HP ProLiant ML530 Generation 2 Server Setup and Installation Guide



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About This Guide

This guide provides IT administrators and technicians step-by-step instructions for installation, and reference information for operation, troubleshooting, and future upgrades for the HP ProLiant ML530 Generation 2 server. The guide explains the standard and optional features of HP ProLiant ML530 Generation 2 servers, how to install hardware options for enhanced system performance, how to install and configure memory, how to install expansion boards, how to install rack and tower models of the servers, and how to cable and configure the servers.

Audience Assumptions

This guide is intended for IT administrators and technicians who are setting up and installing ProLiant ML530 Generation 2 servers. The guide assumes readers have a working knowledge of standard computer hardware, software, operating systems, and server installation equipment and procedures. Readers must also understand standard computer industry terminology and safety procedures regarding moving and working with heavy, electronic equipment.

Important Safety Information

Before installing this product, read the *Important Safety Information* document included with the server.

Symbols on Equipment

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



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



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

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



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

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



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

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



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

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



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

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



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

Weight in kg Weight in lb weigh

Rack Stability

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.

Symbols in Text

These symbols may be found in the text of this guide. They have the following meanings.



WARNING: Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or loss of life.

CAUTION: Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of information.

IMPORTANT: Text set off in this manner presents essential information to explain a concept or complete a task.

NOTE: Text set off in this manner presents additional information to emphasize or supplement important points of the main text.

Related Documents

For additional information on the topics covered in this guide, refer to the following documentation:

- The hardware installation and configuration poster that ships with your server
- The hardware installation and configuration labels located on the inside of the access panel of your server
- The installation documentation that ship with option kits
- The Documentation CD, which includes the following resources:
 - Servers Troubleshooting Guide
 - Remote Insight Lights-Out Edition User Guide
 - ROM-Based Setup Utility Guide
 - PCI Hot Plug Administration Guide
 - Memory installation guide
 - A link to the maintenance and service guide

Getting Help

If you have a problem and have exhausted the information in this guide, you can get further information and other help in the following locations.

Technical Support

In North America, call the HP Technical Support Phone Center at 1-800-652-6672. This service is available 24 hours a day, 7 days a week. For continuous quality improvement, calls may be recorded or monitored. Outside North America, call the nearest HP Technical Support Phone Center. Telephone numbers for worldwide Technical Support Centers are listed on the HP website, www.hp.com.

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

• Technical support registration number (if applicable)

- Product serial number
- Product model name and number
- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level

HP Website

The HP website has information on this product as well as the latest drivers and flash ROM images. You can access the HP website at www.hp.com.

Authorized Reseller

For the name of your nearest authorized reseller:

- In the United States, call 1-800-345-1518.
- In Canada, call 1-800-263-5868.
- Elsewhere, see the HP website for locations and telephone numbers.

Optional Installation Service

You may choose to have HP install your system. The installation service can be purchased as a CarePaq packaged service or as a customized service agreement to meet your specific requirements. Some of the CarePaq services are as follows:

- CarePaq Installation Services for Hardware
- CarePaq Hardware and Operating System Installation for ProLiant Servers
- CarePaq Installation and Start-up Services for Microsoft Windows 2000 and Windows NT operating systems

- CarePaq Installation and Start-up and Migration Services for Novell NetWare operating system
- CarePaq Installation and Start-up Services for Insight Manager

Visit the HP website for detailed descriptions of these CarePaq services. This method helps ensure top performance from the start and is especially valuable for business-critical environments.

This optional hardware installation service is available in all countries where HP has a direct or indirect service presence. Service may be ordered from and directly provided by an HP authorized service reseller or, in the United States only, service may be ordered by calling 1-800-652-6672. In the United States, HP makes all of the arrangements to have the system installed by qualified guaranteed service providers. For U.S. ordering information, refer to the HP website:

www.hp.com

For worldwide ordering information, refer to the HP website:

www.hp.com

Reader's Comments

HP welcomes your comments on this guide. Please send your comments and suggestions by e-mail to ServerDocumentation@hp.com.

Server Features

HP ProLiant ML530 Generation 2 servers are high-performance, 2-way servers that deliver maximum expansion and availability. HP engineering and design expertise optimizes system performance and efficiency for intensive network environments. Processor, memory, and I/O subsystems combine to provide an unbeatable high-performance system. Maximum internal expansion of up to 14 hot-plug hard drives and 7 PCI-X slots enables application flexibility and headroom for future growth. High-availability features, including Advanced Memory Protection technology and hot-plug components, guarantee maximum uptime for business-critical applications.

Overview

The following features deliver superior 2-way performance on all HP ProLiant ML530 Generation 2 servers:

- 2-way Intel® Xeon processors with Hyper-Threading technology
- 400-MHz system bus
- 2-way interleaved PC 1600 ECC DDR SDRAM
- Four 64-bit, 100-MHz, peered PCI-X buses

HP ProLiant ML530 Generation 2 servers offer a highly scalable environment with the following expansion capabilities:

- Memory expansion
- 16 media bays
- 7 PCI-X slots (4 hot-plug slots)
- Embedded RJ-45 10/100 Autosensing Ethernet network interface controller (NIC) with Wake On LAN (WOL) support and Preboot eXecution Environment (PXE) support

Key redundancy and hot-plug features create a high availability environment:

- Advanced Memory Protection technology
- Redundant hot-plug fans
- Redundant hot-plug power supplies
- PCI-X Hot Plug
- Redundant ROM
- Optional redundant NIC

HP ProLiant ML530 Generation 2 servers also feature management and configuration tools that are the hallmark of HP ProLiant servers:

- SmartStart utility
- SmartStart scripting
- ROM-Based Setup Utility (RBSU)
- Preboot eXecution Environment (PXE)
- Insight Manager 7 compatibility
- Remote Insight Lights-Out support
- Automatic Server Recovery-2 (ASR-2)
- Integrated Management Log (IML)
- Pre-Failure Warranty on hard drives, processors, and memory

The ProLiant ML530 Generation 2 server ships in either a tower or rack-mountable configuration.



Figure 1-1 shows the tower model of the HP ProLiant ML530 Generation 2 server.

Figure 1-1: HP ProLiant ML530 Generation 2 towermodel server

NOTE: A tower-model server can convert into a rack-model server using the tower-to-rack conversion kit.



Figure 1-2 shows the rack model of the HP ProLiant ML530 Generation 2 server.

Figure 1-2: HP ProLiant ML530 Generation 2 rack-model server

NOTE: A rack-model server can convert into a tower-model server using the rack-to-tower conversion kit.

Standard Features

The following features are standard on all HP ProLiant ML530 Generation 2 models, unless otherwise noted.

Processors

HP ProLiant ML530 Generation 2 servers support up to two Intel Xeon processors with Hyper-Threading technology.

Memory

HP ProLiant ML530 Generation 2 servers support the following memory features:

• PC1600 registered DDR SDRAM DIMMs

- ECC and Advanced ECC memory for single-bit memory error correction and multi-bit memory error detection
- 2×1 interleaving memory
- Optional Advanced Memory Protection

For more information on Advanced Memory Protection, refer to the *HP ProLiant ML530 Generation 2 Server Memory Installation Guide*.

PCI-X Expansion Slots

HP ProLiant ML530 Generation 2 servers offer a range of features for internal and external expansion in ways that ensure optimal availability and performance.

PCI-X technology

HP ProLiant ML530 Generation 2 servers feature seven 64-bit, 100-MHz expansion slots operating across four buses that support the latest industry-standard technology, Peripheral Component Interconnect Extended (PCI-X). This follow-on technology increases the data throughput capacity of PCI technology and minimizes bottlenecks associated with high-bandwidth devices, such as:

- Gigabit Ethernet NICs
- Fibre channel controllers
- Smart Array Controllers
- Load balancing and PCI Hot Plug

The server's PCI-X expansion slots operate across four separate buses to enable load balancing across multiple expansion boards. Four hot-plug slots provide enhanced availability.

• Expansion slot speed LEDs

Internal LEDs associated with each PCI-X slot enable you to determine at a glance whether the board in that slot is a PCI board or a PCI-X board, as well as the speed at which the board is operating.

Embedded Network Interface Controller

The standard network interface controller (NIC) provided with your ProLiant ML530 Generation 2 server is an NC3163 Embedded 10/100 Fast Ethernet NIC with the following features:

- Dual 10/100 MB/s data transfer rate
- Preboot eXecution Environment (PXE) support
- Wake On LAN (WOL) support
- Autosensing LAN capable at either 10 or 100 MBps
- Full-duplex Ethernet for two-way transmission

SCSI Support

HP ProLiant ML530 Generation 2 servers provide support for both internal and external SCSI devices.

• Integrated SCSI controller

HP ProLiant ML530 Generation 2 servers provide a Dual Channel Integrated Ultra3 SCSI controller.

• SCSI drive cages

HP ProLiant ML530 Generation 2 servers ship with two internal six-bay drive cages. Each cage supports Ultra3 or Ultra4 SCSI hot-plug hard drives.

• Optional internal two-bay hot-plug SCSI drive cage

The removable media bay in the ProLiant ML530 Generation 2 server supports the installation of an optional internal two-bay hot-plug SCSI drive cage, which provides space for up to two additional hot-plug hard drives.

• Internal-to-external SCSI cable assembly

HP ProLiant ML530 Generation 2 servers ship with an internal-to-external SCSI connector and cable. The cable can be connected to one of the SCSI connectors on the system board, enabling you to connect external SCSI devices through the VHDCI SCSI connector on the rear panel of the server.

System Monitoring

In HP ProLiant ML530 Generation 2 servers, the system is monitored by internal and external LEDs, including:

- Component LEDs visible on the front of the server
 - Power On/Standby button and LED
 - Internal health
 - External health
 - Embedded NIC activity
 - Hard drives
 - UID (Unit Identification) LED and button
- Component LEDs visible on the rear of the server
 - Power supplies
 - Embedded NIC activity
 - Hot-plug expansion slots (power and fault status)
 - UID (Unit Identification) LED and button
- Component LEDs visible inside the server
 - Processors
 - Processor Power Modules (PPMs)
 - Memory board
 - Expansion slots (speed, power, and fault status)
 - Fans
 - Memory board interlock
 - Thermal warning
- Diagnostic support through RBSU, the ROM, the health drivers, and Insight Manager 7

For more information about system LEDs, see Appendix C, "System LEDs and Switches."

Hot-Plug Fans

HP ProLiant ML530 Generation 2 servers support redundant hot-plug fans. If the primary fan fails, the server generates a system alert and commands the redundant fan to function automatically. The redundant hot-plug fan protects the various server components from overheating, provides rapid serviceability, and minimizes the risk of system interruption:

- Standard: One hot-plug CPU fan, one hot-plug I/O fan, two required hot-plug drive fans, and one redundant hot-plug drive fan
- Optional: One redundant hot-plug CPU fan and one redundant hot-plug I/O fan

Hot-Plug Power Supplies

Improved power supply performance ensures that a single power supply provides sufficient power to the entire system. Complete redundancy can be achieved by installing only one additional power supply.

The standard and redundant power supplies run simultaneously under normal operating conditions. The redundant hot-plug power supply ensures the delivery of electricity to the server, provides rapid serviceability, and minimizes the risk of system interruption.

In case of a loss of redundancy, the system sends an alert of the failure to the system administrator. The failure does not cause any loss of power, and the failed unit can be replaced without having to power down the server or save system data.

- Standard: One hot-plug 600-W power supply
- Optional: One hot-plug 600-W power supply

Hot-plug power supplies also have advanced features that ease operation:

- Auto Line Sensing capability automatically selects the appropriate line voltage.
- Power Down Manager ensures that ProLiant ML530 Generation 2 servers deactivate in a manner that safeguards data and system integrity.

Storage Media

HP ProLiant ML530 Generation 2 servers offer a variety of media bays for flexibility in choosing internal storage devices.

For information about installing storage devices into the media bays, see Chapter 3, "Installing Hardware Options."

Internal Hot-Plug Drive Bays

HP ProLiant ML530 Generation 2 servers ship with twelve one-inch hot-plug drive bays supporting Ultra3 or Ultra4 hard drives.

Fixed Internal Media Drive Bays

HP ProLiant ML530 Generation 2 servers support two pre-installed media bays:

- IDE CD-ROM drive
- 3.5-inch 1.44-MB diskette drive

Removable Media Bays

HP ProLiant ML530 Generation 2 servers have two available half-height bays for optional media devices such as DVDs, digital linear tape (DLT) drives, or a two-bay hot-plug SCSI drive cage for hot-plug SCSI devices.

Video

HP ProLiant ML530 Generation 2 servers deliver the following video features:

- Integrated ATI Rage XL Video Controller with maximum resolution of 1280 × 1024, 16-bit color, noninterlaced
- 8-MB video SDRAM standard

Server Configuration and Management

HP offers an extensive set of features and optional tools to support effective server management and configuration. This section provides an overview of the following server management features that are detailed in Chapter 8, "Server Configuration and Utilities."

Integrated Features

• ROM-Based Setup Utility (RBSU)

RBSU is an updateable configuration utility that is embedded in the server ROM. The RBSU helps you configure certain server hardware settings and prepare the server for operating system installation. The RBSU enables you to view and establish server configuration settings during initial system startup, as well as modify them after the server has been configured. With the RBSU, you can manage system options, such as the operating system, Advanced Memory Protection, standard boot order, PCI-X devices, date and time, ASR-2, server passwords, boot control order, and advanced options.

• Redundant ROM support

Redundant ROM provides a disaster recovery mechanism for mission-critical servers. With redundant ROM support, HP ProLiant ML530 Generation 2 servers enable you to upgrade or configure your ROM safely. For example, if your server loses power during a ROM flash or if the flash process is interrupted in any way, the system can be restarted with the original ROM image.

The server has a ROM image that acts as two, separate 1-MB ROMs. If the boot ROM experiences a problem, the system defaults to the previous version to maximize server availability and performance. Without this redundancy, the server would be unavailable until a special disaster recovery process restored the original ROM.

Redundant ROM also enables you to use RBSU to switch between two ROM images for testing and evaluation purposes. If the new ROM does not meet your expectations, you can use RBSU to restore the previous ROM image. Without redundant ROM, you would need to use the ROMPaq Flash Utility to restore the previous ROM image.

• ROMPaq Utility

Flash ROM capability enables you to upgrade the firmware (BIOS) with system or option ROMPaq utilities.

• Remote ROM Flash Utility

The Remote ROM Flash Utility enables administrators to upgrade the system ROMs as well as the supported Smart Array controllers on multiple servers from a single point of execution. The ROM upgrades can be flashed either individually or batched together to perform multiple ROM upgrades in a single step.

• ROM legacy USB support

ROM legacy USB support provides USB mouse and keyboard support for operating systems that do not support USB, as well as POST and RBSU support for keyboards. For information about operating systems currently providing USB support, refer to the operating system support matrix on the website:

ftp://ftp.compaq.com/pub/products/servers/ os%20feature%20matrix%20103000.pdf • Preboot eXecution Environment (PXE)

PXE enables servers to load and execute a network bootstrap program (NBP) from a PXE server and execute a pre-configured image. The image can be an operating system image created by software, or a boot diskette image. PXE makes it possible to configure or reconfigure a system remotely. The NIC (either the embedded NIC or a NIC installed in an expansion slot) on HP ProLiant ML530 Generation 2 servers contains a PXE universal service agent. When HP ProLiant ML530 Generation 2 servers are connected to a network, this agent can interact with the remote PXE server to retrieve the boot image. An administrator at a management console can then install an operating system or configure the HP ProLiant ML530 Generation 2 servers remotely.

Software Tools and Utilities

• SmartStart for Servers CD

SmartStart is a set of server integration tools and utilities that optimizes platform configuration and simplifies setup of servers. SmartStart includes the suite of HP server software from diagnostics to drivers and supports the installation and integration of operating system software. The SmartStart CD is the recommended tool for loading system software, achieving a well-integrated server, and ensuring maximum dependability and supportability.

• SmartStart Diskette Builder

The SmartStart Diskette Builder is a utility that uses data stored on the SmartStart CD to create support diskettes. You can create support diskettes for specific configuration needs or for software that cannot be used directly from the SmartStart CD.

• SmartStart Scripting Toolkit

The SmartStart Scripting Toolkit contains a set of MS-DOS-based utilities that enable you to configure and deploy servers in a customized, predictable, and unattended manner. These utilities provide scripted server and array replication for mass server deployment. They enable you to duplicate the configuration of a source server onto target systems with minimum user interaction. • Insight Manager 7

Insight Manager 7 provides web-based system management for HP servers and any HTTP, SNMP, MIB2, or DMI v2.0-compliant device. Insight Manager 7 is installed from the Management CD. It is an easy-to-use, intuitive software utility designed for collecting server information including fault conditions, performance, security, remote management, and recovery services.

• Diagnostics Utility

The Diagnostics Utility displays information about the server's hardware and tests the system to be sure that it is operating properly. If you used SmartStart to install your operating system, you can access the Diagnostics Utility from the SmartStart CD.

• Automatic Server Recovery-2 (ASR-2)

ASR-2 enables the server to boot automatically from either the operating system or from HP utilities. If there is a critical system failure, ASR-2 automatically restarts the server and can be configured to page a designated system administrator.

• Integrated Management Log (IML)

The IML provides a detailed log of key system events. This log also monitors the server health log and is accessible from Insight Manager 7 and your Remote Insight Lights-Out Edition option.

• Multi-Initiator Configuration Utility

The Multi-Initiator Configuration Utility enables administrators to configure the Integrated Dual Channel Ultra3 SCSI controller for support of HP storage and clustering options.

For more detailed information about these tools and utilities, see Chapter 8, "Server Configuration and Utilities," or refer to the SmartStart documentation, the ProLiant Essentials Foundation Pack, or the Documentation CD that ships with your server.

Warranties

For no additional cost, HP ProLiant ML530 Generation 2 servers come with the following optional warranties:

- Three-Year Parts, Labor, and On-Site Limited Warranty depending on your location
- Next Business Day Warranty
- Pre-Failure Warranty on processors, memory, and hard drives when Insight Manager 7 is installed
- Global Warranty (where HP has a service presence)

For additional service and support offerings, visit the HP website:

www.hp.com/servers/proliant

Security Features

To safeguard the integrity of data stored on or managed by your server, HP provides the following security features:

- Power-on password
- Administrator password
- Network server mode
- QuickLock
- Diskette drive control
- Diskette write control
- Diskette boot control
- Serial/parallel interface control

- NVRAM invalidation
- Front bezel door lock (tower model only)
- Hot-plug door lock

Diagnostic Tools

HP ProLiant ML530 Generation 2 servers provide the following software and firmware diagnostic tools:

- Power-On Self-Test (POST)
- Insight Manager 7
- User diagnostics (DIAGS)
- Integrated Management Log (IML)
- Health driver
- ROMPaq utilities to upgrade redundant ROM
- ASR-2

For additional information concerning HP diagnostic tools, refer to the Documentation CD that ships with your server.
Planning the Server Installation

This chapter provides information and instructions for planning the installation of the HP server. Figure 2-1 illustrates multiple HP ProLiant ML530 Generation 2 servers installed in a rack.



Figure 2-1: ProLiant ML530 Generation 2 servers installed in a rack

The following sections describe the server and site preparation required to correctly and safely install your server. This preparation includes:

- Optimum environment considerations
- Rack planning resources
- Rack warnings and cautions

- Server warnings and cautions
- Server shipping contents

Optimum Environment

When installing the HP ProLiant ML530 Generation 2 server in a rack, select a location that meets the environmental standards described in the following sections.

Information is available for optional rack adapter kits to install your server in a telco or third-party rack. Complete instructions for using adapter kits to install your server in a rack are included with each option kit.

• For information about obtaining rack option kits for third-party racks, refer to the HP website:

www.hp.com/servers/proliant

• For information about installing your server in a telco rack, refer to the following website:

www.racksolutions.com/hp

Space and Airflow Requirements

To enable servicing and adequate airflow, observe the following spatial requirements when deciding where to install your Compaq branded or third-party rack:

- Leave a minimum clearance of 63.5 cm (25 inches) in front of the rack.
- Leave a minimum clearance of 76.2 cm (30 inches) in the back of the rack.
- Leave a minimum clearance of 121.9 cm (48 inches) from the back of the rack to the rear of another rack or row of racks.

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



CAUTION: Do not block the ventilation openings.

When there is any vertical space in the rack not filled by servers or rack components, the gaps between the components cause changes in airflow through the rack and across the servers. Cover all gaps with blanks to maintain proper airflow.

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

CAU high

CAUTION: When using a Compaq branded 7000 Series rack, you must install the high airflow rack door insert [P/N 327281-B21 (42U) and 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 your 42U server rack includes closing front and rear doors, you must allow 5,350 sq cm (830 square inches) 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 inches).



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

Temperature Requirements

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

The HP maximum recommended ambient operating temperature (TMRA) for most server products is $35^{\circ}C$ ($95^{\circ}F$). The temperature in the room where the rack is located must not exceed $35^{\circ}C$ ($95^{\circ}F$).

Power Requirements



The installation of this equipment shall be in accordance with local/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 Edition (code for Protection of Electronic Computer/Data Processing Equipment). For electrical power ratings on options, refer to the product's rating label or the user documentation supplied with that option.

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:

- The power load must be balanced between available AC supply branch circuits.
- The overall system AC current load must not exceed 80 percent of the branch circuit AC current rating.

Grounding Requirements

For proper operation and safety, the server must be properly grounded. 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, the equipment must be installed in accordance with Canadian Standards Association, CSA C22.1, Canadian Electrical Code. In all other countries, the installation must follow any regional or national electrical wiring codes, such as the International Electrotechnical Commission (IEC) 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 power distribution unit (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. HP does not recommend using common power outlet strips for this equipment.

Rack Planning Resources

The following resource information is available on rack designs and products.

The Rack Builder Pro Configuration Tool and Rack Products documentation information can be found on the website:

www.compaq.com/support/files/storage/index.html

The Rack Resource CD Kit ships with all Compaq branded racks. A summary of the content of each CD follows:

• Rack Builder Pro Configuration Tool

This information helps you to simulate potential Compaq branded rack configurations based on your input. Rack Builder Pro provides the following information:

- Graphical preview of properly configured racks
- Site planning data, including power requirements, cooling mandates, and physical specifications
- Ordering information, including required components, part numbers, and appropriate quantities
- Installing Rack Products video

This video provides a visual overview of operations required for configuring a Compaq branded rack with rack-mountable components. It also provides the following important configuration steps:

- Site planning
- Installing rack servers and rack options
- Cabling
- Coupling racks
- Rack Products Documentation CD

The resource information on this CD enables you to view, search, and print documentation for Compaq branded racks and rack options. It also helps you set up and optimize your new Compaq branded rack in a manner that best fits your environment.

