HP Integrity rx7620 Server User Service Guide

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About This Document

This document describes how to troubleshoot and diagnose server problems, and remove and replace server components for the HP Integrity rx7620 server.

The document publication date and part number indicate the document's current edition. The publication date changes when a new edition is published. Minor changes may be made without changing the publication date. The document part number will change when extensive changes are made.

Document updates may be issued between editions to correct errors or document product changes. To ensure that you receive the updated or new editions, you should subscribe to the appropriate product support service. See your HP sales representative for details.

The latest version of this document can be found online at http://www.hp.com/go/Integrity_Servers-docs.

Intended Audience

This document is intended to provide technical product and support information for authorized service providers, customer system administrators, and HP support personnel.

New and Changed Information in This Edition

This document has been updated with the latest HP styles and formatting.

Publishing History

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Document Organization

The *HP Integrity rx7620 User Service Guide* is divided into several chapters, each chapter contains information about servicing the HP Integrity rx7620. The appendixes contain supplemental information.

Typographic Conventions

This document uses the following conventions.

`%`, `$`, or `#`	A percent sign represents the C shell system prompt. A dollar sign represents the system prompt for the Bourne, Korn, and POSIX shells. A number sign represents the superuser prompt.
`Command`	A command name or qualified command phrase.
`Computer output`	Text displayed by the computer.

Ctrl+x	A key sequence. A sequence such as **Ctrl+x** indicates that you must hold down the key labeled **Ctrl** while you press another key or mouse button.
`ENVIRONMENT VARIABLE`	The name of an environment variable, for example, `PATH`.
[ERROR NAME]	The name of an error, usually returned in the `errno` variable.
Key	The name of a keyboard key. **Return** and **Enter** both refer to the same key.
Term	The defined use of an important word or phrase.
`User input`	Commands and other text that you type.
`Variable`	The name of a placeholder in a command, function, or other syntax display that you replace with an actual value.
[]	The contents are optional in syntax. If the contents are a list separated by `|`, you must choose one of the items.
{}	The contents are required in syntax. If the contents are a list separated by `|`, you must choose one of the items.
...	The preceding element can be repeated an arbitrary number of times.
⌾	Indicates the continuation of a code example.
|	Separates items in a list of choices.
WARNING	A warning calls attention to important information that if not understood or followed will result in personal injury or nonrecoverable system problems.
CAUTION	A caution calls attention to important information that if not understood or followed will result in data loss, data corruption, or damage to hardware or software.
IMPORTANT	This alert provides essential information to explain a concept or to complete a task
NOTE	A note contains additional information to emphasize or supplement important points of the main text.

Related Documents

You can find other information on HP server hardware management and diagnostic support tools in the following publications.

HP Technical Documentation Website

http://www.hp.com/go/Integrity_Servers-docs

Windows® Operating System Information

Find information about administration of the Microsoft® Windows operating system at the following website:

http://www.microsoft.com/technet/

Diagnostics and Event Monitoring: Hardware Support Tools

Complete information about HP hardware support tools, including online and offline diagnostics and event monitoring tools, is on the HP website at:

http://www.docs.hp.com/HP-UX/diag/

Website for HP Technical Support

http://h20219.www2.hp.com/services/cache/126868-0-0-225-121.html?jumpid=reg_R1002_USEN

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

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Include the document title and manufacturing part number. All submissions become the property of HP.

1 Introduction

The HP Integrity rx7620 Server is a member of the HP business-critical computing platform family: a mid-range, mid-volume server, positioned as an upgrade to the HP 9000 rp7410 product in the IA-64 product line. The HP Integrity rx7620 Server shares the same hardware as the HP 9000 rp7410 with changes to the cell board, CPU modules, core I/O and the PCI-X backplane. The HP Integrity rx7620 Server provides increased performance over its predecessor.

Overview

The HP Integrity rx7620 Server is a 10U, 8-socket symmetric multi-processing, rack-mount server that accommodates up to 64 GB of memory, PCI-X I/O, and internal peripherals, including disks and DVD/tape. Its high availability features include N+1 hot-pluggable fans and power, redundant power cords, and hot-pluggable PCI-X cards and internal disks. It currently accommodates up to 8 IA-64 processor modules with a maximum of four processor modules per cell board and a maximum of two cell boards.

Figure 1-1 HP Integrity rx7620 Server (left-front view)

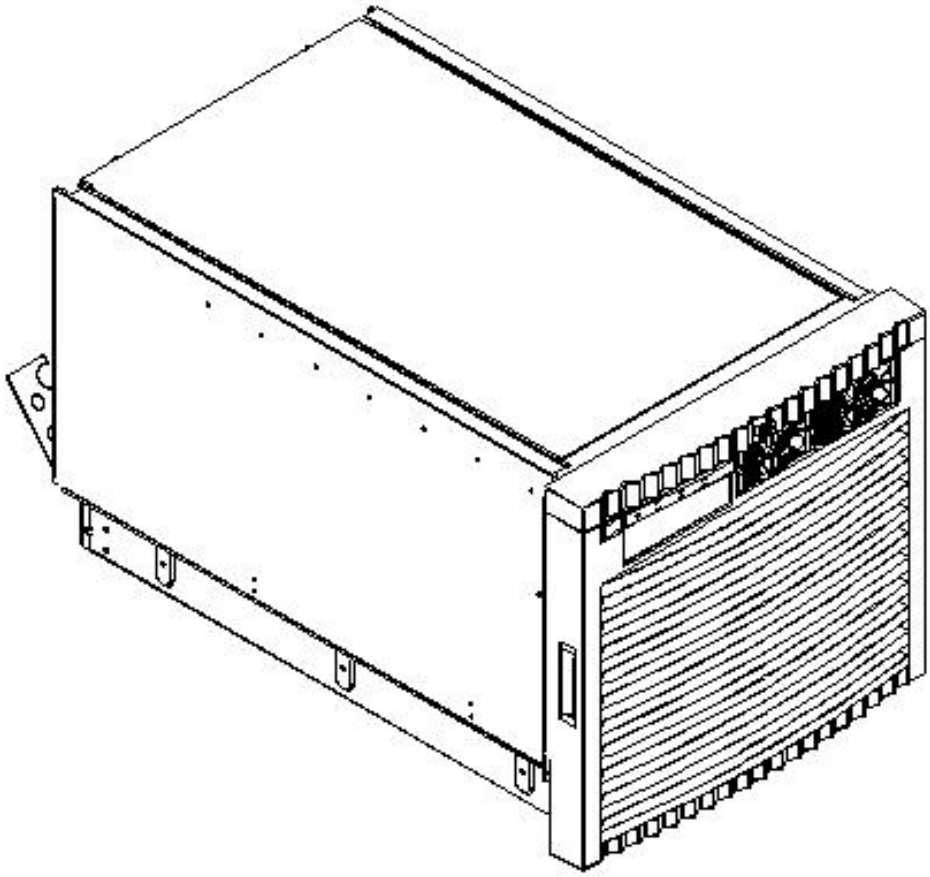
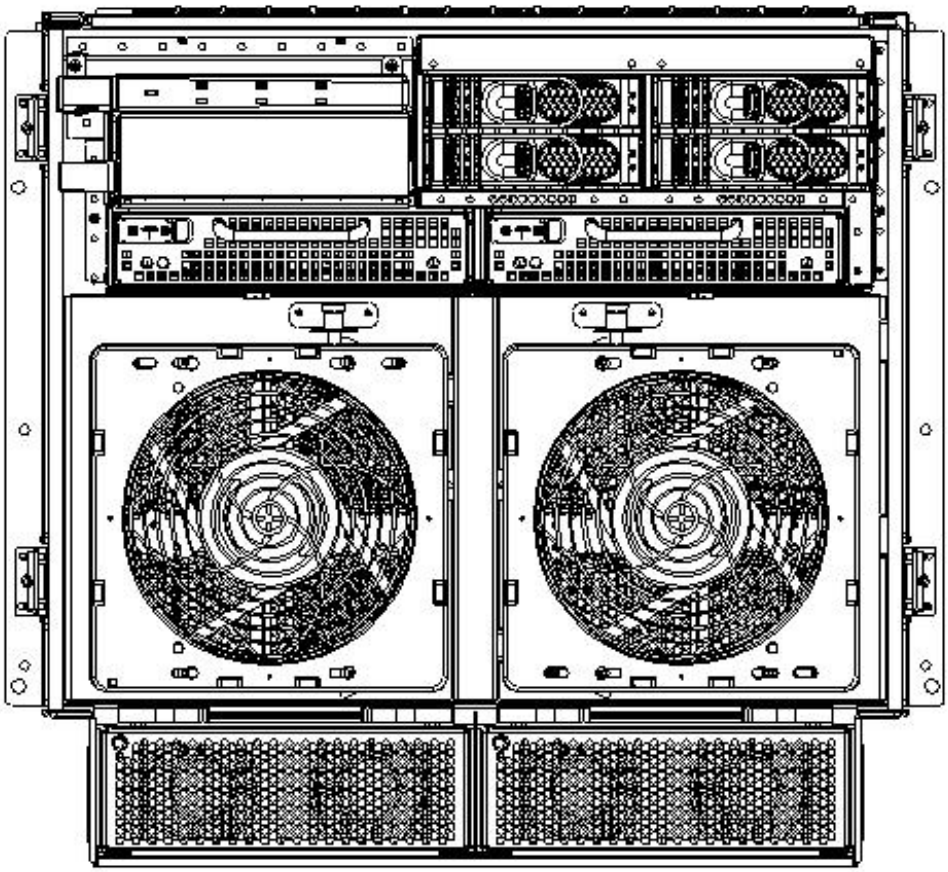


Figure 1-2 HP Integrity rx7620 Server (without front bezel)

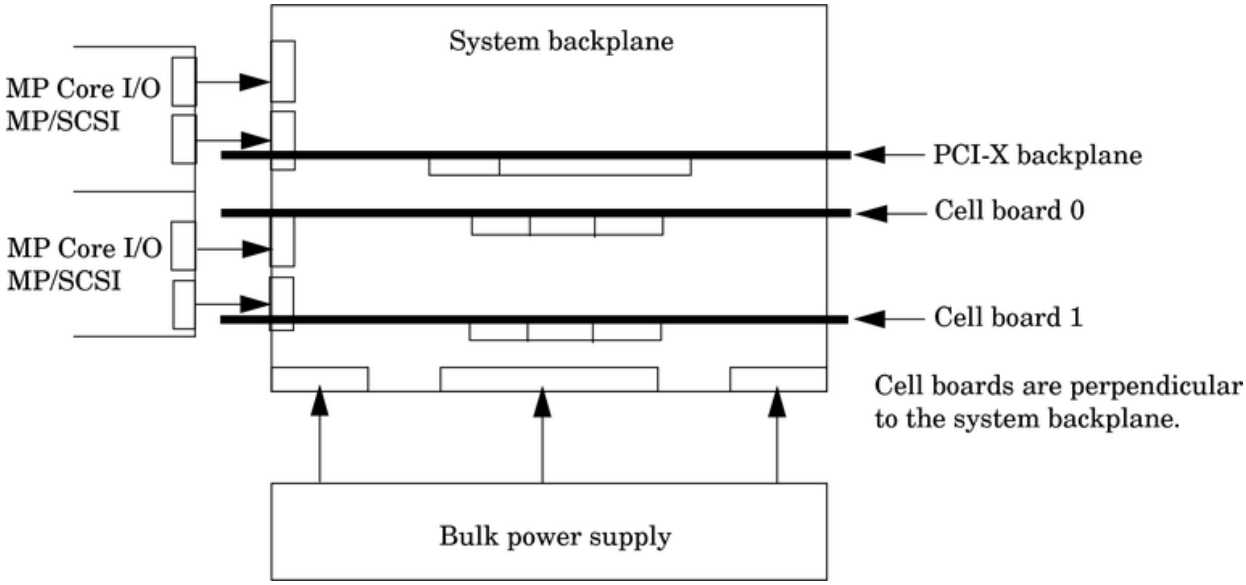


System Backplane

The system backplane comprises the system clock generation logic, the system reset generation logic, DC-to-DC converters, power monitor logic, and two Local Bus Adapter (LBA) link-to-PCI converter ASICs. It also includes connectors for attaching the cell boards, the PCI-X backplane, MP/SCSI core I/O boards, SCSI cables, bulk power, chassis fans, the front panel display, intrusion switches, and the system scan card. Unlike Superdome or the rp8400, there are no Crossbar Chips (XBC) on the system backplane. The “crossbar-less” back-to-back CC connection increases performance and reduces costs.

Only half of the MP/SCSI core I/O board set connects to the system backplane. The MP/SCSI boards plug into the backplane, while the LAN/SCSI boards plug into the PCI-X backplane.

Figure 1-3 System Backplane Block Diagram



System Backplane to PCI-X Backplane Connectivity

The PCI-X backplane uses two connectors for the SBA link bus and two connectors for the high-speed data signals and the manageability signals.

SBA link bus signals are routed through the system backplane to the cell controller on each corresponding cell board.

The high-speed data signals are routed from the SBA chips on the PCI-X backplane to the two LBA PCI bus controllers on the system backplane.

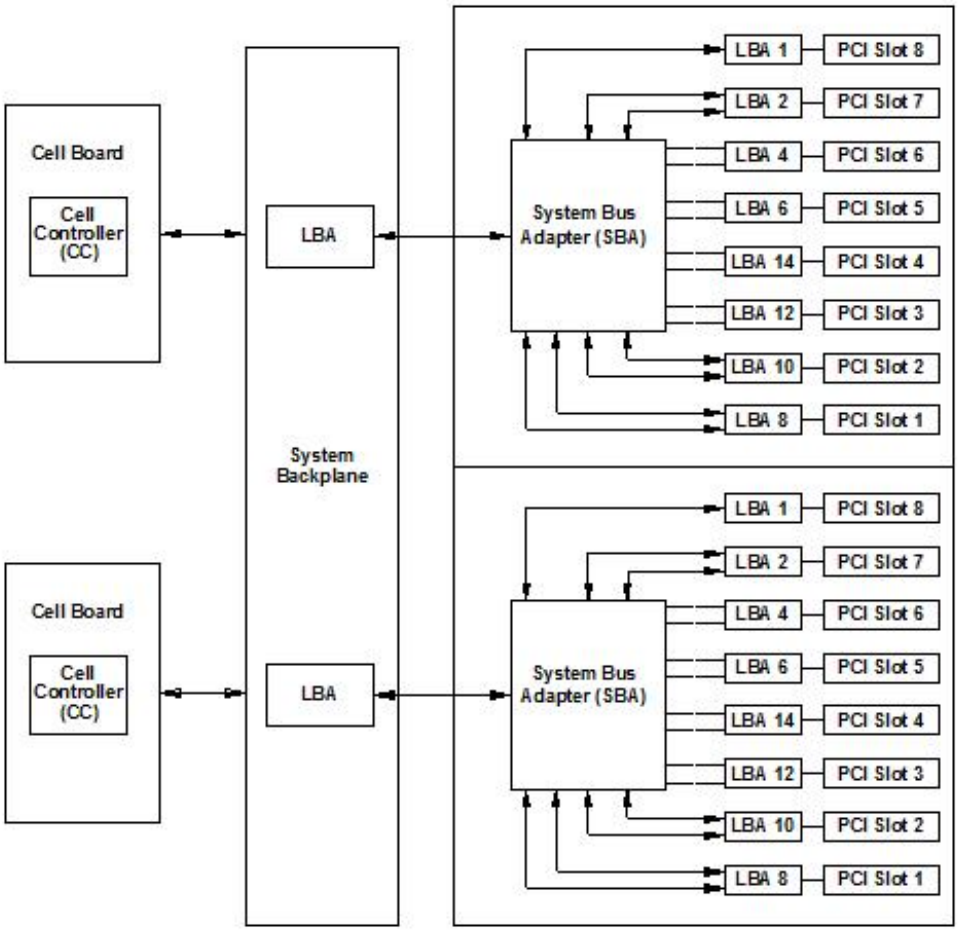
Clocks and Reset

The system backplane contains reset and clock circuitry that propagates through the whole system. The central clocks drive all major chip set clocks. Therefore, these circuits represent a system-wide single-point of failure.

I/O Subsystem

The cell board to the PCI-X board path runs from the CC to the SBA, from the SBA to the ropes, from the ropes to the LBA, and from the LBA to the PCI slots seen in Figure 1-4. The CC on cell board 0 and cell board 1 communicates with one each SBA over the SBA link. The SBA link consists of both an inbound and an outbound link with an effective bandwidth of approximately 1 GB/sec. The SBA converts the SBA link protocol into “ropes.” A rope is defined as a high-speed point-to-point data bus. The SBA can support up to 16 of these high-speed bi-directional rope links for a total aggregate bandwidth of approximately 4 GB/sec. Each LBA acts as a bus bridge, supporting either one or two ropes and capable of driving 33 Mhz or 66 Mhz for PCI cards. The LBAs can also drive at 66 Mhz or 133 Mhz for PCI-X cards.

Figure 1-4 PCI-X Board to Cell Board Block Diagram



NOTE: PCI-X slots 1-7 are dual rope slots while slot 8 is a single rope slot. A rope is defined as a high-speed point-to-point data bus.

The PCI-X backplane is the primary I/O interface for the HP Integrity rx7620 Server systems. It provides sixteen 64-bit, hot-plug PCI/PCI-X slots. Fourteen of the slots have dual ropes connected to the LBA chips. The remaining two slots have a single rope connected to each LBA chip. Each of the sixteen slots are capable of 66MHz/33MHz PCI or 133MHz/66MHz PCI-X. All sixteen PCI slots are keyed for 3.3 volt connectors (accepting both Universal and 3.3 V cards). The PCI-X backplane does not provide any 5 volt slots for the I/O cards. For more details, see Table 1-1.

The PCI-X backplane is physically one board but behaves like two independent partitions. SBA 0 and its associated LBAs and eight PCI-X slots form one I/0 partition. SBA 1 and its associated LBAs and eight PCI-X slots form the other I/0 partition. One I/O partition can be powered down separately from the other I/O partition.

Table 1-1 PCI-X Slot Types

I/O Partition	Slot	Device[1]
0	8	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, Hot-Plug Slot.
0	7	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, Hot-Plug Slot.
0	6	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, Hot-Plug Slot.
0	5	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, Hot-Plug Slot.
0	4	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, Hot-Plug Slot.

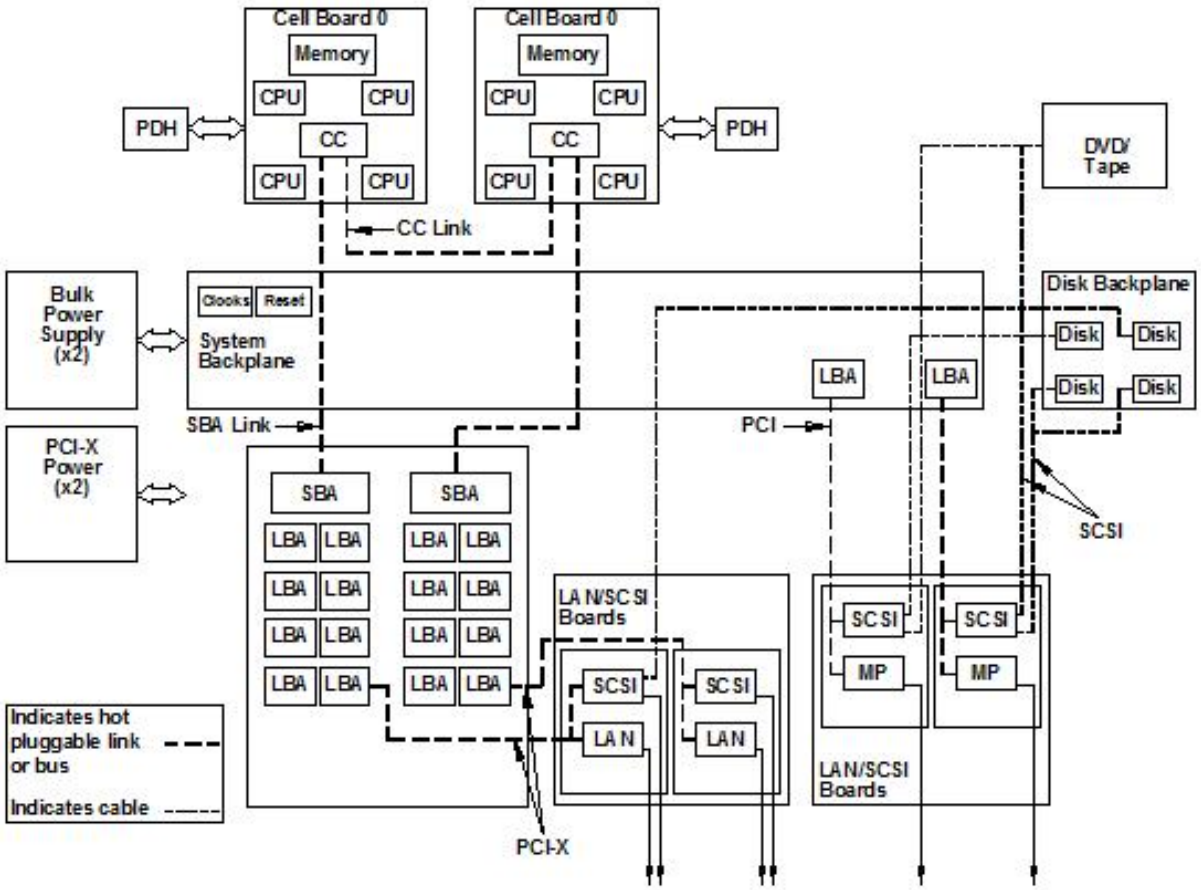
Table 1-1 PCI-X Slot Types *(continued)*

I/O Partition	Slot	Device[1]
0	3	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, Hot-Plug Slot.
0	2	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, Hot-Plug Slot.
0	1	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, Hot-Plug Slot.
1	8	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, Hot-Plug Slot.
1	7	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, Hot-Plug Slot.
1	6	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, Hot-Plug Slot.
1	5	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, Hot-Plug Slot.
1	4	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, Hot-Plug Slot.
1	3	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, Hot-Plug Slot.
1	2	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, Hot-Plug Slot.
1	1	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, Hot-Plug Slot.

1 If the slot is used as a PCI slot, either the 33MHz or 66MHz PCI frequency is supported. If the slot is used as a PCI-X slot, either the 66MHz or 133MHz PCI-X frequency is supported.

Detailed HP Integrity rx7620 Server Description

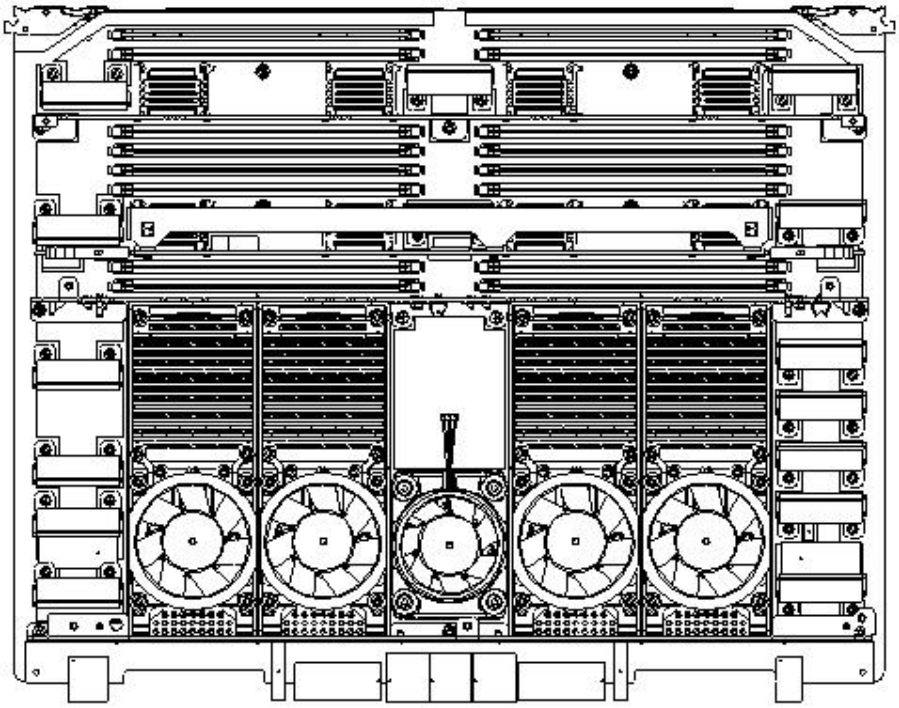
Figure 1-5 HP Integrity rx7620 Server 8-Socket Block Diagram



Cell Board

The cell board contains several hardware blocks connected by several data buses. The major hardware blocks are the Central Processor Units (CPUs), the Cache Coherency Controller (CC), the memory controllers, and the memory. Minor hardware blocks include Clock Distribution, Power Distribution, Reset Circuit, and PDH Riser Board Interface. The buses include two Front Side Buses (FBS0 and FBS1), a Memory (MID) bus, a Crossbar (XB) bus, and an I/O bus. All these blocks come together at the CC chip.

Figure 1-6 Cell Board

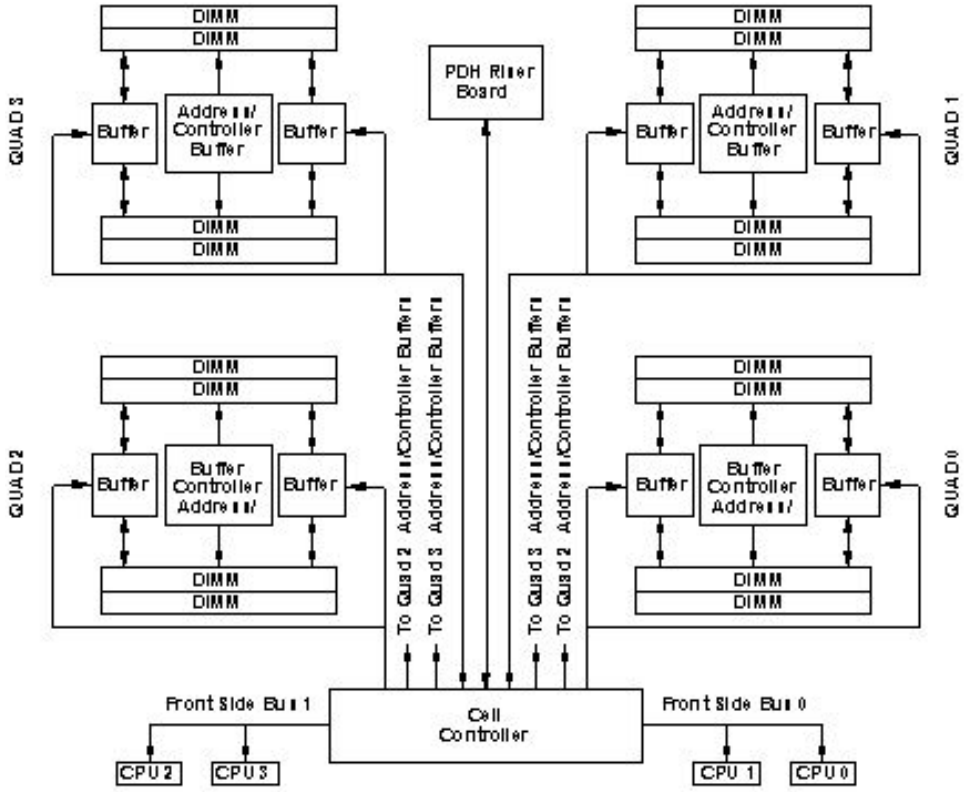


The HP Integrity rx7620 Server has a 48V distributed power system and receives the 48V power from the system backplane board. The cell board contains DC-to-DC converters to generate the required voltage rails. The DC-to-DC converters on the cell board do not provide N+1 redundancy.

Because of space limitations on the cell board, the PDH/PDHC circuitry resides on a riser board that plugs into the cell board at a right angle. The cell board also includes clock circuits, test circuits, and de-coupling capacitors.

Figure 1-7 shows a simplified view of the memory subsystem. It consists of two independent access paths, each path having its own address bus, control bus, data bus, and DIMMs . In practice, the CC runs the two paths 180 degrees out of phase with respect to each other to facilitate pipelining in the CC. Address and control signals are fanned out through register ports to the synchronous dynamic random access memory (SDRAM) on the DIMMs.

Figure 1-7 Memory Subsystem



PDH Riser Board

The Platform Dependant Hardware Riser board is a daughter card for the cell board. It contains a micro-processor memory interface microcircuit, processor-dependent hardware including the processor-dependent code (PDC), flash memory, and a manageability microcontroller, called the Platform Dependant Hardware Controller (PDHC) with associated circuitry. The PDH obtains cell board configuration information from cell board signals and from the cell's LPM.

The PDH riser board contains circuitry that the cell board requires to function and, therefore, each cell board must have a PDH Riser installed before it is added to a server.

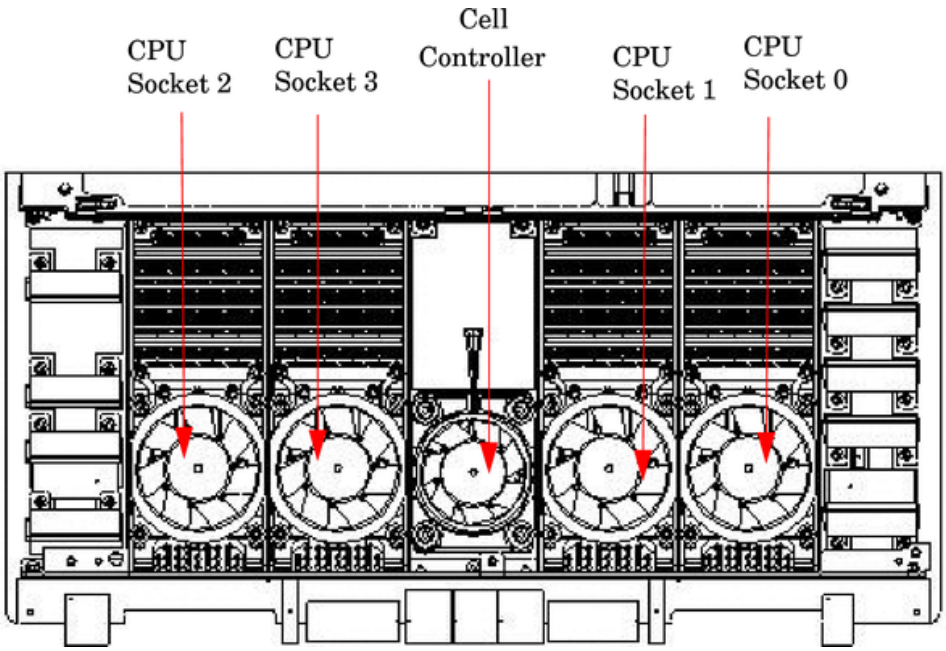
Central Processor Units

The cell board can hold up to four CPU modules and can be populated with CPUs in increments of one after meeting the minimum of two CPUs installed on the cell board. On a cell board, the processors must be the same type and speed. For the CPU load order that must be maintained when adding CPUs to the cell board, see Table 1-2. For the locations on the cell board for installing CPUs, see Figure 1-8. A single CPU configuration is not available for the cell board.

Table 1-2 Cell Board CPU Load Order

Number of CPUs Installed	Socket 0 Location	Socket 1 Location	Socket 2 Location	Socket 3 Location
Two	CPU installed	Empty slot	Terminator	Empty
Four	CPU installed	Empty slot	CPU installed	Empty
Six	CPU installed	CPU or empty	CPU installed	Empty or CPU
Eight	CPU installed	CPU installed	CPU installed	CPU installed

Figure 1-8 CPU Locations on the Cell Board



DIMMs

The memory DIMMs used by the HP Integrity rx7620 Server are custom-designed by HP and are identical to those used in the Superdome server. Each DIMM contains SDRAM memory components and is qualified to run at 125MHz. The CPU chip set does not support traditional DRAMs.

The HP Integrity rx7620 Server supports DIMMs with densities of 64, 128, 256, and 512 Mb for the SDRAM devices. Figure 1-3 shows each supported DIMM size, the resulting total system capacity, and the memory component density. Each DIMM is connected to two buffer chips on the cell board.

You must load DIMMs in sets of four at specific locations. For best performance, HP recommends loading sets of eight DIMMs.

Table 1-3 HP Integrity rx7620 Server DIMMs

DIMM Size	Total Capacity	Memory Component Density
256 MB	8 GB	64 megabit
512 MB	16 GB	128 megabit
1 GB	32 GB	256 megabit
2 GB	64 GB	512 megabit
4 GB	128 GB	1024 megabit

Main Memory Performance

Latency to main memory is an important parameter in determining overall system performance. With memory buses running at 125 MHz, the latency for a page hit is 8.5 cycles (68 ns), the latency for a page closed is 11.5 cycles (92 ns), and the latency for a page miss is 14.5 cycles (116 ns).

Valid Memory Configurations

The HP Integrity rx7620 Server is capable of supporting as little as 0.5 GB of main memory using two 256 MB DIMMs installed on one of the cell boards and as much as 64 GB by filling all 16 DIMM slots on both cell boards with 2 GB DIMMs.

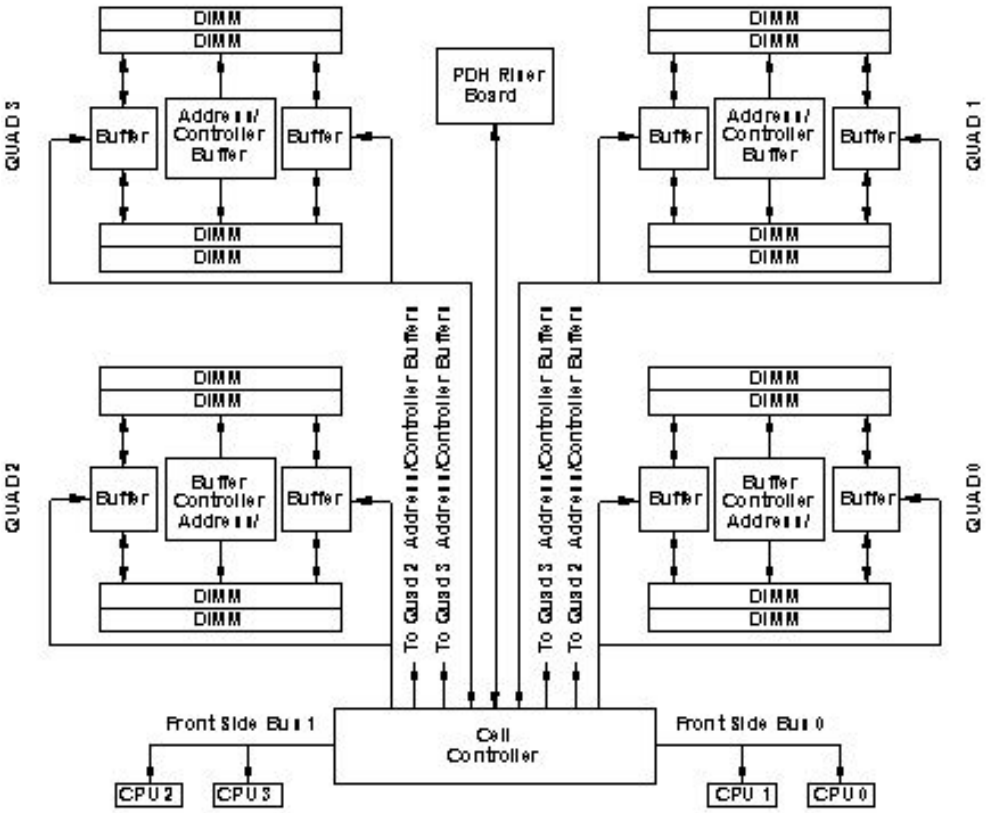
DIMMs must be loaded in sets of two at specified locations on the cell board. Two DIMMs are called an “echelon”, so two echelons would be equivalent to four DIMMs, three echelons would be equivalent to six DIMMs and so on. The DIMMs must be the same size in an echelon. The DIMMs across all cells in a partition should have identical memory loaded. Figure 1-9 shows the DIMM slot layout on the cell board. For DIMM load order, see Table 1-4.

A quad seen in Figure 1-9 is a grouping of four DIMMs. Configurations with 8 or 16 DIMM slots loaded are recommended. The DIMM sizes in a quad can be different but the DIMMs in an echelon must be the same size.

Table 1-4 DIMM Load Order

Number of DIMMs Installed	Action Taken	DIMM Location on Cell Board	Quad Location
2 DIMMs = 1 Echelon	Install First	0A and 0B	Quad 0
4 DIMMs = 2 Echelons	Add Second	1A and 1B	Quad 1
6 DIMMs = 3 Echelons	Add Third	2A and 2B	Quad 2
8 DIMMs = 4 Echelons	Add Fourth	3A and 3B	Quad 3
10 DIMMs = 5 Echelons	Add Fifth	4A and 4B	Quad 0
12 DIMMs = 6 Echelons	Add Sixth	5A and 5B	Quad 1
14 DIMMs = 7 Echelons	Add Seventh	6A and 6B	Quad 2
16 DIMMs = 8 Echelons	Add Last	7A and 7B	Quad 3

Figure 1-9 DIMM Slot Layout



Cells and nPartitions

NOTE: In the following discussion, the term “cell” refers to a cell board.

A cell board that has an I/O link to a bootable device and a console (usually supplied by an MP/SCSI core I/O card) is a potential boot cell. The cell that contains the boot console I/O path is the called the root cell. Both cells are potential root cells. The primary or default root cell in a single nPartition system is the bottom cell (cell 1).

An nPartition (also called a protection domain) is a cell or cells running the same operating system and sharing processes and memory space among the components. Each nPartition must have one root cell and may have both. The HP Integrity rx7620 Server has only two possible nPartition configurations: single or dual. The additional cell that can be part of the nPartition does not require I/O links or MP/SCSI core I/O cards.

In the single nPartition case, if two cells are present, either cell may be the root cell, assuming that both cells have MP core I/O functionality present. If only one cell is present, that cell is the root cell (and should be cell 1).

In the dual nPartition case (two cells required), each nPartition consists of one cell, and each cell must be a root cell. The ability to interconnect two cells in one nPartition or isolate the cells in a dual nPartition system provides system configuration flexibility. System partitioning is configured by the system Management Processor (MP).

NOTE: Partition configuration information is available on the HP website at http://docs.hp.com.

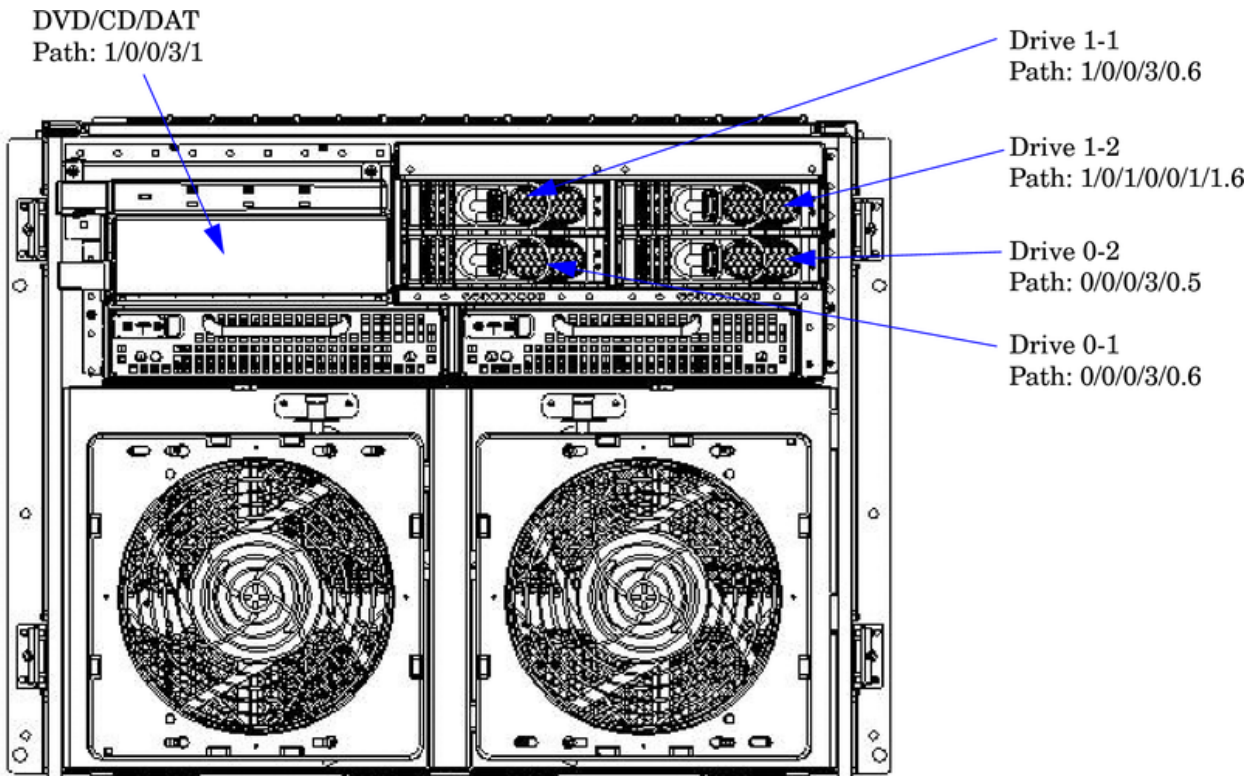
For nPartitions details, see the *HP System Partitions Guide: Administration for nPartitions*.

Internal Disk Devices for the HP Integrity rx7620 Server

In an HP Integrity rx7620 Server, the top internal disk drives connect to cell 1 through the core I/O for cell 1. Both of the bottom disk drives connect to cell 0 through the core I/O for cell 0.

The CD/DVD/DAT drive connects to cell 1 through the core I/O card for cell 1.

Figure 1-10 Internal Disks



MP/SCSI Core I/O Board

The HP Integrity rx7620 Server accommodates two sets of MP/SCSI core I/O functionality. Each MP/SCSI core I/O board set consists of a MP/SCSI board and a Procurium LAN/SCSI board. At least one MP/SCSI board is required (independent of partitions). An additional MP/SCSI board can be added as well (and is required in a dual partition system). Both MP/SCSI core I/O boards are oriented vertically and plug into the system backplane. The MP/SCSI core I/O board incorporates a dual channel Ultra160 SCSI controller and is hot-pluggable.

Procurium LAN/SCSI Board

At least one Procurium LAN/SCSI board is required for the minimum system configuration; two are required in a dual partition system. The Procurium board is a standard PCI form factor card with PCI card edge connectors. The PCI-X backplane has one slot location reserved for the required Procurium board and another that can accommodate either a Procurium board or any other supported add-in PCI-X card. The Procurium board is hot-pluggable.

Mass Storage (Disk) Backplane

Internal mass storage connections to disks are routed on the mass storage backplane, having connectors and termination circuitry. All disks are hot-pluggable. The HP Integrity rx7620 Server accommodates one internal removable media device. Therefore, only one power connector for a removable media device is required on the mass storage backplane. The mass storage backplane incorporates a circuit that allows power to the internal removable media device to be programmatically cycled.

Server Description

Dimensions

The dimensions of the HP Integrity rx7620 Server are as follows:

- Width: 44.45 cm (17.5 inches), constrained by EIA standard 19-inch racks.
- Depth: Defined by cable management constraints to fit into standard 36-inch deep racks (Rittal/Compaq, Rosebowl I):

  25.5 inches from front rack column to PCI connector surface.

  26.7 inches from front rack column to MP core I/O connector surface.

  30 inches overall package dimension, including 2.7 inches protruding in front of the front rack columns.
- Height: 10U – 0.54 cm = 43.91 cm (17.287 inches). This is the appropriate height for a product that consumes 10U of rack height while allowing adequate clearance between products directly above and below this product. Fitting four server units per 2 m rack and upgrade of current 10U height products in the future are the main height constraints.

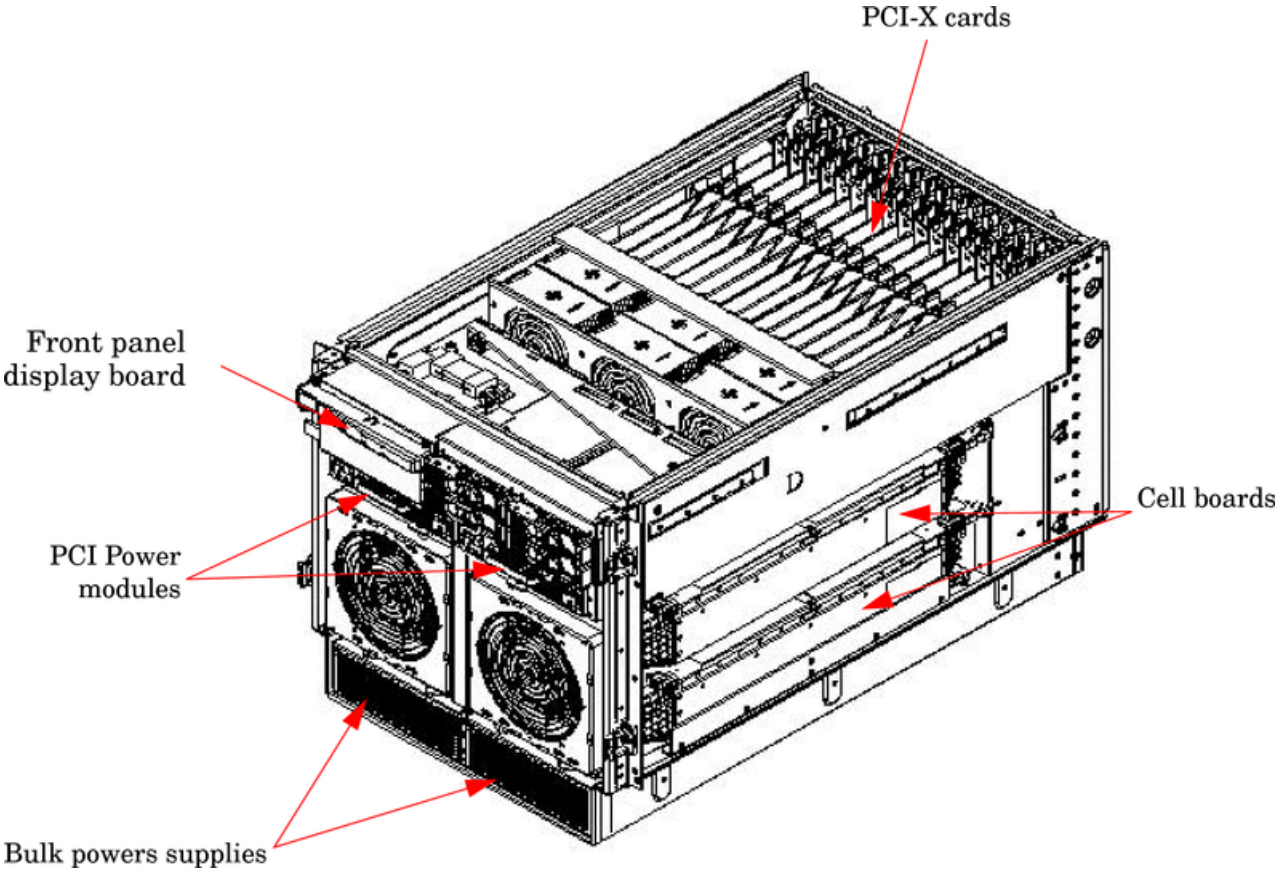
System Chassis

The mass storage section located in the front allows access to the 3.5-inch hard drives without removal of the bezel. This is especially helpful when the system is mounted in the lowest position in a rack. The mass storage bay also accommodates one 5.25-inch removable media device. The front bezel must be removed to gain access to this device. The front panel display board, containing LEDs and the system power switch, is located directly above the 5.25-inch removable media bay.

Below the mass storage section and behind a removable bezel are two PCI DC-to-DC power converters.

The bulk power supply section is partitioned by a sealed metallic enclosure located in the bottom of the package. This enclosure houses the N+1 fully redundant BPSs.

Figure 1-11 Right-Front View of HP Integrity rx7620 Server



The PCI-X card section, located toward the rear, is accessed by removing the top cover.

The PCI OLR fan modules are located in front of the PCI-X cards. These six 9.2-cm fans are housed in plastic carriers. They are configured in two rows of three fans.

The MP/SCSI core I/O boards are positioned vertically at the rear of the chassis.

The PCI-X card bulkhead connectors are located in the top rear portion of the chassis.

Four OLR system fan modules, externally attached to the chassis, are 15-cm (6.5-inch) fans. Two fans are mounted on the front surface of the chassis and two are mounted on the rear surface.The two hot-pluggable N+1 redundant DC bulk power supplies provide a wide input voltage range. They are installed in the front of the chassis, directly under the front fans.

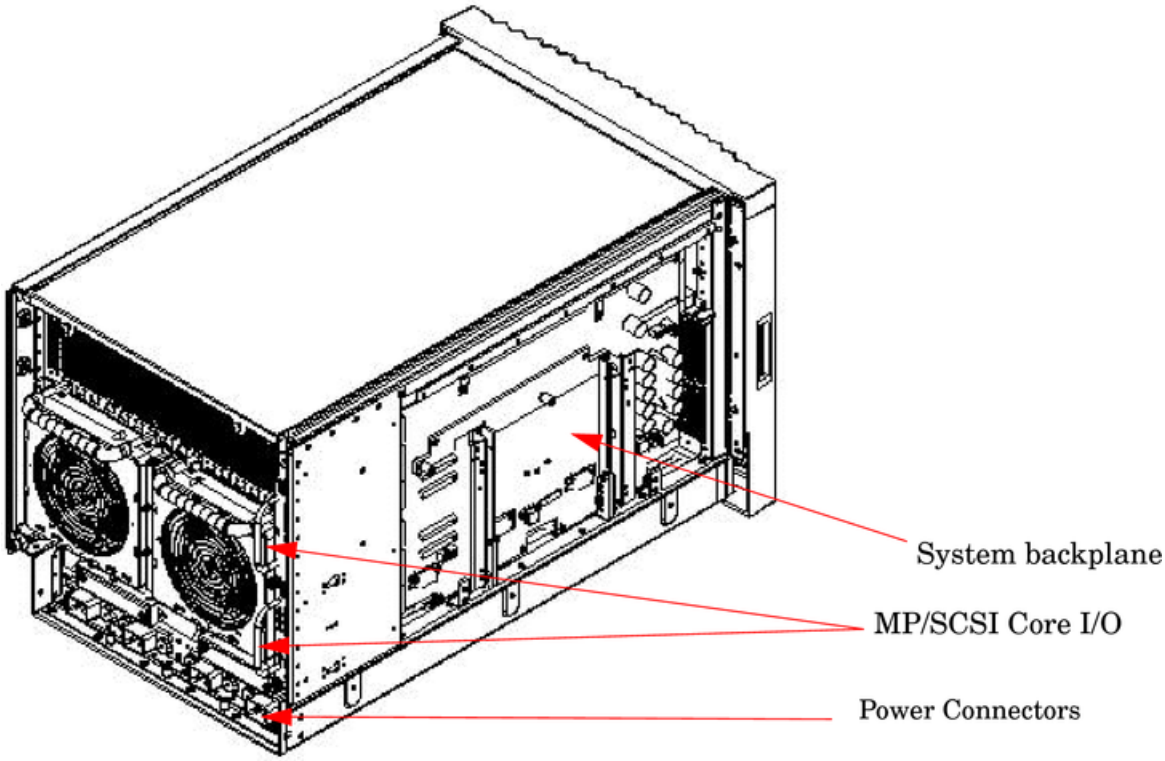
A cable harness that connects from the rear of the BPSs to the system backplane provides DC power distribution.

