = System remotely managed Off = Deactivated

Item	Description	Status
2	Internal health LED	Green = Normal Amber = System degraded. Refer to system board LEDs to identify component in degraded state. Red = System critical. Refer to system board LEDs to identify component in critical state. Off = Normal (when in standby mode)
3	External health LED (power supply)	Green = Normal Red = Power redundancy failure
4	NIC activity LED	Green = Network link Flashing = Network link and activity Off = No link to network. If power is off, view the rear panel RJ-45 LEDs for status.
5	Power LED	On = Power Amber = System off and power available Off = No power
6	System power button	
7	UID button	

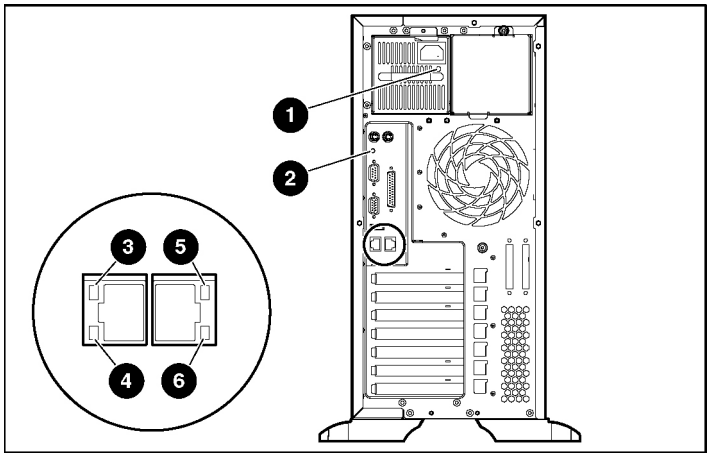
Rear Panel Components



Item	Description
1	Power cord connector
2	Optional hot-plug redundant power supply bay
3	SCSI connector knockouts
4	PCI Express 4x (half-length card), slot 1
5	PCI Express 8x (full-length card), slot 2
6	64-bit, 100-MHz PCI-X slot, bus 9, slot 3
7	64-bit, 100-MHz PCI-X slot, bus 9, slot 4
8	64-bit, 133-MHz PCI-X slot, bus 6, slot 5
9	64-bit, 66-MHz PCI-X slot, bus 2, slot 6
10	iLo Management port
11	RJ-45 Ethernet port
12	USB 2.0 port
13	Video port
14	Parallel port
15	Serial port

Item	Description
16	Keyboard port
17	Mouse port

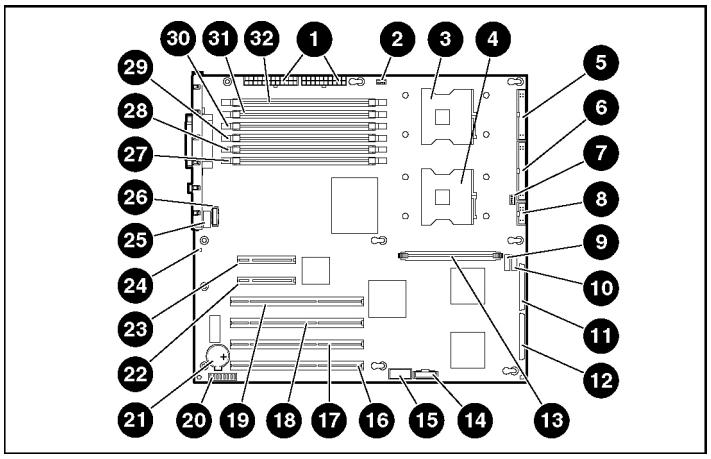
Rear Panel LEDs



Location	LED	Status
1	Power supply LED	Off = No power or inadequate power supply Green = Power supply is on and functioning
2	UID LED	Blue = Activated Off = Deactivated Flashing = Remote inquiry
3	10/100/1000 NIC link LED	On = Link Flashing = Activity Off = No Link
4	10/100/1000 NIC standby LED	On = Standby Off = Activity

Location	LED	Status
5	iLo NIC Activity LED	On = Link Flashing = Activity Off = No Link
6	iLo NIC standby LED	On = Standby Off = Activity

System Board Components



NOTE: PPM 1 is embedded onto the system board.

Item	Description
1	Power supply connectors
2	Processor 1 heatsink connector
3	Processor socket 1
4	Processor socket 2
5	Diskette drive connector
6	Primary IDE connector (ATAPI devices)

Item	Description
7	Processor 2 heatsink connector
8	Power button/LED connector
9	SATA 1 connector
10	SATA 2 connector
11	Primary SCSI connector
12	Secondary SCSI connector
13	PPM 2 socket
14	RILOE II connector (30-pin)
15	Serial port connector
16	64-bit, 66-MHz PCI-X slot, bus 2
17	64-bit, 133-MHz PCI-X slot, bus 6
18	64-bit, 100-MHz PCI-X slot, bus 9
19	64-bit, 100-MHz PCI-X slot, bus 9
20	System maintenance switch
21	System battery
22	PCI Express x4 slot (full-length card)
23	PCI Express x4 slot (full-length card)
24	NMI switch
25	Redundant fan connector
26	System fan connector
27	DIMM slot 6 (Bank C)
28	DIMM slot 5 (Bank C)
29	DIMM slot 4 (Bank B)
30	DIMM slot 3 (Bank B)
31	DIMM slot 2 (Bank A)

Item	Description
32	DIMM slot 1 (Bank A)

NMI Jumper

The NMI jumper allows administrators to perform a memory dump before performing a hard reset. Crash dump analysis is an essential part of eliminating reliability problems, such as hangs or crashes in operating systems, device drivers, and applications. Many crashes freeze a system, requiring you to do a hard reset. Resetting the system erases any information that would support root cause analysis.

Systems running Microsoft® Windows® operating systems experience a blue screen trap when the operating system crashes. When this happens, Microsoft® recommends that system administrators perform an NMI event by pressing a dump switch. The NMI event enables a hung system to become responsive again.

System Maintenance Switch

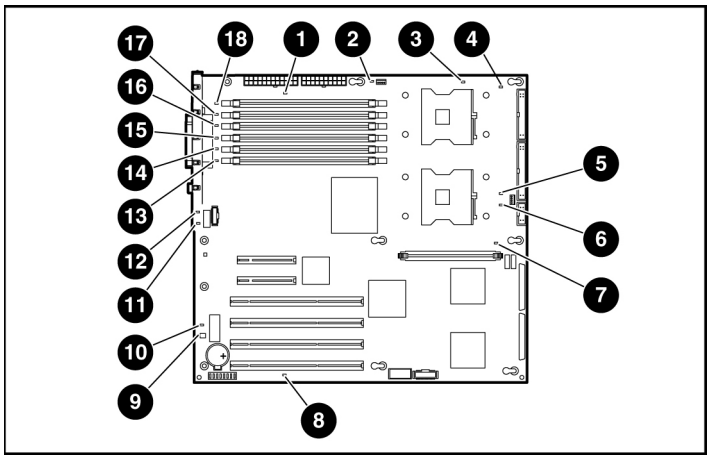
Position	Default	Function
S1	iLo Security	Off = iLO security is enabled On = iLO security is disabled
S2	Off	Off = System configuration can be changed. On = System configuration is locked.
S3	Off	Reserved
S4	Off	Reserved
S5	Off	Off = Power-on password is enabled. On = Power-on password is disabled.
S6	Off	Off = No function On = Clear NVRAM

Position	Default	Function
S7		Reserved
S8		Reserved

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

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

System Board LEDs



Item	LED Description	Status
1	AC power	Off = No AC power or failed power supply Green = Power supply is on and functioning
2	Processor 1 fan status	Off = Processor fan is functioning Amber = Fan is not installed or has failed

Item	LED Description	Status
3	Processor 1 status	Off = Processor 1 functioning Amber = Processor 1 failed
4	PPM 1 (embedded) status	Off = PPM 1 functioning Amber = PPM 1 failed
5	Processor 2 fan status	Off = Processor fan is functioning Amber = Fan is not installed or has failed
6	Processor 2 status	Off = Processor 1 functioning Amber = Processor 1 failed
7	PPM 2 status	Off = PPM 2 functioning Amber = PPM 2 failed
8	Temperature threshold	Off = Normal Amber = System temperature threshold exceeded
9	Memory status	Off = Normal Amber = Memory failed or configuration problem
10	Online spare memory failover	Off = Normal Amber = Online spare memory is in use due to memory failover
11	Redundant fan status	Off = Fan is functioning Amber = Redundant fan has failed
12	Rear fan status	Off = Processor fan is functioning Amber = Fan is not installed or has failed
13	DIMM 6 status	Off = DIMM 6 functioning (default) Amber = DIMM 6 failed
14	DIMM 5 status	Off = DIMM 5 functioning (default) Amber = DIMM 5 failed
15	DIMM 4 status	Off = DIMM 4 functioning (default) Amber = DIMM 4 failed

Item	LED Description	Status
16	DIMM 3 status	Off = DIMM 3 functioning (default) Amber = DIMM 3 failed
17	DIMM 2 status	Off = DIMM 2 functioning (default) Amber = DIMM 2 failed
18	DIMM 1 status	Off = DIMM 1 functioning (default) Amber = DIMM 1 failed

System LEDs and Internal Health LED Combinations

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

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

System LED and Color	Internal Health LED Color	Status
Processor failure, socket *X* (Amber)	Red	One or more of the following conditions may exist: • Processor in socket *X* has failed. • Processor in socket *X* failed over to the second processor. • Processor *X* is not installed in the socket. • Processor *X* is not supported. • Processor heatsink is not attached properly.
	Amber	Processor in socket *X* is in a pre-failure condition.
Processor failure, both sockets (Amber)	Red	Processor types are mismatched.
PPM failure (Amber)	Red	• PPM has failed. • PPM is not installed, but the corresponding processor is installed.

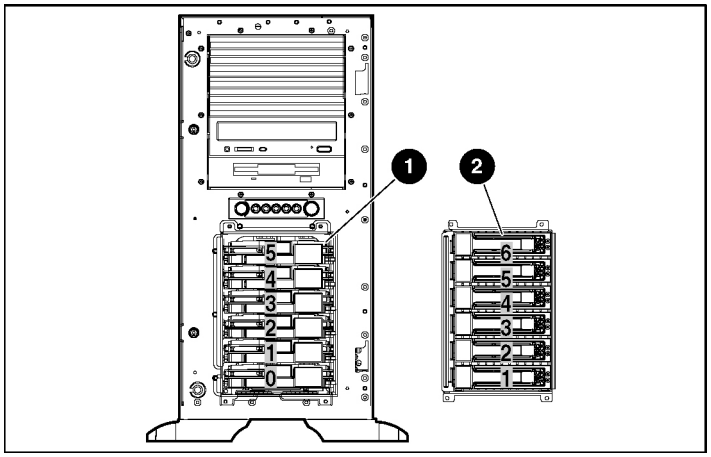
System LED and Color	Internal Health LED Color	Status
DIMM failure, slot *X* (Amber)	Red	• DIMM in slot *X* has failed. • DIMM in slot *X* is an unsupported type, and no valid memory exists in another bank.
	Amber	• DIMM in slot *X* has reached single-bit correctable error threshold. • DIMM in slot *X* is in a pre-failure condition. • DIMM in slot *X* is an unsupported type, but valid memory exists in another bank.
Overtemperature (Amber)	Red	• The Health Driver has detected a cautionary temperature level. • The server has detected a hardware critical temperature level.
Fan (Amber)	Red	The minimum fan requirements are not being met. Fan has failed.
	Amber	A fan has failed but still meets the minimum fan requirements (with redundant fan option only).

Hot-Plug Hard Drive IDs

SCSI models of the HP ProLiant ML350 Generation 4p server support single- or dual-channel SCSI hard drive configurations. The single-channel configuration (simplex) supports up to six SCSI hard drives on one channel. The dual-channel configuration (duplex) supports two SCSI hard drives on one channel (SCSI IDs 4 and 5) and up to four SCSI hard drives on the other channel (SCSI IDs 0 through 3) with the duplex option.

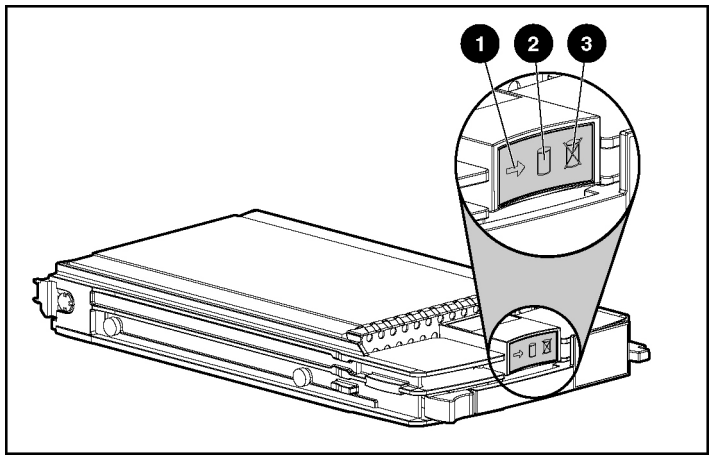
The SCSI IDs for both simplex and duplex configurations are illustrated. Always populate hard drive bays starting with the lowest SCSI ID.

SATA models of the HP ProLiant ML350 Generation 4p server support up to six hard drives. The embedded SATA controller supports drives in bays 1 and 2 (SATA IDs 1 and 2). An optional controller is required to support drives in bays 3 through 6 (SATA IDs 3 through 6). The hot-plug SATA drive cage also supports 8.89-cm (3.5-in) SAS hot-plug hard drives. An optional SAS controller is required to support SAS drives.



Item	Description
1	Hot-plug SCSI hard drive cage
2	Hot-plug SATA hard drive cage (SAS-enabled)

Hot-Plug SCSI Hard Drive LEDs

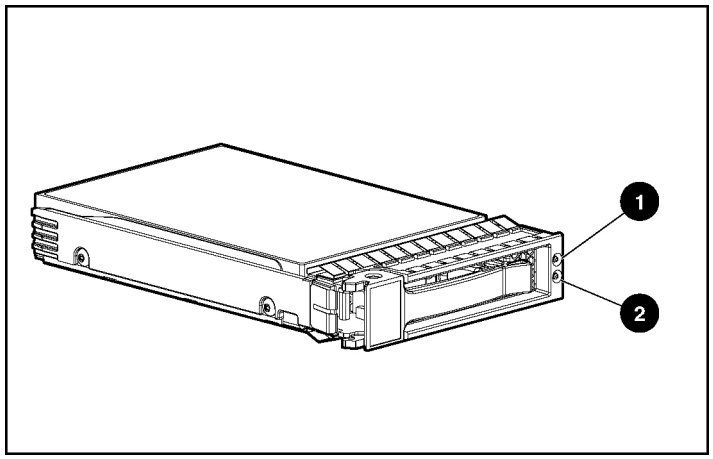


Item	LED Description	Status
1	Activity status	On = Drive activity Flashing = High activity on the drive or drive is being configured as part of an array. Off = No drive activity
2	Online status	On = Drive is part of an array and is currently working. Flashing = Drive is actively online. Off = Drive is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

Hot-Plug SCSI Hard Drive LED Combinations

Activity LED (1)	Online LED (2)	Fault LED (3)	Interpretation
On, off, or flashing	On or off	Flashing	A predictive failure alert has been received for this drive. Replace the drive as soon as possible.
On, off, or flashing	On	Off	The drive is online and is configured as part of an array. If the array is configured for fault tolerance and all other drives in the array are online, and a predictive failure alert is received or a drive capacity upgrade is in progress, you may replace the drive online.
On or flashing	Flashing	Off	**Do not remove the drive. Removing a drive may terminate the current operation and cause data loss.** The drive is rebuilding or undergoing capacity expansion.
On	Off	Off	**Do not remove the drive.** The drive is being accessed, but (1) it is not configured as part of an array; (2) it is a replacement drive and rebuild has not yet started; or (3) it is spinning up during the POST sequence.
Flashing	Flashing	Flashing	**Do not remove the drive. Removing a drive may cause data loss in non-fault-tolerant configurations.** Either (1) the drive is part of an array being selected by an array configuration utility; (2) Drive Identification has been selected in HP SIM; or (3) drive firmware is being updated.
Off	Off	On	The drive has failed and has been placed offline. You may replace the drive.
Off	Off	Off	Either (1) the drive is not configured as part of an array; (2) the drive is configured as part of an array, but it is a replacement drive that is not being accessed or being rebuilt yet; or (3) the drive is configured as an online spare. If the drive is connected to an array controller, you may replace the drive online.

SATA or SAS Hard Drive LEDs



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

Server Operations

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Powering Up the Server

To power up the server, press the Power On/Standby button.

Powering Down the Server

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

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

1. Back up the server data.
2. Shut down the operating system as directed by the operating system documentation.
3. If the server is installed in a rack, press the UID LED button on the front panel. Blue LEDs illuminate on the front and rear panels of the server.
4. Press the Power On/Standby button to place the server in standby mode. When the server activates standby power mode, the system power LED changes to amber.

5. If the server is installed in a rack, locate the server by identifying the illuminated rear UID LED button.
6. Disconnect the power cords.

The system is now without power.

Extending the Server from the Rack

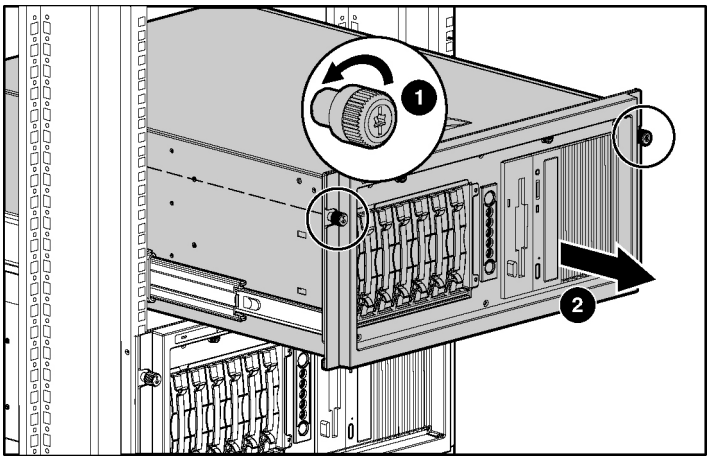
1. Loosen the thumbscrews that secure the server faceplate to the front of the rack.

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

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

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

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



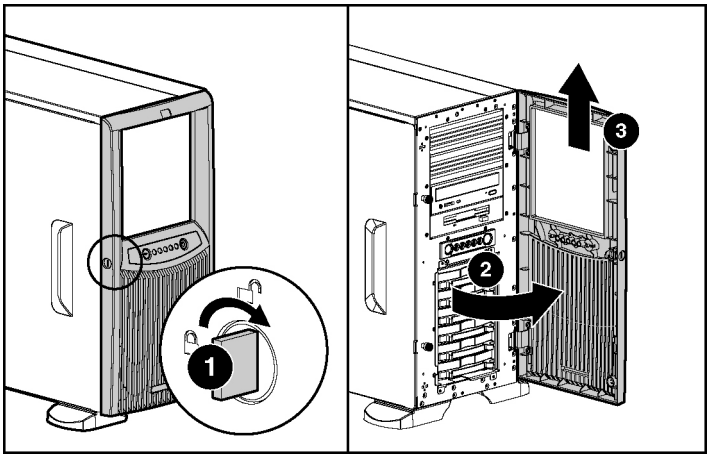
3. After performing the installation or maintenance procedure, slide the server back into the rack:
   a. Press the server rail-release latches and slide the server fully into rack.
   b. Secure the server by tightening the thumbscrews.

Removing the Front Bezel (Tower Model)

This server has a removable front bezel that must be unlocked and opened before accessing the hard drive cage or removing the access panel. The door should be kept closed during normal server operations.

Use the key provided with the server to unlock the bezel with a clockwise turn.

If necessary, remove the front bezel.



Removing Access Panel

1. Loosen the two thumbscrews located on the left side on the front of the chassis.
2. Slide the access panel back about 1.5 cm (0.5 in).
3. Lift and remove the access panel.

NOTE: Turn the access panel over to locate the System Configuration and Options hood labels. These labels will provide information on installing various options, flexible memory configurations, LED status indicators, and switch settings.

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

Server Setup

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Optional Installation Services

Delivered by experienced, certified engineers, HP Care Pack services help you keep your servers up and running with support packages tailored specifically for HP ProLiant systems. HP Care Packs let you integrate both hardware and software support into a single package. A number of service level options are available to meet your needs.

HP Care Pack Services offer upgraded service levels to expand your standard product warranty with easy-to-buy, easy-to-use support packages that help you make the most of your server investments. Some of the Care Pack services are:

- Hardware support
  - 6-Hour Call-to-Repair
  - 4-Hour 24x7 Same Day
  - 4-Hour Same Business Day
- Software support

  - Microsoft®
  - Linux
  - HP ProLiant Essentials (HP SIM and RDP)
  - VMWare
- Integrated hardware and software support
  - Critical Service
  - Proactive 24
  - Support Plus
  - Support Plus 24
- Startup and implementation services for both hardware and software

For more information on Care Packs, refer to the HP website (http://www.hp.com/hps/carepack/servers/cp_proliant.html).

Optimum Environment

When installing the server, select a location that meets the environmental standards described in this section.

Space and Airflow Requirements

Tower Server

In a tower configuration, leave at least a 7.6-cm (3-in) clearance space at the front and back of the server for proper ventilation.

Rack Server

To allow for servicing and adequate airflow, observe the following space and airflow requirements when deciding where to install a rack:

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

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

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

CAUTION: To prevent improper cooling and damage to the equipment, do not block the ventilation openings.

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

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

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

- Front and rear doors—If the 42U rack includes closing front and rear doors, you must allow 5,350 sq cm (830 sq in) of holes evenly distributed from top to bottom to permit adequate airflow (equivalent to the required 64 percent open area for ventilation).
- Side—The clearance between the installed rack component and the side panels of the rack must be a minimum of 7 cm (2.75 in).

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

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

Temperature Requirements

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

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

CAUTION: To reduce the risk of damage to the equipment when installing third-party options:

- Do not permit optional equipment to impede airflow around the server or to increase the internal rack temperature beyond the maximum allowable limits.
- Do not exceed the manufacturer's TMRA.

Power Requirements

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

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

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.

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

- Balance the server power load between available AC supply branch circuits.
- Do not allow the overall system AC current load to exceed 80 percent of the branch circuit AC current rating.
- Do not use common power outlet strips for this equipment.
- Provide a separate electrical circuit for the server.