Rack Warnings

Before installing your rack, be sure you understand the following warnings:



WARNING: To reduce the risk of personal injury or equipment damage, always be sure that the rack is adequately stabilized before extending a component outside the rack. A rack may become unstable if more than one component is extended for any reason. Extend only one component at a time.



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

- The leveling jacks are extended to the floor.
- The full weight of the rack rests on the leveling jacks.
- The stabilizers are attached to the rack for single-rack installation.
- The racks are coupled in multiple-rack installations.



WARNING: To reduce the risk of personal injury or equipment damage, 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: Always begin by mounting the heaviest item on the bottom of the rack. Continue to populate the rack from the bottom to the top.

Server Warnings and Cautions

Before installing your server, be sure you understand the following warnings and cautions:



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 electrical shock or damage to the equipment:

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

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.

Server Shipping Carton Contents

Unpack the server shipping carton and locate the materials and documentation necessary for installing your server. All of the rack-mounting hardware necessary for installing the ProLiant ML530 Generation 2 server into the rack is included with the rack or the server.

The contents of the server shipping carton include the following:

- HP ProLiant ML530 Generation 2 server
- Hardware documentation, reference information, and software products
- AC power cord
- Rack-mounting hardware (Figure 2-2 and Table 2-1)



Figure 2-2: Rack-mounting hardware

Table 2-1:	Rack-Mounting	Hardware
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Item	Description	Item	Description
1	Rack rail assemblies (2)	5	Retaining screws
			Shipping screws (2)
			 M6 x 12mm Phillips head (4)
2	Server rails (2)	6	Rack template
3	Cable management arm bracket	7	Cable management arm
4	Cable management arm support bracket		

Installing Hardware Options

This chapter explains procedures for the installation of hot-plug and non-hot-plug options specific to the HP ProLiant ML530 Generation 2 server.

For more information about option installation procedures, refer to the following resources:

- The installation documentation that ships with the option kit
- The hardware installation and configuration poster that ships with your server
- The hardware installation and configuration labels located on the inside of the access panel of your server

For more information about memory installation procedures, refer to the server memory installation guide on the Documentation CD.

For more information about hot-plug expansion board installation procedures, see Chapter 4, "PCI-X Technology."

The following warnings apply to all procedures:



WARNING: The server is very heavy, up to 66 kg (146 lb). To reduce the risk of personal injury or damage to the equipment:

- Remove all hot-plug power supplies to reduce the weight of the server before lifting it.
- Observe local occupational health and safety requirements and guidelines for material handling.
- Get help to lift and maneuver the server.
- Be sure the server casters are locked in place on tower models.

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

- Heed all warnings and cautions throughout the installation instructions.
 - Allow internal system components to cool before touching any surfaces.
 - Be sure that the power to the server is turned off and that all power cords are disconnected.
 - Allow only qualified service personnel—those trained to work with products capable of producing hazardous energy levels—to install options, except when installing hot-plug power supplies or hard drives.



CAUTION: Electrostatic discharge can damage electronic components. Be sure you are properly grounded before beginning any installation procedures.

The following warnings apply to in-rack operations only:



WARNING: Always begin by mounting the heaviest item on the bottom of the rack. Continue to populate the rack from the bottom to the top.



WARNING: To reduce the risk of personal injury or equipment damage, always be sure that the rack is adequately stabilized before extending a component outside the rack. A rack may become unstable if more than one component is extended for any reason. Extend only one component at a time.



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

- The leveling jacks are extended to the floor.
- The full weight of the rack rests on the leveling jacks.
- The stabilizers are attached to the rack for single-rack installation.
- The racks are coupled in multiple-rack installations.



WARNING: To reduce the risk of personal injury from hazardous energy or of damage to the equipment when working on energized servers with precautions:

- Remove all watches, rings, and any other loose fitting jewelry.
- Avoid the use of conductive tools inside the server that could bridge live parts.



CAUTION: For Compaq branded Series 7000 racks, you must install highly ventilated rack door inserts to provide proper front-to-back airflow and cooling.



CAUTION: Be sure that your rack meets all recommended space and airflow requirements for your server.

HP has equipped the ProLiant ML530 Generation 2 server chassis with a system tray to facilitate the installation of hardware upgrades, particularly accessing the drive fans and internal cabling. Most hardware options are installed onto the system board, the memory board, or in the drive bay.

To streamline the installation process, read the installation instructions for all of the hardware options and identify similar steps before installing the hardware options.

Use Table 3-1 to determine how to reach the most commonly accessed internal server components.

Component	Access Instruction
Expansion slots	Open the front bezel door (tower model only) and remove the access panel.
Hot-plug expansion slots	Open the hot-plug door.
Memory	Open the hot-plug door.
Processor sockets	Open the front bezel door (tower model only) and remove the access panel.

 Table 3-1: Gaining Access to Internal Components

Differences Between the Tower- and Rack-Model Servers

You can perform the following chassis conversions by using the appropriate conversion option kit:

- Tower-to-rack
- Rack-to-tower

Chassis Configuration

The primary difference between the ProLiant ML530 Generation 2 tower and rack models (Figure 3-1) is the chassis configuration. The tower model also has casters on the bottom of the server and a front bezel door to cover the server chassis. This chapter illustrates only the rack model of the server for most of the hardware installation procedures.



Figure 3-1: Front view of the tower model with the front bezel door removed and front view of the rack model

Table 3-2 shows the front chassis components.

Item	Component
1	Access panel
2	Hot-plug door
3	Front panel LED assembly
4	Removable media bay
5	Drive cage

Table 3-2:	Front	Chassis	Com	ponents



Figure 3-2 shows the rear view of the tower-model and rack-model server.

Figure 3-2: Rear view of the tower-model and rack-model server

Table 3-3 shows the rear chassis components.

Table 3-3:	Rear	Chassis	Components
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Item	Component
1	System tray handle
2	PCI-X expansion slots
3	Hot-plug power supply 1
4	Hot-plug power supply bay 2 (redundant)
5	Hot-plug power supply bay 3 (not used)*
6	Torx T-15 tool

*Improved power supply performance ensures that a single power supply provides sufficient power to the entire system. Complete redundancy can be achieved by installing only one additional power supply.

The features in Table 3-3 pertain directly to the hardware options in this chapter. For a detailed description of the rear panel connectors, see Chapter 5, "Installing the Rack Server," or Chapter 6, "Installing the Tower Server."

Opening the Front Bezel Door

This procedure applies only to tower-model servers.

To open the front bezel door of the tower-model server:

- 1. If the front bezel door is locked, turn the key lock to release it (1).
- 2. Swing the front bezel door open (2).



Figure 3-3: Opening the front bezel door on the tower-model server

To secure the tower chassis and lock the front bezel door, reverse steps 1 and 2.

Preparing for an Installation

Most internal installation procedures involve either the memory or system board. Installing components onto these boards may require the following common preparatory tasks:

- Powering down the server
- Locating and removing the Torx T-15 tool
- Removing the access panel
- Opening the hot-plug door

Powering Down the Server

To power down the server:

- 1. Shut down the operating system as directed in the operating system instructions.
- 2. For tower-model servers only, open the front bezel door. See "Opening the Front Bezel Door" in this chapter.
- 3. If the server is on, set the Power On/Standby button to standby.
- 4. Be sure that the following events occur:
 - The Power On/Standby button LED turns amber, indicating that the system is in standby mode.
 - All fans stop spinning.
- 5. Disconnect all AC power cords.



WARNING: The system power in the server does not completely shut off from the front panel Power On/Standby button. Moving the button from on to standby leaves some portions of the hot-plug power supply and some internal circuitry active. To shut off all power to the system, move the button to standby and disconnect all AC power cords from the server.

Locating and Removing the Torx T-15 Tool

Many hardware procedures in the ProLiant ML530 Generation 2 server are toolless, but a few require the removal of Torx T-15 screws that have been installed for shipping or security reasons. A Torx T-15 tool ships with the server for the removal of these screws.

To remove the Torx T-15 tool:

- 1. Locate the Torx T-15 tool on the back of the server, just below the system tray handle.
- 2. Slide the tool out of the retaining clips.



Figure 3-4: Locating and removing the Torx T-15 tool

Removing the Access Panel

WARNING: To avoid risk of injury or damage to the equipment from hazardous energy, the access panel must remain secure during normal operation, or the server must be installed in a controlled access location and serviced only by qualified personnel.

To remove the access panel:

- 1. For tower-model servers only, complete the following steps to prepare the server for the removal of the access panel:
 - a. Remove the front bezel door by opening the door fully and lifting the door up and away from the server chassis.



Figure 3-5: Removing the front bezel door

b. Lock the casters at the base of the server and gently tilt the server onto the side opposite the access panel to facilitate access to internal components.

- 2. For rack-model servers already installed in a rack, complete the following steps to prepare the server for the removal of the access panel:
 - a. Loosen the front panel thumbscrews to release the server from the rack.
 - b. Pull the server out from the front of the rack until it stops.
- 3. Loosen the screws located on the front panel of the server to release the access panel (1).

IMPORTANT: One screw is keyed for a Torx T-15 tool only. Use the Torx T-15 tool that ships with the server to remove this screw. See "Locating and Removing the Torx T-15 Tool" in this chapter. The other two fasteners are thumbscrews and are loosened by hand.

- 4. Slide the access panel 1.27 cm (0.5 inch) toward the rear of the unit (2).
- 5. Lift and remove the access panel.



Figure 3-6: Removing the access panel (tower server)

- 6. Turn the access panel over to locate the hood labels. These labels provide information about installing and configuring drives, installing memory, and installing additional processors.
- 7. Set the panel aside and use the label to locate components inside the chassis.
- 8. Reverse steps 1-5 to reinstall the access panel.

Opening the Hot-Plug Door

To open the hot-plug door:

- 1. For tower-model servers only, lock the casters at the base of the server and gently tilt the server onto the side opposite the access panel to facilitate access to internal components.
- 2. For rack-model servers already installed in a rack, complete the following steps to lock the server into the fully extended position:
 - a. Loosen the front panel thumbscrews to release the server from the rack.
 - b. Extend the server from rack until it stops.
- 3. Locate the hot-plug door key. The key is located inside the front bezel door on tower-model servers (1), or in a bag attached to the rear handle on rack-model servers (2).



Figure 3-7: Locating the hot-plug door key

- 4. If the hot-plug door is locked, use the hot-plug door key to release it (1).
- 5. Push the latches toward the center of the hot-plug door (2) and lift to view the memory and PCI-related hood labels (3).



WARNING: The hot-plug door provides access to hazardous energy circuits. To avoid risk of injury or damage to the equipment from hazardous energy, be sure that the door remains locked during normal operation or install the server in a controlled access location.



Figure 3-8: Unlocking and opening the hot-plug door

Processors

ProLiant ML530 Generation 2 servers support up to two Intel Xeon processors.

The Intel Xeon processor and Intel Xeon processor MP, introduce a new technology called Hyper-Threading which allows the processor to execute multiple threads simultaneously. Hyper-Threading technology makes a single processor look like two logical processors to operating systems that recognize Hyper-Threading technology.

Although no software changes are needed to take advantage of Hyper-Threading, this feature can be disabled in the server's RBSU.

For more information on Hyper-Threading, visit the Intel website. This site also provides information on Microsoft® OS licensing:

http://developer.intel.com/technology/hyperthread/

Also, refer to the following website for HP Hyper-Threading technology information:

www.compaq.com/products/servers/technology/hyper-threading.html

CAUTION: To be sure that the system ROM recognizes the new processor you are installing, update the ROM if necessary. For the most recent ROMpaq, refer to the HP website:

www.hp.com/servers/proliant/manage

Failure to flash your ROM before installing processors can cause system failure.

CAUTION: Processor socket 1 and PPM slot 1 must always be populated. Failure to populate processor socket 1 and PPM slot 1 prevents the system from operating.

IMPORTANT: Install a PPM for each processor in the system. When installing a new processor, you must also install a new PPM.

IMPORTANT: If processors of differing speeds are installed, each processor matches the rated speed of the slower processor.

IMPORTANT: ProLiant ML530 Generation 2 servers ship with gold-colored processor/heatsink assemblies. To be sure that you install a processor compatible with your server, only install processors with gold-colored heatsinks.

Installing an Additional Processor

ProLiant ML530 Generation 2 servers ship with one processor and support up to two processors. To install an additional processor:

- 1. For tower-model servers only, open the front bezel door. See "Opening the Front Bezel Door" in this chapter.
- 2. Power down the server. See "Powering Down the Server" in this chapter.
- 3. For rack-model servers only, extend the server from the rack by loosening the front panel thumbscrews and extending the server out of the front of the rack until it stops.
- 4. Remove the access panel. See "Removing the Access Panel" in this chapter.
- 5. Remove the processor air baffle:
 - a. Loosen the two thumbscrews that secure the air baffle to the system tray (1).



b. Lift the air baffle up out of the server (2).

Figure 3-9: Removing the processor air baffle

6. Using Figure 3-10 and Table 3-4, locate the available processor socket and PPM slot on the system board.



Figure 3-10: Processor sockets and PPM slots on the system board

 Table 3-4: Processor Sockets and PPM Slots on the

 System Board

Item	Slot or Socket
1	PPM 1 slot (ships populated)
2	Processor 1 socket (ships populated)
3	Processor 2 socket
4	PPM 2 slot

IMPORTANT: Processor socket 1 and PPM slot 1 must always be populated. Failure to populate processor socket 1 and PPM slot 1 prevents the system from operating.

- 7. Loosen the thumbscrew on the processor retaining bracket (1) and lift the bracket upward (2).
- 8. Open the processor locking lever (3).



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



Figure 3-11: Lifting the processor retaining bracket and processor locking lever

- 9. Install the processor/heatsink assembly into the available processor socket:
 - a. Determine the correct processor orientation by observing the three guide pins on the processor retaining bracket and the three corresponding guide holes on the processor/heatsink assembly.
 - b. Insert the processor/heatsink assembly into the processor socket (1).
- 10. Close the processor locking lever (2).

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

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



Figure 3-12: Installing the processor/heatsink assembly and securing the processor locking lever

NOTE: PPMs may look different than those illustrated in this document.

11. Install the PPM into the available PPM slot, making sure the key slot in the PPM is aligned with the key in the slot. Press firmly to be sure that the PPM is fully seated in the slot.



Figure 3-13: Installing a PPM

12. Lower the processor retaining bracket into position over the processor and PPM (1) and secure it by tightening the thumbscrew (2).



Figure 3-14: Securing the processor retaining bracket



CAUTION: Before closing the processor retaining bracket, be sure that the processor locking lever is closed. Forcing the bracket shut may damage the processor or the processor socket.

- 13. Reinstall the processor air baffle:
 - a. Insert the air baffle into the server. Be sure to insert the plastic tab on the air baffle into the raised metal slot on the chassis wall (1).
 - b. Tighten the thumbscrews (2).



Figure 3-15: Installing the processor air baffle

- 14. Reinstall the access panel.
- 15. Install the server. See Chapter 5, "Installing the Rack Server" or Chapter 6, "Installing the Tower Server."
- 16. Power up the server. See Chapter 5, "Installing the Rack Server" or Chapter 6, "Installing the Tower Server."

NOTE: The ROM sets the processing frequency during the Power-On Self-Test (POST).

- 17. Be sure that the internal health LED on the front of the system is illuminated green, indicating that the system is functioning properly. For detailed information on LEDs, see Appendix C, "System LEDs and Switches."
- 18. If the LED indicates an error, see Appendix D, "Troubleshooting," or refer to the troubleshooting guide for instructions.

Upgrading a Processor

CAUTION: To be sure that the system ROM recognizes the new processor you are installing, update the ROM if necessary. For the most recent ROMpaq, refer to the HP website:

www.hp.com/servers/proliant/manage

Failure to flash your ROM before installing processors can cause system failure.

CAUTION: Processor socket 1 and PPM slot 1 must always be populated. Failure to populate processor socket 1 and PPM slot 1 prevents the system from operating.

IMPORTANT: Install a PPM for each processor in the system. When installing a new processor, you must also install a new PPM.

IMPORTANT: If processors of differing speeds are installed, each processor matches the rated speed of the slower processor. For optimal performance, upgrade both processors at the same time, rather than mixing processor speeds.

IMPORTANT: ProLiant ML530 Generation 2 servers ship with gold-colored processor/heatsink assemblies. To be sure that you install a processor compatible with your server, only install processors with gold-colored heatsinks.

NOTE: When upgrading the processors to a higher speed, you do not need to set any switches to set processor frequency. The system ROM automatically sets the processor frequency during POST.

To replace existing processors with new processors of higher frequency:

- 1. For tower-model servers only, open the front bezel door. See "Opening the Front Bezel Door" in this chapter.
- 2. Power down the server. See "Powering Down the Server" in this chapter.
- 3. For rack-model servers only, extend the server from the rack by loosening the front panel thumbscrews and extending the server out of the front of the rack until it stops.
- 4. Remove the access panel. See "Removing the Access Panel" in this chapter.

- 5. Remove the processor air baffle:
 - a. Loosen the two thumbscrews that secure the air baffle to the server tray (1).
 - b. Lift the air baffle upward out of the server (2).



Figure 3-16: Removing the processor air baffle

6. If necessary, remove the memory board to gain access to the processor. For detailed information on removing a memory board, refer to the server memory installation guide on the Documentation CD.

7. Loosen the thumbscrew on the processor retaining bracket (1) and lift the bracket upward (2).



Figure 3-17: Lifting the processor retaining bracket

8. Remove the PPMs.



Figure 3-18: Removing a PPM

- 9. Remove the processors:
 - a. Lift the processor locking lever upward to release the processor from the socket (1).



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

b. Remove the obsolete processor/heatsink assembly (2).



Figure 3-19: Removing a processor



WARNING: Heatsinks may be hot. Allow processor/heatsink assemblies to cool before attempting to remove them.

- 10. Install the new processor/heatsink assembly:
 - a. Determine the correct processor orientation by observing the three pins on the processor retaining bracket and the corresponding holes on the processor/heatsink assembly.
 - b. Insert the processor/heatsink assembly into the processor socket (1).
- 11. Secure the processor locking lever (2).

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

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



Figure 3-20: Installing the processor/heatsink assembly and securing the processor locking lever
12. Insert the new PPM into the available PPM slot, making sure the key slot in the PPM is aligned with the key in the slot. Press firmly to be sure that the PPM is fully seated in the slot.



Figure 3-21: Installing a PPM

13. Lower the processor retaining bracket into position over the processor and PPM (1) and secure it by tightening the thumbscrew (2).



CAUTION: Before closing the processor retaining bracket, be sure that the processor locking lever is closed. Forcing the bracket shut may damage the processor or the processor socket.



Figure 3-22: Securing the processor retaining bracket

- 14. Repeat steps 7 through 13 to upgrade the second processor, if installed.
- 15. If necessary, reinstall the memory board. For more detailed information about installing a memory board, refer to the server memory installation guide on the Documentation CD.

- 16. Reinstall the processor air baffle:
 - a. Insert the air baffle into the server. Be sure to insert the plastic tab on the air baffle into the raised metal slot on the chassis wall (1).
 - b. Tighten the thumbscrews (2).



Figure 3-23: Installing the processor air baffle

- 17. Reinstall the access panel.
- 18. Install the server. See Chapter 5, "Installing the Rack Server" or Chapter 6, "Installing the Tower Server."
- 19. Power up the server. See Chapter 5, "Installing the Rack Server" or Chapter 6, "Installing the Tower Server."

NOTE: The ROM sets the processing frequency during the Power-On Self-Test (POST).

- 20. Be sure that the internal health LED on the front of the system is illuminated green, indicating that the system is functioning properly. For detailed information on LEDs, see Appendix C, "System LEDs and Switches."
- 21. If the LED indicates an error, see Appendix D, "Troubleshooting," or refer to the troubleshooting guide for instructions.

Hot-Plug Fan

The ProLiant ML530 Generation 2 server enables you to install up to two CPU hotplug fans and two I/O hot-plug fans. CPU fans provide cooling for the processors, while I/O fans cool other system components.

To install a redundant hot-plug fan:

- 1. Remove the access panel. See "Removing the Access Panel" in this chapter.
- 2. Install the hot-plug fan:
 - a. Locate the fan bay where you want to install the redundant fan.



Figure 3-24: CPU and I/O hot-plug fan bays (view from the front panel looking down)

Item	CPU Fan	Item	I/O Fan
1	Standard CPU hot-plug fan	3	Standard I/O hot-plug fan
2	Optional redundant CPU hot-plug fan	4	Optional redundant I/O hot-plug fan

- b. Align the fan with the fan bay.
- c. Slide the fan down into its bay.
- d. Press down on the top of the fan until the lock engages.



Figure 3-25: Installing CPU or I/O hot-plug fans

- 3. Be sure that the newly installed fan functions properly:
 - a. Locate the fan LED.



Figure 3-26: Locating the CPU or I/O hot-plug fan LED

b. Using the following table, confirm that the LEDs reflect proper fan operation.

Table 3-6: CPU and I/O Hot-Plug Fan LEDs

LED	Status
Off	Fan is not installed properly.
Green	Fan is operational.
Amber	Fan has failed.

- 4. Repeat steps 2 and 3 to install a second redundant fan.
- 5. Be sure that the internal health LED on the front panel LED assembly is illuminated green, indicating that the system is functioning properly. For detailed information on LEDs, see Appendix C, "System LEDs and Switches."
- 6. If any of the LEDs indicates an error, see Appendix D, "Troubleshooting," or refer to the troubleshooting guide for instructions.
- 7. Reinstall the access panel.
- 8. Install the server. See Chapter 5, "Installing the Rack Server" or Chapter 6, "Installing the Tower Server."

Memory

Details about Advanced Memory Protection, DIMM configuration requirements, and memory board and DIMM installation procedures are discussed in detail in the server memory installation guide on the Documentation CD. For more information about Advanced Memory Protection, refer to the memory installation guide or to one of the following resources:

- The Advanced Memory Protection interactive multimedia on the Documentation CD
- The memory option kit documentation
- The hardware installation and configuration poster that ships with your server
- The hardware installation and configuration label attached to the inside of the access panel

Non-Hot-Plug Expansion Boards

The ProLiant ML530 Generation 2 server contains seven expansion slots using the new Peripheral Component Interconnect Extended (PCI-X) protocol. These seven slots include four with PCI Hot Plug capability.

For detailed information on the benefits of PCI-X technology, information on balancing and blending of expansion boards, and detailed instructions on the hot-plug installation of a PCI or PCI-X expansion board, see Chapter 4, "PCI-X Technology."

PCI and PCI-X Expansion Boards

ProLiant ML530 Generation 2 servers support the installation of both PCI and PCI-X expansion boards.

- PCI expansion boards operate at a peak frequency of 66 MHz.
- PCI-X expansion boards operate at a peak frequency of 100 MHz.

