HP ProLiant ML310 Generation 2 Server User Guide

February 2005 (First Edition)
Part Number 378289-001

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Audience Assumptions

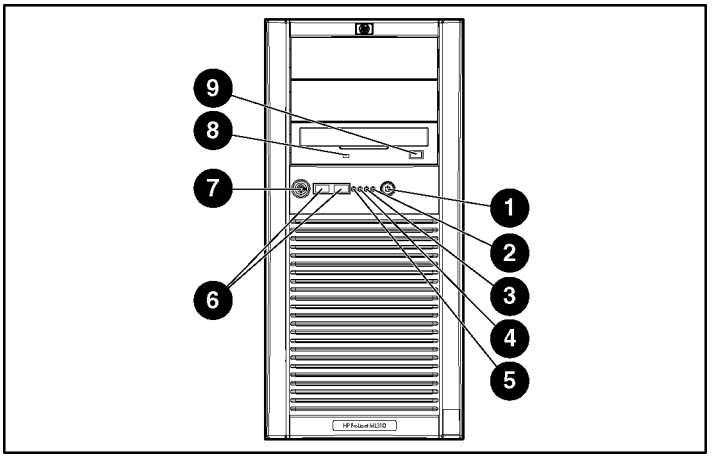
This document is for the person who installs, administers, and troubleshoots servers and storage systems. HP assumes you are qualified in the servicing of computer equipment and trained in recognizing hazards in products with hazardous energy levels.

Contents

Server Component Identification

In This Section

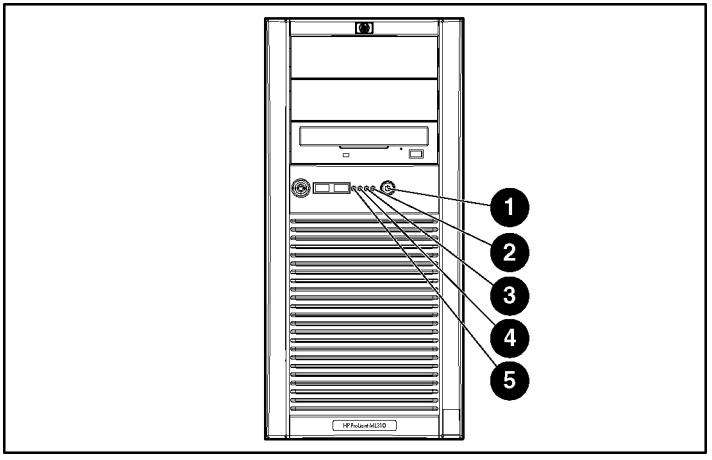
Front Panel Components



Item	Description
1	Power button

Item	Description
2	Power LED
3	Hard Drive activity LED
4	NIC LED
5	Internal health LED
6	USB connectors (2)
7	Bezel lock
8	CD-ROM drive indicator LED
9	CD-ROM drive ejector button

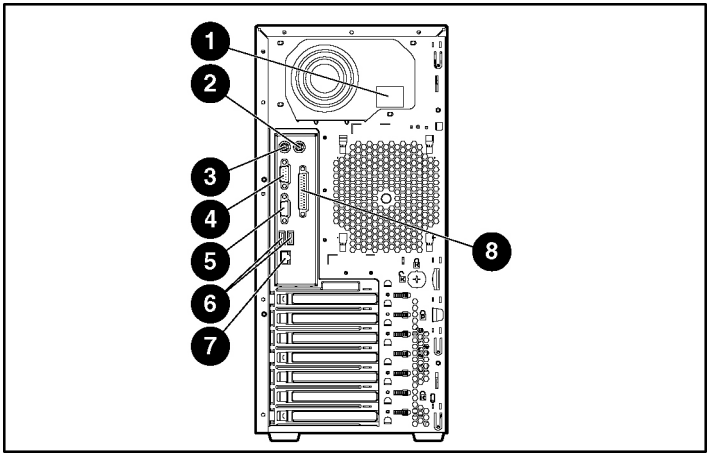
Front Panel LEDs and Buttons



Item	Description	Status
1	Power on/Standby button	N/A
2	Power on/Standby LED	Amber = System has AC power and is in standby mode Green = System has AC power and is turned on Off = System has no AC power

Item	Description	Status
3	Hard drive activity LED	Green = Hard drives are properly connected and functioning Off = No hard drive activity
4	NIC link/activity LED (embedded NIC only)	Green = Linked to network Flashing green = Linked with activity on the network Off = No network connection
5	Internal system health LED	Green = Normal (system on) Amber = System health is degraded Red = System health is critical Off = Normal (system off)

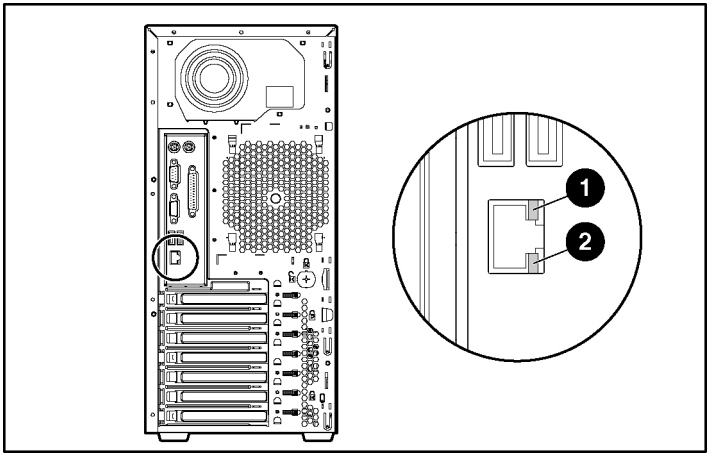
Rear Panel Components



Item	Description
1	Power cord connector
2	Mouse connector
3	Keyboard connector
4	Serial connector

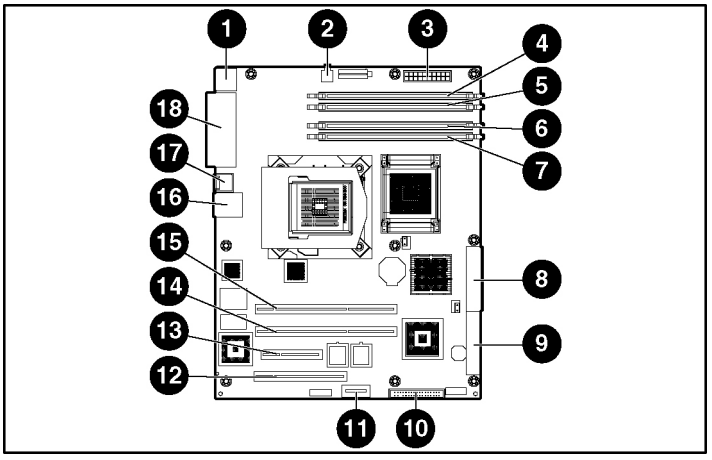
Item	Description
5	Video connector
6	USB connectors (2)
7	RJ-45 Ethernet connector
8	Parallel connector

Rear Panel LEDs and Buttons



Item	Description	Status
1	10/100/1000 NIC link LED	On = Link Off = No link
2	10/100/1000 NIC standby LED	Flashing = Activity Off = No activity

System Board Components



Item	Description	Item	Description
1	Mouse/keyboard connectors	10	Diskette drive connector
2	Processor power connector	11	RILOE connector
3	Power supply connector	12	32-bit PCI slot
4	DIMM slot 4 (Channel B)	13	PCI Express x4 slot *
5	DIMM slot 3 (Channel B)	14	PCI-X slot 2
6	DIMM slot 2 (Channel A)	15	PCI-X slot 1
7	DIMM slot 1 (Channel A)	16	RJ-45 connector
8	IDE connector	17	USB connectors (2)
9	SATA connector	18	Serial/video/parallel ports

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

System Maintenance Switch

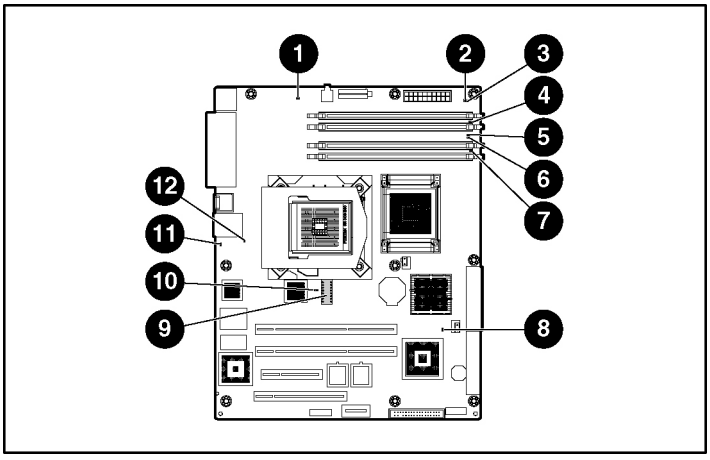
The system maintenance switch (SW1) is a six-position switch that is used for system configuration. The default position for all six positions is Off.

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

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

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

System Board LEDs



Item	LED Description	Status
1	PPM error	Off = Normal Amber = PPM failed or missing
2	Multibit error	Off = Normal Amber = A multibit error has occurred
3	Single bit error	Off = Normal Amber = Single bit error limit has been exceeded
4	DIMM 4 failure	Off = Normal Amber = DIMM 4 has failed or is missing
5	DIMM 3 failure	Off = Normal Amber = DIMM 3 has failed or is missing
6	DIMM 2 failure	Off = Normal Amber = DIMM 2 has failed or is missing
7	DIMM 1 failure	Off = Normal Amber = DIMM 1 has failed or is missing

Item	LED Description	Status
8	Power good	Off = Normal Green = Power failed
9	Processor failure	Off = Normal Amber = Processor has failed
10	System temperature alert	Off = Normal Amber = System temperature has exceeded OS cautionary level
11	System fan failure	Off = Normal Amber = System fan has failed or is missing
12	Processor fan failure	Off = Normal Amber = Processor fan has failed or is missing

System LEDs and Internal Health LED Combinations

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

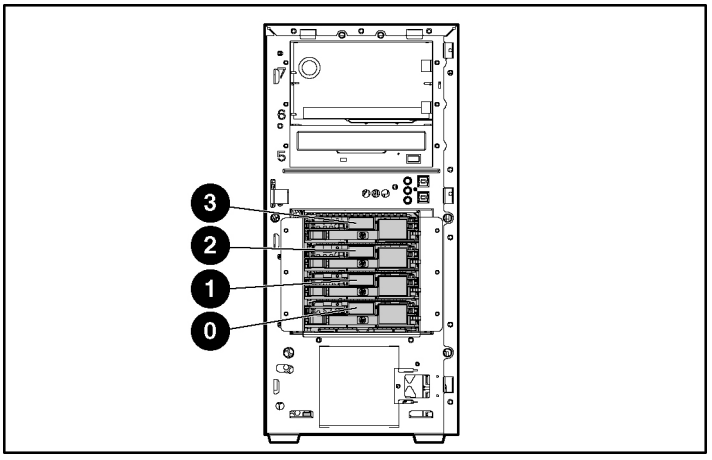
NOTE: The system management driver must be installed in order for the internal health LED to provide pre-failure and warranty conditions.