Electrical Grounding Requirements

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

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

Rack Planning Resources

The rack resource kit ships with all HP branded or Compaq branded 9000, 10000, and H9 series racks. A summary of the content of each resource follows:

- Custom Builder is a web-based service for configuring one or many racks. Rack configurations can be created using:

  - A simple, guided interface
  - Build-it-yourself mode

  For more information, refer to the HP website (http://www.hp.com/products/configurator).

- The Installing Rack Products video provides a visual overview of operations required for configuring a rack with rack-mountable components. It also provides the following important configuration steps:
  - Planning the site
  - Installing rack servers and rack options
  - Cabling servers in a rack
  - Coupling multiple racks
- The Rack Products Documentation CD enables you to view, search, and print documentation for HP and Compaq branded racks and rack options. It also helps you set up and optimize a rack in a manner that best fits your environment.

If you intend to deploy and configure multiple servers in a single rack, refer to the white paper on high-density deployment on the HP website (http://www.hp.com).

Rack Warnings

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

- **The leveling jacks are extended to the floor.**
- **The full weight of the rack rests on the leveling jacks.**
- **The stabilizing feet are attached to the rack if it is a single-rack installation.**
- **The racks are coupled together in multiple-rack installations.**
- **Only one component is extended at a time. A rack may become unstable if more than one component is extended for any reason.**

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

- **At least two people are needed to safely unload the rack from the pallet. An empty 42U rack can weigh as much as 115 kg (253 lb), can stand more than 2.1 m (7 ft) tall, and may become unstable when being moved on its casters.**
- **Never stand in front of the rack when it is rolling down the ramp from the pallet. Always handle the rack from both sides.**

Identifying Tower Server Carton Contents

Unpack the server shipping carton and locate the materials and documentation necessary for installing the server.

The contents of the server shipping carton include:

- Server
- Power cord
- Keyboard (not included in all regions)
- Mouse (not included in all regions)
- Hardware documentation, Documentation CD, and software products

In addition to the supplied items, you may need:

- T-15 Torx screwdriver

- Hardware options
- Operating system or application software
- UPS

Identifying Rack Server Shipping Carton Contents

Unpack the server shipping carton and locate the materials and documentation necessary for installing the server. All the rack mounting hardware necessary for installing the server into the rack is included with the rack or the server.

The contents of the server shipping carton include:

- Server
- Power cord
- Hardware documentation, Documentation CD, and software products
- Rack mounting hardware

In addition to the supplied items, you may need:

- T-15 Torx screwdriver
- Hardware options
- Operating system or application software
- PDU

Installing Hardware Options

Install any hardware options before initializing the server. For options installation information, refer to the option documentation. For server-specific information, refer to "Hardware Options Installation (on page 45)."

Setting up a Tower Server

Follow the steps in this section to set up a tower model server. If you are going to install the server into a rack, refer to the rack installation ("Installing the Server into the Rack" on page 37) section.

1. Connect peripheral devices to the server ("Rear Panel Components" on page 12).

   WARNING: To reduce the risk of electric shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into RJ-45 connectors.

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

2. Connect the power cord to the back of the server.
3. Connect the power cord to the AC power source.

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

   - **Do not disable the power cord grounding plug. The grounding plug is an important safety feature.**
   - **Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.**
   - **Unplug the power cord from the power supply to disconnect power to the equipment.**
   - **Do not route the power cord where it can be walked on or pinched by items placed against it. Pay particular attention to the plug, electrical outlet, and the point where the cord extends from the server.**

Installing the Server into the Rack

Follow the steps in this section to install the server into either a round-hole or square-hole rack.

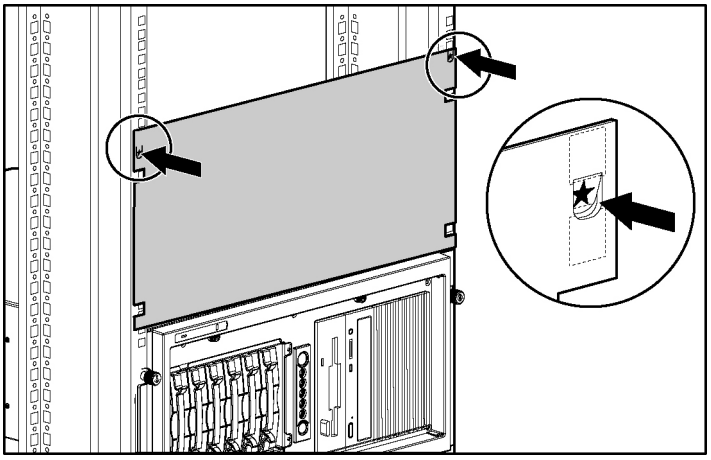
NOTE: If using a round-hole rack, follow the same steps using the round-hole cage nuts provided with the kit.

If you are installing the server into a telco rack, order the appropriate option kit at the RackSolutions.com website (http://www.racksolutions.com/hp). Follow the server-specific instructions on the website to install the rack brackets. After installing the brackets, follow the steps in this section.

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

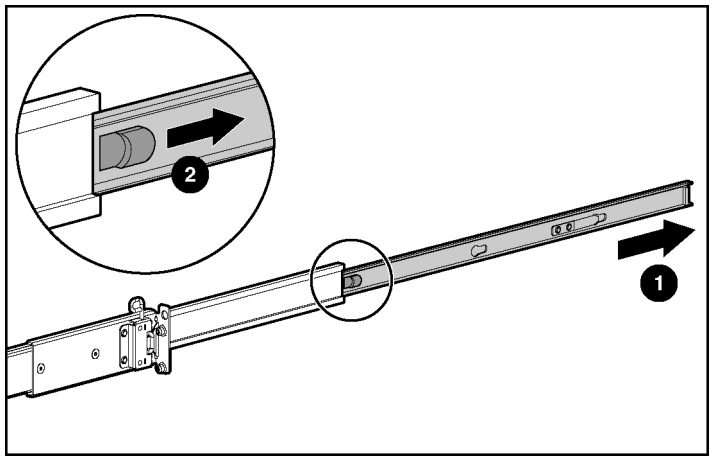
1. Mark the rack with the rack template.

CAUTION: Always plan the rack installation so that the heaviest item is on the bottom of the rack. Install the heaviest item first, and continue to populate the rack from the bottom to the top.

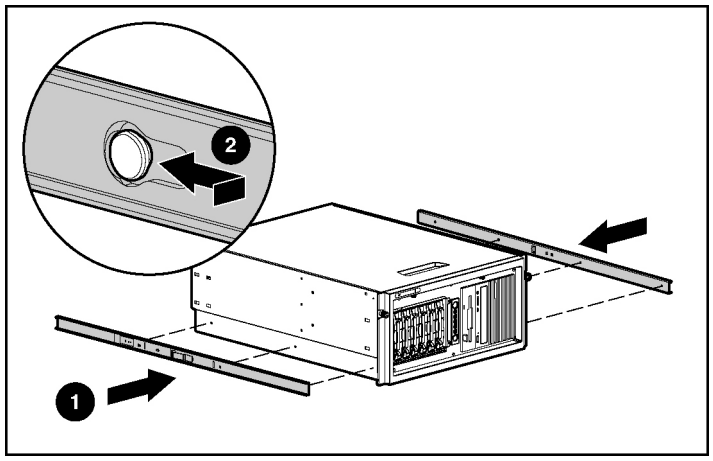


NOTE: Rack components are removed for clarity.

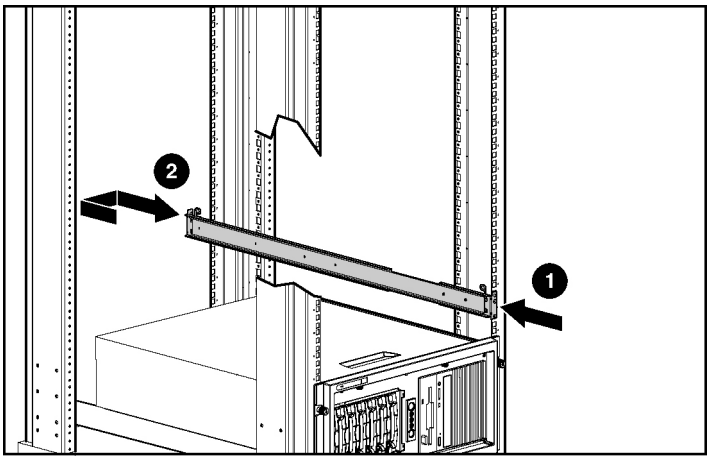
2. Extend the component rail until the rail-release latch engages. Press the latch and continue to pull the component rail until it is completely separate from the rack rail.



3. Secure each server component rail to the server.



4. Install the rack rails in the rack.

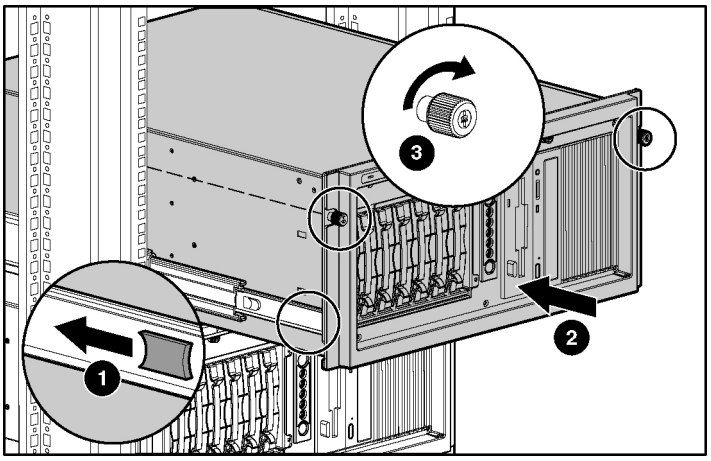


5. Press the rail-release latches, slide the server into the rack and tighten the thumbscrews.

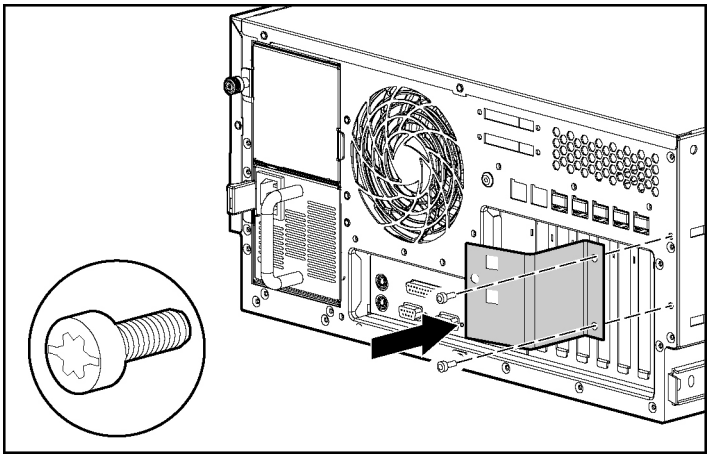
WARNING: To reduce the risk of personal injury or damage to the equipment, adequately stabilize the rack before extending a component outside the rack. Extend only one component at a time. A rack may become unstable if more than one component is extended.

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

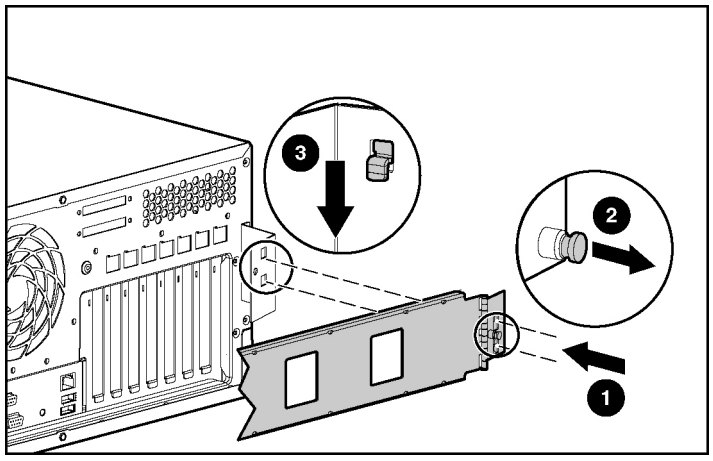
CAUTION: Be sure to keep the server parallel to the floor when sliding the server rails into the rack rails. Tilting the server up or down could result in damage to the rails.



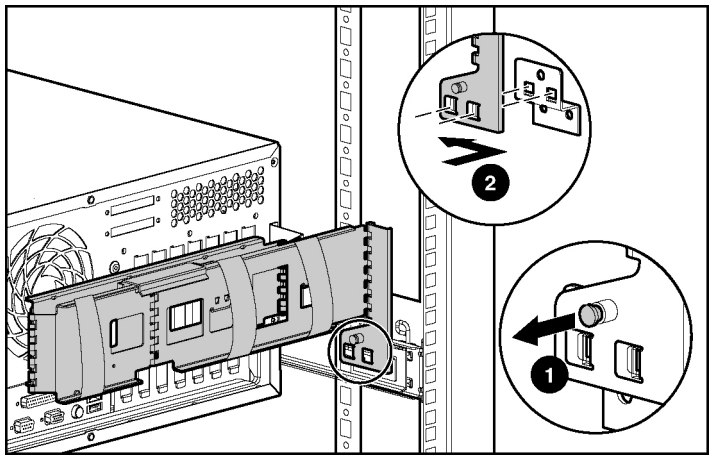
6. Secure the cable management bracket to the rear of the server using a T-15 Torx screwdriver.



7. Secure the cable management arm to the bracket.

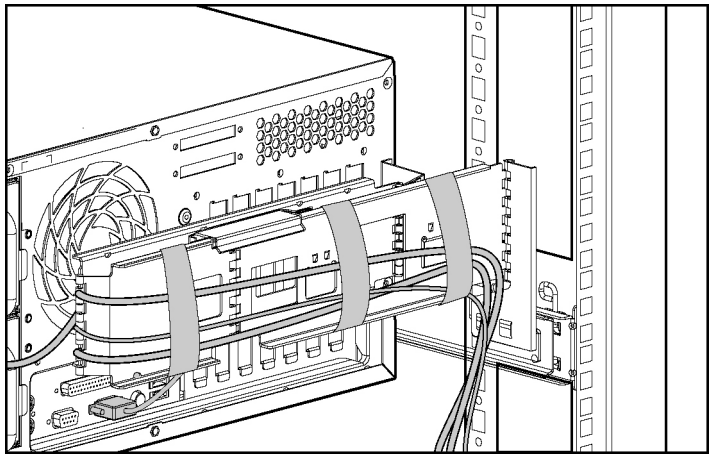


8. Secure the cable management arm to the rack.



9. Connect peripheral devices to the server. Refer to setting up a tower server for more information on rear panel component connection.
10. Connect the power cord to the back of the server.

11. Route cables through the cable management arm.



12. Connect the power cord to the AC power source.

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

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

Do not route the power cord where it can be walked on or pinched by items placed against it. Pay particular attention to the plug, electrical outlet, and the point where the cord extends from the server.

Powering Up and Configuring the Server

To power up the server, press the Power On/Standby button.

While the server boots, RBSU and the ORCA utility are automatically configured to prepare the server for operating system installation.

To configure these utilities manually:

- Press the **F8** key when prompted during the array controller initialization to configure the array controller using ORCA.
- Press the **F9** key when prompted during the boot process to change the server settings using RBSU. The system is set up by default for the English language.

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

Installing the Operating System

To operate properly, the server must have a supported operating system. For the latest information on supported operating systems, refer to the HP website (http://www.hp.com/go/supportos).

Two methods are available to install an operating system on the server:

- SmartStart assisted installation—Insert the SmartStart CD into the CD-ROM drive and reboot the server.
- Manual installation—Insert the operating system CD into the CD-ROM drive and reboot the server. This process may require you to obtain additional drivers from the HP website (http://www.hp.com/support).

Follow the on-screen instructions to begin the installation process.

For information on using these installation paths, refer to the SmartStart installation poster in the HP ProLiant Essentials Foundation Pack, included with the server.

Registering the Server

To register a server, refer to the registration card in the HP ProLiant Essentials Foundation Pack or the HP Registration website (http://register.hp.com).

Hardware Options Installation

In This Section

Introduction 45
Processor Option 46
Memory Options 50
Hard Drive Options 54
Removable Media Device Options 57
Redundant Hot-Plug Power Supply Option 65
Expansion Board Options 67
VHDCI or HD68 SCSI Cable Option 70
Tower-to-Rack Conversion Option 73
Installing a Second Serial Port 77
Installing a Redundant Fan 78

Introduction

If more than one option is being installed, read the installation instructions for all the hardware options and identify similar steps to streamline the installation process.

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

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

Processor Option

The server supports single- and dual-processor operation. With two processors installed, the server supports boot functions through the processor installed in processor socket 1. However, if processor 1 fails, the system automatically boots from processor 2 and provides a processor failure message.

The server uses PPMs as DC-to-DC converters to provide the proper power to each processor. Processor 1 uses an embedded PPM. Processor 2 uses a PPM that must be installed in the adjacent slot.

CAUTION: To prevent thermal instability and damage to the server, do not separate the processor from the heatsink. The processor, heatsink, and retaining clip make up a single assembly.

CAUTION: To prevent possible server malfunction and damage to the equipment, do not mix processors of different types.

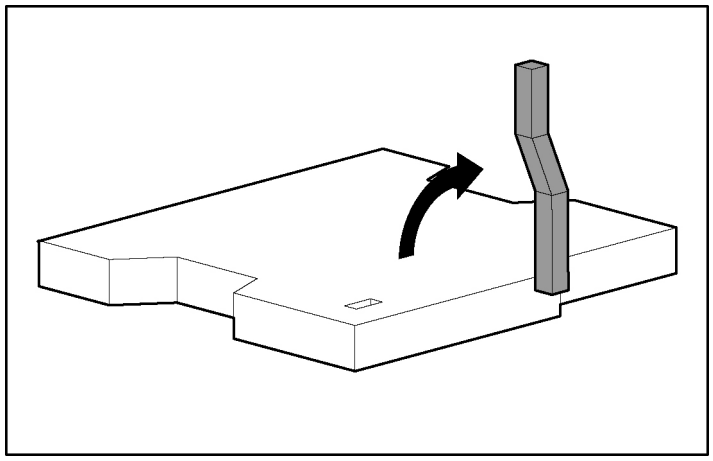
IMPORTANT: If upgrading processor speed, update the system ROM before installing the processor.

IMPORTANT: PPM 2 must be installed when processor 2 is installed. The system fails to boot if the PPM is missing.

To install a processor:

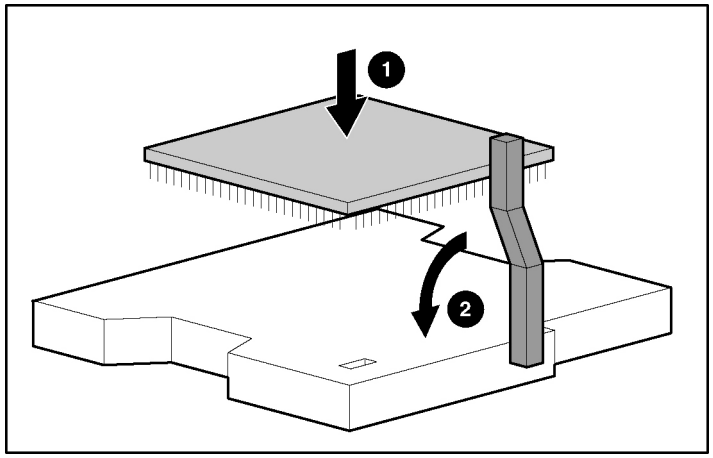
1. Power down the server ("Powering Down the Server" on page 25).
2. Extend the server from the rack, if applicable ("Extending the Server from the Rack" on page 26).
3. Remove the front bezel, if necessary ("Removing the Front Bezel (Tower Model)" on page 27).
4. Remove the access panel ("Removing Access Panel" on page 27).
5. Open the processor locking lever.

CAUTION: Failure to completely open the processor locking lever prevents the processor from seating during installation, leading to hardware damage.

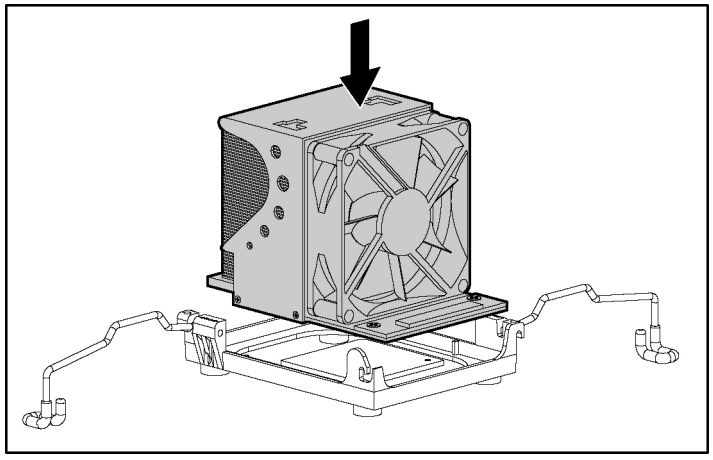


6. Install the processor and close the processor locking lever.

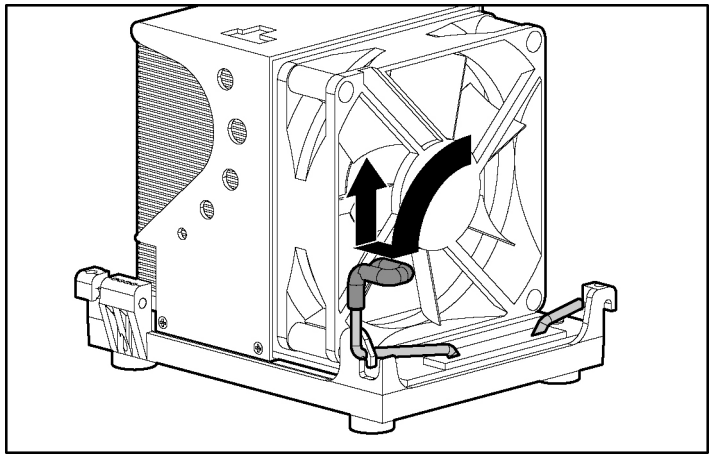
CAUTION: Forcing the processor locking lever could lead to hardware damage.