PCI-X Slot Architecture

Each of the seven PCI-X expansion slots in the ProLiant ML530 Generation 2 server operates at a maximum frequency of 100 MHz and is distributed across four buses. Figure 3-27 and Table 3-7 identify the PCI-X expansion slots and buses.



Figure 3-27: PCI-X expansion slots and buses

Item	Slot	
1	Slot 1 (hot-plug)	Shared BCLX bus
2	Slot 2 (hot-plug)	Shared FCI-X bus
3	Slot 3 (hot-plug)	Shared BCL V bus
4	Slot 4 (hot-plug)	
5	Slot 5	Shared BCLX bus
6	Slot 6	
7	Slot 7	PCI-X bus

Note: Slot 7 is recommended for the Remote Insight board due to internal cabling requirements.

The ProLiant ML530 Generation 2 server facilitates load balancing by having no more than two slots per bus.

IMPORTANT: Always pair expansion boards of the same speed on the same bus for optimal performance. If expansion boards of different speeds are installed on the same bus, the server operates both boards at the lower frequency, resulting in potential bottlenecks.

Use Figure 3-28 and Table 3-8 to identify the speed for each PCI slot and to help ensure optimal performance.



Figure 3-28: Expansion slot speed LEDs

Table 3-8:	Expansion	Slot	Speed	LEDs
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LED	Slot Speed
1	33-MHz PCI
2	66-MHz PCI
3	66-MHz PCI-X
4	100-MHz PCI-X

Embedded NIC

The embedded NIC that ships with the server is an RJ-45 10/100 Autosensing Ethernet network interface controller (NIC) with Wake On LAN (WOL) support and Preboot eXecution Environment (PXE) support. The embedded NIC shares a PCI bus with the embedded SCSI controller and the embedded video controller. Using the Network Teaming and Configuration Utility, the embedded NIC can be teamed with any other standup NC series NIC for Network Fault Tolerance and Adaptive Load Balancing. The teaming software can be downloaded from the HP website:

www.hp.com/servers/proliant/manage

Installing a Non-Hot-Plug Expansion Board

This section gives detailed information about installing a non-hot-plug expansion board. For a text overview of the hot-plug installation procedure, see "Hot-Installing an Expansion Board" in Chapter 4, "PCI-X Technology."



CAUTION: To avoid risk of damage to the system or expansion boards, remove all AC power cords before installing or removing expansion boards. With the front panel Power On/Standby button in the standby position, auxiliary power is still connected to the expansion slots and may damage the board.



CAUTION: Be sure that either an expansion board or an expansion slot cover is installed at all times. Proper airflow can only be maintained when an expansion board or an expansion slot cover is in place. Leaving a rear panel expansion slot opening uncovered can lead to improper cooling and thermal damage.

To install an expansion board in a non-hot-plug PCI-X expansion slot:

- 1. For tower-model servers only, open the front bezel door. See "Opening the Front Bezel Door" in this chapter.
- 2. Power down the server. See "Powering Down the Server" in this chapter.
- 3. Remove the access panel. See "Removing the Access Panel" in this chapter.
- 4. Identify the PCI-X expansion slot you want to populate. Slots 5, 6, and 7 are the non-hot-plug slots. The expansion slot latches and PCI retaining clips for these slots are color-coded slate-blue.

- 5. Press down on the expansion slot latch (1) and open the latch toward the rear of the unit (2).
- 6. Remove the expansion slot cover (3).



Figure 3-29: Releasing the expansion slot latch and removing the expansion slot cover

7. Align the expansion board with the groove on the PCI retaining clip opposite the removed expansion slot cover (for full-length expansion boards only).

NOTE: The PCI retaining clip can be locked in the open position to facilitate expansion board removal.



Figure 3-30: Locking the PCI retaining clip open

- 8. Insert the expansion board (1).
- 9. Close the expansion slot latch to secure the board into the server (2).



Figure 3-31: Inserting and securing an expansion board



10. Close the PCI retaining clip (for full-length expansion boards only).

Figure 3-32: Securing the PCI retaining clip

NOTE: If you are installing a Remote Insight board, you must cable the expansion board to the system board. See "Remote Insight Board" in this chapter.

- 11. Install the access panel.
- 12. Install the server. See Chapter 5, "Installing the Rack Server" or Chapter 6, "Installing the Tower Server."
- 13. Cable the server. See Chapter 7, "Cabling the Server."
- 14. Power up the server. See Chapter 8, "Server Configuration and Utilities."
- 15. Be sure that the internal health LED on the front panel LED assembly is illuminated green, indicating that the system is functioning properly. For detailed information on LEDs, see Appendix C, "System LEDs and Switches."
- 16. If the LED indicates an error, see Appendix D, "Troubleshooting," or refer to the troubleshooting guide for instructions.

Remote Insight Board

The HP Remote Insight board is a PCI-based expansion board that contains a built-in processor and fully supports keyboard, mouse, and PCI video functions. With a Remote Insight board installed in the ProLiant ML530 Generation 2 server, you can use a standard web browser and Insight Manager to access and remotely manage your server from any console on the network, regardless of the state of the host operating system.

The ProLiant ML530 Generation 2 server supports the following Remote Insight boards:

- Remote Insight Lights-Out Edition (16-pin connector)
- Remote Insight Lights-Out Pro (30-pin connector)

For more detailed information on installing a Remote Insight board, refer to the Documentation CD or to the website:

www.compaq.com/manage/15minslideshow/

To install a Remote Insight board:

IMPORTANT: Due to cabling requirements, HP recommends that you install the Remote Insight board in slot 7.

- 1. Identify slot 7, the recommended slot for the Remote Insight board.
- 2. To install the Remote Insight board, see "Installing a Non-Hot-Plug Expansion Board" in this chapter.

3. Identify the 30-pin (1) and 16-pin (2) remote management connectors and determine which is appropriate for your Remote Insight board.



Figure 3-33: 30-pin and 16-pin remote management connectors

4. Use the cable to connect the connector on the expansion board (1) to the 30-pin or 16-pin remote management connector on the system board (2). For more information on cabling the Remote Insight board, refer to the documentation that ships with the expansion board.



Figure 3-34: Cabling the Remote Insight Light-Out Pro to the system board (30-pin)



Figure 3-35: Cabling the Remote Insight Lights-Out Edition to the system board (16-pin)

- 5. Close the access panel.
- 6. Install the server. See Chapter 5, "Installing the Rack Server" or Chapter 6, "Installing the Tower Server."
- 7. Identify the rear panel connectors of the Remote Insight board.



Figure 3-36: The Remote Insight Lights-Out Edition (left) and Remote Insight Lights-Out Pro (right) rear panel connectors

Table 3-9:	Remote	Insight	Board	Connectors
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Item	Connector
1	AC adapter connector*
2	Video connector
3	Keyboard/mouse connector*
4	NIC Connector (RJ-45)
*If you use	vinternal cabling as shown in step 4, you do not

*If you use internal cabling as shown in step 4, you do not need to use these connectors.

8. Configure the external cabling. Refer to the *Remote Insight Lights-Out Installation and User Guide* on the Documentation CD that ships with your server or see Chapter 7, "Cabling the Server." **IMPORTANT:** Once the Remote Insight board is installed in your server, be sure that you connect your video cable into the video connector on the rear of the Remote Insight board. The standard video connector on the server rear panel is not used when the Remote Insight board is installed. For more information, refer to the documentation that ships with the Remote Insight board option kit.

- 9. Power up the server. See "Powering Up the Server" in Chapter 5, "Installing the Rack Server" or Chapter 6, "Installing the Tower Server."
- 10. Be sure that the internal health LED on the front panel LED assembly is illuminated green, indicating that the system is functioning properly. For detailed information on LEDs, see Appendix C, "System LEDs and Switches."
- 11. If the LED indicates an error, see Appendix D, "Troubleshooting," or refer to the troubleshooting guide for instructions.

Hot-Plug Power Supplies

CAUTION: Hot-plug power supplies for the ProLiant ML530 Generation 2 server are keyed to ensure that only 600-W hot-plug power supplies can be installed in the server. The handles on 600-W power supplies are carbon (black) to distinguish them from 450-W power supplies, which are opal (white).



IMPORTANT: For rack-model servers, do not install the power supplies until after the server is installed in the rack. Leaving the power supplies out reduces the weight of the server for purposes of rack installation.

The ProLiant ML530 Generation 2 server ships with one hot-plug power supply. The following procedures show you how to install an optional hot-plug power supply for redundancy.

To install the redundant hot-plug power supply:

1. Locate the power supply blank at the rear of the server beneath the system tray.



Figure 3-37: Hot-plug power supplies (rack configuration)

Table 3-10:	Hot-Plug	Power	Supply	Locations
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Item	Power Supply
1	Hot-plug power supply 1
2	Hot-plug power supply bay 2 (redundant)
3	Hot-plug power supply bay 3 (not used)*
*Improved power	ar supply performance ensures that a single

*Improved power supply performance ensures that a single power supply provides sufficient power to the entire system. Complete redundancy can be achieved by installing only one additional power supply.

2. Locate and remove the Torx T-15 tool. See "Locating and Removing the Torx T-15 Tool" in this chapter.

- 3. Remove the power supply blank:
 - a. Loosen the two Torx T-15 screws on the cover protecting the available hot-plug power supply bay, just beneath the system tray (1).
 - b. Slide the power supply blank up and out to remove it (2).



Figure 3-38: Removing the power supply blank from its bay

- 4. Install the redundant hot-plug power supply:
 - a. Press down on the port-colored button (1) and pull down the hot-plug power supply handle until it is in the fully horizontal position (2).
 - b. Slide the hot-plug power supply into the bay (3).
 - c. Push up the hot-plug power supply handle until the button locks into place (4).



Figure 3-39: Installing the hot-plug power supply

IMPORTANT: The power supplies are designed to fit only one way into the power supply bays. Do not force the power supplies into the power supply bays. If the power supply does not seat properly, be sure that it is oriented correctly and that it is 600-W power supply. 600-W power supplies have carbon-colored (black) handles.

d. For shipment or for optional added security, install the retaining screw, which ships in a plastic bag with your power supply option kit.



Figure 3-40: Installing the retaining screw

IMPORTANT: Whenever power is first applied to a hot-plug power supply, booting may be delayed as long as 10 seconds.

5. Reinstall the Torx T-15 tool.



6. Locate and be sure that the rear LEDs on the hot-plug power supply are activated.

Figure 3-41: Power supply LEDs (rack configuration)

Table 3-11: Power Supply LE

Power Supply Condition	1: Power LED (Green)	2: Fault LED (Amber)
No AC power to any power supply	Off	Off
No AC power to a particular power supply	Off	On
AC power present; system in standby mode	Blinking	Off
Power supply on and working properly	On	Off
Power supply current limit exceeded	On	Blinking

- Be sure that the external health LED on the front Power On/Standby button of the system is illuminated green, indicating that the system is functioning properly. For detailed information on LEDs, see Appendix C, "System LEDs and Switches."
- 8. If any of the LEDs indicates an error, see Appendix D, "Troubleshooting," or refer to the troubleshooting guide for instructions.

Internal Storage Areas

The following areas of the ProLiant ML530 Generation 2 server support installation of internal storage devices:

- Drive bays
 - Hot-plug hard drive
 - Hot-plug universal tape drive
- Removable media bays
 - Tape drive
 - Two-bay hot-plug SCSI drive cage
 - CD-ROM drive
 - DVD drive
- CD-ROM/DVD drive in the CD-ROM drive bay



Figure 3-42 and Table 3-12 show the optional internal storage device locations in the rack-model server.

Figure 3-42: Internal storage device locations in the rack-model server

Table 3-12:	Internal	Storage	Device	Locations
-------------	----------	---------	--------	-----------

Item	Storage Device	
1–2*	Optional DVD drive, CD-ROM drive, tape drive, or two-bay hot-plug SCSI drive cage	
3	Drive cage A for hot-plug hard drives and universal tape drives	
4	Drive cage B for hot-plug hard drives and universal tape drives	
5	CD-ROM drive or optional DVD drive	
*The removable media bays do not support non-hot-plug hard drives.		

A label on the front of each drive cage indicates the numbering of each drive slot, SCSI IDs 0 to 5.

Drive Bays

ProLiant ML530 Generation 2 servers support installation of the following storage devices into a drive bay:

- Hot-plug hard drives
- Hot-plug universal tape drives

Installing a Hot-Plug Hard Drive into a Drive Bay

Installation of optional hot-plug hard drives requires the following operations:

- Determining the proper hot-plug hard drive installation order
- Following the guidelines for installing SCSI devices
- Installing the hot-plug hard drive



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

Determining the Proper Hot-Plug Hard Drive Installation Order

The system reads and manages the hot-plug hard drives based on the SCSI ID number assigned to each drive. For optimal hard drive management and performance, install the hard drives in the order of SCSI ID assignments.

The system assigns the following sequence of SCSI ID numbers to the hard drives. The sequence is the same for both tower- and rack-model servers.



Figure 3-43: Hot-plug hard drive installation order

The SCSI drive cages are labeled as follows:

- (1) SCSI drive cage A
- (2) SCSI drive cage B

Guidelines for Installing SCSI Devices

The following guidelines apply for installing internal and external SCSI devices:

- Set the drive to standby mode as directed by the operating system instructions before adding or removing any SCSI drives.
- The server supports Ultra3 or Ultra4 SCSI types. Mixing other drive standards degrades the overall performance of the drive subsystem.

- Use drives with the same capacity to provide the greatest storage space efficiency when the drives are grouped together into the same drive array.
- Remove all terminating jumpers from third-party SCSI devices before cabling. HP SCSI cables are already terminated.
- The SCSI ID for each hard drive is set automatically as the bay number (bay 0 = SCSI ID 0).

Installing the Hot-Plug Hard Drive

To install a hot-plug hard drive into a drive cage:

- 1. For tower-model servers only, open the front bezel door to access the hot-plug drive cages on the front of the server. See "Opening the Front Bezel Door" in this chapter.
- 2. Remove the drive blank from the next available hot-plug drive bay:
 - a. Push the retaining clip inward to unlock the drive blank (1).
 - b. Grasp the drive blank by the front handle.
 - c. Slide the drive blank out of the drive bay (2).



Figure 3-44: Removing the drive blank from the next available hot-plug drive bay

- 3. Align the new hot-plug hard drive with the drive bay, then slide the hard drive into the bay until seated (1).
- 4. Push in the drive ejector lever until it locks the hard drive in place (2).



Figure 3-45: Installing a hot-plug hard drive

- 5. Repeat steps 2 through 4 to install additional hard drives.
- 6. Be sure that the hot-plug hard drive activity LEDs on the front of the system are illuminated green, indicating that the system is functioning properly. For detailed information on LEDs, see Appendix C, "System LEDs and Switches."
- 7. If any of the LEDs indicates an error, see Appendix D, "Troubleshooting," or refer to the troubleshooting guide for instructions.
- 8. If you have a tower-model server, close the front bezel door.
- 9. Run the ROM-Based Setup Utility or Smart Array Controller Utility to configure the new hard drives.

Installing a Hot-Plug Universal Tape Drive into a Drive Bay

To install a hot-plug universal tape drive into a drive cage:

1. For tower-model servers only, open the front bezel door to access the drive cages on the front of the server. See "Opening the Front Bezel Door" in this chapter.

- 2. Remove the drive blank from the next available hot-plug drive bay:
 - a. Push the retaining clip inward to unlock the drive blank (1).
 - b. Grasp the drive blank by the front handle.
 - c. Slide the drive blank out of the hot-plug hard drive bay (2).



Figure 3-46: Removing the drive blank from the next available hot-plug hard drive bay

3. HP hot-plug universal tape drives require two drive bays for installation, so you must remove two drive blanks. Repeat step 2 to remove a second drive blank.

4. Align the hot-plug universal tape drive with the drive bays and slide the tape drive into the drive bays until the release latch snaps into place.



Figure 3-47: Installing the HP universal hot-plug tape drive

- 5. Be sure that the tape drive LED on the front of the tape drive is illuminated green, indicating that the system is functioning properly. For detailed information on LEDs, see Appendix C, "System LEDs and Switches."
- 6. If any of the LEDs indicates an error, see Appendix D, "Troubleshooting," or refer to the troubleshooting guide for instructions.

For more information regarding installing the HP hot-plug universal tape drive, refer to the installation documentation provided with the drive.

Removable Media Bays

ProLiant ML530 Generation 2 servers support installation of IDE or SCSI storage devices into the removable media bays. Devices supported include:

- SCSI devices:
 - Digital Linear Tape (DLT) drive
 - Digital Audio Tape (DAT) drive
 - Advanced Intelligent Tape (AIT) drive
 - Two-bay hot-plug SCSI drive cage
- IDE devices:
 - CD-ROM drive
 - DVD drive



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

Installing SCSI or IDE Devices into the Removable Media Bays

To install a SCSI or IDE device into the removable media bay:

NOTE: The external appearance of your SCSI or IDE device may look different from the following illustrations, depending on your device.

- 1. For tower-model servers only, open the front bezel door. See "Opening the Front Bezel Door" in this chapter.
- 2. Power down the server. See "Powering Down the Server" in this chapter.
- 3. Remove the access panel. See "Removing the Access Panel" in this chapter.

4. Lift the slate-blue release latch (1) and slide out a removable media bay blank (2).



Figure 3-48: Removing the media bay blanks (tower model)

NOTE: If you plan to install a full-height device, you must remove both media bay blanks.

- 5. If you remove the lower removable media bay blank, remove the terminated multi-drop SCSI cable bundled in the bay blank and store it for later use.
- 6. Locate and remove the Torx T-15 tool. See "Locating and Removing the Torx T-15 Tool" in this chapter.

7. Remove the rails from one of the removable media bay blanks by removing all four Torx T-15 screws in the rails. Note that the orientation of the left rail is the reverse of the orientation of the right rail.



Figure 3-49: Removing the removable media bay blank rails

8. Affix the rails to the SCSI or IDE device. Be sure to orient the rails properly.



Figure 3-50: Affixing the removable media bay blank rails to a SCSI or IDE device
9. Slide the device into the removable media drive bay until the release latch locks into place.



Figure 3-51: Installing a SCSI or IDE device in the removable media bays (tower model)

- 10. Cable the power and signal cables for your SCSI or IDE device. See "Cabling SCSI Devices in the Removable Media Bay" or "Cabling IDE Devices in the Removable Media Bay" in this chapter.
- 11. Reinstall the access panel.
- 12. If you have a tower-model server, close the front bezel door.
- 13. Install the server. See Chapter 5, "Installing the Rack Server" or Chapter 6, "Installing the Tower Server."
- 14. Power up the server. See Chapter 5, "Installing the Rack Server" or Chapter 6, "Installing the Tower Server."
- 15. Be sure that the LED on the front of the SCSI or IDE device is illuminated green, indicating that the system is functioning properly. For detailed information on LEDs, see Appendix C, "System LEDs and Switches."
- 16. If any of the LEDs indicates an error, see Appendix D, "Troubleshooting," or refer to the troubleshooting guide for instructions.

For more information about installing and configuring SCSI or IDE devices in the removable media bays, refer to the documentation that ships with the option kit.

Cabling SCSI Devices in the Removable Media Bays

You can cable SCSI devices in the removable media bays in several ways:

- To SCSI connector A on the system board
- To SCSI connector B on the system board
- To a SCSI controller installed in an expansion slot
- To a Smart Array Controller installed in an expansion slot

IMPORTANT: The ProLiant ML530 Generation 2 server ships with the drive cages cabled internally to SCSI connectors A and B.

If you want to cable a SCSI device from the removable media bay to SCSI connector A or B, you must first disconnect the appropriate drive cage cable. Once you have disconnected a drive cage cable, you must cable it to a controller board to retain use of that drive cage.

IMPORTANT: SCSI devices in the removable media bay must have a designated SCSI channel; they cannot be daisy-chained with other devices.

IMPORTANT: If a SCSI cable ships with your option kit, use that cable rather than the one that ships with the server bundled in the lower removable media bay blank.

For more information on cabling SCSI devices, see Chapter 7, "Cabling the Server," or refer to the documentation that ships with your option kit.

Cabling IDE Devices in the Removable Media Bays

Figure 3-52 illustrates the proper cable routing of an IDE device from the removable media bay to the secondary IDE connector on the system board.



Figure 3-52: Cable routing of an IDE device from the removable media bay to the secondary IDE connector on the system board

Installing a DVD Drive in the CD-ROM Drive Bay

The ProLiant ML530 Generation 2 server ships standard with a CD-ROM drive installed in the CD-ROM drive bay. However, you have the option of removing the CD-ROM drive and installing a DVD drive in its place. Installing a DVD drive in place of the CD-ROM drive requires the following operations:

- Removing the CD-ROM drive
 - Removing the CPU and I/O fans
 - Removing the fan baskets
 - Removing the drive air baffle
 - Removing the CD-ROM drive
- Installing the DVD drive into the CD-ROM drive bay
 - Installing the DVD drive
 - Cabling the DVD drive

Removing the CD-ROM Drive to Install a DVD Drive

To install a DVD drive in the CD-ROM drive bay, you must first remove the CD-ROM drive, which requires the following steps:

- 1. Power down the server. See "Powering Down the Server" in this chapter.
- 2. Remove the access panel. See "Removing the Access Panel" in this chapter.
- 3. Remove the CPU and I/O fans:
 - a. Push in on the release lever (1).
 - b. Lift the fan out of the server (2).



Figure 3-53: Removing a CPU or I/O fan

- 4. Remove both fan baskets. To remove a fan basket:
 - a. Loosen the thumbscrew (1).
 - b. Lift the fan basket out of the server (2).



Figure 3-54: Removing a fan basket

5. Press down on the system tray locking latch (1) and slide the system tray out until it stops (2).



Figure 3-55: Extending the system tray

- 6. Remove the drive air baffle:
 - a. Loosen the two thumbscrews securing the drive air baffle in place (1).
 - b. Remove the drive air baffle from the server (2).



Figure 3-56: Removing the drive air baffle

7. Disconnect the power and signal cables from the CD-ROM drive.



Figure 3-57: Disconnecting cables from the CD-ROM drive

- 8. Loosen the thumbscrew located near the bottom of the CPU fan basket to release the metal locking bracket (1).
- 9. Slide the metal locking bracket away from the fans (2).
- 10. Pull the CD-ROM drive out through the front of the chassis (3).



Figure 3-58: Removing the CD-ROM drive

Installing the DVD Drive in the CD-ROM Drive Bay

To install a DVD drive in place of the CD-ROM drive:

- 1. Remove the CD-ROM drive. See "Removing the CD-ROM Drive to Install a DVD Drive" in this chapter.
- 2. Insert the DVD drive into the front of the chassis (1).
- 3. Slide the metal locking bracket toward the fans (2).
- 4. Tighten the thumbscrew near the bottom of the CPU fan basket (3).