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

System LED and Color	Internal Health LED Color	Status
Processor failure, socket *X* (Amber)	Red	One or more of the following conditions may exist: • Processor in socket *X* has failed. • Processor *X* is not installed in the socket. • ROM detected a failed processor during POST.
	Amber	Processor in socket *X* is in a pre-failure condition.

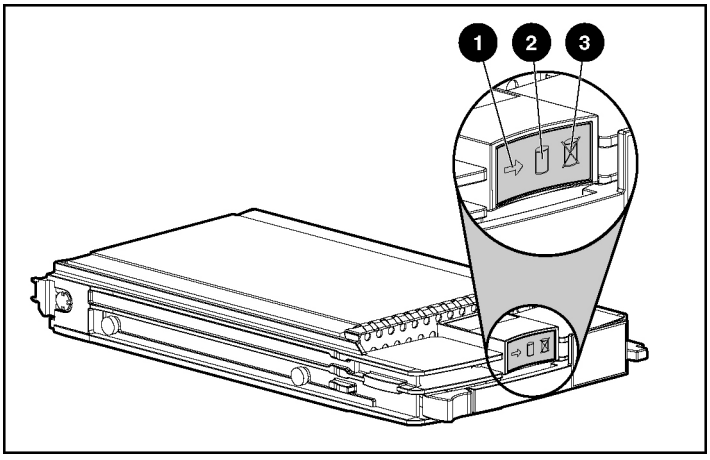
System LED and Color	Internal Health LED Color	Status
PPM failure, slot *X* (Amber)	Red	• PPM in slot *X* has failed. • PPM is not installed in slot *X*, but the corresponding processor is installed.
DIMM failure, slot *X* (Amber)	Red	• DIMM in slot *X* has failed. • DIMM has experienced a multi-bit error.
	Amber	• DIMM in slot *X* has reached single-bit correctable error threshold. • DIMM in slot *X* is in a pre-failure condition.
DIMM bank error (all slots in one bank, Amber)	Red	The bank is not populated entirely or DIMMs do not all match within the bank.
DIMM failure (all slots, Amber)	Red	• No valid or usable memory is installed in the system. • The banks are not populated in the correct order.
System temperature alert (Amber)	Red	System temperature has exceeded OS cautionary level or critical hardware level.
Fan (Amber)	Red	A required fan has failed.
	Amber	A redundant fan has failed.
Power supply backplane failure (Amber)	Red	The power supply backplane has failed.

SCSI IDs



Item	Description
0	SCSI ID 0
1	SCSI ID 1
2	SCSI ID 2
3	SCSI ID 3

Hot-Plug SCSI Hard Drive LEDs

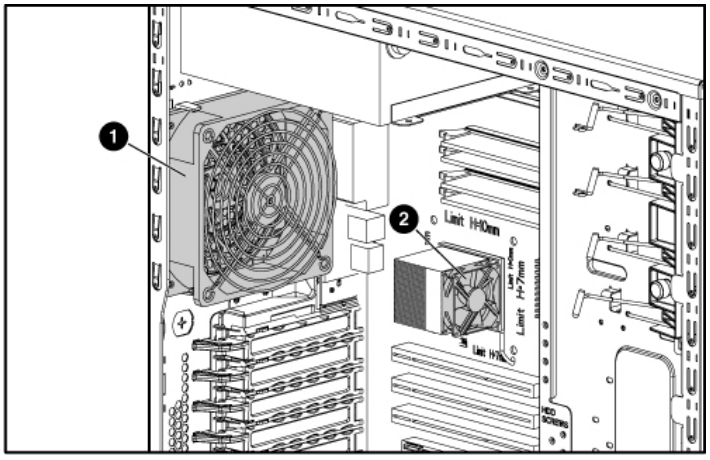


Item	LED Description	Status
1	Activity status	On = Drive activity Flashing = High activity on the drive or drive is being configured as part of an array. Off = No drive activity
2	Online status	On = Drive is part of an array and is currently working. Flashing = Drive is actively online. Off = Drive is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

Identifying Fans



Item	Description
1	System fan
2	Processor fan

Server Operations

In This Section

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.

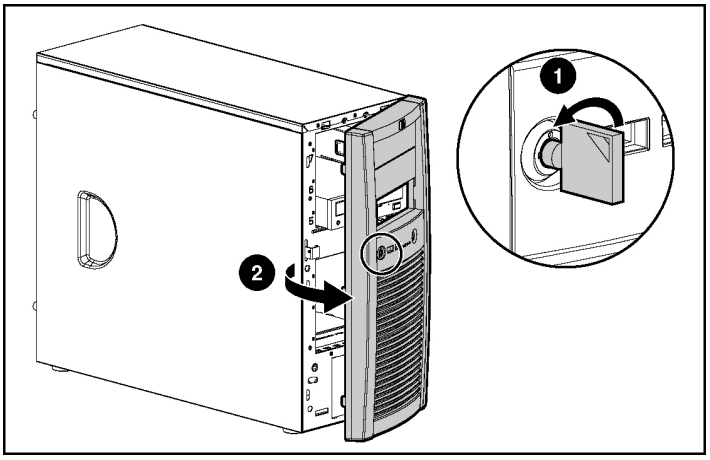
1. Shut down the OS as directed by the OS documentation.
2. Press the Power On/Standby button to place the server in standby mode. When the server enters standby power mode, the system power LED changes to amber.
3. Disconnect the power cords.

The system is now without power.

Unlocking the Tower Bezel

The removable tower bezel must be unlocked and opened before accessing the hard drive cage and before removing the access panel. The bezel must remain closed during normal server operations.

If necessary, remove the tower bezel.



Removing the Access Panel

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

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

1. Power down the server if performing a non-hot-plug installation or maintenance procedure.
2. Extend or remove the server from the rack.

3. Open the tower bezel ("Unlocking the Tower Bezel" on page 22).
4. Loosen the two captive thumbscrews.
5. Slide the access panel toward the rear of the server, and remove from the server.

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

Server Setup

In This Section

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).

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/products/servers/platforms).

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 Warnings and Cautions

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

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

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

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

 **WARNING: 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.**

 **WARNING: This server is very heavy. 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.**
- **Get help to lift and stabilize the product during installation or removal, especially when the product is not fastened to the rails. When the server weighs more than 22.5 kg (50 lb), at least two people must lift the server into the rack together. A third person may be required to help align the server if the server is installed higher than chest level.**
- **Use caution when installing the server in or removing the server from the rack; it is unstable when not fastened to the rails.**

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

 **WARNING: To reduce the risk of 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.**

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

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

Identifying Tower Server Shipping 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 all SKUs)
- Mouse
- Hardware documentation, Documentation CD, and software products

In addition to the supplied items, you may need:

- 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 37)."

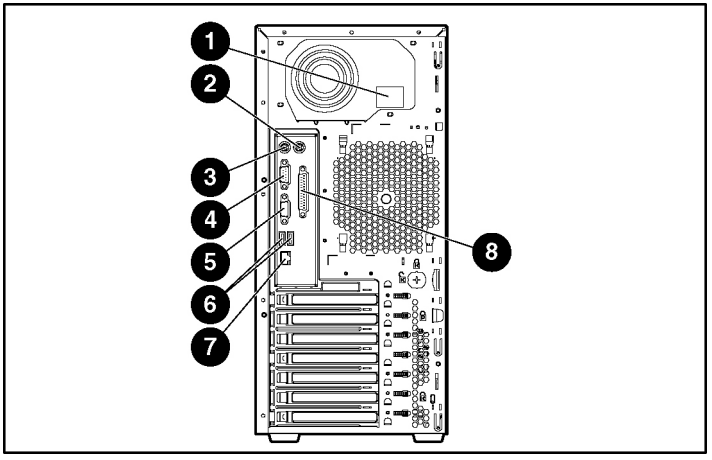
Setting up a Tower Server

Follow the steps in this section to set up a tower model server.

1. Connect peripheral devices to the server.

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*.



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

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.**

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, such as the settings for language and operating system, using RBSU. The system is set up by default for the English language and a Microsoft® Windows® 2000 installation.

For more information on the automatic configuration, refer to the *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

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 and Heatsink

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

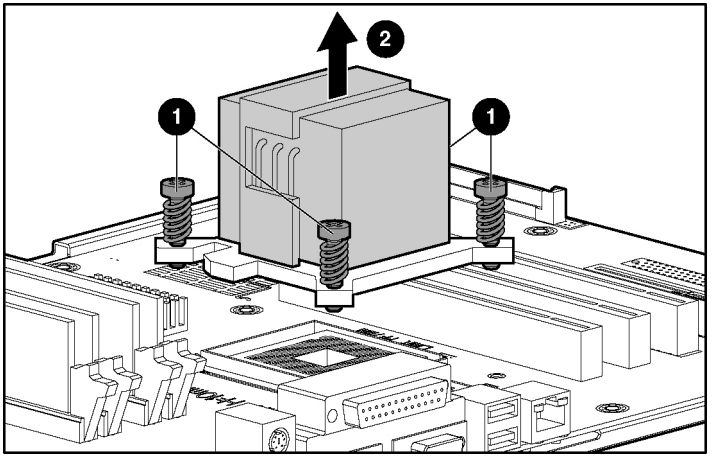
To remove the component:

1. Power down the server.
2. Remove the access panel ("Removing the Access Panel" on page 22).
3. Disconnect the fan cable from the system board.
4. Loosen the four heatsink retaining screws.

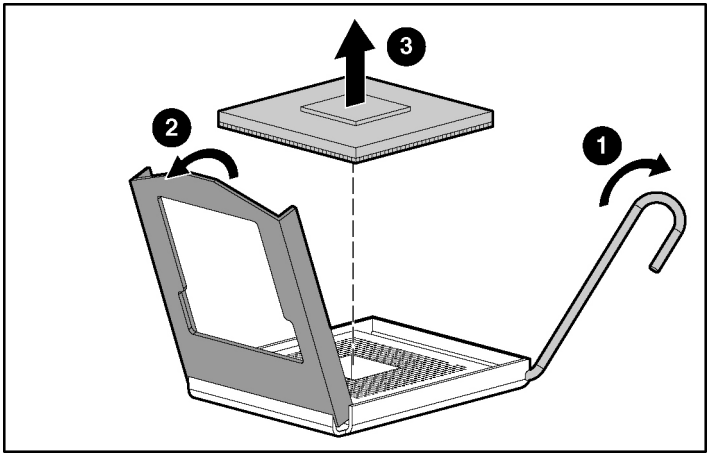
CAUTION: Heatsink retaining screws should be removed in diagonally opposite pairs (in an "X" pattern).

CAUTION: The pins on the processor socket are very fragile. Any damage to them may require replacing the system board.

5. Remove the heatsink fan assembly



6. Release the processor locking lever, and remove the processor.

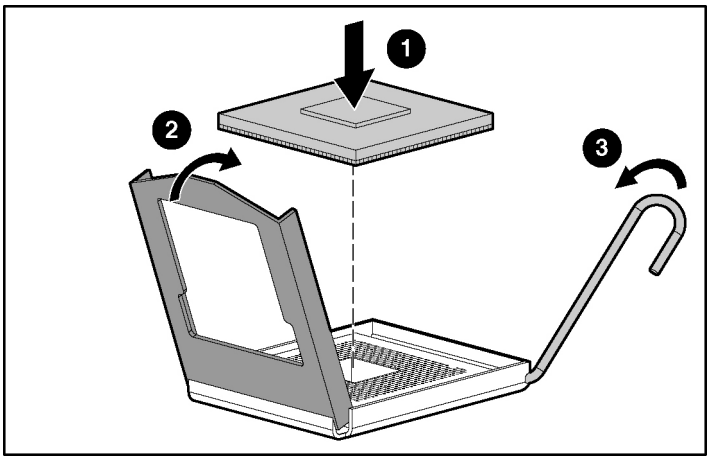


To replace the component:

1. Open the processor retaining bracket.
2. Place the processor into the processor socket.
3. Close the processor locking lever.