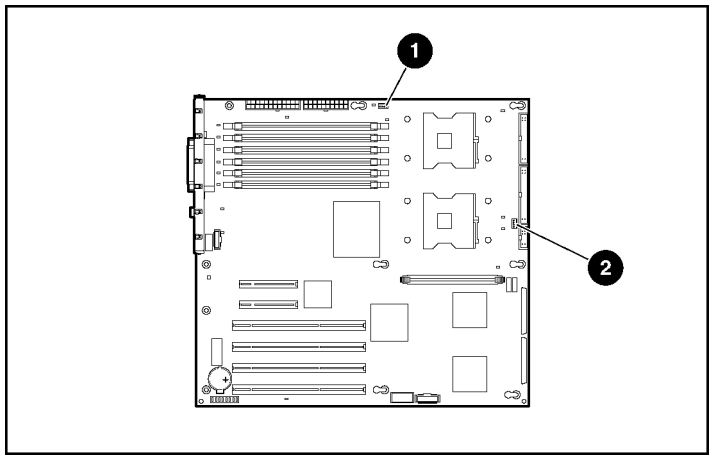
7. Install the heatsink.



8. Close the processor retaining brackets.



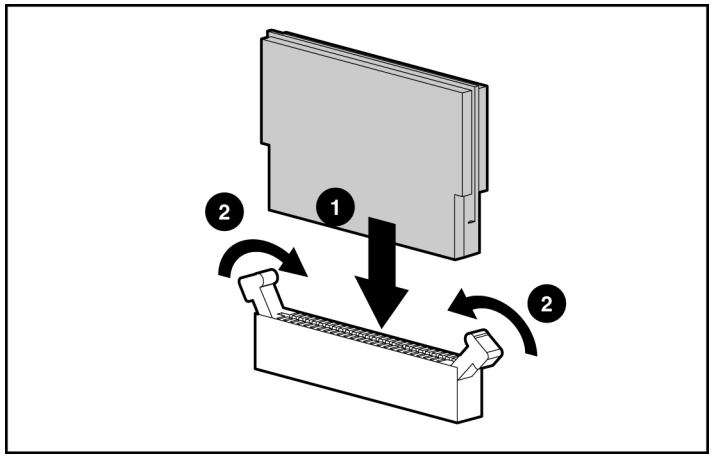
9. Connect the heatsink connector to the connector on the system board.



Item	Description
1	Processor 1 heatsink connector
2	Processor 2 heatsink connector

10. Open the latches on the corresponding PPM slot.
11. Install the PPM for processor 2 (if installing a second processor).

NOTE: PPM 1 is embedded onto the system board.



NOTE: The appearance of compatible PPMs may vary.

12. Replace the front bezel ("Removing the Front Bezel (Tower Model)" on page 27), if applicable.
13. Replace the access panel ("Removing Access Panel" on page 27).

Memory Options

You can expand server memory by installing PC2-3200R Registered DDR2 DRAM DIMMs. The system supports up to six DIMMs.

The server supports two types of memory configurations:

- Standard memory configuration (Advanced ECC) for maximum performance, using up to 12 GB of active memory (six 2-GB single-rank DIMMs) ("Single- and Dual-Rank DIMMs" on page 51)
- Online spare memory configuration for maximum availability, using up to 8 GB (four 2-GB single-rank DIMMs) of active memory and 4 GB (two 2-GB single-rank DIMMs) of online spare memory

Refer to "System Board Components" for DIMM slot locations and bank assignments.

For more information on the server, refer to the Documentation CD or the QuickSpecs on the HP website (http://www.hp.com/products/servers/proliantml350/).

General Memory Configuration Requirements

- The server supports DIMM configurations of one DIMM, two DIMMs, four DIMMs, and six DIMMs.
- If mixing dual- and single-rank DIMMs, the dual-rank DIMMs must be installed first ("Single- and Dual-Rank DIMMs" on page 51).
- The server supports six single-rank DIMMs or four dual-rank DIMMs.
- If the server contains more than 4 GB of memory, consult the OS documentation about accessing the full amount of installed memory.

Single- and Dual-Rank DIMMs

PC2-3200 DIMMs can either be single- or dual-rank. While it is not normally important for you to differentiate between these two types of DIMMs, certain DIMM configuration requirements are based on these classifications.

Certain configuration requirements exist with single- and dual-rank DIMMs that allow the architecture to optimize performance. A dual-rank DIMM is similar to having two separate DIMMs on the same module. Although only a single DIMM module, a dual-rank DIMM acts as if it were two separate DIMMs. The primary reason for the existence of dual-rank DIMMs is to provide the largest capacity DIMM given the current DIMM technology. If the maximum DIMM technology allows for creating 2-GB single-rank DIMMs, a dual-rank DIMM using the same technology would be 4-GB.

Understanding the existence of single- and dual-rank DIMMs is all that is necessary for understanding the memory population guidelines of this server.

Online Spare Memory Configuration

In the online spare configuration, the ROM automatically configures the last populated bank as the spare memory. If only banks A and B are populated, bank B is the spare bank. If banks A, B, and C are populated, bank C is the spare bank. If DIMMs in a non-spare bank exceed the limit for the single-bit correctable errors threshold as defined by the Pre-Failure Warranty, the system copies the memory contents of the failing bank to the spare bank. The system then deactivates the failing bank and automatically switches over to the spare bank.

For online spare memory support, DIMMs installed in the spare bank must be of equal or greater capacity than the DIMMs installed in other banks.

For example, if bank A is populated with two 512-MB DIMMs and bank B is populated with two 1-GB DIMMs, bank C must be populated with two 1-GB or greater DIMMs in order for online spare memory support to function properly.

The following guidelines apply to Online Spare Memory configuration:

- Online Spare Memory requires all DIMMs to be single-rank. ROM will display an error if any dual-rank DIMMs are installed.

- Online Spare Memory operates with four or six DIMMs.

After installing DIMMs, use RBSU to configure the system for online spare memory support.

DIMM Installation Guidelines

You must observe the following guidelines when installing additional memory:

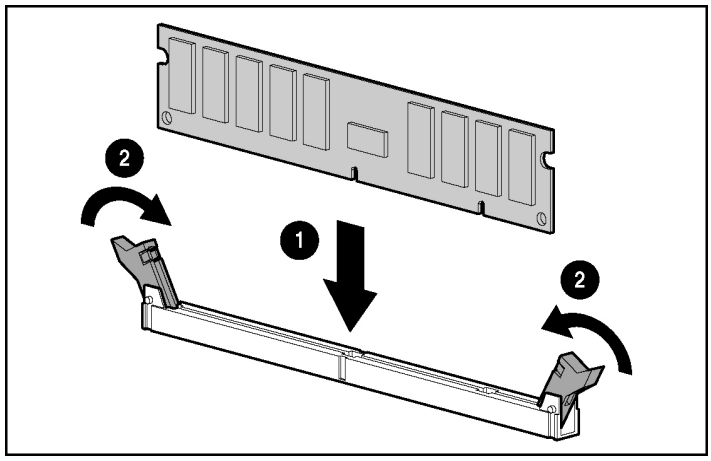
- Always install DIMM pairs in a memory bank with identical DIMMs.
- Install only PC2-3200R DIMMs.
- Install DIMMs into both slots within a single bank.
- Upgrade memory by installing DIMM pairs into banks in sequential bank order, starting with bank B.

For online spare memory support, you must also observe additional guidelines.

Installing DIMMs

1. Power down the server ("Powering Down the Server" on page 25).
2. Extend or remove the server from the rack ("Extending the Server from the Rack" on page 26).
3. Remove the front bezel door, if necessary ("Removing the Front Bezel (Tower Model)" on page 27).
4. Remove the access panel ("Removing Access Panel" on page 27).
5. Open the DIMM slot latches.

6. Install the DIMM.



7. Install the access panel.
8. If you are installing DIMMs in an online spare configuration, use RBSU to configure this feature.

Interleaving and Non-Interleaving Memory Configuration

This server supports both interleaving and non-interleaving memory configurations. Interleaving memory increases bandwidth by allowing simultaneous access to more than one block of data (for example, overlapping Read-Writes). This is accomplished by dividing the system memory between pairs of DIMMs and Writing-Reading blocks of data to/from both simultaneously. In order to take advantage of memory interleaving, identical DIMMs must be installed in pairs. DIMMs can also be installed singularly in slot 1 only if memory interleaving is not desired.

Activating Interleaving Memory

Interleaving memory functionality is automatically activated whenever two identical DIMMs are detected in sockets 1 and 2. If sockets 3 and 4 are populated, it must be with identical DIMMs as well. If identical DIMMs are installed in sockets 1, 2, and 3, the system will not boot.

For more information, refer to "Server Software and Configuration Utilities (on page 93)" in this guide.

Hard Drive Options

Removing a Hard Drive Blank (on page 54)

SCSI Hard Drive Guidelines (on page 55)

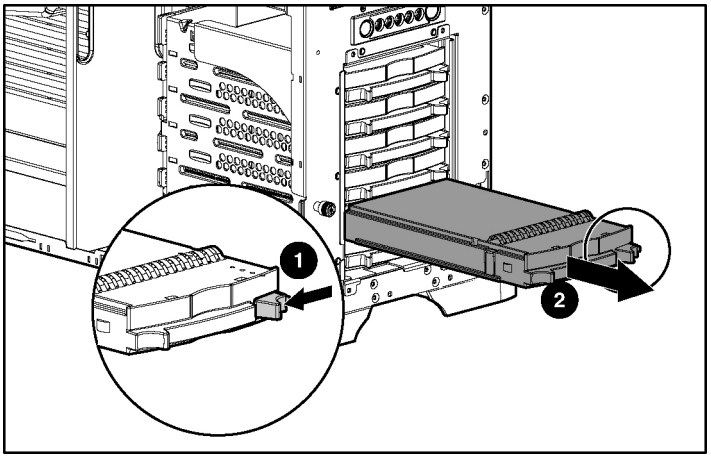
Installing Hot-Plug SCSI Hard Drives (on page 55)

Installing a SATA or SAS Drive ("Installing a SATA or SAS Hard Drive" on page 56)

Removing a Hard Drive Blank

To remove a hard drive blank, push the lever to release the blank and pull out.

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



NOTE: Depending on model purchased, the server may look slightly different than shown.

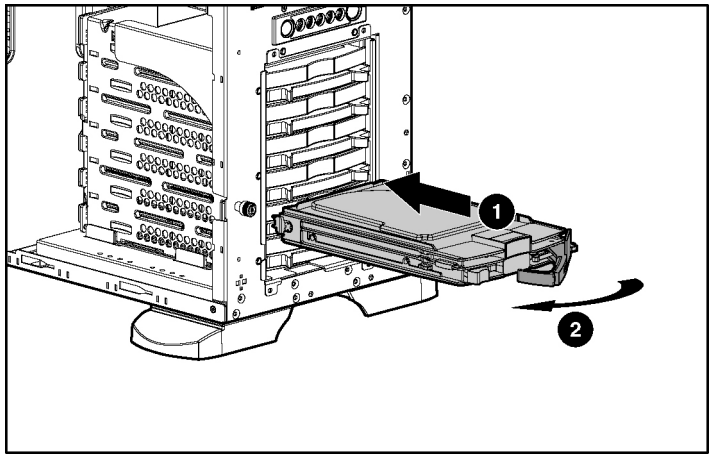
SCSI Hard Drive Guidelines

When adding SCSI hard drives to the server, observe the following general guidelines:

- A maximum of six SCSI devices per channel can be added.
- Each SCSI drive must have a unique ID. The system automatically sets all SCSI IDs on hot-plug models.
- The SCSI ID for each hot-plug hard drive is set automatically to the next sequential ID number in a series beginning with ID0.
- If only one SCSI hard drive is used, install it in the bay with the lowest number.
- Hot-plug SCSI hard drives must be Ultra320. Mixing these types with other drive standards degrades the overall performance of the drive subsystem.

Installing Hot-Plug SCSI Hard Drives

1. Remove the existing hard drive blank or hard drive from the drive bay.
2. Install the hard drive.



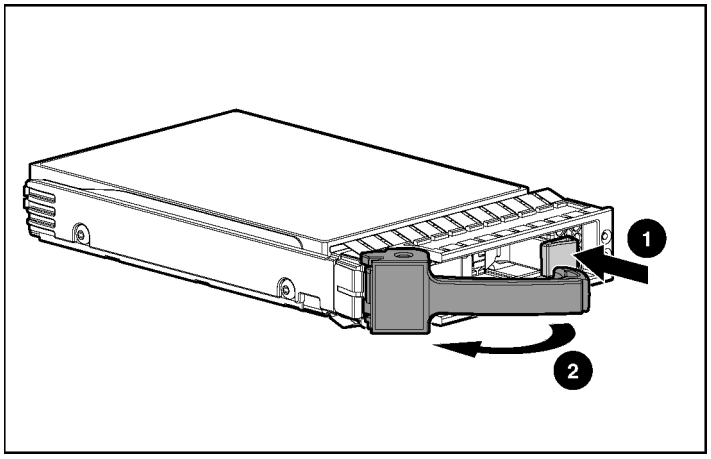
NOTE: Depending on model purchased, the server may look slightly different than shown.

3. Determine the status of the hard drive from the hot-plug SCSI hard drive LEDs ("Hot-Plug SCSI Hard Drive LED Combinations" on page 23, on page 22).
4. Resume normal server operations.

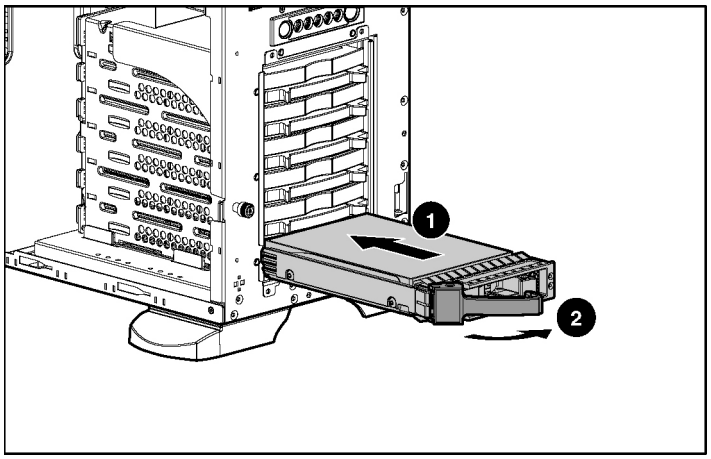
Installing a SATA or SAS Hard Drive

NOTE: The default configuration for hot-plug SATA hard drives is bays 1 and 2 (SATA IDs 1 and 2). An optional controller is required to support drives in bays 3 through 6 (SATA IDs 3 through 6).

1. Remove the existing hard drive blank or hard drive from the drive bay.
2. Open the release latch to prepare the drive for installation.



3. Install the drive.



NOTE: Depending on model purchased, the server may look slightly different than shown.

4. Determine the status of the drive by observing the drive LEDs ("SATA or SAS Hard Drive LEDs" on page 24).
5. Resume normal server operations.

Removable Media Device Options

Identifying Guide Screws (on page 58)

Accessing the Removable Media Cage (on page 58)

Removing Shipping Brackets (on page 59)

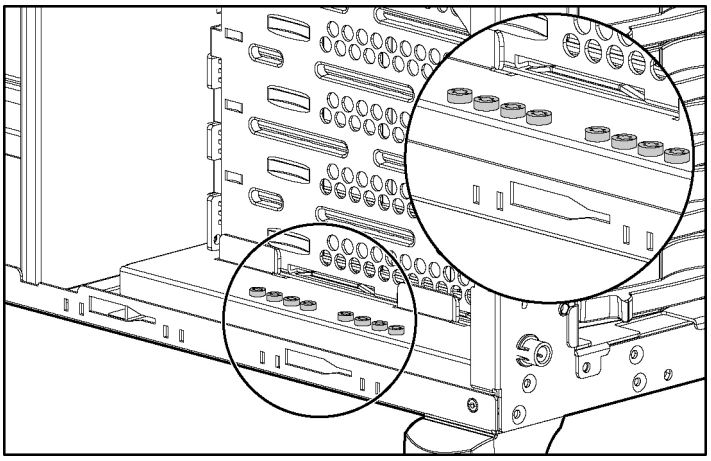
Installing a Half-Height or Full-Height Media Device Option (on page 60)

Installing a Tape Drive Option (on page 62)

Installing an Internal Two-Bay Hot-Plug SCSI Drive Cage Option ("Installing a Tape Drive Option" on page 62)

Identifying Guide Screws

When installing drives in the removable media bay, guide screws must be installed to make sure the drives correctly align in the drive cage. HP has provided extra guide screws. They are located behind the side access panel of the server. Some options use 5.25 M3 metric screws and some use HD 6-32 screws. The metric screws supplied by HP are black.



Accessing the Removable Media Cage

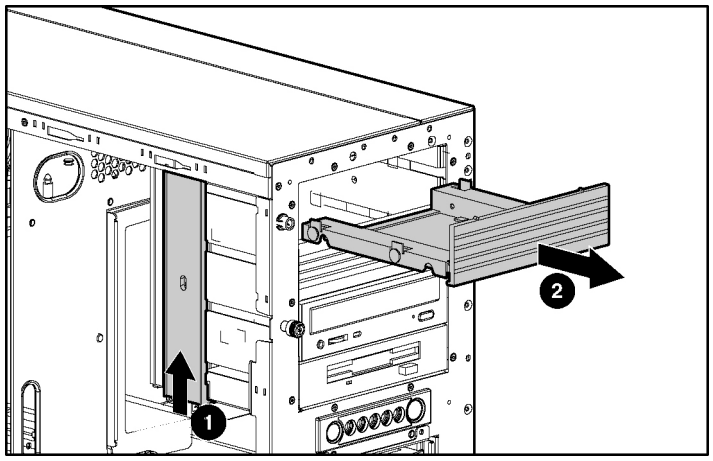
The server supports installation of optional internal storage devices.

> **IMPORTANT:** HP and Compaq branded SCSI non-hot-plug cables are terminated. Remove all terminating jumpers from third-party SCSI devices before installing them in the server.

1. Power down the server ("Powering Down the Server" on page 25).
2. Extend the server from the rack, if applicable ("Extending the Server from the Rack" on page 26).
3. Remove the front bezel door, if necessary ("Removing the Front Bezel (Tower Model)" on page 27).
4. Remove the access panel ("Removing Access Panel" on page 27).

CAUTION: Always populate each media bay with either a device or a blank. Proper airflow can only be maintained when the bays are populated. Unpopulated drive bays can lead to improper cooling and thermal damage.

5. Remove the shipping bracket ("Removing Shipping Brackets" on page 59).
6. Push up on the drivelock to release the blanks and gently pull it away from the chassis.



7. Install other hardware options as needed.
8. Replace the front bezel ("Removing the Front Bezel (Tower Model)" on page 27), if applicable.
9. Replace the access panel ("Removing Access Panel" on page 27).

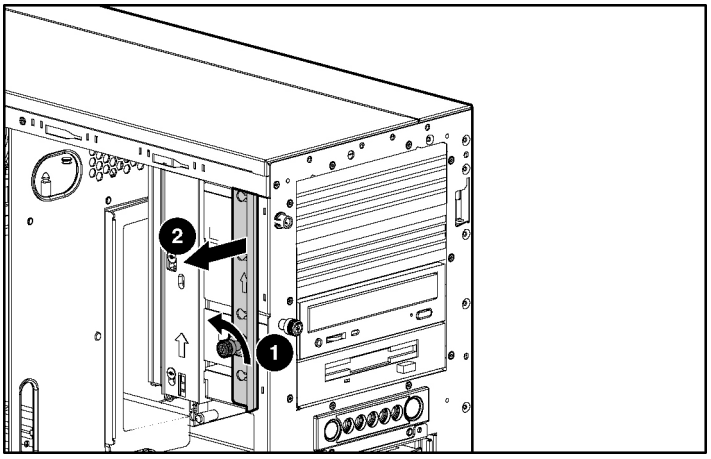
Removing Shipping Brackets

Shipping brackets prevent the drive cage from moving while the server is being shipped.

NOTE: The shipping brackets do not need to be removed from the server when the server is in normal operation.

Before installing an option into the removable media bay area, remove the shipping brackets. To remove shipping brackets:

1. Loosen the thumbscrew securing the shipping bracket to the server.
2. Remove the shipping bracket.



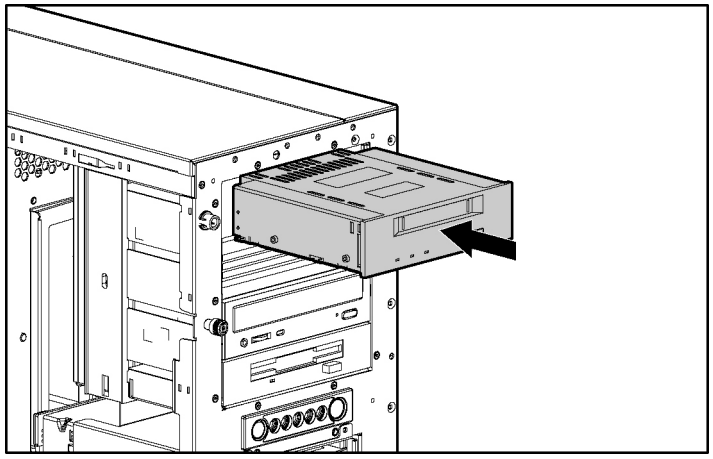
3. Before shipping the server with an option installed in the removable media bay, reverse steps 1 and 2 to install the shipping brackets.

Installing a Half-Height or Full-Height Media Device Option

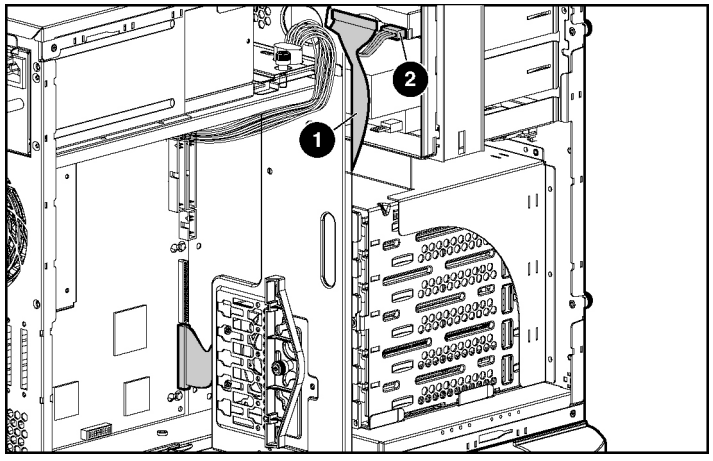
The server includes four removable media bays. The lower two bays are occupied with a 3.5-inch diskette drive and an IDE CD-ROM drive. The upper two removable media bays are vacant. You can install up to two half-height or one full-height removable media devices in the removable media cage. To install a half-height or full-height media device:

1. Power down the server ("Powering Down the Server" on page 25).
2. Extend the server from the rack, if applicable ("Extending the Server from the Rack" on page 26).
3. Remove the front bezel door, if necessary ("Removing the Front Bezel (Tower Model)" on page 27).
4. Remove the access panel ("Removing Access Panel" on page 27).
5. Remove the media device blanks.