Figure 3-59: Installing a DVD drive in the CD-ROM drive bay

5. Connect the power and signal cables to the DVD drive. Refer to the documentation that ships with the option kit for directions on cabling the DVD drive. For internal cabling information specific to DVD drive installation in the ProLiant ML530 Generation 2 server, see Chapter 7, "Cabling the Server."



Figure 3-60: Cabling a DVD drive from the CD-ROM drive bay to the primary IDE connector on the system board

- 6. Reinstall the drive air baffle and tighten the thumbscrews.
- 7. Reinstall the CPU and I/O fan baskets and tighten the thumbscrews.
- 8. Reinstall the CPU and I/O fans.
- 9. Close the system tray.
- 10. Reinstall the access panel.
- 11. Install the server. See Chapter 5, "Installing the Rack Server" or Chapter 6, "Installing the Tower Server."
- 12. Power up the server. See Chapter 5, "Installing the Rack Server" or Chapter 6, "Installing the Tower Server."

- 13. Be sure that the LED on the front of the DVD drive is illuminated green, indicating that the system is functioning properly. For detailed information on LEDs, see Appendix C, "System LEDs and Switches."
- 14. If any of the LEDs indicates an error, see Appendix D, "Troubleshooting," or refer to the troubleshooting guide for instructions.

External Devices

You can connect external devices in two ways:

- To SCSI connector A or B on the system board using the internal-to-external SCSI cable assembly
- To a SCSI controller or Smart Array Controller installed in an expansion slot

IMPORTANT: The ProLiant ML530 Generation 2 server ships with the drive cages cabled internally to SCSI connectors A and B.

If you want to cable a SCSI device to SCSI connector A or B using the internal-to-external SCSI cable assembly, you must first disconnect the appropriate drive cage cable. Once you have disconnected a drive cage cable, you must cable it to a controller board to retain use of that drive cage.

For more information on cabling external storage devices, see Chapter 7, "Cabling the Server," or refer to the documentation that ships with the external storage device.

Connecting an External Device using the Internal-to-External SCSI Cable Assembly

NOTE: The external configuration and external appearance of your server may look different from the following illustrations, depending on your server configuration.

To connect an external SCSI device using the internal-to-external SCSI cable assembly:

- 1. Be sure that the external device can connect to a VHDCI SCSI connector.
- 2. Power down the server. See "Powering Down the Server" in this chapter.
- 3. Remove the access panel. See "Removing the Access Panel" in this chapter.

4. Disconnect drive cage A or B from SCSI connector A or B on the system board.

IMPORTANT: Once you have disconnected a drive cage cable, you must cable it to a controller board to retain use of that drive cage.

- 5. Locate the loose end of the internal-to-external SCSI cable and connect it to the available SCSI connector on the system board.
- 6. Reinstall the access panel.
- 7. Connect the external device to the VHDCI SCSI connector on the rear panel of the server.



Figure 3-61: Connecting an external device to the VHDCI SCSI connector

- 8. Power up the external device.
- 9. Power up the server. See Chapter 5, "Installing the Rack Server" or Chapter 6, "Installing the Tower Server."

Connecting an External Device to an Expansion Board

To connect an external device to an expansion board:

1. Be sure that the external storage device can connect to the external connectors of the expansion board.

- 2. Identify the expansion slot into which you intend to install the expansion board. For more information on PCI-X technology and expansion slots, see Chapter 4, "PCI-X Technology."
- 3. Install the expansion board according to the procedures in this guide.
- 4. Connect the external device to the expansion board at the rear of the server.



Figure 3-62: Connecting an external storage device to an expansion board

- 5. Power up the external device.
- 6. Power up the server. See Chapter 5, "Installing the Rack Server" or Chapter 6, "Installing the Tower Server."

PCI-X Technology

This chapter provides the following information:

- A brief discussion of the enhanced performance delivered by Peripheral Component Interconnect Extended (PCI-X) technology over Peripheral Component Interconnect (PCI) technology
- An explanation of how to operate PCI Hot Plug technology

For more information specific to hot-plug technology, refer to the following resources on the Documentation CD:

- The online PCI Hot Plug Administration Guide
- The PCI Hot Plug animation and additional information

The ProLiant ML530 Generation 2 server contains seven expansion slots using the new Peripheral Component Interconnect Extended (PCI-X) protocol. These seven slots include four with PCI-X Hot Plug capability.

PCI and PCI-X Expansion Boards

ProLiant ML530 Generation 2 servers support the installation of both PCI and PCI-X expansion boards.

- PCI expansion boards are designed to a peak frequency of no more than 66 MHz.
- PCI-X expansion boards are designed to a peak frequency of at least 100 MHz.

Slot Architecture

Each of the seven PCI-X expansion slots in the ProLiant ML530 Generation 2 server operates at a maximum frequency of 100 MHz and is managed across four data buses. The server facilitates load balancing by having no more than two slots per bus. Figure 4-1 and Table 4-1 identify the PCI-X expansion slots and buses.



Figure 4-1: PCI-X expansion slots and buses

Item	Slot		
1	Slot 1 (hot-plug)	Shared PCLV bus	
2	Slot 2 (hot-plug)	Shared F CI-A bus	
3	Slot 3 (hot-plug)	Shared PCLV bus	
4	Slot 4 (hot-plug)	Shareu F CI-A Dus	
5	Slot 5	Shared PCLV bus	
6	Slot 6		
7	Slot 7*	PCI-X bus	

*Slot 7 is recommended for the Remote Insight Lights-Out Edition due to internal cabling requirements.

Embedded NIC

The embedded NIC that ships with the server is an RJ-45 10/100 Autosensing Ethernet network interface controller (NIC) with Wake On LAN (WOL) support and Preboot eXecution Environment (PXE) support. The embedded NIC shares a PCI bus with the embedded SCSI controller and the embedded video controller. Using the Network Teaming and Configuration Utility, the embedded NIC can be teamed with any other standup NC series NIC for Network Fault Tolerance and Adaptive Load Balancing. The teaming software can be downloaded from the HP website:

www.hp.com/servers/proliant/manage

Performance Balancing

Balancing is the paired arrangement of expansion boards for optimal performance based on the bus architecture of the expansion slots.

Properly balancing the expansion boards across buses can improve performance. To balance expansion boards, populate slots across different buses before populating two slots on the same bus.

Table 4-2 provides a guideline for slot population order.

NOTE: The slot population order that follows is a recommendation only; any PCI or PCI-X expansion board may reside in any slot.

Slot Number	Population Order		
1	1	- Sharad PCLV bus	
2	5	- Shared FCI-X bus	
3	2	Sharad PCLV bus	
4	6	- Shared FOFA bus	
5	3	- Shared PCLX bus	
6	7	- Shareu PCI-X DUS	
7*	4	PCI-X bus	
*Slot 7 is recommended for the Remote Insight Lights-Out Edition due to			

 Table 4-2: Recommended PCI-X Expansion Slot Population

 Order

internal cabling requirements.

The operating system detects the PCI devices in the slots in this order:

1-2-3-4-5-6-7

For more information about PCI bus architecture and numbering, refer to the white paper, *PCI Bus Numbering in a Windows NT Environment*, on the website:

www.compaq.com/support/techpubs/whitepapers

Expansion Slot Speed LEDs

The bus architecture delivers matched speed of expansion boards on the same bus.

IMPORTANT: Always pair expansion boards of the same speed on the same bus for optimal performance. If expansion boards of different speeds are installed on the same bus, the server sets the bus speed to that of the slower expansion board.

Use Figure 4-2 and Table 4-3 to identify the speed for each PCI slot and to help ensure optimal performance.



Figure 4-2: Expansion slot speed LEDs

Table 4-5: Expansion Siol Speed LEL	Table 4-3:	Expansion	Slot S	peed	LEDs
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LED	Slot Speed
1	33 MHz PCI
2	66 MHz PCI
3	66 MHz PCI-X
4	100 MHz PCI-X

PCI-X Hot Plug Technology

HP ProLiant ML530 Generation 2 servers support PCI-X Hot Plug technology.

PCI-X Hot Plug Features

PCI-X Hot Plug and the server's operating system work together to enable the following hot-plug operations:

• Hot replacement of expansion boards

You can replace a failed expansion board with an identical expansion board without powering down the server.

• Hot addition of expansion boards

You can install new PCI expansion boards in previously empty slots without powering down the server.

• Hot upgrade of expansion boards

You can replace an expansion board with a different expansion board without powering down the server.

PCI-X Hot Plug features enable you to remove, upgrade, and add PCI or PCI-X expansion boards without powering down the server by either using the PCI Hot Plug button or the PCI Hot Plug Utility software. Any PCI adapter can be placed in a PCI Hot Plug slot. However, PCI Hot Plug device drivers and operating system support are required to enable the PCI Hot Plug feature.

PCI-X Hot Plug Requirements

Your server **must** have all of the following to be PCI-X Hot Plug-capable:

- PCI-X Hot Plug system hardware (available in this server)
- PCI-X Hot Plug device drivers (installed from the SmartStart CD)
- An operating system that supports PCI-X Hot Plug technology

For information about specific operating systems with PCI-X Hot Plug support, refer to the operating system support matrix available from the website:

ftp://ftp.compaq.com/pub/products/servers/os-support-matrix-310.pdf



CAUTION: Before adding or removing any PCI Hot Plug devices, be sure to remove power to the slot using the PCI Hot Plug application or the PCI Hot Plug button. Failure to do so could result in critical errors.

IMPORTANT: If any of the three required components are not available, the system is fully functional, though not PCI Hot Plug-capable.

PCI Hot Plug Utility

SmartStart provides the PCI Hot Plug Utility for each operating system supported by the ProLiant ML530 Generation 2 server. The PCI Hot Plug Utility is delivered as part of the Support Paq, which is available on the SmartStart CD and at the HP website:

www.hp.com/servers/proliant/manage

The PCI Hot Plug Utility is the user interface of the PCI Hot Plug architecture. The application performs the following functions:

- Slot control
- PCI Hot Plug option configuration
- Expansion board status monitoring and reporting

For more information, refer to the SmartStart for Servers documentation.

PCI Hot Plug Button

The PCI Hot Plug button provides PCI Hot Plug hardware control without requiring you to first run the PCI Hot Plug Utility software. Press the port-colored PCI Hot Plug button once to power down or power up a slot. You can cancel an action by pressing the button again within five seconds. When you press the button, the system automatically stops or starts expansion board drivers. See Figure 4-3 and Table 4-4 to locate the PCI Hot Plug button.

Expansion Slot LEDs

One green and one amber LED are associated with each hot-plug expansion slot to identify the location and indicate the status of the slot. The LEDs are visible from the rear of the server or from inside the server when the hot-plug door is open. Use the following figures and tables to assist in locating the LEDs.



Figure 4-3: Internal expansion slot LEDs and PCI Hot Plug button

Table 4-4:	Internal Expansion Slot LEDs and PCI	Hot
Plug Butto	n	

Item	Description	
1	Fault LED (amber)	
2	Power LED (green)	
3	PCI Hot Plug button (port)	



Figure 4-4: External expansion slot LEDs

Table 4-5: Exter	nal Expansion Slot LEDs
------------------	-------------------------

Item	Description	
1	Power LED (green)	
2	Fault LED (amber)	

Use the following table to identify PCI-X Hot Plug slot activity status according to LED description.

LED	State	OK to Open	Slot Status	
Power	On	No	Power is currently applied to the slot. Do NOT open	
Fault	Off		the expansion slot latch. The slot is functioning normally.	
Power	On	No	Power is currently applied to this slot, but the slot	
Fault	On		needs ATTENTION for a possible problem with the slot, expansion board, or driver. Do NOT open the expansion slot latch.	
Power	Flashing	No	The power slot is being turned off or on, which may	
Fault	On or off		take several minutes. Do NOT open the expansion slot latch. Press the PCI Hot Plug button to cancel the operation.	
Power	Off	Yes	Power to this slot is turned off, but this slot needs	
Fault	On		ATTENTION. There may be a problem with the slot expansion board, or driver.	
Power	Off	Yes	The power to the slot is off. An expansion board may	
Fault	Off		de installed in this slot.	

Table 4-6: PCI-X Expansion Slot LEDs

Note: If the any of the LEDs indicates an error, see Appendix D, "Troubleshooting," for more information.

Performing PCI Hot Plug Operations

This section discusses hot-plug installation and removal of expansion boards. For an overview of non-hot-plug expansion board procedures, see Chapter 3, "Installing Hardware Options."

Before adding or removing an expansion board, you must install:

- The PCI-X Hot Plug device drivers, (installed from the SmartStart CD)
- An operating system that supports PCI-X Hot Plug technology

For information about specific operating systems with PCI-X Hot Plug support, refer to the operating system support matrix available from the website:

ftp://ftp.compaq.com/pub/products/servers/os%20feature%20matrix%20103000.pdf

To install an operating system, see Chapter 5, "Installing the Rack Server," or Chapter 6, "Installing the Tower Server."



WARNING: To reduce the risk of personal injury from hazardous energy or of damage to the equipment when working on energized servers:

- Remove all watches, rings, and any other loose fitting jewelry.
- Avoid the use of conductive tools inside the server that could bridge live parts.



WARNING: The hot-plug door provides access to hazardous energy circuits. To avoid risk of injury or damage to the equipment from hazardous energy, be sure that the door remains locked during normal operation or install the server in a controlled access location.



CAUTION: Be sure that either an expansion board or an expansion slot cover is installed at all times. Proper airflow can only be maintained when an expansion board or an expansion slot cover is in place. Leaving a rear panel expansion slot opening uncovered can lead to improper cooling and thermal damage.

IMPORTANT: Illustrations in the following procedures show how to use the PCI Hot Plug button, instead of a utility, to power down and power up the expansion slot. For information about procedures using utilities and PCI Hot Plug applications, see the "PCI Hot Plug Utilities" section in this chapter.

Hot Installing an Expansion Board

To install an expansion board into a PCI-X Hot Plug slot:

- 1. If the server is installed in the rack, extend the server from the rack.
- 2. Open the hot-plug door. See "Opening the Hot-Plug Door" in Chapter 3, "Installing Hardware Options."
- 3. Identify the PCI Hot Plug expansion slot that you want to populate and the PCI Hot Plug button that manages it.



CAUTION: Do not attempt this hot-plug operation if your operating system does not provide PCI Hot Plug support or if you do not have the appropriate device drivers installed. Failure to properly execute a hot-plug operation can halt your system.

4. Press the port-colored PCI Hot Plug button or use the PCI Hot Plug Utility to power down the PCI Hot Plug slot.



CAUTION: Be sure that the slot LED is off before installing the expansion board.



Figure 4-5: Powering down the slot with the port-colored PCI Hot Plug button

- 5. Press down on the expansion slot latch (1).
- 6. Allow the latch to spring up and open the slot (2).
- 7. Remove the expansion slot cover (3).



Figure 4-6: Releasing the expansion slot latch and removing the expansion slot cover

8. If you are installing a full-length board, press the PCI retaining clip toward the center wall to lock it in the open position.



Figure 4-7: Locking the PCI retaining clip open

- 9. Install the expansion board in the slot and apply even pressure to seat the board securely (1).
- 10. Flip the expansion slot latch down and lock it into place (2).



Figure 4-8: Inserting a PCI Hot Plug expansion board

11. If you are installing a full-length board, pull the PCI retaining clip into a locked position to secure the board in the slot.



Figure 4-9: Securing the PCI retaining clip

- 12. Connect any required cables to the PCI expansion board.
- 13. Press the PCI Hot Plug button or use the PCI Hot Plug Utility to power up the PCI Hot Plug slot.
- 14. Wait until the amber LED is off and the green LED stays illuminated to be sure that you have installed the board properly.
- 15. Install other hardware options as needed or reinstall the access panel as described in Chapter 3, "Installing Hardware Options."
- 16. If you have a rack-model server, slide the server back into the rack and secure it as described in Chapter 5, "Installing the Rack Server."
- 17. Configure the expansion board using the documentation and software that ships with the option.

NOTE: For information about using a PCI Hot Plug Utility for installations with system drivers, see the "PCI Hot Plug Utilities" section in this chapter.

Hot Removing an Expansion Board

Your HP ProLiant ML530 Generation 2 server includes a PCI slot divider and ejector to ensure slot safety and to facilitate expansion board removal. To remove an expansion board from a PCI-X Hot Plug slot:

1. Press the port-colored PCI Hot Plug button or use the PCI Hot Plug Utility to power down the PCI Hot Plug slot. Be sure that the slot is powered down by observing the flashing green LED until it turns off.



Figure 4-10: Powering down the slot with the port-colored PCI Hot Plug button

CAUTION: Be sure that the slot LED is off before removing the expansion board.



2. Open the PCI retaining clip (full-length expansion boards only).

Figure 4-11: Locking the PCI retaining clip open

- 3. Press the expansion slot latch down to release (1).
- 4. Flip the latch up to open the slot (2).
- 5. Pull upward on the expansion board release handle to eject the expansion board from the slot (3).



Figure 4-12: Releasing the expansion board with the expansion board release handle



6. Lift the expansion board out of the server.

Figure 4-13: Removing a PCI Hot Plug expansion board from the server

PCI Hot Plug Utilities

In partnerships with Microsoft, Novell, and Caldera, HP has developed software support implementations for each operating system. HP is promoting standardization with operating system software leaders to ensure the broad availability of PCI Hot Plug technology. Each operating system supplier is responsible for its own implementation of the software.

• Microsoft Windows NT® operating system

The PCI Hot Plug Utility for Windows NT is the graphical interface for management of PCI Hot Plug functions. See the "PCI Hot Plug Utility for Windows NT" section in this chapter.

• Microsoft Windows 2000 operating system

Windows 2000 contains native support for PCI Hot Plug functionality and monitoring. For more information, refer to the documentation that ships with the operating system.

• Novell NetWare operating system

The Novell NetWare Configuration Manager Console is the user interface for management of PCI Hot Plug functions. See the "Novell NetWare Configuration Manager Console" section in this chapter.

• Caldera UnixWare operating system

The Caldera Admin Manager, part of the UnixWare operating system, contains native support for PCI Hot Plug functionality and monitoring. For more information, refer to the documentation that ships with the operating system.

• For more information about PCI Hot Plug technology, visit the HP website:

www.compaq.com/products/servers/technology/pci-hotplug-pd.html

PCI Hot Plug Utility for Windows NT

The PCI Hot Plug Utility for Windows NT (located on the SmartStart CD) enables you to view the status of the PCI Hot Plug slots and to initiate actions such as replacing a failed expansion board.

The Windows NT PCI Hot Plug Utility screen is divided into three sections:

Top

This area enables you to connect to a remote computer by typing the server name in the combo box, selecting a server from the combo box, or using the **Browse** button to bring up a selection dialog. The **Refresh** button refreshes the PCI Hot Plug information for the current server.

• Middle

The list control displays information about the PCI Hot Plug slots on the current server: LEDs, location, expansion board name (if any), and the status of the slot and/or expansion board. The columns can be sorted and resized, and some can be hidden. These commands are accessible by right-clicking the mouse on a column header.

• Bottom

The filter drop-down list box can be used to define the slots shown: the **Power** button toggles the power to the currently selected slot, the **Help** button brings up the standard **Help Finder** dialog, and the **Exit** button exits the utility.

Novell NetWare Configuration Manager Console

The Novell NetWare Configuration Manager Console (NCMCON) user interface enables you to view status information on PCI slots and control features, such as removing and adding PCI Hot Plug expansion boards all from one focal point.

Navigating the NCMCON Menus

The NCMCON interface constantly retrieves and displays the status of all of the slots. If there are any errors, the appropriate error message displays. To navigate through these menus, follow these guidelines:

- From the **Main** menu, use the arrow keys to move up and down the list of slots. The current line is highlighted.
- Press the **Enter** key to go to the **Slot Options** menu. Use the arrow keys to highlight the correct option and press the **Enter** key to select that option. If you press the **Enter** key when a non-hot-plug slot is highlighted, the **Slot Detail** screen displays.
- If at any point you want to return to the Main menu, press the Esc key.
- Press the **F1** key for online help.

Performing PCI Hot Plug Actions

The PCI Hot Plug Utility and the NetWare PCI Hot Plug application work together to enable the following hot-plug actions:

• View slot detail information

This option enables you to view detailed information about each PCI slot.

• Hot removal of expansion boards

You can manually shut down and permanently remove an expansion board, regardless of whether it is working or has failed. Performing a manual removal also disables the device driver.

• Hot replacement of expansion boards

This option enables you to replace a failed expansion board with an identical expansion board. This action applies power to and configures the slot.

• Hot addition of expansion boards

This option enables you to add an expansion board into an empty slot.
Viewing Slot Detail Information

To view slot detail information:

- 1. From the **Main** menu, highlight the slot and expansion board information to be viewed.
- 2. Press the **Enter** key.
- 3. Select Slot Detail Information from the Slot Options menu.

Removing an Expansion Board

To remove an expansion board:

- 1. From the Main menu, highlight the slot and expansion board to be removed.
- 2. Press the Enter key to go to the Slot Options menu.
- 3. Use the arrow keys to highlight **Remove Expansion Board** and press the **Enter** key. NCMCON then processes the remove request.
- 4. Be sure that the slot has a status of POWERED down and the green LED is no longer illuminated.
- 5. Open the expansion slot latch.
- 6. Remove the expansion board from the slot. NCMCON updates the status of the slot.

Replacing an Expansion Board

To replace an expansion board:

- 1. Remove the expansion board from the slot. See the "Hot Removing an Expansion Board" section in this chapter.
- 2. Be sure that the slot has a status of POWERED down and the green LED is not illuminated.
- 3. Install the new expansion board in the slot.
- 4. Close the expansion slot latch.

- 5. When the new expansion board is detected, NCMCON automatically asks if you want to configure and apply power to the slot:
 - If you answer "Yes," power is applied to the slot, the green LED illuminates, and the status of the slot on the console changes to READY.
 - If you answer "No," the console status does not change.
- 6. Press the **Enter** key to go to the **Slot Options** menu.
- 7. Use the arrow keys to highlight **Replace Adapter** and press the **Enter** key. NCMCON processes the replace request.

Adding an Expansion Board

To add an expansion board:

- 1. From the **Main** menu, highlight the slot into which the expansion board is to be added.
- 2. Press the Enter key to go to the Slot Options menu.
- 3. Use the arrow keys to highlight **Add Adapter** and press the **Enter** key. NCMCON then processes the request.
- 4. Be sure that the slot has a status of POWERED down and the green LED is no longer illuminated.
- 5. Install the new expansion board in the slot.
- 6. Close the expansion slot latch.
- 7. When the new expansion board is detected, NCMCON automatically asks if you want to configure and apply power to the slot.
 - If you answer "Yes," power is applied to the slot, the green LED illuminates, and the status of the slot changes to READY.
 - If you answer "No," the console status does not change.
- 8. Press the **Enter** key to go to the **Slot Options** menu.