CAUTION: To prevent possible server malfunction or damage to the equipment, be sure to align the processor pins with the corresponding holes in the socket.

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

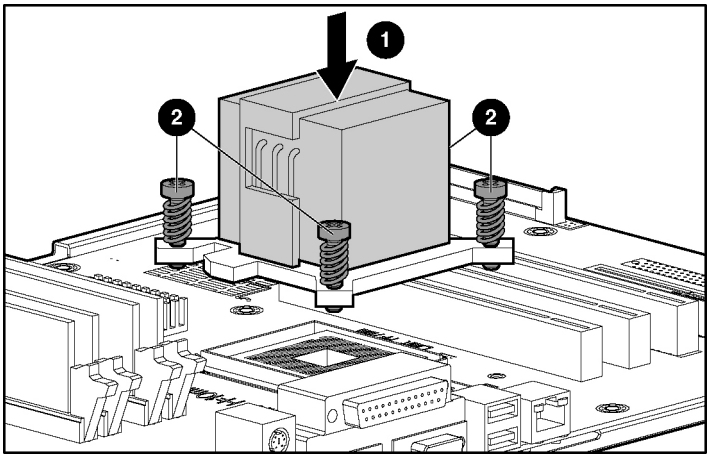


4. Prepare the heatsink for installation:
   a. If reusing the heatsink, clean the bottom of the heatsink with the provided alcohol pad then apply a thin layer of thermal grease to the top of the processor.

      NOTE: HP recommends ShinEtsu G751 thermal grease compound for this server.

   b. If installing a new heatsink, remove the protective covering.
5. Install the heatsink fan assembly.
6. Tighten the four heatsink retaining screws.

CAUTION: Heatsink retaining screws should be tightened in diagonally opposite pairs (in an "X" pattern).



7. Connect the fan cable to the system board.
8. Replace the access panel ("Removing the Access Panel" on page 22).

Memory Options

You can expand server memory by installing PC-3200 DDR SDRAM DIMMs with Advanced ECC. The system supports up to four DIMMs for a maximum of 4 GB.

Refer to "System Board Components (on page 11)" for DIMM slot locations and bank assignments.

DIMM Installation Guidelines

Observe the following guidelines when installing additional memory:

- DIMMs installed in the server must be Unbuffered DDR DRAM, 2.5 volts, 64 bits wide, and ECC.
- If only a single DIMM is installed, it must be installed in slot 1A.

- All DIMMs installed must be the same speed.

BIOS detects the DIMM population and sets the system as follows:

- Single-channel mode: DIMMs installed in one channel only.
- Dual-channel asymmetric mode: DIMMs installed in both channels but of unequal capacities per channel.
- Dual-channel interleaved mode: DIMMs installed in both channels with equal channel capacities.

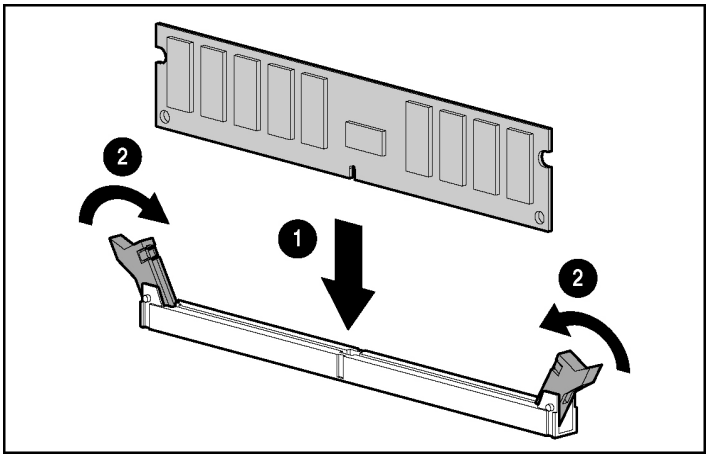
The following table lists some, but not all, possible configurations. For best performance, HP recommends dual-channel interleaved mode configurations.

Slot 1A	Slot 2A	Slot 3B	Slot 4B	Total Memory	Mode
128 MB	—	—	—	128 MB	Single-channel
128 MB	—	128 MB	—	256 MB	Dual-channel interleaved
128 MB	128 MB	128 MB	—	384 MB	Dual-channel asymmetric
128 MB	128 MB	128 MB	128 MB	512 MB	Dual-channel interleaved
256 MB	—	—	—	256 MB	Single-channel
256 MB	—	256 MB	—	512 MB	Dual-channel interleaved
512 MB	—	—	—	512 MB	Single-channel
512 MB	—	512 MB	—	1 GB	Dual-channel interleaved
1 GB	—	—	—	1 GB	Single-channel
1 GB	—	1 GB	—	2 GB	Dual-channel interleaved
1 GB	1 GB	1 GB	—	3 GB	Dual-channel asymmetric
1 GB	1 GB	1 GB	1 GB	4 GB	Dual-channel interleaved

Installing DIMMs

1. Power down the server.
2. Remove the access panel ("Removing the Access Panel" on page 22).

3. Open the DIMM slot latches.
4. Install the DIMM.



5. Install the access panel ("Removing the Access Panel" on page 22).

Hard Drive Options

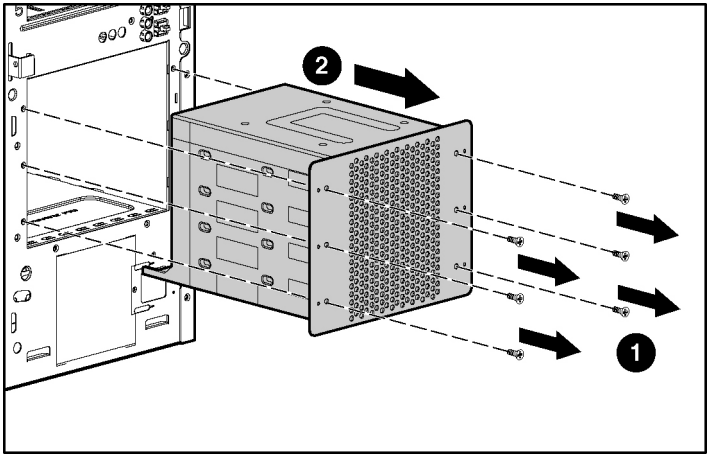
The server supports non-hot-plug SCSI hard drives, hot-plug SAS hard drives, and hot-plug SATA hard drives. Hot-plug SATA hard drives are interchangeable with hot-plug SAS hard drives when the optional SAS controller ("SAS Controller" on page 50) is installed.

Hard Drive Model	Drives Supported	Additional Required Components
Non-hot-plug SATA	SATA	N/A
Non-hot-plug SCSI	SCSI	N/A
Hot-plug SATA/SAS	SATA, SAS	SAS controller required for hot-plug SAS hard drive

Non-Hot-Plug SATA Hard Drive

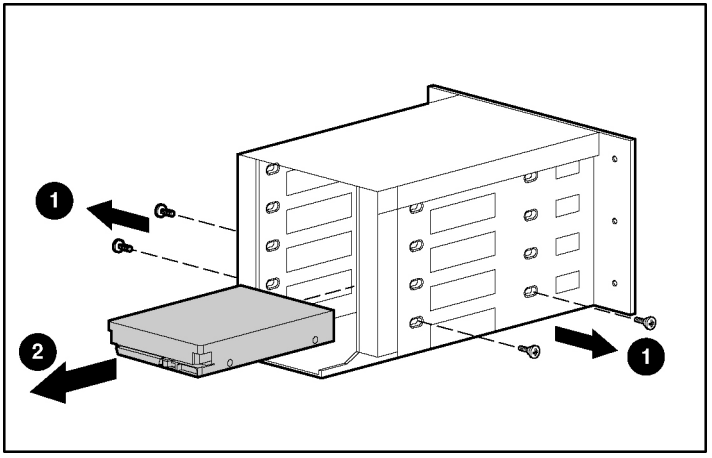
To remove the component:

1. Power down the server.
2. Remove the access panel ("Removing the Access Panel" on page 22).
3. Disconnect the power and data cables from the rear of the hard drive.
4. Remove the drive cage from the chassis.



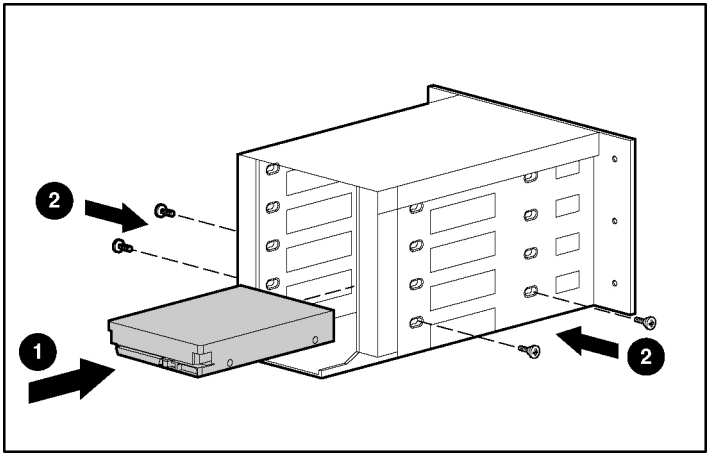
5. Remove the six Torx screws that secure the drive cage to the chassis.

6. Remove the hard drive.

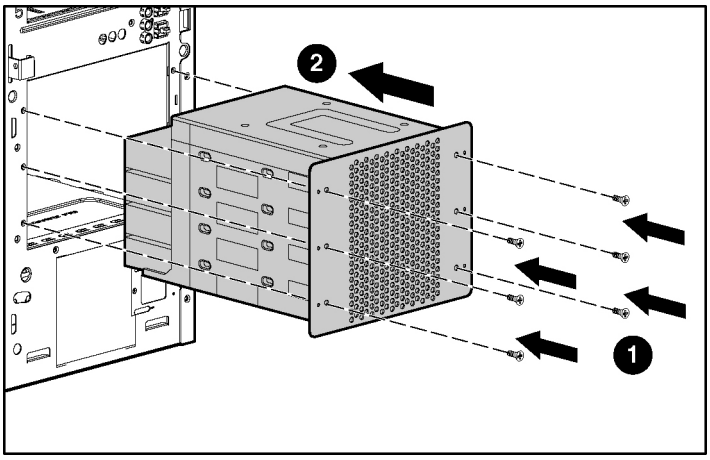


To replace the component:

1. Install the non-hot-plug SATA hard drive into the drive cage.



2. Install the drive cage into the chassis, and secure with the six (6) Torx screws.



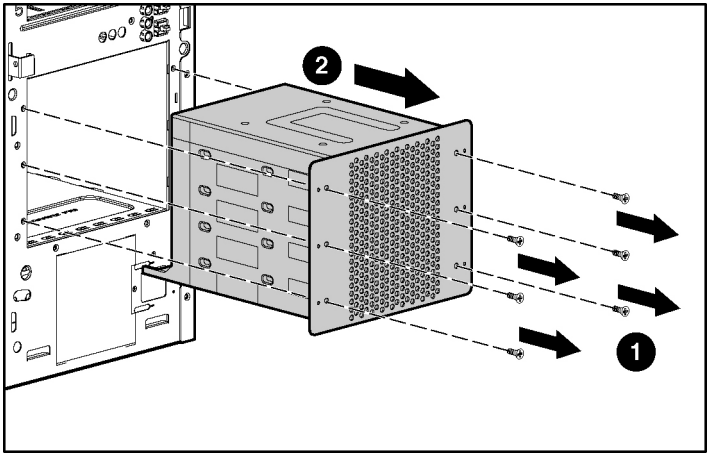
3. Connect the data and power cables to the rear of the installed hard drive.