Access to the system backplane is accomplished by removing the left side cover. The system backplane inserts by a guide/insertion mechanism using a single large jack screw assembly.

SCSI ribbon-cable assemblies route from the mass storage area to the backside of the system backplane and to the Procurium PCI MP core I/O card.

Cell boards are accessed from the right side of the chassis behind a removable side cover.

Figure 1-12 Left-Rear View of HP Integrity rx7620 Server



2 Unpacking the Server

HP shipping containers are designed to protect their contents under normal shipping conditions. After the equipment arrives, carefully inspect each carton for signs of shipping damage. A tilt indicator is installed on each carton shipped. The beads in the indicator will roll to the upper position if the container has been tilted to an angle that could cause equipment damage. The tilt indicator itself has two windows; and each window, under normal conditions, shows four beads present. If a carton has been mishandled or accidentally dropped, the tilt indicator indicates missing beads. If damage is found, document the damage with photographs, and contact the transport carrier immediately.

Examine the server cabinet for visible shipping damage. After unpacking the cabinet, check for damage that might have been obscured by the shipping container. If damage is found after visual inspection, document the damage with photographs, and contact the transport carrier immediately.

If the equipment has any damage, a damage claim form must be obtained by the customer from the shipping representative. The customer must complete the form and return it to the shipping representative.

NOTE: The server might come already racked or ready for rack installation.

Unpacking a Racked Server

This section contains information about unpacking the cabinet.

WARNING! Wear protective glasses while cutting the plastic bands around the shipping container. These bands are under tension. When cut, they can spring back and cause serious eye injury.

NOTE: Position the pallet to allow for enough space to roll the cabinet off the pallet before unpacking.

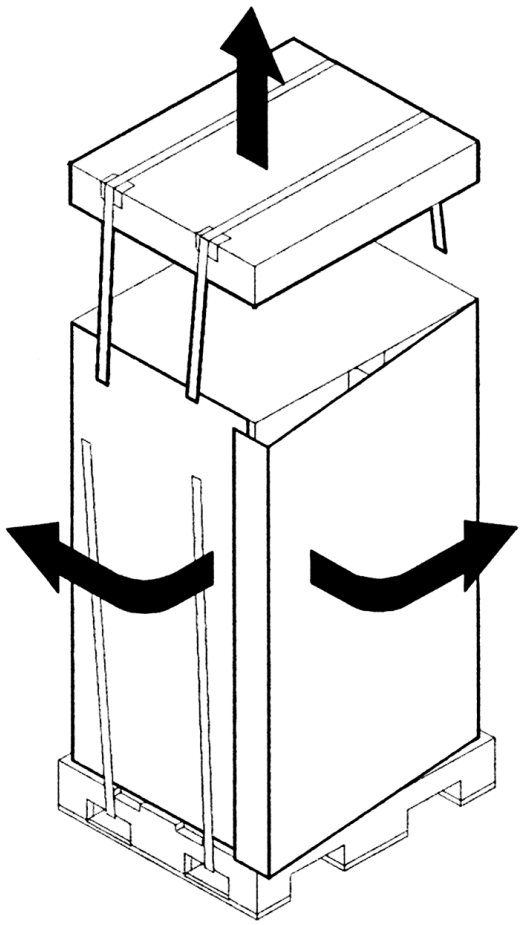
To remove the cabinet, follow these steps:

1. Cut the polystrap bands around the shipping container.
2. Lift the cardboard top cap from the shipping box. See Figure 2-1.

3. Remove the corrugated wrap from the pallet.
4. Remove the packing materials.

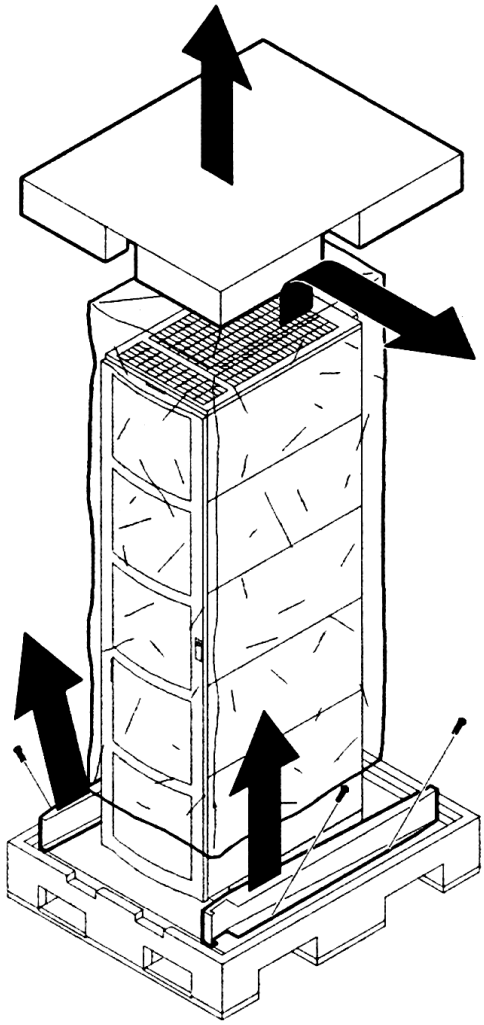
CAUTION: The plastic wrapping material should be cut off rather than pulled off. Pulling the plastic covering off represents an ESD hazard.

Figure 2-1 Removing the Polystraps and Cardboard



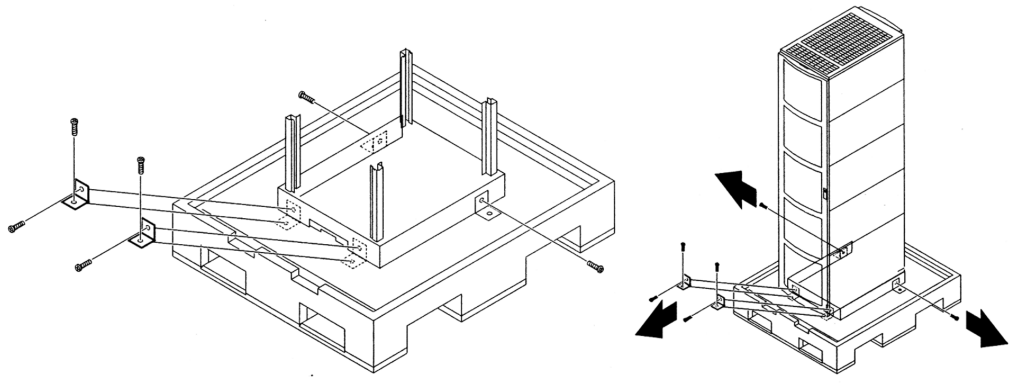
5. Remove the four bolts that hold the ramps to the pallet, and remove the ramps. See Figure 2-2.

Figure 2-2 Removing the Shipping Bolts and Plastic Cover



6. Remove the six bolts from the base that attaches the rack to the pallet. See Figure 2-3.

Figure 2-3 Preparing to Roll Off the Pallet

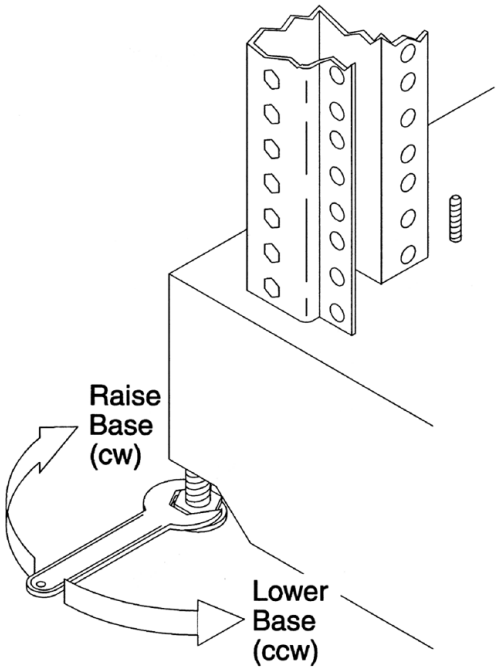


WARNING! Be sure that the leveling feet on the rack are raised before you roll the rack down the ramp and any time you roll the rack on the casters. Use caution when rolling the cabinet off the ramp. A single server in the cabinet weighs approximately 665 pounds. HP strongly recommends that two people roll the cabinet off the pallet.

Securing the Cabinet

When in position, secure and stabilize the cabinet, using the leveling feet at the corners of the base. Install the anti-tip mechanisms on the bottom front and rear of the rack.

Figure 2-4 Securing the Cabinet



Unpacking a Non-Racked Server

NOTE: If this server was delivered with a wheel kit, proceed to Chapter 3 (page 41).

NOTE: HP recommends the use of a lifter, such as a RONI Company model 17000 SP 400 lifting device, when moving a non-racked system, shown in Figure 2-5. If no lifter is available, install the lift handle panels provided with the system.

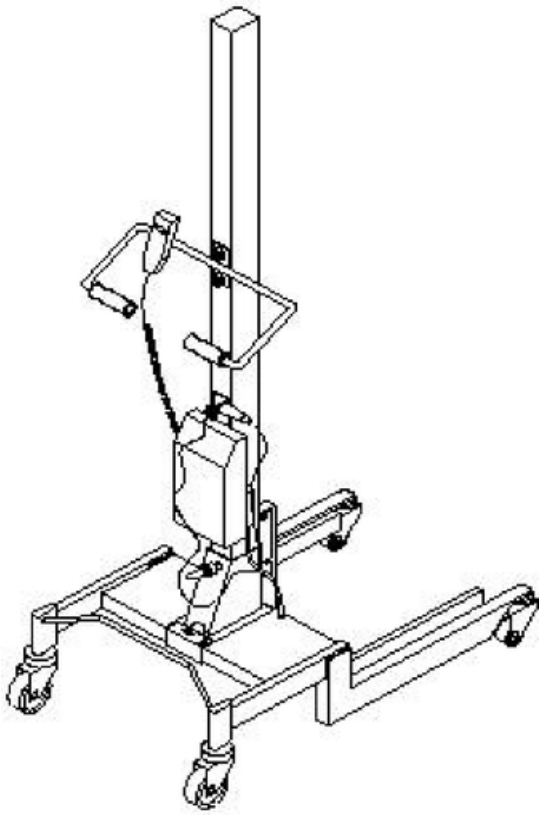
Unloading With a Lifter

To unload the server from the pallet using a lifter, follow these steps:

WARNING! Use caution when using a lifter. Because of the weight of the server, it must be centered on the lifter forks before raising it off the pallet to avoid injury.

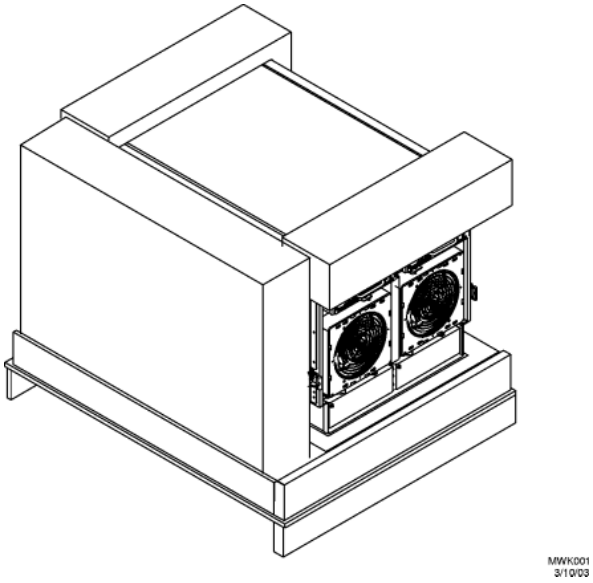
Never extend more than one server from the same cabinet while installing or servicing another server product. Failure to follow these instructions can result in the cabinet tipping over.

Figure 2-5 RONI Lifter



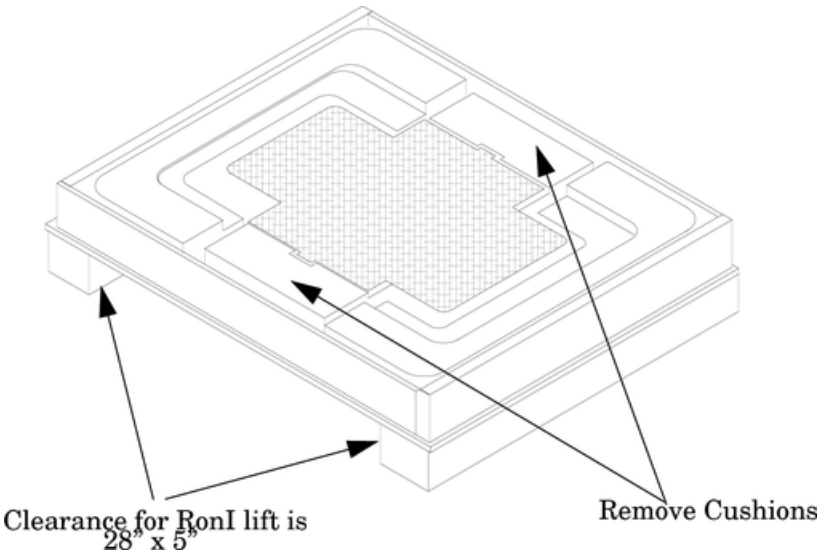
1. Follow the instructions on the outside of the server packaging to remove the banding and carton top from the server pallet.

Figure 2-6 Server With Shipping Box Removed



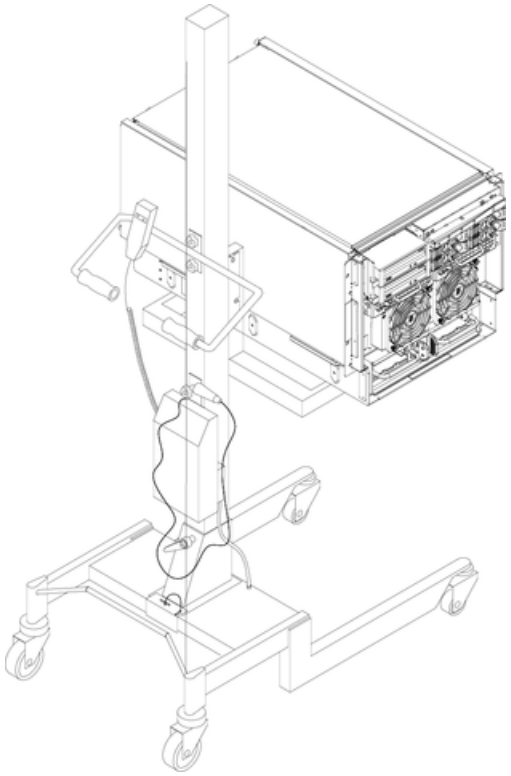
1. Remove all cartons from the pallet, leaving only the server.
2. Remove the two foam cushions for lift access as shown in Figure 2-7.

Figure 2-7 Remove Cushions for Lift Access



3. Insert the lifter forks under the server.
4. Carefully roll the lift forward until it is fully positioned against the side of the server.
5. Slowly raise the server off the pallet until it clears the pallet cushions.

Figure 2-8 Raising a Server Off the Pallet



6. Roll the lifter and server away from the pallet. Do not raise the server any higher than necessary when moving it over to the rack.

NOTE: When installing the server in a rack, see the *HP J1530B Rack Integration Kit Installation Guide*.

Unloading With Lift Handle Panels

WARNING! Use this procedure only if an HP-approved lift is not available. This procedure should only be attempted by two authorized HP service technicians.

Before attempting this procedure, HP recommends removing all cell boards and AC power supplies. For instructions on removing these components, see Chapter 6 (page 95). Before attempting to move the server using the lift handle panels, review local safety regulations.

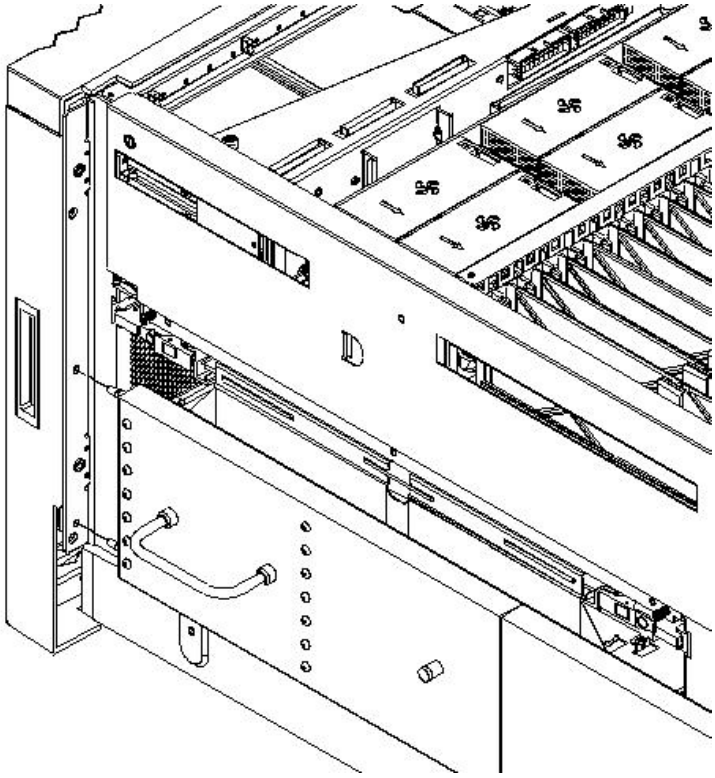
Failure to observe these precautions can cause serious injury to personnel or damage to equipment.

CAUTION: Unpack the server in an ESD-safe environment. Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

To remove the server using lift handle panels, follow these steps:

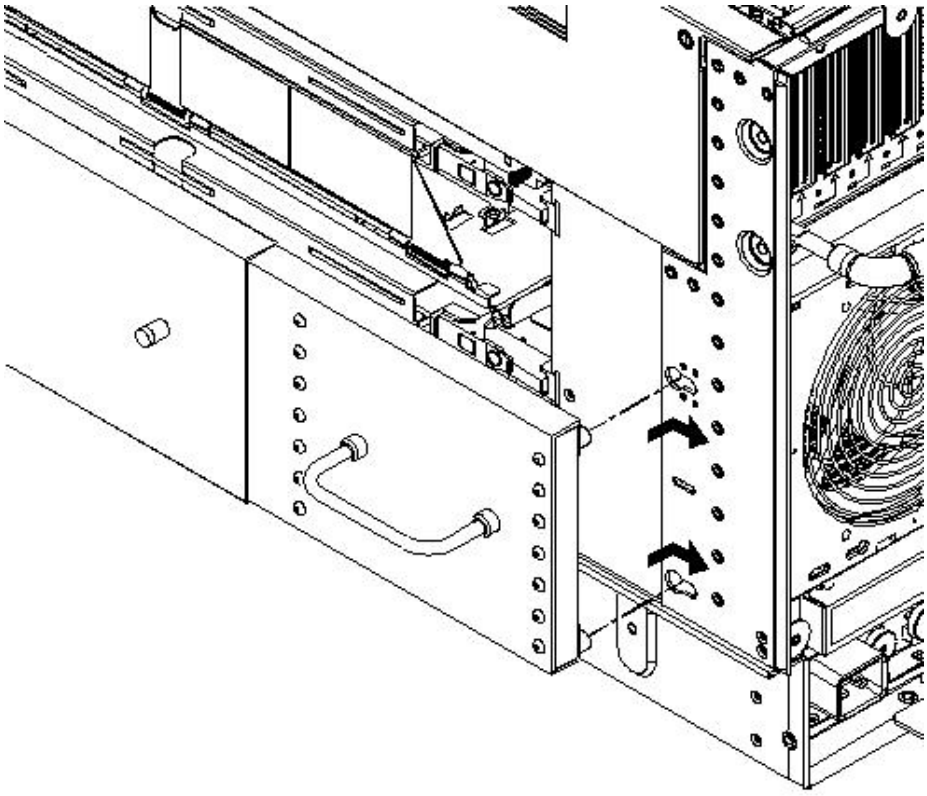
1. Remove both side covers. If present, remove the front panel.
2. Locate lift handles and remove from storage plate.
3. Orient lift handle panels such that when installed, the handles hang down at 90 degrees and lock in a horizontal position during lifting.

Figure 2-9 Positioning the Lift Handles



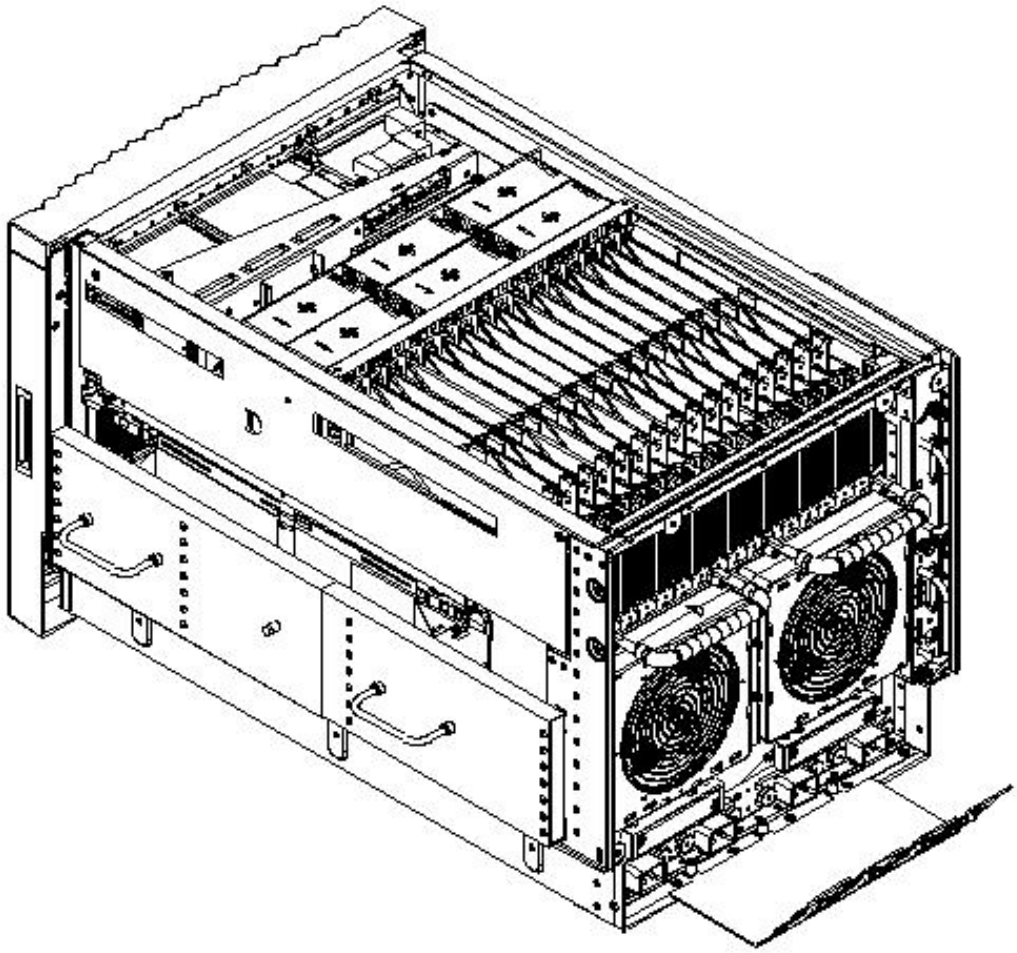
4. With one handle in each hand, install the pin end of the panel into the back side of the front rack mount ears on the chassis.

Figure 2-10 Inserting the Pins Into the Rack



5. Pull the string plunger out, move the handles apart, and install the shoulder washer end of the panel into the keyway feature.

Figure 2-11 Lift Handles Mounted



6. Continue to pull the handles apart until the spring plunger snaps into final position. The spring plunger will drop down into the recess position.
7. Ensure that the handles are secure by pressing the handles together and moving back and forth.
8. Repeat steps above for the other handle.
9. To lift the server, rotate the handles 90 degrees to horizontal position.

NOTE: If installing the server in a rack, see the *Installation Guide, HP J1530B, Rack Installation Kit*.

10. After moving the server, remove the lift handle panels from the chassis and reinstall the server covers and front bezel. See the *Installation Guide, HP J1530B, Rack Installation Kit*.

Installing the Server Into the Rack

Any server that is to be installed into a rack is shipped with equipment slides. With every set of slides comes an installation guide: *Installation Guide, HP J1530B, Rack Installation Kit*.

3 Installing Additional Components

This chapter describes the installation of those components not installed at time of delivery.

Wheel Kit Installation

Before beginning the installation, compare the packing list with the contents of the wheel kit.

Table 3-1 Wheel Kit Packing List

Part Number	Description	Quantity
A6753-04013	Wheel Kit consisting of the following components:	1
A6753-04002	Side cover	1
A6753-04003	Side cover	1
A6753-04004	Top cover	1
A6753-00007	Caster cover	2
A6753-04001	Right front caster assembly	1
A6753-04005	Right rear caster assembly	1
A6753-04006	Left front caster assembly	1
A6753-04007	Left rear caster assembly	1
0515-2478	M4 x 0.7 8mm T15 steel zinc machine screw (Used to attach each caster to the chassis)	4
A6093-44013	Plywood unloading ramp	1
Not Applicable	Phillips head wood screw (Used to attach the ramp to the pallet)	2

Tools Required for Installation

The following list provides the installer with the recommended tools to perform the wheel kit installation.

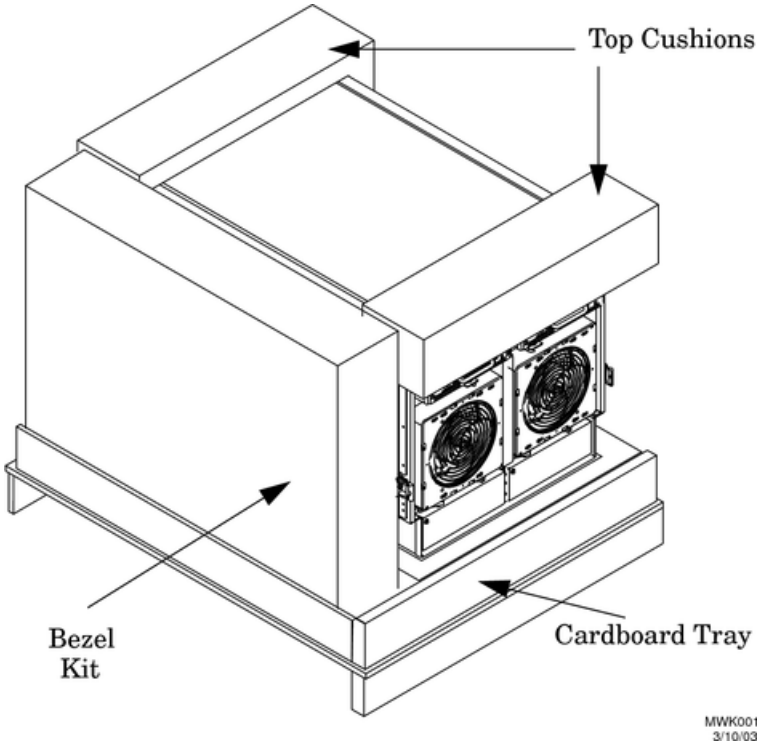
- Diagonal side cutters
- Safety glasses
- Torx screwdriver with T-15 bit
- Phillips head screwdriver

WARNING! Wear protective glasses while cutting the plastic bands around the shipping container. These bands are under tension. When cut, they can spring back and cause serious eye injury.

To install the wheel kit, follow these steps:

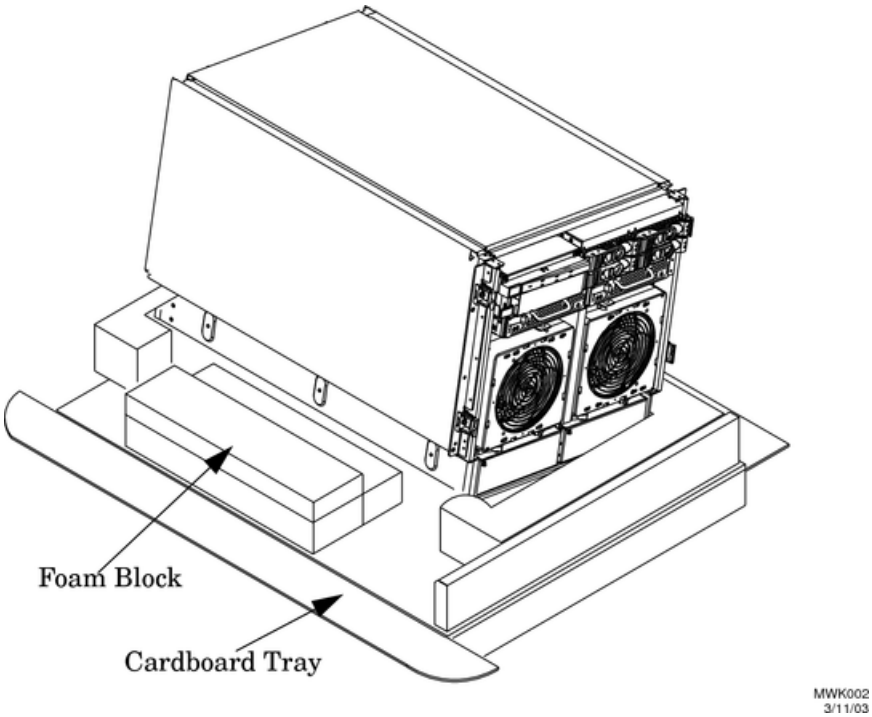
1. Cut and remove the polystrap bands securing the HP server to the pallet.
2. Lift the carton top from the cardboard tray resting on the pallet.
3. Remove the bezel kit carton and the top cushions from the pallet.

Figure 3-1 Component Locations



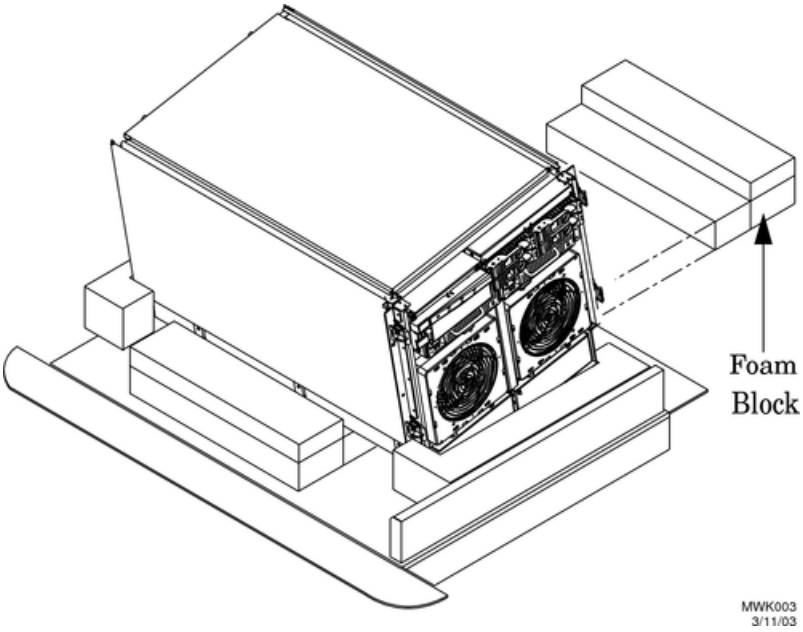
4. Unfold the bottom cardboard tray.
5. Carefully tilt the server and place one of the foam blocks (A6093-44002) under the left side of the server. Do not remove any other cushions until instructed to do so.

Figure 3-2 Left Foam Block Position



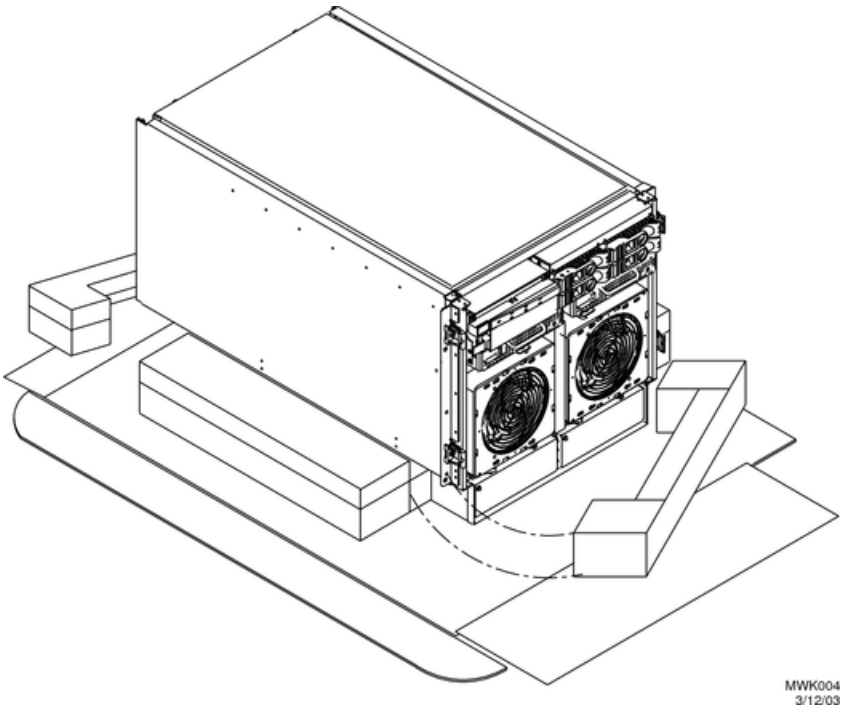
6. Carefully tilt the server and place the other foam block provided in the kit under the right side of the server.

Figure 3-3 Right Foam Block Position



7. Remove the cushions from the lower front and rear of the server. Do not disturb the side cushions.

Figure 3-4 Foam Block Removal



8. Locate and identify the caster assemblies. Use the following table to identify the casters.

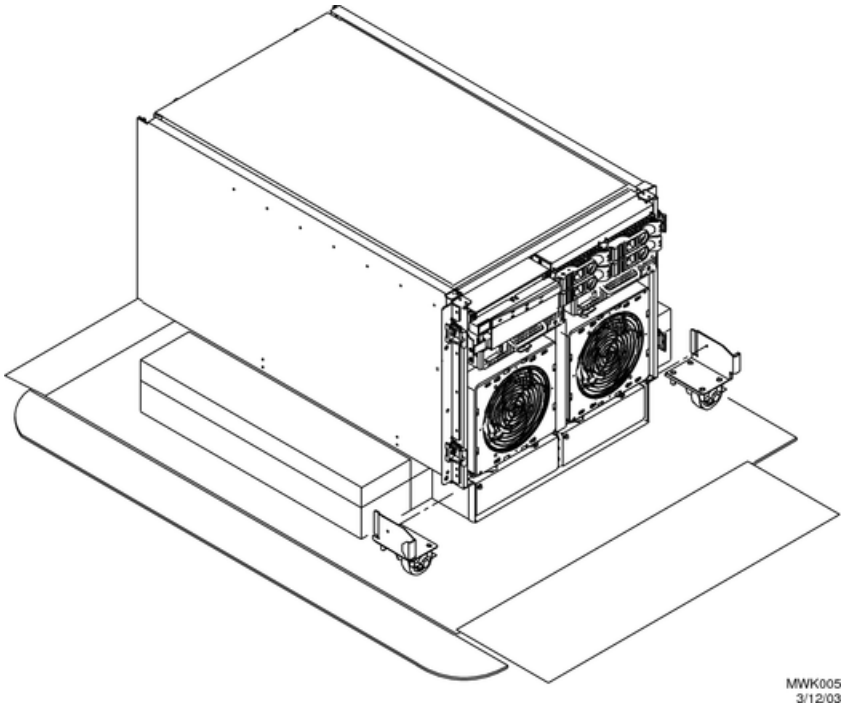
NOTE: The caster part number is stamped on the caster mounting plate.

Table 3-2 Caster Part Numbers

Caster	Part Number
Right front	A6753-04001
Right rear	A6753-04005
Left front	A6753-04006
Left rear	A6753-04007

9. Locate and remove one of the four screws from the plastic pouch. Attach a caster to the server.

Figure 3-5 Attaching a Caster to the Server



10. Attach the remaining casters to the server using the screws supplied in the plastic pouch.
11. Remove the foam blocks from the left and right side of the server.
12. Locate the plywood ramp.
13. Attach the ramp to the edge of the pallet.

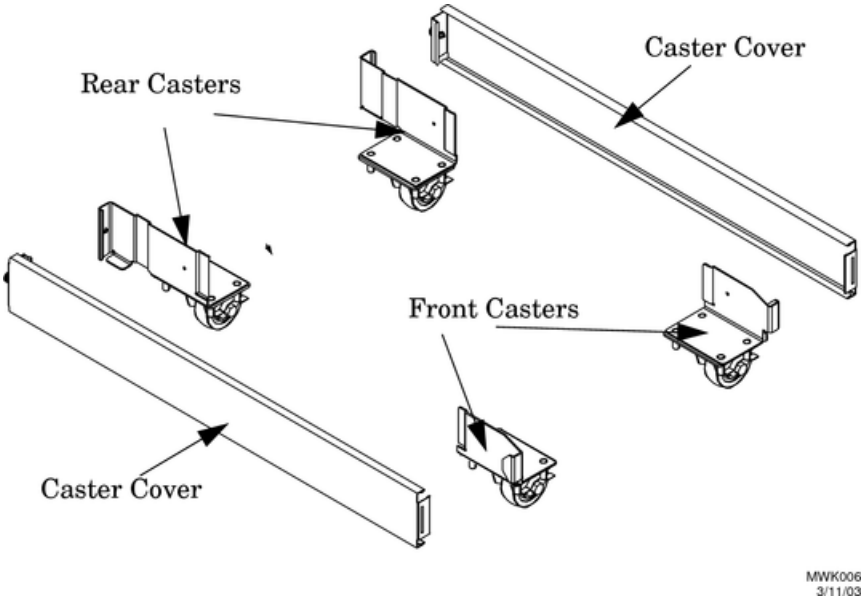
NOTE: There are two pre-drilled holes in the ramp. Use the two screws taped to the ramp to attach the ramp to the pallet.

14. Carefully roll the server off the pallet and down the ramp.
15. Locate the caster covers.

NOTE: The caster covers are designed to fit on either side of the server.

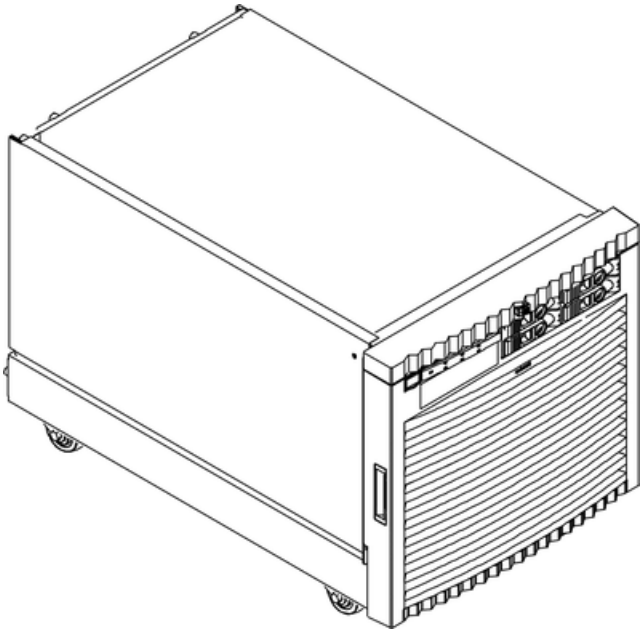
16. Insert the slot on the caster cover into the front caster. Secure the cover to the server by tightening the captive screw on the cover at the rear of the server.

Figure 3-6 Securing Each Caster Cover to the Server



17. Wheel kit installation is complete when both caster covers are attached to the server, and the front bezel and all covers are installed.

Figure 3-7 Completed Server



PCI-X Card Cage Assembly I/O Cards

A number of PCI and PCI-X I/O cards are supported in the HP Integrity rx7620 Server. Known cards supported at the release of this guide are shown in Tables 3-3 through 3-6.

Table 3-3 HP Integrity rx7620 Server - HP-UX Supported I/O Cards

Part Number	Card Description	Number of Cards Supported (B-Bootable)
A5158A	PCI 1 port 2x Fibre Channel	15
A6795A	PCI 2 GB Fibre Channel	15B

Table 3-3 HP Integrity rx7620 Server - HP-UX Supported I/O Cards *(continued)*

Part Number	Card Description	Number of Cards Supported (B-Bootable)
AB378A	PCI-X 1 port 4 GB Fibre Channel	15B
A6794AX	Procurium GigE LAN/SCSI combo card	2B
A6828A	PCI 1 channel Ultra 160 SCSI	15B
A6829A	PCI 1 channel Ultra160 SCSI	15B
A7173A	Dual Channel Ultra320 SCSI Adapter	15B
A5149A	PCI 1 port Ultra2 SCSI	15
A5150A	PCI 2 port Ultra2 SCSI	15
A6826A	PCI X 2 channel 2 Gb/s Fibre Channel	15B
A9890A	PCI-X 2-channel Smart Array 6402	8B
A9891A	PCI-X 4 channel Smart Array 6404/256 MB	8B
AB287A	PCI-X 1-port 10 Gb Ethernet Fiber Adapter	2
AB545A	PCI-X 4 port 1000Base-T Gigabit Adapter	15
A6847A	PCI 1 port1000Base-SX	15B
A6825A	PCI 1port1000Base-T	15B
A4926A	PCI 1 port 1000Base-SX	15
A5230A	PCI 1 port10/100Base-T	15
A4929A	PCI 1 port1000Base-T	15
A5506B	PCI 4 port 10/100Base-T	15
A5783A	PCI 1 port 802.5 Token Ring 4/16/100	15
A6869A	Obsidian USB/VGA PCI card	1
A6869B	Obsidian USB/VGA PCI card	1
A7011A	PCI X 2 port 1000Base SX	8
A7012A	PCI X 2 port 1000Base T	8
AB286A	PCI-X 2-port 4X Fabric HCA (HPC)	2
AB286C	PCI X 2 port 4X Fabric HCA (HPC)	8
A3739B	PCI 1 port Universal FDDI	15
AB345A	PCI X 2 port 4X Fabric (HA and DB) Adapter	15
AB286C	PCI X 2 port 4X Fabric HCA (HPC)	8
A3739B	PCI 1 port Universal FDDI	15
AB345A	PCI X 2 port 4X Fabric (HA and DB) Adapter	15
AB286C	PCI-X 2-port 4X Fabric (HPC) Adapter	8
AB379A	PCI 2 port 4 Gb Fibre Channel	8B
A5838A	PCI 2 port 100Base T / 2 port Ultra2 SCSI	15B
A9782A	PCI X 2 Gb Fibre Channel/1000Base SX	15B
A9784A	PCI-X 2-Gb Fibre Channel, 1000Base-T	15B

Table 3-3 HP Integrity rx7620 Server - HP-UX Supported I/O Cards *(continued)*

Part Number	Card Description	Number of Cards Supported (B-Bootable)
AB465A	PCI-X 2-port 2 Gb FC/ 2-port 1 Gb Ethernet	15B
AB290A	PCI-X 2-port 1000BT/2-port U320 SCSI	15B
AD278A	8-port Terminal MUX	15
AD279A	64-port Terminal MUX	15
A5513A	PCI 1 port ATM 155 Mb/s MMF	15
J3525A	2-port Programmable Serial Interface (PSI) X.25/Frame Relay/SDLC	15
A6748A	PCI 8-port Terminal Multiplexer	15
A6749A	PCI 64-port Terminal Multiplexer	15
A6386A	Hyperfabric2 Fiber Adapter	4
Z7340A	8-port PCI ACC	16

Table 3-4 HP Integrity rx7620 Server - Windows I/O Cards

Part Number	Card Description	Number of Cards Supported
A7059A	PCI Windows and Linux Ultra160 SCSI	6
A7060A	PCI Windows and Linux 2 channel Ultra160 SCSI	6
A7173A	PCI 2 Channel Ultra 320 SCSI Adapter	6
337972-B21	PCI-X Smart Array P600 Serial Attached SCSI (SAS) Controller[1]	8
A9890A	PCI-X SmartArray 6402/128 MB	8
A9891A	PCI-X Smart Array 6404 256 MB	8
AB287A	10 G NIC	4
AB232A	PCI X 2 GB /s FCA2404 Fibre Channel	8
AB466A	PCI-X 2 channel 2 GB / s Fibre Channel	6
AB467A	PCI-C 1 channel 2 GB /s Fibre Channel	8
AD167A	Emulex 4 GB	8
AD168A	Emulex 4 GB - DC	6
A9900A	PCI 2-port Windows / Linux 1000Base-TX	8
A9899A	PCI 2-port Windows / Linux 1000Base-SX	8
A7061A	PCI 1 port 1000Base-T	8
A7073A	PCI 1 port 1000Base-SX	8
A6869A	Obsidian USB/VGA PCI card	1
A6869B	Obsidian USB/VGA PCI card	1

1 For Windows, each 337972-B21 external port supports a maximum of two (2) MSA 50s, attached in series.

Table 3-5 HP Integrity rx7620 Server - Linux Supported I/O Cards

Part Number	Card Description	Number of Cards Supported
A7173A	PCI-X Dual-Channel Ultra320 SCSI	8
A7059A	PCI Windows and Linux Ultra160 SCSI	8
A7060A	PCI Windows and Linux 2 channel Ultra160 SCSI	5
A9890A	PCI-X SmartArray 6402/128 MB	8
337972-B21	PCI-X Smart Array P600 serial attached SCSI (SAS) controller[1]	8
A6826A	PCI X 2 channel 2 Gb /s Fibre Channel	8
A7538A	PCI-X 1-port 2 Gb Fibre Channel	15
A7061A	PCI 1 port 1000Base T	8
A7073A	PCI 1 port 1000Base SX	8
A5506B	PCI 4-port 100Base-TX	2
A9899A	PCI 2-port 1000Base-SX	8
A9900A	PCI 2-port 1000Base-T	8
AD144A	PCI 1-port 10 GbE SR (133 Mhz)	2
AD145A	PCI 4-port 1000Base-T	4

1 Not supported with AD145A 10 GbE adapter

Table 3-6 HP Integrity rx7620 Server - OpenVMS Supported I/O Cards

Part Number	Card Description	Number of Cards Supported (B-Bootable)
A6826A	PCI X 2 channel 2 Gb /s Fibre Channel	8B
A7173A	PCI 2 channel Ultra320 SCSI Adapter	2B
AB378A	PCI 1 port 4 Gb Fibre Channel	8B
AB379A	PCI 2 port 4 Gb Fibre Channel	8B
AB545A	PCI X 4 port 1000Base T Gigabit Adapter	3
A6847A	PCI 1 port 1000Base SX	8
A6825A	PCI 1 port 1000Base T	8
A7011A	PCI X 2 port 1000Base SX	8
A7012A	PCI X 2 port 1000Base T	8
A9782A	PCI X 2 Gb Fibre Channel, 1000Base SX	4B
A9784A	PCI X 2 Gb Fibre Channel, 1000Base T	4B
AB465A	PCI X 2 port 2 Gb FC/2 port 1 Gb Ethernet	2B
AB290A	PCI X 2 port 1000Base T/2 port Ultra320 SCSI	2B

PCI I/O Card Installation

HP Integrity rx7620 Servers implement manual release latch (MRL) hardware for use in online add or replacement (OLAR) operations. If an MRL is left open while the server is booting, HP-UX can incorrectly cache PCI slot power status causing OLAR operations to fail. To prevent this situation, ensure all the MRLs are closed before booting the server.

If OLAR reports that a slot is present and powered off, but no OLAR operations to turn power on to that slot have succeeded even after the MRL is closed, the MRL may have been left open during boot. To clear this condition, close the MRL for the PCI slot then power off the PCI slot using the `rad -o` command. This enables future OLAR operations to succeed on this PCI slot.

IMPORTANT: The installation process varies depending on what method for installing the PCI card is selected. PCI I/O card installation procedures should be downloaded from the HP website at http://docs.hp.com. Background information and procedures for adding a new PCI I/O card using online addition are found in the *Interface Card OL* Support Guide*.

PCI I/O OL* Card Methods

There are three methods for performing OL* operations on PCI I/O cards.

`pdweb`	The Peripheral Device Tool (pdweb) web-based method of performing OL*.
`olrad`	The command line method of performing OL*.
Attention Button	The hardware system slot based method of performing OL*.

Prerequisites for Adding a PCI I/O Card Using the Attention Button

The prerequisites for this procedure are as follows:

- Drivers for the card have already been installed.
- There are no drivers associated with the slot.
- The green power LED is steady OFF. Should the empty slot be in the ON state use the `olrad` command or the `pdweb` tool to power the slot OFF.
- The yellow attention LED is steady OFF or is blinking if a user has requested the slot location.
- For details on card installation, see the host bus adapter (HBA) documentation.
- To determine the status of all the PCI I/O slots, run the `olrad -q` command.
- Before attempting to insert a PCI I/O card into the PCI-X card cage assembly backplane slot, obtain a copy of the interface card guide for instructions on preparing the operating system for the online addition of the PCI I/O card.

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

This procedure describes how to perform an online addition of a PCI card using the attention button for cards whose drivers support online add or replacement (OLAR). The attention button is also referred to as the doorbell.

To add a PCI card, follow these steps:

1. Remove the top cover.
2. Remove the PCI bulkhead filler panel.
3. Flip the PCI manual retention latch (MRL) for the card slot to the open position. See Figure 3-8.
4. Install the new PCI card in the slot.

NOTE: To properly seat the card into the backplane, apply slow, firm pressure.

5. Flip the PCI MRL for the card slot to the closed position.

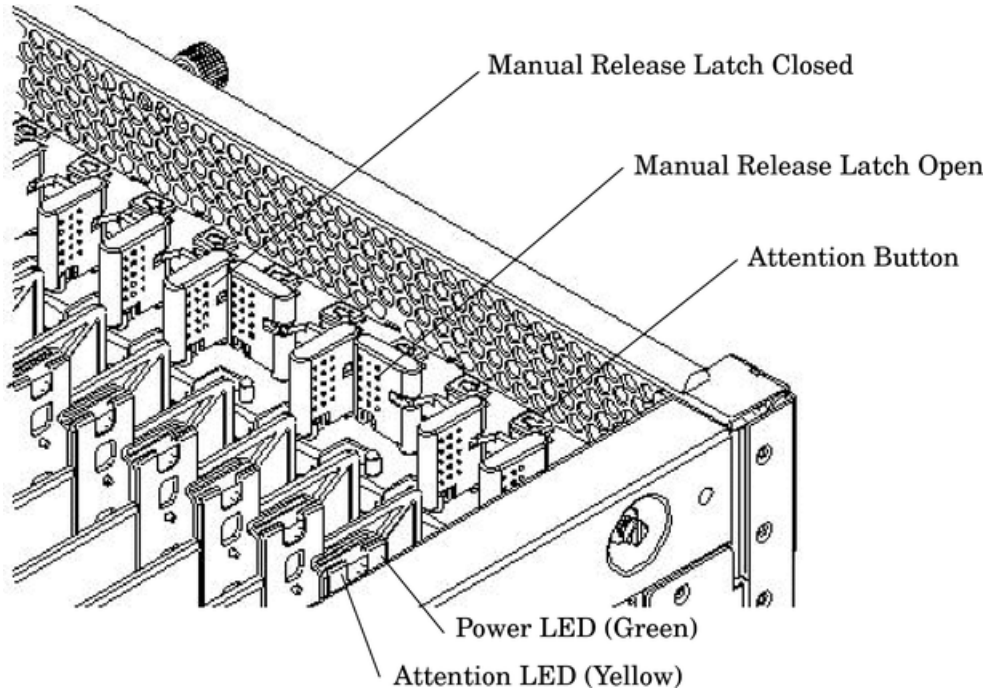
CAUTION: Working out of sequence or not completing the actions within each step can cause the system to crash.