6. Configure the device by setting the SCSI ID. The SCSI ID on each device in the media bays must be manually set to a unique value. Refer to the documentation provided with the device for instructions on setting the SCSI ID.
7. Remove all terminating jumpers from third-party SCSI devices.
8. Install the guide screws ("Identifying Guide Screws" on page 58), if applicable.
9. Slide the drive into the bay until it clicks into place.



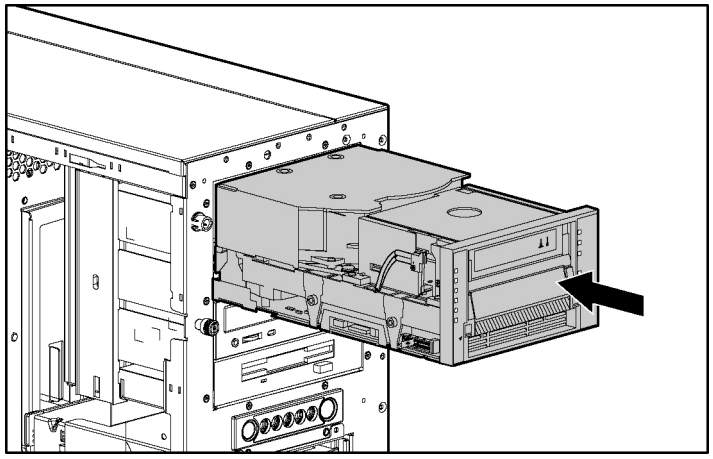
10. Connect the data and power cables to the back of the device.



11. Connect the data cable into a SCSI controller channel (secondary SCSI channel shown).
12. Replace the front bezel ("Removing the Front Bezel (Tower Model)" on page 27), if applicable.
13. Replace the access panel ("Removing Access Panel" on page 27).

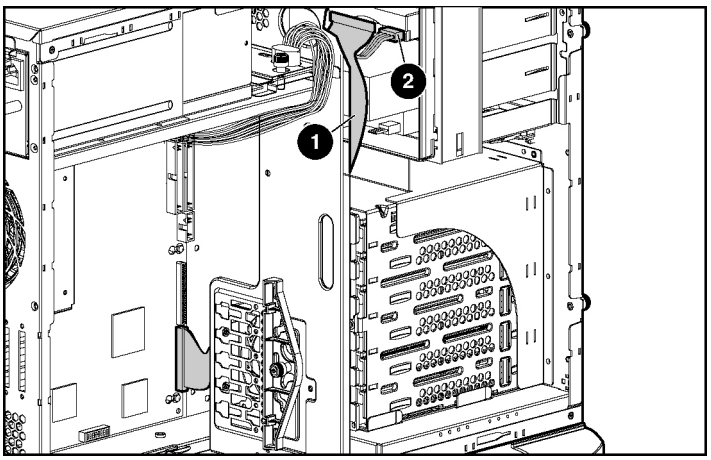
Installing a Tape Drive Option

1. Power down the server ("Powering Down the Server" on page 25).
2. Extend the server from the rack, if applicable ("Extending the Server from the Rack" on page 26).
3. Remove the front bezel door, if necessary ("Removing the Front Bezel (Tower Model)" on page 27).
4. Remove the access panel ("Removing Access Panel" on page 27).
5. Install the guide screws ("Identifying Guide Screws" on page 58), if applicable.
6. Configure the device by setting the SCSI ID. The SCSI ID on each device must be manually set to a unique value. Refer to the documentation provided with the device for instructions on setting the SCSI ID.
7. Install the drive into the drive bay until it clicks into place.



IMPORTANT: HP recommends installing the tape drive on a separate SCSI cable to avoid a decrease in performance on other SCSI devices.

8. Connect the data and power cables to the back of the device.



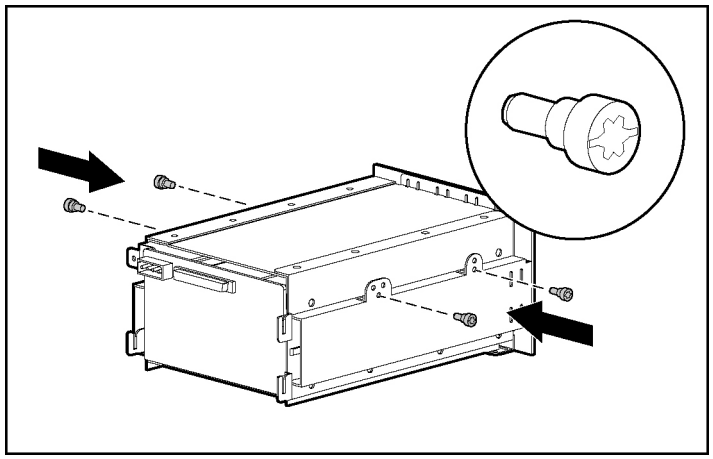
9. Connect the data cable into a SCSI controller channel (secondary SCSI channel shown).
10. Replace the front bezel ("Removing the Front Bezel (Tower Model)" on page 27), if applicable.
11. Replace the access panel ("Removing Access Panel" on page 27).

Installing an Internal Two-Bay Hot-Plug SCSI Drive Cage Option

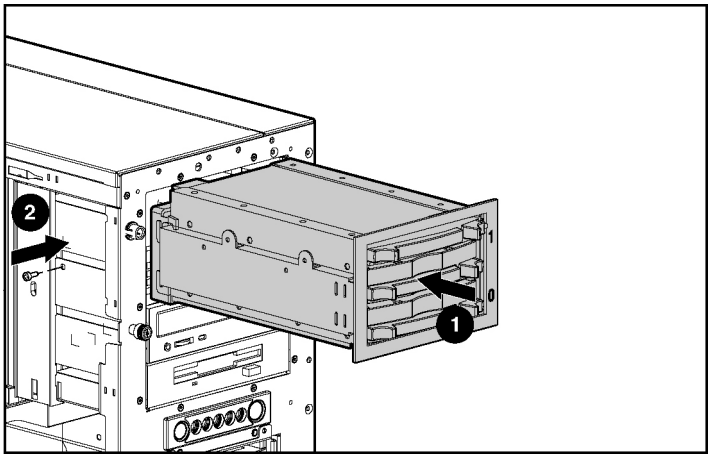
You can install up to two half-height or one full-height removable media device in the removable media cage. To install a half-height or full-height media device:

1. Extend the server from the rack, if applicable ("Extending the Server from the Rack" on page 26).
2. Remove the front bezel door, if necessary ("Removing the Front Bezel (Tower Model)" on page 27).
3. Remove the access panel ("Removing Access Panel" on page 27).
4. Access the removable media cage ("Accessing the Removable Media Cage" on page 58).

5. Using the T-15 Torx screwdriver attached to the back of the server, position two screws in the upper mounting holes on each side of the drive cage.

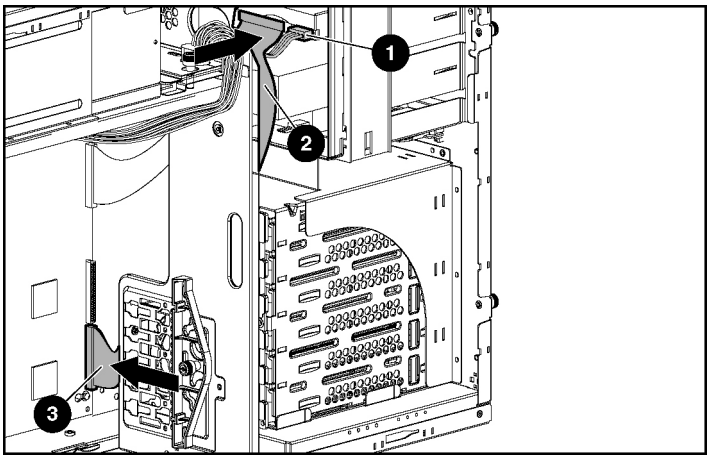


6. Slide the drive cage into the chassis until it locks into place.



IMPORTANT: Be sure that the unit identification numbers (0 and 1) appear on the right side of the drive cage front panel.

7. Connect the SCSI and power cables.



8. Replace the front bezel ("Removing the Front Bezel (Tower Model)" on page 27), if applicable.
9. Replace the access panel ("Removing Access Panel" on page 27).

Refer to the *HP Internal Two-Bay Hot-Plug SCSI Drive Cage Installation Instructions* for additional information.

Redundant Hot-Plug Power Supply Option

WARNING: To reduce the risk of personal injury or damage to the equipment, the installation of power supplies should be performed only by individuals who are qualified in servicing server equipment and trained to deal with products capable of producing hazardous energy levels.

WARNING: To reduce the risk of personal injury from hot surfaces, observe the thermal labels on each power supply or module.

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

CAUTION: Electrostatic discharge (ESD) can damage electronic components. Be sure that you are properly grounded (earthed) before beginning any installation procedure.

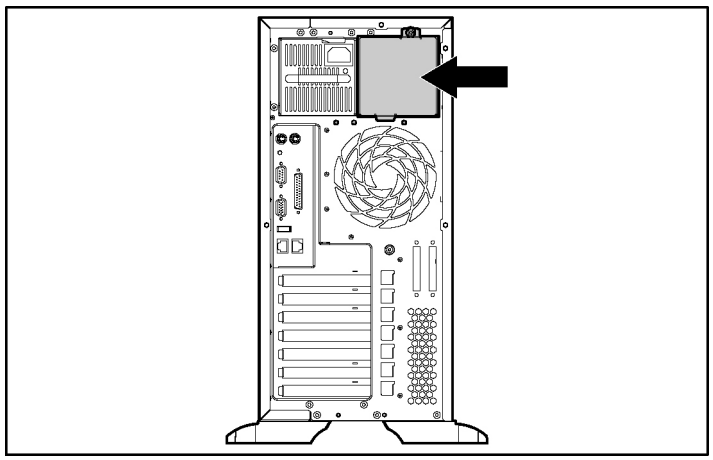
NOTE: Do not attempt to remove the power supply from a non-hot-plug SCSI model.

IMPORTANT: The HP ProLiant ML350 Generation 4 and ProLiant ML350 Generation 4p server power supplies are **not** interchangeable.

To install the optional hot-plug redundant power supply:

1. Identify the redundant power supply bay at the back of the server.

   IMPORTANT: Power supplies for the model shown are hot-pluggable. When using the redundant power supply option, it is not necessary to power down the server before removing or installing a power supply.



2. Loosen thumbscrews and remove the power supply blank.

   WARNING: To reduce the risk of electric shock or damage to the equipment, do not connect AC power cords to uninstalled power supplies.

3. Slide the power supply into the power supply bay, then apply pressure to the power supply until the release/lock lever clicks the power supply securely into the bay.
4. Connect the power cords to the power supplies.
5. Be sure that the power supply and redundant power supply LEDs are illuminated green.

Expansion Board Options

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

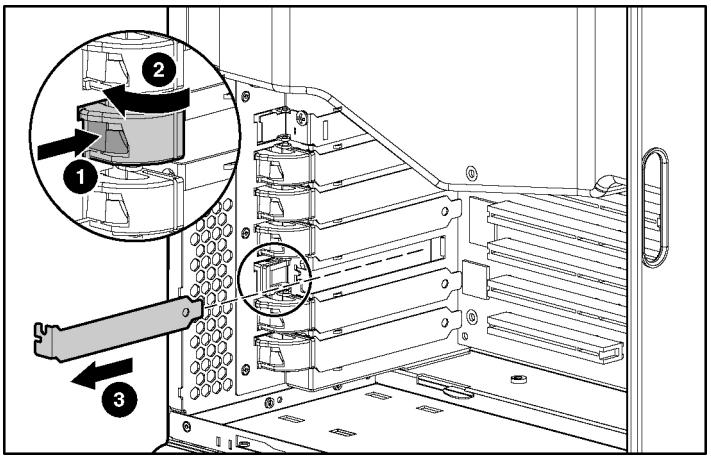
For instructions on installing a RILOE II board, refer to the *HP Remote Insight Lights-Out Edition II User Guide* on the Documentation CD.

IMPORTANT: It is recommended that the optional RILOE II board be installed in slot 6. If you plan to install a RILOE II board in the future, leave slot 6 unpopulated.

Removing the Expansion Slot Cover

1. Power down the server ("Powering Down the Server" on page 25).
2. Extend the server from the rack, if applicable ("Extending the Server from the Rack" on page 26).
3. Remove the front bezel door, if necessary ("Removing the Front Bezel (Tower Model)" on page 27).
4. Remove the access panel ("Removing Access Panel" on page 27).

5. Remove the expansion slot cover.



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

Installing an Expansion Board

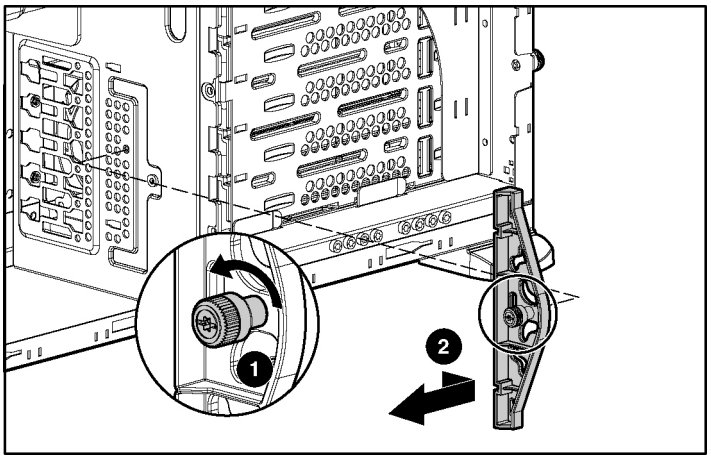
CAUTION: To prevent damage to the server or expansion boards, power down the server and remove all AC power cords before removing or installing the expansion boards.

To install an expansion board:

1. Power down the server ("Powering Down the Server" on page 25).
2. Extend the server from the rack, if applicable ("Extending the Server from the Rack" on page 26).
3. Remove the front bezel door, if necessary ("Removing the Front Bezel (Tower Model)" on page 27).
4. Remove the access panel ("Removing Access Panel" on page 27).
5. Remove the expansion slot cover from the slot, if installed ("Installing an Expansion Board" on page 68).

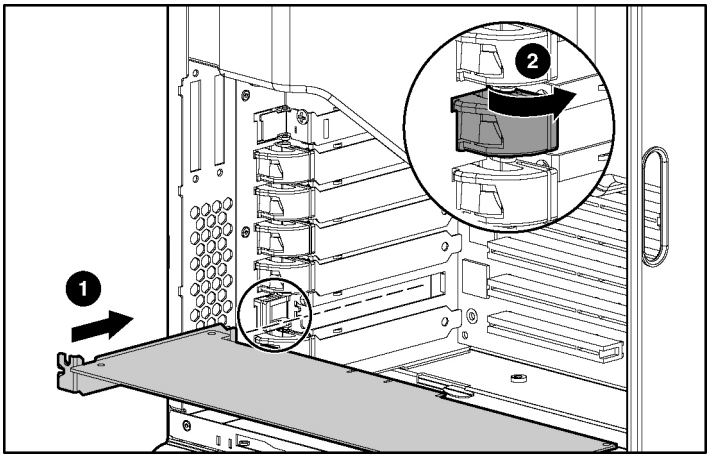
IMPORTANT: It may be necessary to remove the slot cover next to the slot in which you are installing a board.

6. Loosen the thumbscrews on the expansion board retainer and pull the retainer out away from the chassis.



7. Install the expansion board.

IMPORTANT: Be sure to insert expansion boards into the appropriate type of expansion slot. Most 32-bit expansion boards can be inserted into a 64-bit PCI-X slot; however, PCI Express expansion boards must be inserted into PCI Express expansion slots only.



8. Close the expansion slot latch to secure the board.

9. Connect any required internal or external cables to the expansion board. Refer to the documentation that ships with the expansion board.
10. Reinstall the expansion board retainer, then tighten the thumbscrew.
11. Replace the front bezel ("Removing the Front Bezel (Tower Model)" on page 27), if applicable.
12. Replace the access panel ("Removing Access Panel" on page 27).

VHDCI or HD68 SCSI Cable Option

The VHDCI or HD68 SCSI Cable connects the server to external SCSI-based storage or backup devices.

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

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

- T-15 Torx screwdriver
- Flat-head screwdriver

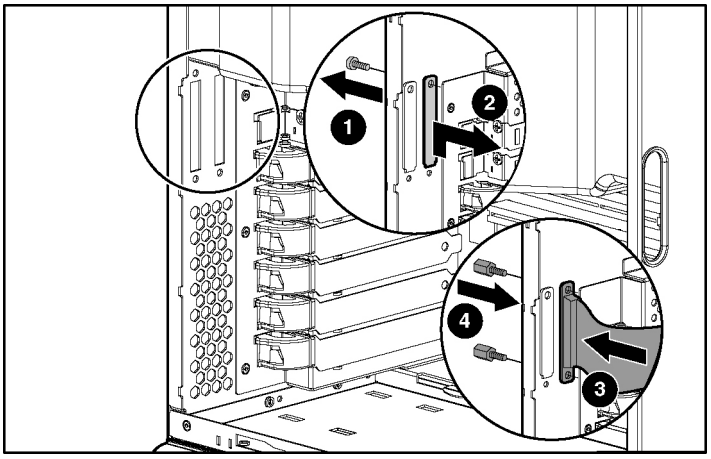
To prepare the server before installing or removing options:

1. Power down the server ("Powering Down the Server" on page 25).
2. Extend the server from the rack, if applicable ("Extending the Server from the Rack" on page 26).
3. Remove the front bezel door, if necessary ("Removing the Front Bezel (Tower Model)" on page 27).
4. Remove the access panel ("Removing Access Panel" on page 27).

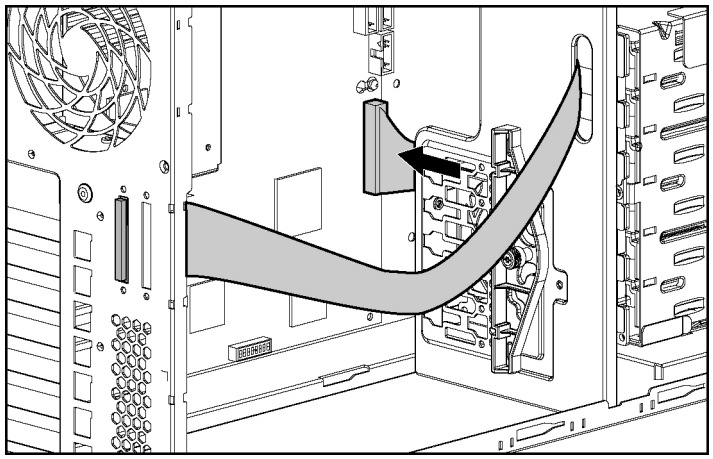
WARNING: To reduce the risk of electric shock or damage to the equipment, disconnect power from the server by unplugging all power cords from the electrical outlets.

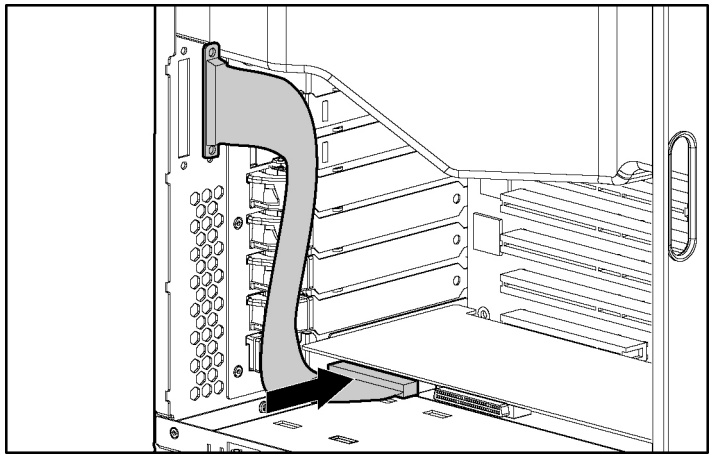
CAUTION: Failure to correctly power down the server could result in damage to equipment or loss of information.

5. Using a T-15 Torx screwdriver, remove the screw holding the SCSI knockout cover plate located on the rear of the chassis and remove it from the chassis.
6. Insert the SCSI connector into the open area. Secure the external SCSI connector to the chassis using the screws provided with the external SCSI connector option kit.



7. Secure the internal-to-external SCSI connector cable to either internal SCSI channel (primary or secondary) or to the SCSI channel of an option card.





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

8. Replace the front bezel ("Removing the Front Bezel (Tower Model)" on page 27), if applicable.
9. Replace the access panel ("Removing Access Panel" on page 27).

Tower-to-Rack Conversion Option

Converting a Tower Server to a Rack Server (on page 73)

Installing the Rack Server (on page 76)

Accessing the Server in the Rack (on page 76)

Converting a Tower Server to a Rack Server

The tower-to-rack conversion kit includes all equipment required to convert the tower model server into a rack model server, and to install the server into most square- or round-hole racks.