Non-Hot-Plug SCSI Hard Drive

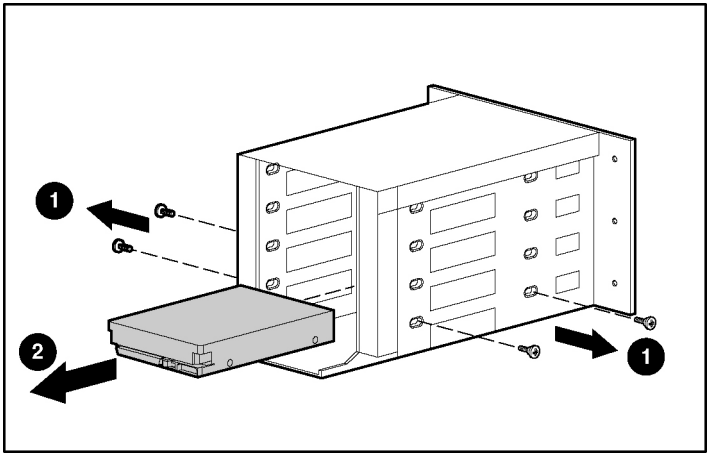
To remove the component:

1. Power down the server.
2. Remove the access panel ("Removing the Access Panel" on page 22).
3. Disconnect the power and data cables from the rear of the hard drive.

4. Remove the drive cage from the chassis.

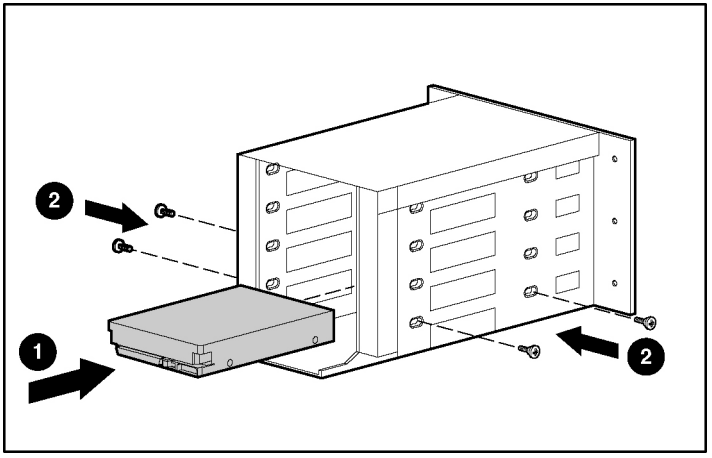


5. Remove the six Torx screws that secure the drive cage to the chassis.
6. Remove the hard drive.

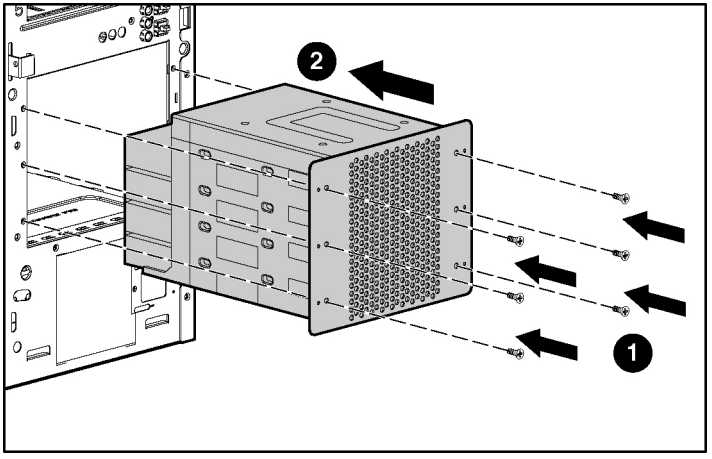


To replace the component:

1. Install the non-hot-plug SCSI hard drive into the drive cage.



2. Install the drive cage into the chassis, and secure with the six Torx screws.



3. Connect the data and power cables to the rear of the installed hard drive.

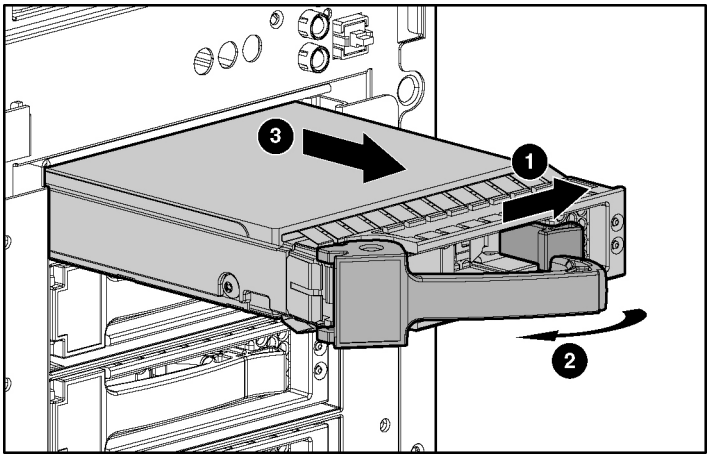
Hot-Plug SATA and SAS Hard Drives

Hot-plug SATA and hot-plug SAS hard drives can be used interchangeably when a SAS controller is installed. The SATA controller is embedded, but before installing a hot-plug SAS hard drive, install the SAS controller ("SAS Controller" on page 50).

To remove the component:

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

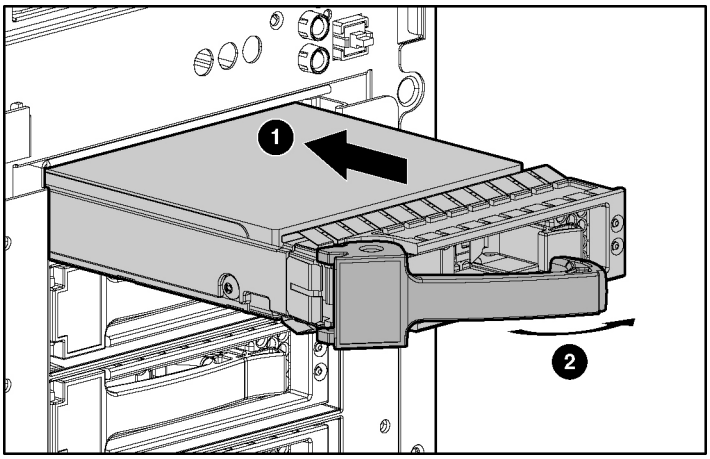
1. Determine the status of the hard drive from the hot-plug hard drive LEDs ("Hot-Plug SCSI Hard Drive LED Combinations" on page 18, "Hot-Plug SCSI Hard Drive LEDs" on page 17).
2. Back up all server data on the hard drive.
3. Disconnect the cables from the hot-plug SATA or SAS drive cage.
4. Remove the hard drive.



To replace the component:

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

2. Install the hard drive.



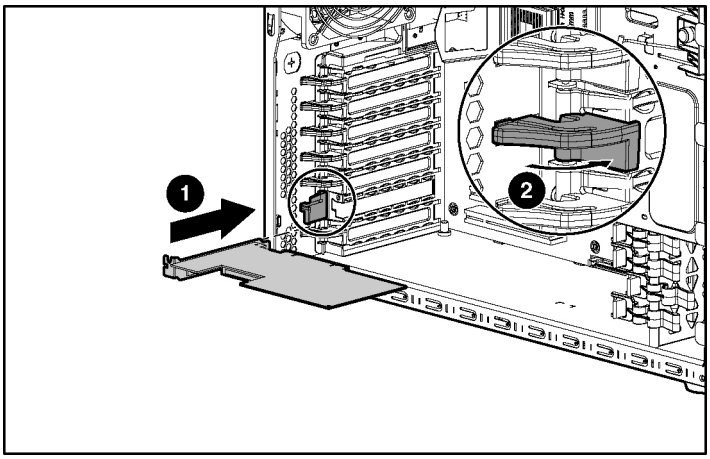
3. Determine the status of the hard drive from the hot-plug hard drive LEDs ("Hot-Plug SCSI Hard Drive LED Combinations" on page 18, "Hot-Plug SCSI Hard Drive LEDs" on page 17).
4. Resume normal server operations.

SAS Controller

To install the component:

1. Power down the server.
2. Remove the access panel ("Removing the Access Panel" on page 22).
3. Remove the expansion slot cover ("Expansion Slot Cover" on page 54).

4. Install the SAS controller, and press it down to seat.



5. Disconnect the SAS cable from the system board and connect it to the SAS controller.
6. Be sure the SAS cable is properly connected to the SAS controller and drive backplane.

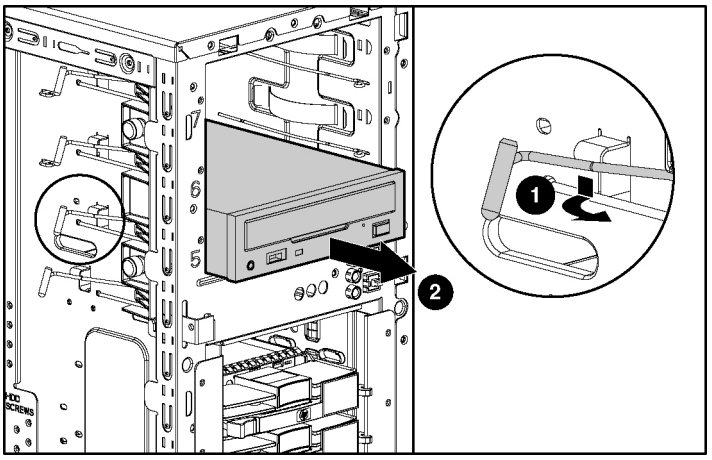
Removing the CD-ROM Drive

Before installing the drive option kit, the CD-ROM drive must be removed.

To remove the component:

1. Power down the server.
2. Remove the access panel ("Removing the Access Panel" on page 22).
3. Disconnect the cables from the rear of the CD-ROM drive.