Do not press the attention button until the latch is locked.

6. Press the attention button.

   The green power LED starts to blink.

Figure 3-8 PCI I/O Slot Details



7. Wait for the green power LED to stop blinking.
8. Check for errors in the hotplug `daemon` log file (default: `/var/adm/hotplugd.log`).

   The critical resource analysis (CRA) performed while doing an attention button initiated add action is very restrictive and the action will not complete–it will fail–to protect critical resources from being impacted. For finer control over CRA actions, use `pdweb` or the `olrad` command. For details, see the *Interface Card OL* Support Guide* located on the HP website at http://docs.hp.com.
9. Replace the top cover.
10. Connect all cables to the installed PCI card.

DVD+RW Installation Instructions

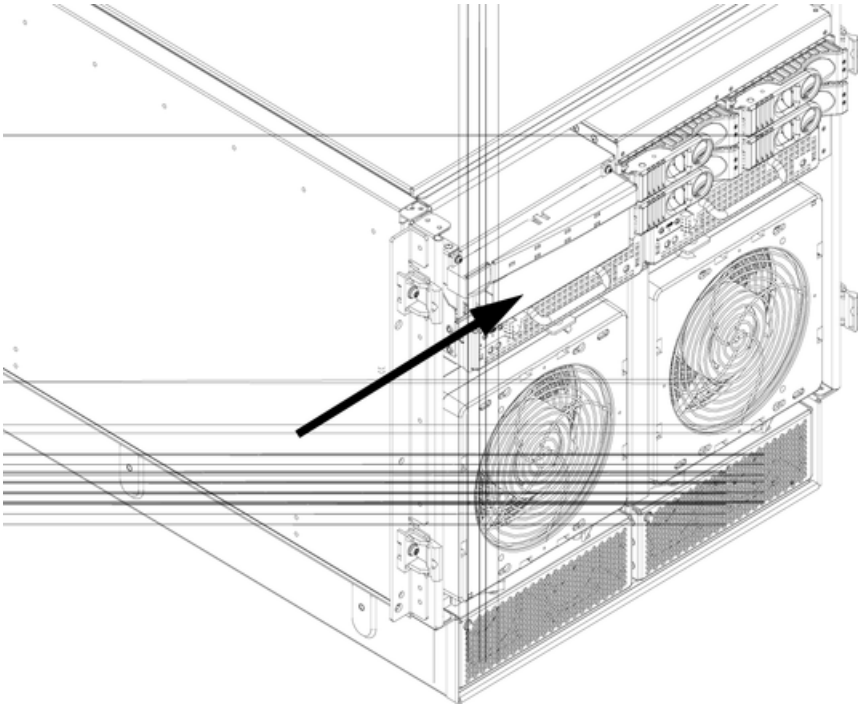
The CD/DVD/DAT is located in the front of the chassis. You must remove the system power to this component before attempting to remove or replace it. See "Shutting Down nPartitions and Powering Off Hardware Components " (page 96).

To install the DVD+RW drive, follow these steps:

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

1. Remove the front bezel and top cover. See "Removing and Replacing the Front Bezel" (page 99) and see "Removing and Replacing the Top Cover" (page 99) .
2. Remove the drive bay blank or removable media drive.

Figure 3-9 Removable Media Bay Location



3. Verify that the SCSI and power cables have the appropriate service length required.

IMPORTANT: For the DVD+RW installation, the SCSI cable length must equal 1.5 inches, +/- 0.25 in. The power cable length must equal 3.5 inches, +/- 0.25 in.

Figure 3-10 SCSI Cable Length

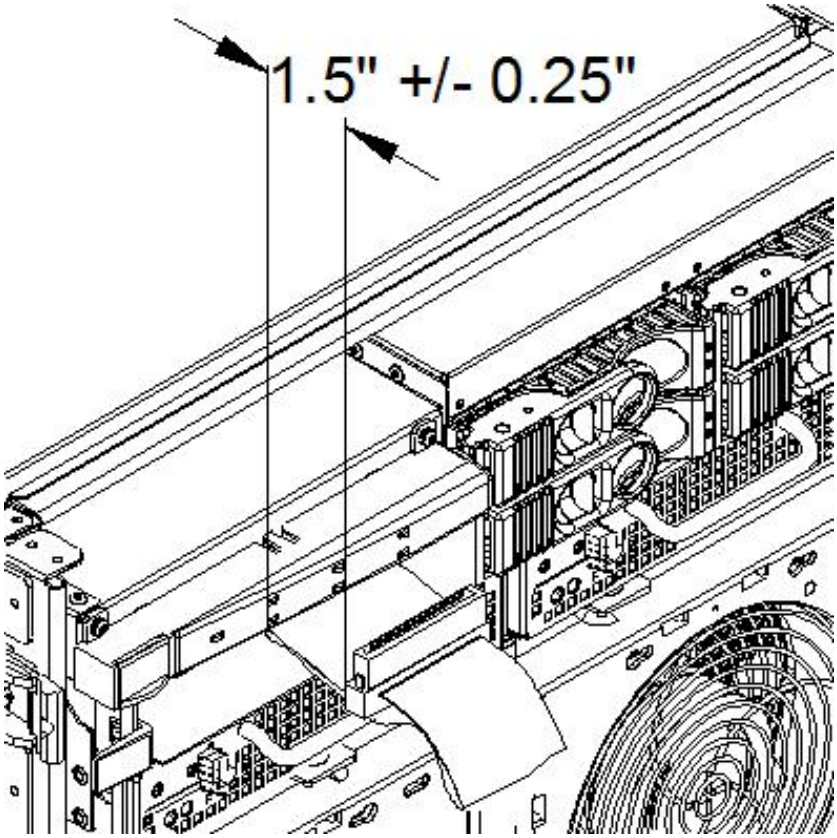
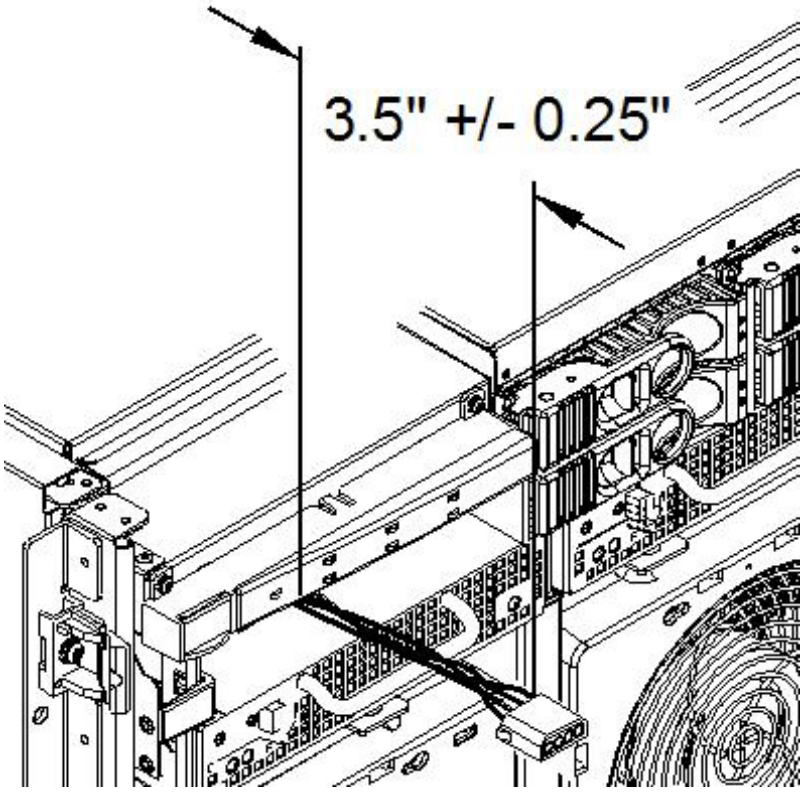
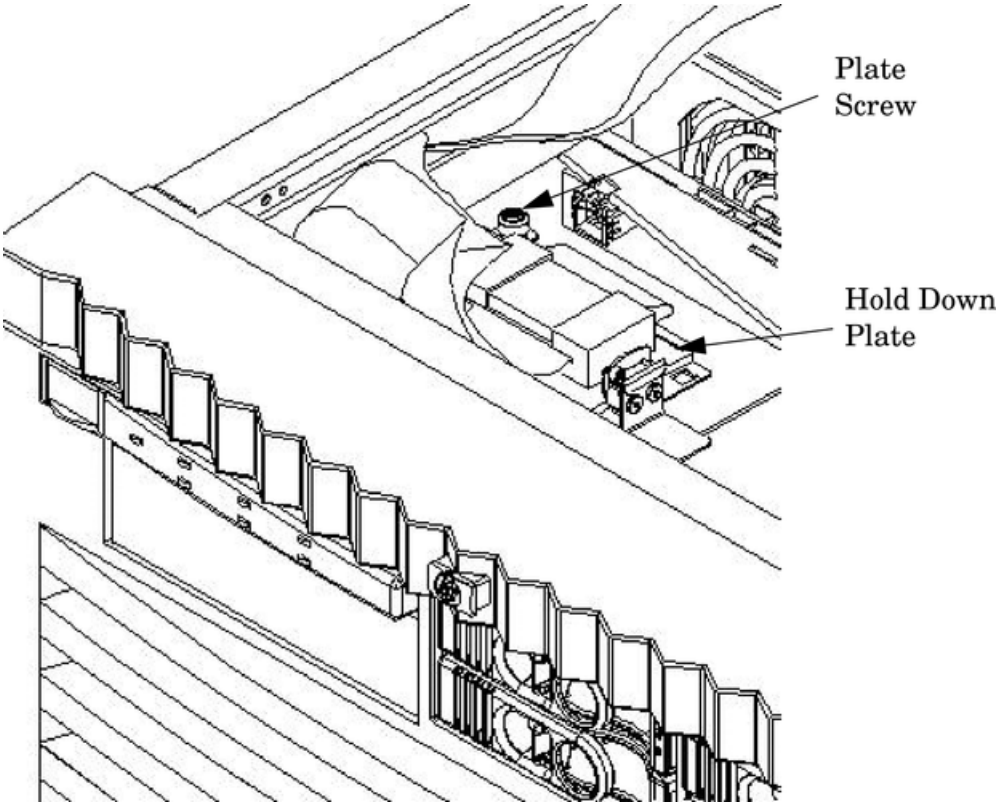


Figure 3-11 Power Cable Length



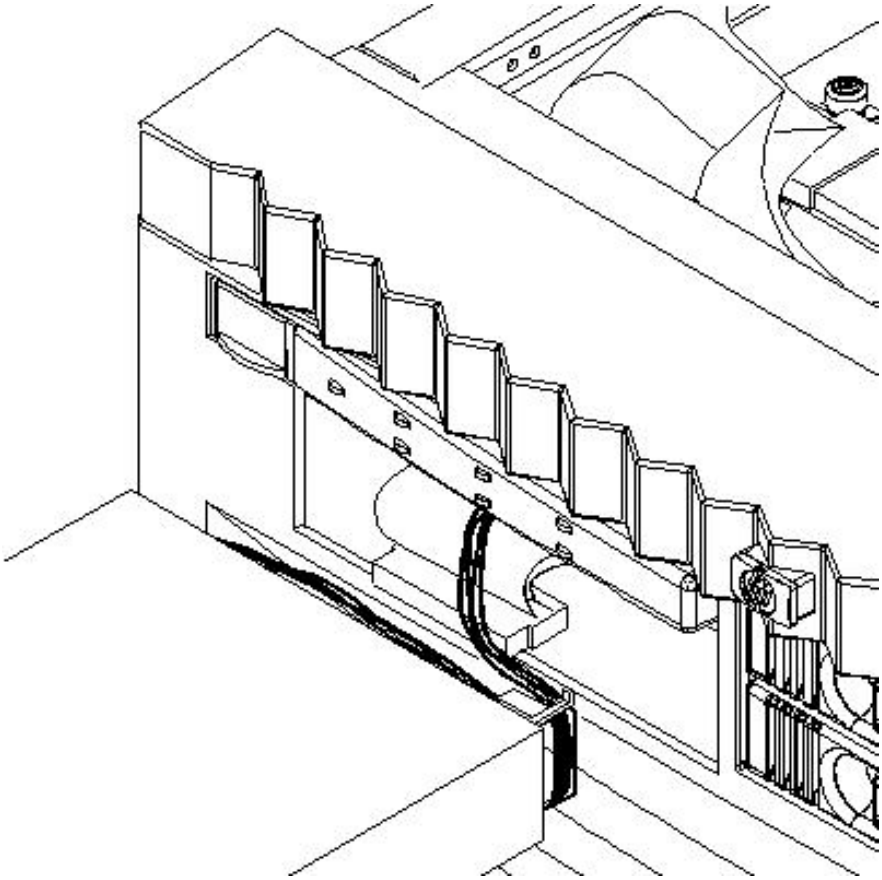
4. Disconnect the three SCSI cables from the Mass Storage Backplane (MSBP). Drape the disconnected cables over to the side of the chassis. If the removable media bay power cable and the corresponding SCSI cable are taped together, separate the cables.
5. Disconnect the four-pin power connector from the MSBP.
6. Loosen the screw on the hold-down plate to adjust the length of the cable.

Figure 3-12 Hold-Down Plate and Screw



7. Slide the hold-down plate toward the rear of the chassis until the tabs disengage. Do not move the plate further than necessary to disengage the tabs.
8. Adjust the length of the SCSI and power cables to the appropriate service length described in Step 3.
9. Pull any excess cable length into the main chassis, and store it between the MSBP and the SCSI Ferrite.
10. Replace the hold-down plate by pushing down, while sliding it toward the front of the chassis.
11. Engage the tabs into the slots. Verify that all the tabs are captured in their slots.
12. Remove the DVD+RW drive from the package.
13. Install the side rails onto the drive.
14. Connect the removable media bay power cable to the loose end of the Y power cable on the DVD+RW assembly. Ensure that the mating connector pair passes through the ruggedizer.
15. Route the removable media bay power cable into the ruggedizer cable clip.
16. Connect the SCSI cable to the DVD+RW dive. Ensure that the power cable passes over the top of the SCSI cable.

Figure 3-13 SCSI and Power Cable Routing



17. Slide the DVD+RW drive and cable into the removable media drive bay. Push the drive until it is fully seated in the bay.
18. Replace the front bezel and top cover. See “Removing and Replacing the Front Bezel” (page 99) and see “Removing and Replacing the Top Cover” (page 99) .
19. Power on the server.
20. Boot the operating system.
21. Install the appropriate device drivers. Use the installation instructions that come packaged with the drive to install device drivers.

4 Cable Connections

This chapter describes cable connections within the server.

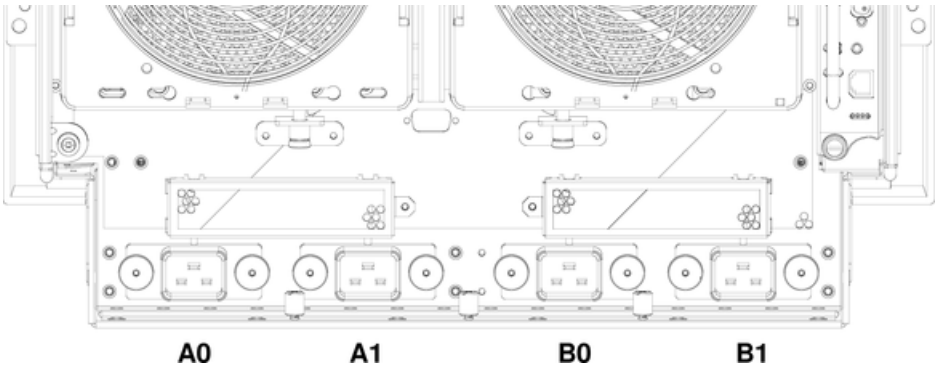
AC Input Power

The server has five line cord configurations:

- All four line cords (preferred configuration)
- Cords A0 and A1 only
- Cords B0 and B1 only
- Cords A0 and B0 only
- Cords A1 and B1 only

A single-line-cord configuration is not allowed.

Figure 4-1 Power Cord Configuration



The power cord configuration is passed to the operating system using the `pwrgrd` (Power Grid) command. Each of the five selections in the `pwrgrd` command matches one of the configurations. The appropriate option should be selected for the actual line cord configuration. With the correct configuration selected, the LEDs should be green. When the `pwrgrd` command is invoked, the following menu displays.

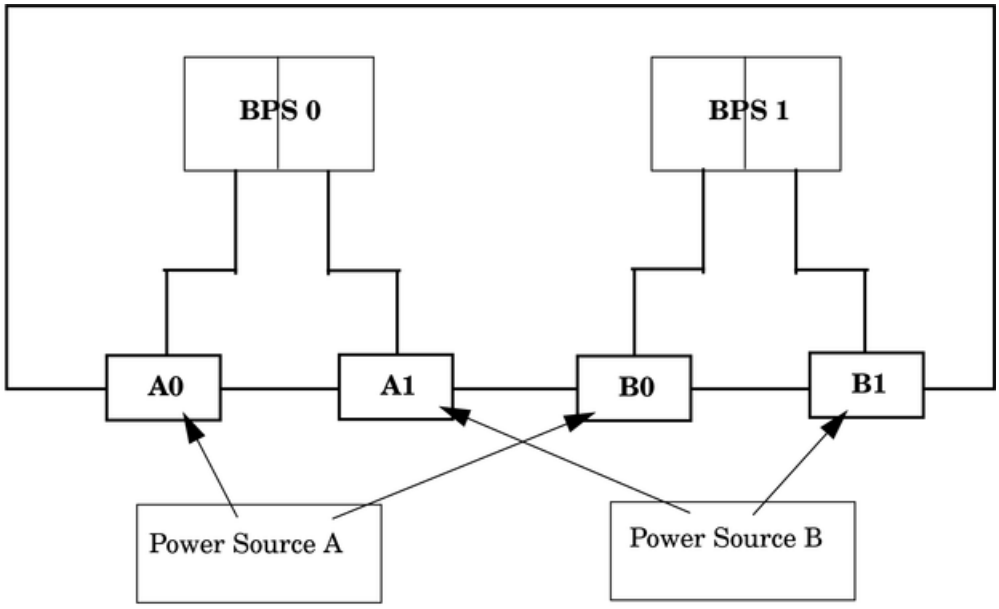
```
prompt> pwrgrd

Power grid configuration preference.
1. Grid A only (Cords A0,B0 required)
2. Grid B only (Cords A1,B1 required)
3. Grids A & B (Cords A0,A1,B0,B1 required)
4. Cords A0 & B0 only5. Cords A1 & B1 only

Select Option:
```

If two separate power sources are available, the two power supplies can be plugged into the separate power sources, increasing system reliability should one power source fail.

Figure 4-2 Power Source Versus Power Distribution



*180-269 VAC

WARNING! Voltage is present at various locations within the server whenever a power source is connected. This voltage is present even when the main power switch is in the off position. To completely remove power, all power cords must be removed from the server. Failure to observe this warning can result in personal injury or damage to equipment.

NOTE: System firmware will prevent boot when a single power cord configuration is detected.

DC Input Power

The HP Integrity rx7620 Server has two fast hot-pluggable DC bulk power supplies that provide 2N redundancy.

The power configuration is passed to the operating system using the `pwrgrd` (Power Grid) command. Each of the four selections in the `pwrgrd` command matches one of the configurations. The appropriate option should be selected for the actual line cord configuration. With the correct configuration selected, the LEDs should be green. When the `pwrgrd` command is invoked, the following menu displays.

IMPORTANT: Options 1 and 2 are for HP internal use only. Do not select these options.

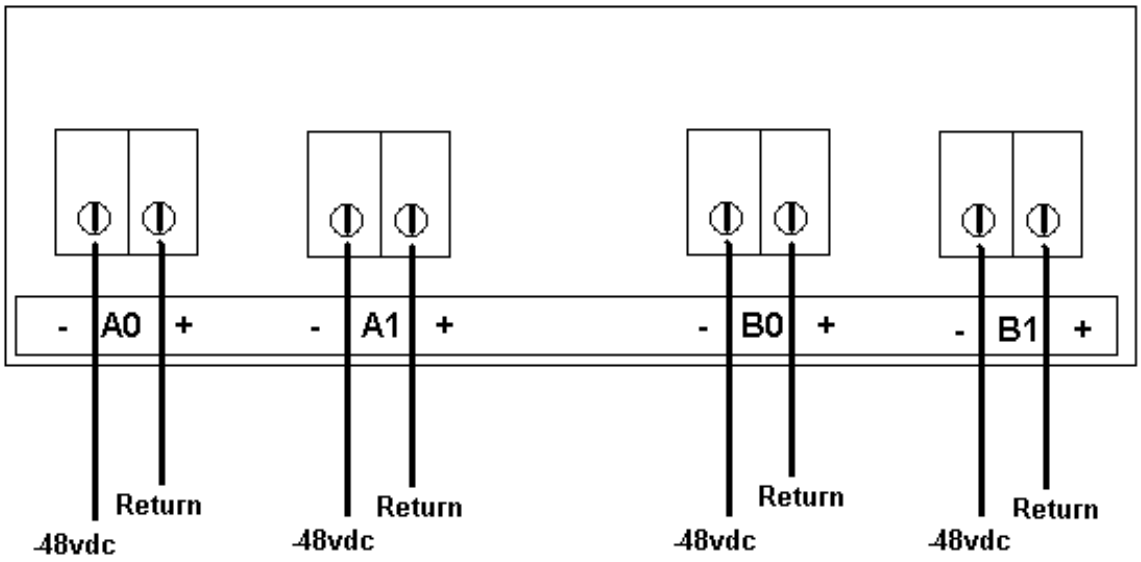
```
prompt> pwrgrd
Power grid configuration preference.
1. Grid A only (Cords A0,A1 required)
2. Grid B only (Cords B0,B1 required)
3. Grids A & B (Cords A0,A1,B0,B1 required)
4. Cords A0 & B0 only5. Cords A1 & B1 only

Select Option:
```

If two separate power sources are available, the two power supplies can be plugged into the separate power sources, increasing system reliability.

Below is an illustration of the input power wiring.

Figure 4-3 HP Integrity rx7620 Server - DC Power Input



WARNING! Voltage is present at various locations within the server whenever a power source is connected. This voltage is present even when the main power switch is in the off position. Failure to observe this warning can result in personal injury or damage to equipment.

NOTE: System firmware prevents booting when a single power cord configuration is detected.

AC Voltage Check

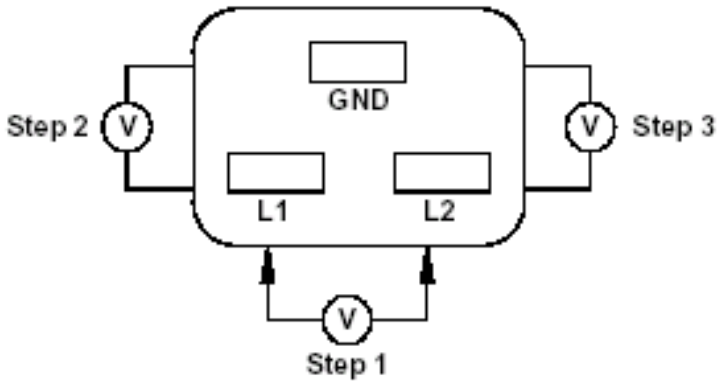
This section provides voltage check information for use on the customer site. The emphasis focuses on measuring the voltages at the power cord plug end specified as an IEC 320 C19 type plug. This end plugs directly into the back of the HP Integrity rx7620 Server chassis.

NOTE: These procedures must be performed for each power cord that will be plugged directly into the back of the HP Integrity rx7620 Server. If the expected results from this procedure are not observed during the voltage check, see "AC Voltage Check (Additional Procedure)" (page 59)

Voltage Range Verification of Receptacle

This measures the voltage between L1 and L2, L1 to ground, and L2 to ground. Three separate measurements are performed during this procedure. For voltage reference points when performing the following measurements, see Figure 4-4.

Figure 4-4 Voltage Reference Points for IEC 320 C19 Plug



IMPORTANT: These measurements must be performed for every power cord that plugs into the HP Integrity rx7620 Server.

To measure the voltage, follow these steps:

1. Measure the voltage between L1 and L2. This is considered to be a phase-to-phase measurement in North America. In Europe and certain parts of Asia-Pacific, this measurement is referred to as a phase-to-neutral measurement. The expected voltage measured should be between 200–240V AC regardless of the geographic region.
2. Measure the voltage between L1 and ground. In North America, verify this voltage is between 100–120V AC. In Europe and certain parts of Asia-Pacific, verify this voltage is between 200–240V AC.
3. Measure the voltage between L2 and ground. In North America, verify this voltage is between 100–120V AC. In Europe and certain parts of Asia-Pacific, verify this voltage is 0 (zero) V AC.

Table 4-1 provides single phase voltage measurement examples dependent on the geographic region where these measurements are taken.

Table 4-1 Single Phase Voltage Examples

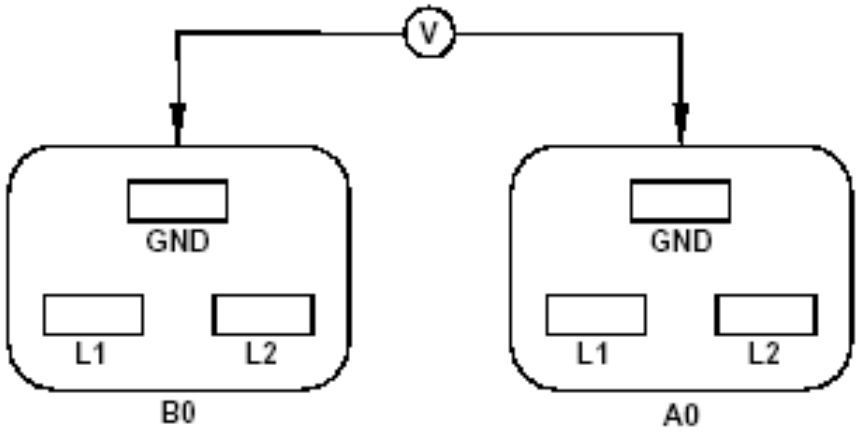
	Japan	North America	Europe[1]
L1-L2	210V	208V or 240V	230V
L1-GND	105V	120V	230V
L2-GND	105V	120V	0V

1 In some European countries there may not be a polarization.

Safety Ground Verification

This measures the voltage level between B0 and A0. The measurement is taken between ground pins of the two power cords. For ground reference points when performing this measurement, see Figure 4-5.

Figure 4-5 Safety Ground Reference Check



1. Measure the voltage between B0 and A0. Take the AC voltage down to the lowest scale on the volt meter.
2. Insert one probe into the ground pin for B0.
3. Insert the other probe into the ground pin for A0.
4. Verify that the measurement is between 0–5V AC. If the measurement is 5V or greater, escalate the situation. Do not attempt to plug the power cords into the HP Integrity rx7620 Server.

AC Voltage Check (Additional Procedure)

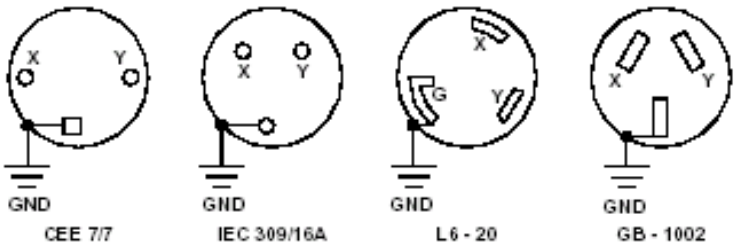
This AC voltage check ensures that all phases (and neutral, for international systems) are connected correctly to the cabinet and that the AC input voltage is within limits.

This procedure must be performed if the previous voltage check procedure did not yield the expected results as previously outlined.

NOTE: If a UPS is used, see the applicable UPS documentation for information to connect the server and to check the UPS output voltage. UPS User Manual documentation is shipped with the UPS. Documentation may also be found on the HP website at http://www.hp.com/racksolutions.

1. Verify that site power is OFF.
2. Open the site circuit breakers.
3. Verify that the receptacle ground connector is connected to ground. For connector details, see Figure 4-6.
4. Set the site power circuit breaker to ON.

Figure 4-6 Wall Receptacle Pinouts



WARNING! There is a risk of shock hazard while testing primary power. Use properly insulated probes.

5. Verify that the voltage between receptacle pins x and y is between 200 and 240V AC.
6. Set the site power circuit breaker to OFF.
7. Ensure that power is removed from the server.
8. Route and connect the server power connector to the site power receptacle.
   - For locking type receptacles, line up the key on the plug with the groove in the receptacle.
   - Push the plug into the receptacle and rotate to lock the connector in place.

WARNING! Do not set site AC circuit breakers serving the processor cabinets to ON before verifying that the cabinet has been wired into the site AC power supply correctly. Failure to do so can result in injury to personnel or damage to equipment when AC power is applied to the cabinet.

9. Set the site power circuit breaker to ON.
10. Set the server power to ON.
11. Check that the indicator light on each power supply is lit.

MP Core I/O Connections

Each HP Integrity rx7620 Server can have up to two MP core I/O board sets installed. This allows for two partitions to be operating, or allows MP core I/O redundancy in a single partition configuration. Each MP core I/O board set consists of two boards: the MP/SCSI board and the LAN/SCSI board. The MP/SCSI board is oriented vertically and accessed from the back of the server. The LAN/SCSI is accessed from the PCI expansion card bay. Only the primary MP core I/O board set (MP/SCSI slot 1 and LAN/SCSI slot 8, chassis 1) is required for a single partition implementation. The secondary MP/SCSI board is not necessary for full operation; however, without the secondary MP/SCSI board, only two internal disks can be accessed.

MP/SCSI Connections

The MP/SCSI board is required to update firmware, access the console, turn partition power on or off, access all but two of the internal peripherals, and utilize other features of the system.

Connections to the MP/SCSI board include the following:

- DB25 connector, by way of the M cable.

  This RS-232 connector provides connections for a local console, external modem, and a UPS. The server end of the M cable terminates in a DB25 connector. The opposite side of the cable terminates in three DB9 connectors labeled CONSOLE, UPS, and REMOTE.

- 10/100 Base-T LAN RJ45 connector (for LAN and web console access).

  This LAN uses standby power and is active when AC is present and the front panel power switch is off.

- Internal LVD Ultra 160 SCSI channel for connections to internal mass storage.
- Internal SE Ultra SCSI channel for connection to an internal removable media device.

LAN/SCSI Connections

The LAN/SCSI board is a PCI form factor card that provides the basic external I/O connectivity for the system.

Connections to the LAN/SCSI board include the following:

- PCI-X to PCI-X bridge for multi-device compatibility
- Internal LVD Ultra 160 SCSI channel for connections to internal mass storage
- External LVD Ultra 160 SCSI channel connected to a 68-pin VHDCI connector
- 10/100/1000 Base-T LAN RJ45 connector.

The primary LAN interface is located on the LAN/SCSI board installed in the rightmost slot when viewing the system from the back.

Management Processor Access

NOTE: To access the MP for the initial installation, the M cable must first be connected to the DB25 connector located on the primary MP/SCSI board. The primary MP/SCSI board is located in the lower MP/SCSI board slot.

Setting Up the Customer Engineer Tool (PC)

The Customer Engineer (CE) Tool is usually a laptop. It enables communication with the MP in the HP Integrity rx7620 Server. The MP monitors the activity of either a one partition or a multiple-partition configuration.

During installation, communicating with the MP enables such tasks as:

- Verifying that the components are present and installed correctly
- Setting LAN IP addresses
- Shutting down cell board power

Communication with the MP is established by connecting the CE Tool to the local RS-232 port on the MP core I/O card.

Setting CE Tool Parameters

- 8/none (parity)
- 9600 baud
- na (Receive)
- na (Transmit)

After powering on the CE Tool, ensure the communications settings are as follows:

If the CE Tool is a laptop using Reflection, ensure communications settings are in place.

To ensure communications settings are in place, follow these steps:

1. From the Reflection main screen, select **Connection** and select **Connection Setup**.
2. Select **Serial Port**.
3. Select **Com1**.
4. Check the settings and change, if required.

   Go to **More Settings** to set Xon/Xoff. Click **OK** to close the More Settings window.
5. Click **OK** to close the Connection Setup window.
6. Pull down the **Setup** menu and select **Terminal** (under the **Emulation** tab).
7. Select any terminal type.
8. Click **Apply**.

   This option is not highlighted if the terminal type you want is already selected.
9. Click **OK**.

Connecting the CE Tool to the Local RS-232 Port On the MP

This connection enables direct communications with the MP. Only one window can be created on the CE Tool to monitor the MP. When enabled, it provides direct access to the MP and any partition.

To connect the CE Tool to the local RS-232 port on the MP, follow these steps:

1. Connect one end of a null modem cable (9-pin to 9-pin) (Part Number 5182-4794) to the M cable connector labeled CONSOLE.
2. Connect the other end of the RS-232 cable to the CE Tool.

Standby Power and Logging In to the MP

After connecting the serial device, it is possible to log in to the MP. Housekeeping power (also known as standby power) is generated as soon as AC power is applied to the server. Because the MP uses standby power, it is possible to log in to the MP even when the power switch is in the OFF position. The power switch is a DC power switch that controls +48V DC.

Before powering on the HP Integrity rx7620 Server for the first time, follow these steps:

1. Verify that the AC voltage at the input source is within specifications for each server being installed.
2. If not already done so, power on the serial display device.

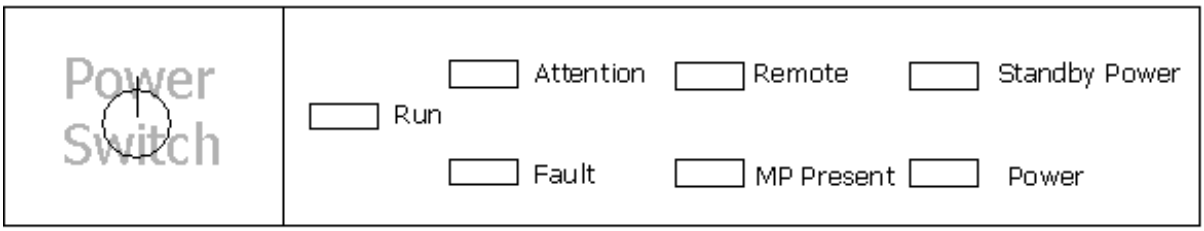
   The preferred tool is the CE tool running Reflection.

To power on the MP, set up a communications link and log in to the MP, follow these steps:

1. Connect the server to AC power.

   On the front of the HP Integrity rx7620 Server, a solid green Standby Power LED, a solid green MP Present LED, and a flashing amber Attention LED illuminates after about 30 seconds.

   Figure 4-7 Front Panel Display



2. Check the bulk power supply LED for each BPS.

   When on, the breakers distribute power to the BPSs. AC power is present at the BPSs:

- When power is first applied. The BPS LEDs flash amber.
- After 30 seconds has elapsed. The flashing amber BPS LED for each BPS becomes a flashing green LED.

To interpret LED indicators, see power cord policies.

3. Log in to the MP:
   a. Enter **Admin** at the login prompt. The login is case sensitive.

      It takes a few moments for the MP prompt to display. If it does not display, check that the laptop serial device settings are correct: 8 bits, no parity, 9600 baud, and na for both Receive and Transmit. Then, try again.

   b. Enter **Admin** at the password prompt. The password is case sensitive.

      The MP Main Menu displays:

Figure 4-8 MP Main Menu

```
MP login: Admin
MP password:

                        Welcome to the

                    rx7620 Management Processor

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                        Version A.5.011


    MP MAIN MENU:

         CO: Consoles
        VFP: Virtual Front Panel (partition status)
         CM: Command Menu
         CL: Console Logs
         SL: Show Event Logs
         HE: Help
          X: Exit Connection

MP>
```

Configuring LAN Information for the MP

To set the MP LAN IP address, follow these steps:

1. At the MP Main Menu prompt (*MP>*), enter **cm**. From the MP Command Menu prompt (*MP:CM>*), enter **lc** (for LAN configuration).

   The default values display, and a prompt, asking if default values are to be modified, displays. It is a good idea to write down the information, because it might be required for future troubleshooting.

NOTE: If the Command Menu is not shown, enter **q** to return to the MP Main Menu, then enter **cm**.

Enter **lc** and press **Return**. The following screen displays:

Figure 4-9 `lc` Command Screen

```
MP:CM> LC

This command modifies the LAN parameters.

Current configuration of MP LAN interface
  MAC address  : 00:30:6e:05:09:24
  IP address   : 15.99.83.215   (0x0f6353d7)
  Hostname     : quartz-s
  Subnet mask  : 255.255.255.0          (0xffffff00)
  Gateway      : 15.99.83.254   (0x0f6353fe)
  Status       : UP and RUNNING
  AutoNegotiate : Enabled
  Data Rate    : 100 Mb/s
  Duplex       : Half
  Error Count  : 0
  Last Error   : none


    Do you want to modify the configuration for the customer LAN? (Y/[N]) q
MP:CM>
```

NOTE: The value in the IP address field is set at the factory. Obtain the actual LAN IP address from the customer.

3. At the prompt, *Do you want to modify the configuration for the customer LAN?*, enter **`y`**.

   The current IP address is shown; and the following prompt displays: *Do you want to modify it? (Y/[N])*
4. Enter **`y`**.
5. Enter the new IP address.

   The customer must provide this address for network interface 0.
6. Confirm the new address.
7. Enter the MP Network name.

   This is the host name for the customer LAN. The name can be as many as 64 characters in length, and include alphanumeric characters, - (dash), _ (under bar),. (period), or a space. HP recommends that the name be a derivative of the complex name. For example, Acme.com_MP.
8. Enter the LAN parameters for the Subnet mask and Gateway address fields.

   This information must come from the customer.
9. The system indicates the parameters have been updated and returns to the MP Command Menu prompt (*MP:CM>*).
10. To check the LAN parameters and status, enter the `ls` command at the MP Command Menu prompt (*MP:CM>*).
11. A screen similar to the following displays, enabling verification of the settings:

Figure 4-10 `ls` Command Screen

```
MP:CM> LS

Current configuration of MP LAN interface
  MAC address  : 00:30:6e:05:09:24
  IP address   : 15.99.83.215   (0x0f6353d7)
  Hostname     : quartz-s
  Subnet mask  : 255.255.255.0         (0xffffff00)
  Gateway      : 15.99.83.254   (0x0f6353fe)
  Status       : UP and RUNNING
  AutoNegotiate : Enabled
  Data Rate    : 100 Mb/s
  Duplex       : Half
  Error Count  : 0
  Last Error   : none

MP:CM>
```

12. To return to the MP main menu, enter **`ma`**.
13. To exit the MP, enter **`x`** at the MP main menu.

Accessing the MP Using a Web Browser

Web browser access is an embedded feature of the MP. The web browser enables access to the server through the LAN port on the core I/O card. MP configuration must be done from an ASCII console.

NOTE: The MP has a separate LAN port from the system LAN port. It requires a separate LAN drop, IP address, and networking information from that of the port used by HP-UX.

Before starting this procedure, the following information is required:

- IP address for the MP LAN
- Subnet mask
- Gateway address
- Host name (this is used when messages are logged or printed)

To configure the LAN port for a web browser, follow these steps:

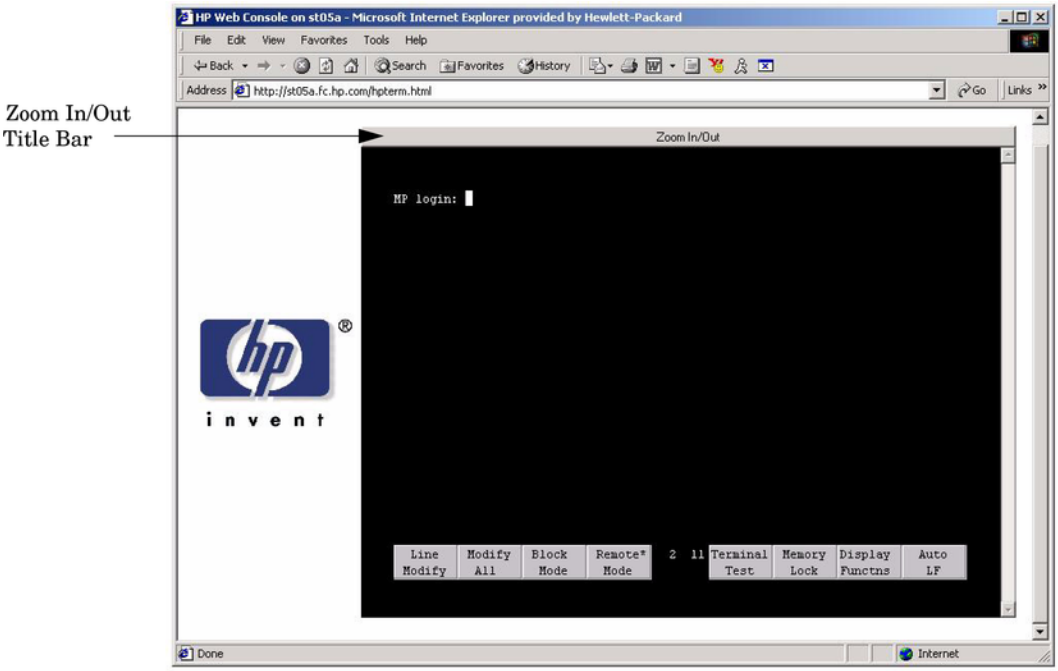
1. Connect to the MP using a serial connection.
2. Configure the MP LAN. See "Configuring LAN Information for the MP".
3. To enter the Command Menu, enter **`CM`**.
4. To display and set MP remote access, enter **SA** at the MP:CM> prompt.

Figure 4-11 Example `sa` Command

```
MP:CM> sa

This command displays and allows modification of access parameters.

    T - Telnet access           : Enabled.
    M - Modem access            : Enabled.
    W - Web Console             : Enabled (SSL NOT active).
    N - Network Diagnostics     : Disabled.
    I - IPMI Lan access         : Disabled.

    Select access mode to change : w

    The following options are available for Web access:
          1 - Web access disabled
          2 - Web access enabled
          3 - Secure web access enabled
    Select option:
```

5. Launch a web browser on the same subnet using the IP address for the MP LAN port.

Figure 4-12 Browser Window



6. Click anywhere on the Zoom In/Out title bar to generate a full screen MP window.
7. Select the emulation type you want to use.
8. Log in to the MP when the login window appears.

Access to the MP using a web browser is now possible.

Verifying the Presence of the Cell Boards

To perform this activity, either connect to the MP using a console, or connect the CE Tool (laptop) to the RS-232 local port on the MP.

After logging in to the MP, verify that the MP detects the presence of all the cells installed in the cabinet. It is important for the MP to detect the cell boards. If it does not, the partitions do not boot.

To determine if the MP detects the cell boards, follow these steps:

1. At the MP prompt, enter **cm**.

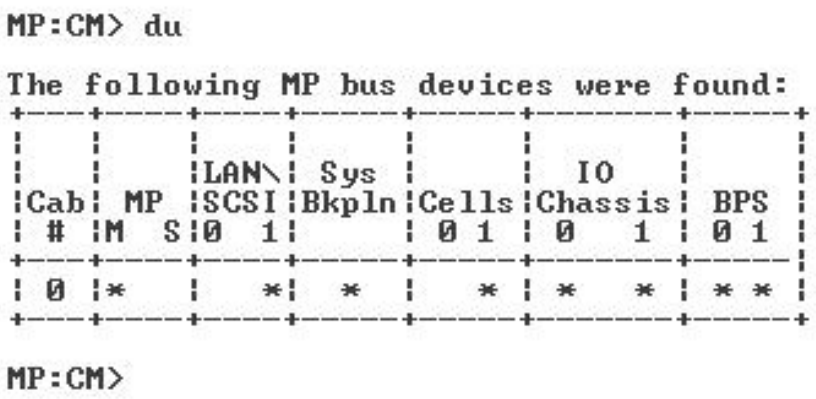
   This displays the Command Menu. The Command Menu enables viewing or modifying the configuration and viewing the utilities controlled by the MP.

   To view a list of the commands available, enter **he**. To see more than one screen of commands, press **Enter**. Use the Page Up and Page Down keys to view the previous or next screen of commands. To exit the Help Menu, enter **q**.

2. From the command prompt (MP:CM>), enter **du**.

   The du command displays the MP bus topology. A screen similar to the following displays:

   Figure 4-13 The du Command Screen



   There is an asterisk (*) in the column marked MP.

3. Verify that there is an asterisk (*) for each of the cells installed in the cabinet, by comparing what is in the Cells column with the cells physically located inside the cabinet.

   Figure 4-13 shows that cells are installed in slots 0 and 1. In the cabinet, cells should be physically located in slots 0 and 1.

System Console Selection

Each operating system requires that the correct console type be selected from the firmware selection menu. The following section describes how to determine the correct console device.

If an operating system is being installed or the system configuration is being changed, you must check the system console setting to ensure it matches the hardware and OS. Not checking the console selection can result in the system using an unexpected device as a console, which can appear as a system hang when booting.

To select a system console, follow these steps:

1. Determine the console you want to use.

   Depending on your operating system and your hardware, you can select one of several possible devices as your system console. The possibilities are as follows:

   - System Serial Port
   - MP Serial Port
   - VGA device

2. Use the EFI menus and select the appropriate console device (deselect unused devices):
   a. Choose the "Boot option maintenance menu" choice from the main Boot Manager Menu.
   b. Select the Console Output, Input or Error devices menu item for the device type you are modifying:
      - "Select Active Console Output Devices"
      - "Select Active Console Input Devices"
      - "Select Active Console Error Devices"
   c. Available devices are displayed for each menu selection. Figure 4-14 shows a typical output of selecting the Console Output Devices menu.

Figure 4-14 Console Output Device Menu

```
EFI Boot Maintenance Manager ver 1.10 [14.61]

Select the Console Output Device(s)


    Acpi(PNP0501,0)/Uart(9600 N81)/VenMsg(PcAnsi)
    Acpi(PNP0501,0)/Uart(9600 N81)/VenMsg(Vt100)
    Acpi(PNP0501,0)/Uart(9600 N81)/VenMsg(Vt100+)
    Acpi(PNP0501,0)/Uart(9600 N81)/VenMsg(VtUtf8)
    Acpi(HWP0002,700)/Pci(0|1)/Uart(9600 N81)/VenMsg(PcAnsi)
    Acpi(HWP0002,700)/Pci(0|1)/Uart(9600 N81)/VenMsg(Vt100)
    Acpi(HWP0002,700)/Pci(0|1)/Uart(9600 N81)/VenMsg(Vt100+)
    Acpi(HWP0002,700)/Pci(0|1)/Uart(9600 N81)/VenMsg(VtUtf8)
  * Acpi(HWP0003,400)/Pci(0|0)
  Save Settings to NVRAM
  Exit
```

   d. Choose the correct device for your system and deselect others. For details about choosing the appropriate device, see "Interface Differences Between Itanium-Based Systems".
   e. To complete the change, select **Save Settings to NVRAM** and then **Exit**.
   f. A system reset is required for the changes to take effect.

VGA Consoles

Any device that has a Pci section in its path and does not have a Uart section is a VGA device. If you require a VGA console, choose the device and unmark all others. Figure 4-14 shows that a VGA device is selected as the console.

Interface Differences Between Itanium-Based Systems

Each Itanium-based system has a similar interface with minor differences. Some devices may not be available on all systems depending on system design or installed options.

MP Consoles

Any device containing both a Uart and Pci section in its path are MP serial ports. To use the MP as your console device, select the MP serial device entry that matches your console type (PcAnsi, Vt100, Vt100+, VtUtf8) and deselect everything else.

Other Console Types

Any device that has a Uart section but no Pci section is a system serial port. To use the system serial port (if available) as your console device, select the system serial device entry that matches your console type (PcAnsi, Vt100, Vt100+, VtUtf8) and deselect everything else.

If you choose either a system or MP serial port, HP recommends that you use a vt100+ capable terminal device.

Additional Notes on Console Selection

Each operating system makes decisions based on the EFI Boot Maintenance Manager menu Select Active Console selections to determine where to send its output. If incorrect console devices are selected, the OS can fail to boot or boots with output directed to the wrong location. Therefore, any time new potential console devices are added to the system or anytime NVRAM on the system is cleared, console selections should be reviewed to ensure they are correct.

Booting the HP Integrity rx7620 Server

After powering on the MP, +3.3 V Housekeeping power, and verifying that the MP detects the presence of the cell boards, power on the server.

If using a LAN crossover cable with the laptop, review server activity for each partition configured, while the server powers on and boots. Windows can be opened for the complex and for each partition. HP recommends that at least two windows be opened:

- A window showing all activity in the complex. Following the installation procedure in this guide causes a window to be open at startup.

  To display activity for the complex, follow these steps:

  1. Open a separate Reflection window and connect to the MP.
  2. From the MP Main Menu, select the `VFP` command with the `s` option.

- A window showing activity for a single partition.

  To display activity for each partition as it powers on, follow these steps:

  1. Open a separate Reflection window and connect to the MP.
  2. Select the `VFP` command and select the desired partition to view.

     There should be no activity on the screen at this point in the installation process.

NOTE: More than one window cannot be opened using a serial display device.

To power on the server, follow these steps:

1. Switch the power switch at the front of the server to On. The following events occur:
   - Power is applied to the server.
   - Processor Dependent Code (PDC) starts to run on each cell.
   - The cell self-test executes.
   - Hardware initializes for the server.
   - Console communication is established.
2. When activity on the Reflection screen stops, return to the MP Main Menu by entering **`Ctrl-B`**.
3. To enter console mode, enter **`co`**.
4. Enter the partition number of the partition to boot.
5. Press **`Enter`**.

Selecting a Boot Partition Using the MP

At this point in the installation process, the hardware is set up, the MP is connected to the LAN, the AC and DC power have been turned on, and the self-test is completed. Now you can verify the configuration.

After the DC power is on and the self-test is complete, use the MP to select a boot partition.

1. From the MP Main Menu, enter **cm**.
2. From the MP Command Menu, enter **bo**.
3. Select the partition to boot. Partitions may be booted in any order.
4. Return to the MP Main menu by entering **ma** from the MP Command menu
5. Exit the MP by entering **co** at the MP Main Menu.

Exiting the MP automatically returns you to the Extensible Firmware Interface (EFI) shell menu.

Verifying the System Configuration Using the EFI Shell

From the EFI main menu, enter the POSSE shell by entering **co**. To list all the command categories available in the shell, enter **help** as follows:

Configuration	Accesses the configuration menu, where you can reset, configure, or view system configuration.
Memory	Accesses memory related commands.

Once the parameters have been verified, enter **x** to return to the EFI Main Menu.

Booting HP-UX Using the EFI Shell

If Instant Ignition was ordered, HP-UX was installed in the factory at the Primary Path address. If HP-UX is at a path other than the Primary Path, follow these steps:

1. To access the Command Menu from the Main Menu, enter **cm**.
2. To boot the selected partition, enter **bo** at the MP:CM> prompt.
3. Select a partition to boot.
4. Return to the Main Menu. MP:CM> **ma**.
5. From the Main Menu, go to the Consoles menu MP> **co** and select the partition number.
6. To go back to the Main Menu, press **ctrl+b**.
7. Once at the EFI Shell prompt, select the file system to boot. Generally this is `fs0`. Shell> **fso:**
8. To boot the HP-UX operating system, enter **HPUX** at the `fs0` prompt. Example: `fso:\>` **hpux**

NOTE: If the partition fails to boot or if the server was shipped without *Instant Ignition*, booting from a DVD that contains the operating system and other necessary software might be required.