The tower-to-rack conversion kit includes:

- Rack rails
- Cable management arm
- Server rails
- Cage nuts
- Rack template
- Server bezel for rack environment

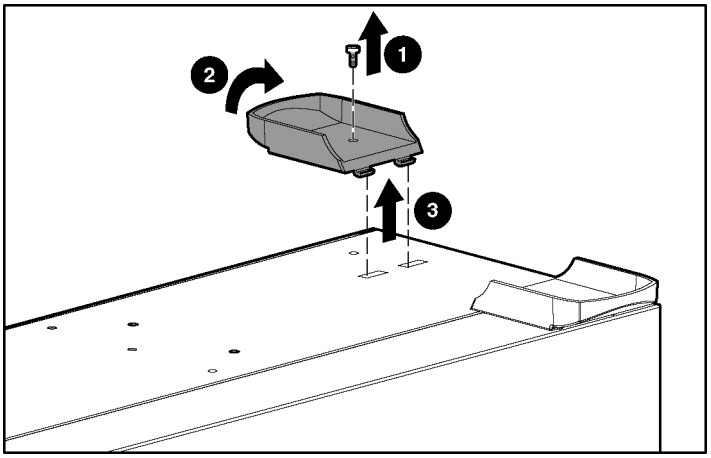
In addition to the supplied items, you may need:

- T-10 Torx screwdriver
- T-15 Torx screwdriver
- Pencil

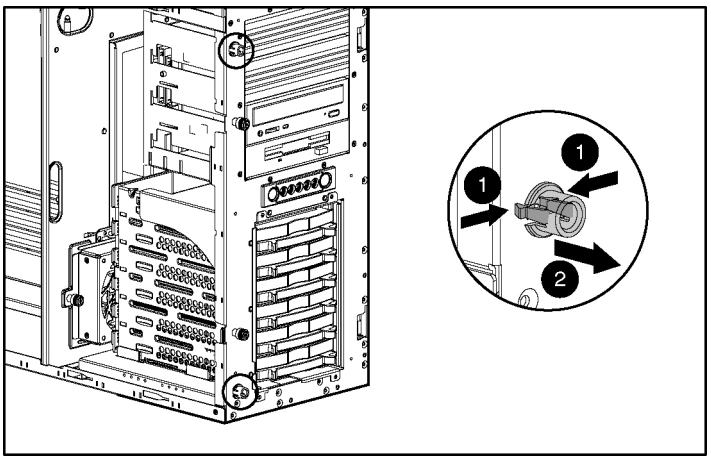
To convert a tower server to a rack server:

1. Power down the server ("Powering Down the Server" on page 25).
2. Remove the front bezel door, if necessary ("Removing the Front Bezel (Tower Model)" on page 27).

3. Remove the feet.

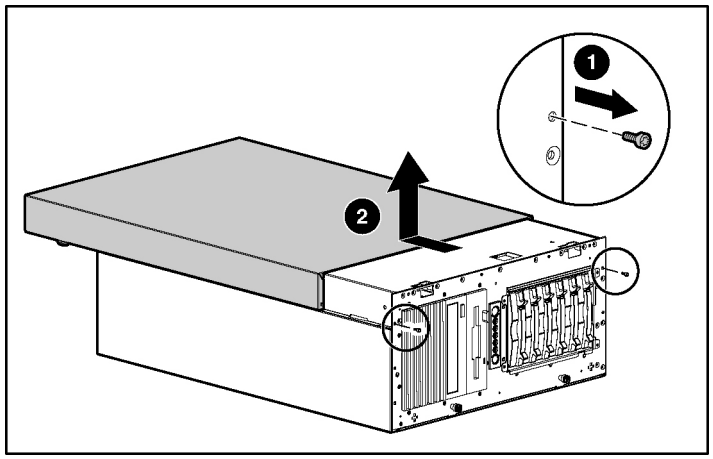


4. Remove the access panel ("Removing Access Panel" on page 27).
5. Disengage the locking brackets and pull them out.

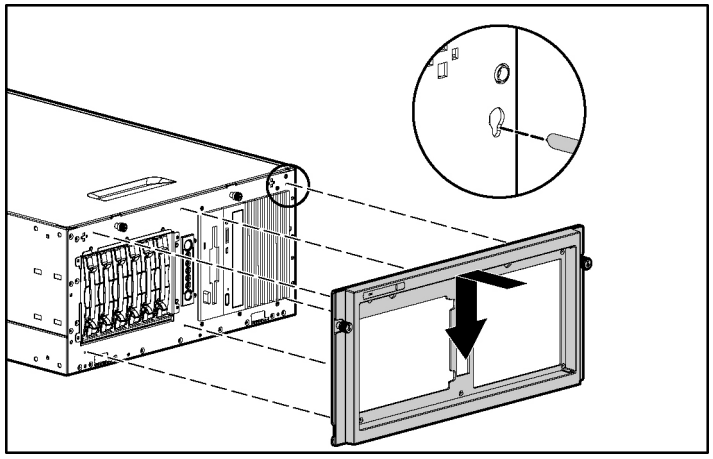


6. Remove the tower configuration panel:

a. Use the T-10 Torx screwdriver to remove the two front panel screws. Slide tower configuration panel back and then away from the chassis.



7. Align the pins on the server bezel with the corresponding slots on the chassis and push down. Secure the server bezel to the chassis by tightening the thumbscrews.



8. Replace the access panel ("Removing Access Panel" on page 27).

Installing the Rack Server

To install the rack server:

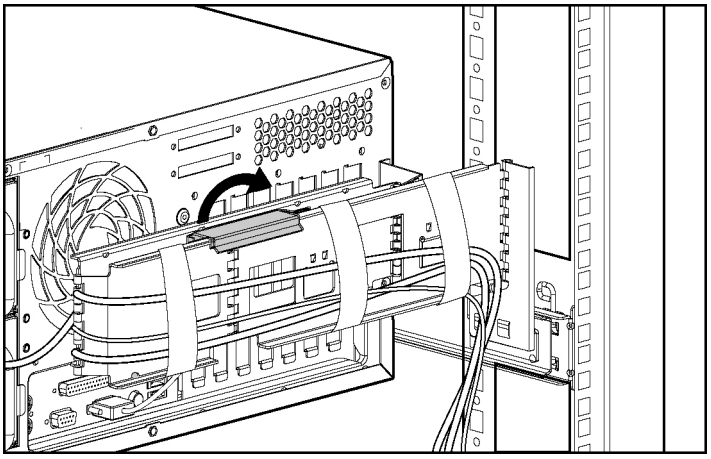
1. Install the server into a rack ("Installing the Server into the Rack" on page 37).
2. Connect the power cord and peripheral devices. Refer to Rear Panel Components (on page 12) for connector locations.
3. Power up the server ("Powering Up the Server" on page 25).
4. Install the operating system ("Installing the Operating System" on page 44).
5. Register the server. To register a server, refer to the registration card in the HP ProLiant Essentials Foundation Pack or the HP Registration website (http://register.hp.com).

Accessing the Server in the Rack

To perform some installation or maintenance procedures, the server must be extended from the rack ("Extending the Server from the Rack" on page 26).

If the maintenance procedure requires accessing the server rear panel:

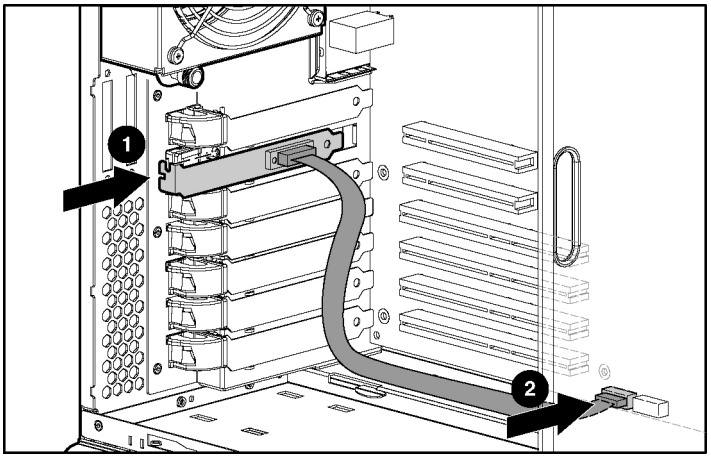
1. Unlock the cable management arm and swing the arm away from the server.



2. Reverse step 1 to secure the cable management arm after the maintenance procedures have been completed.

Installing a Second Serial Port

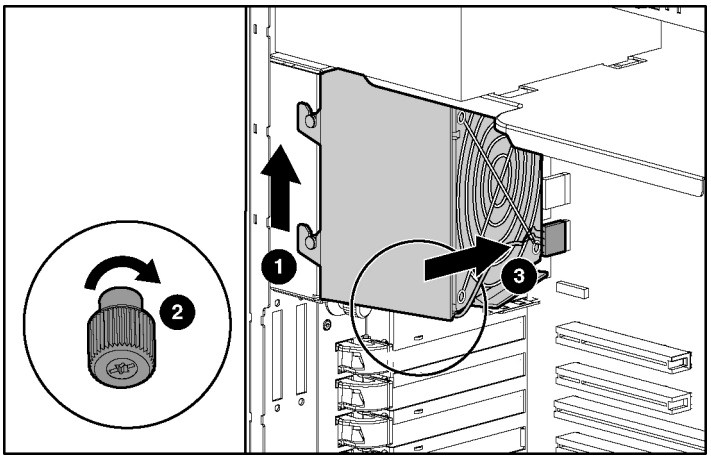
1. Power down the server ("Powering Down the Server" on page 25).
2. Extend the server from the rack, if applicable ("Extending the Server from the Rack" on page 26).
3. Remove the front bezel, if applicable ("Removing the Front Bezel (Tower Model)" on page 27).
4. Remove the access panel ("Removing Access Panel" on page 27).
5. Remove the expansion slot cover.
6. Install the serial port bracket and close the slot cover.
7. Connect the serial port cable to the serial port connector on the system board.



8. Replace the front bezel ("Removing the Front Bezel (Tower Model)" on page 27), if applicable.
9. Replace the access panel ("Removing Access Panel" on page 27).

Installing a Redundant Fan

1. Power down the server ("Powering Down the Server" on page 25).
2. Extend the server from the rack, if applicable ("Extending the Server from the Rack" on page 26).
3. Remove the front bezel door, if necessary ("Removing the Front Bezel (Tower Model)" on page 27).
4. Remove the access panel ("Removing Access Panel" on page 27).
5. Install the redundant fan assembly and tighten the thumbscrew.
6. Connect the redundant fan cable to the redundant fan connector on the system board.



7. Replace the front bezel ("Removing the Front Bezel (Tower Model)" on page 27), if applicable.
8. Replace the access panel ("Removing Access Panel" on page 27).

Server Cabling

In This Section

Cabling Guidelines 79
SCSI Hot-Plug Cabling 79
Connecting ATA or ATAPI Devices to the Integrated IDE Controller.....92

Cabling Guidelines

This chapter provides an overview of the internal cabling of the HP ProLiant ML350 Generation 4 Performance (G4p) server chassis. It also includes information on how to cable SCSI, SATA, SAS, IDE, and removable media devices in the system, as well as information about all critical system cabling. If external cabling is required, refer to the documentation included with the external storage device.

SCSI Hot-Plug Cabling

Storage Device Installation (on page 79)

Identifying SCSI Components (on page 80)

Installing an Internal-to-External SCSI Controller ("Connecting ATA or ATAPI Devices to the Integrated IDE Controller" on page 92)

Cabling SmartArray or other RAID Controller ("Installing an Internal-to-External SCSI Connector" on page 87)

Cabling SCSI Devices in the Removable Media Area (on page 89)

Storage Device Installation Guidelines

Consider the following guidelines when adding SCSI devices:

- As a general rule, a maximum of six devices may be added per channel. The server is equipped with two integrated Ultra320 SCSI channels.
- The configuration settings on each SCSI device should be set to the SCSI ID of the bay (Bay 0 = SCSI ID 0) that it will occupy.
- If only one SCSI hard drive is used, it should be installed in the lowest-numbered bay (0).
- Be sure to remove all terminating jumpers from third-party SCSI devices.

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

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

Identifying SCSI Components

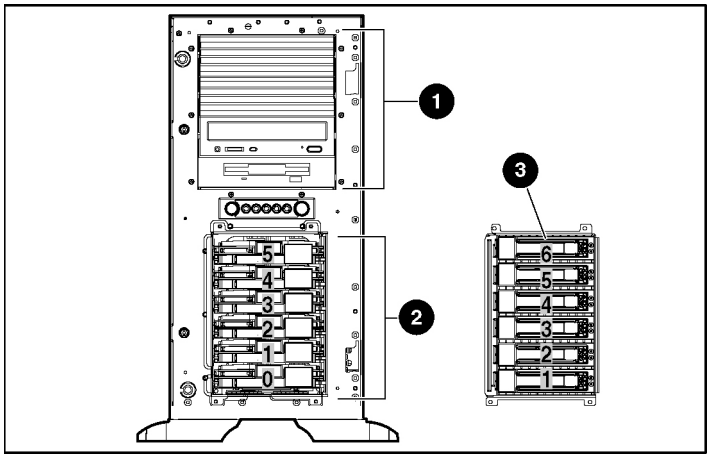
Media Bays and Hard Drives (on page 81)

Hot-Plug Hard Drive SCSI Cable (on page 82)

Internal SCSI Components (on page 86)

68-to-50 Pin SCSI Adapter (on page 87)

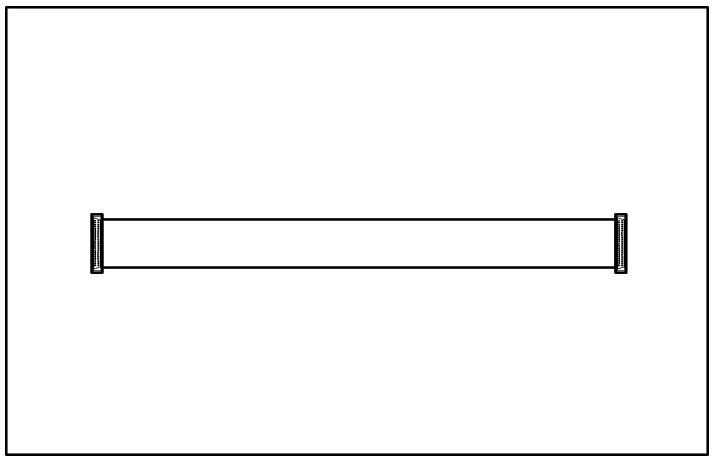
Media Bays and Hard Drives



Number	Description
1	Removable media bay
2	Hot-plug SCSI hard drive cage
3	Hot-plug SATA or SAS hard drive cage

Hot-Plug Hard Drive SCSI Cable

The SCSI cable shown is included with the server. The SCSI cable connects the hot-plug drive cage to the SCSI controller. The hot-plug hard drive cage has built-in termination.

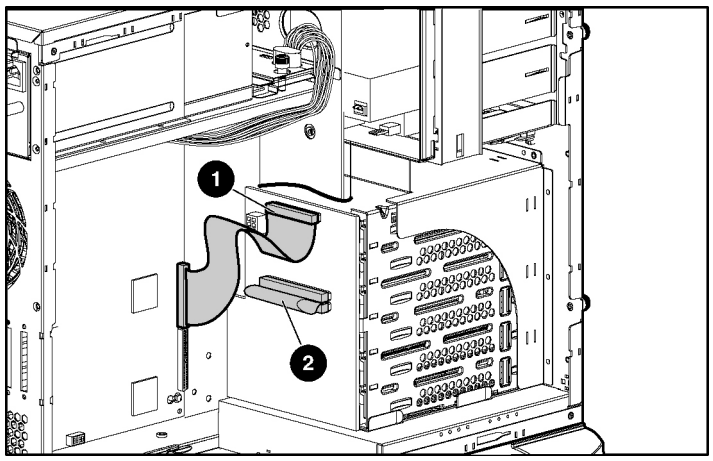


Simplex Hot-Plug SCSI Cabling

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

CAUTION: Secondary SCSI controller is not recommended in simplex mode.

NOTE: The server ships with the required cables.

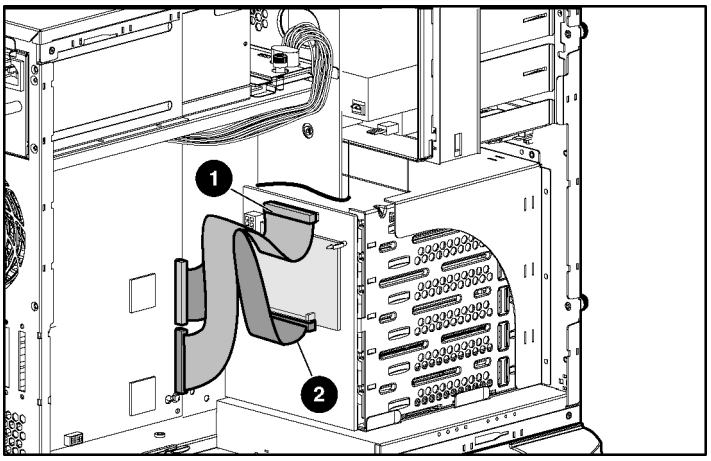


Item	Component description	SCSI IDs managed
1	SCSI cable	0, 1, 2, 3, 4, 5
2	SCSI cable used to jumper the two SCSI buses together	N/A

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

Duplex Hot-Plug SCSI Cabling

In the duplex cabling configuration, refer to the documentation that ships with this option.

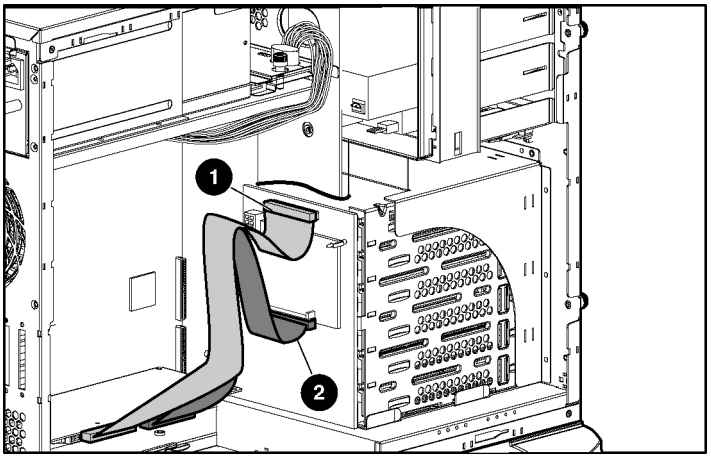


Item	Description	SCSI IDs	Connection
1	SCSI cable	4,5	Secondary SCSI channel or Smart Array controller
2	Duplex SCSI cable (optional)	0,1,2,3	Primary SCSI channel or Smart Array controller

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

Array Controller Duplex SCSI Cabling

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

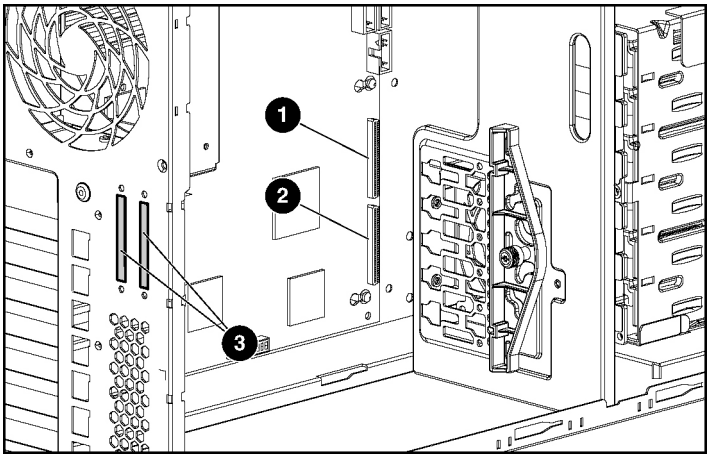


Item	Component description	SCSI IDs managed
1	SCSI cable	4, 5
2	SCSI cable *	0, 1, 2, 3

* One SCSI cable is provided with the server, and one SCSI cable is provided with the Duplex SCSI Backplane Option Kit.

Internal SCSI Components

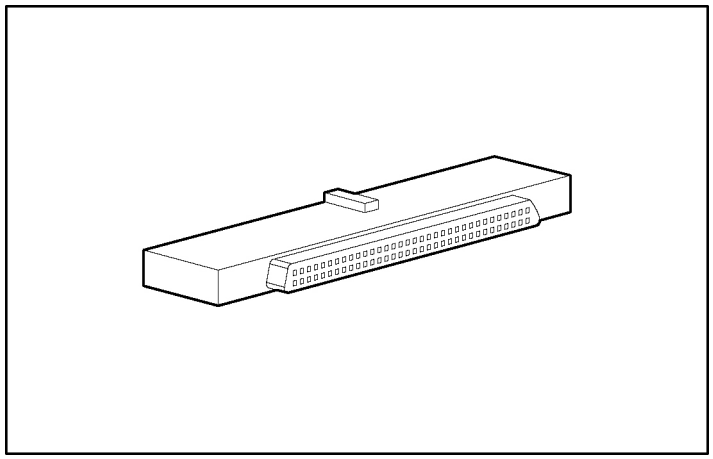
Before cabling the server, note the removable media and hard drive cage locations. For additional information about installing SCSI devices, refer to the documentation included with the device.



Number	Description
1	SCSI connector, primary
2	SCSI connector, secondary
3	SCSI connector, knockouts

68-to-50 Pin SCSI Adapter

If installing a device that uses a Fast SCSI-2 interface, you must provide a 68-to-50 pin SCSI adapter. This adapter should be installed between the 50-pin interface on the device and the 68-pin SCSI cable connected to the SCSI channel on the system board.



Installing an Internal-to-External SCSI Connector

If you are not using one or both SCSI channels (primary or secondary) internally or you install a SCSI or SmartArray option card, you may install an internal-to-external SCSI connector in the SCSI knockout locations on the rear of the chassis.

For installation instructions, refer to the VHDCI or HD68 SCSI Cable ("VHDCI or HD68 SCSI Cable Option" on page 70) section in this guide.

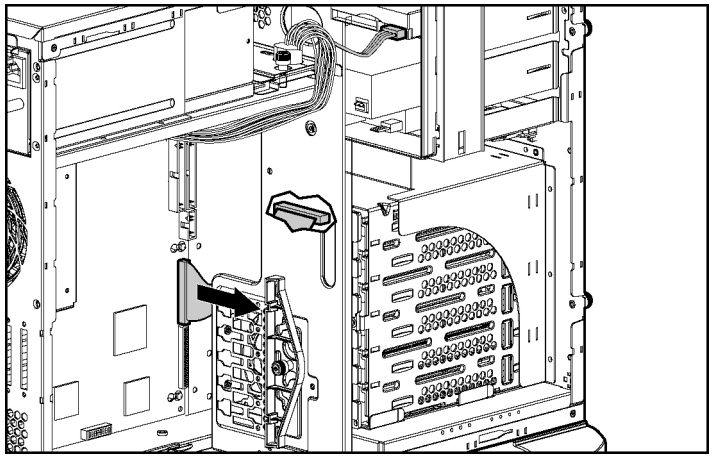
Cabling SCSI SmartArray or other RAID Controller

Many configurations are possible when SCSI controllers are added. This section outlines the procedure for connecting internal hard drives to a SCSI controller option or a SmartArray controller and assumes that the controller option or SmartArray controller is already installed.