4. Push up on the release lever and push the drive partially out through the front of the server.



5. Remove the CD-ROM drive.

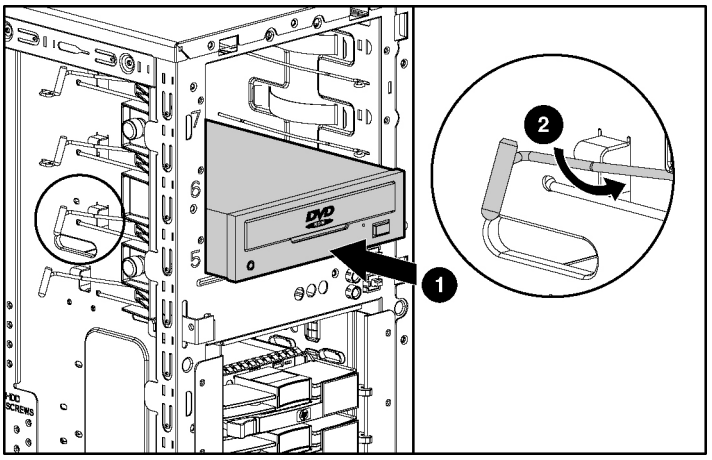
CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

DVD-ROM Drive

To install the component:

1. Power down the server.
2. Remove the access panel ("Removing the Access Panel" on page 22).

3. Slide the DVD-ROM drive into the DVD-ROM drive bay.



4. Secure the DVD-ROM drive cable to the DVD-ROM drive cable connector on the system board.

Optional Diskette Drive

When using operating systems that support USB, the server supports USB devices, including, but not limited to:

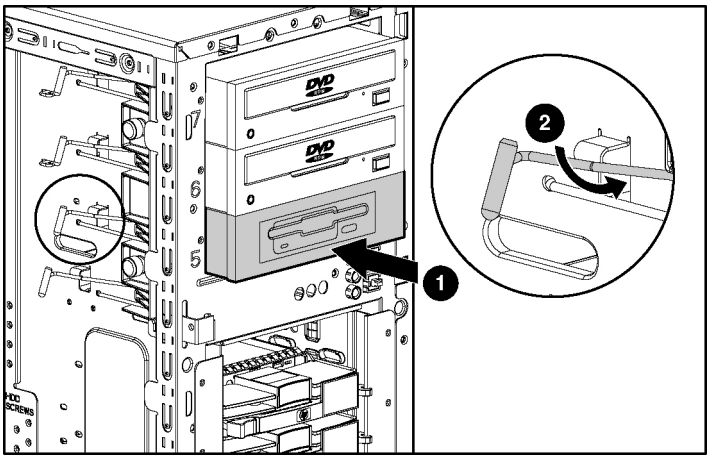
- CD-ROM drives
- Diskette drives
- Keyboard
- Mouse

For other operating systems, the ROM provides USB support for a keyboard, mouse, and diskette drives, which do not support USB, but not for CD-ROM drives.

ROM legacy USB support is available during POST and while the operating system is running. The maximum device support is two USB keyboards, two USB mouse devices, and one layer of hubs.

To install the component:

1. Power down the server.
2. Slide the diskette drive into the diskette drive bay.



3. Secure the diskette drive cable to the diskette drive cable connector on the system board.

Expansion Boards

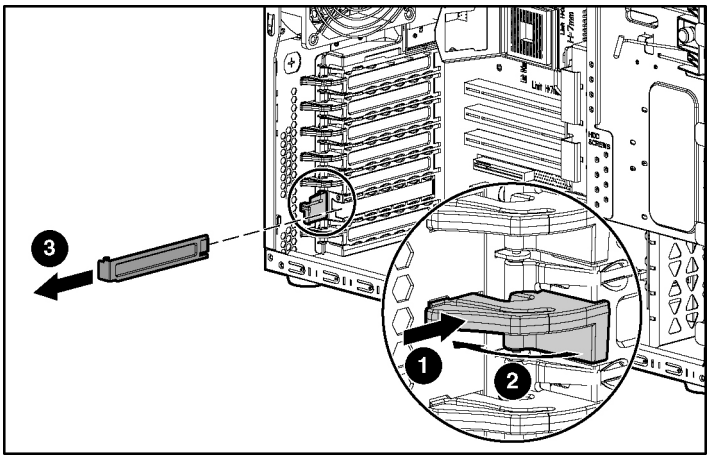
The server supports PCI, PCI-X, and PCI Express expansion boards.

Slot	Expansion card type	Connector	Capable speed
1	PCI-X	64 bit, 3.3 volt	100 MHz
2	PCI-X	64 bit, 3.3 volt	100 MHz
3	PCI Express	x8	x4
4	PCI	32-bit, 3.3 volt	33 MHz

Expansion Slot Cover

1. Power down the server.
2. Remove the access panel ("Removing the Access Panel" on page 22).

3. Remove the expansion slot cover.



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

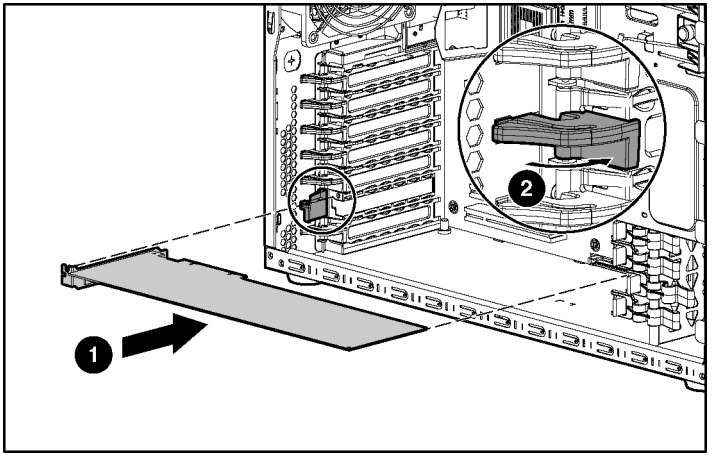
To replace the component, reverse the removal procedure.

Installing Expansion Boards

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.

1. Power down the server.
2. Remove the access panel ("Removing the Access Panel" on page 22).
3. Remove the expansion slot cover ("Expansion Slot Cover" on page 54).

4. Install the expansion board, and press it down to seat.



5. Connect any required internal or external cables to the expansion board. Refer to the documentation that ships with the expansion board.

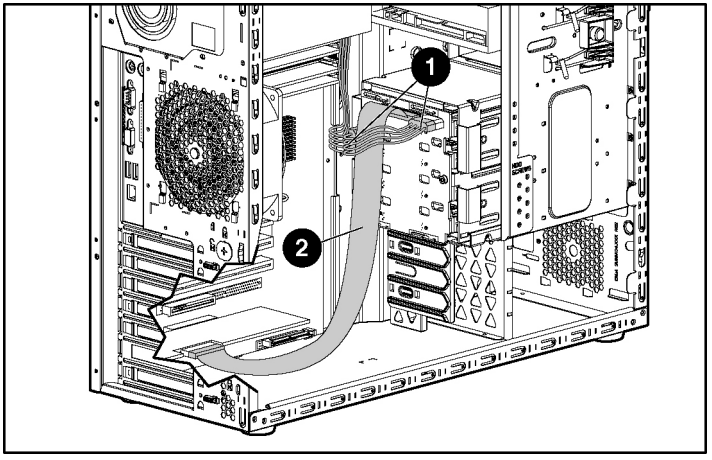
Server Cabling

In This Section

Server Cabling

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

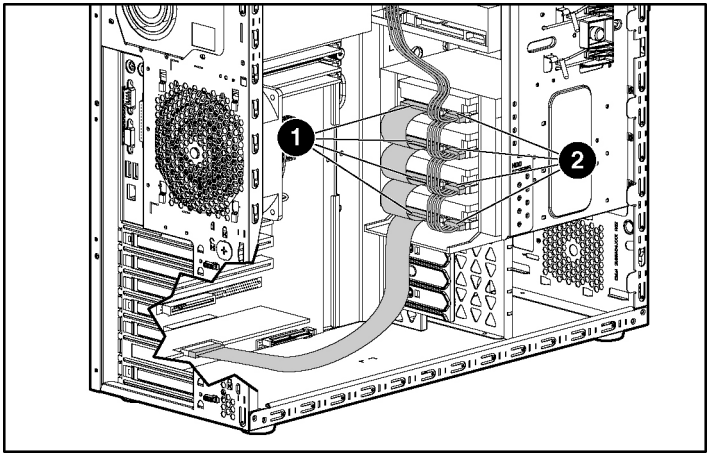
Hot-Plug SCSI Cabling



Item	Cable Description
1	Power cable

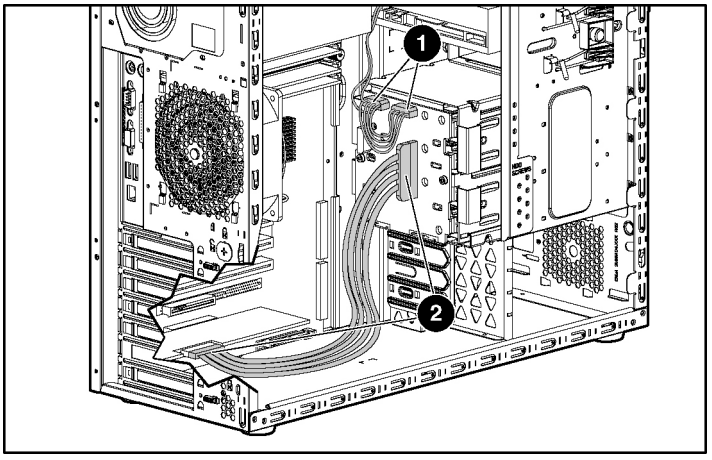
Item	Cable Description
2	SCSI cable

Non-Hot-Plug SCSI Cabling



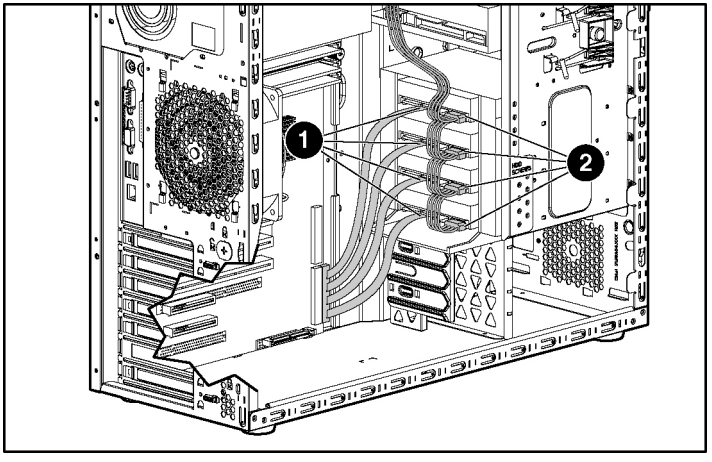
Item	Cable Description
1	SCSI cable
2	Power cable

Hot-Plug SATA Cabling



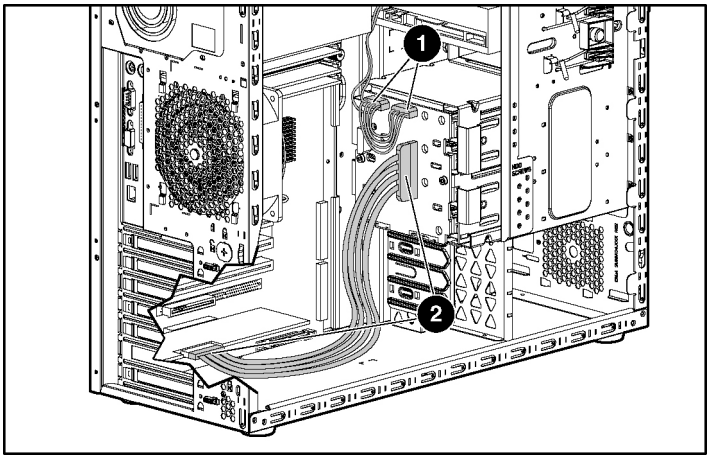
Item	Cable Description
1	Power cable
2	SATA cable

Non-Hot-Plug SATA Cabling



Item	Cable Description
1	SATA cable
2	Power cable

SAS Cabling



Item	Cable Description
1	Power cable
2	SAS cable

Server Software and Configuration Utilities

In This Section

Configuration Tools

List of Tools:

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 73)
- 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 65), Array Diagnostics Utility ("Array Diagnostic Utility" on page 72), and Erase Utility (on page 69)

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).