Using the Checklist

The following checklist is an installation aid and should be used only after you have installed several systems using the detailed procedures described in the body of this manual. This checklist is a compilation of the tasks described in this manual, and is organized as follows:

PROCEDURES	The procedures outlined in this document in order
IN-PROCESS	The portion of the checklist that enables you to comment on the current status of a procedure
COMPLETED	The final check to ensure that a step has been completed and comments

Major tasks are in **bold type**, sub tasks are indented.

Table 4-2 Factory-Integrated Installation Checklist

PROCEDURE	IN-PROCESS		COMPLETED	
	Initials	Comments	Initials	Comments
Obtain LAN information				
Verify site preparation				

Table 4-2 Factory-Integrated Installation Checklist *(continued)*

PROCEDURE		IN-PROCESS		COMPLETED	
	Site grounding verified				
	Power requirements verified				
Check inventory					
Inspect shipping containers for damage					
Unpack SPU cabinet					
	Allow proper clearance				
	Cut polystrap bands				
	Remove cardboard top cap				
	Remove corrugated wrap from the pallet				
	Remove four bolts holding down the ramps and remove the ramps				
	Remove antistatic bag				
	Check for damage (exterior and interior)				
	Position ramps				
	Roll cabinet off ramp				
Unpack the peripheral cabinet (if ordered)					
Unpack other equipment					
Remove and dispose of packaging material					
Move cabinet(s) and equipment to computer room					
Move cabinets into final position					
	Position cabinets next to each other (approximately 1/2 inch)				
	Adjust leveling feet				
	Install anti-tip plates				
	Inspect cables for proper installation				
Set up CE tool and connect to Remote RS-232 port on MP					
Apply power to cabinet (Housekeeping)					
Check power to BPSs					
Log in to MP					
Set LAN IP address on MP					

Table 4-2 Factory-Integrated Installation Checklist *(continued)*

PROCEDURE		IN-PROCESS		COMPLETED	
Connect customer console					
Set up network on customer console					
Verify LAN connection					
Verify presence of cells					
Power on cabinet (48 V)					
Verify system configuration and set boot parameters					
Set automatic system restart					
Boot partitions					
Configure remote login (if required). See Appendix B.					
Verify remote link (if required)					
Install non-factory, integrated I/O cards (if required)					
	Select PCI card slot				
	Install PCI card				
	Verify installation				
Route cables using the cable management arm					
Install other peripherals (if required)					
Perform visual inspection and complete installation					
Set up network services (if required)					
Enable iCOD (if available)					
Final inspection of circuit boards					
Final inspection of cabling					
Area cleaned and debris and packing materials disposed of					
Account for tools					
Dispose of parts and other items					
Make entry in Gold Book (recommended)					
Customer acceptance and signoff (if required)					

5 Troubleshooting

This chapter provides preferred strategies, procedures, and tools for troubleshooting server error and fault conditions.

Common Installation Problems

This section provides basic server troubleshooting information. It is designed to help you diagnose common issues that can occur during server installation.

△ **CAUTION:** Replace the top cover before operating the server, even for a short time. Overheating can damage chips, boards, and mass storage devices. However, you can safely remove the PCI access panel while the server is running to remove and replace PCI hot-plug boards. For any other service activity requiring access to the processor baseboard or I/O backplane, power off the server and observe all safety precautions.

Most problems are the result of incorrect system and SCSI subsystem configurations.

To troubleshoot an installation problem, perform the following checks in the order given:

1. Check all cable and power connections, including those in the rack.
2. Ensure the server is configured properly.

   Check the Setup Utility. If the error is a network-related problem, determine if the server has enough memory and hard disk drive capacity.
3. Verify all cables and boards are securely plugged in to the appropriate connectors or slots.
4. Remove all extra options, such as disk drives, one at a time, checking the affect of each on the server.
5. Unplug the power cord, wait 20 seconds, plug-in the power cord and restart the server.
6. If a hardware error is suspected, follow these steps:
   a. Log users off the LAN and power off the server.
   b. Extend the server out of the rack and remove the top cover.
   c. Simplify the server to the minimum configuration.

      The minimum configuration consists of the following:

      - One cell
      - Two processors
      - One quad of memory DIMMS (size 256 MB or larger)
      - One MP/SCSI card
      - One LAN/SCSI card
      - System backplane
      - PCI-X backplane
      - One BPS
      - Two PCI power modules
      - Two power cords
7. Remove all third-party options and reinstall each one, one at a time, checking the server after each installation.
8. Replace the top cover and reconnect the power cord and other cables. Boot the server. If it does not function properly, see the procedures in the following section.

The Server Does Not Power On

To check for power related problems, follow these steps:

1. Check each BPS LED.

   The LED is located in the lower left corner of the power supply face. Table 5-3 shows the states of the LEDs. A yellow LED indicates that the line cord connections are not consistent with the `pwrgrd` settings.

2. Verify that power is making it to the server and that the power lines are properly connected to the chassis.

The Server Powers On, Then Shuts Off with a Fault Light

Use this checklist to check for the following problems when the server powers on and then off:

1. Ensure that a conductive item has not been dropped or left inside the server chassis.
2. Check the connections on all boards.
3. Check the system backplane for bent pins.

Cell Board Extraction Levers

It is important that both extraction levers on the cell board be in the locked position. Both levers must be locked in order for the MP to recognize that the cell board is powered up and functioning properly.

Power to the cell board should only be removed using the MP:CM>`PE` command or by shutting off the partition or server. Therefore, if the levers become unlocked, the partition does not have a chance to logically shut off, and damage can occur to the operating system.

If the cell board is powered on and one lever becomes unlocked, the cell board stays powered on. However, if the cell board is powered off, it does not power on again until the cell board is extracted, then reinserted and both levers are in the locked position.

The lever status can be determined by issuing the MP:CM>`DE` command and viewing the power status of the cell board controller (PDHC). The “ready” bit is only true when both levers are locked and all VRMs are installed. This status can be used to determine if both levers are locked and the cell board is properly installed in the chassis. For a sample of the output, see Figure 5-1. If the state is RDY (all caps), it means that the “ready bit” is true. If the state is rdy (lower case) it means that the “ready bit” is false. Descriptions of each of these states is listed below.

Figure 5-1 de Command Output

```
MP:CM> de

Display summary status of the selected MP device.

    B - BPS  (Bulk Power Supplies)
    U - CLU  (Cabinet Utilities: Fans, Intrusion, Clock's etc.)
    A - PACI (Partition Console Interface)
    G - MP   (Management Processor)
    P - PM   (Power Management)
    H - Cell Board Controller (PDHC)
        Select device: h
    Enter cell number: 1

Cell Controller (PDHC) status. Cell 1
FW Revision  : 3.006 built FRI AUG 15 12:01:54 2003
MICE Revision : 1.0

PDHC state       : 0x3b (err bib SMG CCO cci I2C PWR)
Attention Led is off

Power Status : 0x7c (12VSTBY RDY EN PWR vflt tflt fanflt)

LED State    : 0x0e (BIB SMG I2C heartbeat)

IO Connection Status      : 0x01 (Connection OK)
IO Chassis Phys Location  : 0x01 (cabinet=0, PCI Backplane=0, PCI Domain=1)
Core Cell Number          : 0x81 (cabinet=0, cell=1, Valid)

Temp Fault Status : 0x00 (cpu0 cpu1 cpu2 cpu3 mmu cell)
CPU 0 Temp                : 47  deg C
CPU 1 Temp                : 0   deg C
CPU 2 Temp                : 59  deg C
CPU 3 Temp                : 0   deg C
MMU Temp                  : 30  deg C
Cell Board Temp           : 28  deg C

Fan Status                : 0x00cc (See PS command for detail)
Local I2C Bus Status      : 0x00 (OK)

MP:CM>
```

Ready Bit (RDY) is set to true

Table 5-1 Ready Bit States

Ready Bit State	MP:>CM DE Command Status	Description
True	RDY (upper case)	All cell VRMs installed, and both cell latches are locked.
False	rdy (lower case)	One or more VRMs not installed or failed, and/or one or more cell latches not locked.

HP Integrity rx7620 Server LED Indicators

The server has LEDs that indicate the health of the server. This section defines those LEDs.

Front Panel LEDs

There are seven LEDs located on the front panel.

Figure 5-2 Front Panel with LED Indicators

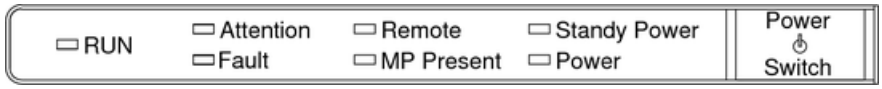


Table 5-2 Front Panel LEDs

LED	Driven By	State	Description
Power	GPM[1]	On Green	48V Good (LED works even if MP is not installed, or installed and not active)
		Off	48V Off
Standby Power	GPM	On Green	3.3V standby good (LED works even if MP is not installed, or installed and is not active)
		Off	3.3V Off
MP[2] Present	GPM	On Green	At least one MP is installed and active
		Off	No MPs are installed or at least one is installed but not active
Remote	MP thru GPM	On Green	Dial-in (remote) console enabled
		Off	Dial-in (remote) console is disabled, or MP not installed, or MP installed and not active
Attention	MP thru GPM	Flash Yellow	Chassis log alert unread
		Off	No alert, or MP not installed, or MP installed and not active
Run	PDC[3]/MP thru GPM	On Green	One or more partitions running
		Off	No partition running, or MP not installed, or MP installed and not active
Fault	PDC/MP thru GPM	Flash Red	One or more partitions have reported a fault
		Off	No partitions running, or MP not installed, or MP installed and not active

1 GPM stands for global power monitor

2 MP stands for manageability processor

3 PDC stands for processor dependent code

Bulk Power Supply LEDs

There is a single three-color LED on each bulk power supply.

Figure 5-3 BPS LED Locations

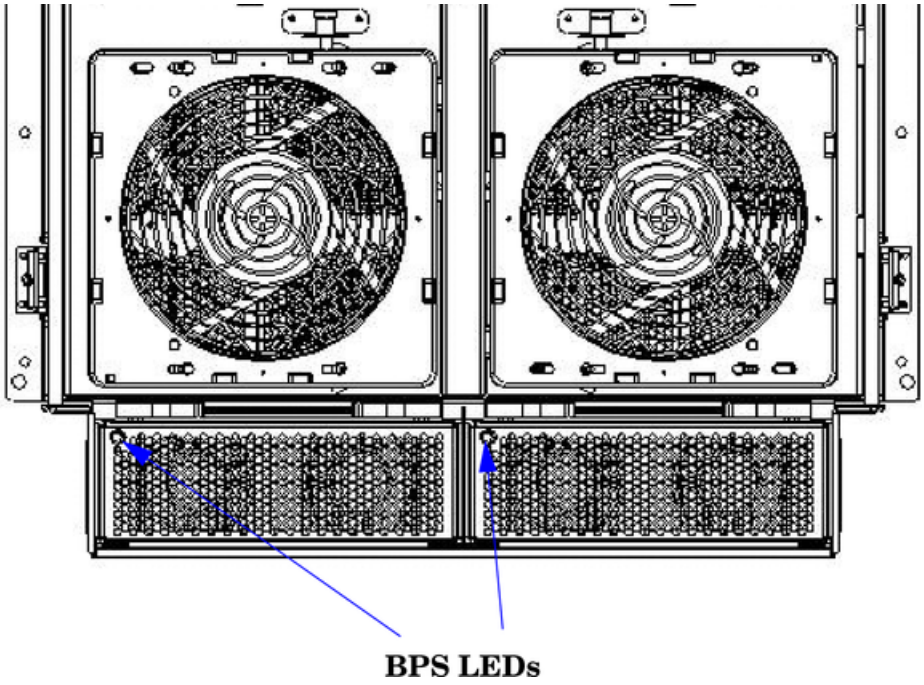


Table 5-3 BPS LEDs

LED Indication	Description
Blinking Green	BPS is in standby state with no faults or warnings
Green	BPS is in run state (48 volt output enabled) with no faults or warnings
Blinking Yellow	BPS is in standby or run state with warning(s) present but no faults
Yellow	BPS is in standby state with recoverable fault(s) present but no non-recoverable faults
Blinking RED	BPS state might be unknown, non-recoverable fault(s) present
Red	Not Used
Off	BPS fault or failure, no power cords installed or no power to the chassis

PCI-X Power Supply LEDs

There are three LEDs on the PCI-X power supply. Green and yellow LEDs follow OL* operation. A multi-color LED reports warnings and faults.

Figure 5-4 PCI-X Power Supply LED Locations

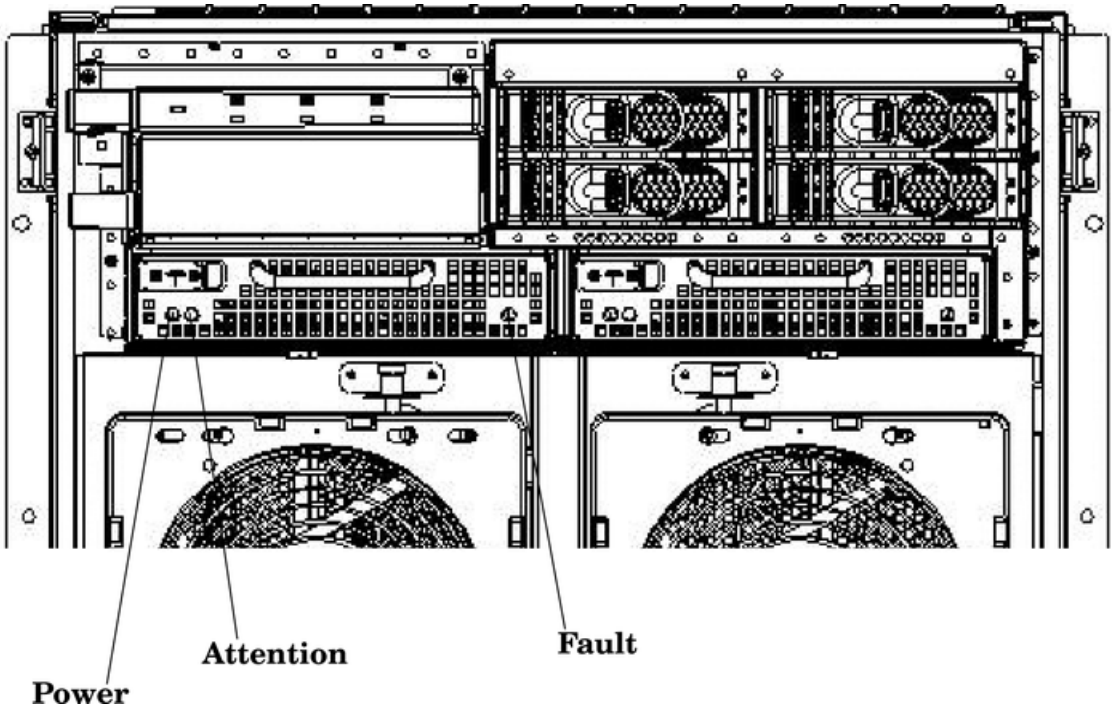


Table 5-4 PCI-X Power Supply LEDs

LED	Driven By	State	Description
Power	Each supply	On Green	All output voltages generated by the power supply are within limits.
		Off	Power to entire system has been removed.
Attention	MP through PCI LPM[1]	Yellow	For LED status in combination with the green power LED for PCI-X slot status, see Table 5-9.
Fault	Each supply	Flash Yellow	The temperature within the power supply is above the lower threshold.
		On Yellow	The temperature of the power supply is approaching the thermal limit.
		Flash Red	Power supply has shut down due to an over temperature condition, a failure to regulate the power within expected limits, or a current-limit condition.
		Off	Normal operation.

1 LPM stands for local power monitor

System and PCI I/O Fan LEDs

There is a single three-color LED on each system and PCI I/O fan.

Figure 5-5 Front, Rear, and PCI I/O Fan LEDs

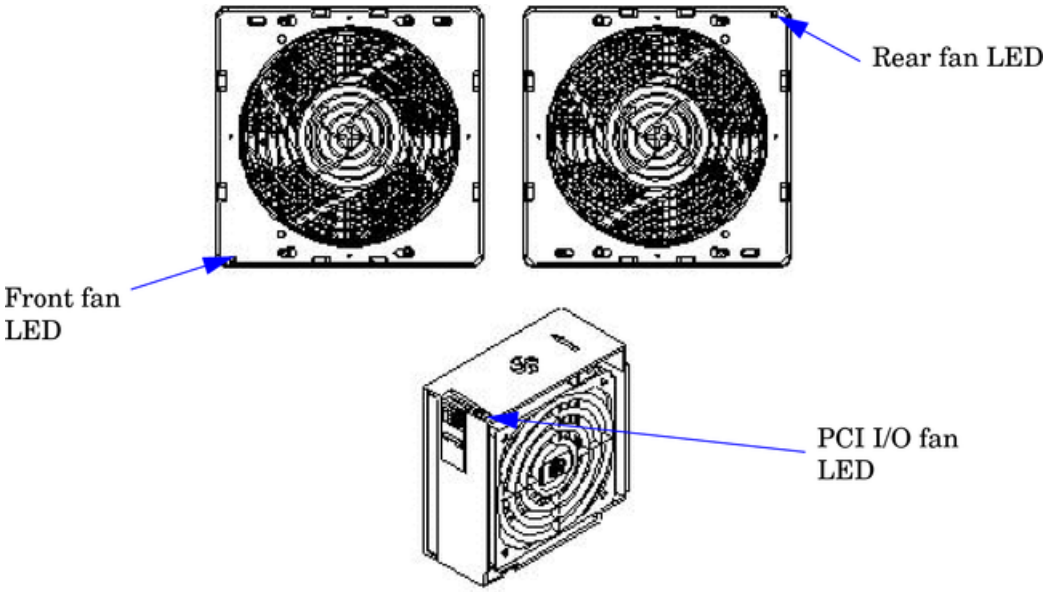


Table 5-5 System and PCI I/O Fan LEDs

LED	Driven By	State	Description
Fan Status	Fan	On Green	Normal
		Flashing Yellow	Predictive failure
		Flashing Red	Failed
		Off	No power

OL* LEDs

Cell Board LEDs

There is one green power LED located next to each ejector on the cell board in the server that indicates the power is good. When the LED is illuminated green, power is being supplied to the cell board and it is unsafe to remove the cell board from the server.

There is one yellow attention LED located next to each ejector on the cell board in the server that indicates when it is safe to remove the cell board from the server. When the LED is flashing yellow, it is safe to remove the cell board from the server.

Figure 5-6 Cell Board LED Locations

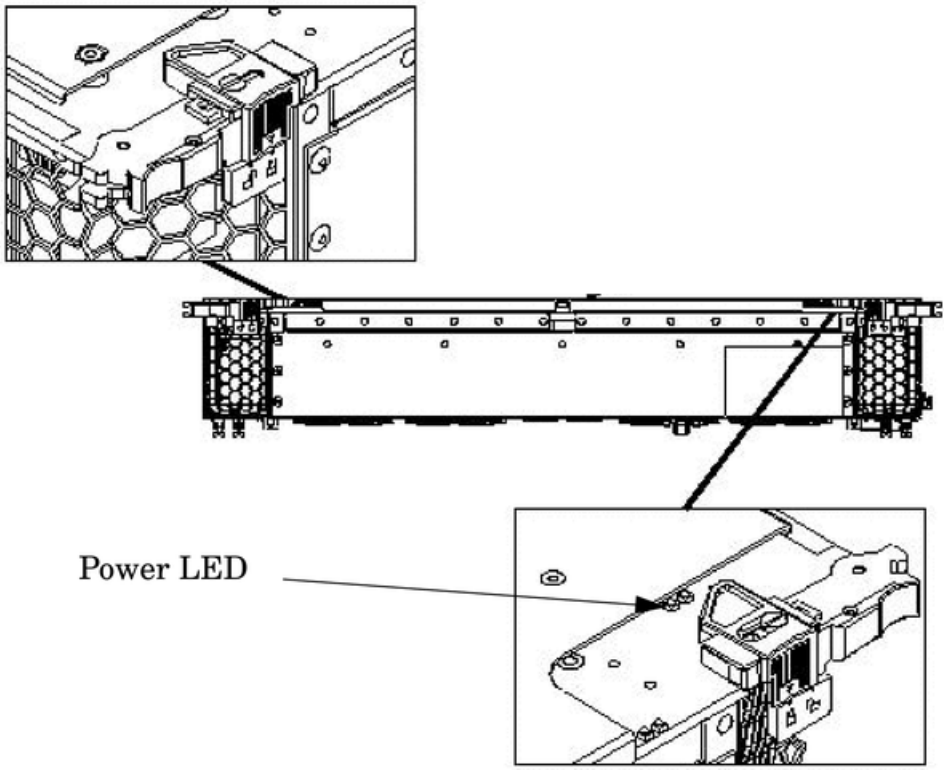


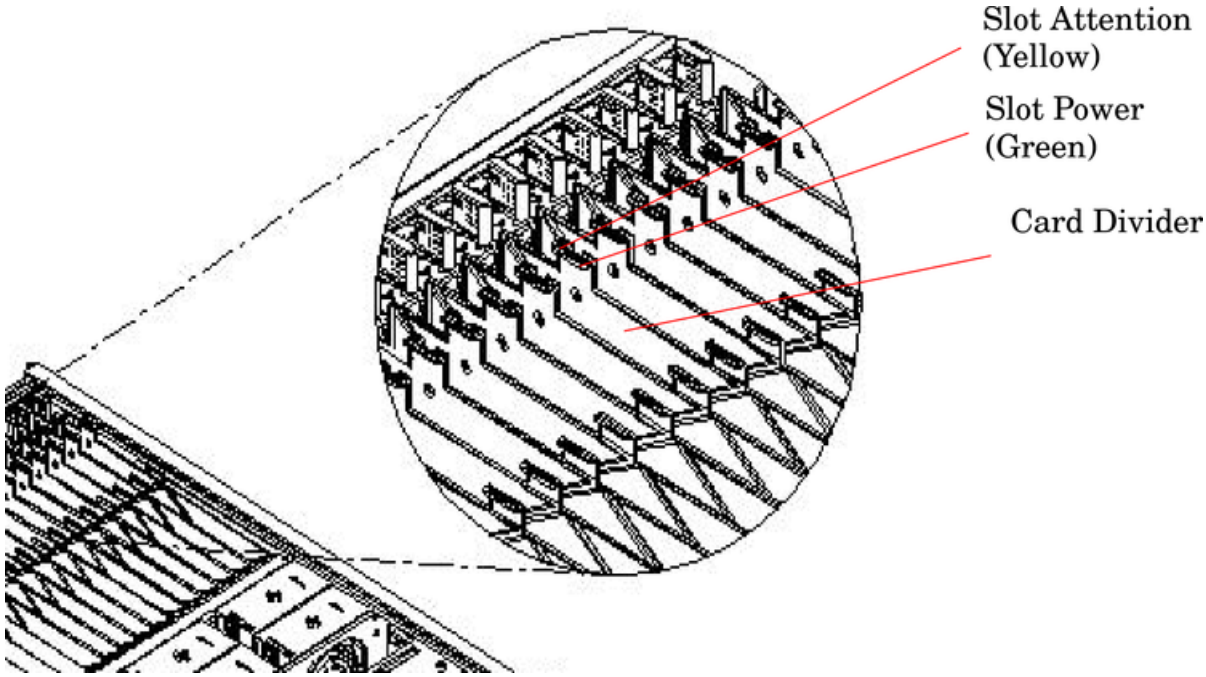
Table 5-6 Cell Board OL* LED Indicators

Location	LED	Driven by	State	Description
On cell board (located in the server cabinet)	Power	Cell LPM	On Green	3.3V Standby and Cell_Pwr_Good
			Off	3.3V Standby off, or 3.3V Standby on and no Cell_Pwr_Good
	Attention	MP thru GPM	Flash Yellow	Safe to remove the cell board from the system

PCI-X OL* Card Divider LEDs

The PCI-X OL* card LEDs are located on each of the 16 PCI-X slot dividers in the PCI-X card cage assembly area. The green power LED indicates whether power is supplied to the card slot. The yellow attention LED states are defined in Table 5-9.

Figure 5-7 PCI-X OL* LED Locations



Core I/O LEDs

The core I/O LEDs in Table 5-7 (page 82) are located on the bulkhead of the installed core I/O PCA.

Figure 5-8 Core I/O Card Bulkhead LEDs

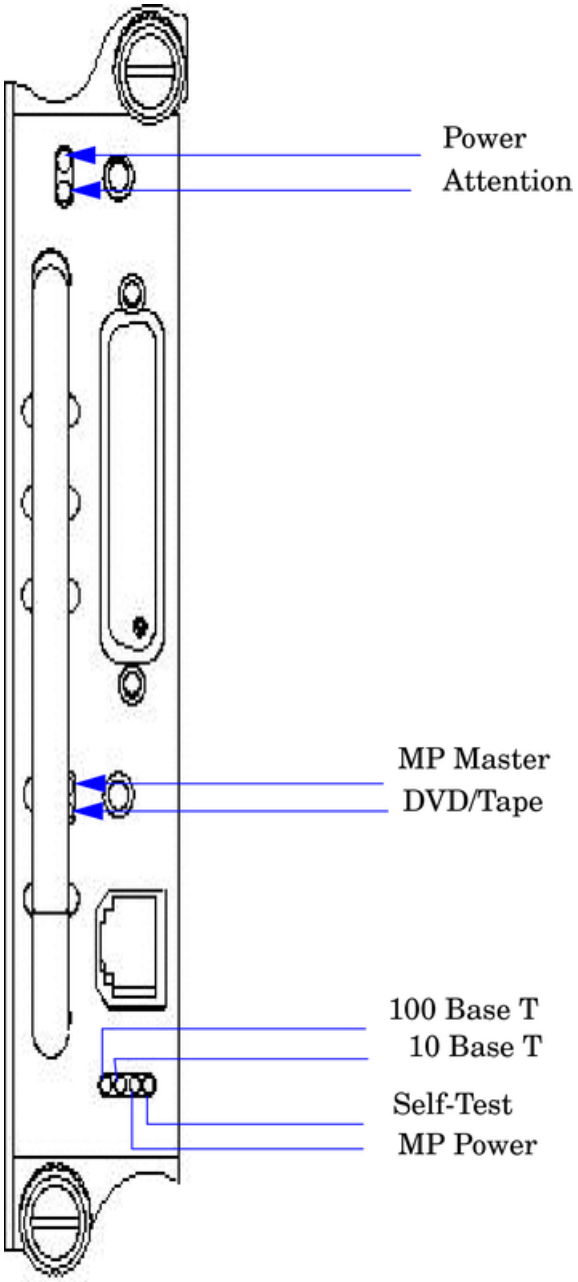


Table 5-7 Core I/O LEDs

LED (as silk-screened on the bulkhead)	State	Description
Power	On Green	I/O power on
Attention	On Yellow	PCI attention
MP Master	On Green	Core I/O is managing the system
DVD/Tape	On Green	Core I/O is managing the DVD/Tape
Self-Test	On Yellow	Failure during POST
MP LAN Act	On Green	MP LAN activity
MP LAN 10 BT	On Green	MP LAN in 10 BT mode
MP LAN 100 BT	On Green	MP LAN in 100 BT mode

Core I/O Buttons

There are two recessed buttons on the back of the core I/O card, as explained in Table 5-8.

Figure 5-9 Core I/O Button Locations

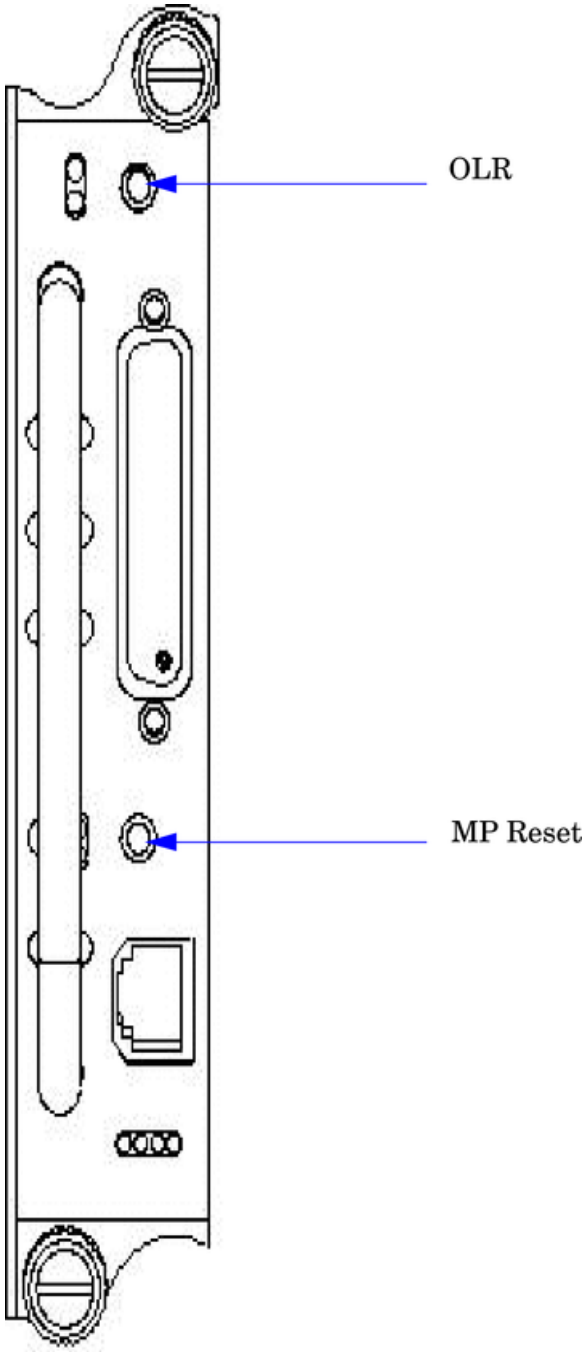


Table 5-8 Core I/O Buttons

Button Identification (as silk-screened on the bulkhead)	Location	Function
MP Reset	Center of the core I/O card	Resets the MP **NOTE:** If the MP Reset button is held for longer than five seconds, it clears the MP password and resets the LAN, RS-232 (serial port), and modem port parameters to their default values. LAN Default Parameters • IP Address—192.168.1.1 • Subnet mask—255.255.255.0 • Default gateway—192.168.1.1 • Hostname—gsp0 RS-232 (Serial Port) Default Parameters • 9600 baud • 8 bits • No parity Remote/Modem Port Parameters • Disabled
OLR (Symbol next to button is shown below)	Top end of the core I/O card	Request OL* for this core I/O slot **NOTE:** The OLR function is not enabled for the core I/O card.

PCI-X Hot-Plug LED OL* LEDs

Table 5-9 OL* LED States

State	Power (Green)	Attention (Yellow)
Normal operation, slot power on	On	Off
Slot selected, slot power on	On	Flashing
Slot needs attention, slot power on	On	On
Slot available, slot power off	Off	Off
Ready for OL*, slot power off	Off	Flashing
Fault detected, slot power off	Off	On
Slot powering down or up	Flashing	Off

Disk Drive LEDs

There are two tri-color LEDs on each disk drive.

Figure 5-10 Disk Drive LED Location

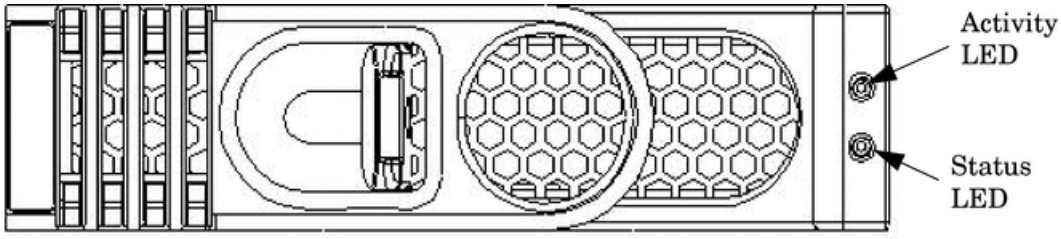


Table 5-10 Disk Drive LEDs

Activity LED	Status LED	Flash Rate	Description
Off	Green	Steady	Normal operation, power applied
Green	Off	Steady	Green stays on during foreground drive self-test
Green	Off	Flutter at rate of activity	I/O disk activity
Off	Yellow	Flashing at 1Hz or 2 Hz	Predictive failure, needs immediate investigation
Off	Yellow	Flashing at 0.5Hz or 1Hz	Operator inducing manually
Off	Yellow	Steady	Module fault, critical
Off	Off	LEDs off	Unit not powered or installed

Server Management Subsystem Hardware Overview

Server management for the HP Integrity rx7620 Server is provided by an MP on the core I/O board. The server management hardware is powered by standby power that is available whenever the server is plugged into primary AC power. This enables service access even if the DC power to the server is switched off.

The MP communicates with the server subsystems, sensors, and PDC by internal buses. It also communicates with the operating console and session gettys by universal asynchronous receiver-transmitters (UARTs) on the core I/O PCI bus.

Connection to the MP is by way of three I/O paths:

- An RS-232 port for a local terminal
- An RS-232 port for a modem connection
- A 10/100/1000 baseT LAN port (web console)

When the server is configured with one core I/O board, that board must be in slot 0, since the master MP is always the MP on the core I/O board in slot 0.

When the server is configured for two partitions, it must contain two core I/O boards, one for each partition. It also contains two MPs. In this case, the MP in slot 0 is the master MP and provides all of the server management functions. The MP on the core I/O board in slot 1 is a slave MP and redirects the operating system gettys to the master MP over an internal MP-to-MP link. All external connections to the MP must be to the master MP in slot 0. The slave MP ports are disabled.

For high availability (HA), the server powers on and powers off without an MP. Booting HP-UX without an MP depends on the ability of the operating system to boot without a console getty. Thus, in a two-partition system, the partition with a failed MP might not boot, since the MP provides the console getty.

The server configuration cannot be changed without the MP.

Resetting the MP through a modem connection may cause `Admin^M` to display on every **`enter`** keystroke. Attempting a modem reset (MP command `MR`) does not clear this incorrect response. This is not experienced with a Telnet connection.

To regain control at a new login prompt, follow these steps:

1. Enter **`Admin`** (case sensitive) and press **< enter > < ctrl + enter >** keys. A new Login prompt is created.
2. To move on to the Password prompt, re-enter **`Admin`****< ctrl + enter >**.
3. To reach the Main Menu, enter **`Admin`** **< ctrl + enter >**.

Afterwards, the `^M` will not return when the **enter** key is pressed. The issue will return if the MP is reset through the modem.

Server Management Overview

Server management consists of four basic functional groups:

- Chassis management
- Chassis logging
- Console and session redirection
- Service access

Chassis Management

Chassis management consists of control and sensing the state of the server subsystems:

- Control and sensing of bulk power
- Control and sensing of DC-to-DC converters
- Control and sensing of fans
- Control of the front panel LEDs
- Sensing temperature
- Sensing of the power switch
- Sensing chassis intrusion
- Reading FRU PROMS

Chassis Logging

Chassis logging consists of maintaining logs of chassis codes:

- Boot codes
- Activity codes
- Error codes

Console and Session Redirection

Console and session redirection enables the console and session terminals to be connected over RS-232, a modem, or a LAN connection (web console).

Service Access

Service access allows access to and control of the server state. Service access is secured by a password. Service access functions include:

- Access to chassis logs
- Configuration of partitions
- Control for online addition and replacement
- Access to the virtual front panel
- Transfer of control and reset

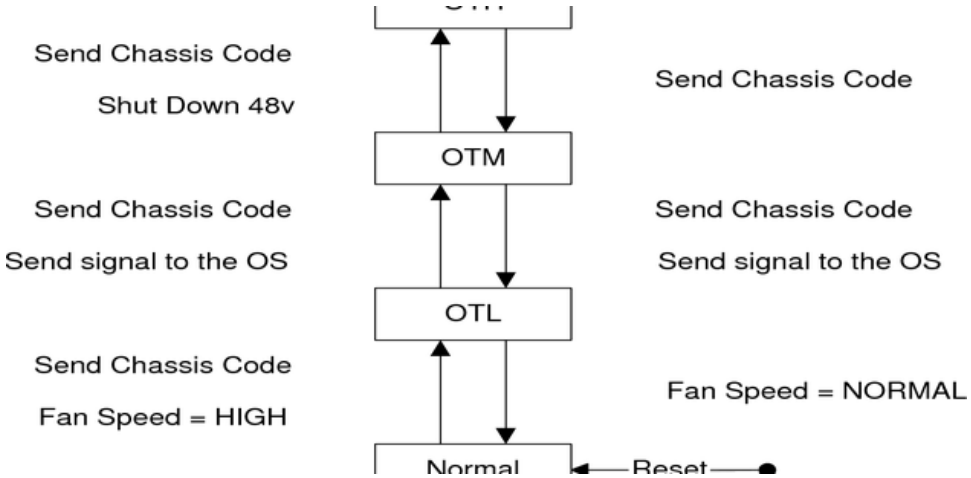
Server Management Behavior

This section describes how the system responds to over-temperature situations, how the firmware controls and monitors fans, and how it controls power to the server.

Thermal Monitoring

The manageability firmware is responsible for monitoring the ambient temperature in the server and taking appropriate action if this temperature becomes too high. To this end, the ambient temperature of the server is broken into four ranges: normal, overtemp low (OTL), overtemp medium (OTM), and overtemp high (OTH). Figure 5-11 shows the actions taken at each range transition. Actions for increasing temperatures are shown on the left; actions for decreasing temps are shown on the right.

Figure 5-11 Temperature States



On large temperature swings, the server transitions through all the states in order. It might go to the following state immediately, but each of the preceding actions will occur. If the temperature reaches the highest range, the server shuts down immediately by the manageability firmware.

Fan Control

There are three sets of fans in the system: those on the I/O bay, the front and rear fans that are connected to the main backplane, and those on the cell boards. The front fans are run off of standby power, and run any time AC input power is supplied to the server. All of the fans turn on when 48 V power is supplied to the system.

As shown in Figure 5-11, the fan behavior is related to the temperature state. The fans are set to high-speed when the ambient temperature is anywhere above the normal operating range. The front and rear fans are set to high-speed any time a chassis intrusion switch is triggered when removing a side cover.

Altimeter Circuit

The PCI-X backplane contains an altimeter circuit. This circuit is used to adjust the chassis fan speeds for the operating altitude at power on and during MP initialization. The chassis fans consist of the two front fans, two rear fans, and the six PCI-X I/O assembly fans. If an altimeter failure is detected, the information is logged as an Event ID then propagated to the OS level to be picked up by monitoring diagnostics.

The altimeter circuit is checked at power on by the MP. If an expected value is returned from the altimeter circuit, the altimeter is determined good. The altimeter reading is then set in non-volatile random access memory (NVRAM) on board the core I/O card. If the value is ever lost like for a core I/O replacement, the NVRAM is updated at the next boot provided the altimeter

is functioning normally. If the altimeter has failed, and the stable storage value has been lost because of a core I/O failure or replacement, the MP adjusts the fan speeds for sea-level operation.

NOTE: Fans driven to a high RPM in dense air cannot maintain expected RPM and are considered bad by the MP leading to a "False Fan Failure" condition.

Power Control

If active, the manageability firmware is responsible for monitoring the power switch on the front panel. Setting this switch to the ON position is a signal to the MP to turn on 48 V DC power to the server. The `PE` command can also be used to send this signal. This signal does not always generate a transition to the powered state. The following conditions prevent the manageability firmware from applying 48 V DC power to the server:

- Insufficient number of active bulk power supplies.
- Insufficient number of I/O fans.
- Insufficient number of main fans.
- Ambient temperature is in an OVERTEMP HIGH condition.

Unless one of the following conditions occurs, 48 V DC power to the server is maintained:

- A main fan failure causes there to be an insufficient number of main fans.
- A I/O fan failure causes there to be an insufficient number of I/O fans.
- Ambient temperature reaches an OVERTEMP HIGH condition.
- The front panel power switch is turned OFF.
- The `PE` command is issued to the manageability firmware to turn off power to the server cabinet.

Management Processor Commands

Table 5-11 lists the server MP commands.

Table 5-11 MP Commands

Command	Description
BO	Boot a partition
DF	Display FRU Information of an Entity
MA	Return to Main Menu
MR	Modem reset
PE	Power entities on or off
RE	Reset entity
RR	Reset partition for reconfiguration
RS	Reset a partition
SYSREV	Returns all system revisions
TC	Send a TOC signal to a partition
TE	Broadcast a message to all users of the MP command handler
WHO	Display list of MP connected users

Table 5-12 lists the server status commands

Table 5-12 Status Commands

Command	Description
CP	Display partition cell assignments
HE	Display the list of available commands
LS	Display LAN connected console status
MS	Display modem status
PS	Display detailed power and hardware configuration status

Table 5-13 lists the server system and access configuration commands

Table 5-13 System and Access Configuration Commands

Command	Description
CA	Configure asynchronous and modem parameters
CC	Initiate a complex configuration
CG	Generate ssl key pair and self signed certificate
CP	Display partition cell assignments
DATE	Set the time and date
DC	Reset parameters to default configuration
DE	Display entity status
DI	Disconnect remote or LAN console
DFW	Duplicate firmware
DU	Display devices on bus
FW	Firmware update utility
ID	Change certain stable complex configuration profile fields
IF	Display network interface information
IT	Modify command interface inactivity time-out
LC	Configure LAN connections
LS	Display LAN connected console status
PARPERM	Enable/disable interpartition security
PD	Modify default Partition for this login session
PWRGRD	Enables you to configure the power grid
RL	Re-key complex profile lock
RU	Reset MP bus device
SA	Display and set MP remote access
SO	Configure security options and access control
XD	MP diagnostic and reboot

Updating Firmware

The server MP pulls a firmware update from an FTP server over the management LAN. When replacing a cell board to a currently operating system, see "Cell Break-Fix Upgrade and Downgrade Procedure" (page 132).

Instructions

- Log into the server console through the LAN, local serial, or remote serial locations.
- Issue the `FW` command to start the firmware update.

FW – Firmware Update

- Access Level: Administrator
- Scope: Complex
- Description: This command prompts you for the location of the firmware software and the FLASH handle (from a list) which represents all upgradeable entities.

Once you reply **`Y`** to the confirmation request, the firmware update firmware makes the connection to the FTP server at the IP address given using you and password details supplied. The appropriate files are downloaded and burned into the selected Flash memories. Note that the firmware update validates the image to determine that the image name supplied is that of a valid image type prior to burning the image into the Flash memory.

Possible Error Messages

- Could not ping host
- Could not validate CRC of packet
- Could not find firmware update
- Invalid password

Firmware Update Tool for IPF

The OS Initate-able Firmware Update Tool for IPF enables the firmware update process to begin and end in the operating system. Minimal interaction from you is required. The tool runs only during installation after which the system is rebooted.

NOTE: The OS Initiate-able Firmware Update Tool for IPF can be used only when system firmware is being upgraded and no other firmware components are to be updated.

In multi-cell systems, the tool updates the firmware for all the cells only in the partition from which the tool is launched. All the other partitions are unaffected and continue to run on the previous version firmware. To update all the partitions, the tool must be run on all the partitions.

NOTE: The use of this tool is restricted to super users.

Installing and Uninstalling on HP-UX

Installing the Firmware Update Tool on HP-UX

To update the firmware, follow these steps:

Enter the `swinstall` command.

```
# swinstall -x autoreboot=true -s /tmp/FUTests/OSIFU.depot PHSS_28608
```

Figure 5-12 swinstall Output

```
=======  08/21/03 20:30:52 PDT  BEGIN swinstall SESSION
         (non-interactive) (jobid=hpdst70-0011)

       * Session started for user "root@hpdst70".

       * Beginning Selection
       * Target connection succeeded for "hpdst70:/".
       * Source:                /tmp/FUTests/OSUFU.depot
       * Targets:               hpdst70:/
       * Software selections:
            PHSS_28608.KERN-RUN,r=1.0,a=HP-
UX_B.11.23,v=HP,fr=1.0,fa=HP-UX_B.11.23
       * Selection succeeded.


       * Beginning Analysis and Execution
       * Session selections have been saved in the file
         "/.sw/sessions/swinstall.last".
       * The analysis phase succeeded for "hpdst70:/".
```

Uninstalling the Firmware Update Tool on HP-UX

Enter the `swremove` command.

```
# swremove -x autoreboot=true PHSS_28608
```

Figure 5-13 swremove Output

```
=======  10/09/03 05:54:34 PDT  BEGIN swremove SESSION
         (non-interactive) (jobid=hpdst28-0014)

       * Session started for user "root@hpdst28".

       * Beginning Selection
       * Target connection succeeded for "hpdst28:/".
       * Software selections:
            PHSS_28608.KERN-RUN,l=/,r=1.0,a=HP-
UX_B.11.23_64,v=HP,fr=1.0,fa=HP-UX_B.11.23_IA
       * Selection succeeded.


       * Beginning Analysis
       * Session selections have been saved in the file
         "/.sw/sessions/swremove.last".
       * The analysis phase succeeded for "hpdst28:/".
       * Analysis succeeded.


       * Beginning Execution
       * The execution phase succeeded for "hpdst28:/".
       * Execution succeeded.


NOTE:    More information may be found in the agent logfile using the
         command "swjob -a log hpdst28-0014 @ hpdst28:/".

=======  10/09/03 05:54:47 PDT  END swremove SESSION (non-interactive)
         (jobid=hpdst28-0014)
```

Installing on Linux

Install the firmware update with the `rpm` command.

Enter the `rpm` command.

```
# rpm -i FWPHSS_28608.rpm
```

Figure 5-14 rpm Output

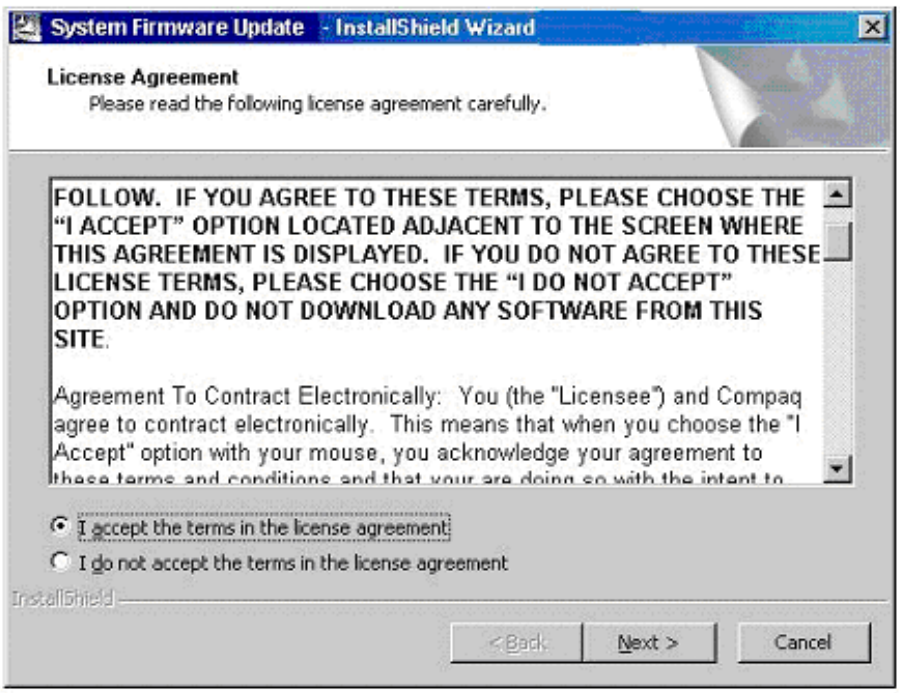
```
Preparing...                ########################################### [100%]
1:FWUPDATE                  ########################################### [100%]
```

Installing on Windows

You must download and run an executable file in Windows. Upon running the utility, a setup wizard guides you through the installation steps. To run the setup wizard, follow these steps:

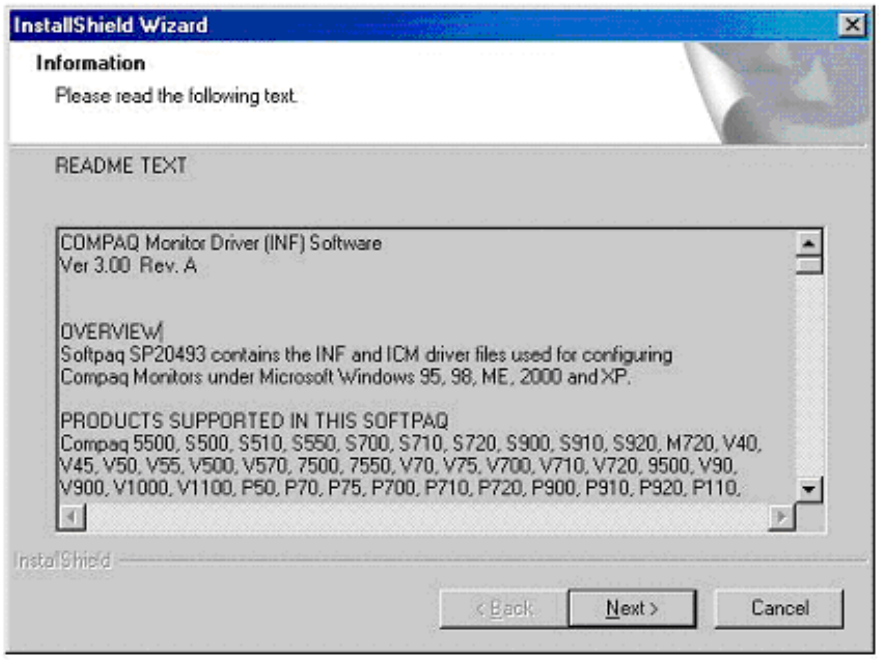
1. Run the executable file.
2. Accept the terms of the agreement and click **Next**.

Figure 5-15 License Agreement



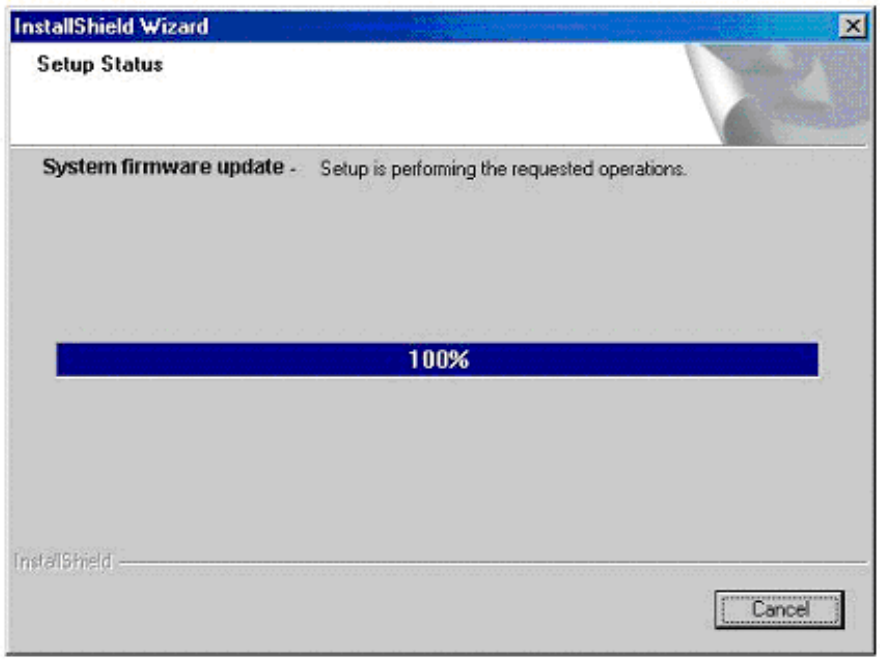
3. Carefully read the `readme` text and click **Next**.