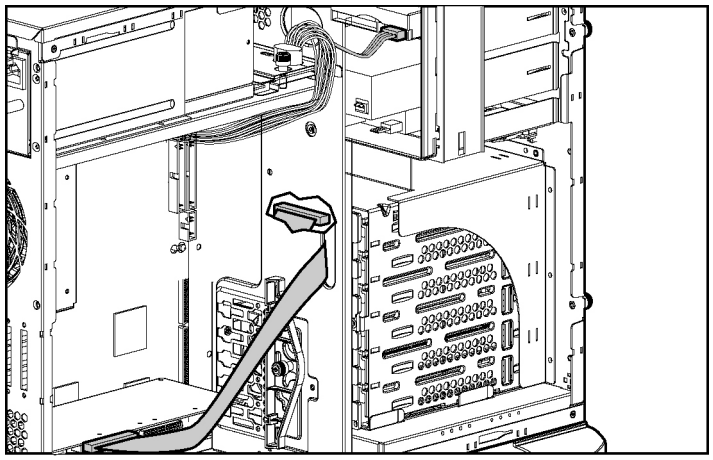
If hard drives and the SCSI or SmartArray controller are not already installed, follow the steps in the sections "Installing Hard Drives ("Installing Hot-Plug SCSI Hard Drives" on page 55)" and "Installing an Expansion Board (on page 68)".

To cable a Smart Array or other RAID controller:

1. Locate and remove the SCSI cable from the SCSI primary connector on the system board.



2. Reconnect the SCSI cable to either the SCSI controller option or SmartArray Controller.

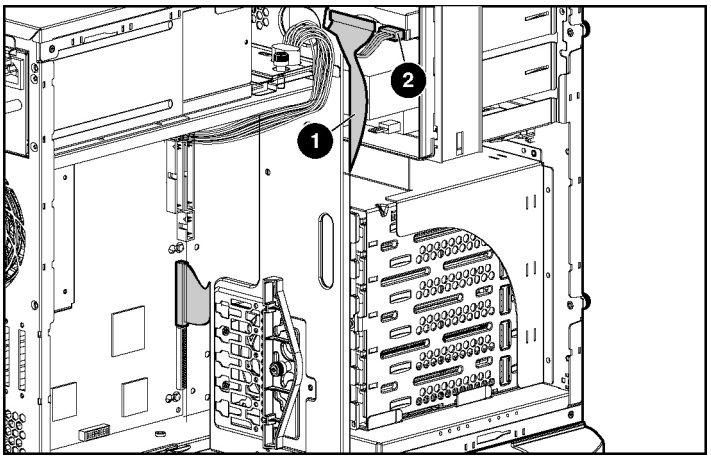


NOTE: Both SCSI channels are self-terminating. If you choose to not use one or both of the SCSI channels, you do not need to terminate the unused channel(s).

Cabling SCSI Devices in the Removable Media Area

The following steps detail the procedure for cabling an integrated SCSI controller to a removable media or other device:

1. Install removable media device ("Installing a Half-Height or Full-Height Media Device Option" on page 60). Be sure that the SCSI ID is uniquely set on each device.
2. Locate the SCSI cable that is shipped with the option. For more information on cables, refer to the HP website (http://www.hp.com/servers/proliantml350).
3. Install the next available connector to the device.



SATA or SAS Cabling

Many configurations are possible when SATA or SAS controllers are added. When upgrading your storage controller, refer to the Quickspecs and the cabling matrix to identify the correct cables (http://www.hp.com/products/servers/proliantml350/).

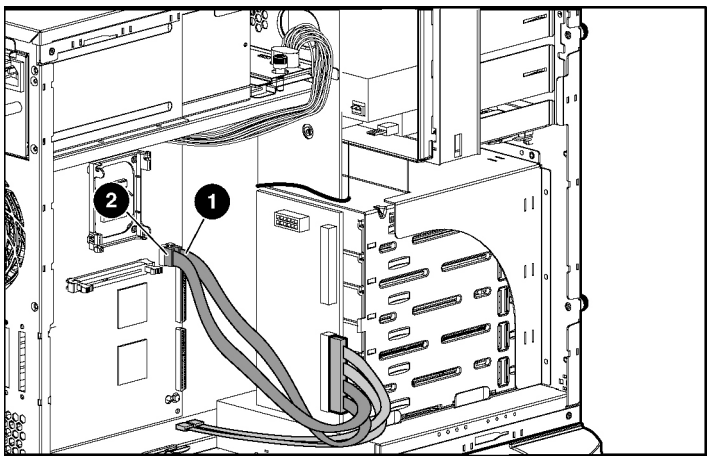
Standard SATA Cabling (on page 90)

SATA-only Array Controller Cabling (on page 91)

SATA/SAS Array Controller Cabling (on page 91)

Standard SATA Cabling

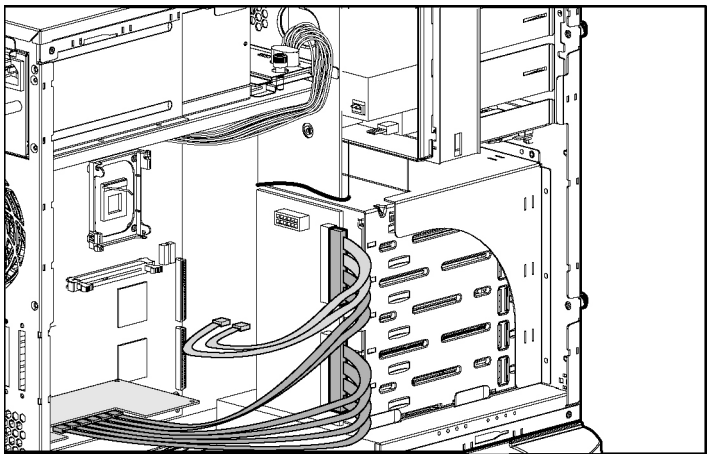
NOTE: Some cables remain unconnected.



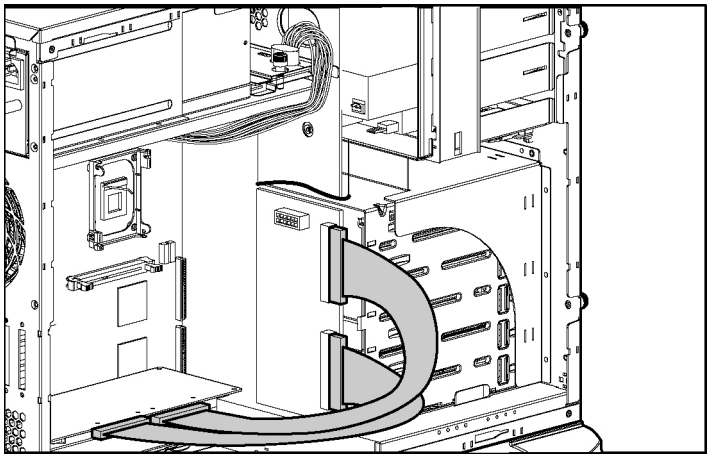
Item	Description
1	SATA 1 connector
2	SATA 2 connector

SATA-only Array Controller Cabling

NOTE: Some cables remain unconnected.



SATA/SAS Array Controller Cabling



Connecting ATA or ATAPI Devices to the Integrated IDE Controller

This server includes one IDE cable (the Cable Select Cable) that can connect up to two ATA or ATAPI devices to the system through the integrated IDE controller. This cable has three clearly labeled connectors. If only one IDE device is connected to the system, it must be secured to the cable connector labeled Drive 0. All IDE devices in the system should have their configuration jumpers set to "Cable Select" or "CS."

IMPORTANT: If the network operating system is Novell NetWare, HP recommends that you connect the CD-ROM to the primary IDE channel and to the Drive 0 connector on the IDE cable.

NOTE: ATA (IDE) hard drives are not supported.

Server Software and Configuration Utilities

In This Section

Configuration Tools....93
Management Tools....99
Diagnostic Tools....105
Keeping the System Current....107

Configuration Tools

List of Tools:

SmartStart Software....93
ROM-Based Setup Utility....95
BIOS Serial Console....97
Array Configuration Utility....97
Option ROM Configuration for Arrays....98
HP ProLiant Essentials Rapid Deployment Pack....98
Re-Entering the Server Serial Number and Product ID....99

SmartStart Software

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

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

- Configuring hardware using embedded configuration utilities, such as RBSU and ORCA
- Preparing the system for installing "off-the-shelf" versions of leading operating system software

- Installing optimized server drivers, management agents, and utilities automatically with every assisted installation
- Testing server hardware using the Insight Diagnostics Utility ("HP Insight Diagnostics" on page 106)
- Installing software drivers directly from the CD. With systems that have internet connection, the SmartStart Autorun Menu provides access to a complete list of ProLiant system software.
- Enabling access to the Array Configuration Utility (on page 97), Array Diagnostic Utility (on page 106), and Erase Utility (on page 102)

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

SmartStart Scripting Toolkit

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

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

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

Configuration Replication Utility

ConRep is shipped in the SmartStart Scripting Toolkit and is a program that works with RBSU to replicate hardware configuration on ProLiant servers. This utility is run during State 0, Run Hardware Configuration Utility, when doing a scripted server deployment. ConRep reads the state of the system environment variables to determine the configuration and then writes the results on an editable script file. This file can then be deployed across multiple servers with similar hardware and software components. For more information, refer to the *SmartStart Scripting Toolkit User Guide* on the HP website (http://h18004.www1.hp.com/products/servers/management/toolkit/documentation.html).

ROM-Based Setup Utility

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

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

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

Using RBSU

The first time you power up the server, the system prompts you to enter RBSU and select a language. Default configuration settings are made at this time and can be changed later. Most of the features in RBSU are not required to set up the server.

To navigate RBSU, use the following keys:

- To access RBSU, press the **F9** key during power up when prompted in the upper right corner of the screen.
- To navigate the menu system, use the arrow keys.

- To make selections, press the **Enter** key.

  IMPORTANT: RBSU automatically saves settings when you press the **Enter** key. The utility does not prompt you for confirmation of settings before you exit the utility. To change a selected setting, you must select a different setting and press the **Enter** key.

Auto-Configuration Process

The auto-configuration process automatically runs when you boot the server for the first time. During the power-up sequence, the system ROM automatically configures the entire system without needing any intervention. During this process, the ORCA utility, in most cases, automatically configures the array to a default setting based on the number of drives connected to the server.

NOTE: The server may not support all the following examples.

NOTE: If the boot drive is not empty or has been written to in the past, ORCA does not automatically configure the array. You must run ORCA to configure the array settings.

Drives Installed	Drives Used	RAID Level
1	1	RAID 0
2	2	RAID 1
3, 4, 5, or 6	3, 4, 5, or 6	RAID 5
More than 6	0	None

To change any ORCA default settings and override the auto-configuration process, press the **F8** key when prompted.

By default, the auto-configuration process configures the system for the English language. To change any default settings in the auto-configuration process, such as the settings for language, operating system, and primary boot controller, execute RBSU by pressing the **F9** key when prompted. After the settings are selected, exit RBSU and allow the server to reboot automatically.

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

Boot Options

After the auto-configuration process completes, or after the server reboots upon exit from RBSU, the POST sequence runs, and then the boot option screen is displayed. This screen is visible for several seconds before the system attempts to boot from either a diskette, CD, or hard drive. During this time, the menu on the screen allows you to install an operating system or make changes to the server configuration in RBSU.

BIOS Serial Console

BIOS Serial Console allows you to configure the serial port to view POST error messages and run RBSU remotely through a serial connection to the server COM port. The server that you are remotely configuring does not require a keyboard and mouse.

For more information about BIOS Serial Console, refer to the *BIOS Serial Console User Guide* on the Documentation CD or the HP website (http://www.hp.com/servers/smartstart).

Array Configuration Utility

ACU is a browser-based utility with the following features:

- Runs as a local application or remote service
- Supports online array capacity expansion, logical drive extension, assignment of online spares, and RAID or stripe size migration
- Suggests the optimum configuration for an unconfigured system
- Provides different operating modes, enabling faster configuration or greater control over the configuration options
- Remains available any time that the server is on
- Displays on-screen tips for individual steps of a configuration procedure

The minimum display settings for optimum performance are 800 × 600 resolution and 256 colors. The server must have Microsoft® Internet Explorer 5.5 (with Service Pack 1) installed and be running Microsoft® Windows® 2000, Windows® Server 2003, or Linux. Refer to the *README.TXT* file for further information about browser and Linux support.

For more information, refer to the *HP Array Configuration Utility User Guide* on the Documentation CD or the HP website (http://www.hp.com).

Option ROM Configuration for Arrays

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

The utility provides support for the following functions:

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

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

For more information regarding array controller configuration, refer to the controller user guide.

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

HP ProLiant Essentials Rapid Deployment Pack

The RDP software is the preferred method for rapid, high-volume server deployments. The RDP software integrates two powerful products: Altiris Deployment Solution and the HP ProLiant Integration Module.

The intuitive graphical user interface of the Altiris Deployment Solution console provides simplified point and click, and drag and drop operations that enable you to deploy target servers remotely, perform imaging or scripting functions, and maintain software images.

For more information about the RDP, refer to the HP ProLiant Essentials Rapid Deployment Pack CD or refer to the HP website (http://www.hp.com/servers/rdp).

Re-Entering the Server Serial Number and Product ID

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

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

   ```
   WARNING! WARNING! WARNING! The serial number is loaded
   into the system during the manufacturing process and
   should NOT be modified. This option should only be used
   by qualified service personnel. This value should always
   match the serial number sticker located on the chassis.
   ```
4. Press the **Enter** key to clear the warning.
5. Enter the serial number and press the **Enter** key.
6. Select **Product ID**.
7. Enter the product ID and press the **Enter** key.
8. Press the **Esc** key to close the menu.
9. Press the **Esc** key to exit RBSU.
10. Press the **F10** key to confirm exiting RBSU. The server will automatically reboot.

Management Tools

List of Tools:

Automatic Server Recovery....100
ROMPaq Utility....100
Integrated Lights-Out Technology....101
System Online ROM Flash Component Utility....101
Erase Utility....102
Management Agents....103
HP Systems Insight Manager....103
Redundant ROM Support....103
USB Support....105

Automatic Server Recovery

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

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

ROMPaq Utility

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

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

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

Integrated Lights-Out Technology

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

Using iLO, you can:

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

For more information about iLO features, refer to the *Integrated Lights-Out User Guide* on the Documentation CD or on the HP website (http://www.hp.com/servers/lights-out).

System Online ROM Flash Component Utility

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

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

  IMPORTANT: This utility supports operating systems that may not be supported by the server. For operating systems supported by the server, refer to the HP website (http://www.hp.com/go/supportos).

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

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

To download the tool and for more information, refer to the HP website (http://h18000.www1.hp.com/support/files/index.html).

Erase Utility

CAUTION: Perform a backup before running the System Erase Utility. The utility sets the system to its original factory state, deletes the current hardware configuration information, including array setup and disk partitioning, and erases all connected hard drives completely. Refer to the instructions for using this utility.

Run the Erase Utility if you need to erase the system for the following reasons:

- You want to install a new operating system on a server with an existing operating system.
- You want to change the operating system selection.
- You encounter a failure-causing error during the SmartStart installation.
- You encounter an error when completing the steps of a factory-installed operating system installation.

The Erase Utility can be accessed from the Software and Drivers Download website (http://www.hp.com/go/support) or the **Maintenance Utilities** menu of the SmartStart CD ("Configuration Tools" on page 93, "SmartStart Software" on page 93).

Management Agents

Management Agents provide the information to enable fault, performance, and configuration management. The agents allow easy manageability of the server through HP SIM software, and third-party SNMP management platforms. Management Agents are installed with every SmartStart assisted installation or can be installed through the HP PSP. The Systems Management homepage provides status and direct access to in-depth subsystem information by accessing data reported through the Management Agents. For additional information, refer to the Management CD in the HP ProLiant Essentials Foundation Pack or the HP website (http://www.hp.com/servers/manage).

HP Systems Insight Manager

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

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

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

Redundant ROM Support

The server enables you to upgrade or configure the ROM safely with redundant ROM support. The server has a 4-MB ROM that acts as two, separate 2-MB ROMs. In the standard implementation, one side of the ROM contains the current ROM program version, while the other side of the ROM contains a backup version.

NOTE: The server ships with the same version programmed on each side of the ROM.

Safety and Security Benefits

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

Access to Redundant ROM Settings

To access the redundant ROM through RBSU:

1. Access RBSU by pressing the **F9** key during powerup when the prompt is displayed in the upper right corner of the screen.
2. Select **Advanced Options**.
3. Select **Redundant ROM Selection**.
4. Select the ROM version.
5. Press the **Enter** key.
6. Press the **Esc** key to exit the current menu or press the **F10** key to exit RBSU. The server restarts automatically.

To access the redundant ROM manually:

1. Power down the server ("Powering Down the Server" on page 25).
2. Remove the access panel ("Removing Access Panel" on page 27).
3. Set positions 1, 5, and 6 of the system maintenance switch to On.
4. Install the access panel.
5. Power up the server ("Powering Up the Server" on page 25).
6. Wait for the server to emit two beeps.
7. Repeat steps 1 and 2.
8. Set positions 1, 5, and 6 of the system maintenance switch to Off.
9. Repeat steps 4 and 5.

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

If both the current and backup versions of the ROM are corrupt, the server automatically enters ROMPaq disaster recovery mode.

USB Support

HP provides both standard USB support and legacy USB support. Standard support is provided by the operating system through the appropriate USB device drivers. HP provides support for USB devices before the operating system loading through legacy USB support, which is enabled by default in the system ROM. HP hardware supports USB version 1.1 or 2.0, depending on the version of the hardware.

Legacy USB support provides USB functionality in environments where USB support is normally not available. Specifically, HP provides legacy USB functionality for:

- POST
- RBSU
- Diagnostics
- DOS
- Operating environments which do not provide native USB support

For more information on ProLiant USB support, refer to the HP website (http://h18004.www1.hp.com/products/servers/platforms/usb-support.html).

Diagnostic Tools

List of Tools:

Array Diagnostic Utility 106
HP Insight Diagnostics 106
Integrated Management Log 106

Array Diagnostic Utility

ADU is tool that collects information about array controllers and generates a list of detected problems. ADU can be accessed from the SmartStart CD ("Configuration Tools" on page 93, "SmartStart Software" on page 93) or downloaded from the HP website (http://www.hp.com).

HP Insight Diagnostics

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

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

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

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

Integrated Management Log

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

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

- From within HP SIM
- From within Survey Utility
- From within operating system-specific IML viewers

  - For NetWare: IML Viewer
  - For Windows®: IML Viewer
  - For Linux: IML Viewer Application
- From within HP Insight Diagnostics

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

Keeping the System Current

List of Tools:

Drivers 107
ProLiant Support Packs 108
Operating System Version Support 108
Change Control and Proactive Notification 108
Natural Language Search Assistant 108
Care Pack 108

Drivers

The server includes new hardware that may not have driver support on all operating system installation media.

If you are installing a SmartStart-supported operating system, use the SmartStart software ("Configuration Tools" on page 93, on page 93) and its Assisted Path feature to install the operating system and latest driver support.

> **NOTE:** If you are installing drivers from the SmartStart CD or the Software Maintenance CD, refer to the SmartStart website (http://www.hp.com/servers/smartstart) to be sure that you are using the latest version of SmartStart. For more information, refer to the documentation provided with the SmartStart CD.

If you do not use the SmartStart CD to install an operating system, drivers for some of the new hardware are required. These drivers, as well as other option drivers, ROM images, and value-add software can be downloaded from the HP website (http://www.hp.com/support).

IMPORTANT: Always perform a backup before installing or updating device drivers.

ProLiant Support Packs

PSPs represent operating system-specific bundles of ProLiant optimized drivers, utilities, and management agents. Refer to the PSP website (http://h18000.www1.hp.com/products/servers/management/psp.html).

Operating System Version Support

Refer to the operating system support matrix (http://www.hp.com/go/supportos).

Change Control and Proactive Notification

HP offers Change Control and Proactive Notification to notify customers 30 to 60 days in advance of upcoming hardware and software changes on HP commercial products.

For more information, refer to the HP website (http://h18023.www1.hp.com/solutions/pcsolutions/pcn.html).

Natural Language Search Assistant

The Natural Language Search Assistant (http://askq.compaq.com) is a search engine that finds information on HP products, including ProLiant servers. The search engine responds to queries entered in question form.

Care Pack

HP Care Pack Services offer upgraded service levels to extend and expand standard product warranty with easy-to-buy, easy-to-use support packages that help you make the most of your server investments. Refer to the Care Pack website (http://www.hp.com/hps/carepack/servers/cp_proliant.html).

Troubleshooting

In This Section

Server Diagnostic Steps....109
Important Safety Information....109
Preparing the Server for Diagnosis....113
Symptom Information....114
Diagnostic Steps....115

Server Diagnostic Steps

This section covers the steps to take in order to diagnose a problem quickly.

To effectively troubleshoot a problem, HP recommends that you start with the first flowchart in this section, "Start Diagnosis Flowchart (on page 115)," and follow the appropriate diagnostic path. If the other flowcharts do not provide a troubleshooting solution, follow the diagnostic steps in "General Diagnosis Flowchart (on page 117)." The General Diagnosis flowchart is a generic troubleshooting process to be used when the problem is not server-specific or is not easily categorized into the other flowcharts.

IMPORTANT: This guide provides information for multiple servers. Some information may not apply to the server you are troubleshooting. Refer to the server documentation for information on procedures, hardware options, software tools, and operating systems supported by the server.

WARNING: To avoid potential problems, ALWAYS read the warnings and cautionary information in the server documentation before removing, replacing, reseating, or modifying system components.

Important Safety Information

Familiarize yourself with the safety information in the following sections before troubleshooting the server.

Important Safety Information

Before servicing this product, read the *Important Safety Information* document provided with the server.

Symbols on Equipment

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

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

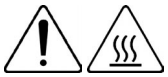
WARNING: To reduce the risk of injury from electric shock hazards, do not open this enclosure. Refer all maintenance, upgrades, and servicing to qualified personnel.

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

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

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

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



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

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

27.22 kg

60 lb

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

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

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

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

Warnings and Cautions

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

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

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

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

- **Do not disable the power cord grounding plug. The grounding plug is an important safety feature.**
- **Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.**
- **Unplug the power cord from the power supply to disconnect power to the equipment.**
- **Do not route the power cord where it can be walked on or pinched by items placed against it. Pay particular attention to the plug, electrical outlet, and the point where the cord extends from the server.**

27.22 kg

60 lb

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

- **Observe local occupation health and safety requirements and guidelines for manual handling.**
- **Obtain adequate assistance to lift and stabilize the chassis during installation or removal.**
- **The server is unstable when not fastened to the rails.**
- **When mounting the server in a rack, remove the power supplies and any other removable module to reduce the overall weight of the product.**

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

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

Preparing the Server for Diagnosis

1. Be sure the server is in the proper operating environment with adequate power, air conditioning, and humidity control. Refer to the server documentation ("Environmental Specifications" on page 145) for required environmental conditions.
2. Record any error messages displayed by the system.
3. Remove all diskettes and CDs from the media drives.
4. Power down the server and peripheral devices if you will be diagnosing the server offline. Always perform an orderly shutdown, if possible. This means you must:
   a. Exit any applications.
   b. Exit the operating system.
   c. Power down the server ("Powering Down the Server" on page 25).