HP ROM-Based Setup Utility

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

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

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

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

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).

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 ("SmartStart Software" on page 61).

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).

USB Support and Functionality

USB Support (on page 71)

Internal USB Functionality (on page 71)

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).

Internal USB Functionality

An internal USB connector is available for use with USB drive keys only. The internal connector shares the same bus with the front external USB connector, and connecting a device to both the front internal and front external USB connectors is not supported. This solution provides for use of a permanent boot drive from a USB drive key installed in the front internal connector, avoiding issues of clearance on the front of the rack and physical access to secure data.

For additional security, you can individually disable the front, rear, and internal USB connectors through RBSU. Disabling the rear USB connectors in RBSU disables both rear USB ports.

Diagnostic Tools

List of Tools:

Survey Utility

Survey Utility, a feature within Insight Diagnostics, gathers critical hardware and software information on ProLiant servers.

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).

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

Survey Utility is installed with every SmartStart-assisted installation or can be installed through the HP PSP.

Array Diagnostic Utility

ADU is a Windows-based tool that collects information about array controllers and generates a list of detected problems. For a list of error messages, refer to "ADU Error Messages."

ADU can be accessed from the SmartStart CD ("SmartStart Software" on page 61).

HP Insight Diagnostics

The HP Insight Diagnostics utility displays information about the server hardware and tests the system to be sure it is operating properly. The utility has online help and can be accessed using the SmartStart CD. Online Diagnostics for Microsoft® Windows® is available for download from the HP website (http://www.hp.com/support).

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

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 (on page 61) 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.

Resource Paqs

Resource Paqs are operating system-specific packages of tools, utilities, and information for HP servers running certain Microsoft® or Novell operating systems. The Resource Paqs include utilities to monitor performance, software drivers, customer support information, and whitepapers on the latest server integration information. Refer to the Enterprise Partnerships website (http://h18000.www1.hp.com/partners), select **Microsoft** or **Novell**, depending on the operating system, and follow the link to the appropriate Resource Paq.

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).

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).

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:

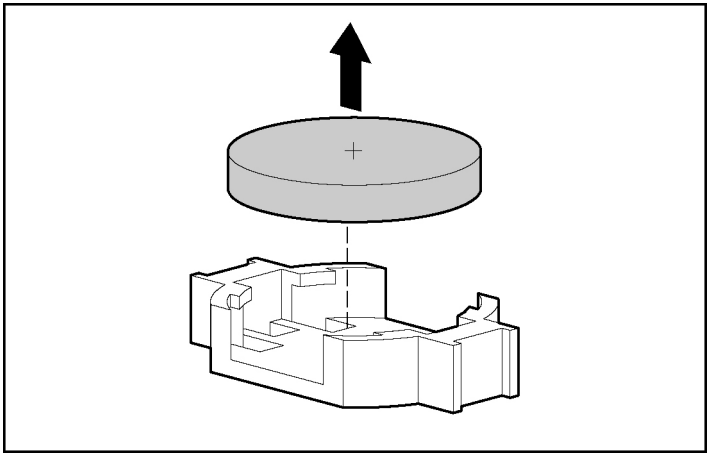
- **Do not attempt to recharge the battery.**
- **Do not expose the battery to temperatures higher than 60°C (140°F).**
- **Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.**
- **Replace only with the spare designated for this product.**

To remove the component:

1. Power down the server.
2. Extend or remove the server from the rack.
3. Remove the access panel ("Removing the Access Panel" on page 22).
4. Remove the PCI riser cage.

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 PCI riser cage.

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.

Troubleshooting

In This Section

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 86)," 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 88)." 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.

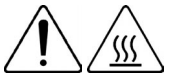
WARNING: To reduce the risk of injury from electric shock hazards, do not open this enclosure. Refer all maintenance, upgrades, and servicing to qualified personnel.

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.

25-41 kg

55-90 lbs

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

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

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

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

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.**

25-41 kg

55-90 lbs

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 113) 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.

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 113) 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 73) 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.

Service Notifications

To find out the latest service notifications, refer to the HP website (http://www.hp.com/products/servers/platforms). Select the appropriate server model, and then click the **Documentation** link on the product page.

Loose Connections

Action:

- Be sure all power cords are securely connected.
- Be sure all cables are properly aligned and securely connected for all external and internal components.
- Remove and check all data and power cables for damage. Be sure no cables have bent pins or damaged connectors.
- If a fixed cable tray is available for the server, be sure the cords and cables connected to the server are correctly routed through the tray.
- Be sure each device is properly seated.
- If a device has latches, be sure they are completely closed and locked.
- Check any interlock or interconnect LEDs that may indicate a component is not connected properly.
- If problems continue to occur, remove and reinstall each device, checking the connectors and sockets for bent pins or other damage.

Diagnostic Steps

To effectively troubleshoot a problem, HP recommends that you start with the first flowchart in this section, "Start Diagnosis Flowchart (on page 86)," 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 88)." 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:

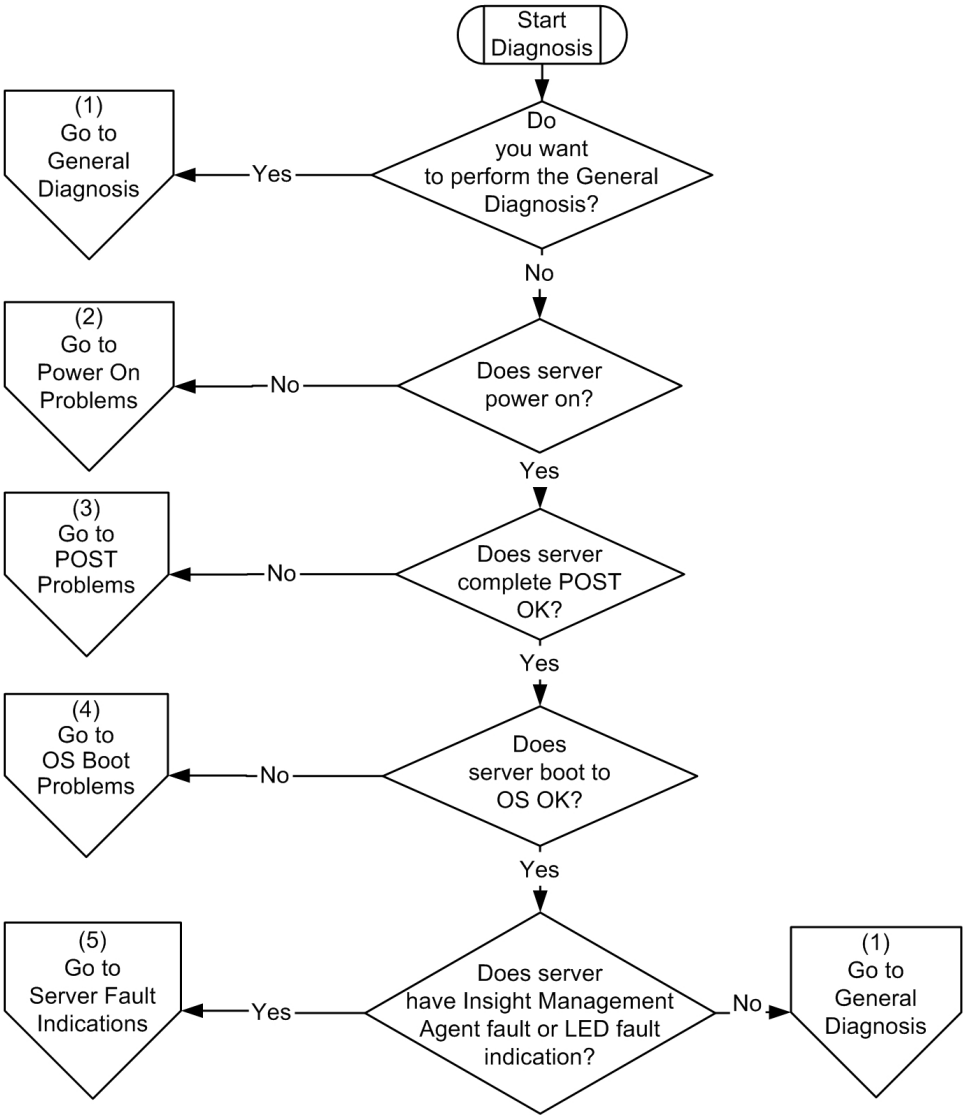
- Start Diagnosis Flowchart (on page 86)
- General Diagnosis Flowchart (on page 88)
- Power-On Problems Flowchart (on page 90)
- POST Problems Flowchart (on page 93)
- OS Boot Problems Flowchart (on page 95)
- Server Fault Indications Flowchart (on page 98)

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.

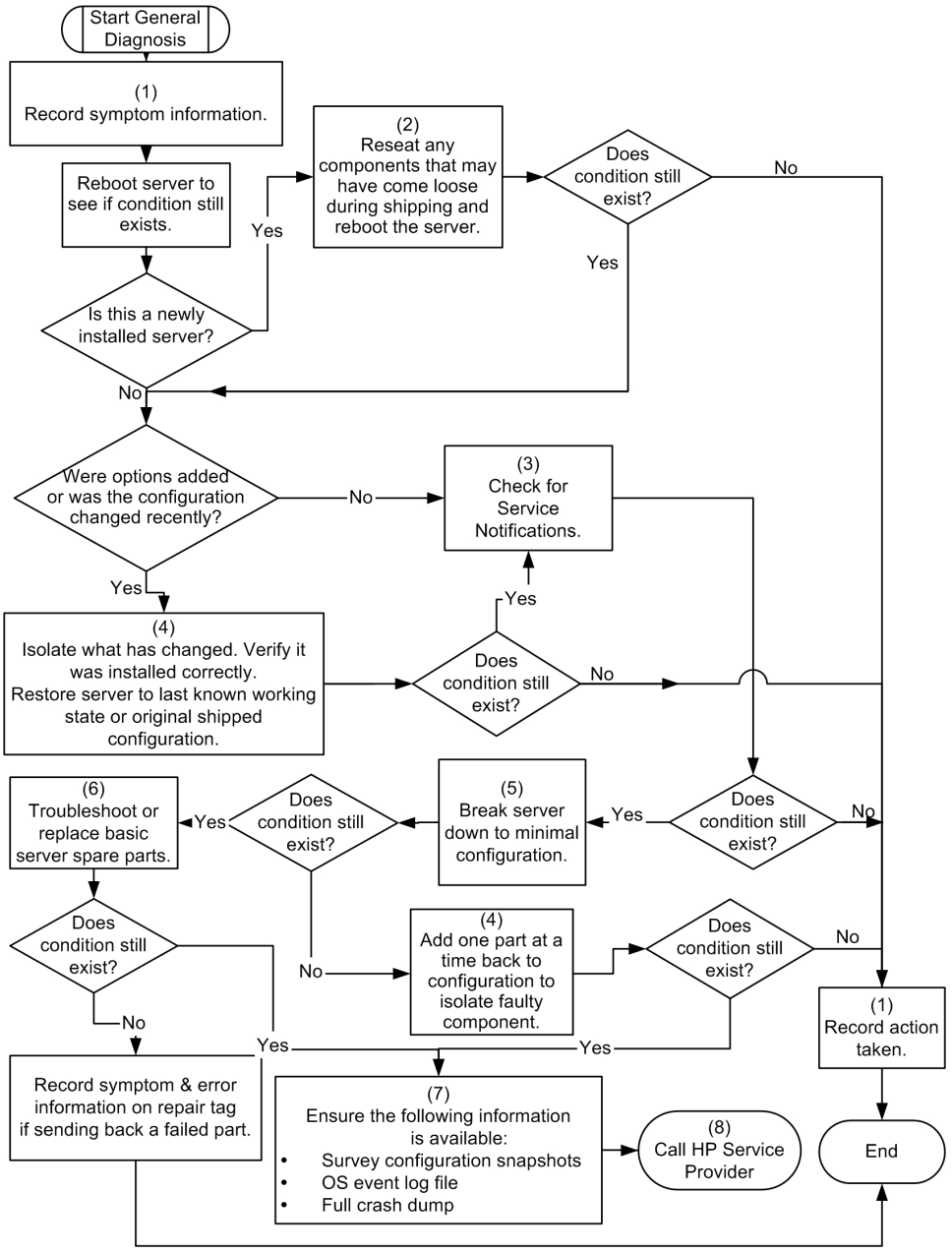
Item	Refer to
1	"General Diagnosis Flowchart (on page 88)"
2	"Power-On Problems Flowchart (on page 90)"
3	"POST Problems Flowchart (on page 93)"
4	"OS Boot Problems Flowchart (on page 95)"
5	"Server Fault Indications Flowchart (on page 98)"