Figure 5-16 Information Screen



4. The status of the installation displays in the Setup Status screen.

Figure 5-17 Setup Status



6 Removing and Replacing Components

This chapter describes how to shut down nPartitions, power off the server, and remove and replace hardware components in the server.

HP Integrity rx7620 Server Field Replaceable Units (FRUs)

These procedures are intended for use by trained and experienced HP service personnel only.

Hot-Pluggable FRUs

A FRU is defined as hot-pluggable if it can be removed from the chassis while the system remains operational but requires software intervention prior to removing the FRU.

The following FRUs are hot-pluggable:

- Removing and Replacing a Disk Drive
- Removing and Replacing a Core I/O Board
- Removing and Replacing a Cell Board
- Removing and Replacing a PCI/PCI-X Card

Hot-Swappable FRUs

A FRU is hot-swappable if it can be removed from the chassis while the server remains operational and requires no software intervention prior to removing the FRU.

The following Frus are hot-swappable:

- Removing and Replacing a Front Smart Fan Assembly
- Removing and Replacing a Rear Smart Fan Assembly
- Removing and Replacing a PCI Smart Fan Assembly
- Removing and Replacing a Bulk Power Supply

Other FRUs

To remove and replace the FRUs that are neither hot-pluggable nor hot-swappagle, you must shut down HP-UX in the nPartition where the FRU resides, and power to the FRU must be turned off before removing it. For complete instructions, see “Shutting Down nPartitions and Powering Off Hardware Components ” (page 96) and Appendix D.

These FRUs include:

- Removing and Replacing a CD/DVD/DAT Drive
- Removing and Replacing a DIMM
- Removing and Replacing the PCA Front Panel Board
- Removing and Replacing the PCI-X Card Cage Assembly
- Removing and Replacing the PCI OLR Assembly
- Removing and Replacing the System Backplane
- Removing and Replacing a Central Processing Unit

Safety and Environmental Considerations

WARNING! Before proceeding with any installation, maintenance, or service on a system that requires physical contact with electrical or electronic components, be sure that either power is removed or safety precautions are followed to protect against electric shock and equipment damage. Observe all WARNING and CAUTION labels on equipment. All installation and service work must be done by qualified personnel.

Communications Interference

HP system compliance tests are conducted with HP-supported peripheral devices and shielded cables, such as those received with the system. The system meets interference requirements of all countries in which it is sold. These requirements provide reasonable protection against interference with radio and television communications.

Installing and using the system in strict accordance with HP instructions minimizes the chances that the system will cause radio or television interference. However, HP does not guarantee that the system will not interfere with radio and television reception.

Take the following precautions:

- Use only shielded cables.
- Install and route the cables per the instructions provided.
- Ensure that all cable connector screws are firmly tightened.
- Use only HP-supported peripheral devices.
- Ensure that all panels and cover plates are in place and secure before system operation.

Electrostatic Discharge

HP systems and peripherals contain assemblies and components that are sensitive to electrostatic discharge (ESD). Carefully observe the precautions and recommended procedures in this guide to prevent component damage from static electricity.

CAUTION: Connect to ground with a wrist strap. Connection may be made to any grounded metal assembly in the cabinet. Both you and the electronic devices must be grounded to avoid static discharges that can cause damage.

Take the following precautions:

- Prepare an ESD-safe work surface large enough to accommodate the various assemblies handled during the upgrade. Use a grounding mat and an anti-static wrist strap, such as those included in the ESD Field Service Kit (A3024-80004).
- The anti-static bag cannot function as a static dissipating mat. Do not use the anti-static bag for any other purpose than to enclose a product.
- Treat all assemblies, components, and interface connections as static sensitive.
- When unpacking cards, interfaces, and other accessories that are packaged separately from the server, keep the accessories in the conductive plastic bags until you are ready to install them.
- Avoid working in carpeted areas, and keep body movement to a minimum while installing accessories.

Shutting Down nPartitions and Powering Off Hardware Components

When you remove and replace hardware, you may need to shut down one or more nPartitions on the server. In some cases, you will also need to power off hardware components as part of the remove and replace procedure.

This section gives details on how to ensure that the nPartiton is properly shut down, and it also describes how to power off and on hardware components.

Shutting Down an nPartition

This procedure is for checking an nPartition boot status and, if needed, shutting down HP-UX on the nPartition.

1. Advise the customer that the system (one or more nPartitions) must be shut down for repairs.

   Ensure that the customer has a current backup and inform the customer of the anticipated downtime.

2. Log in to the MP.
3. Use the Virtual Front Panel (VFP) to view the current state of the nPartition to be shut down.

   From the MP Main menu, enter **`VFP`** to access the Virtual Front Panel menu, and select the nPartition whose boot state you want to view.

   To exit the VFP display, enter **Control-b** (**^B**).

   If an nPartition has booted HP-UX or if it is in the process of launching HP-UX, you must shut down HP-UX on the nPartition.

   When HP-UX is running on an nPartition, its VFP displays "HP-UX heartbeat" with a blinking asterisk (`*`) to indicate its interactivity.

4. From the MP Main menu, enter **`CO`** and select the console for the nPartition you plan to shut down.

   You should have access to the HP-UX login prompt (or command line) when using the nPartition console. If you have no interactivity at the console, HP-UX might be halted or hung.

5. At the nPartition console, log in to HP-UX and shut down the operating system.

   After making arrangements with the customer, issue the `shutdown` command to shut down and halt HP-UX on the nPartition.

   For example, the `shutdown -h 240` command shuts down and halts HP-UX on the nPartition after waiting for a grace period of four minutes (240 seconds).

   To reboot the nPartition after it is halted, use the MP Command menu `RS` command to restart the nPartition.

Powering Off Hardware Components

To power off individual components or the entire cabinet, follow these steps:

1. Log in to the MP.
2. If the component you will power off is assigned to an nPartition, use the VFP to view the current boot state of the nPartition.

   HP-UX on the nPartition must be shut down before you power off any of the hardware assigned to the nPartition. See Appendix D.

   When you are certain the nPartition is not running HP-UX, you can power off components that belong to the nPartition.

   For details on determining the nPartition boot state and shutting down HP-UX, see Appendix D.

3. Access the MP Command menu.

   From the MP Main menu, enter **`CM`** to access the Command menu.

4. To check details about the hardware component you plan to power off, use the MP Command menu `PS` command.

   The `PS` command enables you to check the status of the cabinet, system backplane, MP core I/O, PCI power domains (or bricks) in the I/O card cage, and cells.

5. Use the MP Command menu `PE` command to power off the hardware component.

   Using the `PE` command, you can power the cabinet (including all cells and I/O in the cabinet) on or off, individual cells along with their associated I/O domain, or PCI power domains (bricks).

   Using the Command menu `PE` command to manage cabinet power is equivalent to using the front panel power switch.

6. If you need to disable *all power* in the entire cabinet, you also must disconnect all power cords to disable all housekeeping power.

IMPORTANT: Because of power redundancy capabilities, it is important that each power cord plug into its proper receptacle. Label all power cords to indicate into which receptacle each cord plugs. Ensure that the cabinet power has been turned off before disconnecting any power cords.

7. Perform the hardware removal and replacement procedure for the powered off component.

Powering On the System

To power on the system after a repair, follow these steps:

1. If needed, reconnect all the power cords to the appropriate receptacles and power on the system.
2. To power on the hardware component that was powered off and replaced, use the MP Command menu `PE` command.
3. To verify that power is enabled to the newly replaced part, use the `PS` command. For example: Enter `C` from within the `PS` command to select the cell.

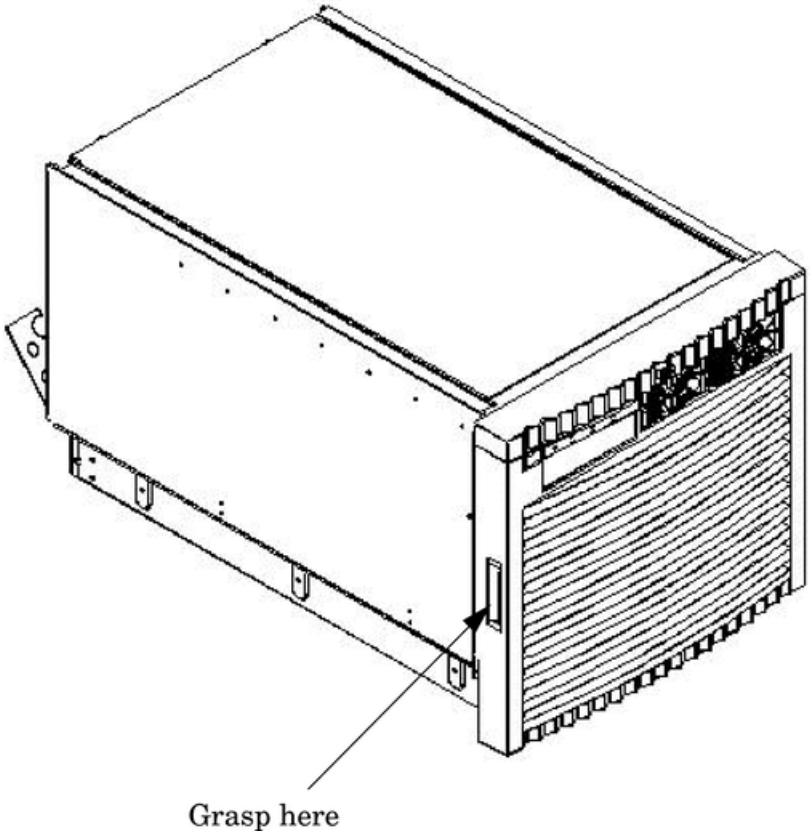
   If power is absent from the part, enter the **`PE`** command and select `T` to power on the entire cabinet.

NOTE: You might need to allow time for some components to complete power on self test (POST) before a complete status is available.

4. Reboot each nPartition. See Appendix D.
5. Verify system functionality by using the On-line Diagnostic Support Tools Manager (STM) exerciser.

Removing and Replacing the Front Bezel

Figure 6-1 Bezel Hand Slots



Removing the Front Bezel

From the front of the server, grasp both sides of the bezel and pull firmly toward you. The catches release and the bezel pulls free.

Replacing the Front Bezel

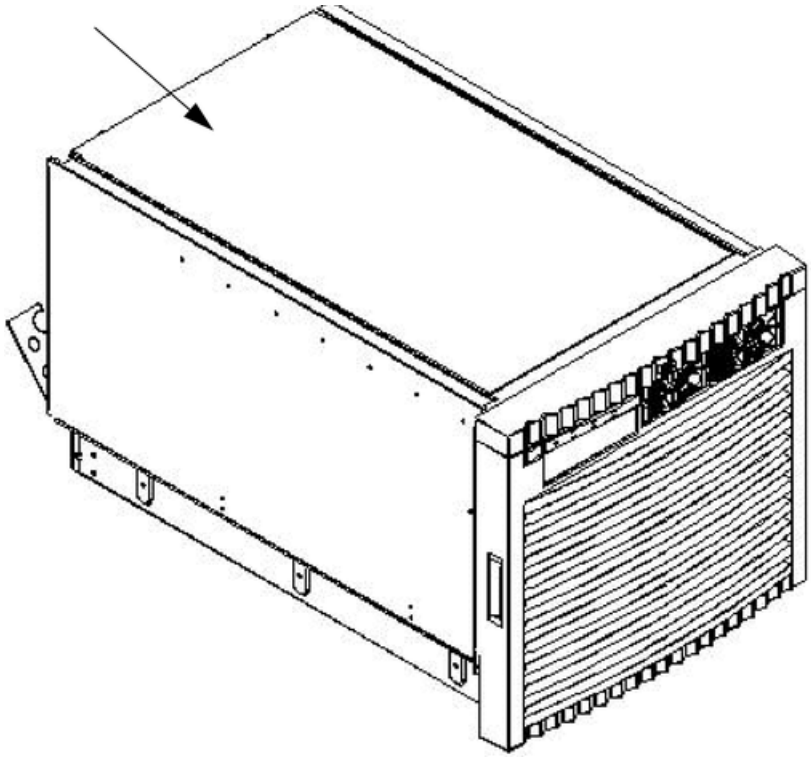
From the front of the server, grasp both sides of the bezel and push toward the server. The catches will secure the bezel to the chassis.

Removing and Replacing the Top Cover

It is necessary to remove and replace one or more of the covers to access the components within the server chassis.

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

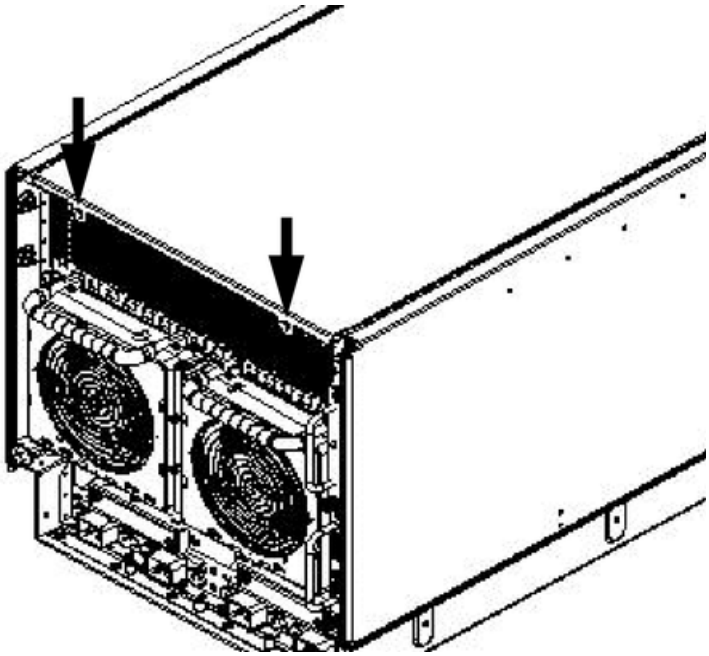
Figure 6-2 Top Cover



Removing the Top Cover

To remove the top cover, follow these steps:

Figure 6-3 Top Cover Retaining Screws



1. Loosen the retaining screws securing the cover to the rear of the chassis.
2. Slide the cover toward the rear of the chassis.

3. Lift the cover up and away from the chassis.

Replacing the Top Cover

To replace the top cover, follow these steps:

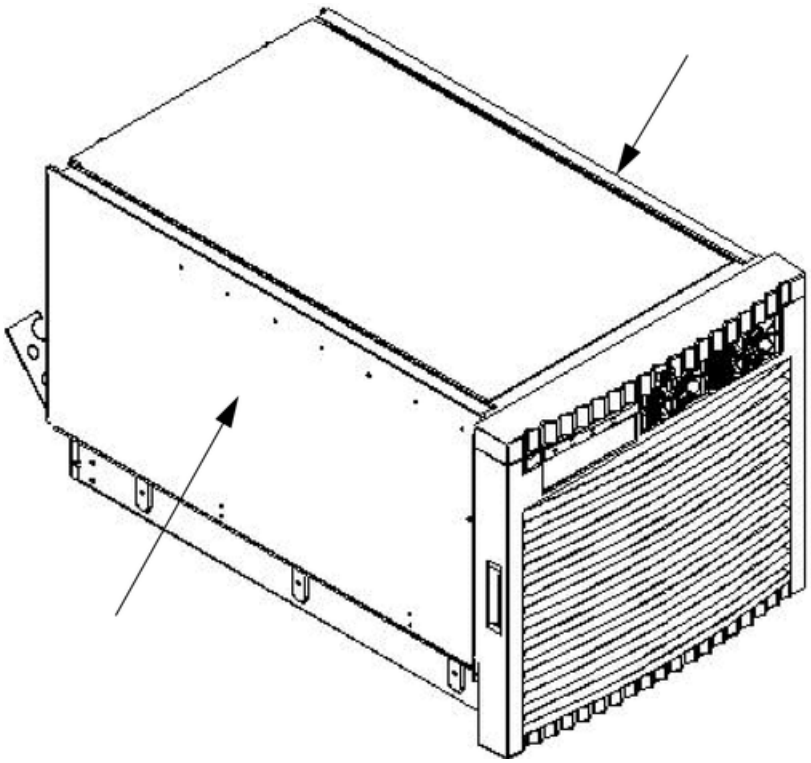
1. Slide the cover into position. It should easily slide into position. Use a slow firm pressure to properly seat the cover.
2. Tighten the retaining screws to secure the cover to the chassis.

Removing and Replacing a Side Cover

It is necessary to remove and replace one or both of the side covers to access the components within the server chassis.

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

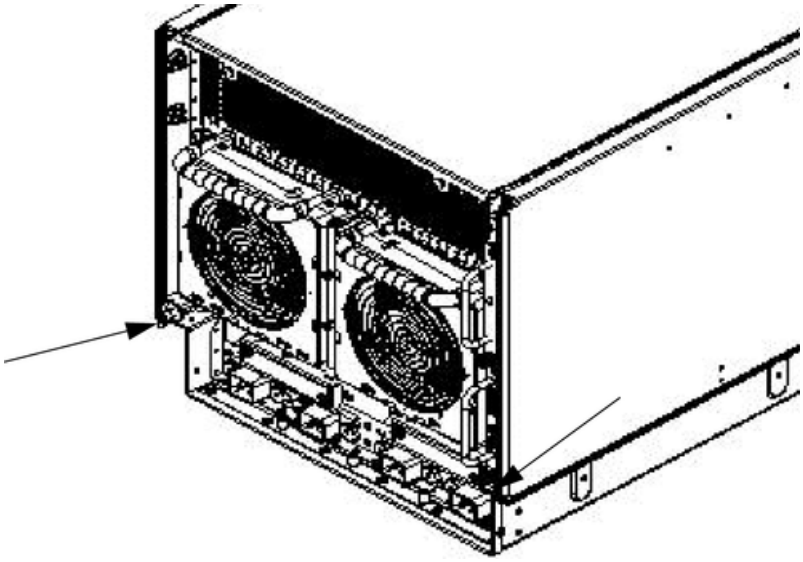
Figure 6-4 Side Cover Locations



Removing a Side Cover

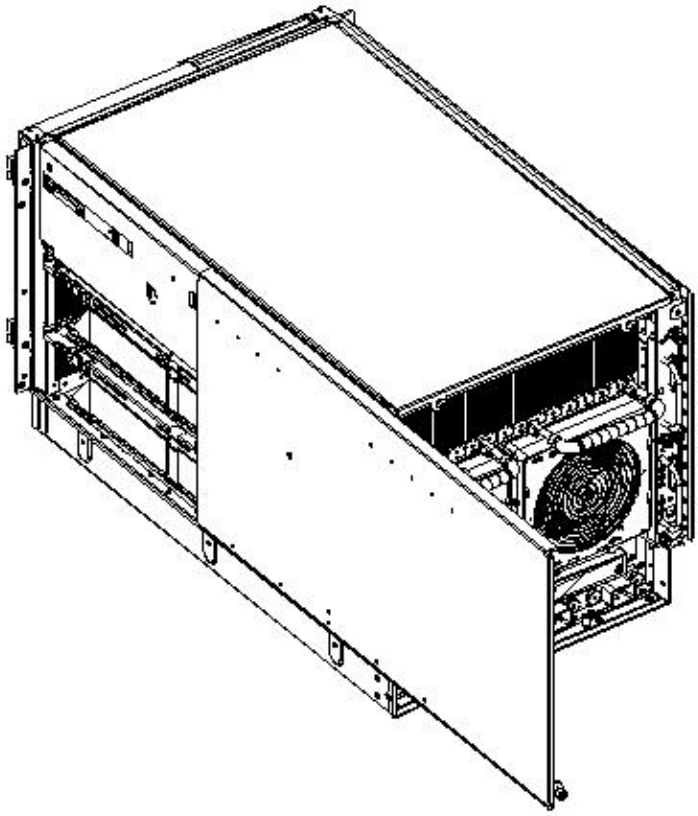
To remove the side cover, follow these steps:

Figure 6-5 Side Cover Retaining Screws



1. Loosen the retaining screw securing the cover to the chassis.
2. Slide the cover from the chassis.

Figure 6-6 Side Cover Removal Detail



Replacing a Side Cover

To replace the side cover, follow these steps:

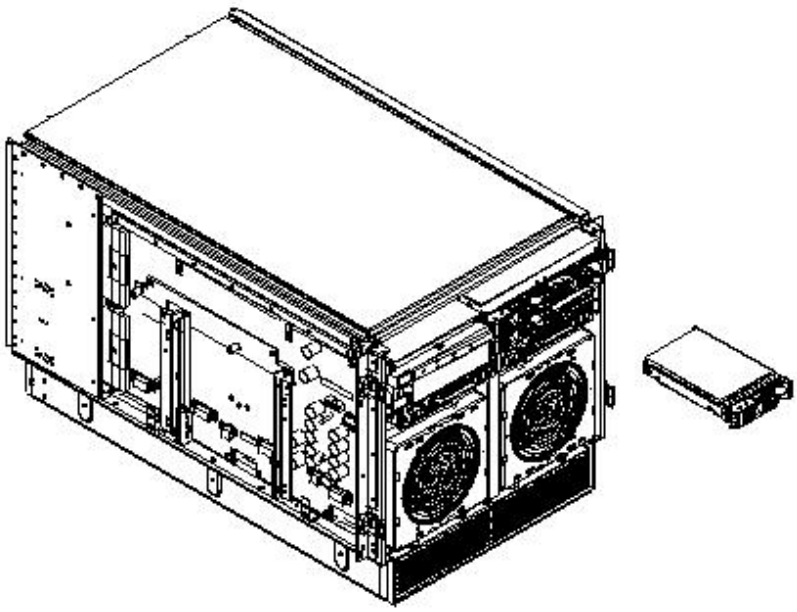
1. Slide the cover in position.
2. The cover easily slides into position. Use a slow firm pressure to properly seat the cover.
3. Tighten the retaining screw to secure the cover to the chassis.

Removing and Replacing a Disk Drive

The disk drives are located in the front of the chassis. You must shut down the nPartition to remove or replace the drive that serves as the boot disk, if the boot disk is not mirrored. For more information, see "Shutting Down nPartitions and Powering Off Hardware Components " (page 96). The remainder of the internal disk drives are hot pluggable.

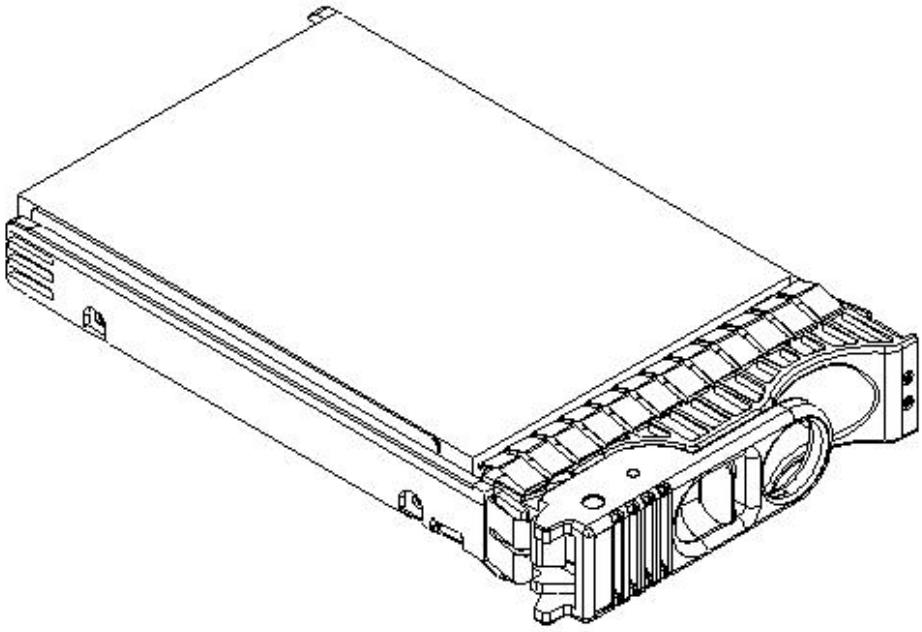
CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Figure 6-7 Disk Drive Location



Removing a Disk Drive

Figure 6-8 Disk Drive Detail



To remove the disk drive, follow these steps:

1. Disengage the front locking latch on the disk drive by pushing the release tab to the right and the latch lever to the left.
2. Pull forward on the front locking latch and carefully slide the disk drive from the chassis.

Replacing a Disk Drive

NOTE: Sometimes using the `diskinfo` and `ioscan` commands will produce cached data. To resolve this, these commands should be run when the disk drive is removed.

To replace the disk drive, follow these steps:

1. Before installing the disk drive, enter the following command:

   `#diskinfo -v /dev/rdsk/cxtxdx`

2. Enter the following command:

   `#ioscan -f`

   The response message after running this command is:

   `NO_HW`

3. Be sure the front locking latch is open, then position the disk drive in the chassis.
4. Slide the disk drive into the chassis. Use a slow firm pressure to properly seat the connection.
5. Depress the front locking latch to secure the disk drive in the chassis.
6. Spin up the disk by entering one of the following commands:

   `#diskinfo -v /dev/rdsk/cxtxdx`

   `#ioscan -f`

   `#pvcreate`

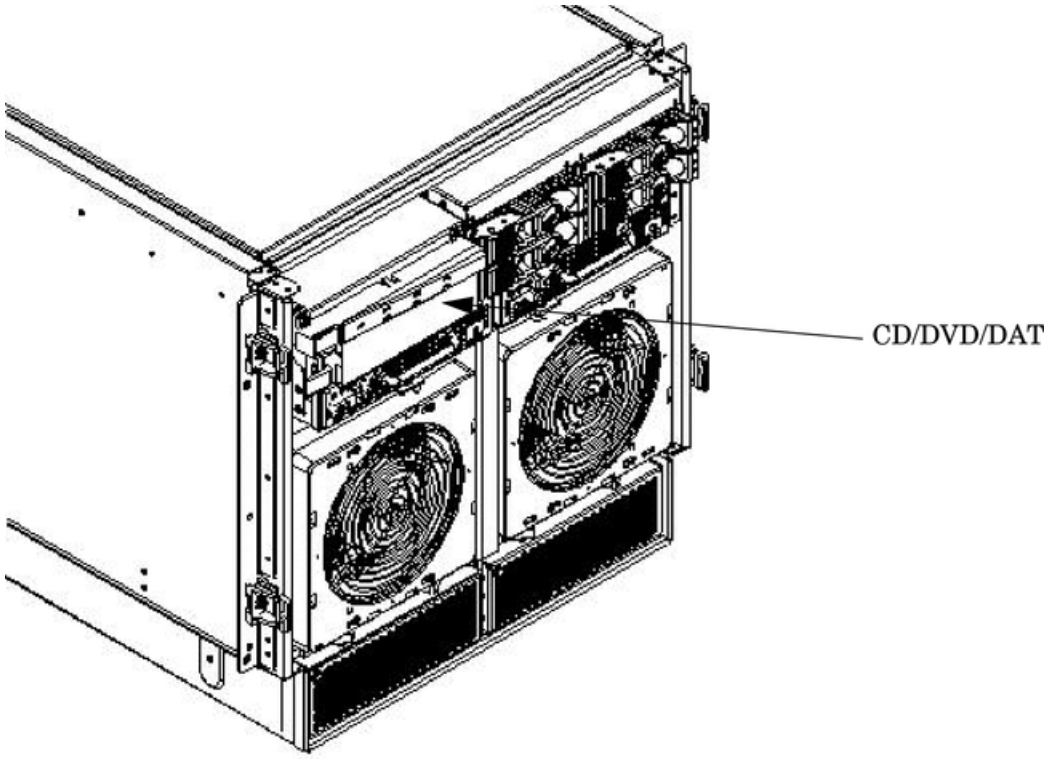
   `#vgcfgrestore`

Removing and Replacing a CD/DVD/DAT Drive

The CD/DVD/DAT is located in the front of the chassis. You must remove the system power to this component before attempting to remove or replace it. For more information, see "Shutting Down nPartitions and Powering Off Hardware Components " (page 96).

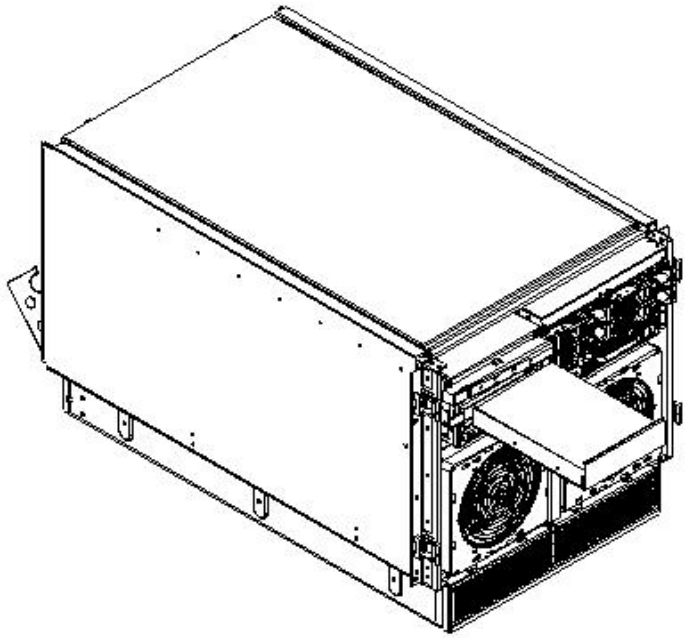
CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Figure 6-9 CD/DVD/DAT Location



Removing a CD/DVD/DAT Drive

Figure 6-10 CD/DVD/DAT Detail



To remove the CD/DVD/DAT drive, follow these steps:

1. Depress the front locking latch to loosen the drive from the chassis.

2. Disengage the cables from the rear of the CD/DVD/DAT.
3. Remove the rails and clips from the drive.
4. Slide the drive from the chassis.

Replacing a CD/DVD/DAT Drive

To replace the CD/DVD/DAT drive, follow these steps:

1. Attach the rails and clips to the drive.
2. Connect the cables to the rear of the CD/DVD/DAT.
3. Slide the drive into the chassis.

CAUTION: Before attempting to install the drive into the chassis, position the data cable over the top of the drive to avoid pinching the cable during installation.

4. The drive easily slides into the chassis. Use a slow firm pressure to properly seat the drive.

Removing and Replacing a Front Smart Fan Assembly

The front smart fan assembly is located in the front of the chassis. The fan assembly is a hot-swappable component.

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Figure 6-11 Front Smart Fan Assembly Locations

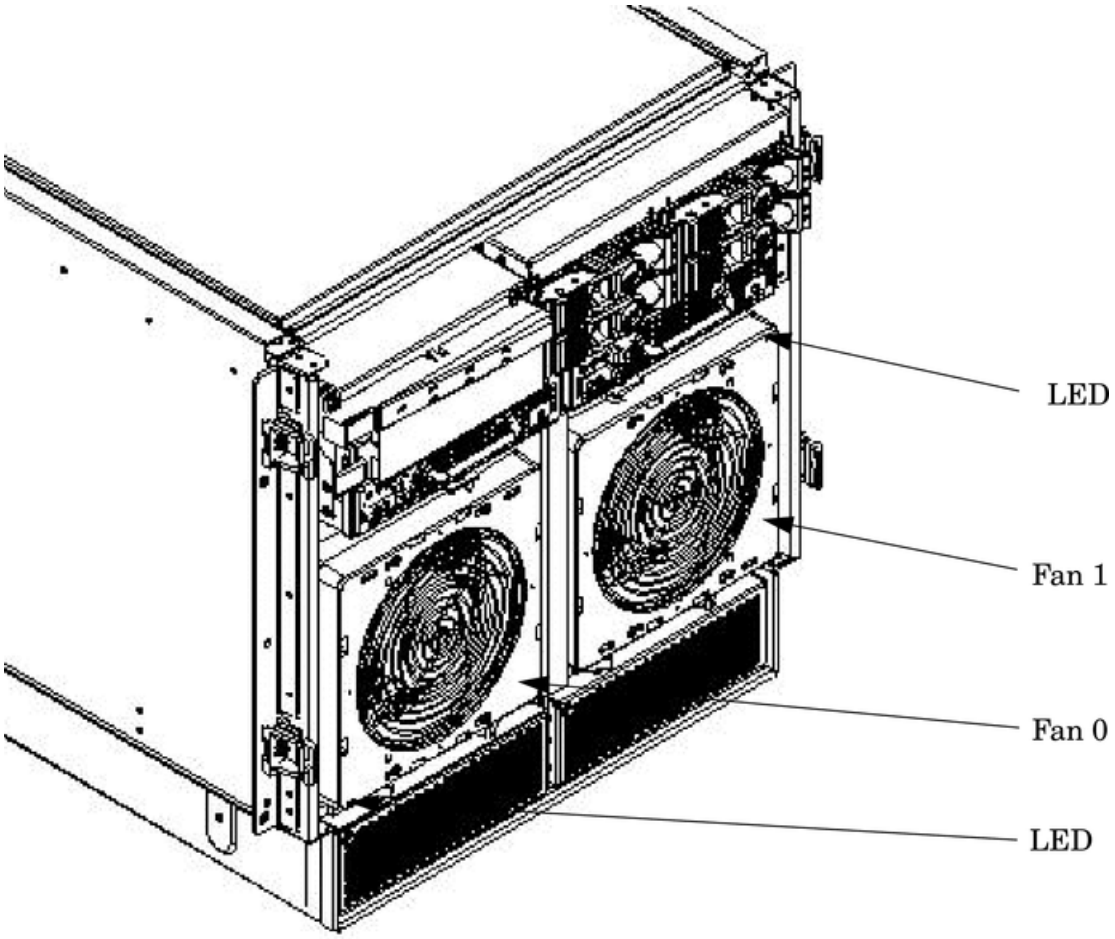
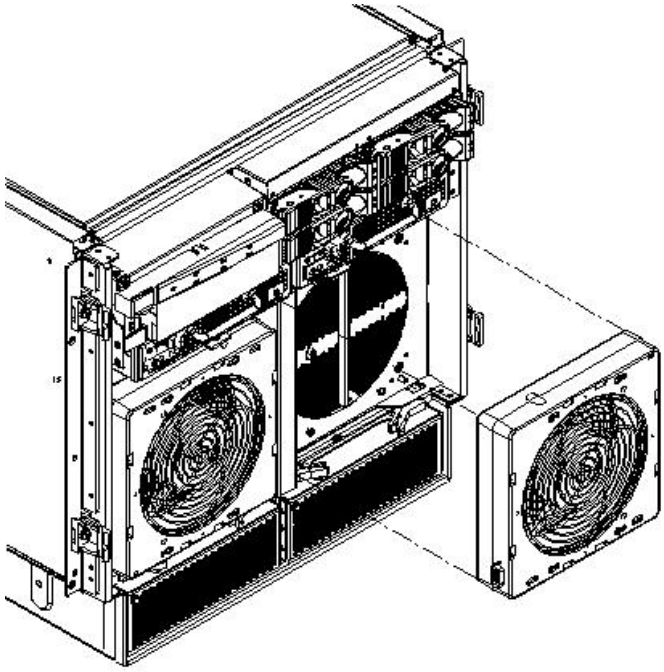


Table 6-1 Front Smart Fan Assembly LED Indications

LED State	Description
On Green	Fan is at speed and in sync or not at speed less than six seconds
Flashing Yellow	Fan is not keeping up with speed/sync pulse for greater than six seconds
Flashing Red	Fan failed/stalled or has run slow or fast for greater than six seconds
Off	Fan is not installed or no power is applied to fan

Removing a Front Smart Fan Assembly

Figure 6-12 Front Fan Detail



To remove a front smart fan assembly, follow these steps:

1. Remove the front bezel.
2. Push the Fan Release Pin away from the fan.
3. Slide the fan away from the connector.
4. Pull the fan away from the chassis.

Replacing a Front Smart Fan Assembly

To replace a front smart fan assembly, follow these steps:

1. Position the fan assembly on the chassis fan guide pins.
2. Slide the fan into the connector.
3. Verify that the fan release pin is in the locked position.
4. Replace the front bezel.

NOTE: A green fan LED indicates the fan is operational.

Removing and Replacing a Rear Smart Fan Assembly

The rear smart fan assembly is located in the rear of the chassis. The fan assembly is a hot-swappable component.

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Figure 6-13 Rear Smart Fan Assembly Locations

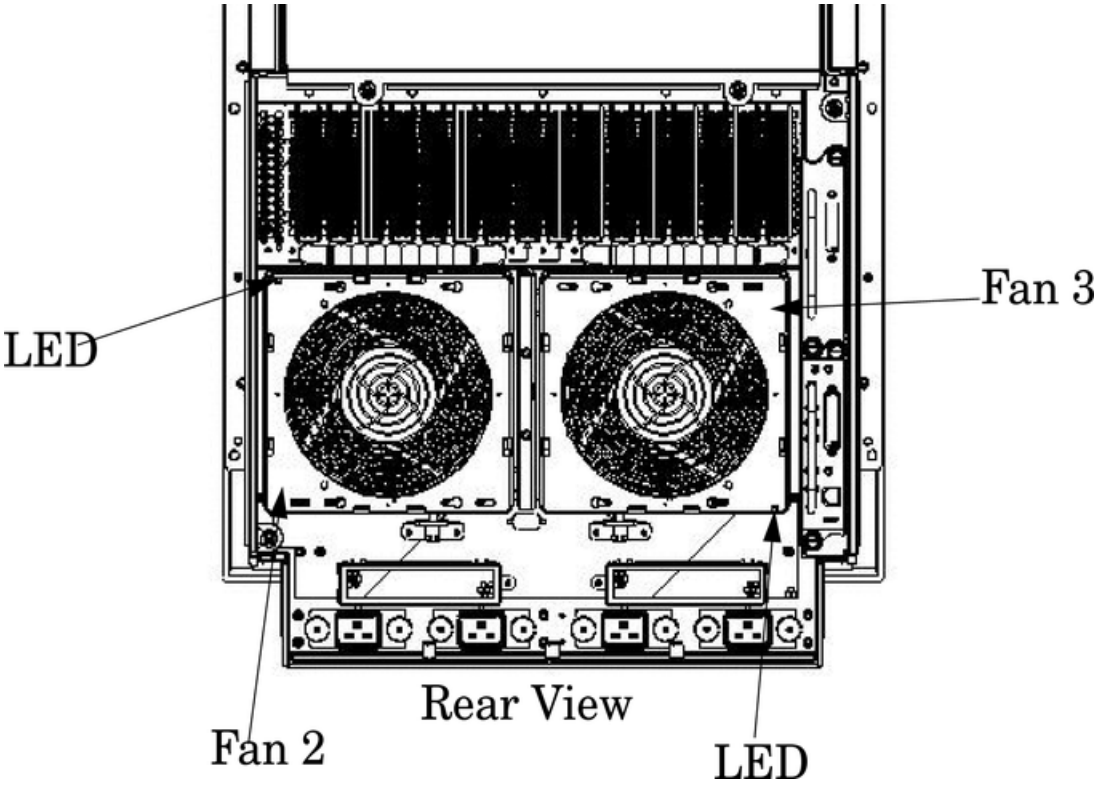
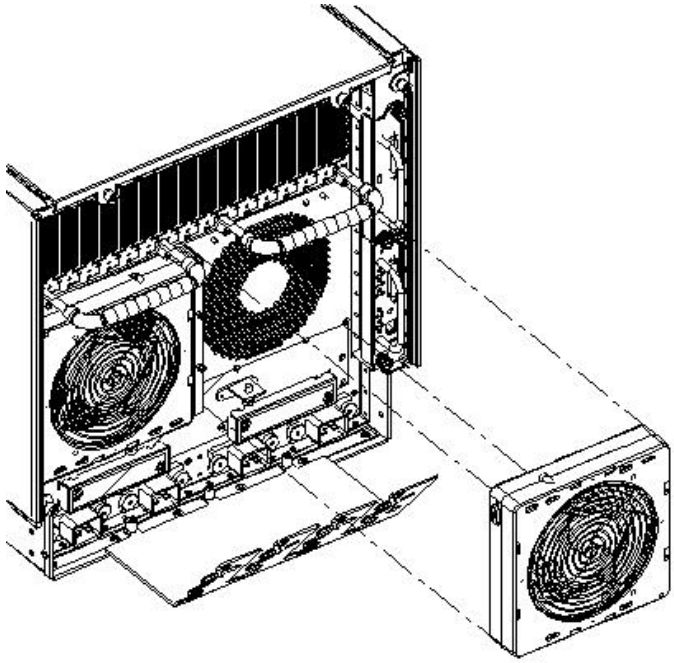


Table 6-2 Rear Smart Fan Assembly LED Indications

LED State	Description
On Green	Fan is at speed and in sync or not at speed less than six seconds
Flashing Yellow	Fan is not keeping up with speed/sync pulse for greater than six seconds
Flashing Red	Fan failed/stalled or has run slow or fast for greater than six seconds
Off	Fan is not installed or no power is applied to fan

Removing a Rear Smart Fan Assembly

Figure 6-14 Rear Fan Detail



To remove a rear smart fan assembly, follow these steps:

1. Push the fan release pin away from the fan.
2. Slide the fan away from the connector.
3. Pull the fan away from the chassis.

Replacing a Rear Smart Fan Assembly

To replace a front smart fan assembly, follow these steps:

1. Carefully position the fan assembly on the chassis fan guide pins.
2. Slide the fan into the connector.
3. Verify that the fan release pin is in the locked position.

NOTE: A green fan LED indicates the fan is operational.

Removing and Replacing a PCI Smart Fan Assembly

The PCI smart fan assembly is located at the front of the PCI card cage, toward the middle top portion of the server. The fan assembly is a hot-swappable component.

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Figure 6-15 PCI Smart Fan Assembly Location

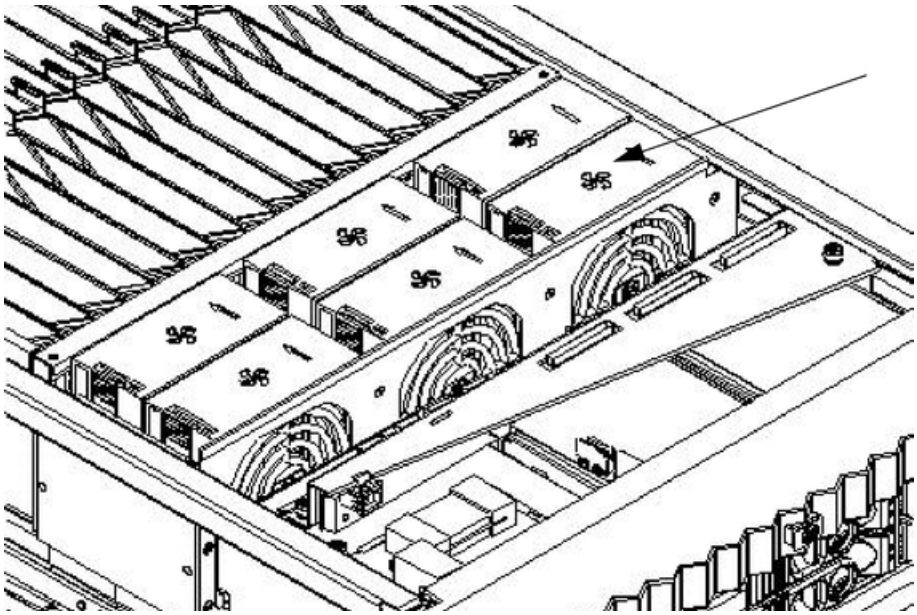
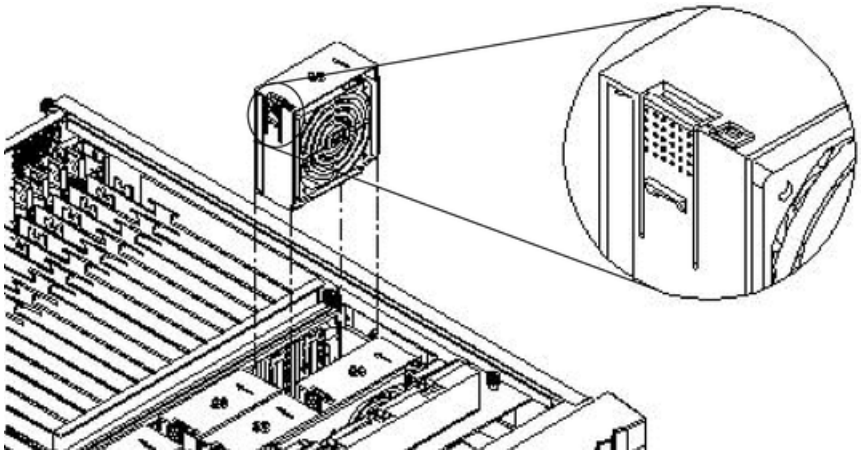


Table 6-3 Smart Fan Assembly LED Indications

LED State	Description
On Green	Fan is at speed and in sync or not at speed less than six seconds
Flashing Yellow	Fan is not keeping up with speed/sync pulse for greater than six seconds
Flashing Red	Fan failed/stalled or has run slow or fast for greater than six seconds
Off	Fan is not installed or no power is applied to fan

Removing a PCI Smart Fan Assembly

Figure 6-16 PCI Smart Fan Assembly Detail



To remove a PCI smart fan assembly, follow these steps:

1. Remove the top cover.

2. Grasp the fan with thumb and forefinger while depressing the locking tab.

NOTE: The two right side fans, as viewed from the front, are located very close to the chassis. It might be necessary to use a tool, such as a flatblade screwdriver, to assist in removing them.

3. Slide the fan upward from the chassis.

Replacing a PCI Smart Fan Assembly

To replace a PCI smart fan assembly, follow these steps:

1. Carefully position the fan assembly in the chassis.
2. The fan easily slides into the chassis. Use a slow firm pressure to properly seat the connection.
3. Replace the top cover.

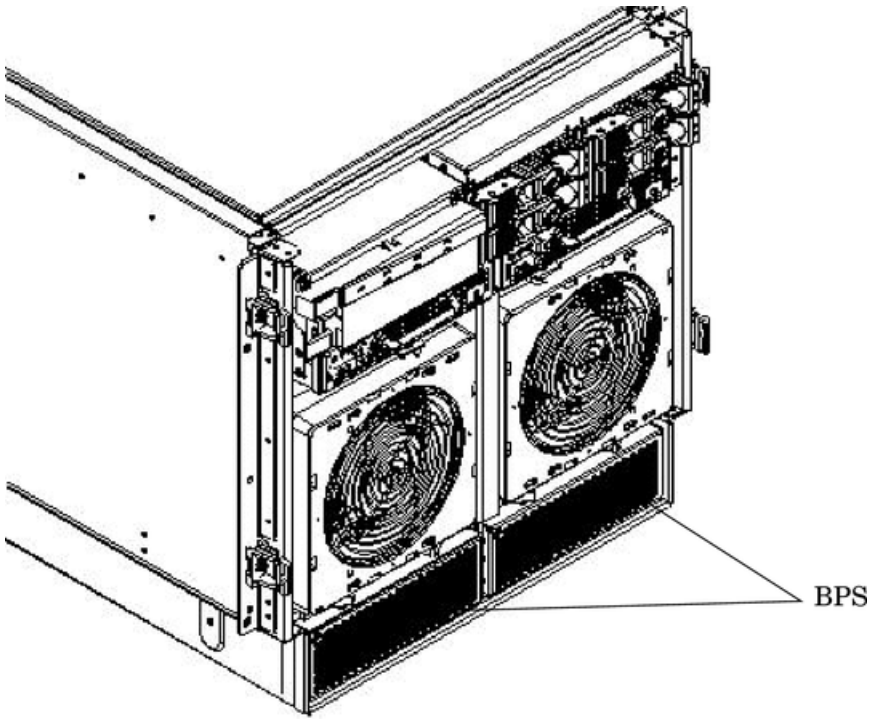
NOTE: A green fan LED indicates the fan is operational.

Removing and Replacing a Bulk Power Supply

The bulk power supply is located in the front of the chassis. The BPS is a hot-swappable component.

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

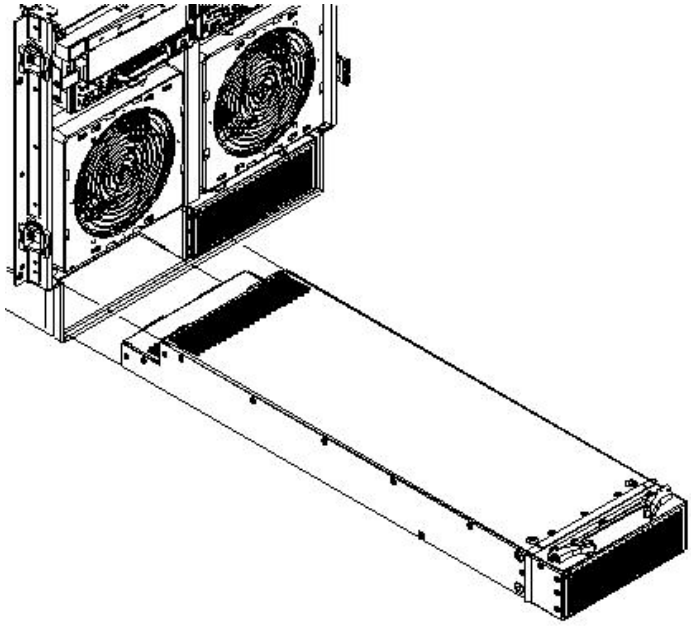
Figure 6-17 BPS Location



IMPORTANT: When a BPS is pulled from the server and then immediately re-inserted, the server might report an overcurrent condition and shut down.

Removing a BPS

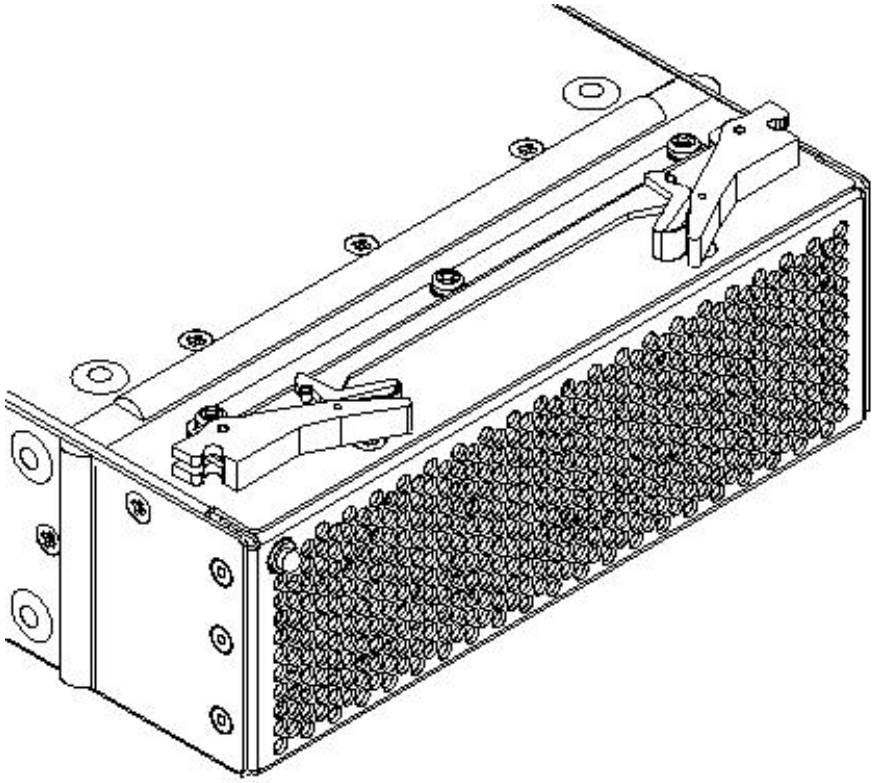
Figure 6-18 BPS Detail



To remove a BPS, follow these steps:

1. Remove the front bezel.
2. Open the extraction levers by pulling them outward.

Figure 6-19 Extraction Levers



3. Slide the BPS forward using the extractions levers to remove it from the chassis.

CAUTION: Use caution when handling the BPS. A BPS weighs 18 lbs.