5. Disconnect any peripheral devices not required for testing (any devices not necessary to power up the server). Do not disconnect the printer if you want to use it to print error messages.
6. Collect all tools and utilities, such as a Torx screwdriver, loopback adapters, ESD wrist strap, and software utilities, necessary to troubleshoot the problem.
   - You must have the appropriate Health Drivers and Management Agents installed on the server.

     NOTE: To verify the server configuration, connect to the System Management homepage and select **Version Control Agent**. The VCA gives you a list of names and versions of all installed HP drivers, Management Agents, and utilities, and whether they are up to date.
   - HP recommends you have access to the SmartStart CD for value-added software and drivers required during the troubleshooting process.
   - HP recommends you have access to the server documentation ("Environmental Specifications" on page 145) for server-specific information.

Symptom Information

Before troubleshooting a server problem, collect the following information:

- What events preceded the failure? After which steps does the problem occur?
- What has been changed between the time the server was working and now?
- Did you recently add or remove hardware or software? If so, did you remember to change the appropriate settings in the server setup utility, if necessary?
- Has the server exhibited problem symptoms for a period of time?
- If the problem occurs randomly, what is the duration or frequency?

To answer these questions, the following information may be useful:

- Run HP Insight Diagnostics (on page 106) and use the survey page to view the current configuration or to compare it to previous configurations.
- Refer to your hardware and software records for information.

Diagnostic Steps

To effectively troubleshoot a problem, HP recommends that you start with the first flowchart in this section, "Start Diagnosis Flowchart (on page 115)," and follow the appropriate diagnostic path. If the other flowcharts do not provide a troubleshooting solution, follow the diagnostic steps in "General Diagnosis Flowchart (on page 117)." The General Diagnosis flowchart is a generic troubleshooting process to be used when the problem is not server-specific or is not easily categorized into the other flowcharts.

The available flowcharts include:

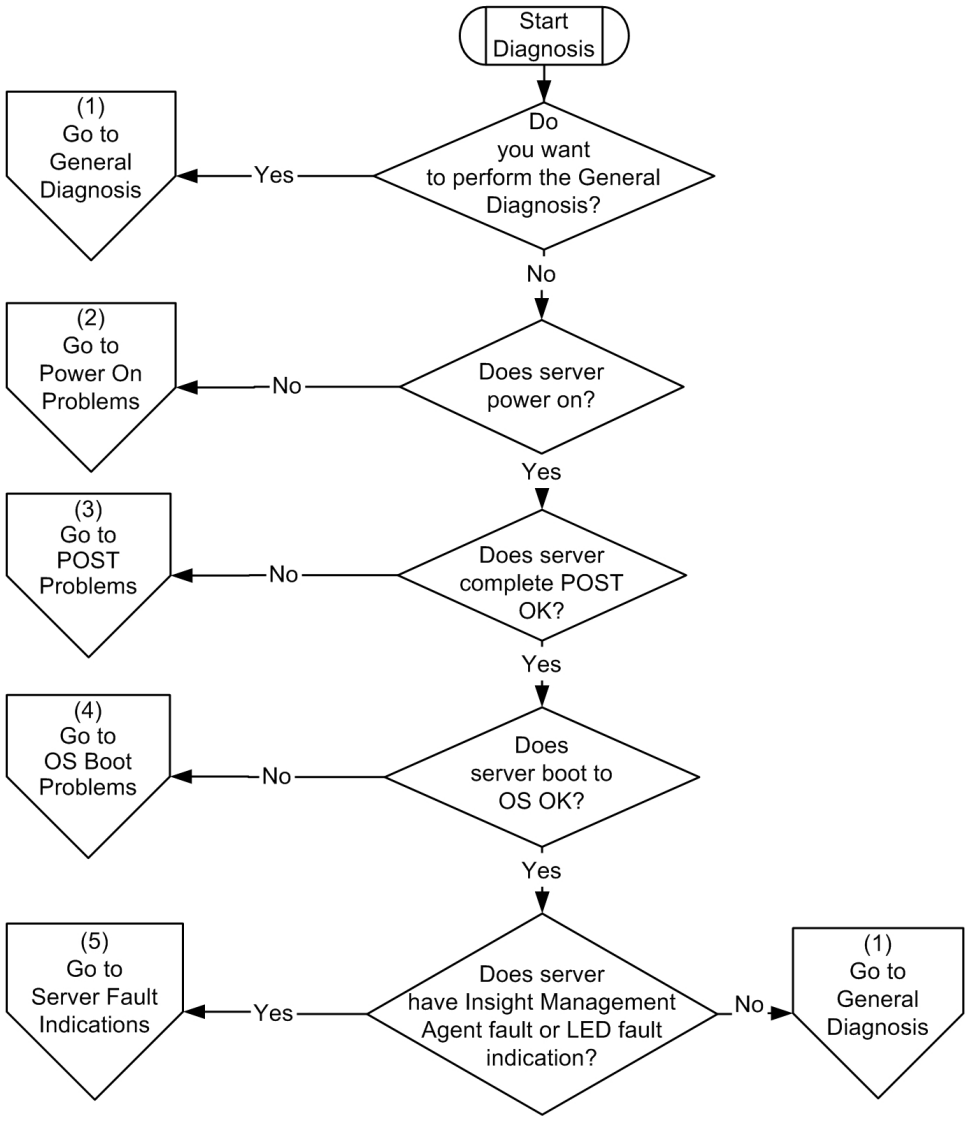
- Start Diagnosis Flowchart (on page 115)
- General Diagnosis Flowchart (on page 117)
- Power-On Problems Flowchart (on page 119)
- POST Problems Flowchart (on page 122)
- OS Boot Problems Flowchart (on page 125)
- Server Fault Indications Flowchart (on page 128)

The number contained in parentheses in the flowchart boxes corresponds to a table with references to other detailed documents or troubleshooting instructions.

Start Diagnosis Flowchart

Use the following flowchart to start the diagnostic process.

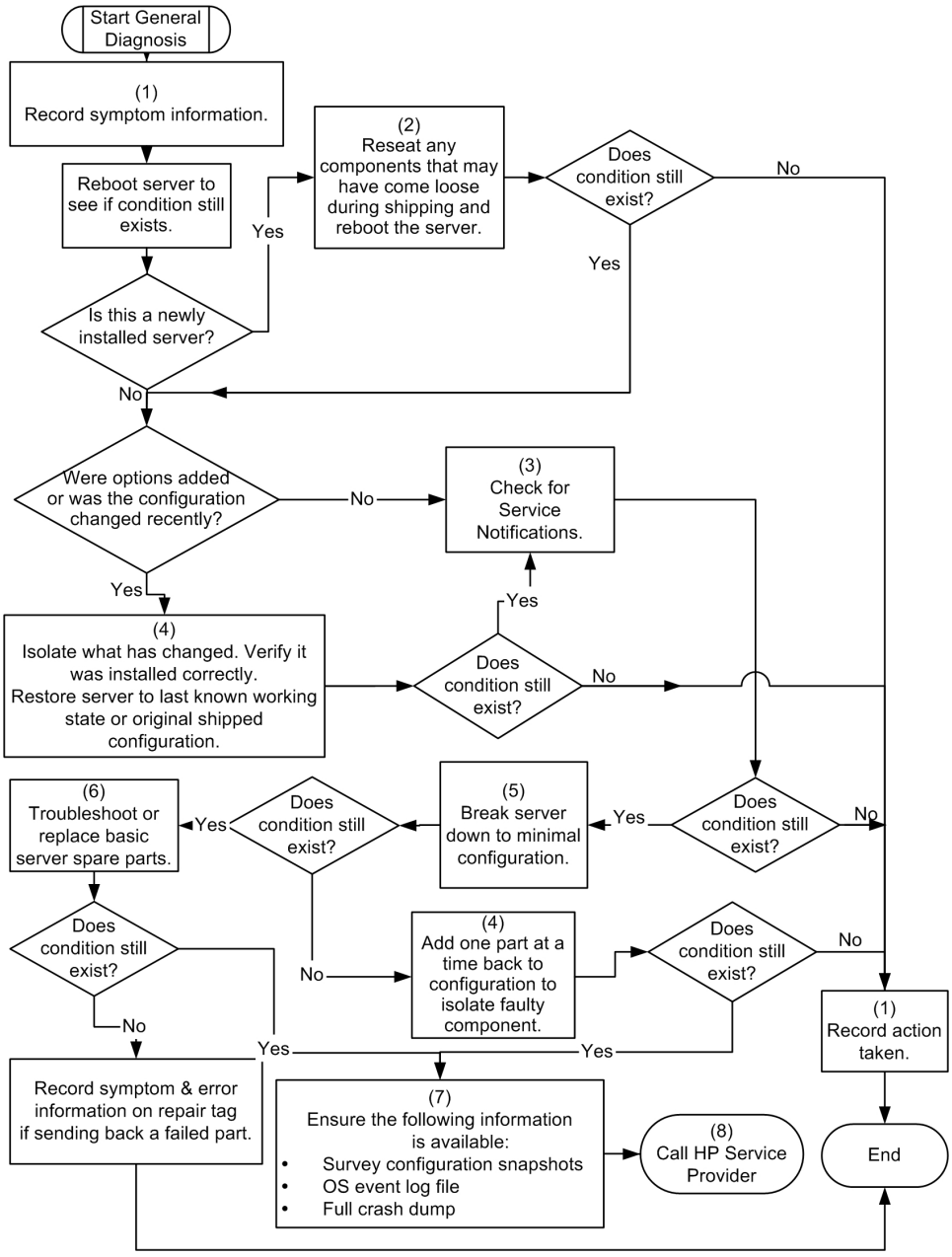
Item	Refer to
1	"General Diagnosis Flowchart (on page 117)"
2	"Power-On Problems Flowchart (on page 119)"
3	"POST Problems Flowchart (on page 122)"
4	"OS Boot Problems Flowchart (on page 125)"
5	"Server Fault Indications Flowchart (on page 128)"


Start Diagnosis
Do you want to perform the General Diagnosis?
Yes
(1) Go to General Diagnosis
No
Does server power on?
No
(2) Go to Power On Problems
Yes
Does server complete POST OK?
No
(3) Go to POST Problems
Yes
Does server boot to OS OK?
No
(4) Go to OS Boot Problems
Yes
Does server have Insight Management Agent fault or LED fault indication?
Yes
(5) Go to Server Fault Indications
No
(1) Go to General Diagnosis

General Diagnosis Flowchart

The General Diagnosis flowchart provides a generic approach to troubleshooting. If you are unsure of the problem, or if the other flowcharts do not fix the problem, use the following flowchart.

Item	Refer to
1	"Symptom Information (on page 114)"
2	"Loose Connections" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support).
3	"Service Notifications" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support).
4	Server maintenance and service guide, located on the Documentation CD or the HP website (http://www.hp.com/products/servers/platforms)
5	Server user guide or setup and installation guide, located on the Documentation CD or the HP website (http://www.hp.com/products/servers/platforms)
6	• Server maintenance and service guide, located on the Documentation CD or the HP website (http://www.hp.com/products/servers/platforms) • "Hardware Problems" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support).
7	• "Server Information You Need" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support). • "Operating System Information You Need" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support).
8	"Contacting HP Technical Support or an Authorized Reseller" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support).


Start General Diagnosis
(1) Record symptom information.
Reboot server to see if condition still exists.
Is this a newly installed server?
Yes
(2) Reseat any components that may have come loose during shipping and reboot the server.
Does condition still exist?
No
Yes
No
Were options added or was the configuration changed recently?
No
(3) Check for Service Notifications.
Yes
(4) Isolate what has changed. Verify it was installed correctly. Restore server to last known working state or original shipped configuration.
Does condition still exist?
Yes
No
(6) Troubleshoot or replace basic server spare parts.
Yes
Does condition still exist?
(5) Break server down to minimal configuration.
Yes
Does condition still exist?
No
Does condition still exist?
No
(4) Add one part at a time back to configuration to isolate faulty component.
Does condition still exist?
No
(1) Record action taken.
No
Yes
Yes
Record symptom & error information on repair tag if sending back a failed part.
(7) Ensure the following information is available:
• Survey configuration snapshots
• OS event log file
• Full crash dump
(8) Call HP Service Provider
End

Power-On Problems Flowchart

Symptoms:

- The server does not power on.
- The system power LED is off or amber.
- The external health LED is red or amber.
- The internal health LED is red or amber.

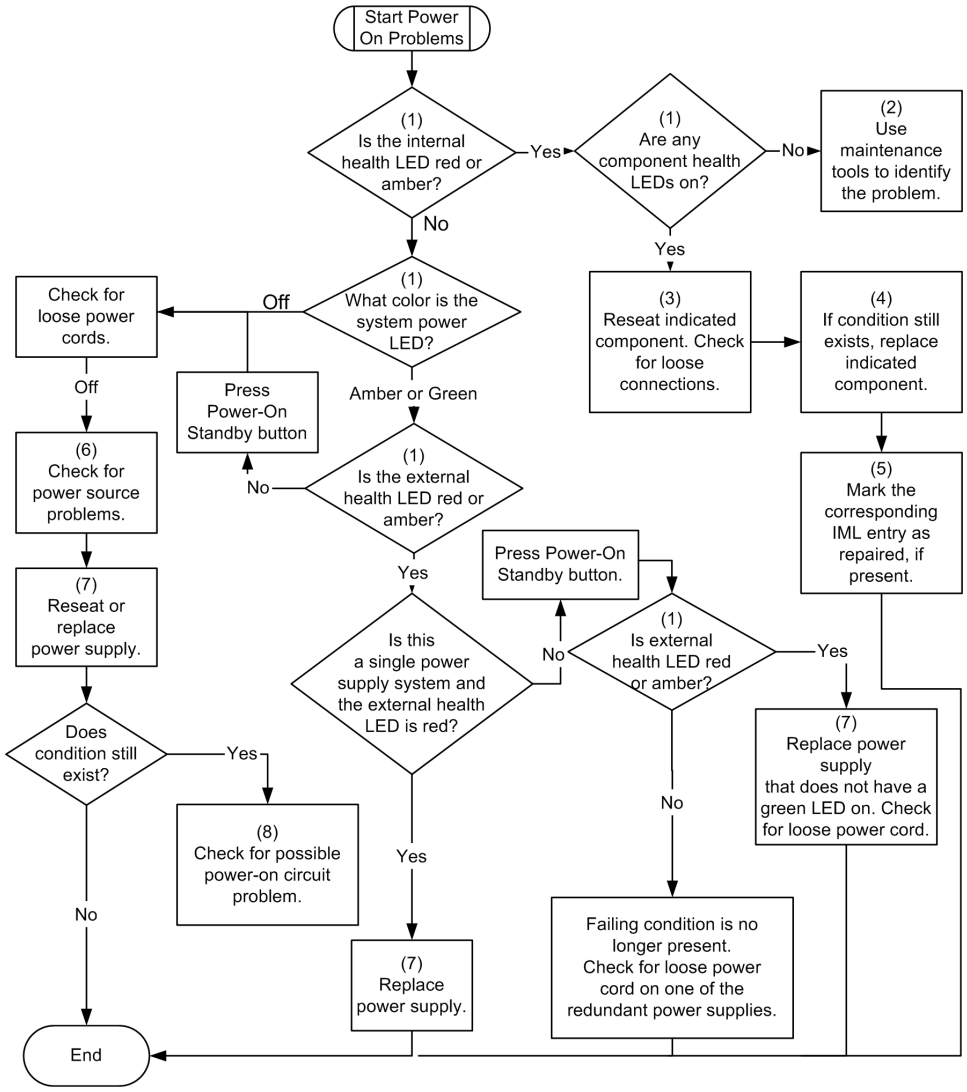
NOTE: For the location of server LEDs and information on their statuses, refer to the server documentation.

Possible causes:

- Improperly seated or faulty power supply
- Loose or faulty power cord
- Power source problem
- Power on circuit problem
- Improperly seated component or interlock problem
- Faulty internal component

Item	Refer to
1	Server user guide or setup and installation guide, located on the Documentation CD or the HP website (http://www.hp.com/products/servers/platforms).
2	"HP Insight Diagnostics (on page 106)"
3	"Loose Connections" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support).
4	Server maintenance and service guide, located on the Documentation CD or the HP website (http://www.hp.com/products/servers/platforms)
5	"Integrated Management Log (on page 106)"
6	"Power Source Problems" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support).

Item	Refer to
7	• "Power Supply Problems" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support). • Server maintenance and service guide, located on the Documentation CD or the HP website (http://www.hp.com/products/servers/platforms)
8	"System Open Circuits and Short Circuits" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support).


Start Power On Problems
(1) Is the internal health LED red or amber?
Yes
(1) Are any component health LEDs on?
No
(2) Use maintenance tools to identify the problem.
Yes
(3) Reseat indicated component. Check for loose connections.
(4) If condition still exists, replace indicated component.
(5) Mark the corresponding IML entry as repaired, if present.
No
(1) What color is the system power LED?
Off
Check for loose power cords.
Off
(6) Check for power source problems.
(7) Reseat or replace power supply.
Does condition still exist?
Yes
(8) Check for possible power-on circuit problem.
No
Press Power-On Standby button
Amber or Green
(1) Is the external health LED red or amber?
No
Yes
Is this a single power supply system and the external health LED is red?
No
Press Power-On Standby button.
(1) Is external health LED red or amber?
Yes
(7) Replace power supply that does not have a green LED on. Check for loose power cord.
No
Failing condition is no longer present. Check for loose power cord on one of the redundant power supplies.
Yes
(7) Replace power supply.
End

POST Problems Flowchart

Symptoms:

- Server does not complete POST

  NOTE: The server has completed POST when the system attempts to access the boot device.

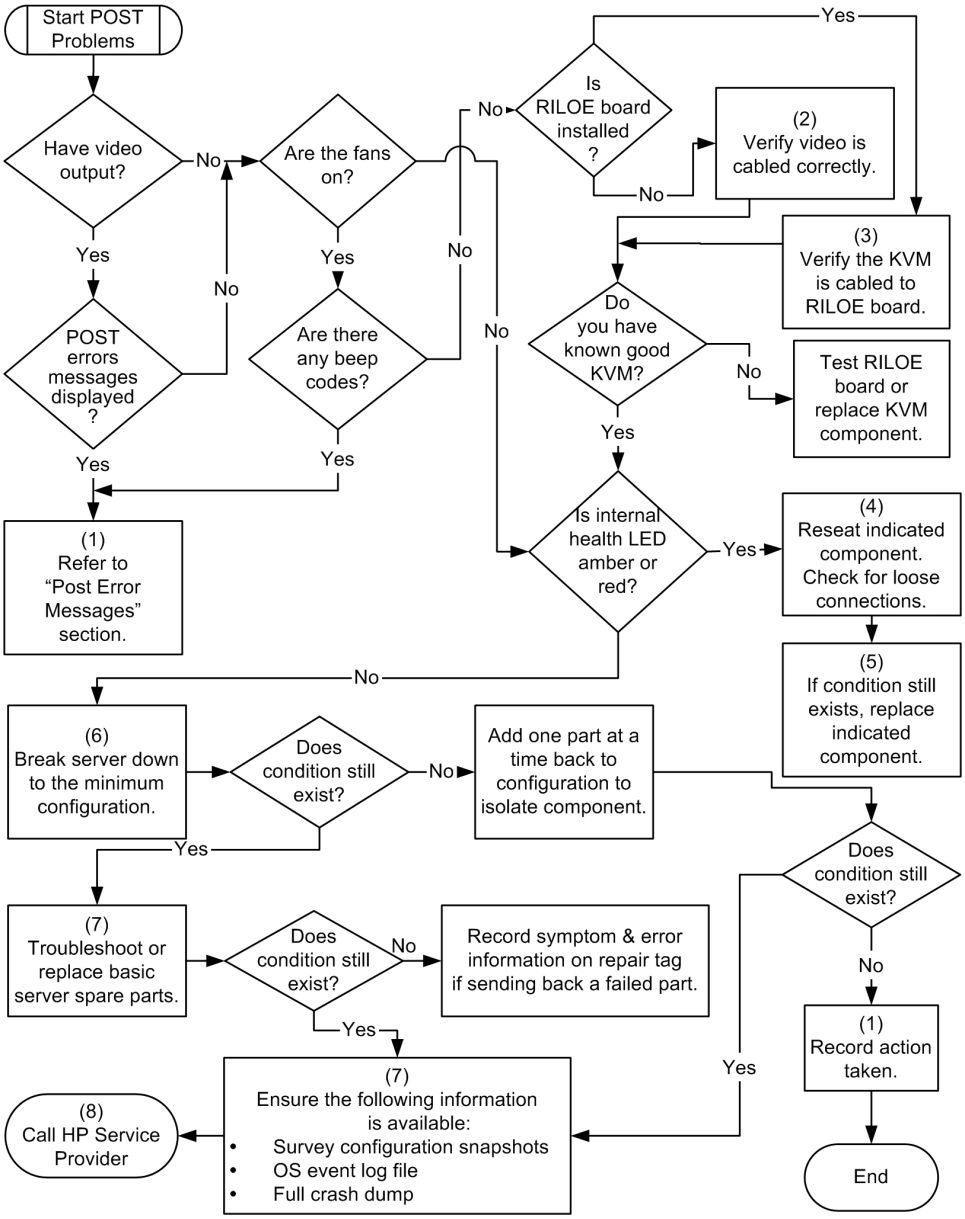
- Server completes POST with errors

Possible Problems:

- Improperly seated or faulty internal component
- Faulty KVM device
- Faulty video device

Item	Refer to
1	"POST Error Messages" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support).
2	"Video Problems" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support).
3	KVM or RILOE documentation or in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP web (http://www.hp.com/support)site.
4	"Loose Connections" or in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support).
5	Server maintenance and service guide, located on the Documentation CD or the HP website (http://www.hp.com/products/servers/platforms)
6	Server user guide or setup and installation guide, located on the Documentation CD or the HP website (http://www.hp.com/products/servers/platforms)