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 84)"
2	"Loose Connections (on page 85)"
3	"Service Notifications (on page 85)"
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.
Yes
(2) Reseat any components that may have come loose during shipping and reboot the server.
Does condition still exist?
No
Yes
Is this a newly installed server?
No
Were options added or was the configuration changed recently?
No
(3) Check for Service Notifications.
Yes
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?
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.
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:

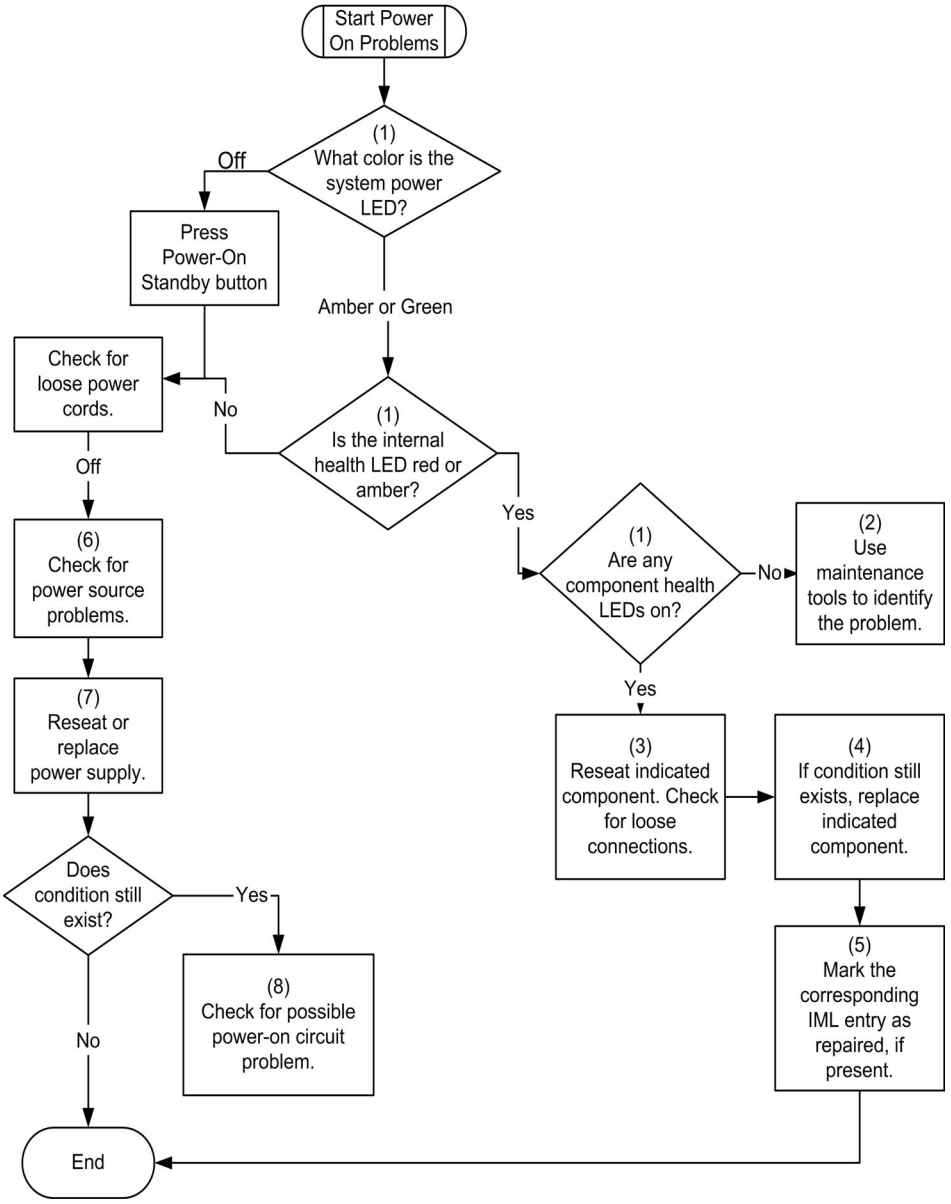
- The server does not power on.
- The system power LED is off or amber.
- The internal health LED is red or amber.

Possible causes:

- Improperly seated or faulty power supply
- Loose or faulty power cord
- Power supply cord improperly seated to system board
- 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 73)"
3	"Loose Connections (on page 85)"
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 73)" or in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support).
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) What color is the system power LED?
Off
Press Power-On Standby button
Amber or Green
Check for loose power cords.
No
(1) Is the internal health LED red or amber?
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
End
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.

POST Problems Flowchart

Symptoms:

- Server does not complete POST

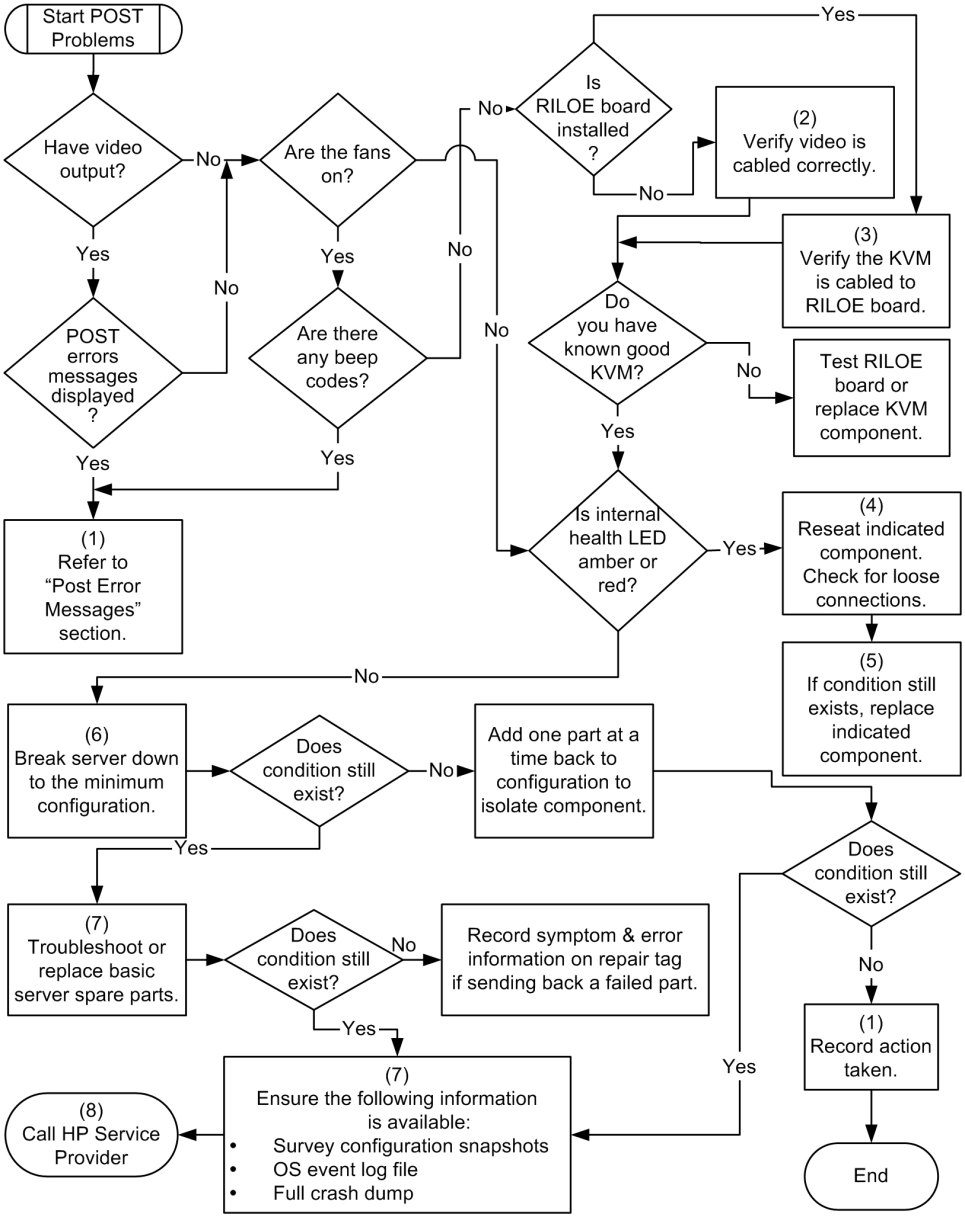
  NOTE: The server has completed POST when the system attempts to access the boot device.