Novell NetWare Operating System Messages

Novell NetWare uses the following list of messages to indicate errors during PCI Hot Plug operations:

- **Expansion Board Not Same**—The expansion board is not the same as the expansion board being replaced. The hot-plug replacement cannot continue.
- **Card Functioning**—The expansion board in the slot is currently functioning. The Add/Replace is ignored.
- **Driver in Use**—The expansion board is currently in use. Do you wish to force removal?
- **Driver Loaded**—The driver for the expansion board is currently loaded and must be unloaded manually. Unload the driver and select again.
- General Failure—Could not perform the action because of a system failure.
- **No Hot-Plug Driver**—The hot-plug driver is not responding. Check to be sure the device driver CPQSBD.NLM is loaded.
- **Remove Not Supt**—The Remove action is not supported for the expansion board/slot.
- **Switch Open**—The slot cannot be initialized because the switch is open. Close the switch and try Add/Replace again.
- Unknown Slot—The Add/Remove was performed on an unknown slot. Try the command again.
- **Replace Load Driver**—The expansion board is successfully replaced. Please load the driver at this time.

Installing the Rack Server

This chapter provides the required procedures for mounting an HP ProLiant ML530 Generation 2 server into a Compaq branded or industry-standard 19-inch rack. For more information, see Chapter 2, "Planning the Server Installation." Server cabling and configuration are discussed in Chapter 7, "Cabling the Server" and Chapter 8, "Server Configuration and Utilities."

This chapter specifically addresses:

- Server installation overview
- Preparing the rack for server installation
 - Measuring with the rack template
 - Inserting cage nuts into the rack frame
 - Installing the rack rail assemblies
- Preparing the server for rack installation
 - Attaching the server rails
 - Removing the power supplies
 - Attaching the cable management arm bracket

- Installing the server into the rack
 - Loading the server into the rack rails
 - Attaching the cable management arm
 - Reinstalling the power supplies
- Securing the server in the rack for shipping
- Connecting the AC power cord and peripheral devices
- Securing cables with the cable management arm
- Powering up the server
- Installing an operating system
- Registering your server
- Routine maintenance

The chapter concludes with routine maintenance guidelines and resources. For additional information, visit the HP website:

www.hp.com/servers/proliant

Server Installation Overview

Installing the server in the rack requires the following actions:

- 1. Select an appropriate site for your server based on the environmental and stability requirements discussed in Chapter 2, "Planning the Server Installation."
- 2. Unpack the server and locate the rack-mounting hardware described in the "Server Shipping Contents" section of Chapter 2, "Planning the Server Installation."
- 3. Install any expansion boards or hardware options such as memory. To install the major hardware items, see Chapter 3, "Installing Hardware Options" or follow the installation instructions provided in each hardware option kit.
- To minimize server weight, remove the hot-plug power supplies and do not install hot-plug hard drives until the server is mounted in the rack. See "Removing the Power Supplies" in this chapter.

- 5. With the exception of additional memory and most PCI-X boards, run the ROM-Based Setup Utility (RBSU) after you install your hardware options. To run RBSU, refer to the ProLiant Essentials Foundation Pack that ships with your server.
- 6. Use the rack template to identify the proper location for the server. See "Measuring with the Template" in this chapter.
- 7. Attach rack-mounting hardware to the server and to the rack. See "Installing the Rack Rail Assemblies" and "Attaching the Cable Management Arm Bracket" in this chapter.
- 8. Slide the server into the rack. See "Installing the Server into the Rack" in this chapter.
- 9. Attach the cable management arm to its support bracket. Attach the optional cable management arm support bracket to the back of the rack.

Preparing the Rack for Server Installation

To prepare the rack for a server installation:

- Measure with the rack template.
- Insert cage nuts into the rack frame.
- Install the rack rail assemblies.

Measuring with the Template

The rack template provides an easy and reliable way to properly position the rack rail assemblies in the rack.

- The template is two-sided and is printed with arrows that show you where to insert rack rail assemblies on the front and back of the rack.
- The template determines the mounting position of the rack rail assemblies and the cage nuts (supplied with the rack kit) that secure the rack bezel to the rack after installation.

Mark the rack from the top and bottom edges of the rack template to identify where the server fits and to provide a starting point for installing the next unit.

WARNING: Reduce the risk of personal injury or damage to the equipment by ensuring that the rack leveling feet extend to the floor and support the full weight of the rack. Each rack must be level and stable. Racks that are not coupled require stabilizers. This must be done before you perform any work on the rack.

Refer to the *Rack Planning and Installation Guide* on the Documentation CD that accompanies the Compaq branded rack for more information on leveling feet and stabilizers.



WARNING: Always mount the heaviest item on the bottom of the rack. Continue to populate the rack from the bottom to the top.

IMPORTANT: Determine the server's place in the rack **before** you start installing the rack rail assemblies. To remind you of the proper placement of the server in the rack, refer to the Rack Builder report you printed when you planned your rack configuration with the Rack Builder tools provided with your Compaq branded rack.

Use the rack template to identify the required space and location for your server.

Marking the Front of the Rack with the Rack Template

To mark the front of the rack with the rack template:

- 1. Identify the front side of the template.
- 2. Starting at the bottom of the rack, or at the top of a previously mounted component, match the hole pattern on the template with the holes on the vertical posts of the rack.

NOTE: Tick marks on the rack's vertical posts mark off U-spaces in the rack configuration and help to maintain the proper alignment.

3. Secure the template against the front of the rack by pressing the two push tabs through the matching holes.



Figure 5-1: Measuring with the rack template on the front of the rack

- 4. Use a pencil to mark the locations on the outside of the front of the rack where the rack rails must be inserted (designated "R" on the template). Also mark the locations for the cage nuts (designated "C" on the template).
- 5. Place additional pencil marks on the rack at the top edge of the template to align the template for the next component.

Marking the Rear of the Rack with the Rack Template

To mark the rear of the rack with the rack template:

- 1. Move to the rear of the rack and turn the template over to use the reverse side of the template.
- 2. Starting at the bottom of the rack, or at the top of a previously mounted component, match the hole pattern on the template with the holes on the vertical posts of the rack.

NOTE: Tick marks on the rack's vertical posts mark off U-spaces in the rack configuration and help to maintain the proper alignment.

- 3. Secure the template against the rear of the rack by pressing the two push tabs through the matching holes.
- 4. Use a pencil to mark the locations on the inside of the rear of the rack where the rack rails must be inserted (designated "R" on the template). Also mark the locations for the cable management arm (designated "A" on the template) on the outside of the rack.

IMPORTANT: On the rear of the rack, make pencil marks on the **inside** of the vertical rails. These markings guide you in installing rack rails into the interior of the rack frame.

NOTE: No cage nuts are required on the rear vertical posts of the rack.

5. Place additional pencil marks on the rack at the top edge of the template to align the template for the next component.

After marking the front and rear of the rack, remove the template from the rack and prepare the rack for installation.

Inserting Cage Nuts into the Rack Frame

Having marked the positions for the cage nuts in the front of the rack, insert cage nuts on the inside of the rack posts at the marked locations.

To insert the cage nuts:

- 1. Position one of the cage nuts on the inside of a vertical post on the front of the rack.
- 2. Compress the sides of the cage nut and insert both tabs into the square cutout on the post.

- 3. If manual compression does not force the cage nut into place, use the fitting tool (supplied with the rack):
 - a. Rest the bottom tab of the cage nut on the square cutout on the vertical post.
 - b. Insert the angled tip of the fitting tool through the other side of the square cutout and hook the top tab of the cage nut.
 - c. Use the fitting tool as a lever to pull the cage nut into position.



Figure 5-2: Inserting cage nuts into the rack frame

4. Repeat steps 1 and 2 for a second cage nut.

Installing the Rack Rail Assemblies

To install the rack rail assemblies into the rack:

1. Identify the left rack rail assembly and the right rack rail assembly.

IMPORTANT: The left rack rail assembly and the right rack rail assembly differ from each other. Check the labeling on the assemblies before installation to be sure that you install each assembly into the appropriate side of the rack. From the front of the rack, the left rack rail assembly installs into the left side of the rack and the right rack rail assembly installs into the rack.

- 2. Compress the left rack rail assembly by pressing the rail compression lever toward the front of the rail (1).
- 3. From the front of the rack, identify the rack holes on the inside of the rear of the rack that you marked with the template. Insert the rear rail tabs on the rack rail assembly into the marked holes on the interior of the vertical posts on the rear of the rack (2).
- 4. Pull the rack rail assembly towards the front of the rack and carefully align the tabs on the front end of the rack rail assembly with the marked holes on the front of the rack (3).



Figure 5-3: Inserting the rack rail assembly into the rack (other rack details are removed for clarity)

5. Release the rail compression lever to seat the locking mechanism in the square hole in the vertical rack post.



Figure 5-4: Releasing the rail compression lever

- 6. Repeat steps 2 through 5 for the right rack rail assembly.
- 7. For additional security or for stability during shipping, insert a 6 x 12 mm Phillips screw into the top hole of each rack rail assembly at both the front and rear of the rack.



Figure 5-5: Inserting screws to secure the rack rail assembly in the rack

Preparing the Server for Rack Installation

To prepare the server for rack installation:

- Attach the server rails.
- Remove the power supplies.
- Attach the cable management arm bracket.

Attaching the Server Rails

To attach the server rails to the server chassis:

IMPORTANT: Install the server rails with the smooth side of the rail against the server chassis.

- 1. Align the four keyholes on the server rail with the four posts on the side of the server chassis.
- 2. Press the rail against the side of the chassis and slide it toward the front of the server until the rail snaps into place.



Figure 5-6: Positioning the server rail on the chassis

3. Repeat steps 1 and 2 to attach the second rail to the server.

Removing the Power Supplies

To make moving and lifting the server more manageable, HP recommends that all power supplies be removed from the server.

To remove the power supplies:

1. Locate the power supplies on the rear of the server under the system tray.



Figure 5-7: Server power supplies

Table 5-1:	Power	Supply	Locations
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Item	Power Supply
1	Hot-plug power supply 1
2	Hot-plug power supply bay 2 (redundant)
3	Hot-plug power supply bay 3 (not used)*

*Improved power supply performance ensures that a single power supply provides sufficient power to the entire system. Complete redundancy can be achieved by installing only one additional power supply.

- 2. If present, remove the Torx T-15 screw from the power supply handle. The Torx T-15 tool is clipped to the rear panel of the server.
- 3. Press the port-colored latch on the primary power supply handle (1) and pull it down (2).
- 4. Pull the power supply out completely and set it aside for reinstallation later (3).



Figure 5-8: Removing the server power supplies

5. Repeat steps 2 through 4 to release and remove any additional power supplies.

Attaching the Cable Management Arm Bracket

The cable management arm bracket fastens to the top-left-rear of the rack server chassis as you look at the rear of the server. The bracket provides an attachment point for the cable management arm from the server to the rear frame of the rack.

To attach the cable management arm bracket:

- 1. Align the two keyholes on the cable management arm bracket over the posts on the rear panel of the chassis.
- 2. Slide the arm down to secure the keyholes onto the posts (1).
- 3. Tighten the thumbscrew to secure the cable management arm to the server (2).



Figure 5-9: Attaching a cable management arm bracket to the server

Installing the Server into the Rack

To complete the server rack installation:

- Load the server into the rack rails.
- Attach the cable management arm.
- Reinstall the power supplies.

Loading the Server into the Rack Rails



WARNING: The server is very heavy, up to 66 kg (146 lb). To reduce the risk of personal injury or damage to the equipment:

- Remove all hot-plug power supplies to reduce the weight of the server before lifting it.
- Observe local occupational health and safety requirements and guidelines for material handling.
- Get help to lift and maneuver the server.

To load the server into the rack and secure it with the rack bezel thumbscrews:

1. Be sure that each rack rail assembly is perfectly aligned and securely installed in the rack.

- 2. Pull the inner slide rail forward from each rack rail assembly until it locks into place (1).
- 3. Slide the inner bearing race on each rack rail assembly forward until it stops (2).



Figure 5-10: Locking the inner slide rails into place

- 4. Use two people to lift the server by its four lift handles (1) and carefully align the open ends of the server rails on the rear of the server with the extended bearing brace and inner slide rail of the rack rail assemblies (2).
- 5. Insert the server rails into the extended inner slide rails on both sides, and then slowly slide the server into the rack. Continue sliding the server forward until it stops (3).



Figure 5-11: Aligning the server rails with the inner slide rails

CAUTION: Keep the server parallel to the floor when sliding the server rails into the inner slide rails. Tilting the server up or down could result in damage to the rails.

6. Reach around the rack bezel to press the rail-release levers at the front of both server rails and continue to slide the server into the rack.



Figure 5-12: Loading the rack server

7. Secure the rail bezel to the front of the rack by tightening the thumbscrews into the cage nuts.



Figure 5-13: Securing the installed server in the rack

Attaching the Cable Management Arm

A double-hinged cable management arm and fasteners ship with each server. The cable management arm attaches to the server's cable management arm bracket and to the rear frame of the rack. All cables leading to and from the server are tied to this arm. The two hinges enable the cable management arm to swing out of the way when you need to access the system tray.

IMPORTANT: For easier handling, slide the server into the rack before attaching the cable management arm to the cable management arm bracket. Attaching the arm before loading the server into the rack may interfere with the loading process.

To attach the cable management arm:

- 1. Identify the cable management arm holes on the outside of the rear of the rack that you marked with the template. Align the end of the cable management arm with the marks on the outside of the rear post of the rack. Insert the tabs on the cable management arm into the marked holes on the interior of the vertical posts on the rear of the rack (1).
- 2. Align the cable management arm support bracket (screw retaining plate) on the outside of the rack and tighten the thumbscrews to secure it in place (2).



Figure 5-14: Attaching the cable management arm to the rear post of the rack

- 3. Lift the locking bar on the cable management arm and swing the arm away from the server to gain full access to the thumbscrews.
- 4. Align the cable management arm to the cable management arm bracket and tighten the two thumbscrews to attach the arm to the bracket.



Figure 5-15: Attaching the cable management arm to the cable management arm bracket

Reinstalling the Power Supplies

To reinstall your power supplies, reverse the procedure "Removing the Power Supplies" in this chapter.

Securing the Server in the Rack for Shipping

For shipping purposes, the server can be secured in the rack by fastening a shipping screw (part number 162811-001) through the hole in the rear of each server rail into the thread barrel on each rack rail.



Figure 5-16: Securing the server in the rack for shipping

Connecting the Power Cord and Peripheral Devices

After the server has been installed in the rack, connect the power cord and peripheral devices to the connectors located on the rear panel of the server. Icons on the back of the server identify the function of each connector.



WARNING: To reduce the risk of electrical shock or fire, do not plug telecommunications/telephone cables into the NIC connectors.

IMPORTANT: If the Remote Insight Lights-Out Edition is installed in your server, be sure that you connect your video cable into the video connector on the rear of the Remote Insight Lights-Out Edition expansion board. The standard video connector on the server rear panel is not used when the Remote Insight Lights-Out Edition is installed. For more information, refer to the documentation that ships with the Remote Insight Lights-Out Edition option kit.



Use the following figure and table to identify connectors on the rear panel of the rack server.

Figure 5-17: Rear panel connectors and components (rack server)

|--|

Item	Description	Item	Description
1	Mouse connector	10	Hot-plug power supply bay 2 (redundant)
2	Serial connector A	11	Torx T-15 tool
3	Parallel connector	12	Unit Identification (UID) switch and LED
4	Embedded NIC connector (RJ-45)	13	USB connectors
5	Locking latch	14	Video connector
6	VHDCI SCSI connector	15	Serial connector B
7	PCI-X Hot Plug expansion slots	16	Hot-plug power supply bay 3 (not used)*
8	PCI-X non-hot-plug expansion slots	17	Keyboard connector
9	Hot-plug power supply 1		

*Improved power supply performance ensures that a single power supply provides sufficient power to the entire system. Complete redundancy can be achieved by installing only one additional power supply.

CAUTION: Hot-plug power supplies for the ProLiant ML530 Generation 2 server are keyed to ensure that only 600-W hot-plug power supplies can be installed in the server. The handles on 600-W power supplies are color-coded carbon (black) to distinguish them from 450-W power supplies, which are color-coded opal (white).

Securing Cables with the Cable Management Arm

The cable management arm that ships in the rack kit with your HP ProLiant ML530 Generation 2 server includes hook-and-loop straps that are used to secure multiple server and peripheral cables to the arm. Using the guidelines in this section enhances cable management among several servers in a rack configuration.

Securing Server Cables

Use the cable management straps attached to the cable management arm to collect and secure external power, network, and peripheral device cables.



Figure 5-18: Server cables secured to the cable management arm

Securing the Power Cord

Plug in the power cord. If desired, secure the AC power cord to the plastic loop on the power supply with a reusable tie-wrap. Leave an eight-inch service loop for the plug to prevent the plug from accidentally being disengaged.



Figure 5-19: Securing the AC power cord to the server

Powering Up the Server

Power up the server after the peripheral and power cords are connected to the server.



- 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 each 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 exits from the server.

To power up the server:

1. Press the Power On/Standby button to power up the server.



Figure 5-20: Powering up the rack server

2. Observe the front panel LEDs to be sure that the server has a successful power-on sequence.

The following table describes a successful power-on sequence.

Item	Description	
Unit Identification (UID)	Off	
Internal health	From off to green	
External health	From off to green	
Embedded NIC activity	From off to green if there is a link on the NIC	
From off to flashing green for network activity		
System power From amber to green		
Note: For a detailed explanation of all system LEDs, see Appendix C,		

Table 5-3: Front Panel LED Activity During the Power-OnSequence

"System LEDs and Switches." When the server powers on for the first time, the server performs a POST. You must

When the server powers on for the first time, the server performs a POST. You must then launch RBSU to configure your server. After selecting initial system settings, install your operating system and perform additional configuration tasks. For additional information about configuring your server with RBSU, refer to the *ROM-Based Setup Utility User Guide*.

Installing an Operating System

To install an operating system on a new or previously unconfigured server, you must configure the server with RBSU.

To configure the server for the first time:

- 1. Launch RBSU.
- 2. When prompted, select a language.
- 3. Select the operating system you want to install on your server. A dialog box appears, indicating that the system configuration is complete.
- 4. Press the **F10** key to exit RBSU or press any other key to return to the RBSU main menu.
- 5. Reboot the system.

6. Insert the SmartStart CD or your operating system installation CD into the CD-ROM drive.

NOTE: Grasp the CD from the edges, not the flat surfaces of the disc.



Figure 5-21: Inserting the CD into the rack server

NOTE: Your CD-ROM drive may look different from the one shown in this chapter.

7. Follow the instructions provided by the SmartStart CD or the operating system manufacturer.

For the most current information about operating system support on HP ProLiant ML530 Generation 2 servers, refer to the operating system support matrix available at the website:

ftp://ftp.compaq.com/pub/products/servers/os-support-matrix-310.pdf

Registering Your Server

You can register your server with the forms included with your server or from the HP website:

www.register.hp.com

Routine Maintenance

The *HP ProLiant ML530 Generation 2 Maintenance and Service Guide* provides specific information required for general maintenance and component replacement, including:

- Spare part numbers
- Removal and replacement procedures
- Diagnostic tools

The *HP ProLiant ML530 Generation 2 Maintenance and Service Guide* can be accessed through the Documentation CD or the HP website:

www.hp.com/servers/proliant

Installing the Tower Server

This chapter provides information and instructions for installing the HP ProLiant ML530 Generation 2 tower server. The installation sequence includes:

- Connecting the power cord and peripheral devices
- Powering up the server
- Installing an operating system
- Registering your server

The chapter concludes with routine maintenance guidelines and resources. For additional information, visit the HP website:

www.hp.com/servers/proliant



The following illustration shows the server in a standard tower configuration.

Figure 6-1: HP ProLiant ML530 Generation 2 tower server

Server Installation Guidelines

Follow the guidelines in Chapter 2, "Planning the Server Installation," to plan an optimum environment and to install your HP ProLiant ML530 Generation 2 server properly and safely. Be aware of all server warnings listed in the chapter and throughout this guide.

Install any optional hardware components before installing and powering up the server for the first time. See Chapter 3, "Installing Hardware Options," for instructions on installing PCI expansion boards and other major hardware options.

IMPORTANT: Use the SmartStart CD to install option drivers.

Connecting the AC Power Cord and Peripheral Devices

After all internal hardware options have been installed in the server, connect external power supplies and peripheral devices to the connectors located on the rear panel of the server. Icons on the back of the server identify the function of each connector.



WARNING: To reduce the risk of electrical shock or fire, do not plug telecommunications/telephone cables into the NIC connectors.

IMPORTANT: If the Remote Insight Lights-Out Edition is installed in your server, be sure that you connect your video cable into the video connector on the rear of the Remote Insight Lights-Out Edition expansion board. The standard video connector on the server rear panel is not used when the Remote Insight Lights-Out Edition is installed. For more information, refer to the documentation that ships with the Remote Insight Lights-Out Edition option kit.

Use the following figure and table to identify connectors on the rear panel of the tower server.



Figure 6-2: Rear panel connectors and components (tower server)

Table 6-1:	Rear Panel Connectors and (Components (Tower Server)

Item	Description	Item	Description
1	Keyboard connector	10	Hot-plug power supply 1
2	Mouse connector	11	Hot-plug power supply bay 2 (redundant)
3	Serial connector A	12	Torx T-15 tool
4	Parallel connector	13	Unit Identification (UID) switch and LED
5	Embedded NIC connector (RJ-45)	14	USB connectors
6	Release latch	15	Video connector
7	VHDCI SCSI connector	16	Serial connector B
8	PCI-X Hot Plug expansion slots	17	Hot-plug power supply bay 3 (not used)
9	PCI-X non-hot-plug expansion slots		

Note: Improved power supply performance ensures that a single power supply provides sufficient power to the entire system. Complete redundancy can be achieved by installing only one additional power supply.
CAUTION: Hot-plug power supplies for the ProLiant ML530 Generation 2 server are keyed to ensure that only 600-W hot-plug power supplies can be installed in the server. The handles on 600-W power supplies are carbon (black) to distinguish them from 450-W power supplies, which are opal (white).

Power Cord Guidelines

Connect the power cords provided with your server or hot-plug power supply option into each AC power supply and use the power cord tie-wraps to secure the AC power cords. Leave a service loop for the plug to prevent the plug from accidentally being disengaged.

See Chapter 5, "Installing the Rack Server," for additional instructions.

Powering Up the Server

Power up the server after the peripheral and power cords are connected to the server.