Replacing a BPS

To replace a BPS, follow these steps:

1. Verify that the extraction levers are in the open position, then insert the BPS into the empty slot.
2. The BPS easily slides into the chassis. Use a slow firm pressure to properly seat the connection.
3. Ensure the BPS has seated by closing the extraction levers.
4. Replace the front bezel.

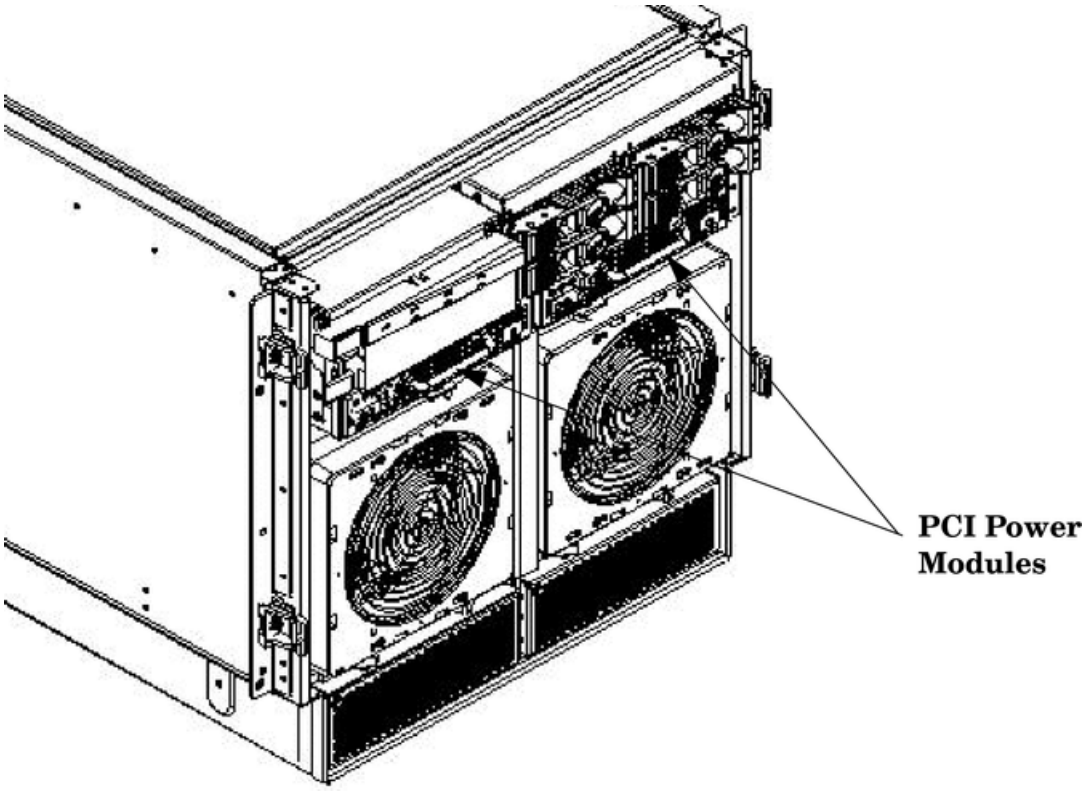
NOTE: The BPS LED should show BPS operational and no fault. The BPS LED should be green.

Removing and Replacing a PCI Power Module

The PCI power module is located in the front of the chassis. The system power must be turned off to replace this FRU. For more information, see "Shutting Down nPartitions and Powering Off Hardware Components " (page 96).

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Figure 6-20 PCI Power Module Location



Preliminary Procedures

Before removing or replacing a PCI power module, follow these steps:

1. Identify the failed power supply. Table 6-4 describes the PCI-X Power Supply LED state.
2. Connect to ground with a wrist strap.
3. Visually inspect the replacement part for proper number and revision.
4. Shut down the partition and power off the PCI domain.
5. Remove the front bezel.

Table 6-4 PCI-X Power Supply LEDs

LED	Driven By	State	Description
Power	Each supply	On Green	All output voltages generated by the power supply are within limits.
		Off	Power to entire system has been removed.
Attention	MP through PCI LPM[1]	Yellow	For LED status in combination with the green power LED for PCI-X slot status, see Table 5-9.

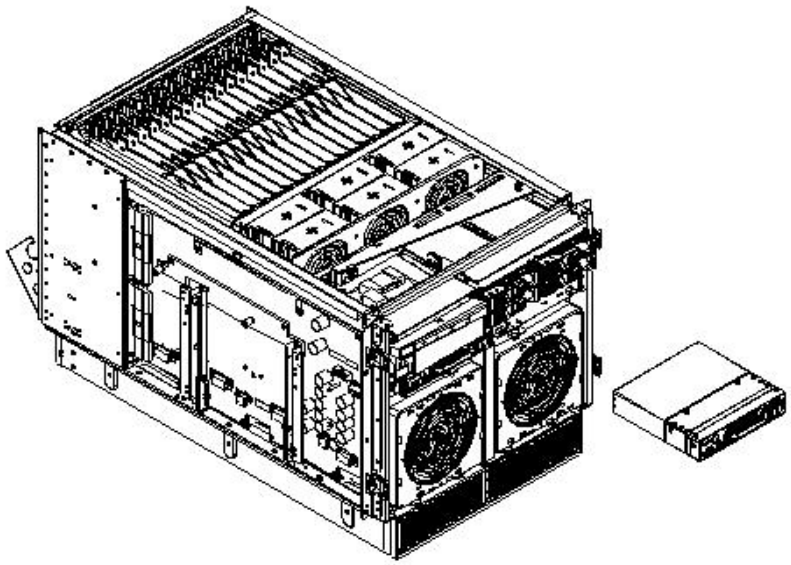
Table 6-4 PCI-X Power Supply LEDs *(continued)*

LED	Driven By	State	Description
Fault	Each supply	Flash Yellow	The temperature within the power supply is above the lower threshold.
		On Yellow	The temperature of the power supply is approaching the thermal limit.
		Flash Red	Power supply has shut down due to an over temperature condition, a failure to regulate the power within expected limits, or a current-limit condition.
		Off	Normal operation.

1 LPM stands for local power monitor

Removing a PCI Power Module

Figure 6-21 PCI Power Module Detail



To remove a PCI power module, follow these steps:

1. Securely grasp the handle on the front of the power module.
2. Slide and hold the locking tab to the right and pull the PCI module from the chassis.

Replacing a PCI Power Module

To replace a PCI power module, follow these steps:

1. Slide the PCI power module into the chassis until the locking tab clicks and locks.
2. Power on the system. Use `PE` and `PS` commands to confirm success.
3. Note status of Power Supply LEDs. The green LED should be on, and the fault LED should be off.

Removing and Replacing the PCI-X Voltage Regulator Modules

Removing the PCI-X VRM

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

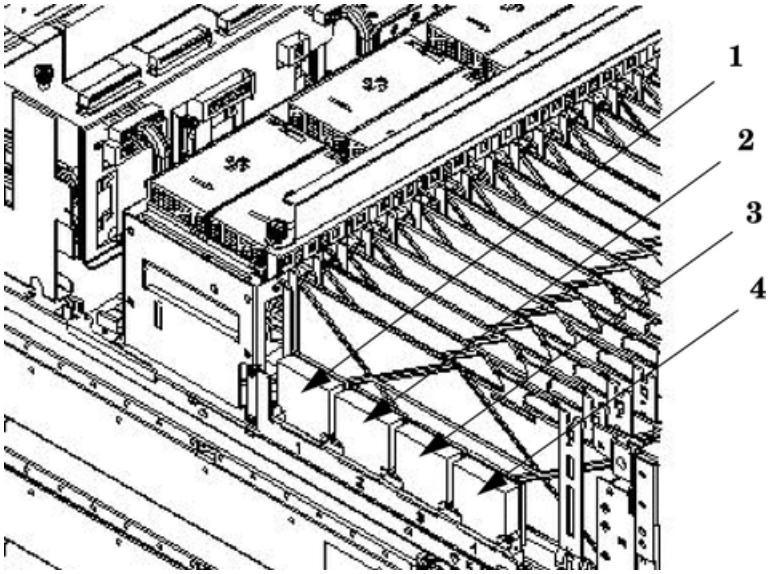
To remove a PCI-X VRM, follow these steps:

1. Power off the server.

IMPORTANT: Power must be removed from the PCI-X card cage assembly to continue.

2. Remove right side cover.
3. Remove PCI side panel.
4. Identify the VRM to be replaced (1 through 4).
5. Unscrew the VRM from the bracket (two screws on non-component side).
6. Lift up and gently pull the VRM from the socket.

Figure 6-22 Locating the VRMs on the PCI-X Backplane



Replacing the PCI-X VRM

To replace a PCI-X VRM, follow these steps:

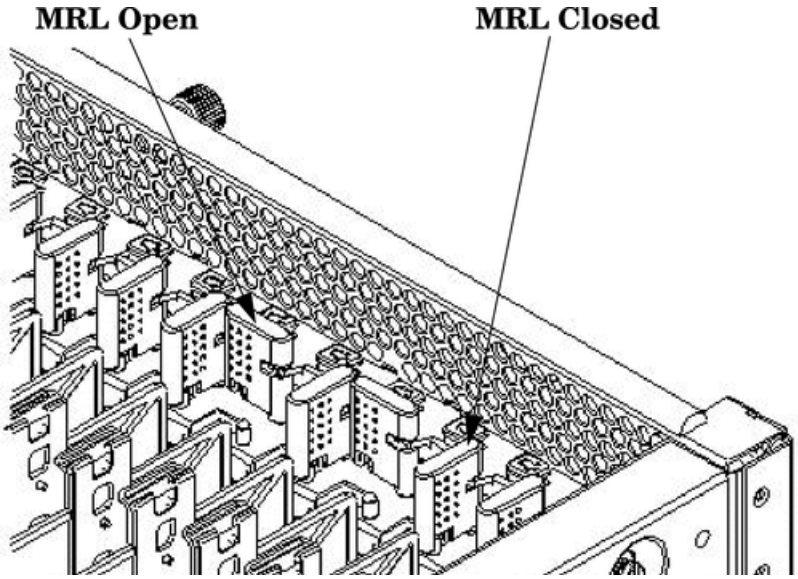
1. Firmly seat the VRM into the socket. Be careful not to bend pins.
2. Attach the bracket to the VRM using the two screws removed earlier.
3. Replace the PCI side panel on the chassis.
4. Replace the right side cover on the chassis.
5. Power on the server.

Removing and Replacing the PCI OLR Assembly

The PCI OLR assembly is located in the rear of the chassis. All system power must be removed before attempting to remove or replace this component.

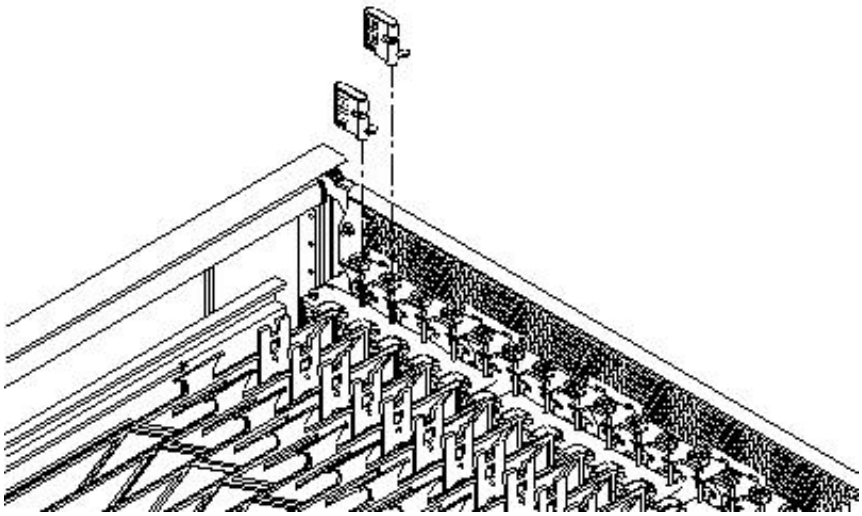
CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Figure 6-23 PCI OLR Assembly Location



Removing the PCI OLR Assembly

Figure 6-24 PCI MRL Detail



NOTE: It is highly recommended that extra PCI MRLs are available, as these may be easily broken during removal or replacement.

To remove a PCI OLR assembly, follow these steps:

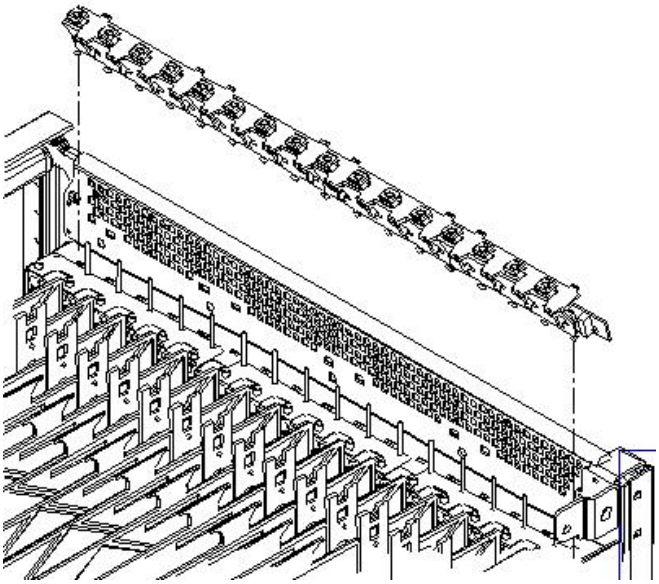
1. Shut down the system and remove all power cables.
2. Remove the top and right side covers.
3. Remove the PCI access panel.
4. Disconnect the PCI OLR cable from the PCI OLR assembly. The connector is located on the cell board side of the system. Take note of the connector orientation and polarity.
5. Flip all PCI MRL to the OPEN position.

6. Remove all of the PCI MRLs, beginning on the OLR cable side of the system (left side when viewed from the rear of the system).
7. Push out on top of the PCI MRL to unclip the PCI MRL axle from the retaining slot carefully, taking care not to break off the optic sensor tab.
8. With the tab clear of obstruction, lift the MRL up and out.

NOTE: It is highly recommended that extra PCI MRLs are available, as these may be easily broken during removal or replacement.

9. Remove the PCI OLR assembly by pushing in on the plastic tabs that secure the assembly to the chassis.
10. Tilt the assembly away from the attach points.
11. Disengage the bottom holding the tabs from the chassis.
12. Lift the assembly up and out.

Figure 6-25 PCI OLR Assembly Removal



Replacing the PCI OLR Assembly

To replace a PCI OLR assembly, follow these steps:

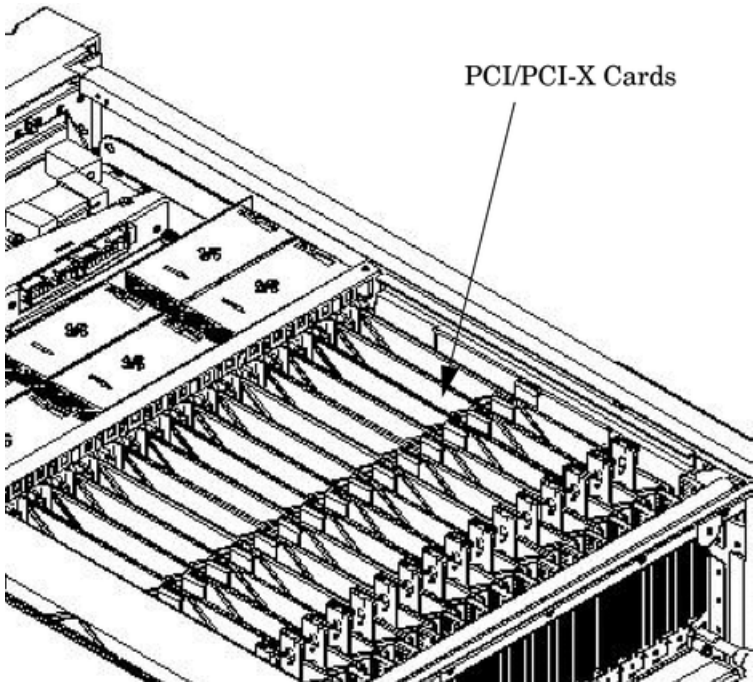
1. Position the assembly at an angle so that the bottom holding tabs engage into the bottom holes of the chassis.
2. Tilt the assembly toward the chassis, bringing it upright, and engage the plastic tabs so that the assembly is firmly and evenly attached to the chassis.
3. Replace all the PCI MRLs one at a time, beginning at the right-most clip position. Ensure that the PCI MRL is in the OPEN position before inserting the bottom pivot pin into the hole in the chassis.
4. Press the PCI MRL axle into the retaining clip.
5. Flip all the PCI MRLs to the CLOSED position.
6. Reconnect the PCI OLR cable to the PCI OLR assembly. Be sure that the connector is inserted with the correct polarity orientation.
7. Replace the PCI access panel.
8. Replace the top and right side covers.
9. Reconnect all power cables and power on the server.

Removing and Replacing a PCI/PCI-X Card

The PCI/PCI-X cards are located in the rear of the chassis in the PCI-X card cage. PCI/PCI-X cards are hot-pluggable components.

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Figure 6-26 PCI/PCI-X Card Location



PCI/PCI-X I/O cards can be removed and replaced by using the SAM (`/usr/sbin/sam`) application or by using Partition Manager (`/opt/parmgr/bin/parmgr`).

This procedure describes how to perform an *online replacement* of a PCI/PCI-X card using SAM, for cards whose drivers support online add or replacement (OLAR).

IMPORTANT: Some PCI/PCI-X I/O cards cannot be added or replaced online while HP-UX remains running. For these cards, you must shut down HP-UX on the nPartition before performing the card replacement or addition. See "Shutting Down nPartitions and Powering Off Hardware Components " (page 96).

Removing a PCI/PCI-X Card

To remove the PCI/PCI-X card, follow these steps:

1. Run SAM (`/usr/sbin/sam`) and from the main SAM Areas screen select the **Peripheral Devices** area, then select the **Cards** area.
2. From the I/O Cards screen, select the card you will replace and then select the **Actions—>Replace** menu item.
3. Wait for SAM to complete its critical resource analysis for the selected card and then review the analysis results.

   If no critical resources are disabled by taking the selected card offline, click **OK** to suspend the card's driver and power off the card's PCI-X slot. Proceed with the next step.

If SAM detected that the selected PCI/PCI-X card cannot be taken offline, you will not be able to click **OK** and you cannot replace the card while HP-UX remains running. In this case, you must shut down HP-UX on the nPartition before replacing the defective card.

4. Locate the PCI-X slot where the selected card resides.

   On the server, you can view the PCI-X slots and slot LEDs from the rear of the cabinet.

   The selected slot powers off (its green power LED is off), and the slot amber attention indicator (a dark orange yellow LED) blinks.

5. Label and remove the cables connected to the PCI/PCI-X card to be removed.
6. Remove the top cover.
7. Flip the card slot PCI MRL to the open position.
8. Firmly pull up on the tabs on the card separator.
9. Remove the card from the PCI slot.

Replacing a PCI/PCI-X Card

To replace the PCI/PCI-X card, follow these steps:

1. Position the replacement PCI/PCI-X card in the slot.

NOTE: Use a slow firm pressure to properly set the card into its connection. PCI/PCI-X cards tend to be difficult to install.

2. Flip the card slot PCI MRL to the closed position.
3. Replace the top cover.
4. Connect all cables to the replacement PCI/PCI-X card.
5. In SAM's Replace Card window, click **OK**.

   SAM powers the PCI slot back on and turns off the slot's attention indicator. SAM also resumes the card's driver operations.

6. Confirm that the replacement card is online and powered on, using SAM's I/O Cards screen.
7. Exit SAM.

Option ROM

To enable faster booting, system firmware does not auto-scan PCI devices with an Option ROM. In order to boot from a PCI connected device with an Option ROM, it must be added to the table of boot devices.

To add an option ROM, follow these steps:

1. Install the I/O card into the chassis.
2. Boot the server to the EFI shell.
3. Run the EFI search command.

   To add a single card:

   `search <cell> <pci_slot #>`

   To add all cards:

   `search all`

4. Issue the EFI **`map -r`** command.
5. To enter the Boot Manager, issue the **`exit`** command.
6. From the EFI Boot Manager Menu, select **`Boot Option Maintenance Menu`**.
7. From the Main Menu, select **`Add a Boot Option`**.
8. Add the device as a new boot device.

Updating Option ROMs

The Option ROM on a PCI I/O card can be "flashed" or updated. To flash an I/O card, follow these steps:

1. Install the I/O card into the chassis.
2. Boot the server to the EFI shell.
3. Run the EFI search command.

   To add a single card:

   `search <cell> <pci_slot #>`

   To add all cards:

   `search all`

4. Run the EFI **`map -r`** command:

NOTE: Each I/O card type and firmware image update may require a different flash utility and procedure. Follow the instructions in the `.txt` file included with the latest HP IPF Offline Diagnostic & Utilities CD.

5. Load the HP IPF Offline Diagnostic & Utilities CD.

   The CD contains the flash utility for IO for each card type, firmware images, and a `.txt` file that includes instructions and information about updating the firmware images.

Removing and Replacing the PCI-X Card Cage Assembly

The PCI-X card cage comes with the PCI-X backplane located in the rear of the server. All system power must be removed before attempting to remove or replace this component. For more information, see "Shutting Down nPartitions and Powering Off Hardware Components " (page 96).

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Figure 6-27 PCI-X Card Cage Assembly Location

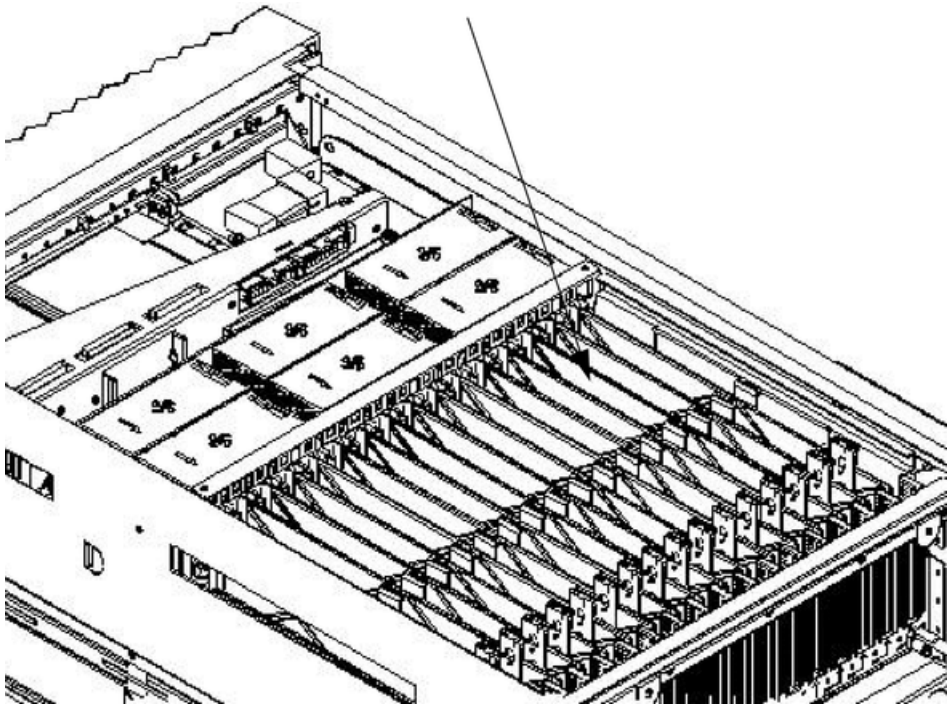
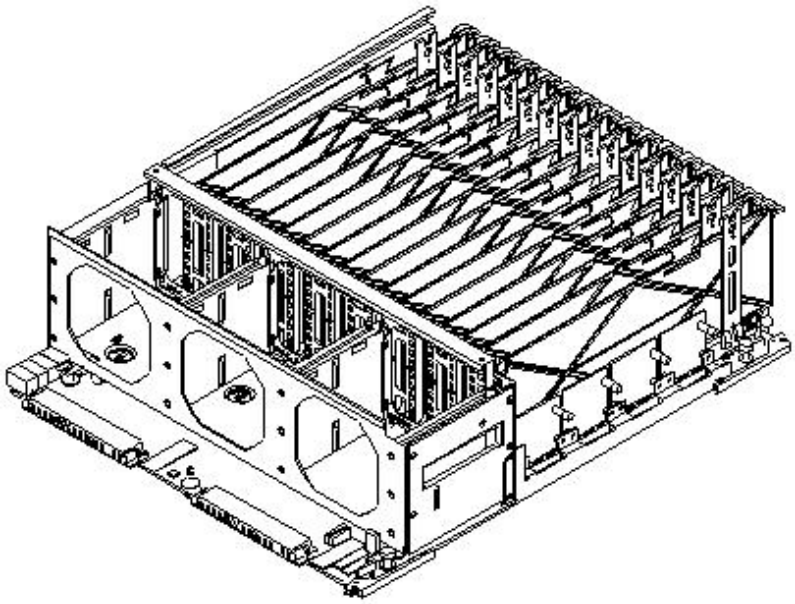


Figure 6-28 PCI Card Cage Assembly Detail



To remove a PCI-X card cage assembly, follow these steps:

1. Shut down the system and remove all power cables.
2. Remove the top and side covers.
3. Remove the PCI access panel by loosening the four retaining screws shown in Figure 6-29.

Figure 6-29 PCI Access Panel Screws

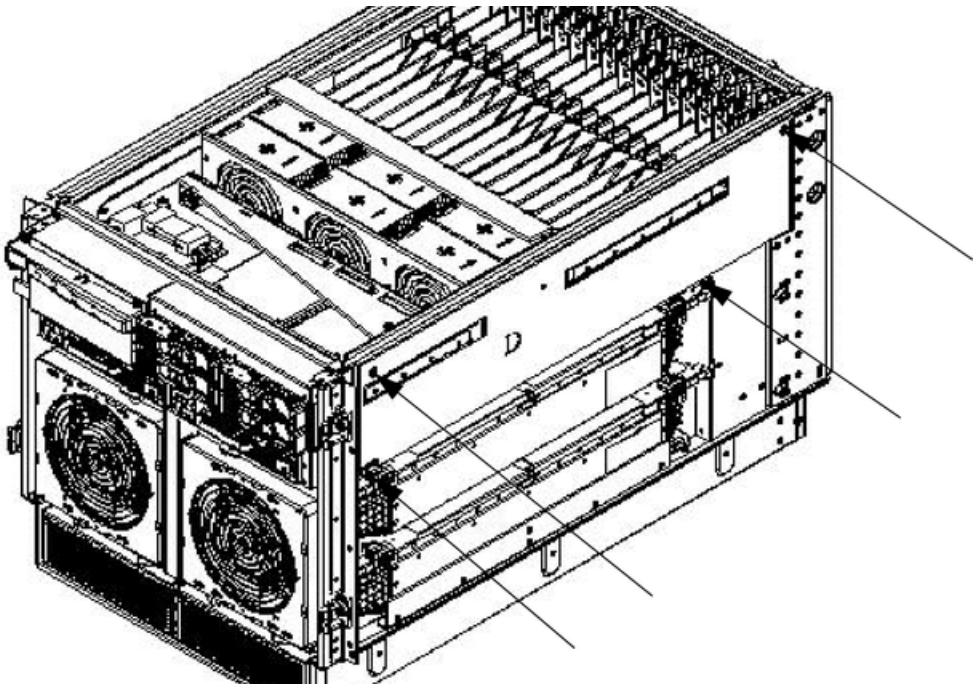
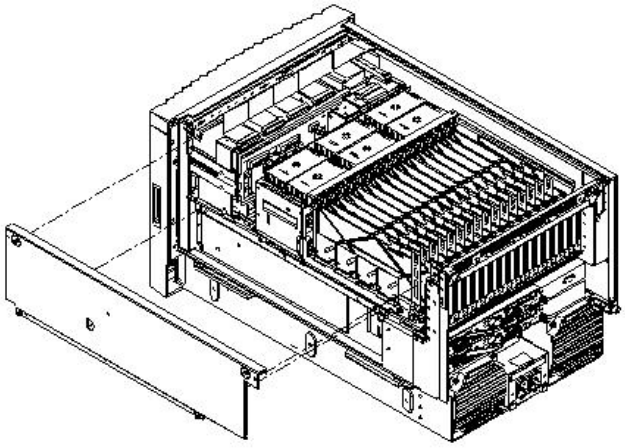


Figure 6-30 Removing the PCI Cage Access Panel



4. Disengage the PCI power supplies by pulling them out approximately 1.5 inches.
5. Remove PCI fans.
6. Disconnect the PCI-X OLR ribbon cable from the PCI backplane. The connector is located on the cell board side of the system.
7. Label and remove all PCI-X card cables.
8. Follow the proper procedures to remove any mounted PCI-X cards. Keep track of each card path for replacement procedures.
9. Disconnect the two cable bundle connectors at the rear of the mass storage board.
10. Loosen the two captive screws on the backplane near the extractor levers.
11. Pull the levers to release from the system board connector.
12. The PCI-X backplane support wall has a grab handle. Use this handle to assist in alignment for removal. The outside of the PCI fan card cage is designed as a handle also.
13. From the right side of the chassis, manipulate the PCI card cage free of retaining stand-off pins. Tilt up the rear of the backplane and lift to remove.

Replacing the PCI-X Card Cage Assembly

To replace a PCI-X card cage assembly, follow these steps:

1. Tilt the assembly toward the chassis. Position the assembly at an angle so that the retaining stand-off pins engage.
2. Use the extractor levers to engage the assembly to the system board connector.
3. Reconnect the two cable bundles at the rear of the mass storage board.
4. Tighten the two captive screws on the backplane near the extractor levers.
5. Replace all PCI-X cards in their proper slots.
6. Reconnect all PCI-X card cables.
7. Reconnect the PCI-X OLR ribbon cable to the PCI-X backplane.
8. Replace the PCI fans.
9. Re-engage the PCI power supplies.
10. Replace the PCI access panel.
11. Replace the top and side covers.

Removing and Replacing the Mass Storage Backplane

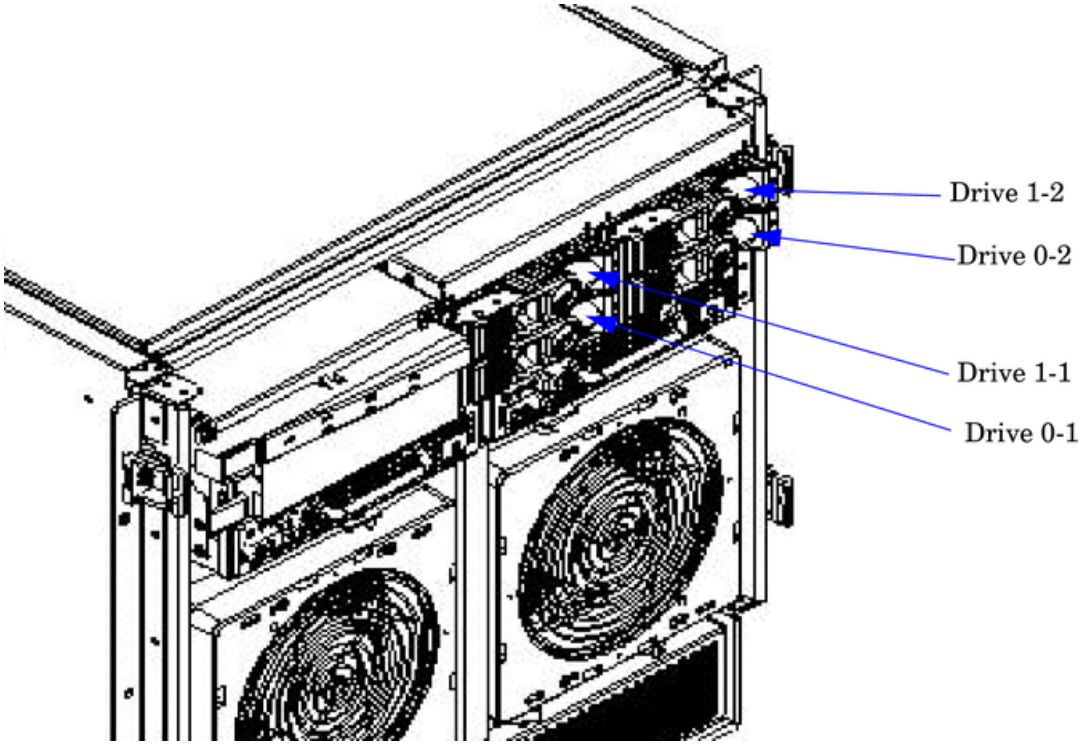
CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Removing the Backplane

To remove a backplane, follow these steps:

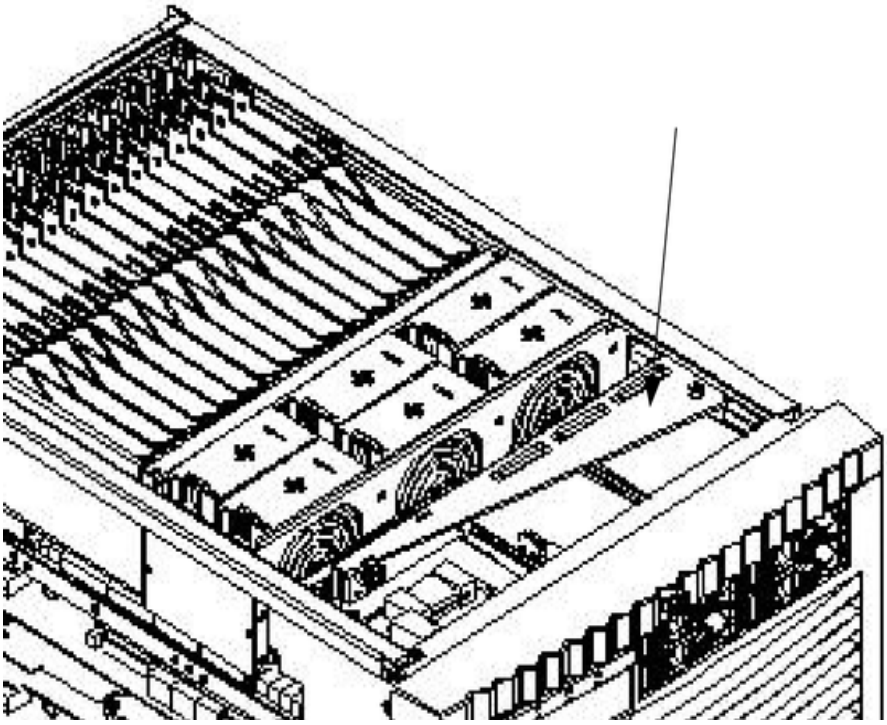
1. Shut down and power off the server.
2. Remove all internal disks.

Figure 6-31 Locating Internal Disks



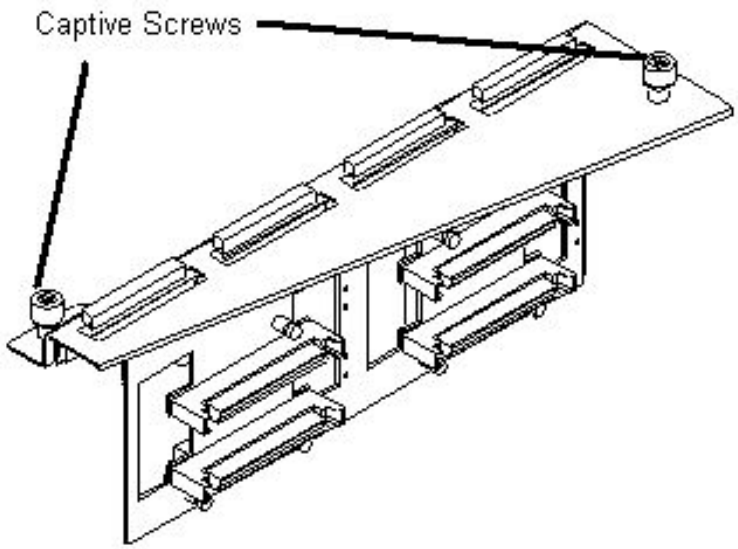
3. Remove the top and right side covers.
4. Remove the PCI access panel.
5. Disconnect all cables from the backplane. Label each connector and take note of routing so that they can be correctly reinstalled.

Figure 6-32 Locating the Mass Storage Backplane



6. Unscrew the two captive screws and remove the backplane/bracket assembly.

Figure 6-33 Mass Storage Backplane



Replacing the Backplane

To replace a backplane, follow these steps:

1. Align the tabs on the backplane with the slots in the chassis and press the assembly into its mount.
2. Fasten the two captive screws.
3. Connect all the cables to the backplane.

4. Install the PCI side panel.
5. Install the top and right side covers.
6. Install all internal disks.

Removing and Replacing a Processor Turbo-Cooler Fan

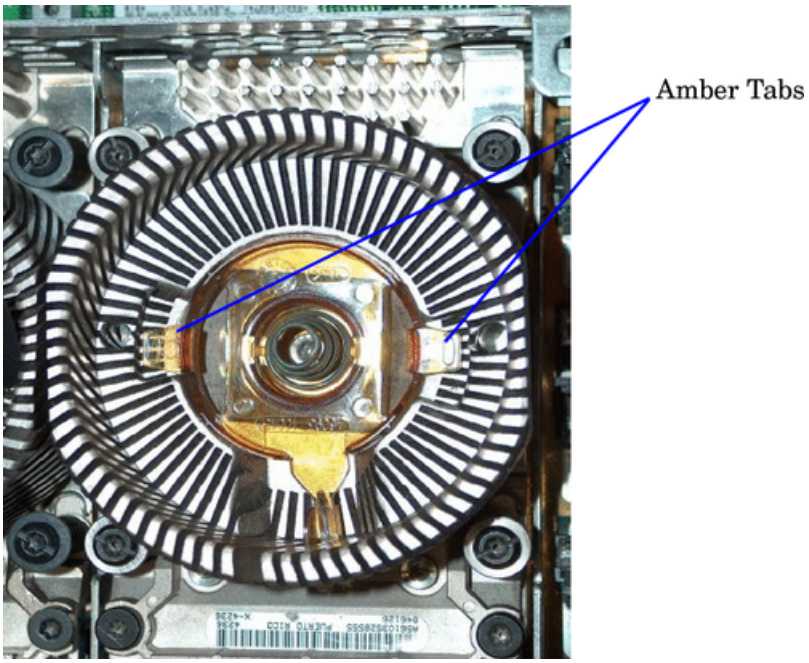
The processor turbo-cooler fans are located on the cell boards.

Removing a Turbo-Cooler Fan

To remove a turbo-cooler fan, follow these steps:

1. Prepare an ESD-safe work surface large enough to accommodate the cell board.
2. Identify the partition and cell to be removed.
3. Power off the nPartition and remove the cell with the fan to be replaced following the instructions found in “Removing and Replacing a Cell Board VRM” (page 157).
4. Place the cell board on the ESD-safe work surface.
5. If necessary, loosen the four captive screws that secure the DIMM cover, remove the cover and set it aside.
6. If so equipped, loosen the captive screws on the CPU cover, remove the cover and set it aside.
7. Identify the CPU turbo-cooler fan to be removed and unplug the fan power cord from the cell board.
8. Insert a screwdriver or pen between the fan blades and gently depress the two amber tabs underneath. Once the two tabs are depressed the fan pops up. See Figure 6-34.

Figure 6-34 Heatsink with Turbo-Cooler Fan Removed



NOTE: There are two different heatsinks used in the turbo-cooler fan assemblies. The removal and replacement procedure is essentially the same for the two. The machined heatsink has thicker fins, and is one-piece. The other heatsink has fins that are thinner and soldered to a base-piece. The machined heatsink has a clip holding the power cable in place that cannot be removed. The soldered heatsink has a clip that must be removed in order to correctly route the cable. See Figure 6-35 and Figure 6-36.

Figure 6-35 Soldered Heatsink and Clip

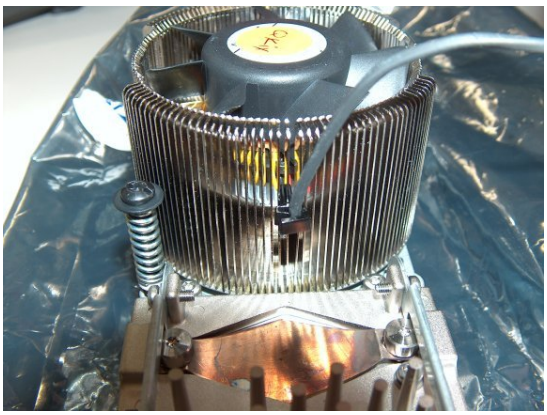
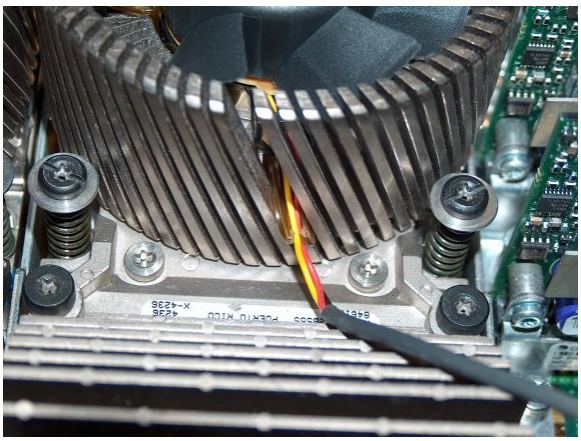


Figure 6-36 Machined Heatsink and Clip



9. On the machined heatsink: note the fan power cable routing and unhook the fan power cable from the clip on the heatsink fin. Care should be used not to break the clip.

   On the soldered heatsink: note the power cable routing and remove the clip by sliding it up and off the heatsink fin. Remove the power cable from the clip and set the clip aside.

Replacing a Turbo-Cooler Fan

To replace a turbo-cooler fan, follow these steps:

1. Position the new fan with the power cable routed toward the clip.
2. Seat the replacement fan in the turbo-cooler by pressing down on the center of the fan. You should hear a snap when each of the two tabs engages.
3. Route the cable carefully through the fins of the heatsink without leaving excess slack inside which could impede the fan. On the soldered heatsink: after routing the cable, slide the clip onto the fin immediately next to where you routed the cable.
4. Secure the power cable in the clip. The fan spins freely when seated properly with the fan power cable secured in the clip.

5. Plug the fan power cable into the cell board.
6. If so equipped, replace the CPU cover and tighten all the captive screws.
7. If removed, replace the DIMM cover and tighten all the captive screws.
8. Replace the cell board in the cabinet.
9. Use the `MP:CM> PE option C` to return 48V power to the cell board
10. Use the `MP:CM> bo` option to boot the partition.

Removing and Replacing a Cell Board

The cell board is located in the right side of the chassis. The cell power must be turned off to replace this component. For more information, see "Shutting Down nPartitions and Powering Off Hardware Components " (page 96).

Cell boards are shipped with all four processors installed. Should the old cell board to be replaced have fewer processors than the new cell board, you will have to remove processors to match what was installed on the old cell board. You must transfer the DIMMs from the old cell board to the new cell board.

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

IMPORTANT: The SCSI parameters and the real time clock data stored in NVRAM are lost when the cell board is removed. Make a note of all SCSI parameters before removing power from the cell board. For more information, see *Matterhorn Service Note A6093A-07A*.

Figure 6-37 Cell Board Location

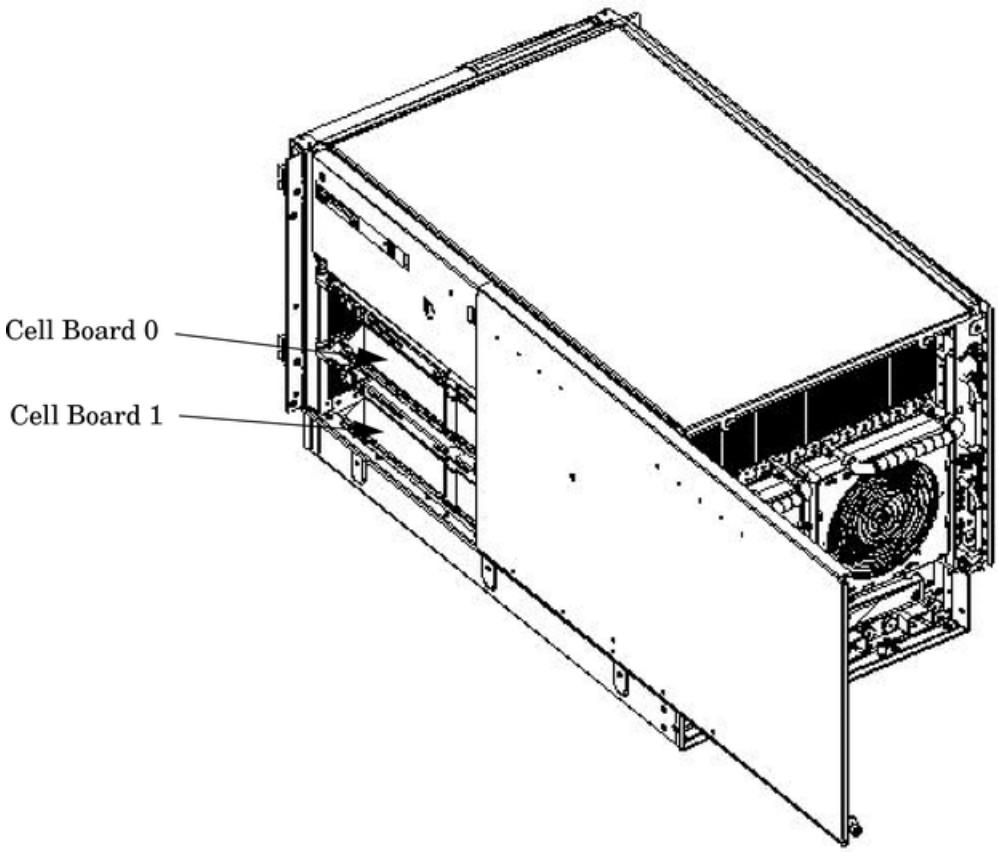
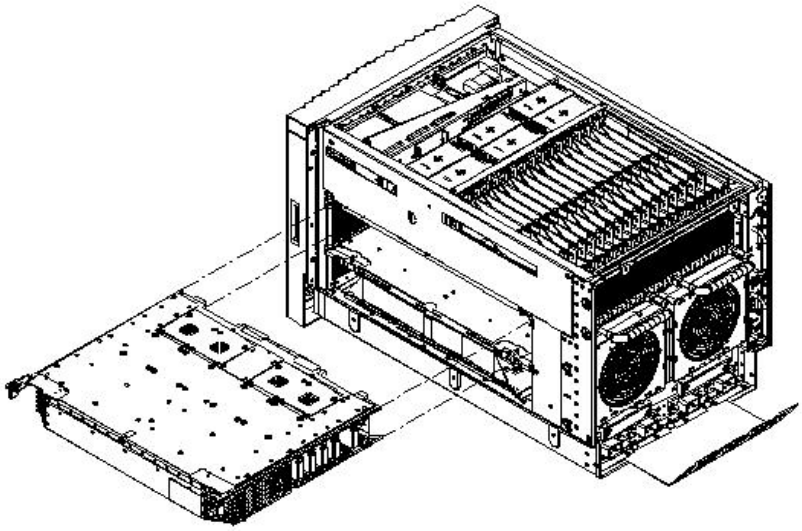


Figure 6-38 Cell Board Detail

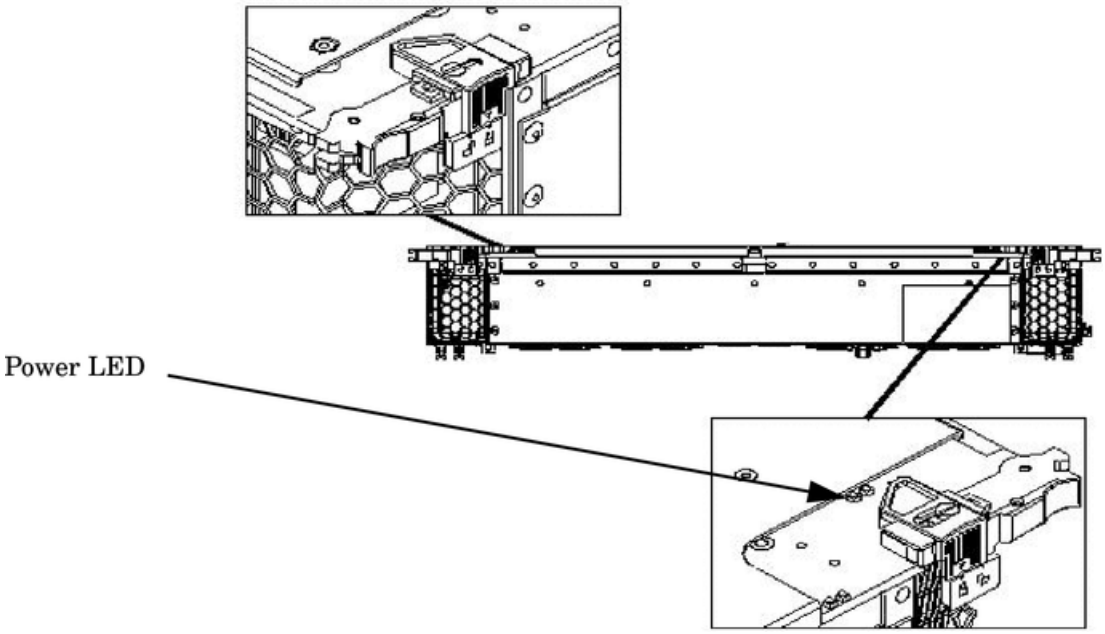


NOTE: The cell board weighs 27.8 lb. Support both side edges while removing the cell board from the chassis.