Item	Refer to
7	• "Hardware Problems" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support). • Server maintenance and service guide, located on the Documentation CD or the HP website (http://www.hp.com/products/servers/platforms)


Start POST Problems
Have video output?
No
Are the fans on?
No
Is RILOE board installed ?
Yes
No
(2) Verify video is cabled correctly.
Yes
Yes
No
(3) Verify the KVM is cabled to RILOE board.
POST errors messages displayed ?
No
Are there any beep codes?
No
Do you have known good KVM?
No
Test RILOE board or replace KVM component.
Yes
Yes
Yes
Yes
(1) Refer to "Post Error Messages" section.
Is internal health LED amber or red?
Yes
(4) Reseat indicated component. Check for loose connections.
No
(5) If condition still exists, replace indicated component.
(6) Break server down to the minimum configuration.
Does condition still exist?
No
Add one part at a time back to configuration to isolate component.
Yes
Does condition still exist?
(7) Troubleshoot or replace basic server spare parts.
Does condition still exist?
No
Record symptom & error information on repair tag if sending back a failed part.
No
(1) Record action taken.
Yes
(7) Ensure the following information is available:
• Survey configuration snapshots
• OS event log file
• Full crash dump
(8) Call HP Service Provider
End

OS Boot Problems Flowchart

Symptoms:

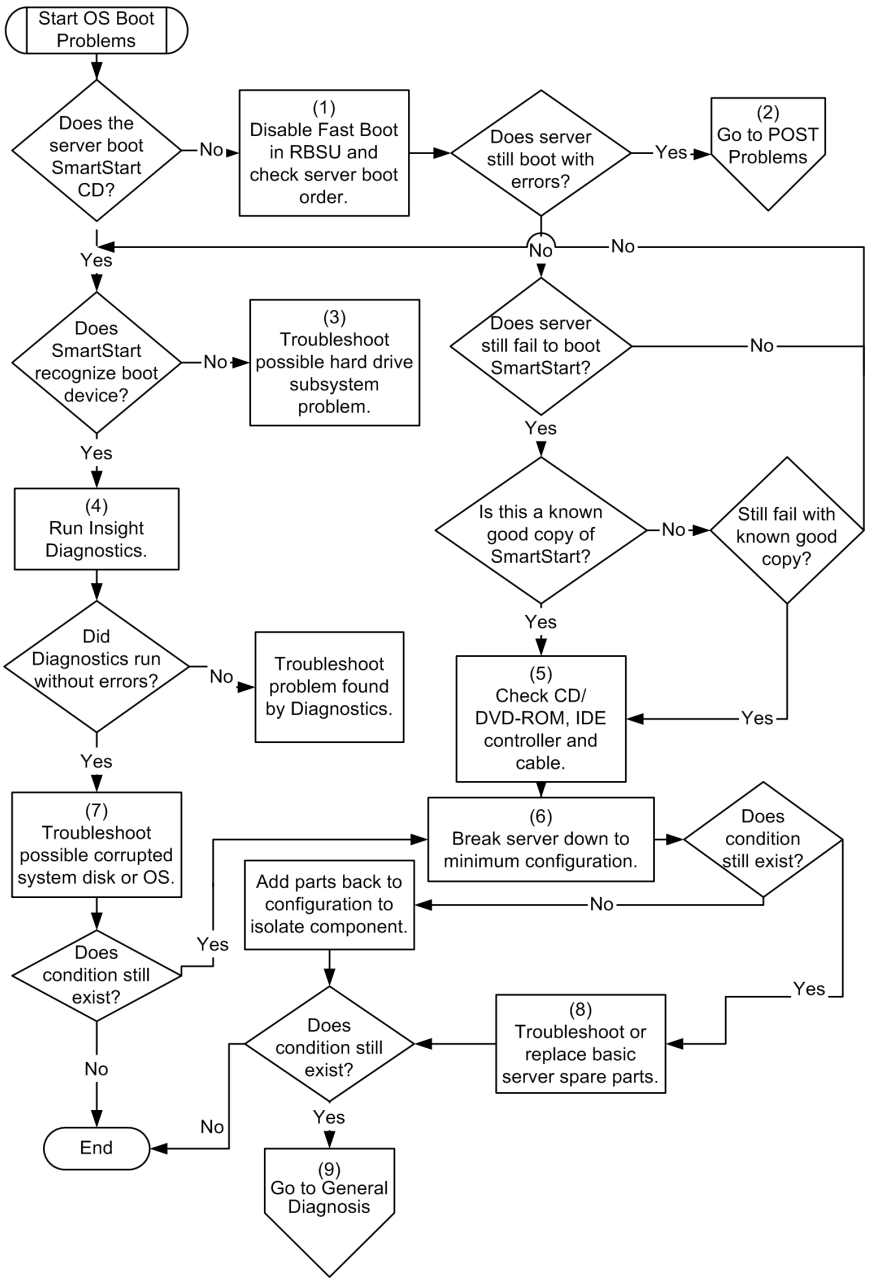
- Server does not boot a previously installed operating system
- Server does not boot SmartStart

Possible Causes:

- Corrupted operating system
- Hard drive subsystem problem

Item	Refer to
1	*HP ROM-Based Setup Utility User Guide* (http://www.hp.com/servers/smartstart)
2	"POST Problems ("POST Problems Flowchart" on page 122)" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support).
3	• "Hard Drive Problems" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support). • Controller documentation or in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support).
4	"HP Insight Diagnostics (on page 106)"
5	• "Loose Connections" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support). • "CD-ROM and DVD Drive Problems" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support). • Controller documentation or in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support).
6	Server user guide or setup and installation guide, located on the Documentation CD or the HP website (http://www.hp.com/products/servers/platforms)

Item	Refer to
7	• "Operating System Problems" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support). • "Contacting HP Technical Support or an Authorized Reseller" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support).
8	• "Hardware Problems" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support). • Server maintenance and service guide, located on the Documentation CD or the HP website (http://www.hp.com/products/servers/platforms)
9	"General Diagnosis Flowchart (on page 117)" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support).


Start OS Boot Problems
Does the server boot SmartStart CD?
No
(1) Disable Fast Boot in RBSU and check server boot order.
Does server still boot with errors?
Yes
(2) Go to POST Problems
No
Yes
No
Does SmartStart recognize boot device?
No
(3) Troubleshoot possible hard drive subsystem problem.
Does server still fail to boot SmartStart?
No
Yes
Yes
(4) Run Insight Diagnostics.
Is this a known good copy of SmartStart?
No
Still fail with known good copy?
Yes
Did Diagnostics run without errors?
No
Troubleshoot problem found by Diagnostics.
(5) Check CD/ DVD-ROM, IDE controller and cable.
Yes
Yes
(7) Troubleshoot possible corrupted system disk or OS.
(6) Break server down to minimum configuration.
Does condition still exist?
Add parts back to configuration to isolate component.
No
Yes
Does condition still exist?
Yes
(8) Troubleshoot or replace basic server spare parts.
Does condition still exist?
No
No
Yes
End
(9) Go to General Diagnosis

Server Fault Indications Flowchart

Symptoms:

- Server boots, but a fault event is reported by Insight Management Agents (on page 103)
- Server boots, but the internal health LED or external health LED is red or amber

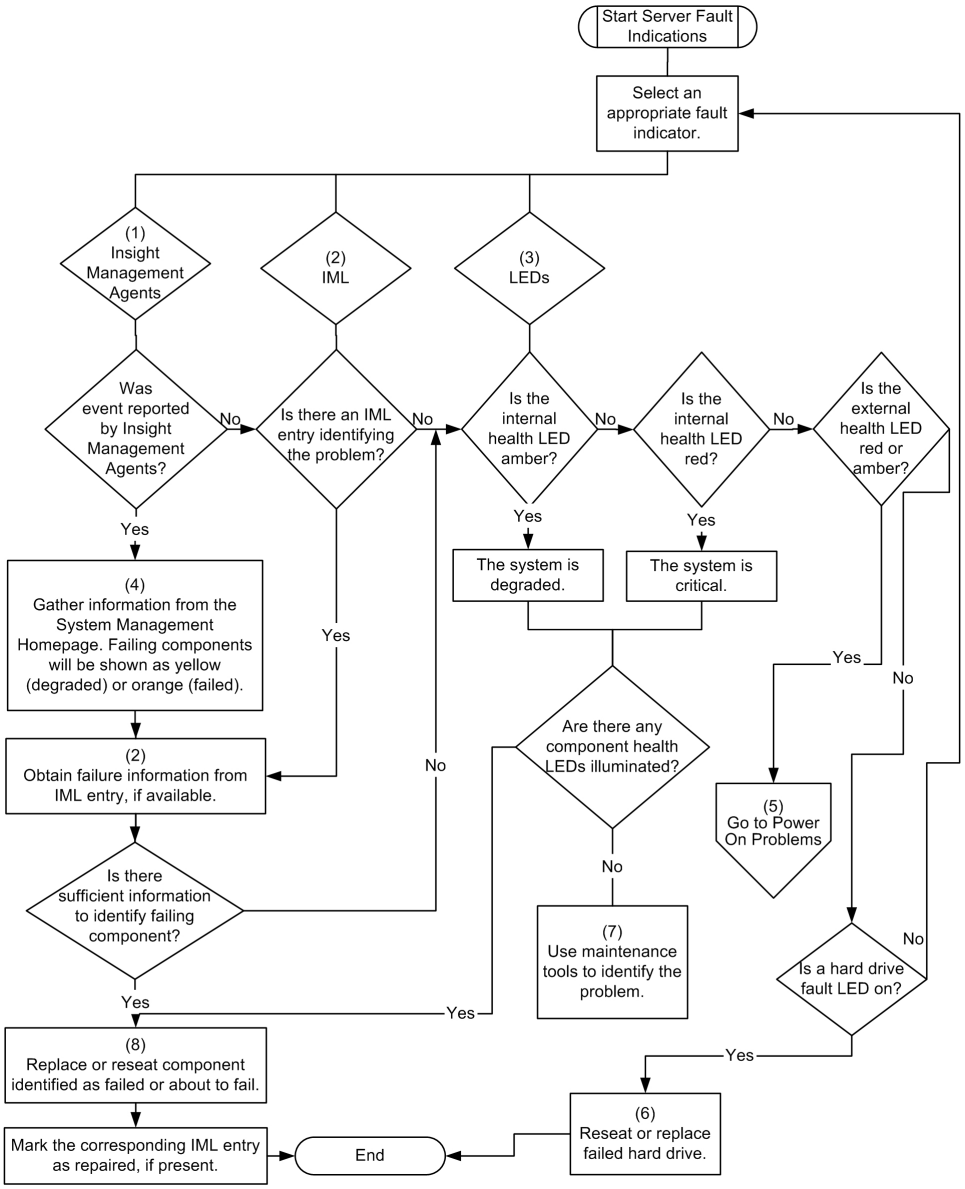
  NOTE: For the location of server LEDs and information on their statuses, refer to the server documentation.

Possible causes:

- Improperly seated or faulty internal or external component
- Unsupported component installed
- Redundancy failure
- System overtemperature condition

Item	Refer to
1	"Management Agents (on page 103)"
2	• "Integrated Management Log (on page 106)" • "Event List Error Messages" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support).
3	Server user guide or setup and installation guide, located on the Documentation CD or the HP website (http://www.hp.com/products/servers/platforms)
4	System Management Homepage at https://localhost:2381 (https://localhost:2381)
5	"Power-On Problems ("Power-On Problems Flowchart" on page 119)" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support).

Item	Refer to
6	• "Hard Drive Problems" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support). • Server maintenance and service guide, located on the Documentation CD or the HP website (http://www.hp.com/products/servers/platforms)
7	"HP Insight Diagnostics (on page 106)"
8	• "Hardware Problems" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support). • Server maintenance and service guide, located on the Documentation CD or the HP website (http://www.hp.com/products/servers/platforms)


Start Server Fault Indications
Select an appropriate fault indicator.
(1) Insight Management Agents
(2) IML
(3) LEDs
Was event reported by Insight Management Agents?
No
Is there an IML entry identifying the problem?
No
Is the internal health LED amber?
No
Is the internal health LED red?
No
Is the external health LED red or amber?
Yes
Yes
Yes
Yes
Yes
The system is degraded.
The system is critical.
(4) Gather information from the System Management Homepage. Failing components will be shown as yellow (degraded) or orange (failed).
(2) Obtain failure information from IML entry, if available.
Is there sufficient information to identify failing component?
No
Yes
Are there any component health LEDs illuminated?
No
Yes
(5) Go to Power On Problems
(7) Use maintenance tools to identify the problem.
Is a hard drive fault LED on?
No
Yes
(8) Replace or reseat component identified as failed or about to fail.
Mark the corresponding IML entry as repaired, if present.
End
(6) Reseat or replace failed hard drive.

Battery Replacement

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

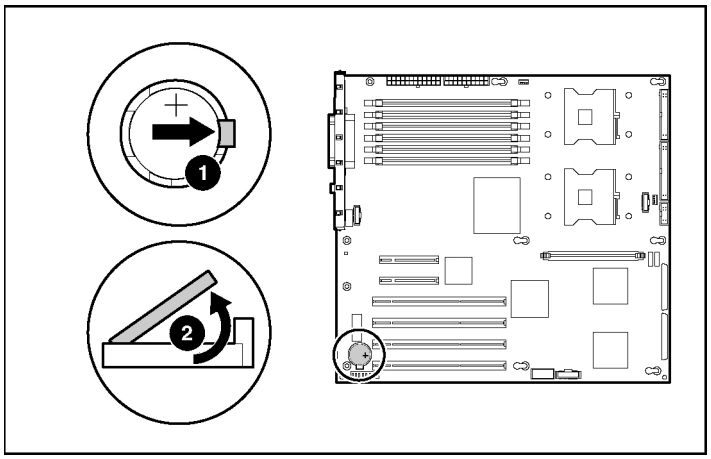
WARNING: The computer contains an internal lithium manganese dioxide, a vanadium pentoxide, or an alkaline battery pack. A risk of fire and burns exists if the battery pack is not properly handled. To reduce the risk of personal injury:

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

To remove the component:

1. Power down the server ("Powering Down the Server" on page 25).
2. Extend or remove the server from the rack ("Extending the Server from the Rack" on page 26).
3. Remove the front bezel door, if necessary ("Removing the Front Bezel (Tower Model)" on page 27).
4. Remove the access panel ("Removing Access Panel" on page 27).

5. Remove the battery.



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

To replace the component, reverse the removal procedure.

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

Regulatory Compliance Notices

In This Section

Regulatory Compliance Identification Numbers 133
Federal Communications Commission Notice 134
Declaration of Conformity for Products Marked with the FCC Logo, United States Only 135
Modifications 136
Cables 136
Mouse Compliance Statement 136
Canadian Notice (Avis Canadien) 136
European Union Regulatory Notice 137
Japanese Notice 138
BSMI Notice 138
Korean Notices 139
Laser Compliance 139
Battery Replacement Notice 140
Taiwan Battery Recycling Notice 141

Regulatory Compliance Identification Numbers

For the purpose of regulatory compliance certifications and identification, this product has been assigned a unique regulatory model number. The regulatory model number can be found on the product nameplate label, along with all required approval markings and information. When requesting compliance information for this product, always refer to this regulatory model number. The regulatory model number is not the marketing name or model number of the product.

Federal Communications Commission Notice

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

FCC Rating Label

The FCC rating label on the device shows the classification (A or B) of the equipment. Class B devices have an FCC logo or ID on the label. Class A devices do not have an FCC logo or ID on the label. After you determine the class of the device, refer to the corresponding statement.

Class A Equipment

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

Class B Equipment

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

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit that is different from that to which the receiver is connected.
- Consult the dealer or an experienced radio or television technician for help.

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

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

For questions regarding this product, contact us by mail or telephone:

- Hewlett-Packard Company
  P. O. Box 692000, Mail Stop 530113
  Houston, Texas 77269-2000
- 1-800-HP-INVENT (1-800-474-6836). (For continuous quality improvement, calls may be recorded or monitored.)

For questions regarding this FCC declaration, contact us by mail or telephone:

- Hewlett-Packard Company
  P. O. Box 692000, Mail Stop 510101
  Houston, Texas 77269-2000
- 1-281-514-3333

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

Modifications

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

Cables

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

Mouse Compliance Statement

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

Canadian Notice (Avis Canadien)

Class A Equipment

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

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

Class B Equipment

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

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

European Union Regulatory Notice

This product complies with the following EU Directives:

- Low Voltage Directive 73/23/EEC
- EMC Directive 89/336/EEC

Compliance with these directives implies conformity to applicable harmonized European standards (European Norms) which are listed on the EU Declaration of Conformity issued by Hewlett-Packard for this product or product family.

This compliance is indicated by the following conformity marking placed on the product:

This marking is valid for non-Telecom products and EU harmonized Telecom products (e.g. Bluetooth).

This marking is valid for EU non-harmonized Telecom products.

*Notified body number (used only if applicable—refer to the product label)

Japanese Notice

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

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

VCCIマークが付いていない場合には、次の点にご注意下さい。

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスA情報技術装置です　この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

BSMI Notice

警告使用者:

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

Korean Notices

Class A Equipment

A급 기기 (업무용 정보통신기기)

이 기기는 업무용으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며, 만약 잘못판매 또는 구입하였을 때에는 가정용으로 교환하시기 바랍니다.

Class B Equipment

B급 기기 (가정용 정보통신기기)

이 기기는 가정용으로 전자파적합등록을 한 기기로서 주거지역에서는 물론 모든지역에서 사용할 수 있습니다.

Laser Compliance

This product may be provided with an optical storage device (that is, CD or DVD drive) and/or fiber optic transceiver. Each of these devices contains a laser that is classified as a Class 1 Laser Product in accordance with US FDA regulations and the IEC 60825-1. The product does not emit hazardous laser radiation.

WARNING: Use of controls or adjustments or performance of procedures other than those specified herein or in the laser product's installation guide may result in hazardous radiation exposure. To reduce the risk of exposure to hazardous radiation:

- **Do not try to open the module enclosure. There are no user-serviceable components inside.**
- **Do not operate controls, make adjustments, or perform procedures to the laser device other than those specified herein.**
- **Allow only HP Authorized Service technicians to repair the unit.**

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

Battery Replacement Notice

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

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

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

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

Taiwan Battery Recycling Notice

The Taiwan EPA requires dry battery manufacturing or importing firms in accordance with Article 15 of the Waste Disposal Act to indicate the recovery marks on the batteries used in sales, giveaway or promotion. Contact a qualified Taiwanese recycler for proper battery disposal.

Electrostatic Discharge

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Preventing Electrostatic Discharge

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

To prevent electrostatic damage:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always be properly grounded when touching a static-sensitive component or assembly.

Grounding Methods to Prevent Electrostatic Discharge

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

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm ±10 percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.
- Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
- Use conductive field service tools.
- Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, have an authorized reseller install the part.

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

Server Specifications

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Environmental Specifications

Temperature range*	Specification
Operating	10°C to 35°C (50°F to 95°F)
Shipping	-40°C to 70°C (-40°F to 158°F)
Maximum wet bulb temperature	28°C (82.4°F)
Relative humidity (noncondensing)**	**Specification**
Operating	10% to 90%
Non-operating	5% to 95%

* All temperature ratings shown are for sea level. An altitude derating of 1°C per 300 m (1.8°F per 1,000 ft) to 3048 m (10,000 ft) is applicable. No direct sunlight allowed.

** Storage maximum humidity of 95% is based on a maximum temperature of 45°C (113°F). Altitude maximum for storage corresponds to a pressure minimum of 70 KPa.

Server Specifications

Dimensions	Specification
Height	44.45 cm (17.50 in)
Depth (with bezel)	64 cm (25.2 in)
Width	22 cm (8.66 in)
Weight (no drives installed)	27.22 kg (60 lb)

Models with a redundant power supply	
Input requirements	**Specification**
Rated input voltage	100 VAC to 240 VAC
Rated input frequency	47 Hz to 63 Hz
Rated input current	10 A (110 V) to 5 A (220 V)
Rated input power	893 W
BTUs per hour	3049
Power supply output	**Specification**
Rated steady-state power	700 W
Maximum peak power	725 W

Technical Support

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Related Documents

For related documentation, refer to the Documentation CD.

Before You Contact HP

Be sure to have the following information available before you call HP:

- Technical support registration number (if applicable)
- Product serial number
- Product model name and number
- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level

HP Contact Information

For the name of the nearest HP authorized reseller:

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

- In other locations, refer to the HP website (http://www.hp.com).

For HP technical support:

- In North America:
  - Call 1-800-HP-INVENT (1-800-474-6836). This service is available 24 hours a day, 7 days a week. For continuous quality improvement, calls may be recorded or monitored.
  - If you have purchased a Care Pack (service upgrade), call 1-800-633-3600. For more information about Care Packs, refer to the HP website (http://www.hp.com).
- Outside North America, call the nearest HP Technical Support Phone Center. For telephone numbers for worldwide Technical Support Centers, refer to the HP website (http://www.hp.com).

Customer Self Repair

What is customer self repair?

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

A convenient, easy-to-use program:

- An HP support specialist will diagnose and assess whether a replacement part is required to address a system problem. The specialist will also determine whether you can replace the part.
- For specific information about customer replaceable parts, refer to the maintenance and service guide on the HP website (http://www.hp.com/support).

Acronyms and Abbreviations

ABEND

abnormal end

ACU

Array Configuration Utility

ADU

Array Diagnostics Utility

ASR

Automatic Server Recovery

DDR

double data rate

DIMM

dual inline memory module

HD68

high density 68

IEC

International Electrotechnical Commission

iLO

Integrated Lights-Out

IML

Integrated Management Log

IPL

initial program load

IRQ

interrupt request

MPS

multi-processor specification

NEMA

National Electrical Manufacturers Association

NFPA

National Fire Protection Association

NIC

network interface controller

NMI

non-maskable interrupt

NVRAM

non-volatile memory

ORCA

Option ROM Configuration for Arrays

PCI Express

peripheral component interconnect express

PCI-X

peripheral component interconnect extended

PDU

power distribution unit

POST

Power-On Self-Test

PPM

Processor Power Module

PSP

ProLiant Support Pack

PXE

preboot eXecution environment

RBSU

ROM-Based Setup Utility

RILOE II

Remote Insight Lights-Out Edition II

SAS

serial attached SCSI

SATA

serial advanced technology attachment

SCSI

small computer system interface

SDRAM

synchronous dynamic RAM

SIM

Systems Insight Manager

TMRA

recommended ambient operating temperature

UID

unit identification

VHDCI

very high density cable interconnect

WOL

Wake-on LAN

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