WARNING: To reduce the risk of electrical 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 each 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 exits from the server.

To power up the server:

1. Open the front bezel door and press the Power On/Standby button to power up the server.



Figure 6-3: Powering up the tower server

2. Observe the front panel LEDs to be sure that the server has a successful power-on sequence. The following table describes a successful power-on sequence.

Table 6-2: Front Panel LED Activity During the Power-OnSequence

Item	Description
Unit Identification (UID)	Off
Internal health	From off to green
External health	From off to green
Embedded NIC connector activity	From off to green if there is a link on the NIC
	From off to flashing green for network activity
System power	From amber to green
Note: For a detailed explanation of all system LEDs, see Appendix C, "System LEDs and Switches."	

When the server powers on for the first time, the server performs a POST. You must then launch RBSU to configure your server. After selecting initial system settings, install your operating system and perform additional configuration tasks. For additional information about configuring your server with RBSU, refer to the *ROM-Based Setup Utility User Guide*.

Installing an Operating System

To configure the server for the first time:

- 1. Launch RBSU.
- 2. When prompted, select a language.
- 3. Select the operating system you want to install on your server. A dialog box appears, indicating that the system configuration is complete.
- 4. Press the **F10** key to exit RBSU or press any other key to return to the RBSU main menu.
- 5. Reboot the system.



6. Insert the SmartStart CD or your operating system installation CD.

Figure 6-4: Inserting the CD into the tower server

NOTE: Your CD-ROM drive may look different from the one shown in this chapter.

7. Follow the instructions provided by the SmartStart software or the operating system manufacturer.

For more information about using RBSU or the SmartStart software to install an operating system, see Chapter 8, "Server Configuration and Utilities."

After RBSU configures your hardware for the first time, use the SmartStart software to install the operating system of your choice.

For the most current information about operating system support on HP ProLiant ML530 Generation 2 servers, refer to the operating system support matrix available at the website:

ftp://ftp.compaq.com/pub/products/servers/os-support-matrix-310.pdf

Registering Your Server

You can register your server with the forms provided with your server or from the HP website:

www.register.hp.com

Routine Maintenance

The *HP ProLiant ML530 Generation 2 Maintenance and Service Guide* provides specific information required for general maintenance and component replacement, including:

- Spare part numbers
- Removal and replacement procedures
- Diagnostic tools

The *HP ProLiant ML530 Generation 2 Maintenance and Service Guide* can be accessed through the Documentation CD or the HP website:

www.hp.com/servers/proliant

Cabling the Server

This chapter provides an overview of standard cabling configurations and guidelines for the following items:

- Internal Cabling Configurations
 - Drive cage cabled to internal SCSI
 - Drive cage cabled to an array controller
 - SCSI devices in the removable media bay
 - IDE devices in the removable media bay
 - DVD drive in the CD-ROM drive bay
 - Remote Insight Lights-Out Edition
 - Front panel LED assembly
- External Cabling Configurations
 - External SCSI hard drives
 - External storage devices
 - External USB devices
- Rack Cabling Guidelines

For more information about cabling, refer to the following resources:

- Chapter 3, "Installing Hardware Options"
- The documentation that ships with the option kit
- The *HP ProLiant ML530 Generation 2 Server Maintenance and Service Guide* on the website:

www.compaq.com/support/servers

• The cabling matrix on the HP website:

www.hp.com/servers/proliant

Figure 7-1 and Table 7-1 illustrate the connectors on the system board. Figure 7-2 and Table 7-2 illustrate the connectors on the power backplane. For an illustration of the rear panel connectors, see Chapter 5, "Installing the Rack Server," or Chapter 6, "Installing the Tower Server."



Figure 7-1: System board connectors

Table 7-1. System Doard Connectors

Item	Connector
1	Secondary IDE (non-bootable)
2	Remote management (30-pin)
3	Remote management (16-pin)
4	I/O fans
5	System power
6	SCSI A (blue)
7	SCSI B (yellow)
8	Power backplane signal
9	Primary IDE (bootable) (orange)
10	Diskette drive (purple)
11	CPU fans
12	System power
13	PCI backplane connector



Figure 7-2: Power backplane connectors

Item	Connector
1	Power supply 1
2	Power supply 2
3	Power supply 3 (not used)
4	SCSI drive cage B
5	CD-ROM/diskette
6	Front panel LED assembly
7	Drive fan 5
8	System power
9	Drive fan 6
10	Power backplane signal
11	Drive fan 7
12	System power
13	Removable media bay/SCSI drive cage A

Table 7-3 lists the cables required for each optional hardware component.

Component	Required Cables	Cable ships with:
Drive cage A	Power	Server
	Signal	Server
Drive cage B	Power	Server
	Signal	Server
SCSI devices in the removable	Power	Server
media bay	Signal	Server
IDE devices in the removable	Power	Server
media bay	Signal	Option kit
DVD drive in the CD-ROM bay	Power	Server
	Signal	Server
Remote Insight board	Power	Option kit
Front panel LED assembly	Power	Server
Internal-to-external SCSI cable assembly	Signal	Server

 Table 7-3: Required Cables

Internal Cabling Configurations

The following sections describe internal signal cabling configurations for the ProLiant ML530 Generation 2 server hardware options.

Internal Drives and Storage Devices

Internal storage devices in the server require minimum cabling, as described in the following section, and include:

- Storage devices in the removable media bays
- DVD drive in the CD-ROM drive bay

Storage Devices in the Removable Media Bays

ProLiant ML530 Generation 2 servers support installation of SCSI or IDE storage devices into the removable media bays. Devices supported include:

- SCSI devices:
 - Digital Linear Tape (DLT) drive
 - Digital Audio Tape (DAT) drive
 - Advanced Intelligent Tape (AIT) drive
 - Two-bay hot-plug SCSI drive cage
- IDE devices:
 - CD-ROM drive
 - DVD drive

Cabling SCSI Devices in the Removable Media Bay

The following illustration shows cable routing for a terminated multi-drop SCSI cable from a SCSI device in the removable media bay to internal SCSI connector B on the system board.



Figure 7-3: Cable routing of a SCSI device from the removable media bay to internal SCSI connector B on the system board

Cabling IDE Devices in the Removable Media Bay

The following illustration shows cable routing for a terminated multi-drop IDE cable from an IDE device in the removable media bay to the system board.



Figure 7-4: Cable routing of an IDE device from the removable media bay to the system board

DVD Drive in the CD-ROM Drive Bay

HP ProLiant ML530 Generation 2 servers support mounting a DVD drive in the CD-ROM drive bay in the front of the server.

The following illustration shows cable routing for a terminated multi-drop IDE cable from the DVD drive in the CD-ROM drive bay to the system board.



Figure 7-5: Cable routing of the DVD drive from the CD-ROM drive bay to the system board

Remote Insight Lights-Out Edition

The following illustration shows the cable routing from the Remote Insight board to the system board. Use the cable to connect the connector on the expansion board (1) to the 30-pin or 16-pin remote management connector on the system board (2). Check the cable that ships with your Remote Insight board to determine which connector to use. See Table 7-1 to locate the remote management connectors on the system board.



Figure 7-6: Cable routing of the Remote Insight Lights-Out Pro (30-pin)



Figure 7-7: Cable routing of the Remote Insight Lights-Out Edition (16-pin)

Power Button Assembly

HP ProLiant ML530 Generation 2 servers include a front panel LED assembly that connects directly to the system board. For instructions on converting the front panel LED assembly from a tower configuration to a rack configuration, refer to the *HP ML500 Series Generation 2 Servers Chassis Conversion Guide*.

External Cabling Configurations

The following sections describe cabling configurations for peripheral devices and external storage devices supported by the ProLiant ML530 Generation 2 server.

External SCSI Hard Drives

Follow these general guidelines when adding external SCSI hard drives:

- A maximum of 14 SCSI devices per SCSI controller can be supported externally.
- Each SCSI drive must have a unique ID.

External Storage Devices

You can cable external storage devices in two ways:

- To SCSI connector A or B on the system board using the internal-to-external SCSI cable assembly
- To a SCSI controller or Smart Array Controller installed in an expansion slot

IMPORTANT: The ProLiant ML530 Generation 2 server ships with the drive cages cabled internally to SCSI connectors A and B.

If you want to cable a SCSI device to SCSI connector A or B using the internal-to-external SCSI cable assembly, you must first disconnect the appropriate drive cage cable. Once you have disconnected a drive cage cable, you must cable it to a controller board to retain use of that drive cage.

The following illustration shows a rack server cabled to an external storage device through the optional VHDCI SCSI connector.



Figure 7-8: Standard cable routing of an external storage device through the VHDCI SCSI connector

The following illustration shows a rack server cabled to an external storage device through an expansion board.



Figure 7-9: Standard cable routing of an external storage device through an expansion board

For additional information about external cabling with your ProLiant ML530 Generation 2 server, refer to the website:

www.compaq.com/support/storage

External USB Devices

HP ProLiant ML530 Generation 2 servers support installation of external USB devices through the two open standard USB connectors on the rear panel of the server shown in the following illustration.



Figure 7-10: Rear panel USB connectors

The system ROM, configurable through RBSU, provides full legacy support for USB keyboard and mouse. Operating systems that currently support USB technology in ProLiant ML530 Generation 2 servers include:

- Windows 2000
- Linux

Refer to the following website for an operating system matrix for USB support:

ftp://ftp.compaq.com/pub/products/servers/ os%20feature%20matrix%20103000.pdf

Rack Cabling Guidelines

After you have installed all internal options, replaced the server access panel, and configured your server for your rack, you are ready to connect the power cord and peripheral devices.

\triangle

CAUTION: Always connect peripheral devices before connecting power to the server. An improper cabling connection sequence can result in electrical damage to peripheral devices.

Rear panel connectors on the ProLiant ML530 Generation 2 server include:

- Video (blue)
- Parallel (burgundy)
- Embedded NIC (RJ-45)
- Serial (teal)
- VHDCI SCSI
- Mouse (green)
- Keyboard (purple)
- USB (black)

For additional rack cabling guidelines and information, refer to the Rack Resources CD provided with your rack.

Routing Cables and Power Cords

Cables and power cords connected to the server rear panel are routed through a cable management arm that prevents loose cabling in the rear of the rack and protects connectors from damage that results when cables are disconnected improperly.

When multiple ProLiant ML530 Generation 2 servers are installed in a rack, the cable management arm effectively organizes the rear panel cabling.



Figure 7-11: ProLiant ML530 Generation 2 server installed in a Compaq branded rack with properly routed cabling

8

Server Configuration and Utilities

This chapter provides information about the following utilities and support tools:

- ROM-Based Setup Utility (RBSU)
- Redundant ROM Support
- ROMPaq Utility
- Remote ROM Flash Utility
- ROM Legacy USB Support
- SmartStart CD
- SmartStart Diskette Builder
- SmartStart Scripting Toolkit
- Insight Manager 7
- Diagnostics Utility
- Automatic Server Recovery (ASR-2)
- Integrated Management Log (IML)
- Multi-Initiator Configuration Utility

ROM-Based Setup Utility

RBSU is a configuration utility that is embedded in the server ROM. RBSU is updateable via ROMPaq. The RBSU helps you configure certain server hardware settings and prepare the server for operating system installation without using diskettes. The RBSU enables you to view and establish server configuration settings during initial system startup, as well as modify them after the server has been configured.

RBSU replaces the System Configuration Utility used in previous systems. RBSU performs a wide range of configuration activities including the following:

- Configuring system devices and installed options
- Viewing system information
- Selecting the operating system
- Selecting the primary boot controller
- Managing storage options
- Configuring advanced memory protection

In addition, RBSU includes other features, which are outlined in "Using RBSU" in this chapter.

Navigating RBSU

To navigate RBSU, use the following keys:

- To access RBSU, press the **F9** key during power up.
- To navigate the menu system, use the arrow keys.
- To make selections, press the **Enter** key.
- To exit RBSU, press the Esc key, and then press the F10 key at the prompt.
- To return to the previous menu, press the **Escape** key.

Saving RBSU Configuration Settings

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.

Using RBSU

RBSU does not run automatically. The first time you power up the server, the system defaults to Windows 2000 and waits temporarily so you can select a different operating system by using RBSU. Press the **F9** key to enter RBSU. While you are in RBSU, press any key to return to the RBSU main menu, or exit RBSU by pressing the **Esc** key, then pressing the **F10** key at the prompt.

NOTE: Most of the features in RBSU are not required in the setup of your server. The options in this utility are designed to assist with specific server configuration issues.

RBSU is divided into a series of menu selections designed to configure specific areas of the system. The primary menus are as follows:

- System Options
- PCI Devices
- Standard Boot Order (IPL)
- Boot Controller Order
- Date and Time
- Automatic Server Recovery
- Server Passwords
- Server Asset Text
- Advanced Options
- Utility Language

For a complete explanation of RBSU features and functions, refer to the *ROM-Based Setup Utility User Guide* on the Documentation CD.

System Options

The **System Options** menu is for overall system configuration settings. The following selections are included in this menu:

- **OS Selection** prompts you to select the operating system. This option automatically selects appropriate advanced settings for the selected operating system and must be set before the operating system installation.
- Serial Number enables you to type in the server serial number.
- **Embedded COM Ports A and B** enables you to either enable the embedded COM ports A and B at the specified resource setting or disable the option.
- **Embedded LPT Port** enables you to either enable the embedded parallel port at the specified resource setting or disable the option.
- **Integrated Diskette Controller** enables you to enable or disable the floppy controller.
- **NUMLOCK Power-On State** enables you to enable or disable the keyboard NUMLOCK feature at server startup.
- **Embedded NIC PXE Support** enables the user to enable or disable PXE support for the NIC.
- **Diskette Write Control** enables you to configure the write control of the removable media drive. The options are read and write or read only.
- **Diskette Boot Control** enables you to have the system boot from the removable media device.
- Advanced Memory Protection enables you to choose a memory mode.

PCI Devices

The **PCI Devices** menu enables you to view and assign the IRQs for all PCI devices. It also enables device disabling.

Standard Boot Order (IPL)

The **Standard Boot Order** (IPL) menu enables you to configure the order of devices used to start an operating system. This feature can be set to select which device the system scans first.

Boot Controller Order

The **Boot Controller Order** menu enables you to view and assign the current controller order.

Date and Time

The Date and Time menu enables you to set the system date and time.

Automatic Server Recovery (ASR)

The Automatic Server Recovery menu includes the following items:

- **ASR Status** enables you to enable or disable the Automatic Server Recovery option.
- **ASR Time Out** enables you to set the ASR timer value.
- **Thermal Shutdown** enables you to enable or disable the system's automatic shutdown feature caused by a thermal caution event. This option is enabled by default. HP does not recommend disabling this feature.

Server Passwords

The **Server Passwords** menu enables you to set up passwords to limit access to the system and its setup options. The following selections are available in this menu:

- Set Administrator Password enables you to assign an administrator password. This password prevents unauthorized users from modifying the setup options.
- Set Power-On Password enables you to assign a power-on password. This password prevents unauthorized users from powering on the system.
- **Network Server Mode** enables the user to disable or enable the system's capability to boot with a locked keyboard or without a keyboard. To unlock the keyboard, enter the power-on password.
- **QuickLock** enables you to lock your keyboard and prompts you for the power-on password to unlock the keyboard.

IMPORTANT: If you forget your password, you can clear all passwords by resetting the system configuration switch. See "System Board Switches" in Appendix C, "System LEDs and Switches."

Server Asset Text

The Server Asset Text menu enables you to access the Server Info Text.

- Set Server Info Text enables the user to identify the system with an Asset Tracking Number.
- Set Administrator Info Text enables you to add an administrator name.
- Set Service Contact Text enables you to add service contact information.

Advanced Options

The **Advanced Options** menu enables you to configure advanced options of the system. The following selections are available in this menu:

• **MPS Table Mode** enables you to change the APIC table setting. The APIC table setting is automatically set by OS selection.

- **Hot-Plug Resources** enables you to allocate additional resources for empty PCI-X slots so adapters can be hot added.
- **POST Speed Up** minimizes downtime and accelerates the power-up sequence. Disabling **POST Speed Up** enables a full memory test during each boot.
- **POST F1 Prompt** enables an F1 prompt for POST error messages. Disabling this option enables you to bypass the F1 prompt.
- **ROM Selection** enables you to switch to a backup ROM image.
- Erase Non-volatile Memory enables you to reset the configuration settings to their factory defaults.
- Set CPU Corrected enables you to indicate correction of a CPU failure.
- Wake On LAN enables you to enable or disable Wake On LAN support (PME).
- **NMI Debug Button** enables you to enable or disable the non-maskable interrupt (NMI) caused by engaging the NMI switch.
- **Custom POST Message** enables you to set a custom message to be displayed during POST.
- **Processor Hyperthreading** enables you to enable or disable the logical processor in an Intel Xeon processor with Hyper-Threading technology.

Utility Language

The Utility Language enables you to set the display language for RBSU. The following choices are available:

- English
- French
- Italian
- German
- Spanish
- Japanese

The following table contains the default settings for options in primary RBSU menus.

Menu/Option	Default Setting
System Options	
OS Selection	Windows 2000 / Windows.Net
Embedded COM Port A	COM 1; IRQ 4
Embedded COM Port B	COM 2; IRQ 3
Embedded LPT Port	LPT 1; IRQ 7
Integrated Diskette Controller	Enabled
NUMLOCK Power-On State	Off
Embedded NIC PXE Support	Enabled
Diskette Read/Write Control	Read and write
Diskette Boot Control	Enabled
Advanced Memory Protection	
Advanced ECC Support	Enabled
	continued

Table 8-1: RBSU Default Settings

Menu/Option	Default Setting
IPL Device Boot Order	
CD-ROM	IPL: 1
Floppy Drive (A:)	IPL: 2
Hard Drive (C:)	IPL: 3
PXE	IPL: 4
Automatic Server Recovery	
ASR Status	Enabled
ASR Timeout	10 minutes
Thermal Shutdown	Enabled
Server Passwords	
Set Administrator Password	None
Set Power-On Password	None
Network Server Mode	Disabled
QuickLock	Disabled
Server Asset Text	
Server Info Text	None
Advanced Options	
MPS Table Mode	AutoSet Table
Hot-Plug Resources	AutoSet
POST Speed Up	Enabled
POST F1 Prompt	Enabled
ROM Selection	Use current ROM
Erase Non-volatile Memory	Off
	continueo

Table 8-1: RBSU Default Settings continued

Menu/Option	Default Setting
Set CPU Corrected	None (choose 1 or 2)
Wake On LAN	Disabled
NMI Debug Button	Enabled
Custom POST Message	None
Processor Hyper-Threading	Enabled

Table 8-1: RBSU Default Settings continued

Configuring Advanced Memory Protection

To configure advanced memory protection:

- 1. Access RBSU by pressing the **F9** key during power up when the prompt displays in the lower right corner of the screen.
- 2. Select System Options.
- 3. Select Advanced Memory Protection.
- 4. Select the desired memory mode.
- 5. Press the **Enter** key.
- 6. Press the **Esc** key to exit the current menu, or press the **Esc** key, and then press the **F10** key at the prompt to exit RBSU.

IMPORTANT: To reconfigure the memory after initial setup, you must reboot the system.

Saving RBSU Configuration Settings for Multiple Server Replication

To save RBSU configuration settings, use the Configuration Replication Utility from the SmartStart Scripting Toolkit. Saving the configuration enables you to restore settings at a later date. Use the Configuration Replication Utility from the SmartStart CD or download the Scripting Toolkit from the website:

www.compaq.com/support/files/server

Redundant ROM Support

The HP ProLiant ML530 Generation 2 server enables you to upgrade or configure your ROM safely with redundant ROM support. The server has a ROM image that acts as two separate 1-MB ROMs. In the standard implementation, one section of the ROM contains the most current ROM version, while the other section of the ROM contains a previous version.

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

There are two methods of accessing the redundant ROM:

- Switching to the backup ROM through RBSU
- Manually forcing to the backup ROM through the system maintenance switch (SW4)

Switching to the Backup ROM Through the ROM-Based Setup Utility

Use ROMPaq utilities to create a backup ROM image before upgrading the configuration or to restore saved ROM data.

- 1. Access RBSU by pressing the **F9** key during power up when the prompt displays in the lower right corner of the screen.
- 2. Select Advanced Options.
- 3. Select ROM Selection.
- 4. Select one of the ROM banks as the system ROM.
- 5. Press the **Enter** key.
- 6. Press the **Esc** key to exit the current menu, or press the **Esc** key, then press the **F10** key at the prompt to exit RBSU.
- 7. Restart the server.

If both the current and backup versions of the ROM are corrupt, the server automatically enters the ROMPaq disaster recovery mode. To perform this procedure, see the "ROMPaq Disaster Recovery" section in Appendix E, "Troubleshooting."

Accessing Redundant ROM Using the System Maintenance Switch

If your system does not boot, you can access the redundant ROM manually using the system maintenance switch (SW4). To access the redundant ROM using SW4:

- 1. Power down the server. See "Powering Down the Server" in Chapter 3, "Installing Hardware Options."
- 2. Set system maintenance switches 1, 5, and 6 to the "on" position. For the location of these switches, see Appendix D, "System LEDs and Switches."
- 3. Power up the server. After the system powers on, it repeatedly emits two long beeps.
- 4. Power down the server again. If necessary, perform a forced shutdown by pressing the power button for four seconds.
- 5. Set system maintenance switches 1, 5, and 6 back to the default position (off).
- 6. Power up the system.

If the system still does not boot, see Appendix E, "Troubleshooting."

Flashing the System ROM

When you flash the system ROM, ROMPaq writes over the older ROM and saves the current ROM as a backup, enabling you to switch easily to the backup ROM version. This feature protects your previous ROM version, even if you experience a power failure while flashing the ROM.

There are two methods for flashing your ROM:

- Upgrading the system ROM using the ROMPaq Utility
- Remote ROM flash

Upgrading the System ROM using the ROMPaq Utility

Flash ROM enables you to upgrade the firmware (BIOS) with system or option ROMPaq utilities. To upgrade the BIOS:

1. Download the latest version of the system BIOS for the ProLiant ML530 Generation 2 server onto a diskette. The latest system BIOS is available at

www.compaq.com/support/files/server

- 2. Insert the ROMPaq diskette into the diskette drive.
- 3. Power up the system.

The ROMPaq Utility checks the system and provides a choice, if more than one exists, of available ROM revisions. By default, the image that is marked as the backup is overwritten. This procedure is the same for both system and option ROMPaq utilities.

If a power loss occurs during a firmware upgrade, redundant ROM support enables data recovery.

Remote ROM Flash

Smart Components for Remote ROM Flash enables Microsoft Windows NT 4.0, Windows 2000, and Novell Netware operating system administrators to upgrade the firmware (BIOS) on a server from a remote location.