To remove a cell board, follow these steps:

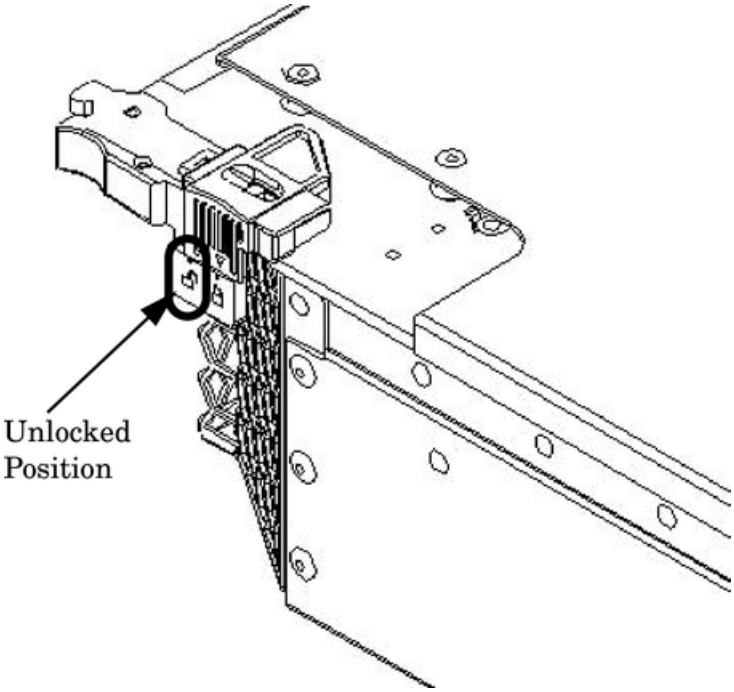
1. Power off the cell board, using the MP command menu `PE` command.
2. Remove the right side cover.
3. Verify that the power LED located on the left side of the cell board is off before removing the cell board.

Figure 6-39 Cell LEDs



4. Press each extraction lever and move the slide to the unlocked position.

Figure 6-40 Extraction Lever



5. Pull out on each lever to unseat the cell board.
6. Slide the cell board from the chassis.
7. Follow proper procedures to remove and replace all FRUs on the cell board.

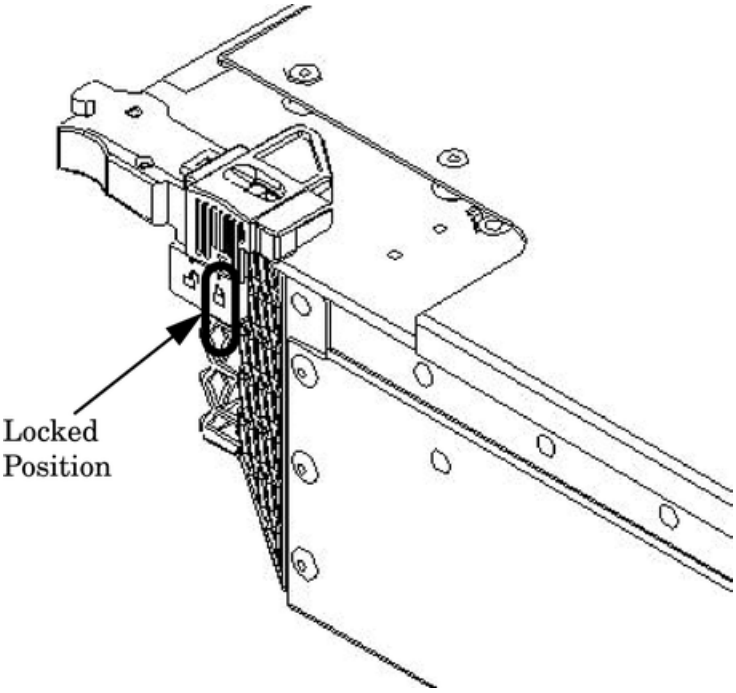
Replacing a Cell Board

NOTE: The cell board weighs 27.8 lb. Support both side edges while replacing the cell board into the chassis.

To replace a cell board, follow these steps:

1. Move the slide to the unlocked position and fully open each latch on the cell board.
2. Insert the cell board into the guide rails. Slide into the chassis until the cell board levers contact the cell board guide rails.
3. Using equal pressure, simultaneously press both extraction levers to seat the cell board in the chassis.
4. Move each slide to the locked position and release the lever. See Figure 6-41.

Figure 6-41 Extraction Lever



Ensure that both levers are in the locked position. If both levers are not locked, the cell board does not power on.

5. To verify that the extraction levers are locked and the cell board is in the proper operational status, enter **de** from the Command Menu. See Figure 6-41 (page 131).
6. To select the `Cell Board Controller (PDHC)`, enter **h** and then enter the cell number.

NOTE: The `PDHC state` should read `Attention LED is off`, and the `Power Status` should read `RDY`. If the `Power Status` reads `rdy`, one or both of the extraction levers are not properly locked. Ensure both cell board extraction levers are locked. Figure 6-42 shows a sample of the output.

Figure 6-42 de Command Output

```
MP:CM> de

Display summary status of the selected MP device.

    B - BPS  (Bulk Power Supplies)
    U - CLU  (Cabinet Utilities: Fans, Intrusion, Clock's etc.)
    A - PACI (Partition Console Interface)
    G - MP   (Management Processor)
    P - PM   (Power Management)
    H - Cell Board Controller (PDHC)
        Select device: h
    Enter cell number: 1

Cell Controller (PDHC) status. Cell 1
FW Revision  : 3.006 built FRI AUG 15 12:01:54 2003
MICE Revision : 1.0

PDHC state       : 0x3b (err bib SMG CCO eci I2C PWR)
Attention Led is off

Power Status : 0x7c (12VSTBY RDY EN PWR vflt tflt fanflt)

LED State    : 0x0e (BIB SMG I2C heartbeat)

IO Connection Status      : 0x01 (Connection OK)
IO Chassis Phys Location  : 0x01 (cabinet=0, PCI Backplane=0, PCI Domain=1)
Core Cell Number          : 0x81 (cabinet=0, cell=1, Valid)

Temp Fault Status : 0x00 (cpu0 cpu1 cpu2 cpu3 mmu cell)
CPU 0 Temp                : 47  deg C
CPU 1 Temp                : 0   deg C
CPU 2 Temp                : 59  deg C
CPU 3 Temp                : 0   deg C
MMU Temp                  : 30  deg C
Cell Board Temp           : 28  deg C

Fan Status                : 0x00cc (See PS command for detail)
Local I2C Bus Status      : 0x00 (OK)

MP:CM>
```

Ready Bit (RDY) is set to true

7. Replace the right side cover. For details, see "Removing and Replacing a Side Cover" (page 101).

Cell Break-Fix Upgrade and Downgrade Procedure

This section provides information and upgrade and downgrade instructions. These instructions pertain to a break fix scenario where a replacement cell is added to a currently operating system.

Upgrading Using the FW Command

To upgrade the newly added cell using the `FW` command, follow these steps:

1. OSP the PDHC FPGA image to the new cell.
2. Firmware upgrade/downgrade the PDHC image to the new cell.
3. AC power cycle the cell
4. Firmware upgrade/downgrade the system firmware image to the new cell.

1. Run the Onboard Scan Programming Utility to upgrade / downgrade the new Cell FPGA to match the version on the other cells.

   ```
   MP:CM> osp
   ```

   When prompted, enter the following information:

   ```
   Enter the Entities to be upgraded (Ex: 2,4,7): (1)
   Enter your user name: (2)Enter your user password: (3)
   Enter the ip address where the FPGA image file can be found: (4)
   Enter the path where the file(s) can be found: (5)
   Enter PDHC FPGA image filename:  (6)
   Are you sure that you want to continue (Y/N): y
   ```

   (1) Select the appropriate entity corresponding to the replacement cell to be upgraded / downgraded by entering the number from the first column of the OSP table.(2) Enter your user name. (3) Enter account password.(4) Enter the ip address of the anonymous FTP server where the firmware images reside.(5) Enter the directory path. For example: `/dist/version3_0` (or some other location). Do not list the actual firmware image filename.(6) Enter the filename. For example: `pdhc_1.7.0.osp`

   Example

```
MP:CM> osp

    ********************************************************************
    *****                                                          *****
    *****            Onboard Scan Programming Utility              *****
    *****                                                          *****
    *****       (C) Copyright 2001 Hewlett-Packard Company         *****
    *****                   All Rights Reserved                    *****
    *****                                                          *****
    *****        THIS PROGRAM IS NOT LICENSED TO CUSTOMERS         *****
    *****                                                          *****
    *****  This program is intended for use by trained HP support  *****
    *****  personnel only.  HP shall not be liable for any damages *****
    *****  resulting from unauthorized use of this program.  This  *****
    *****  program is the property of HP.                          *****
    *****                                                          *****
    *****                     Version  1.03                        *****
    *****                                                          *****
    ********************************************************************
                                          Flash    Current
    Number  Cabinet    Name   Partition   Handle   FPGA Version
    ------ --------- -------- ---------- -------- --------------
       1          0     CIO 0          0     2048      2.008
       2          0     CIO 1          1     2049      2.008
       3          0       GPM          0     2184      1.002
       4          0        FM          0     2192      1.002
       5          0       OSP          0     2232      1.002
       6          0    Pci HS          0     2328      1.000
       7          0   PciXLPM          0     2352      2.000
  (2)  8     (1)  8     CIO 0          0    34816      2.008
  (2)  9     (1)  8     CIO 1          1    34817      2.008
  (2) 10     (1)  8       GPM          0    34952      1.002
  (2) 11     (1)  8        FM          0    34960      1.002
  (2) 12     (1)  8       OSP          0    35000      1.002
  (2) 13     (1)  8    Pci HS          0    35096      1.000
  (2) 14     (1)  8   PciXLPM          0    35120      2.000
      15         0    PDHC 0          0     2472      1.007
      16         0   CLPM  0          0     2480      1.002
      17         0    PDHC 1          1     2473      1.007
      18         0   CLPM  1          1     2481      1.002
  (2) 19         0    PDHC 2          0     2474      1.007
  (2) 20         0   CLPM  2          0     2482      1.002
  (2) 21         0    PDHC 3          1     2475      1.007
  (2) 22         0   CLPM  3          1     2483      1.002

   Enter the Entities to be upgraded (Ex: 2,4,7) : 15
   Enter your user name: anonymousEnter your user password: ********
   Enter the ip address where the FPGA image file can be found: 192.1.1.1
   Enter the path where the file(s) can be found: /dist/versionX_X
   Enter PDHC FPGA image filename: pdhc_X.X.X.osp (Refer to Note (3) in this step)
   Are you sure that you want to continue(Y/N): y
   **** Updating PDHC FPGA ****
```

Firmware updating progress is reported) NOTE (1): When a SEU is connected to an system, cabinet id 8 is assigned to the SEU. NOTE (2): These entities might be different depending on your server. NOTE (3): X.X.X is the version number corresponding to the version of the FPGA on the other cells.

CAUTION: *DO NOT RESET* the cell or server unless you have received confirmation that the FPGAs were updated successfully. Repeat the firmware update procedure immediately for all entities failing to update successfully.

---

2. Verify that you have received confirmation that the FPGA was updated successfully. If any entity failed to update properly do not continue until the entity have been successfully updated. A successful update returns the following message:

   ```
   OSP has completed successfully for all selected FPGAs.
   ```

NOTE: FPGAs updated in step 4 will not show the updated version when running the sysrev command until after the next AC cycle of the cell. Once ALL firmware images have been updated, you are instructed to AC cycle the cell later in this procedure.

---

3. **Do not reset** the cell until the next step (step 4) is completed.
4. Run the Firmware Update Utility to update Cell PDHC version (s) to A.X.X.X (See Note (1) in this step) using the fw command:

   ```
   MP:CM> fw
   ```

   Enter the following information when prompted:

   ```
   Enter the Entities to be upgraded (Ex: 3,4,10): (1)
   Enter your user name: (2)
   Enter your user password: (3)
   Enter the ip address where the firmware can be found: (4)
   Enter the path where the firmware can be found: (5)
   Enter the filename of the firmware image for the PDHC: (6)
   Enter the filename of the System Firmware image: (7)
   Enter the filename of the firmware image for the MP: (8)
   Are you sure that you want to continue (Y/N): y
   ```

   (1) Select the appropriate entity corresponding to the replacement cell to be upgraded / downgraded by entering the number from the first column of the FW table.(2) Enter your user name. (3) Enter account password. (4) Enter the ip address of the anonymous FTP server where the firmware images reside. (5) Enter the directory path. For example: /dist/versionX_X (or some other location). Do not list the actual firmware image filename. (6) Enter the PDHC filename: pdhc_A.X.X.X.bin (See Note (1) in this step). NOTE (1): X.X.X is the version number corresponding to the version of the PDHC firmware on the other cells.

   Example:

   ```
   MP:CM> fw

   ************************************************************************
   *****                                                              *****
   *****                  Firmware Update Utility                     *****
   *****                                                              *****
   *****       (C) Copyright 2001 Hewlett-Packard Company             *****
   *****                   All Rights Reserved                        *****
   *****                                                              *****
   *****        THIS PROGRAM IS NOT LICENSED TO CUSTOMERS             *****
   *****                                                              *****
   *****  This program is intended for use by trained HP support      *****
   *****  personnel only.  HP shall not be liable for any damages     *****
   *****  resulting from unauthorized use of this program.  This      *****
   *****  program is the property of HP.                              *****
   *****                                                              *****
   *****                      Version  4.00                           *****
   ```

```
*****                                                                *****
**********************************************************************
                                          Flash    Current
 Number  Cabinet    Name   Partition   Handle   Firmware Version  Comments
 ------ --------- -------- ---------- -------- ------------------ --------
 (1)  1        0     MP 0          0        0          5.022      Master
 (1)  2        0     MP 1          1        1          5.022      Slave
 (3)  3   (2)  8     MP 0          0    32768          5.022      Master
 (3)  4   (2)  8     MP 1          1    32769          5.022      Slave
      5        0   PDHC 0          0      256          3.012         -
      6        0    SFW 0          0      320         21.003         -
      7        0   PDHC 1          1      257          3.014         -
      8        0    SFW 1          1      321         21.003         -
 (3)  9        0   PDHC 2          0      258          3.014         -
 (3) 10        0    SFW 2          0      322         21.003         -
 (3) 11        0   PDHC 3          1      259          3.014         -
 (3) 12        0    SFW 3          1      323         21.003         -

Enter the Entities to be upgraded (Ex: 3,4,10): 5
Enter your user name: anonymousEnter your user password: ********
Enter the ip address where the firmware can be found: 192.1.1.1
Enter the path where the firmware can be found: /dist/versionX_X
Enter the filename of the firmware image for the PDHC: pdhc_A.X.X.X.bin
Are you sure that you want to continue(Y/N): y
**** Firmware Updating PDHC ****
```

(Firmware updating progress is reported) NOTE (1): Cabinet id `8` is assigned to the SEU. NOTE (2): These entities might be different depending on your server. NOTE (3): `X.X.X` is the version number corresponding to the version of the PDHC Firmware on the other cells.

5. Ensure the entity selected was updated successfully. A successful update returns the following message:

   ```
   Firmware Update has completed successfully for all entities.

   MP:CM>
   ```

   An unsuccessful update results in an error message. If the FTP connection was successful, but the update failed, a warning is noted for the entity being updated. For example:

   ```
   Firmware Update failed for entity SFW 0.
   DO NOT REBOOT SFW 0 until it has been successfully updated!!!
   Firmware Update completed with errors.
   ```

△ **CAUTION:** Repeat the firmware update procedure immediately for all entities failing to update successfully. *DO NOT RESET* or *AC POWER CYCLE* until you get a message indicating that all updates have completed successfully.

---

6. Activate the new Firmware for all updated components by cycling power to the cell, following these specific steps:
   a. Eject the Cell.
   b. Reinsert the Cell.
7. Following the Cell AC power cycle, verify the updated firmware revisions by using the `sysrev` command.

   Example:

   ```
   MP:CM> sysrev

                     Cabinet firmware revision report
                         PROGRAMMABLE HARDWARE :

                         System Backplane :   GPM           FM        OSP
                                            -------     -------    -------
                                              1.002       1.002      1.002

                         PCI-X Backplane  :    LPM          HS
                                            -------     -------
                                              2.000       1.000
   ```

```
      Core IO          : Master       Slave
                       --------     -------
                          2.009       2.009

                                LPM        PDHC
                              -------     -------
       Cell 0 :                 1.002       1.007
       Cell 1 :                 1.002       1.007
       Cell 2 :                 1.002       1.007
       Cell 3 :                 1.002       1.007

    FIRMWARE:
      Core IO
        Master          :  A.006.012
        Event Dict.     :         0.009
        Slave           :  A.006.012
        Event Dict.     :         0.009

      Cell 0
        PDHC            :  A.003.023
        Pri SFW         :     21.003 (PA)
        Sec SFW         :     21.003 (PA)

      Cell 1
        PDHC            :  A.003.023
        Pri SFW         :     21.003 (PA)
        Sec SFW         :     22.002 (PA)

      Cell 2
        PDHC            :  A.003.023
        Pri SFW         :     21.003 (PA)
        Sec SFW         :     22.002 (PA)

      Cell 3
        PDHC            :  A.003.023
        Pri SFW         :     21.003 (PA)
        Sec SFW         :     22.002 (PA)

  IO Cabinet FPGA and Firmware revision report

 System Backplane :      GPM          FM         OSP
                       -------     -------    -------
                         1.002       1.002      1.002

 PCI-X Backplane  :      LPM          HS
                       -------     -------
                         2.000       1.000

                         FPGA          MP
                       -------     -------
IOX Master Core IO  :    2.009    A.006.012
Event Dict.                                0.009
IOX Slave  Core IO  :    2.009    A.006.012
Event Dict.                                0.009
```

NOTE: System Firmware does not display the correct revision until it has been updated separately in step 8.

8. Having verified that all other firmware components have been updated successfully, run the Firmware Update Utility to update Cell System Firmware version(s) to `A.X.X.X` (See Note (1) in this step) using the `fw` command:

   ```
   MP:CM> fw
   ```

   Enter the following information when prompted:

   ```
   Enter the Entities to be upgraded (Ex: 3,4,10): (1)
   Enter your user name: (2)
   Enter your user password: (3)
   Enter the ip address where the firmware can be found: (4)
   ```

```
Enter the path where the firmware can be found: (5)
Enter the filename of the firmware image for the PDHC: (6)(a or b)
Enter the filename of the System Firmware image: (7)
Enter the filename of the firmware image for the MP: (8)
Are you sure that you want to continue (Y/N): y
```

(1) Select the appropriate entity corresponding to the replacement cell to be upgraded / downgraded by entering the number from the first column of the FW table(2) Enter your user name.(3) Enter account password.(4) Enter the IP address of the anonymous FTP server where the firmware images reside.(5) Enter the directory path. For example: `/dist/versionX_X` (or some other location). Do not list the actual firmware image filename. (6a) Enter the System Firmware filename: `pinn.bin.X.X.fh` (See Note (1) in this step). (6b) Enter the System Firmware filename: `sfw.X.X.X.fh` (See Note (1) in this step). NOTE (1): `X.X.X` is the version number corresponding to the version of the System firmware on the other cells.

Example:

```
MP:CM> fw
    ********************************************************************
    *****                                                          *****
    *****                  Firmware Update Utility                 *****
    *****                                                          *****
    *****       (C) Copyright 2001 Hewlett-Packard Company         *****
    *****                   All Rights Reserved                    *****
    *****                                                          *****
    *****        THIS PROGRAM IS NOT LICENSED TO CUSTOMERS         *****
    *****                                                          *****
    *****  This program is intended for use by trained HP support  *****
    *****  personnel only.  HP shall not be liable for any damages *****
    *****  resulting from unauthorized use of this program.  This  *****
    *****  program is the property of HP.                          *****
    *****                                                          *****
    *****                     Version  4.00                        *****
    *****                                                          *****
    ********************************************************************

                                          Flash      Current
   Number  Cabinet    Name   Partition   Handle   Firmware Version  Comments
   ------ --------- -------- ---------- -------- ------------------ --------
   (1)  1         0     MP 0          0        0          5.022       Master
   (1)  2         0     MP 1          1        1          5.022       Slave
   (3)  3   (2)  8     MP 0          0    32768          5.022       Master
   (3)  4   (2)  8     MP 1          1    32769          5.022       Slave
        5         0   PDHC 0          0      256          3.014         -
        6         0    SFW 0          0      320         21.001         -
        7         0   PDHC 1          1      257          3.014         -
        8         0    SFW 1          1      321         22.002         -
   (3)  9         0   PDHC 2          0      258          3.014         -
   (3) 10         0    SFW 2          0      322         22.002         -
   (3) 11         0   PDHC 3          1      259          3.014         -
   (3) 12         0    SFW 3          1      323         22.002         -

   Enter the Entities to be upgraded (Ex: 3,4,10): 6
   Enter your user name: anonymousEnter your user password: ********
   Enter the ip address where the firmware can be found: 192.1.1.1
   Enter the path where the firmware can be found: /dist/versionX_X
   Enter the filename of the System Firmware image: pin.bin.X.X.fh
   Are you sure that you want to continue(Y/N): y

   **** Firmware Updating System Firmware ****
```

(Firmware updating progress is reported) NOTE (1): Cabinet id `8` is assigned to the SEU. NOTE (2): These entities might be different depending on your server. NOTE (3): `X.X.X` is the version number corresponding to the version of the System Firmware on the other cells.

9. Ensure the entity selected was updated successfully. A successful update returns the following message:

   `Firmware Update has completed successfully for all entities.`

```
MP:CM>
```

An unsuccessful update results in an error message. If the FTP connection was successful, but the update failed, a warning is noted for the entity being updated. For example:

```
Firmware Update failed for entity SFW 0.DO NOT REBOOT SFW 0 until
it has been successfully updated!!!Firmware Update completed with
errors.
```

CAUTION: Repeat the firmware update procedure immediately for all entities failing to update successfully. *DO NOT RESET* or *AC POWER CYCLE* until you get a message indicating that all updates have completed successfully.

---

10. Verify the updated firmware revisions using the `sysrev` command. Example:

```
MP:CM> sysrev
                    Cabinet firmware revision report
                        PROGRAMMABLE HARDWARE :
                             System Backplane :   GPM          FM        OSP
                                               -------     -------    -------
                                                 1.002       1.002      1.002

                        PCI-X Backplane  :   LPM          HS
                                           -------     -------
                                             2.000       1.000

                        Core IO
                       :  Master       Slave
                        --------     -------
                           2.009       2.009

                                             LPM        PDHC
                                           -------    -------
                        Cell 0 :             1.002      1.007
                        Cell 1 :             1.002      1.007
                        Cell 2 :             1.002      1.007
                        Cell 3 :             1.002      1.007

                                    FIRMWARE:
                        Core IO
                          Master        :  A.006.012
                          Event Dict.   :         0.009
                          Slave         :  A.006.012
                          Event Dict.   :         0.009

                        Cell 0
                          PDHC          :  A.003.023
                          Pri SFW       :     21.003 (PA)
                          Sec SFW       :     22.002 (PA)
                        Cell 1
                          PDHC          :  A.003.023
                          Pri SFW       :     21.003 (PA)
                          Sec SFW       :     22.002 (PA)
                        Cell 2
                          PDHC          :  A.003.023
                          Pri SFW       :     21.003 (PA)
                          Sec SFW       :     22.002 (PA)
                        Cell 3
                          PDHC          :  A.003.023
                          Pri SFW       :     21.003 (PA
                          Sec SFW       :     22.002 (PA)

                     IO Cabinet FPGA and Firmware revision report
                         System Backplane :      GPM          FM        OSP
                                           -------     -------    -------
                                             1.002       1.002      1.002

                         PCI-X Backplane  :      LPM          HS
                                           -------     -------
                                             2.000       1.000
```

```
                                          FPGA          MP
                                        -------     -------

IOX Master Core IO  :   2.009    A.006.012
Event Dict.                                          0.009
IOX Slave  Core IO  :   2.009    A.006.012
Event Dict.                                          0.009
```

11. After resetting the firmware, verify the firmware and programmable hardware revisions again using the `sysrev` command. If all versions are now correct, continue to step 12. If not correct, run `dfw`, `fw` or `osp` again to copy or download the correct firmware.
12. Reset the partition using the `rs` command:

```
MP:CM> rs

This command resets the selected partition.

WARNING: Execution of this command irrecoverably halts
all system processing and I/O activity and restarts the
selected partition.

   Part#  Name
   -----  ----
      0)  Partition 0
      1)  Partition 1
   Select a partition number: 0 (or 1)
```

Upgrading Using the DFW Command

If problems are encountered during the firmware update procedure, it might be necessary to use the MP `DFW` command. The `DFW` command can be used to copy a PDHC or a system firmware image from one cell to another.

NOTE: The steps for upgrading using the `DFW` command are the same as listed in "Upgrading Using the FW Command" (page 132):

1. To upgrade the newly added cell using the `DFW` command, follow these steps:
   1. OSP the PDHC FPGA image to the new cell.
   2. To copy the PDHC image to the new cell, use `DFW`.
   3. AC power cycle the cell
   4. To copy the System Firmware image to the new cell, use `DFW`.
2. Perform step 1 from Step 1 and step 2 from Step 2.

   Do not reset the cell until the next step (step 3) is completed.
3. Example (To upgrade the PDHC firmware):

```
MP:CM> dfw
    ********************************************************************
    *****                                                          *****
    *****               Duplicate Firmware Utility                 *****
    *****                                                          *****
    *****       (C) Copyright 2001 Hewlett-Packard Company         *****
    *****                   All Rights Reserved                    *****
    *****                                                          *****
    *****        THIS PROGRAM IS NOT LICENSED TO CUSTOMERS         *****
    *****                                                          *****
    *****  This program is intended for use by trained HP support  *****
    *****  personnel only.  HP shall not be liable for any damages *****
    *****  resulting from unauthorized use of this program.  This  *****
    *****  program is the property of HP.                          *****
    *****                                                          *****
    *****                     Version  1.04                        *****
    *****                                                          *****
    ********************************************************************
```

```
                                          Flash        Current
 Number  Cabinet    Name   Partition  Handle   Firmware Version  Comments
 ------ --------- -------- --------- -------- ------------------ --------
     1         0   PDHC 0A         0      256      A.003.023      Current
     2         0   PDHC 0B         0      264      A.003.023      Old
     3         0    SFW 0A         0      320         21.003      Pri PA
     4         0    SFW 0B         0      328         21.003      Sec PA
     5         0   PDHC 1A         0      257      A.003.034      Current
     6         0   PDHC 1B         0      265      A.003.034      Old
     7         0    SFW 1A         0      321         22.002      Pri PA
     8         0    SFW 1B         0      329         22.002      Sec PA

Note: You can only duplicate one firmware type at a time.
Enter the Entities to be updated (EX: 7,8) : 1
Enter the source entity for the PDHC firmware image: 5
Are you sure that you want to continue(Y/N): y

**** Updating device PDHC 0A ****
Erasing Flash(es).    This may take several minutes.
DFW has completed successfully for all entities
```

Once DFW has completed, verify the following message is returned:

```
DFW has completed successfully for all entities
```

CAUTION: *DO NOT RESET* or *AC POWER CYCLE* the server unless you have received confirmation that DFW has completed successfully. Repeat the DFW command immediately if the firmware failed to complete successfully.

NOTE (1): After a DFW copy of a Cell PDHC firmware image is captured, the version displayed by the sysrev command will not be correct until the cell PDHC is reset using the ru command or AC power is cycled.

4. Perform steps 6 and 7 from Step 6.
5. Example (To upgrade the System Firmware firmware)

```
MP:CM> dfw
    ************************************************************************
    *****                                                              *****
    *****               Duplicate Firmware Utility                     *****
    *****                                                              *****
    *****       (C) Copyright 2001 Hewlett-Packard Company             *****
    *****                   All Rights Reserved                        *****
    *****                                                              *****
    *****        THIS PROGRAM IS NOT LICENSED TO CUSTOMERS             *****
    *****                                                              *****
    *****  This program is intended for use by trained HP support      *****
    *****  personnel only.  HP shall not be liable for any damages     *****
    *****  resulting from unauthorized use of this program.  This      *****
    *****  program is the property of HP.                              *****
    *****                                                              *****
    *****                      Version  1.04                           *****
    *****                                                              *****
    ************************************************************************

                                          Flash        Current
 Number  Cabinet    Name   Partition  Handle   Firmware Version  Comments
 ------ --------- -------- --------- -------- ------------------ --------
     1         0   PDHC 0A         0      256      A.003.034      Current
     2         0   PDHC 0B         0      264      A.003.034      Old
     3         0    SFW 0A         0      320         21.001      Pri PA
     4         0    SFW 0B         0      328         21.001      Sec PA
     5         0   PDHC 1A         0      257      A.003.034      Current
     6         0   PDHC 1B         0      265      A.003.034      Old
     7         0    SFW 1A         0      321         22.002      Pri PA
     8         0    SFW 1B         0      329         22.002      Sec PA

Note: You can only duplicate one firmware type at a time.
Enter the Entities to be updated (EX: 7,8) : 3
Enter the source entity for the System firmware image: 7
```

```
Are you sure that you want to continue(Y/N): y

**** Updating device SFW 0A ****
Erasing Flash(es).   This may take several minutes.
DFW has completed successfully for all entities
```

Once DFW has completed, verify the following message is returned:

```
DFW has completed successfully for all entities
```

CAUTION: *DO NOT RESET* or *AC POWER CYCLE* the cell or server unless you have received confirmation that DFW has completed successfully. Repeat the DFW command immediately if the firmware failed to complete successfully.

6. Perform steps 11 and 12.

Downgrading Using the DFW Command

1. If problems are encountered during the firmware update procedure, it may be necessary to use the MP DFW command. The DFW command can be used to copy a PDHC or a System firmware image from one cell to another. The steps for upgrading using the DFW command are the same as listed in "Upgrading Using the DFW Command" (page 139) with two additional steps:
   1. OSP the PDHC FPGA image to the new cell.
   2. Use DFW to copy the PDHC image to the new cell image A.
   3. Use DFW to copy the PDHC image to the new cell image B.
   4. AC power cycle the cell.
   5. Use DFW to copy the System Firmware image to the new cell image A.
   6. Use DFW to copy the System Firmware image to the new cell image B.
2. Perform step 1 from Step 1 and step 2 from Step 2.

   Do not reset the cell until step 4 on Step 4 has been completed.
3. Example (To downgrade the PDHC image A firmware)

```
MP:CM> dfw
    ************************************************************************
    *****                                                                *****
    *****               Duplicate Firmware Utility                       *****
    *****                                                                *****
    *****       (C) Copyright 2001 Hewlett-Packard Company               *****
    *****                   All Rights Reserved                          *****
    *****                                                                *****
    *****        THIS PROGRAM IS NOT LICENSED TO CUSTOMERS               *****
    *****                                                                *****
    *****  This program is intended for use by trained HP support        *****
    *****  personnel only.  HP shall not be liable for any damages       *****
    *****  resulting from unauthorized use of this program.  This        *****
    *****  program is the property of HP.                                *****
    *****                                                                *****
    *****                      Version  1.04                             *****
    *****                                                                *****
    ************************************************************************

                                        Flash        Current
   Number  Cabinet    Name   Partition  Handle   Firmware Version  Comments
   ------ --------- -------- --------- -------- ------------------ --------
       1         0   PDHC 0A         0      256      A.003.034      Current
       2         0   PDHC 0B         0      264      A.003.034      Old
       3         0    SFW 0A         0      320         22.002      Pri PA
       4         0    SFW 0B         0      328         22.002      Sec PA
       5         0   PDHC 1A         0      257      A.003.023      Current
       6         0   PDHC 1B         0      265      A.003.023      Old
       7         0    SFW 1A         0      321         21.001      Pri PA
       8         0    SFW 1B         0      329         21.001      Sec PA

   Note: You can only duplicate one firmware type at a time.
   Enter the Entities to be updated (EX: 7,8) : 1
   Enter the source entity for the PDHC firmware image: 5
   Are you sure that you want to continue(Y/N): y

**** Updating device PDHC 0A ****
   Erasing Flash(es). This may take several minutes.DFW has completed successfully for all entities
```

Once DFW has completed, verify the following message is returned:

```
DFW has completed successfully for all entities
```

CAUTION: *DO NOT RESET* or *AC POWER CYCLE* the server unless you have received confirmation that DFW has completed successfully. Repeat the DFW command immediately if the firmware failed to complete successfully.

NOTE (1): After a DFW copy of a cell PDHC firmware image is captured, the version displayed by the sysrev command is not correct until the cell PDHC is reset using the ru command or AC power is cycled.

4. Example (To downgrade the PDHC image B firmware)

```
MP:CM> dfw
    ************************************************************************
    *****                                                                *****
    *****               Duplicate Firmware Utility                       *****
    *****                                                                *****
    *****       (C) Copyright 2001 Hewlett-Packard Company               *****
    *****                   All Rights Reserved                          *****
    *****                                                                *****
    *****        THIS PROGRAM IS NOT LICENSED TO CUSTOMERS               *****
    *****                                                                *****
    *****  This program is intended for use by trained HP support        *****
    *****  personnel only.  HP shall not be liable for any damages       *****
    *****  resulting from unauthorized use of this program.  This        *****
    *****  program is the property of HP.                                *****
    *****                                                                *****
    *****                      Version  1.04                             *****
    *****                                                                *****
    ************************************************************************

                                          Flash        Current
    Number  Cabinet    Name   Partition  Handle   Firmware Version  Comments
    ------ --------- -------- --------- -------- ------------------ --------
        1         0   PDHC 0A         0      256      A.003.034      Current
        2         0   PDHC 0B         0      264      A.003.034      Old
        3         0    SFW 0A         0      320         22.002      Pri PA
        4         0    SFW 0B         0      328         22.002      Sec PA
        5         0   PDHC 1A         0      257      A.003.023      Current
        6         0   PDHC 1B         0      265      A.003.023      Old
        7         0    SFW 1A         0      321         21.001      Pri PA
        8         0    SFW 1B         0      329         21.001      Sec PA

   Note: You can only duplicate one firmware type at a time.
   Enter the Entities to be updated (EX: 7,8) : 2
   Enter the source entity for the PDHC firmware image: 5
   Are you sure that you want to continue(Y/N): y

   **** Updating device PDHC 0B ****
   Erasing Flash(es). This may take several minutes.
   DFW has completed successfully for all entities
```

Once DFW has completed, verify the following message is returned:

```
DFW has completed successfully for all entities
```

CAUTION: *DO NOT RESET* or *AC POWER CYCLE* the server unless you have received confirmation that DFW has completed successfully. Repeat the DFW command immediately if the firmware failed to complete successfully.

NOTE (1): After a DFW copy of a cell PDHC firmware image is captured, the version displayed by the sysrev command will not be correct until the cell PDHC is reset using the ru command or AC power is cycled.

5. Perform steps 6 and 7 from Step 6.
6. Example (To downgrade the System Firmware image A firmware)

```
MP:CM> dfw
    ************************************************************************
```

```
*****                                                                *****
*****               Duplicate Firmware Utility                       *****
*****                                                                *****
*****       (C) Copyright 2001 Hewlett-Packard Company               *****
*****                   All Rights Reserved                          *****
*****                                                                *****
*****        THIS PROGRAM IS NOT LICENSED TO CUSTOMERS               *****
*****                                                                *****
*****  This program is intended for use by trained HP support        *****
*****  personnel only.  HP shall not be liable for any damages       *****
*****  resulting from unauthorized use of this program.  This        *****
*****  program is the property of HP.                                *****
*****                                                                *****
*****                       Version  1.04                            *****
*****                                                                *****
**********************************************************************

                                      Flash        Current
Number  Cabinet    Name   Partition  Handle   Firmware Version  Comments
------ --------- -------- --------- -------- ------------------ --------
    1         0   PDHC 0A         0      256      A.003.023      Current
    2         0   PDHC 0B         0      264      A.003.023      Old
    3         0    SFW 0A         0      320         22.002      Pri PA
    4         0    SFW 0B         0      328         22.002      Sec PA
    5         0   PDHC 1A         0      257      A.003.034      Current
    6         0   PDHC 1B         0      265      A.003.034      Old
    7         0    SFW 1A         0      321         21.001      Pri PA
    8         0    SFW 1B         0      329         21.001      Sec PA

Note: You can only duplicate one firmware type at a time.
Enter the Entities to be updated (EX: 7,8) : 3
Enter the source entity for the System firmware image: 7
Are you sure that you want to continue(Y/N): y

**** Updating device SFW 0A ****
Erasing Flash(es). This may take several minutes.
DFW has completed successfully for all entities
```

Once DFW has completed, verify the following message is returned:

```
DFW has completed successfully for all entities
```

△ **CAUTION:** *DO NOT RESET* or *AC POWER CYCLE* the cell or server unless you have received confirmation that DFW has completed successfully. Repeat the DFW command immediately if the firmware failed to complete successfully.

---

7. Example (To downgrade the System Firmware image B firmware)

```
MP:CM> dfw
**********************************************************************
*****                                                                *****
*****               Duplicate Firmware Utility                       *****
*****                                                                *****
*****       (C) Copyright 2001 Hewlett-Packard Company               *****
*****                   All Rights Reserved                          *****
*****                                                                *****
*****        THIS PROGRAM IS NOT LICENSED TO CUSTOMERS               *****
*****                                                                *****
*****  This program is intended for use by trained HP support        *****
*****  personnel only.  HP shall not be liable for any damages       *****
*****  resulting from unauthorized use of this program.  This        *****
*****  program is the property of HP.                                *****
*****                                                                *****
*****                       Version  1.04                            *****
*****                                                                *****
**********************************************************************

                                      Flash        Current
Number  Cabinet    Name   Partition  Handle   Firmware Version  Comments
------ --------- -------- --------- -------- ------------------ --------
    1         0   PDHC 0A         0      256      A.003.034      Current
```

```
2          0    PDHC 0B        0      264      A.003.034      Old
3          0     SFW 0A        0      320         21.001      Pri PA
4          0     SFW 0B        0      328         22.002      Sec PA
5          0    PDHC 1A        0      257      A.003.034      Current
6          0    PDHC 1B        0      265      A.003.034      Old
7          0     SFW 1A        0      321         21.001      Pri PA
8          0     SFW 1B        0      329         21.001     Sec PA

   Note: You can only duplicate one firmware type at a time.
   Enter the Entities to be updated (EX: 7,8) : 4
   Enter the source entity for the System firmware image: 7
   Are you sure that you want to continue(Y/N): y

**** Updating device SFW 0B ****
   Erasing Flash(es). This may take several minutes.
   DFW has completed successfully for all entities
```

Once DFW has completed, verify the following message is returned:

```
DFW has completed successfully for all entities
```

CAUTION: *DO NOT RESET* or *AC POWER CYCLE* the cell or server unless you have received confirmation that DFW has completed successfully. Repeat the DFW command immediately if the firmware failed to complete successfully.

8. Perform steps 11 and 12 from Step 11.

Installing the VRM Cover (AB388-00002) and Door Opener (AB388-00003)

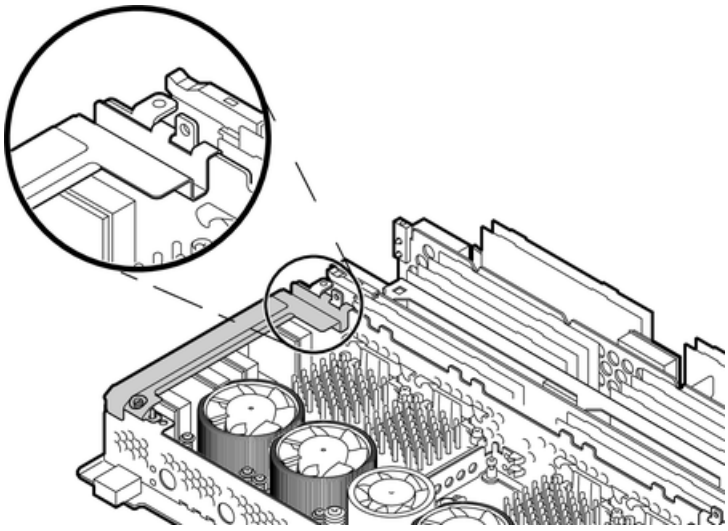
These two assemblies replace the single CPU cover when installing PA8800 and dual-core IPF processors. The assemblies are included in upgrade kits and are not available to order individually. The following is a list of processors that require the new air baffles.

- Intel® Itanium® 2 CPUs (AB548A and AB439A)
- PA8800 CPUs (AB536A and AB537A)

To install new air baffles, follow these steps:

1. Remove the old CPU cover.
2. Install the VRM cover (AB388-00002), onto the left side of the cell board.
3. Tighten the screw. See Figure 6-43.

Figure 6-43 VRM Cover Installed



4. Install the door opener (AB388-00003), onto the right side of the cell board.

5. Tighten the screw. See Figure 6-44.

Figure 6-44 Door Opener Installed

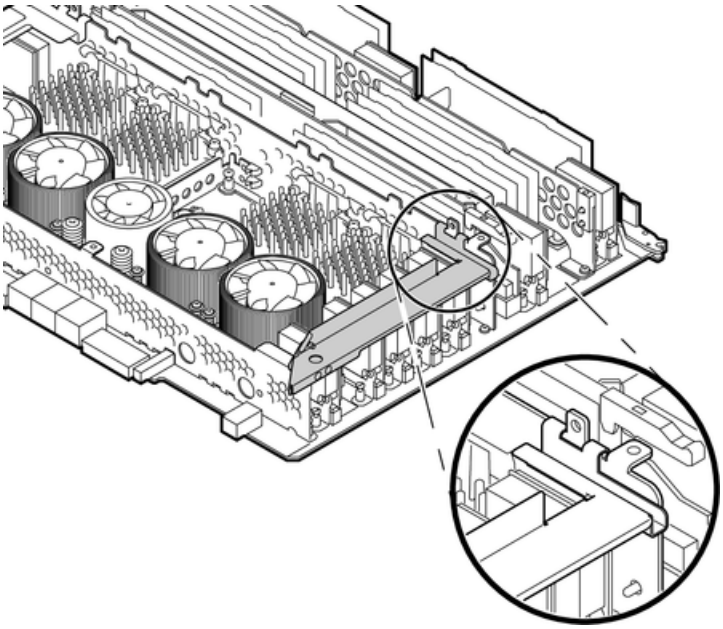
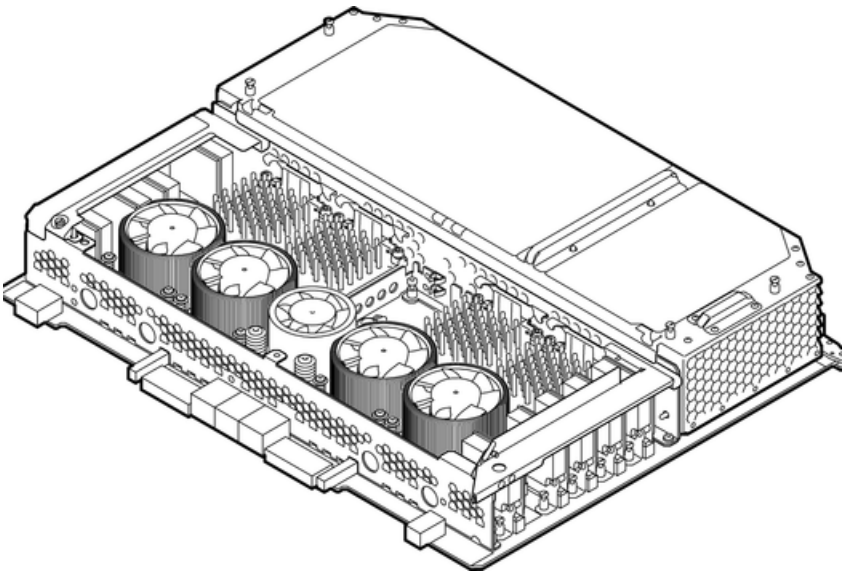


Figure 6-45 VRM Cover, Door Opener, and DIMM Cover Installed



6. Install the cell board into the server.
7. Replace the right side cover.
8. Power on the server. For more information, see "Shutting Down nPartitions and Powering Off Hardware Components " (page 96).
9. Power on the nPartition. See Appendix D.
10. To verify proper operation of the cell board, use the `info cpu` command from the EFI Shell.

Removing and Replacing a Central Processing Unit

The CPUs are located on the cell boards.

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

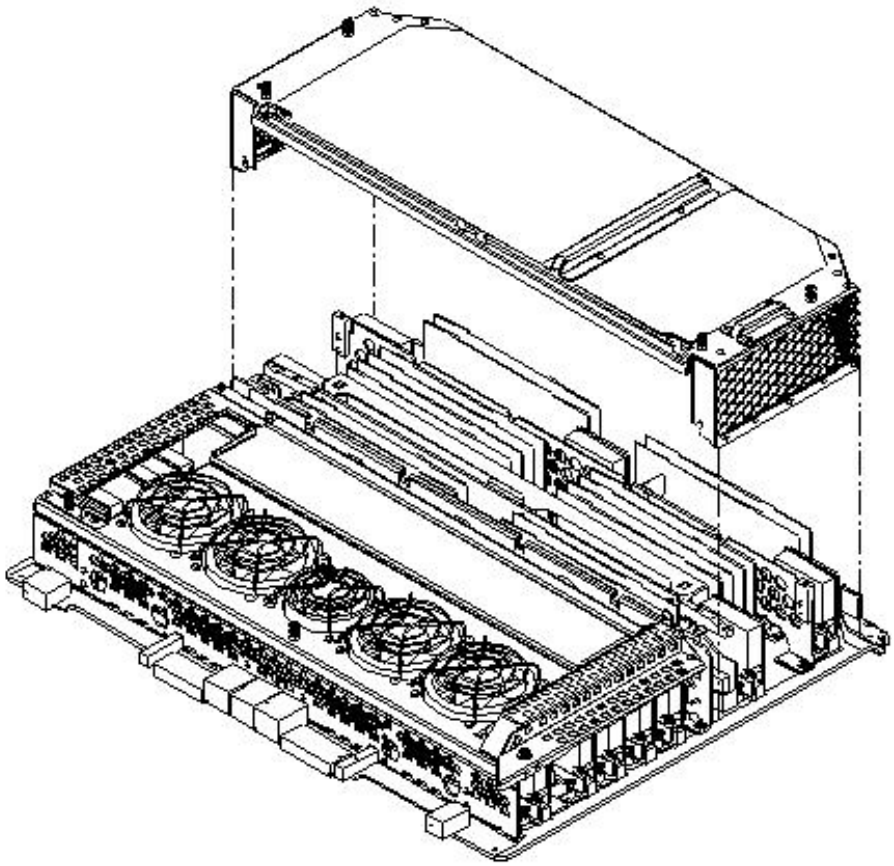
Removing the Processor

To remove the processor, follow these steps:

1. Prepare an ESD-safe work surface large enough to accommodate the cell board. Use a grounded mat and an anti-static wrist strap, such as those included in the ESD Field Service Kit (HP P/N/ A3024-80004).
2. Identify the partition, cell board, and processors that are to be removed.
3. Power off the server.

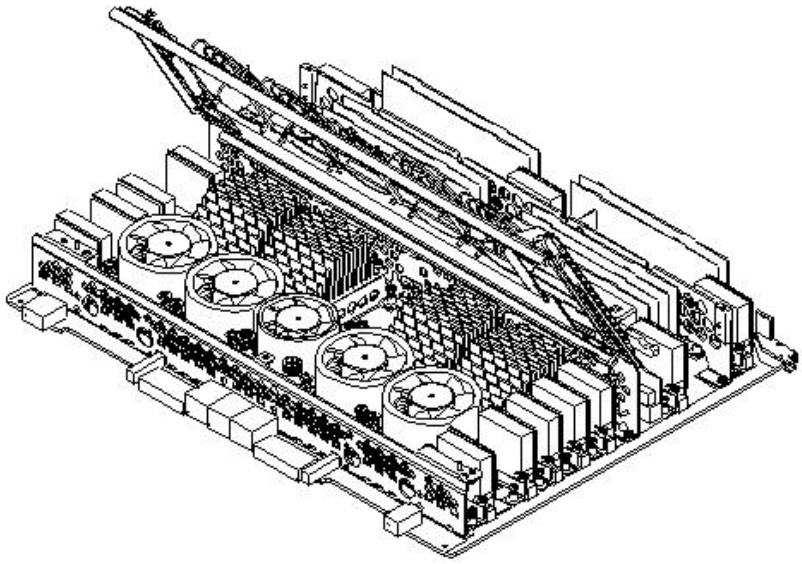
   For more information, see "Shutting Down nPartitions and Powering Off Hardware Components " (page 96), and Appendix D (page 205).
4. Remove the right side cover.
5. Remove the cell board.
6. Position the cell board on the ESD-safe work surface with the backplane connectors facing toward you.
7. Loosen the four captive screws that secure the DIMM cover.
8. Lift the DIMM cover away from the cell board.

Figure 6-46 DIMM Cover Removed



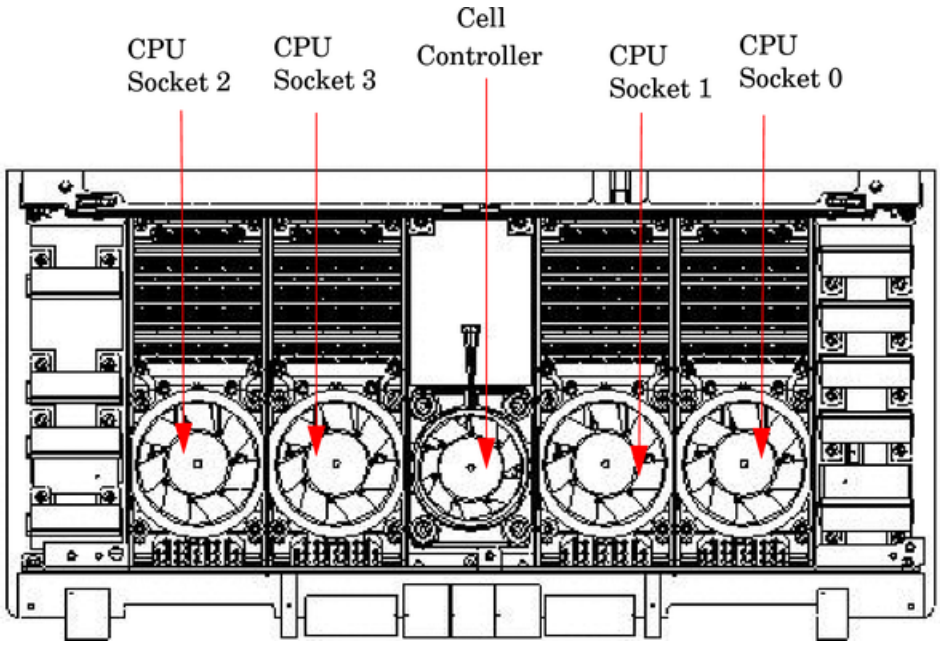
9. Loosen the captive screws on the CPU cover, lift the cover, and set aside.

Figure 6-47 CPU Cover Raised



10. Identify the CPUs to be removed.
11. Disconnect the CPU power pod cable connector from its connector on the cell board.
12. Disconnect the turbo-cooler fan cable from the cell board.

Figure 6-48 CPUs with Turbo-Cooler Fans



13. Loosen the four T15 heat-sink screws and the four turbo-cooler load screws. Loosen these screws in an X pattern, rotating each screw two to three turns until all screws are loose from the cell board.
14. Push the load screw sequencer toward the fan.

15. Locate the peep hole on the left side of the CPU turbo-cooler by slightly rotating the fan blades.

WARNING! When unlocking the ZIF socket, do not exceed the one half turn counter-clockwise. Damage to the socket will occur, requiring replacement of the cell board.

16. Insert the 2.5 mm hex driver between the fan blades, through the peep hole, and turn the ZIF socket lock screw one half turn counter-clockwise to unlock the CPU from the socket.
17. Lift the CPU/turbo-cooler/power pod assembly straight up and off the cell board.

NOTE: If the socket will not be populated with a replacement processor module, place the ZIF socket cover over the ZIF socket. Tighten the four screws in an X pattern until secure.

Replacing the Processor

CAUTION: Avoid removing any VRMs to connect the CPU power pod and turbo-cooler cables into the cell board connectors.

NOTE: CPU load order must be maintained when adding CPUs to the cell board. Always load CPU socket 0 first.