- 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
4	"Loose Connections (on page 85)"
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)
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.
(3) Verify the KVM is cabled to RILOE board.
Yes
No
POST errors messages displayed ?
Yes
No
Are there any beep codes?
Yes
No
Do you have known good KVM?
No
Test RILOE board or replace KVM component.
Yes
(1) Refer to "Post Error Messages" section.
Is internal health LED amber or red?
Yes
(4) Reseat indicated component. Check for loose connections.
(5) If condition still exists, replace indicated component.
No
(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
(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.
Yes
Does condition still exist?
No
(1) Record action taken.
End
Yes
(7) Ensure the following information is available:
• Survey configuration snapshots
• OS event log file
• Full crash dump
(8) Call HP Service Provider

OS Boot Problems Flowchart

Symptoms:

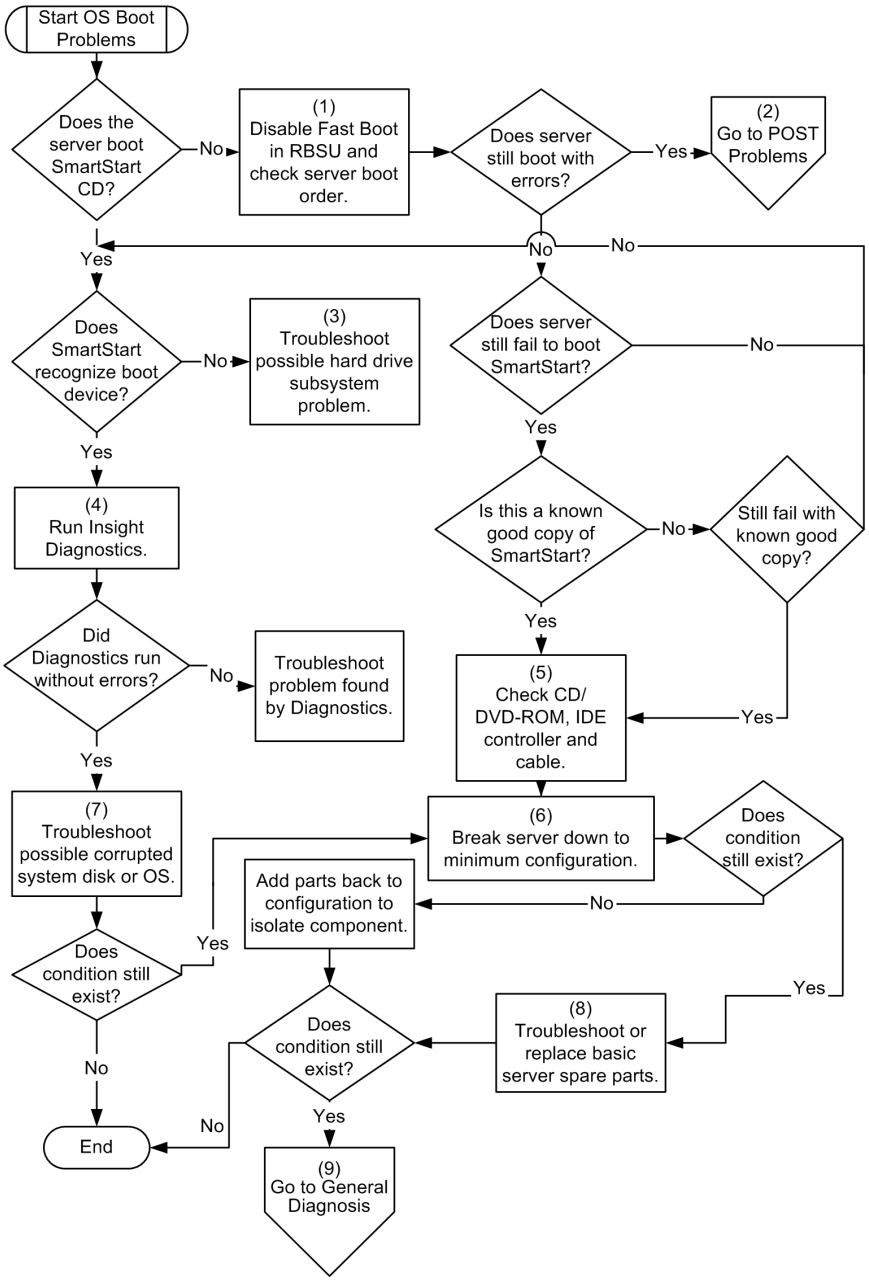
- Server does not boot a previously installed operating system
- Server does not boot SmartStart

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 93)"
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
4	"HP Insight Diagnostics (on page 73)"
5	• "Loose Connections (on page 85)" • "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
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)
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).

Item	Refer to
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 88)"


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
No
Yes
Does SmartStart recognize boot device?
No
(3) Troubleshoot possible hard drive subsystem problem.
Does server still fail to boot SmartStart?
No
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
Does condition still exist?
(8) Troubleshoot or replace basic server spare parts.
No
No
End
Yes
(9) Go to General Diagnosis

Server Fault Indications Flowchart

Symptoms:

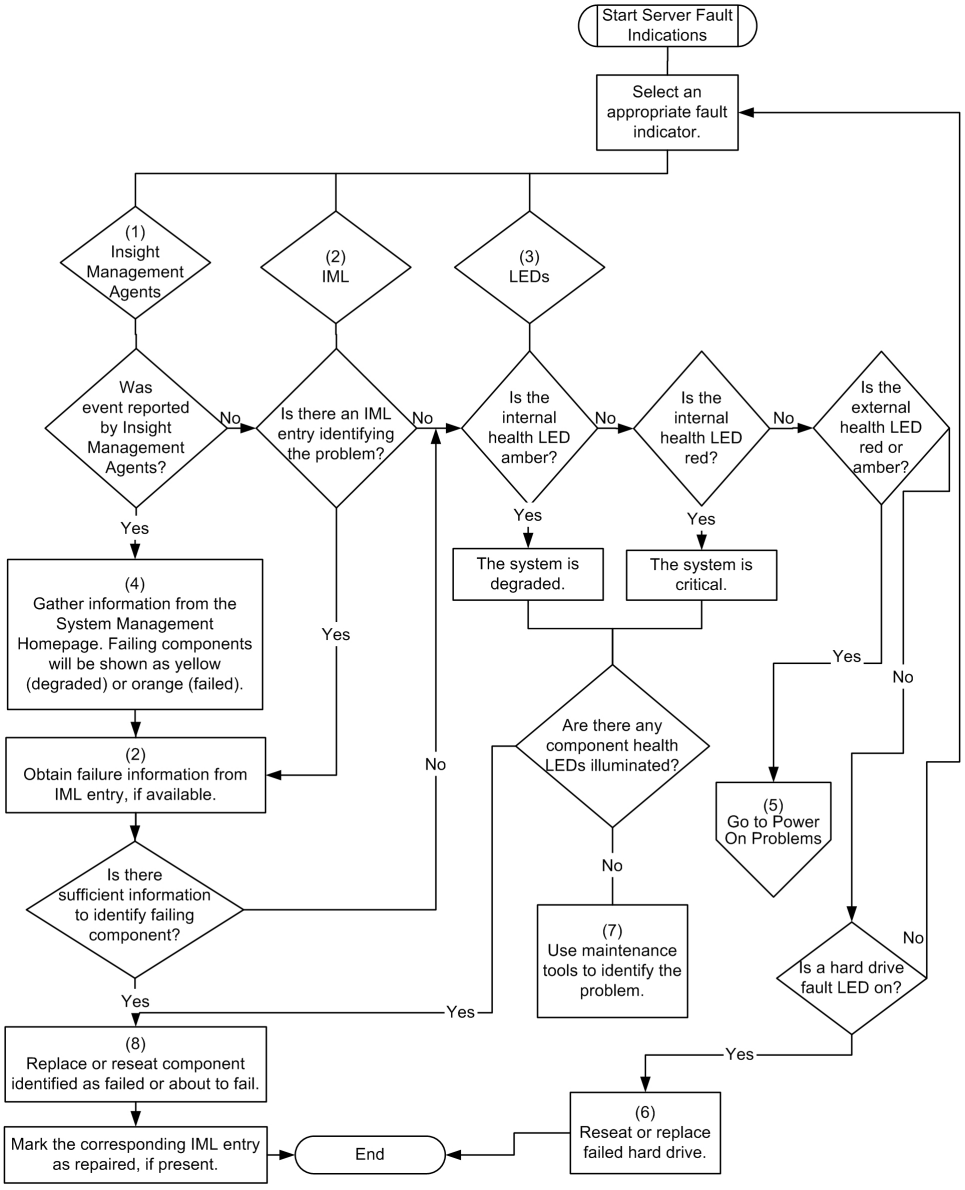
- Server boots, but a fault event is reported by Insight Management Agents (on page 70)
- Server boots, but the internal health LED is red or amber

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 70)"
2	• "Integrated Management Log (on page 73)" • "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 (http://h18013.www1.hp.com/products/servers/management/agents/index.html)
5	"Power-On Problems ("Power-On Problems Flowchart" on page 90)"
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 73)"

Item	Refer to
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.

ROMPaq Disaster Recovery

If both the current and backup versions of the ROM are corrupt, perform ROMPaq disaster recovery procedures:

1. Create a ROMPaq diskette using the Autorun Menu on the SmartStart CD.
2. Power down the server.
3. Insert the ROMPaq diskette.
4. Power up the server ("Powering Up the Server" on page 21).
    a. The server generates one long beep and two short beeps to indicate that you are in disaster recovery mode. If the diskette is not in place, the system continues to beep until a valid ROMPaq diskette is inserted.
    b. The ROMPaq diskette flashes both system ROM images. If successful, a sequence of ascending audible beeps is generated. If unsuccessful, a sequence of descending audible beeps is generated and you need to repeat the disaster recovery process.
5. Power down the server.
6. Remove the ROMPaq diskette.
7. Power up the server ("Powering Up the Server" on page 21).

Manual Recovery

To manually set the server for ROMPaq disaster recovery:

1. Power down the server.
2. Remove the access panel ("Removing the Access Panel" on page 22).
3. Set positions 1, 4, 5, and 6 of the system maintenance switch to On.
4. Insert a ROMPaq diskette with the latest system ROM from the SmartStart CD or the HP website ((http://www.hp.com/support).
5. Install the access panel ("Removing the Access Panel" on page 22).
6. Power up the server ("Powering Up the Server" on page 21).
7. Allow the system to boot completely.

8. Repeat steps 1 and 2.
9. Set positions 1, 4, 5, and 6 of the system maintenance switch to Off.
10. Repeat steps 5 and 6.

Other Information Resources

For additional troubleshooting information, refer to the *HP ProLiant Servers Troubleshooting Guide* on the Documentation CD.

For information on warranties and service and support upgrades (Care Pack services), refer to the HP website (http://www.hp.com/support).

Regulatory Compliance Notices

In This Section

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
- 1-800-652-6672 (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.

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)

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.

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。

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

In This Section

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

In This Section

Server Specifications

Dimensions	Specifications
Height	43 cm (16.93 in)
Depth	50 cm (19.69 in)
Width	20 cm (7.87 in)
Weight (maximum)	22 kg (47.41 lb)
Weight (no drives installed)	16.5 kg (36.24 lb)
Input Requirements	**Specifications**
Rated input voltage	100 VAC to 240 VAC *
Rated input frequency	47 Hz to 63 Hz
Rated input current	10 A (100 V) to 5 A (200 V)
Rated input power	1000 W
BTUs per hour	2730
Power Supply Output	**Specifications**
Rated steady-state power	320 W
Maximum peak power	350 W

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

Environmental Specifications

Temperature range*	Specification

Operating	10°C to 35°C (50°F to 95°F)
Shipping	-10°C to 60°C (14°F to 140°F)
Maximum wet bulb temperature	28°C (82.4°F)
Relative humidity (noncondensing)**	**Specification**
Operating	20% to 80%
Non-operating	20% to 90%

* 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.

Technical Support

In This Section

Related Documents

For related documentation, refer to the Documentation CD.

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).

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

Acronyms and Abbreviations

ABEND

abnormal end

ACU

Array Configuration Utility

ASR

Automatic Server Recovery

DDR

double data rate

DIMM

dual inline memory module

ECC

error checking and correcting

HBA

host bus adapter

IEC

International Electrotechnical Commission

iLO

Integrated Lights-Out

IML

Integrated Management Log

IPL

initial program load

IRQ

interrupt request

LDAP

Lightweight Directory Access Protocol

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-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

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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