To update your ROM from a remote location, download the Online Flash Utility from the website:

www.compaq.com/support/files/server

The Remote ROM Flash utility automatically checks for hardware, firmware, and operating system dependencies, and installs only the correct ROM upgrades required by each target server.

If a power loss occurs during a firmware upgrade, redundant ROM support enables data recovery.

ROM Legacy USB Support

When using operating systems that support USB, your HP ProLiant ML530 Generation 2 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 the keyboard and mouse, but not for other devices.

ROM legacy USB support is available during POST, DOS, and while the operating system is running. The ROM does not support hot-plug events for the legacy USB keyboard or legacy USB mouse at any time. You must have the keyboard and mouse plugged in when you power on the server. The maximum device support is two USB keyboards, two USB mouse devices, and one layer of hubs.

For a list of operating systems supported by the HP ProLiant ML530 Generation 2 server, visit the FTP site:

ftp://ftp.compaq.com/pub/products/servers/os-support-matrix-310.pdf

To determine whether an operating system supports a particular feature, visit the FTP site:

ftp://ftp.compaq.com/pub/products/servers/ OS%20Feature%20Matrix%20103000.pdf
SmartStart CD

The SmartStart CD is the recommended method for loading system software, thereby achieving a well-integrated server and ensuring maximum dependability and supportability. The SmartStart CD contains diagnostic utilities and ROMPaq tools.

IMPORTANT: Do not use the SmartStart CD to load system software if you purchased your system with a factory-installed operating system. Refer to the *Factory-Installed Operating System Software User Guide* for software installation guidelines.

SmartStart enables you to perform the following functions:

- Auto-detect and configure your server hardware and drive arrays
- Install any major server operating system using packaged product CDs
- Install the latest HP optimized drivers, ROMPaqs, and management agents
- Deploy and maintain multiple servers using Integration Server
- Create and copy standard server configuration scripts using the Scripting Toolkit and Configuration Replication Utility
- Test HP server hardware
- Create support software diskettes that enable you to update your drivers

For more information about the SmartStart software, refer to the documentation that ships with your server.

SmartStart Diskette Builder

The SmartStart Diskette Builder is a utility that uses data stored on the SmartStart CD to create support diskettes. You can create support diskettes for specific configuration needs or for software that cannot be used directly from the SmartStart CD. Use the SmartStart Diskette Builder to create the following support diskettes:

- Array Configuration Utility
- Operating system support

- Diagnostic utilities
- Server utilities
- Erase utility
- System and option ROMPaq

To run the Diskette Builder, you need a PC with a Microsoft Windows 95 or later operating system and several 1.44-MB diskettes.

All existing data on the diskettes is overwritten. Insert the SmartStart CD in the workstation drive. The CD automatically runs the Diskette Builder utility.

However, if the PC does not support the auto-run feature, use Windows Explorer and enter the following command line:

```
CD-ROM DRIVE:\DSKBLDR\DSKBLDR.EXE
```

SmartStart Scripting Toolkit

The SmartStart Scripting Toolkit is a set of DOS-based utilities that enable you to configure and deploy servers in a customized, predictable, and unattended manner. These utilities provide scripted server and array replication for mass server deployment and duplicate the configuration of a configured source server onto target systems with minimum user interaction.

The Configuration Replication Utility is a stand-alone DOS utility that duplicates the settings of an operating RBSU-configured server by saving the server configuration to a scripted file. You can edit and modify settings in the scripted file at the subset level. For example, you can change ASR-2 settings without having to change settings for boot controller order.

For more information, refer to the SmartStart Scripting Toolkit User Guide.

Insight Manager 7

Insight Manager 7 is the HP application for easily managing network devices. Insight Manager 7 delivers intelligent monitoring and alerting as well as visual control of your HP devices. Documentation for Insight Manager 7 is available on the Management CD. Insert the Management CD and accept the License Agreement. From the left sidebar, select **Insight Manager 7**, then click **Documentation** in the right frame. A list of Insight Manager 7 documentation will display. You must install and use Insight Manager 7 to benefit from the prefailure warranties on processors, hard drives, and memory modules.

Insight Manager 7 features include:

• Comprehensive Fault Management

Insight Manager 7 provides comprehensive fault management for all major subsystems, including prefailure alerting for disks, memory, and processors.

• Integration Management

Insight Manager 7, in conjunction with SmartStart, enables you to effectively deploy and manage configurations throughout the enterprise using the Integration Server and Insight Version Control.

• Performance Management

Insight Manager 7 enables you to set performance and capacity thresholds for management variables related to CPU and bus utilization, NIC throughput, logical disk capacity, and more.

Workstation Management

Insight Manager 7 enables you to monitor and manage HP Professional Workstations.

• Client Management

Insight Manager 7 enables you to manage faults and assets on HP DeskPro computers and HP portables.

Asset Management

Insight Manager 7 enables you to export asset information from the Insight Manager 7 database to leading database and spreadsheet applications, making asset management easier than ever.

• Remote Management

Insight Manager 7 enables you to manage in-band or out-of-band devices online or offline from anywhere.

• Reporting

Using Automatic Data Collection, Insight Manager 7 enables you to gather historic performance information for graphing or export purposes, which helps with upgrade performance.

• Integration with Enterprise Management Platforms

Insight Manager 7 provides integration with leading management platforms including OpenView, IBM NetView, SunNet Manager, and Microsoft Systems Management Server.

Diagnostics Utility

The Diagnostics Utility displays information about the server's hardware and tests the system to be sure that it is operating properly. If you used SmartStart to install your operating system, you can access the Diagnostics Utility from the SmartStart CD. You can also download the Diagnostics Utility from the website:

www.compaq.com/support/files/

Automatic Server Recovery-2

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

ASR-2 increases server availability by restarting the server within 10 minutes after a system hang or shutdown. At the same time, the Insight Manager 7 console notifies you by sending a message to a designated pager number that ASR-2 has restarted the system. You can disable ASR-2 from the Insight Manager 7 console or RBSU.

Integrated Management Log

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

Events listed in the IML are categorized as one of four event severity levels:

- Status—indicates that the message is informational only
- Repaired—indicates that corrective action was taken
- Caution—indicates a non-fatal error condition occurred
- Critical—indicates a component failure has occurred

IML requires HP operating system-dependent drivers. Refer to the SmartStart CD for instructions on installing the appropriate drivers.

Viewing the Log

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

- From within the Insight Manager 7
- From within the Survey Utility
- From within operating system-specific IML viewers
 - For a Windows NT operating system, Event Viewer, or IML Viewer
 - For a NetWare operating system, IML Viewer
 - For a Linux operating system, IML Viewer Application

Insight Manager 7

Insight Manager 7 is a server management tool that provides in-depth fault, configuration, and performance monitoring of hundreds of HP servers from a single management console. The system parameters that are monitored describe the status of all key server components. By being able to view the events that may occur to these components, you can take immediate action.

Use the instructions in the following section to view and print the event list from within Insight Manager 7. You can also mark a critical or caution event as repaired after the affected component has been replaced. For example, when a failed fan is replaced, you can mark the event as repaired, which lowers the severity of the event. You can only view the list from the Recovery/Integrated Management Log screen.

Viewing the Event List

To view the event list:

- 1. From the Insight Manager 7, select the appropriate server; then select **View Device Data.** The selected server is displayed with buttons around its perimeter.
- 2. Click **Recovery**.
- 3. Select HP Integrated Management Log.
- 4. If a failed component has been replaced, select the event from the list, then select **Mark Repaired.**

Printing the Event List

To print the event list:

- 1. From the Insight Manager 7, select the appropriate server. The selected server is displayed with buttons around its perimeter.
- 2. Click **Configuration.**
- 3. Click Recovery.
- 4. Click Print.

Survey Utility

The Survey Utility is a serviceability tool available for Microsoft Windows NT, Novell NetWare, Linux, and UnixWare operating systems that delivers configuration capture and comparison to maximize server availability. It is available on the Management CD in the ProLiant Essentials Foundation Pack, or it is available on the website:

www.compaq.com/support/files

Refer to the Management CD for information on installing and running the Survey Utility. After you run the Survey Utility, you can view the IML by loading the output of the utility (typically called *SURVEY.TXT*) into a text viewer such as Microsoft Notepad. The event list follows the system slot information. After you open the text file, you can print it using the print feature of the viewer.

Multi-Initiator Configuration Utility

The Integrated Dual Channel Ultra3 SCSI Controller can be configured into multi-initiator mode to support HP storage and clustering options needing this feature. The Multi-Initiator Configuration Utility is available in the HP ProLiant ML530 Generation 2 system ROM and is accessible directly from the CTRL-A prompt at system startup. Refer to your option documentation for additional information and detailed instruction on using this utility.

Regulatory Compliance Notices

Regulatory Compliance Identification Numbers

For the purpose of regulatory compliance certifications and identification, your product has been assigned a unique HP series number. The series 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 series number. The series number should not be confused with the marketing name or model number of the product.

Federal Communications Commission Notice

Part 15 of the Federal Communications Commission (FCC) Rules and Regulations 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 (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. The rating label on the device indicates the class (A or B) in which the equipment falls. Class A devices do not have an FCC logo or FCC ID on the label. Class B devices have an FCC logo or FCC ID on the label. Once the class of the device is determined, refer to the following 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 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 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 your product, contact:

Hewlett-Packard Company P. O. Box 692000, Mail Stop 530113 Houston, Texas 77269-2000

or call 1-800-652-6672. (For continuous quality improvement, calls may be recorded or monitored.)

For questions regarding this FCC declaration, contact:

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

or call 281-514-3333.

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

Modifications

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

Cables

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

Mouse Compliance Statement

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

Canadian Notice (Avis Canadien)

Class A Equipment

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

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

Class B Equipment

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

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

European Union Notice

Products bearing the CE marking comply with the EMC Directive (89/336/EEC) and the Low Voltage Directive (73/23/EEC) issued by the Commission of the European Community and if this product has telecommunication functionality, the R&TTE Directive (1999/5/EC).

Compliance with these directives implies conformity to the following European Norms (in parentheses are the equivalent international standards and regulations):

- EN 55022 (CISPR 22) Electromagnetic Interference
- EN55024 (IEC61000-4-2, 3, 4, 5, 6, 8, 11) Electromagnetic Immunity
- EN61000-3-2 (IEC61000-3-2) Power Line Harmonics
- EN61000-3-3 (IEC61000-3-3) Power Line Flicker
- EN 60950 (IEC 60950) Product Safety

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 Devices

All HP systems equipped with a laser device comply with safety standards, including International Electrotechnical Commission (IEC) 825. With specific regard to the laser, the equipment complies with laser product performance standards set by government agencies as a Class 1 laser product. The product does not emit hazardous light; the beam is totally enclosed during all modes of customer operation and maintenance.

Laser Safety Warnings

WARNING: To reduce the risk of exposure to hazardous radiation:

- Do not try to open the laser device 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 laser device.

Compliance with CDRH Regulations

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.

Compliance with International Regulations

All HP systems equipped with laser devices comply with appropriate safety standards including IEC 825.

Laser Product Label

The following label or equivalent is located on the surface of the HP supplied laser device.



This label indicates that the product is classified as a CLASS 1 LASER PRODUCT. This label appears on a laser device installed in your product.

Laser Information

Laser Type	Semiconductor GaAIAs
Wave Length	780 nm +/- 35 nm
Divergence Angle	53.5 degrees +/- 0.5 degrees
Output Power	Less than 0.2 mW or 10,869 W·m-2 sr-1
Polarization	Circular 0.25
Numerical Aperture	0.45 inches +/- 0.04 inches

Battery Replacement Notice

This server is provided with an internal lithium battery. There is a danger of explosion and risk of personal injury if the battery is incorrectly replaced or mistreated. Follow battery installation procedures carefully and adhere to all warnings and cautions associated with the installation. For more information about battery replacement or proper disposal, contact an HP authorized reseller or authorized service provider.



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

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



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 a public collection system or return them to HP or HP authorized resellers.

Power Cords

The power cord set included in your server meets the requirements for use in the country where you purchased your server. If you need to use this server in another country, purchase a power cord that is approved for use in that country.

The power cord must be rated for the product and for the voltage and current marked on the product's electrical ratings label. The voltage and current rating of the cord should be greater than the voltage and current rating marked on the product. In addition, the diameter of the wire must be a minimum of 1.00 mm² or 18AWG, and the length of the cord must be between 1.8 m (6 feet) and 3.6 m (12 feet). If you have questions about the type of power cord to use, contact an HP authorized service provider.

IMPORTANT: Route power cords so that they will not be walked on or pinched by items placed upon or against them. Pay particular attention to the plug, electrical outlet, and the point where the cords exit from the product.

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.

Preventing Electrostatic Damage

To prevent electrostatic damage, observe the following precautions:

- 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

There are several methods 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 cord. To provide proper grounding, 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 HP authorized reseller install the part.

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

System LEDs and Switches

This appendix provides information about locating and using system LEDs and switches in the HP ProLiant ML530 Generation 2 server. For additional information about troubleshooting procedures, see Appendix D, "Troubleshooting."

System LEDs

HP ProLiant ML530 Generation 2 servers contain LEDs that indicate the status and settings of hardware components. This section discusses the following types and locations of LEDs:

- Front panel
- System board
- Memory board
- PCI-X Hot Plug
- Expansion slot speed
- Hot-plug power supply
- Hot-plug fan
- Embedded NIC connector (RJ-45)
- Rear UID (Unit Identification LED)
- Hot-plug hard drive

Information at the end of this section discusses the interactions between front panel and system LEDs in troubleshooting or assessing system status.

Front Panel LEDs

The set of five LEDs on the front of the server indicates system health. The following figure and table identify and describe the location and function of each of the LEDs.



Figure C-1: Front panel LEDs

Table C-1: Front Panel LE	Ds
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LED	Description	Indicator	State
1	UID button and LED	Blue	Activated
		Blue flashing	System is being managed remotely
		Off	Deactivated
2	Internal health LED*	Green	Normal
		Amber	System health degraded
		Red	System has critical failure
		Off	System is off
			continuea

LED	Description	Indicator	State
3 External health (power supply) LED		Green	Normal
		Amber	Redundant power supply failure
		Red	Critical power supply failure
		Off	System is off
4	Embedded NIC connector	Green	Network link
activity LED		Blinking	Network link with activity
		Off	No network connection
5 Power On/Standby button		Amber	System is off (auxiliary power present)
and LED	and LED	Green	System is on
		Off	Server has no AC power

Table C-1: Front Panel LEDs continued

*The internal health LED identifies service events for internal components in a prefailure or failed condition. For a list of these events, see Appendix D, "Troubleshooting."

System Board LEDs

Use the following figure and table to identify system board LED locations and status.



Figure C-2: System board LEDs

LED	Description	State
1	PPM 1	
2	Processor 1	Amber = Processor or PPM failed
3	PPM 2	Off = Normal
4	Processor 2	
5	Thermal warning	Amber = Thermal event
		Off = Normal
6	Memory board interlock LED	Amber = No memory board is installed
		Off = Normal

Table C-2: System Board LEDs

Memory Board LEDs and Icons

For information about memory board LEDs and icons, refer to the server memory installation guide on the Documentation CD.

Expansion Slot LEDs

The expansion slot LEDs provide a visual status for each slot, and are viewable from the rear or from inside the server after removing the access panel.

Use the following figures and tables to locate expansion slot LEDs.



Figure C-3: External expansion slot LEDs

Table C-3: External Expansion Slot LEDs

Item	Description
1	Power LED (green)
2	Fault LED (amber)



Figure C-4: Internal expansion slot LEDs and PCI Hot Plug button

Table C-4: Internal Expansion Slot LEDsand PCI Hot Plug Button

Item	Description
1	Fault LED (amber)
2	Power LED (green)
3	PCI Hot Plug button (port)

Use the following table to identify PCI-X Hot Plug slot activity status according to LED description.

LED	State	OK to Open	Slot Status
Power	On	No	Power is currently applied to the slot. Do NOT
Fault	Off		open the expansion slot latch. The slot is functioning normally.
Power	On	No	Power is currently applied to this slot, but the
Fault	On		slot needs ATTENTION for a possible problem with the slot, expansion board, or driver. Do NOT open the expansion slot latch.
Power	Flashing	No	The power slot is being turned off or on, which
Fault	On or off		may take several minutes. Do NOT open the expansion slot latch. Press the PCI-X Hot Plug button to cancel the operation.
Power	Off	Yes	Power to this slot is turned off, but this slot
Fault	On		needs ATTENTION. There may be a problem with the slot, expansion board, or driver.
Power	Off	Yes	The power to the slot is off. An expansion
Fault	Off		board may be installed in this slot.
Note: If the	any of the LED	s indicates an	error, see Appendix D, "Troubleshooting," for more

 Table C-5:
 PCI-X Expansion Slot LEDs

Note: If the any of the LEDs indicates an error, see Appendix D, "Troubleshooting," for more information.

Expansion Slot Speed LEDs

The bus architecture delivers matched speed of expansion boards on the same bus.

IMPORTANT: Always pair expansion boards of the same speed on the same bus for optimal performance. If expansion boards of different speeds are installed on the same bus, the server operates both boards at the lower frequency, resulting in potential bottlenecks.

Use Figure C-5 and Table C-6 to identify the speed for each PCI slot and to help ensure optimal performance.



Figure C-5: Expansion slot speed LEDs

Table C-6: Expansion Slot Speed LED

LED	Slot Speed	
1	33 MHz PCI	
2	66 MHz PCI	
3	66 MHz PCI-X	
4	100 MHz PCI-X	

Hot-Plug Power Supply LEDs

Determine the hot-plug power supply status by noting the color of the power supply LED located adjacent to the AC power socket.



Figure C-6: Power supply LEDs (rack configuration)

Power Supply Condition	1: Power LED (Green)	2: Fault LED (Amber)
No AC power to any power supply	Off	Off
No AC power to a particular power supply	Off	On
AC power present; system in standby mode	Blinking	Off
Power supply on and working properly	On	Off
Power supply current limit exceeded	On	Blinking

Table C-7. Fower Supply LEDS	Table	C-7:	Power	Supply	/ LEDs
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Hot-Plug Fan LEDs



Each hot-plug fan has a corresponding status LED in the fan basket.

Figure C-7: Hot-plug fan LEDs

Table C-8: Hot-Plug Fan LEDs

Fan	Description	
1	Standard CPU fan	
2	Optional redundant CPU fan	
3	Standard I/O fan	
4	Optional redundant CPU fan	
5	Drive fan	
6	Drive fan	
7	Drive fan	

The hot-plug fan LEDs indicate the following conditions:

- Green = The fan is operating normally.
- Amber = The fan has failed.
- Off = The fan is not installed, has no power, or is not properly seated.

Embedded NIC Connector Activity LEDs

The RJ-45 connector for the embedded NIC, located on the server rear panel, contains two LEDs. Use the following figure and table to identify the LED locations and status.



Figure C-8: Embedded NIC connector activity LEDs

	Table C-9:	Embedded	NIC	Connector	Activity	LEDs
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LED	Description	State
1	Activity	On or flashing = Network activity
		Off = No network activity
2	Link	On = Linked to network
		Off = No network link

Rear Unit Identification LED and Button

The HP ProLiant ML530 Generation 2 server includes unit identification (UID) LEDs with buttons on both the front and rear panels. The UID LEDs indicate activity status and can be toggled on and off by the pushing the UID button or through Insight Manager 7.

The rear UID provides a visual reference for locating an individual server in a rack of servers. The rear UID contains an integrated button to activate or deactivate the LED.



Figure C-9: Rear UID and button

The rear UID indicates the following states:

- Blue = The button is activated.
- Blue flashing = The system is being monitored remotely.
- Off = The button is deactivated.

NOTE: You can activate and deactivate the UID from either the front or rear UID button.

Hot-Plug Hard Drive LEDs

Each hot-plug hard drive has three LEDs located on the front of the drive. They provide activity, online, and fault status for each corresponding drive when configured as a part of an array and attached to an active Smart Array Controller. LED behaviors may vary, depending on the status of other drives in the array. Use the following figure and tables to identify LED locations and analyze the status of each hot-plug hard drive.

CAUTION: Read the "Hot-Plug Hard Drive Replacement Guidelines" in the *Servers Troubleshooting Guide* before removing a hard drive.



Figure C-10: Hot-plug hard drive LEDs

Table C-10:	Hot-Plug Hard Drive LEDs
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LED	Description	State
1	Drive activity	On = Drive activity
		Off = No drive activity
2	Online status	Flashing = Online activity
		Off = No online activity
3	Fault status	Flashing = Fault-process activity
		Off = No fault-process activity

Activity LED	Online LED	Fault LED	State
On	Off	Off	Do not remove the drive. Removing a drive during this process causes data loss.
			The drive is being accessed and is not configured as part of an array.
On	Flashing	Off	Do not remove the drive. Removing a drive during this process causes data loss.
			The drive is rebuilding or undergoing capacity expansion.
Flashing	Flashing	Flashing	Do not remove the drive. Removing a drive during this process causes data loss.
			The drive is part of an array being selected by the Array Configuration Utility.
			-Or-
			The Options ROMPaq is upgrading the drive.
Off	Off	Off	OK to replace the drive online if a predictive failure alert is received and the drive is attached to an array controller.
			The drive is not configured as part of an array.
			-Or-
			If this drive is part of an array, a powered-on controller is not accessing the drive.
			-Or-
			The drive is configured as an online spare.

Table C-11: Hot-Plug SCSI Hard Drive LED Combinations

continued

Activity LED	Online LED	Fault LED	State
Off	Off	On	OK to replace the drive online.
			The drive has failed and has been placed offline.
Off	On	Off	OK to replace the drive online if a predictive failure alert is received, provided that the array is configured for fault tolerance and all other drives in the array are online.
			The drive is online and configured as part of an array.
On or flashing	On	Off	OK to replace the drive online if a predictive failure alert is received, provided that the array is configured for fault tolerance and all other drives in the array are online.
			The drive is online and being accessed.

 Table C-11: Hot-Plug SCSI Hard Drive LED Combinations continued

System LEDs and Internal Health LED Status Combinations

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

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

The internal health LEDs on the front panel indicate the current hardware status and are used to assist in initial troubleshooting. Note that in some situations, Insight Manager 7 reports server status differently than the health LEDs because it tracks more system attributes.

For information on troubleshooting health events indicated by the internal and external LEDs, see Appendix D, "Troubleshooting," or refer to the *Servers Troubleshooting Guide* included on the Documentation CD that ships with your server.

Internal System LED and Color	Front Panel Internal Health LED Color	State	
Processor failure (amber)	Red	Processor has failed.	
		Required processor is not installed in socket 1.	
		 ROM detects a failed processor during POST. 	
	Amber	Processor is in pre-failure condition.	
PPM failure (amber)	Red	• PPM has failed.	
		 PPM is not installed, but the corresponding processor is installed. 	
DIMM failure (amber)	Red	DIMM has experienced a multi-bit error.	
	Amber	DIMM has reached single-bit correctable error threshold.	

Table C-12: System LEDs and Internal Health LED Status Combinations

continued
System LED and Color	Internal Health LED Color	State
DIMM failure, all slots in one bank (flashing amber)	Red	Configuration error: The indicated DIMMs are not properly populated or are an unsupported type.
DIMM failure, all slots (amber)	Red	No valid or usable memory is installed in the system.
Memory board interlock (amber)	Red	No memory board is installed.
Thermal warning (amber)	Red	System has exceeded OS cautionary level or critical hardware level.
Fan (amber)	Red	A required fan has failed or is missing.
	Amber	A redundant fan has failed.
Power supply (off)	Red	A required power supply has failed.
	Amber	A redundant power supply has failed.

Table C-12: System LEDs and Internal Health LED Status Combinations continued

System Board Switches

Some server operations, including adding or removing a component, changing a security feature, or reconfiguring the server from tower to rack, require that you reconfigure a system switch. If the system configuration is incorrect, your server may not work properly and you may receive error messages on the screen.

This section discusses the following system board switches:

- System maintenance
- Non-maskable interrupt (NMI)



Figure C-11: System board switches

 Table C-13:
 System Board Switches

Switch	Switch Type
1	System maintenance switch (SW4)
2	NMI switch (SW3)

System Maintenance Switch

The system maintenance switch (SW4) is an 8-position switch that is used for system configuration. The default setting for all eight positions is off. For the proper system maintenance switch settings, refer to the labels attached to the inside of the server access panel or see the following table.

Position	Description	On/Off Function
1	Reserved	
2	Lock configuration	Off = System configuration can be changed.
	information	On = System configuration is locked and cannot be modified.
3	Tower/rack model select	Off = System is in a tower configuration.
		On = System is in a rack configuration.
4	Enable diskette boot	Off = Booting from diskette is controlled by RBSU.
		On = Booting from diskette is enabled and RBSU setting is overridden.
5	Clear system passwords	Off = System passwords work normally.
		On = System passwords will be erased.
6	Invalidate NVRAM	Off = No function is available.
	and CMOS	On = ROM treats system configuration as invalid.
7	Reserved	
8	Reserved	

Table C-14: System Maintenance Switch (SW4)

Note: To access redundant ROM, set system maintenance switches 1, 5, and 6 to the "on" position. See "Redundant ROM Support" in Chapter 8, "Server Configuration and Utilities" for more information.

Non-Maskable Interrupt Switch

Crash dump analysis is an essential part of determining the cause of problems such as hangs or crashes in operating systems, device drivers, and applications. Many crashes freeze a system requiring you to do a hard reset. Resetting the system erases any information that supports root cause analysis.

When an operating system crashes, system administrators can perform a non-maskable interrupt (NMI) event by pressing a dump switch. The NMI event enables a hung system to once again become responsive enough to provide debug information.

The NMI switch is used ONLY in the event of a service emergency that requires a complete data dump in preparation for recovering the system from a catastrophic event.

System Configuration Settings

It may be necessary at some time to clear and reset system configuration settings. 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. For additional information about locating the switch and switch settings, see "System Maintenance Switch" in this appendix. The default setting for all positions is off.

IMPORTANT: Clearing CMOS and/or (NVRAM) deletes your configuration information. See Chapter 8, "Server Configuration and Utilities," for complete instructions on configuring your server.

To erase all system configuration settings:

- 1. Power down the server.
- 2. Remove the access panel.
- 3. Set the position 6 lever to the on position.
- 4. Power up the server and wait for the system to display a message confirming that the maintenance switch has been set.
- 5. Power down the server.
- 6. Reset the position 6 lever to the default position (off).
- 7. Power up the server.
- 8. Press the **F9** key to run RBSU and reset all system configuration settings.

For instructions on using RBSU to reset system configuration settings, see Chapter 8, "Server Configuration and Utilities."

D

Troubleshooting

This appendix provides specific troubleshooting information for your HP ProLiant ML530 Generation 2 server. Use it to find details about server startup and operation errors.

For a list of new server error messages specific to this server's memory, refer to the server memory installation guide on the Documentation CD. For information on LEDs and switches specific to your server, see Appendix C, "System LEDs and Switches."

For a more detailed discussion of troubleshooting techniques, diagnostic tools, error messages, and preventative maintenance, refer to the *Servers Troubleshooting Guide* included on the Documentation CD that ships with your server.



WARNING: There is a risk of personal injury from hazardous energy levels. The installation of options and the routine maintenance and service of this product shall be performed by individuals who are knowledgeable about the procedures, precautions, and hazards associated with equipment containing hazardous energy circuits. This appendix includes the following topics:

• When the Server Does Not Start

You are provided with initial instructions on what to try and where to go for help for the most common problems encountered during the initial Power-On Self-Test (POST). A successful startup requires the server to complete this test each time you power up, before the server can load the operating system and start running software applications.

• Diagnosis Steps

If the server does not power up after you have performed initial troubleshooting procedures, use the tables in this section to identify possible reasons for the problem, possible solutions, and references to other sources of information.

• Problems After Initial Boot

Once your server has passed the POST, you may still encounter errors, such as an inability to load your operating system. You are provided with instructions on what to try and where to go for help when you encounter errors after the server completes the POST.

• ROMPaq Disaster Recovery

During troubleshooting, it may become apparent that your system ROM is corrupted. Because the server has redundant ROM capability, you can use the backup ROM until it is feasible to bring your server down. If both ROMs are corrupted, you will need to perform the ROMPaq disaster recovery procedure before the server will boot.

Other Information Resources

This section provides a list of reference information available for your server.

For troubleshooting information beyond the scope of this guide, both general and specific to ProLiant ML530 servers, see Table D-8.

When the Server Does Not Start

This section provides systematic instructions on what to try and where to go for help for the most common problems encountered during initial POST. The server must first complete this test each time you power up, before it can load the operating system and start running software applications.



WARNING: There is a risk of personal injury from hazardous energy levels. The installation of options, and the routine maintenance and service of this product shall be performed by individuals who are knowledgeable about the procedures, precautions, and hazards associated with equipment containing hazardous energy circuits.

If the server does not start:

- 1. Be sure that the server and monitor are plugged into a working outlet.
- 2. Be sure that your power source is working properly by checking the system power LED. If the power source is not working properly, be sure that the Power On/Standby button is pressed firmly.
- 3. Be sure that the power supplies are working properly by checking the power supply LEDs.

NOTE: For more information about the location and status of LEDs, see Appendix C, "System LEDs and Switches." For more information about power, refer to the "Power Source" section in the *Servers Troubleshooting Guide*.

- 4. If the system does not complete POST or start loading an operating system, refer to "Loose Connections" in the *Servers Troubleshooting Guide*.
- 5. If the server is rebooting repeatedly, be sure that the system is not rebooting due to a problem that initiates an ASR-2 reboot.

Some operating systems reboot server when an error occurs. This is the default in Windows 2000.

6. Restart the server.

IMPORTANT: If the server does not restart, proceed to the following section, "Diagnosis Steps."

- 7. Check the server for the following normal power-up sequence to be sure that your system meets the minimal hardware requirements and is powered up during normal operations:
 - a. The power button LED turns from standby (amber) to on (green).
 - b. The fans start up.
- 8. Check the monitor for the following messages that verify your system meets the minimal hardware requirements and is powered up during normal operations:
 - a. HP ProLiant logo
 - b. BIOS information
 - c. Copyright information
 - d. Processor initialization
 - e. Multi-initiator configuration

IMPORTANT: Select the multi-initiator configuration utility (CRTL-A) only to support HP storage and clustering options. See Chapter 8, "Server Configuration and Utilities," for additional information.

- f. PXE initialization
- g. Option ROMs
- h. SCSI devices

The operating system loads to complete the boot process.

If the server completes POST and attempts to load the operating system, go to the "Problems After Initial Boot" section in this appendix.

Diagnostic Steps

If your server does not power up, or powers up but does not complete POST, answer the questions in Table D-1 to determine appropriate actions based on the symptoms observed. The flow of questions reflects the usual flow of events during a power-on sequence.

According to the answers you give, you will be directed to an appropriate secondary table in this section. The table outlines possible reasons for the problem, options available to assist in diagnosis, possible solutions, and references to other sources of information.

Question	Action
Question 1:	If no, continue to question 2.
Is the system power button LED off?	If yes, see Table D-2.
Question 2:	If yes, continue to question 3.
Is the system power button LED green?	If no, see Table D-3.
Question 3:	If yes, continue to question 4.
Is the external health LED green?	If no, see Table D-4.
Question 4:	If yes, continue to question 5.
Is the internal health LED green?	If no, see Table D-5.
Question 5:	If yes, use the POST messages for further
Is the monitor displaying information?	diagnosis. See Table D-6 for details.
	If no, see Table D-6.

Table D-1: Diagnostic Steps

Answer	Possible Reasons	Possible Solutions
Yes, it is off	The system is not connected to AC power, or no AC power is available.	Be sure that the power cord is connected to the power supply.
	A power supply problem exists. The power supply may not be connected or inserted properly, it may have a damaged connector, or it may have failed.	Be sure that the power supply is undamaged, the power supply is fully seated, and the power supply LED is green when you power up the server.
	There is a broken connection between the front panel LED assembly and the power backplane.	Be sure that the system power and power supply signal cables are connected to the system board and power backplane.
	The front panel LED assembly has failed.	Be sure that the front panel LED assembly cable is connected to the power backplane.
		Refer to "Power Problems" and "General Hardware Problems" in the <i>Servers Troubleshooting Guide</i> for further options.
		If these solutions do not solve the problem, contact an HP authorized service provider for assistance.
No	If the system power button LED is amber, press the Power On/Standby button.	
	See Table D-3.	

Table D-2: Is the System Power LED Off?

Note: For LED locations and functions, see Appendix C, "System LEDs and Switches." For cabling configurations, see Chapter 7, "Cabling the Server."

Answer	Possible Reasons	Possible Solutions
No, it is off	Power On/Standby button has not been pressed firmly.	Firmly press the power button.
	A power supply problem exists. The power supply may not be connected or inserted properly, it may have a damaged connector, or it may have failed.	Be sure that the power supply is undamaged, the power supply is fully seated, and the power supply LED is green.
	The system may have experienced a short.	Check for bent connector pins and improperly seated expansion boards.
	The front panel LED assembly has failed.	Be sure that the front panel LED assembly cable is connected to the power backplane.
		If these solutions do not solve the problem, contact an HP authorized service provider for assistance.
Yes	If the system power button LED is green, see Table D-4.	
Note: For LED locations and functions, see Appendix C, "System LEDs and Switches." For cabling		

Table D-3: Is the System Power LED Green?

configurations, see Chapter 7, "Cabling the Server."

Answer	Possible Reasons	Possible Solutions
No, it is O amber th re	One power supply has failed; therefore, power supply redundancy is lost.	Be sure that each installed power supply is securely connected to an AC power source.
		Locate the amber power supply LED to Identify the failed power supply.
		Contact an HP authorized service provider for replacement parts and service.
No, it is red	All installed power supplies have experienced a failure.	Remove all AC power from power supplies and reconnect to clear the error condition.
		Replace the power supply. Contact an HP authorized service provider for replacement parts and service.
Yes	If the external health LED is green, see Table D-5.	
Note: For LED locations and functions, see Appendix C. "System LEDs and Switches" For cabling		

Table D-4: Is the External Health LED Green?

Note: For LED locations and functions, see Appendix C, "System LEDs and Switches." For cabling configurations, see Chapter 7, "Cabling the Server."

Table D-5: Is the Internal Health LED Green?

Answer	Possible Reasons	Possible Solutions
No, it is amber	A processor is in prD-failure condition.	Use internal component failure LEDs to identify:
	A DIMM is in prD-failure	Missing components
	One memory bank is valid, but another bank is missing a DIMM.	Degraded components
		Failed components
	One memory bank is valid, but another bank has mismatched DIMMs installed. One memory bank is valid, but another bank has an unsupported DIMM type installed. A redundant fan has failed.	 Improperly installed components
		For corrective procedures, see the Maintenance and Service Guide on the
		Documentation CD that ships with your server.
		Contact an HP authorized service provider
		for replacement parts and service.

continued

Answer	Possible Reasons	Possible Solutions
No, it is red	A processor has failed.	Use internal component failure LEDs to
	Processor 1 is not installed.	identify:
	A processor is an unsupported type.	Missing components
		Failed components
	Processor voltage requirements are	Improperly installed components
	mismaicned.	Thermal event
	Processor does not have an associated PPM installed.	For corrective procedures, see the Maintenance and Service Guide on the
	A PPM has failed.	Documentation CD that ships with your
	A DIMM has experienced a multibit error.	server.
		Contact an HP authorized service provider for replacement parts and service.
	DIMM pairs have mismatched DIMMs.	
	DIMMs are missing.	
	DIMMs are an unsupported type.	
	A required fan has failed.	
	A thermal event has occurred.	
	A component is not properly seated.	Be sure that all components are seated securely.
	Memory board is missing.	Add memory board.
Yes	If the internal health LED is green, see Table D-6.	
Note: For LED locations and functions, see Appendix C, "System LEDs and Switches."		

 Table D-5:
 Is the Internal Health LED Green? continued

Answer	Possible Reasons	Possible Solutions
No	The monitor may not have power.	Be sure that the monitor AC power cord is plugged in and that the monitor power button has been pressed.
	Video may not be connected properly.	If a video card is installed, be sure that the video cable is properly connected.
		If a Remote Insight Lights-Out Edition expansion board is installed, be sure that the video cable is connected to the video connector on this expansion board.
		Refer to "Video Problems" in the Servers Troubleshooting Guide.
	Non-volatile RAM (NVRAM) may be corrupted.	Clear NVRAM. See Caution below. See Appendix C for the correct switch setting.
		Are there any audible indicators, such as a series of beeps? A series of beeps is the audible signal indicating the presence of a POST error message. Refer to the "POST Error Messages" appendix in the <i>Servers Troubleshooting Guide</i> for a complete description of each beep sequence and the corresponding error messages.
	The system ROM and redundant ROM may be	If the system ROM and redundant ROM are corrupt, see "ROMPaq Disaster Recovery" in this chapter for instructions on performing a recovery procedure.
corrupted.	corrupted.	If these steps do not solve the problem, contact an HP authorized service provider for assistance.
Yes	Video is available for diagnosis. Determine the next action by observing POST progress and error messages. Refer to the <i>Servers Troubleshooting Guide</i> for a complete description of each POST error message.	

Table D-6: Is the Monitor Displaying Information?

CAUTION: Clearing non-volatile RAM (NVRAM) deletes your configuration information. Refer to your server maintenance and service guide for complete instructions prior to performing this operation or data loss could occur.

Problems After Initial Boot

Once your server has passed POST, you may still encounter errors, such as an inability to load your operating system. Use Table D-7 to troubleshoot server installation problems that occur after the initial boot.

Refer to "Software Problems" in the *Servers Troubleshooting Guide* for more information.

Problem	Possible Reasons	Possible Solutions
System cannot load SmartStart.	SmartStart requirement not performed.	Check the SmartStart Release Notes provided in the SmartStart Online Reference Information on the SmartStart CD.
	IDE cable or power cable not connected to CD-ROM drive.	Check the IDE signal cable between the system board and CD-ROM to be sure that it is connected properly.
		Check the power supply connection between the CD-ROM drive and the power backplane.
	Insufficient memory is available.	A rare Insufficient Memory message may display the first time SmartStart is booted on certain unconfigured systems. Simply cold- boot the machine with the SmartStart CD inserted in the CD-ROM drive to correct the problem.
	Existing software is causing conflict.	Run the System Erase Utility. Read the Caution below. Refer to the instructions in the <i>Servers Troubleshooting Guide.</i>

Table D-7: Problems After Initial Boot

continued

Problem	Possible Reasons	Possible Solutions
SmartStart fails during installation.	Error occurs during installation.	Follow the error information provided. If it is necessary to reinstall, run the System Erase Utility. Read the caution below. Refer to the instructions in the <i>Servers Troubleshooting Guide</i> .
	CMOS is not cleared.	Run the System Erase Utility. Read the following caution. Refer to the instructions in the <i>Servers Troubleshooting Guide</i> .
Server cannot	Required operating system	Follow these steps:
load operating system.	step was missed.	 Note at which phase the operating system failed.
		2. Remove any loaded operating system.
		 Refer to your operating system documentation.
		4. Install the operating system again.
	Installation problem occurred.	Refer to your operating system documentation and to the SmartStart Release Notes on the SmartStart CD.
		Run RBSU and check the OS Selection menu.
	Problem was encountered with the hardware you have	Refer to the documentation provided with the hardware.
	added to the system.	See Chapter 7, "Cabling the Server" to identify correct SCSI bus cabling configuration for your unit.
	Problem was encountered with hardware added to a new configure-to-order system (where available).	You must complete the factory-installed operating system software installation before adding new hardware to the system.
		Be sure you are following the instructions provided in the <i>Factory-Installed Operating System Software Installation Guide</i> .
		Remove the new hardware and complete the software installation. Then, reinstall the new hardware.

Table D-7: Problems After Initial Boot continued

CAUTION: The System Erase Utility causes loss of all configuration information, as well as loss of existing data on all connected hard drives. Please read "System Erase Utility" and the associated warning in the *Servers Troubleshooting Guide* prior to performing this operation.

Refer to the Servers Troubleshooting Guide for the following:

- Information you need to collect when diagnosing software problems and to provide when contacting support.
- Instructions on how to upgrade your operating system and its drivers.
- Information about available recovery options and advice on minimizing downtime.

ROMPaq Disaster Recovery

A corrupted system ROM requires that you recreate the ROM BIOS by a process called disaster recovery. This operation can be accomplished only when the system is in disaster recovery (emergency repair boot) mode. When both system ROMs are corrupt, the system defaults into disaster recovery mode automatically and the server emits two extended beeps.

IMPORTANT: Prior to performing this operation, refer to the *Servers Troubleshooting Guide* for complete instructions on disaster recovery.

To perform ROMPaq disaster recovery:

- 1. Power down the server.
- 2. Set system maintenance switches 1, 4, 5, and 6 to the "on" position. For the location of these switches, see Appendix C, "System LEDs and Switches."
- 3. Power up the server. After the system powers on, it emits two extended beeps.
- 4. Insert a ROMPaq diskette with the latest system ROM that you have downloaded from the website:

www.compaq.com/support/files/

IMPORTANT: The ROMPaq flashes both sides of the redundant ROM, and this process may take up to 10 minutes.

- 5. Wait until the server emits three rising beeps, indicating the completion of the ROM flash process.
- 6. Power down the server again. If necessary, perform a forced shutdown by pressing the power button for four seconds.
- 7. Set system maintenance switches 1, 4, 5, and 6 back to the default position (off).
- 8. Restart the server.

Other Information Resources

Refer to the following additional information for help.

Resource	Description
Servers Troubleshooting Guide	This is a resource for obtaining troubleshooting information that is beyond the scope of this document. It includes general hardware and software troubleshooting information for all HP ProLiant servers, a complete list of error messages along with explanations of probable causes, and a list of remedial measures. This guide resides on the Documentation CD that ships with your server. To be sure that you have the most up-to-date copy of the <i>Servers Troubleshooting Guide</i> document, visit the website:
	www.compaq.com/support/
HP ProLiant ML530 Generation 2 Server Maintenance and Service Guide	This resource provides a complete list of all replacement parts available, along with instructions on removal and replacement. Locate this guide on the Documentation CD that ships with your server and on the support website:
	www.compaq.com/support/
	Follow the link for maintenance and service guides and download the document provided for your server.
Other on-line documentation	Product Bulletin Quickspecs
	OS Support Matrix

 Table D-8:
 Troubleshooting Resources

For additional information on warranties and service and support upgrades (CarePaq services) visit the website:

www.compaq.com/services/carepaq

Server Specifications

This appendix provides operating and performance specifications for the HP ProLiant ML530 Generation 2 server.

Feature	Units
Dimensions	
Height (without casters)	51.5 cm (20.3 in)
Depth (without bezel)	69.7 cm (27.5 in)
Width	32.6 cm (12.9 in)
Weight	45.4 kg (100 lb) to 66.2 kg (146 lb)
Input requirements	
Rated input voltage	100–127 VAC 200–240 VAC
Rated input frequency	47–63 Hz
Rated input current	10A for 100–127 VAC 4.8A for 200–240 VAC
Rated input power	1000W for 100–127 VAC 960W for 200–240 VAC
BTUs per hour	3415 BTUs/hr 100–127 VAC 3015 BTUs/hr 200–240 VAC
Power supply output	
Rated steady-state power	Rated steady-state power: 600 W
Maximum peak power	Maximum peak power: 600 W
Temperature range	
Operating	10° to 35°C (50° to 95°F)
Shipping	-30° to 60°C (-20° to 140°F)
Relative humidity (non-condensing)	
Operating	20% to 80%
Non-operating	5% to 90%
Wet bulb temperature	38.7°C (101.7°F)
Heat dissipation	2400 BTUs/hr maximum

Table E-1: Server Specifications

System Battery

HP ProLiant ML530 Generation 2 servers have a memory function that requires a battery for retaining stored information.

System Board Battery Replacement

When your 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 usually about 5 to 10 years. Use an HP 540-mAh, lithium, 3-volt replacement battery (CR 2032). The HP spare part number for the battery is 175115-001.



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.



WARNING: Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.



WARNING: To remove all power from the server, unplug the power cord from either the electrical outlet or the server or other product. If there is more than one power cord, all cords must be unplugged before all power is removed from the server.

To install a new battery:

1. If the server is on, remove power from the system. For detailed instructions, see "Powering Down the Server" in Chapter 3, "Installing Hardware Options."

- 2. Remove the access panel. See "Removing the Access Panel" in Chapter 3, "Installing Hardware Options."
- 3. Locate the battery connector on the system board.



Figure F-1: Locating the system battery

4. Remove the existing battery and note which side is positive.



Figure F-2: Removing the battery

5. Insert the new battery.



Figure F-3: Installing the battery

- 6. Install the access panel as directed in Chapter 3, "Installing Hardware Options."
- 7. Reconnect the power cord and peripheral devices. See "Connecting the Power Cord and Peripheral Devices" in Chapter 5, "Installing the Rack Server," or in Chapter 6, "Installing the Tower Server."
- 8. Power up the server. See "Powering Up the Server" in Chapter 5, "Installing the Rack Server," or in Chapter 6, "Installing the Tower Server."
- 9. Run the Rom-Based Setup Utility (RBSU) to reconfigure the system with the new battery. Reset the time and date. See Chapter 8, "Server Configuration and Utilities."

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