To replace the processor, follow these steps:

1. If the CPU 0 ZIF socket is not exposed, remove the ZIF socket pin cover from the cell board.
2. Ensure that the cell board ZIF socket is in the unlocked position.
3. Remove the CPU module from its packaging.
4. Remove the CPU module pin cover and inspect the pins for any damage.

NOTE: Carefully remove pin cover to avoid any damage to the pins.

5. Slide the load screw sequencer toward the turbo-cooler to expose the ZIF socket peep hole through the turbo-cooler.
6. Lower the CPU module onto the ZIF socket making sure it is held level to the board until the pins engage the ZIF socket.
7. Using a 2.5 mm hex driver through the peep hole, turn the ZIF socket lock/unlock screw one half turn to lock the CPU into place.

CAUTION: Do not exceed one half turn clockwise when locking the CPU into the ZIF socket. Damage to the ZIF socket will occur, requiring the cell board to be replaced.

NOTE: Ensure that the ZIF socket is fully locked. Use a 2.5mm hex wrench to lock the ZIF socket. Check that the CPU module housing is level and shifts slightly right when locking the ZIF socket.

8. Slide the load screw sequencer away from the turbo-cooler.
9. Tighten the four T15 screws on the sequencer in an X pattern, turning each screw two to three turns until all screws are secure.

NOTE: The processor screws do not need to be torqued. The processor is properly secured when the screws reach the bottom on the socket frame.

10. Tighten the four captive screws on the power pod in an X pattern until secure.
11. Connect the turbo-cooler fan cable to the cell board connector.

12. Reconnect the CPU power cable to the cell board connector.
13. Replace the processor cover and tighten the captive screws.

NOTE: New cell boards housing the new IPF processors will require new air baffles. For more information, see "Installing the VRM Cover (AB388-00002) and Door Opener (AB388-00003)" (page 144).

14. Position the DIMM cover in place.
15. Tighten the four captive screws to secure the DIMM cover.
16. Install the cell board in the server.
17. Replace covers.
18. Power on the server.
19. Power on the nPartition. See Appendix D.

Installing Dual-Core CPUs (A9767A)

There are three additional components required when replacing a CPU with a dual-core CPU. If only one CPU module is installed on the cell board, a terminator must be installed in CPU socket 2.

- Dual-core CPU (A9767-04012)
- Sequencer fan assembly (A9767-04007)
- CPU cover

All CPU sockets must be empty before proceeding.

CAUTION: Avoid removing any VRMs to connect the CPU power pod and turbo-cooler cables into the cell board connectors.

NOTE: CPU load order that must be maintained when adding CPUs to the cell board. Always load CPU socket 0 first.

To install a dual-core CPU, follow these steps:

1. Remove the dual-core CPU from its packaging.
2. Route the red and black cables into the groove in the back of the CPU module toward the appropriate power connector on the cell board.
3. Lower the CPU module onto the socket making sure it is held level to the board.
4. Align the locating pins on the underside of the module onto the guide holes on the cell board socket rails.

Figure 6-49 Locating Pins on the CPU Module

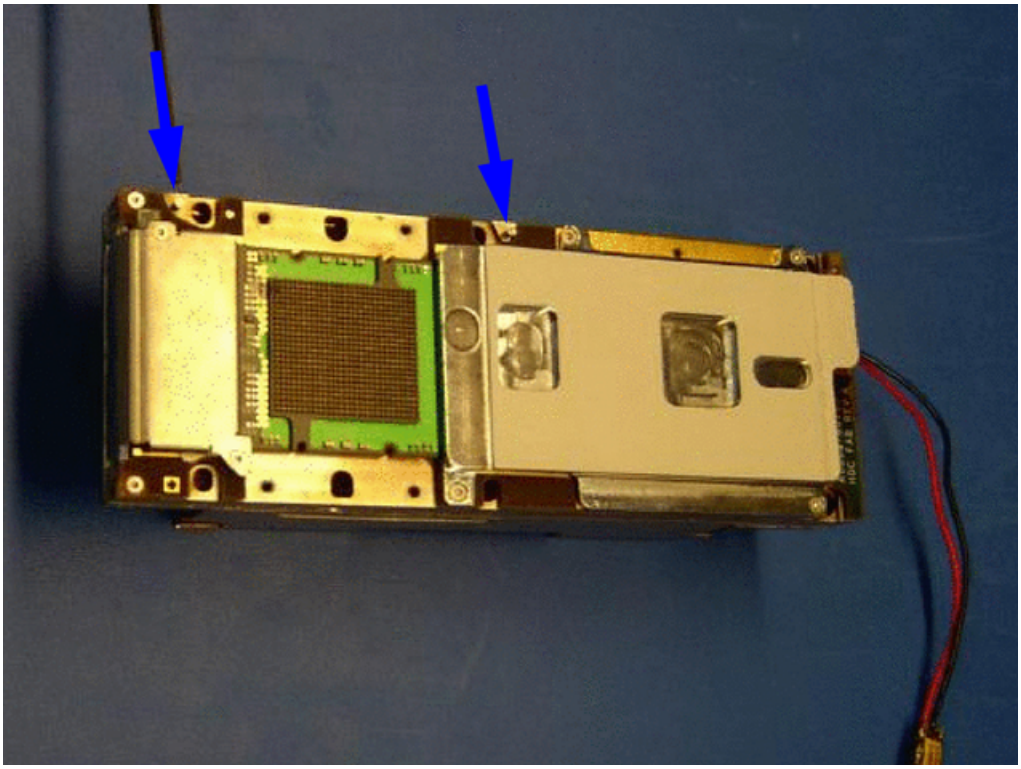
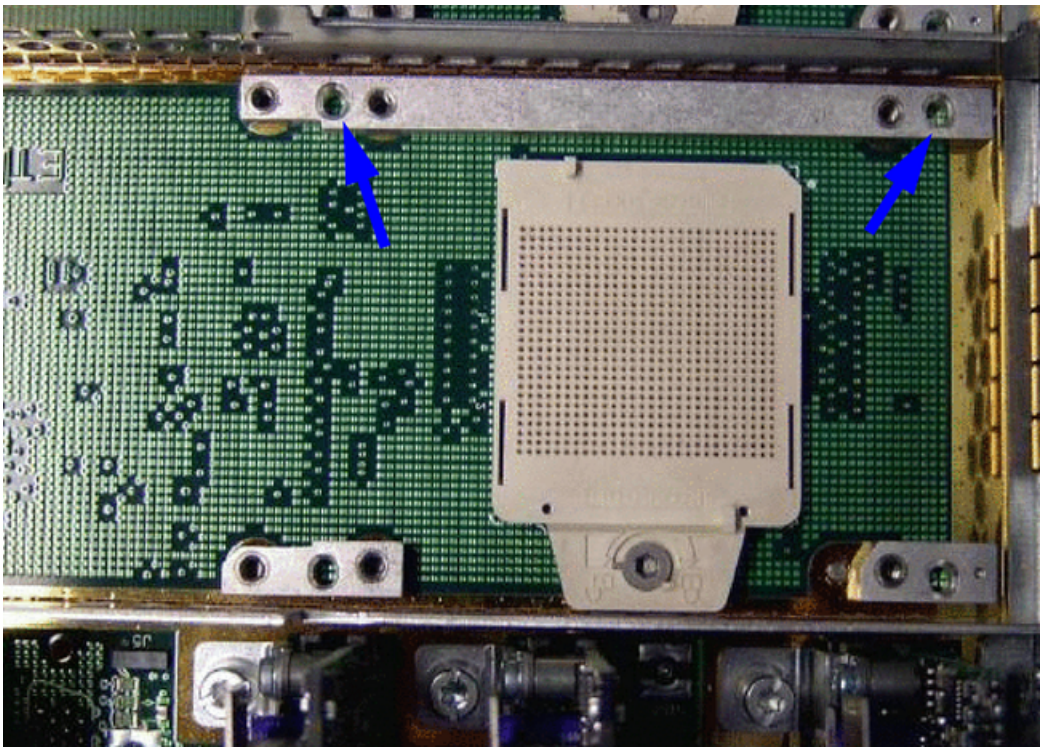
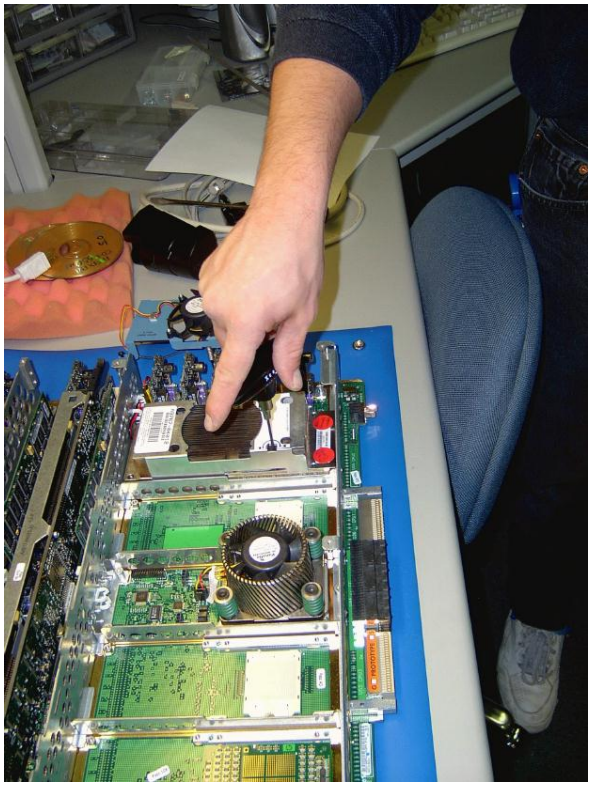


Figure 6-50 Guide Holes on Cell Board



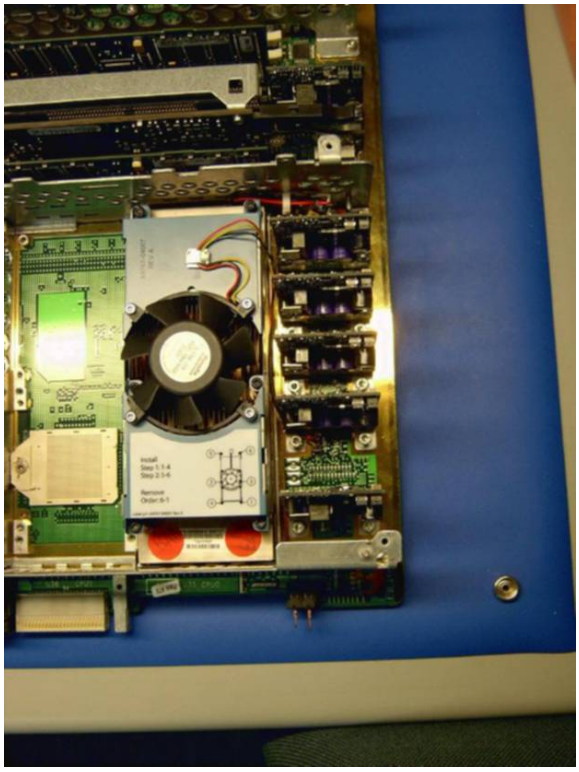
5. Using a 2.5 mm hex driver, turn the ZIF socket screw one half turn clockwise to lock the CPU into place.

Figure 6-51 Locking the CPU Into the Cell Board ZIF Socket



6. Place the sequencer fan assembly over the CPU module.
7. Tighten the T15 screws on the sequencer in an X pattern turning each screw 2–3 turns until all screws are secure.

Figure 6-52 Sequencer Fan Assembly Installed



8. Alternately tighten the power module screws until secure.

9. Connect the sequencer fan cable to the connector on the cell board.
10. Connect the CPU power cable to the cell board connector.
11. Ensure all cables are properly routed, secured, and connected.
12. Repeat steps 1 through 10 for all remaining CPU modules.
13. Install the new processor cover and secure all screws.
14. Position the DIMM cover in place and tighten all captive screws.
15. Install the cell board in the server.
16. Repeat steps 1 through 15 for all remaining cell boards to be upgraded.
17. Replace covers.
18. Power on the server.
19. Use the Firmware Update Utility (FW) from the MP Command Menu to update firmware to the latest revision.
20. Upgrade the operating system if required.

NOTE: Firmware must be updated to support the new dual-core processors. Below is an example of the minimum Firmware Version 3.3.

PROGRAMMABLE HARDWARE	
System Backplane GPM	1.002
System Backplane FM	1.002
System Backplane OSP	1.002
PCI-X Backplane LPM	2.000
PCI-X Backplane HS	1.000
Core IO	2.008
Cell LPM	1.002
Cell PDHC	1.007
FIRMWARE:	
Core IO MP	A.006.012
Event Dictionary	1.009
Cell PDHC	A.003.023
Cell SFW	1.025

22. Power on the nPartition.
23. To verify proper operation of the cell board, use the `info cpu` command from the EFI Shell.

Installing Intel Itanium 2 CPUs (AB548A and AB439A)

There are additional components required when replacing a CPU with an Intel Itanium 2 CPU.

- Intel Itanium 2 CPUs (AB548A and AB439A)
- VRM cover (AB388-00002)
- Door opener (AB388-00003)
- Review IMPORTANT information regarding A1 vs. A2 Stepping Processors prior to installation

AB439A and AB548A Processor Stepping Information

IMPORTANT: Intel updated A2 stepping of the Itanium 2 AB439A and AB548A processors. Intel is no longer providing A1 stepping processors. HP and its customers will have to gradually transition to A2 stepping processors.

For approximately two years (June 2005 - June 2007), A1 stepping processors were replaced with A1 stepping processors and A2 stepping processors were replaced with A2 stepping processors. Once A1 processor exchange parts are no longer available, the parts must be replaced with A2 processors and the system firmware updated if necessary.

How to Identify an A1 Stepping processor from an A2 Stepping processor

Table 6-5 Processor Stepping Comparisons

FRU Exchange P/N	Description	Stepping Number	FRU-ID P/N
A6913-69009	1.5GHz 4MB	A1	AB439-04001
A6913-69011	1.6GHz 6MB	A1	AB548-04001
A6913-69014	1.5GHz 4MB	A2	AB439-04004
A6913-69015	1.6GHz 6MB	A2	AB548-04004

Mixing A1 and A2 Stepping Processors

A1 and A2 processors may be mixed on the same cell board with A2-compatible firmware. Cell boards with A1 processors may be mixed with cell boards with A2 processors within the same partition.

CAUTION: Minimum Firmware Version must be 3.3 with A2 processor cell board(s) or the system does not boot. If the logical firmware download order is not followed, unpredictable results can also occur.

Related Information

- On the WTEC server, see the WTEC newsletter of Current Issues *Communications Relative to the Intel Itanium 2 Madison 9M Processor and Upcoming Firmware* (#319).
- Service Notes for the firmware releases with A2 Stepping processor support. Firmware Release notes are summarized in the service note for the HP Integrity rx7620.
- *ReadMe* flyers are included with the Add-On A2 processor parts and GSO replacement parts indicating the minimum level of firmware required.

CPU Installation Procedures

All CPU sockets must be empty before proceeding.

CAUTION: Avoid removing any VRMs to connect the CPU power pod and turbo-cooler cables into the cell board connectors.

NOTE: CPU load order must be maintained when adding CPUs to the cell board. Always load CPU socket 0 first.

To install new CPUs, follow these steps:

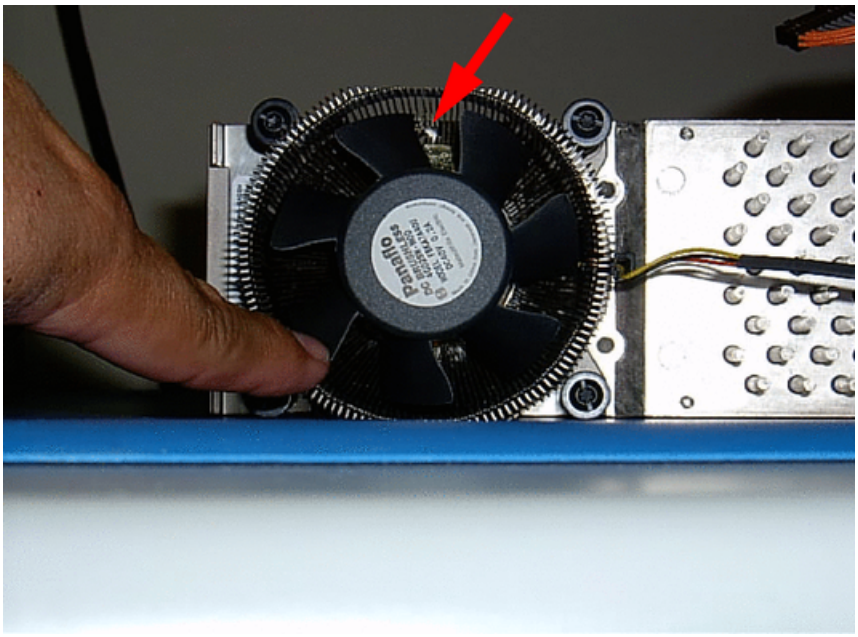
1. If the CPU 0 ZIF socket is not exposed, remove the ZIF socket pin cover from the cell board.
2. Ensure that the cell board ZIF socket is in the unlocked position.
3. Remove the CPU module from its packaging.

4. Remove the CPU module pin cover and inspect the pins for any damage.

NOTE: Carefully remove pin cover to avoid any damage to the pins.

5. To expose the ZIF socket peep hole through the turbo-cooler, slide the load screw sequencer toward the turbo-cooler.
6. Rotate the fan to expose the ZIF socket peep hole location. See Figure 6-53 (page 154).

Figure 6-53 ZIF Socket Lock/Unlock Peep Hole Location



7. Lower the CPU module into the ZIF socket making sure it is held level to the board, until the pins on the CPU engage with the ZIF socket.

NOTE: The new CPU power pod is slightly hinged. Ensure that the CPU assembly is level prior to lowering it onto the cell board.

8. Using a 2.5 mm hex driver through the peep hole, turn the ZIF socket lock/unlock screw one half turn to lock the CPU into place.

CAUTION: Do not exceed one half turn clockwise when locking the CPU into the ZIF socket. Damage to the ZIF socket will occur, requiring the cell board to be replaced.

NOTE: Ensure that the ZIF socket is fully locked. Use a 2.5mm hex wrench to lock the ZIF socket. Check that the CPU module housing is level and shifts slightly right when locking the ZIF socket.

9. Push the load sequencer away from the fan.
10. Tighten the four CPU module screws in an X pattern, turning each screw two to three turns, until all screws are secure.

NOTE: The processor screws do not need to be torqued. The processor is properly secured when the screws reach the bottom on the socket frame.

11. Alternately tighten the two power pod screws until secured. Ensure that the entire CPU module is seated level in the cell board.

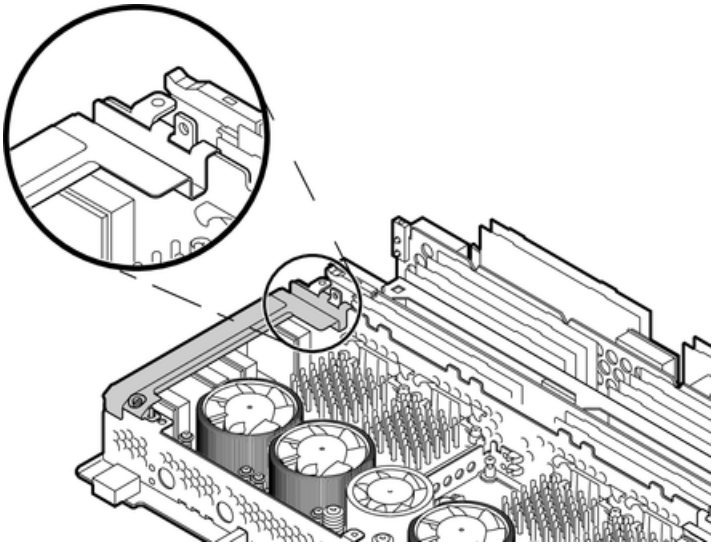
NOTE: Do not overtighten the screws. Damage can occur to the cell board.

12. Connect the turbo-cooler fan cable to the connector on the cell board.
13. Route the power cable, left or right, to the cell board connector.
14. Reconnect the CPU power pod cable to the cell board connector.

NOTE: Due to space constraints, it may be necessary to use a tool to assist with inserting CPU 0 and CPU2 power pod and turbo-cooler cables into the cell board connectors.

15. Install remaining CPUs, keeping load order in mind.
16. Install the VRM cover (AB388-00002), onto the left side of the cell board. Tighten the screw. See Figure 6-54.

Figure 6-54 VRM Cover Installed



17. Install the door opener, onto the right side of the cell board. Tighten the screw. See Figure 6-55.

Figure 6-55 Door Opener Installed

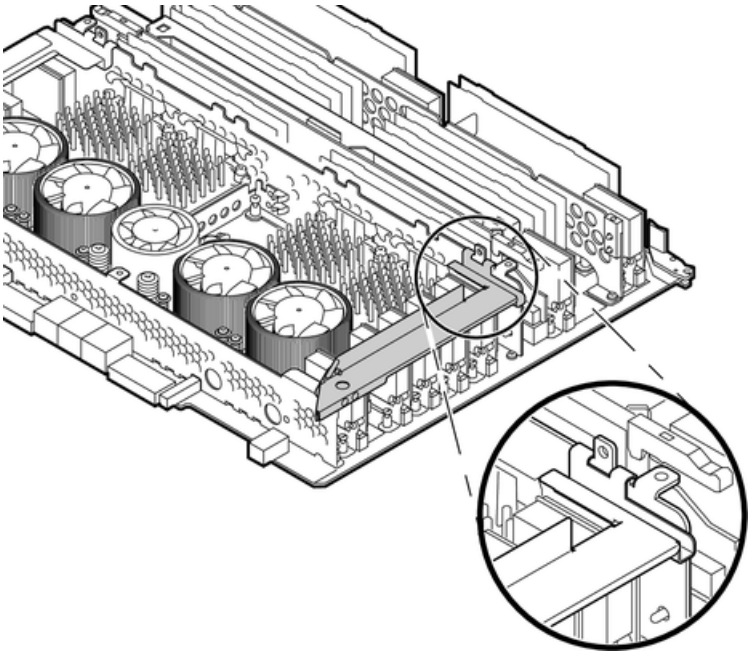
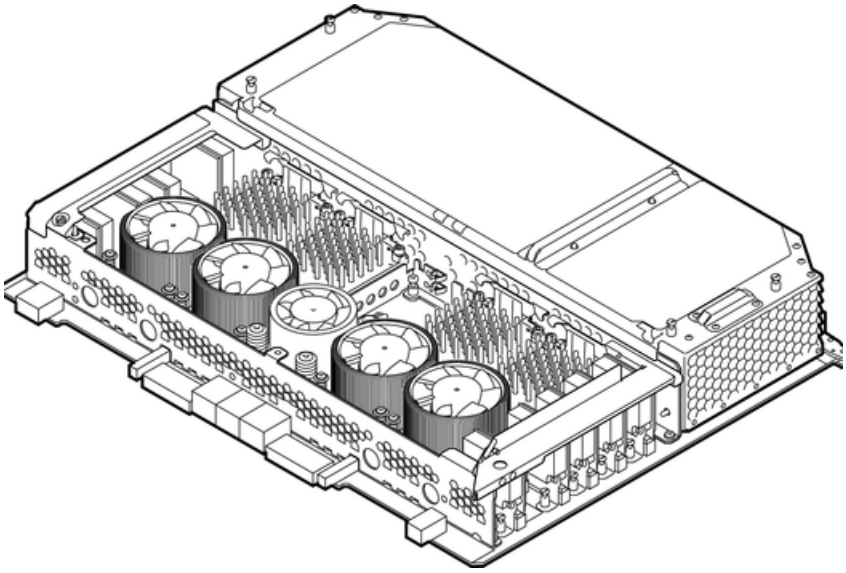


Figure 6-56 VRM Cover and Door Opener Installed



18. Position the DIMM cover in place.
19. Tighten the four captive screws to secure the DIMM cover.
20. Install the cell board in the server.
21. Replace the right side cover.
22. Power on the server. For more information, see "Shutting Down nPartitions and Powering Off Hardware Components " (page 96).
23. Verify the firmware and hardware programmable hardware revisions in standby power mode by using the MP:CM>`SYSREV` command. Below is an example of the minimum firmware version.

NOTE: Firmware must be updated to support the new processors. Below is an example of minimum Firmware Version 3.3.

PROGRAMMABLE HARDWARE	
System Backplane GPM	1.002
System Backplane FM	1.002
System Backplane OSP	1.002
PCI-X Backplane LPM	2.000
PCI-X Backplane HS	1.000
Core IO	2.008
Cell LPM	1.002
Cell PDHC	1.007
FIRMWARE:	
Core IO MP	A.006.012
Event Dictionary	1.009
Cell PDHC	A.003.023
Cell SFW	1.025

NOTE: If the firmware or programmable hardware versions are not at or above the minimum versions, go to the HP website to obtain the latest Firmware Release Notice and firmware patches.

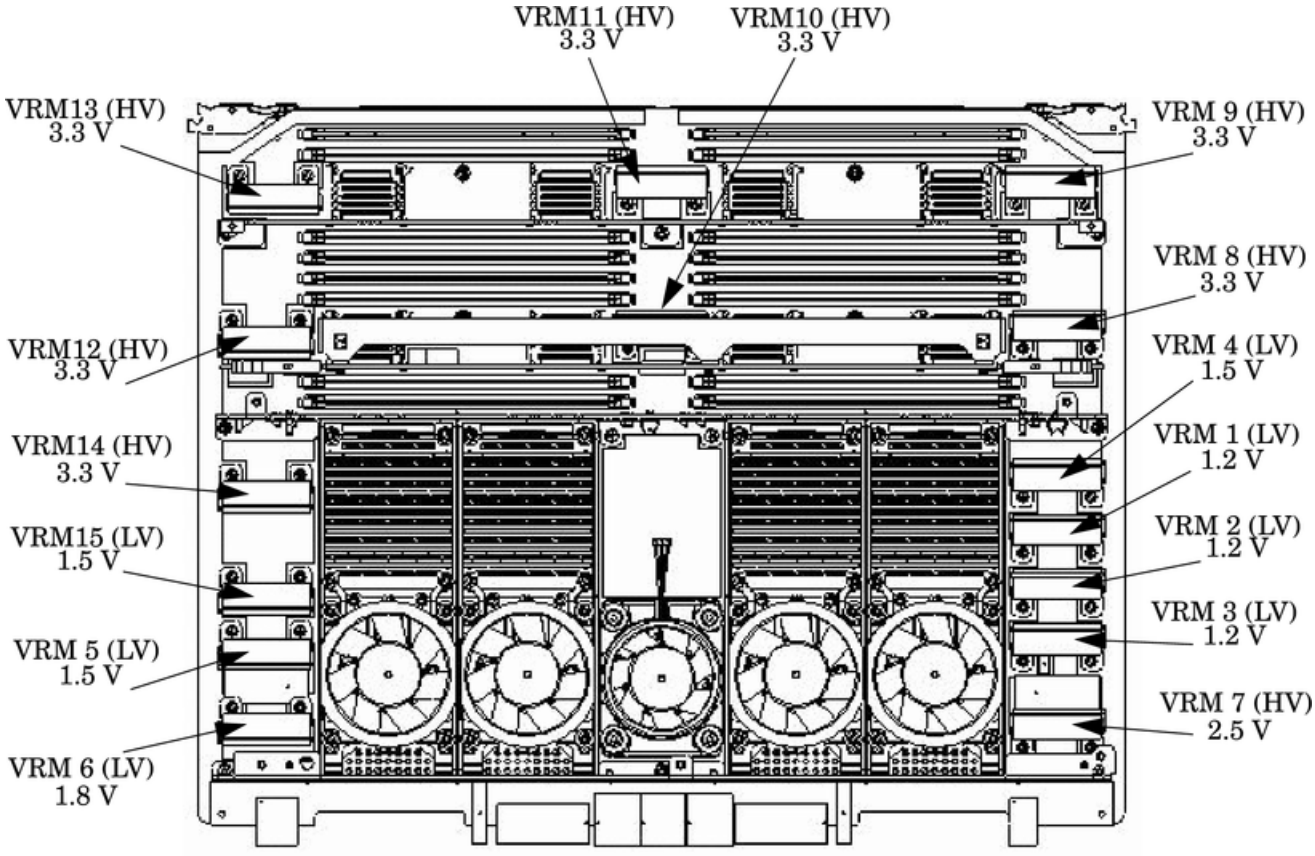
The Firmware Update Release notice is included in the download bundle and includes the upgrade instructions.

24. Power on the nPartition. See Appendix D.
25. To verify proper operation of the cell board, use the `info cpu` command from the EFI Shell.

Removing and Replacing a Cell Board VRM

The voltage regulator modules (VRMs) are located on the cell boards. There are a total of 15 VRMs on the cell board. Seven are high voltage and eight are low voltage.

Figure 6-57 VRM Locations

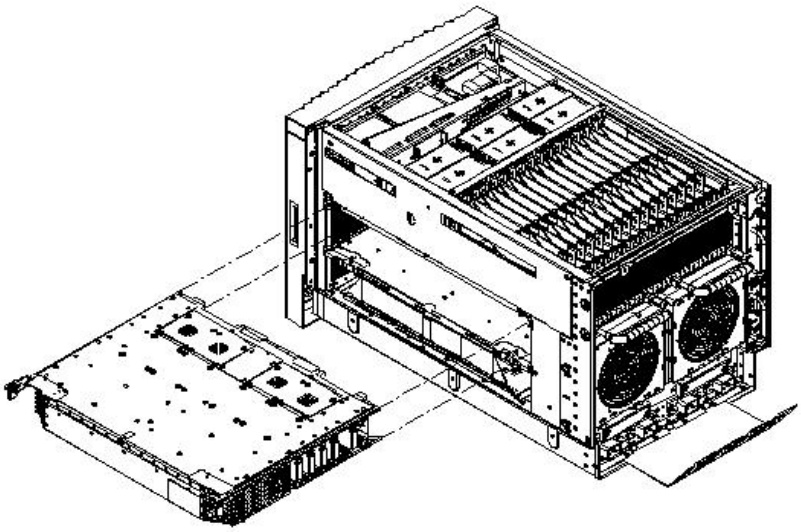


CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Removing a Cell Board VRM

Before attempting to remove or replace a VRM, you must remove the system power to the cell board that contains the VRM to be replaced. For more information, see "Shutting Down nPartitions and Powering Off Hardware Components " (page 96).

Figure 6-58 Cell Board Detail



NOTE: The cell board weighs 27.8 lb. Support both side edges while removing the cell board from the chassis.

To remove a cell board VRM, follow these steps:

1. Power off the cell board using the MP command menu `PE` command.
2. Remove the right side cover.
3. Verify that the power LED located on the left side of the cell board is off before removing the cell board. For more information, see "Removing a Cell Board VRM" (page 157).
4. Slide the cell board from the chassis.
5. Remove the DIMM cover.
   a. Loosen the four captive screws that secure the DIMM cover.
   b. Lift the DIMM cover away from the cell board.
6. Remove the CPU cover.
   a. Loosen the captive screws on the CPU cover.
   b. Lift the cover and set aside.
7. Locate the VRM to be removed.
8. Loosen the hold-down retaining screws that secure the VRM to the cell board.
9. Lift the VRM out of the socket.

Replacing a Cell Board VRM

To replace a cell board VRM, follow these steps:

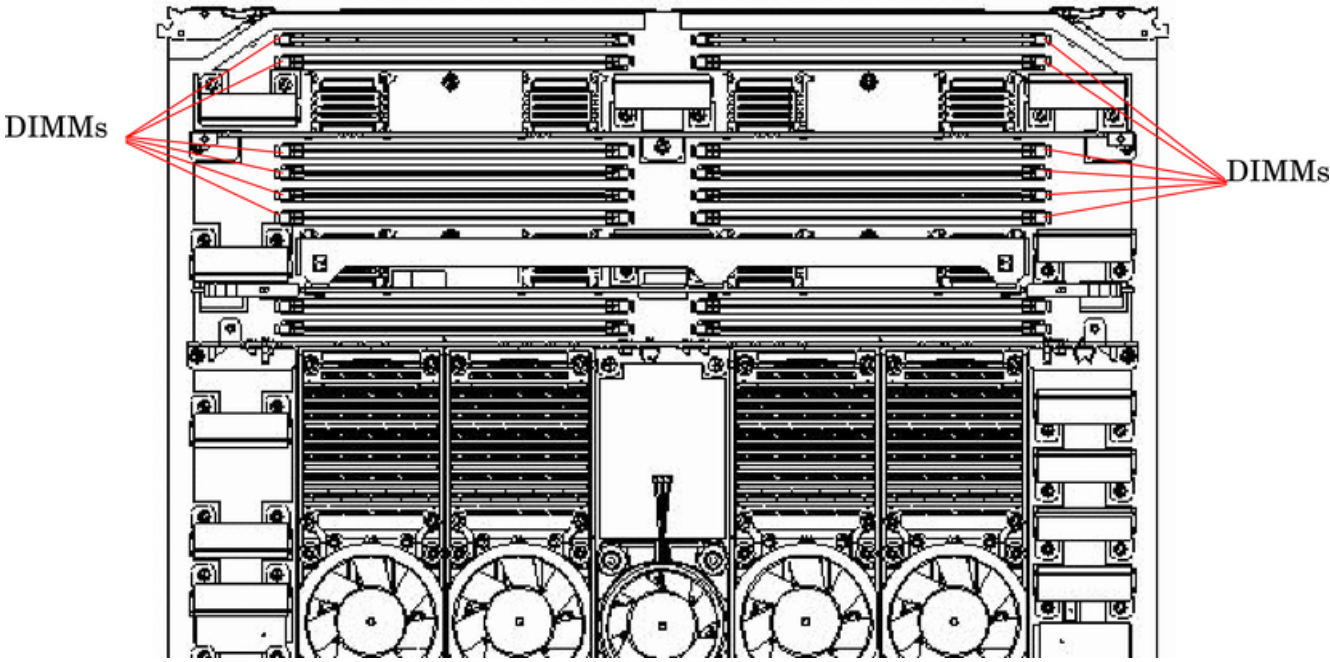
1. Place the VRM into the socket.
2. Tighten the hold-down retaining screws to secure the VRM into the cell board. Do not over tighten the screws.
3. Replace the CPU cover.
4. Replace the DIMM cover.
5. Insert the cell board into the chassis.
6. Replace the right side cover.
7. Power on the server.
8. Verify proper operation of the cell board.

Removing and Replacing a DIMM

The DIMMs reside on the cell board. The system power to cell board that contains the DIMMs must be removed before attempting to remove or replace a DIMM. For more information, see "Shutting Down nPartitions and Powering Off Hardware Components " (page 96).

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Figure 6-59 Cell Board and DIMM Location

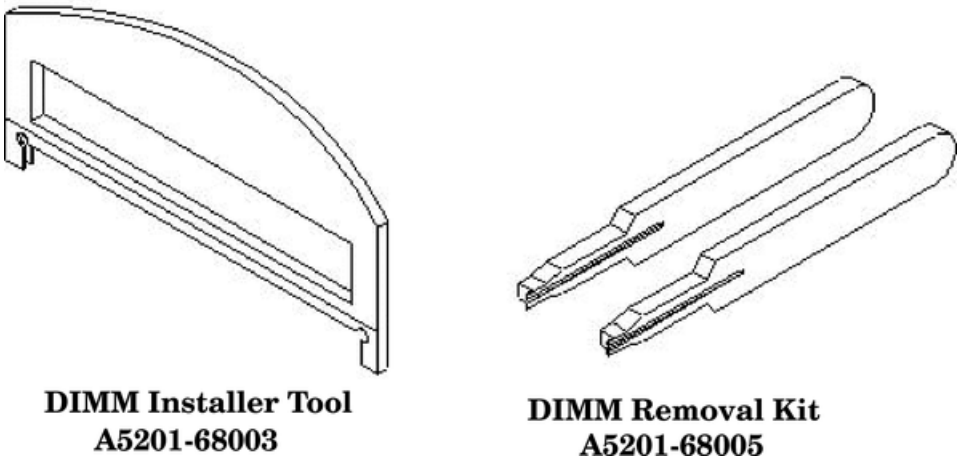


Removing a DIMM

To remove a DIMM, follow these steps:

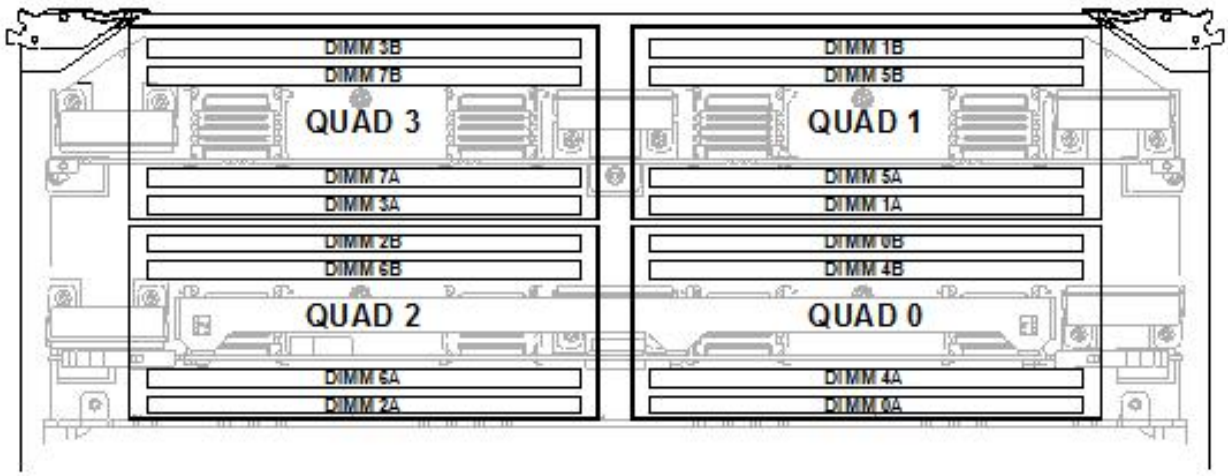
1. Remove the right side cover.
2. Remove the cell board.
3. Place the cell board onto a flat ESD-safe work surface.
4. Loosen the captive screws that secure the DIMM cover.
5. Remove the cover to gain access to the DIMMs.
6. Identify the defective DIMM using Figure 6-61 to aid with DIMM location on the cell board.
7. Using both DIMM removal tools, place the grooved side of each tool on each side of the target DIMM.

Figure 6-60 DIMM Removal and Installation Tools



8. Seat the tool tips down to the limit, then leverage connector latches outward to unseat the DIMM from the memory slot.

Figure 6-61 DIMM Detail With Locations



Replacing a DIMM

To replace a DIMM, follow these steps:

1. Orient the replacement DIMMs connector key over the memory slot.
2. Using the DIMM installer tool, press downward evenly to seat the DIMM into the memory slot.
3. Close the cover.
4. Tighten the retaining screws that hold the cover.
5. Replace the cell board into the chassis.
6. Replace the side cover.
7. To power on the cell board, use the `PS` command.
8. To verify that all DIMMs are allocated, use the `IN ME` command from the BCH prompt.

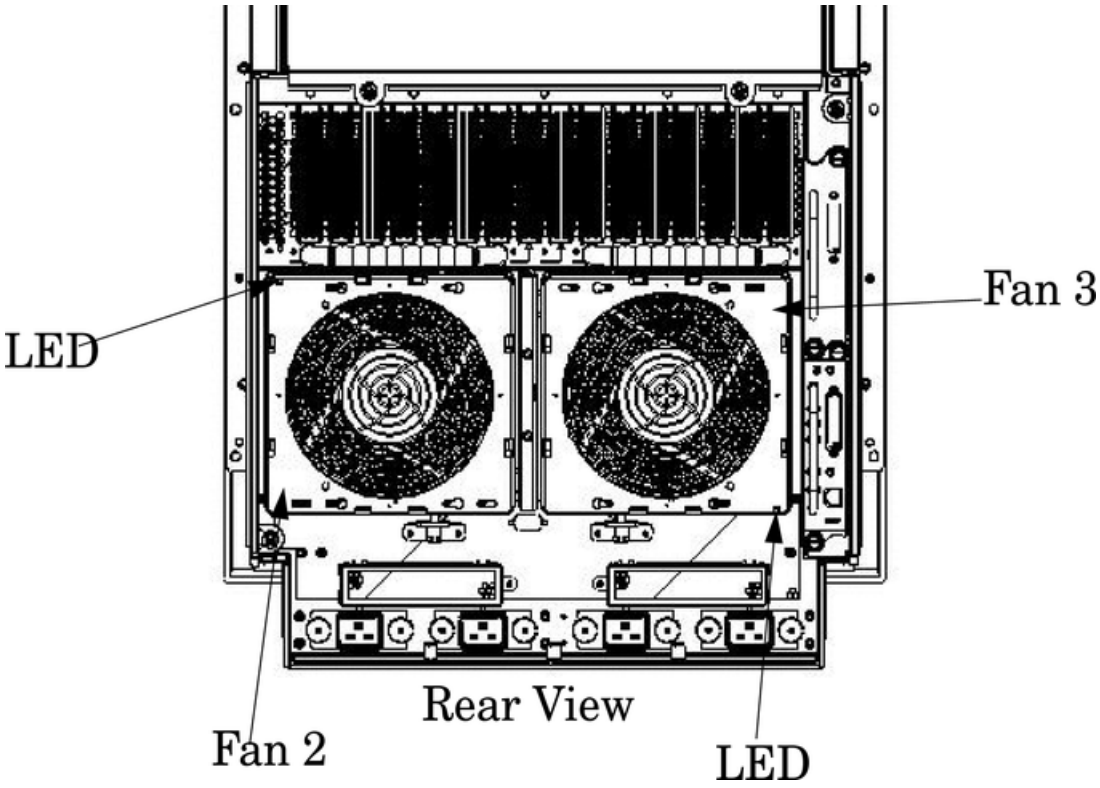
Removing and Replacing a Core I/O Board

The MP/SCSI core I/O board is located in the rear of the chassis. There can be two MP/SCSI core I/O boards installed in the server, core I/O 0 and core I/O 1. The core I/O board can be replaced

while standby power is applied. However, the operating system on the nPartition must be shut down to replace this FRU.

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Figure 6-62 Core I/O Location



Removing a Core I/O Board

To remove a core I/O board, follow these steps:

1. Save all MP networking details, including: the IP address, hostname, subnet mask, gateway, and other information. From the MP Command menu, enter the `LS` command to display the current MP customer LAN interface status.
2. To determine I/O board status, use the MP:`CM> PS`, or the MP:`CM> DE` commands with option `G`. See Figure 6-63 and Figure 6-64.

Figure 6-63 PS Command

```
MP:CM> ps

Display detailed status of the selected MP bus device.


The following MP bus devices were found:
+---+----+----+-----+-----+-------+-----+
|   |    |    |     |     |       |     |
|   |    |LAN\| Sys |     |  IO   |     |
|Cab| MP |SCSI|Bkpln|Cells|Chassis| BPS |
| # |M  S|0  1|     | 0 1 | 0   1 | 0 1 |
+---+----+----+-----+-----+-------+-----+
| 0 |*  *|*  *|  *  | * * | *   * | * * |
+---+----+----+-----+-----+-------+-----+

You may display detailed power and hardware status for the following items:

    T - Cabinet
    S - System Backplane
    G - MP (Core I/O)
    P - IO Chassis
    C - Cell
        Select Device: g

HW status for MP : No Fault Detected

Complex model string: 9000/800/rx7620

MP is not failed over

Attention LED is ON
Remote LED is on

Battery state is good

Last MP software reset occurred FRI FEB 13 10:58:29 2004

MP firmware rev 5.018, built on Jan 23 2004 10:11:10

MP:CM> _
```

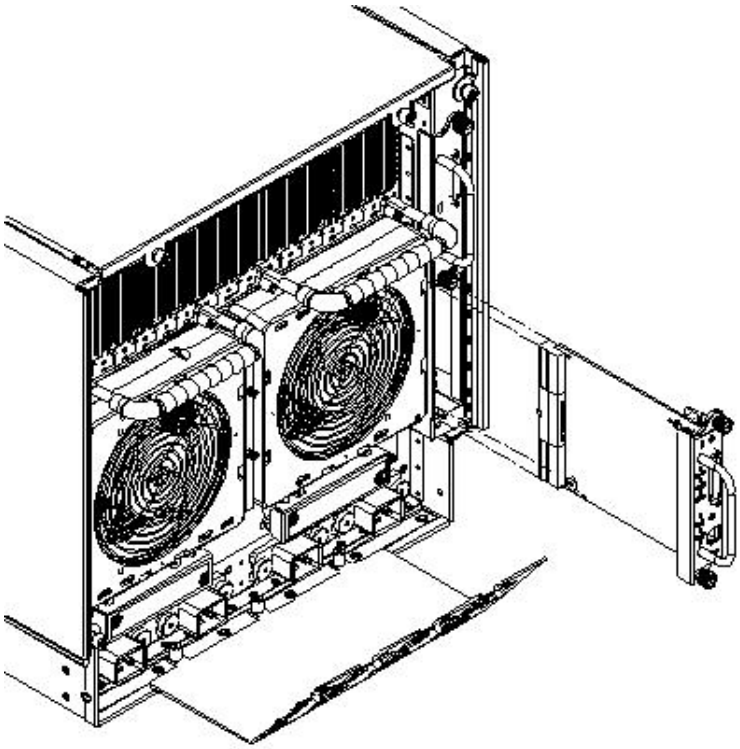
Figure 6-64 DE Command

```
MP:CM> de

Display summary status of the selected MP device.

    B - BPS  (Bulk Power Supplies)
    U - CLU  (Cabinet Utilities: Fans, Intrusion, Clock's etc.)
    A - PACI (Partition Console Interface)
    G - MP   (Management Processor)
    P - PM   (Power Management)
    H - Cell Board Controller (PDHC)
        Select device: g

Cabinet 0 MP status
FW revision    :   5.018 built on Jan 23 2004 at 10:11:10
MP failed over : false
Battery state  : good
Attention LED  : on
Remote LED     : on
Cabinet type   : rx7620

MP Reset Registry
Timestamp      :  FRI FEB 13 10:58:29 2004
Task name      :  tModel
Function name  :  subReset
Line number    :  202
Module errno   :  0
VxWorks errno  :  0
Error level    :  Crash
Parameter1     :  0xffffffff
Parameter2     :  0xffffffff

 MP:CM>
```

3. Label and remove all cables connected to the core I/O board.
4. Loosen the two retaining screws securing the board to the chassis.
5. Securely grasp the handle on the board.

6. Slide the board from the chassis.

Figure 6-65 Core I/O Detail



Replacing a Core I/O Board

To replace a core I/O board, follow these steps:

1. Position the core I/O board in the chassis.
2. The board slides easily into the chassis. Use a slow, firm pressure to properly seat the connection.
3. Tighten the two retaining screws, securing the board to the chassis.
4. Connect the cables that were labeled and detached during removal of the core I/O.
5. Reset the nPartition with the MP `RR` command. This command stops the boot process at BIB and enables you to check the firmware revision of the new MP. Update or backdate as needed. Configure the network settings as outlined in the following section.

Configuring MP Network Settings

After removing and replacing the core I/O in the server, configure the customer LAN network settings, using the settings from the original (replaced) core I/O.

To *configure* MP network settings, use the MP Command menu's `LC` command. To *list* the current MP network configuration, use the `LS` command.

Default MP Network Settings

Table 6-6 lists an example of the default customer LAN network settings for the server.

Table 6-6 Default Configuration for MP Customer LAN

Customer LAN IP Address	192.168.1.1
Customer LAN Host Name	gsp0

Table 6-6 Default Configuration for MP Customer LAN *(continued)*

Customer LAN Subnet Mask	255.255.255.0
Customer LAN Gateway	192.168.1.1

This procedure (Command menu, **LC** command) configures the MP customer LAN network settings from the MP Command menu.

1. Connect to the server complex MP and enter **CM** to access the Command menu.

   To connect to the MP, use `Telnet` if possible.

   If a MP is at its default configuration (including default network settings), connect to it using either of these methods:

   - Establish a direct serial cable connection through the MP local RS-232 port.
   - Access a PC or workstation on the same subnet as the MP, modify its network routing tables to include the default customer LAN IP address, then `Telnet` to the MP.

     To modify networking and connect, follow these steps:

     1. Access a PC or workstation on the MP subnet.

     2. Modify the network routing tables for the PC or workstation by using the

     `route add 192.168.1.1`*ClientName*

     command, where

     ClientName Is the network name of the PC or workstation.

     From a PC command prompt, enter **`route add 192.168.1.1`***ClientName*

     On an HP-UX workstation, log in as `root` and use the `/usr/sbin/route add 192.168.1.1` *ClientName* command:

     After reconfiguring the MP networking, remove these network routing table changes with the `route delete` command.

     3. To confirm the new network connection to the MP, enter the `ping 198.168.1.1 -n 2` command.

     4. To connect to the MP, use the `telnet 192.168.1.1` command from the PC or workstation.

2. From the MP Command menu, enter **LS** to *list* the current network settings, and, if needed, use the **LC** command to *reconfigure* the network settings for the MP.

   The `LC` command enables modifications to the customer LAN and/or the private LAN configuration.

   Cancel all changes to the MP LAN configuration at any time by replying **Q** to any of the `LC` command prompts.

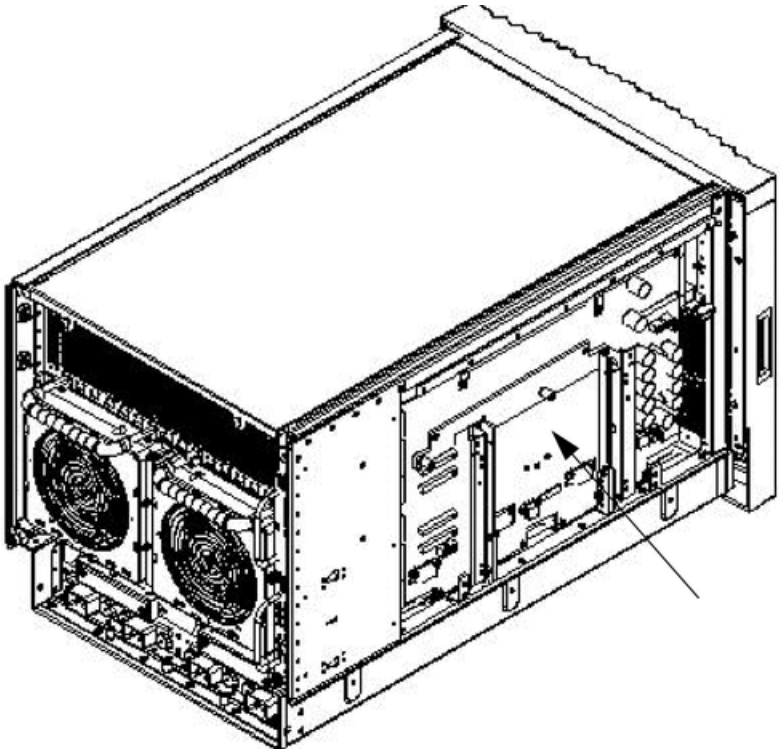
3. Ensure that the MP networking configuration is correct.

Removing and Replacing the System Backplane

The system backplane is located in the left side of the chassis. Before attempting to remove or replace this component, you must remove all system power.

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Figure 6-66 System Backplane Location



Removing the System Backplane

Figure 6-67 System Backplane Removal

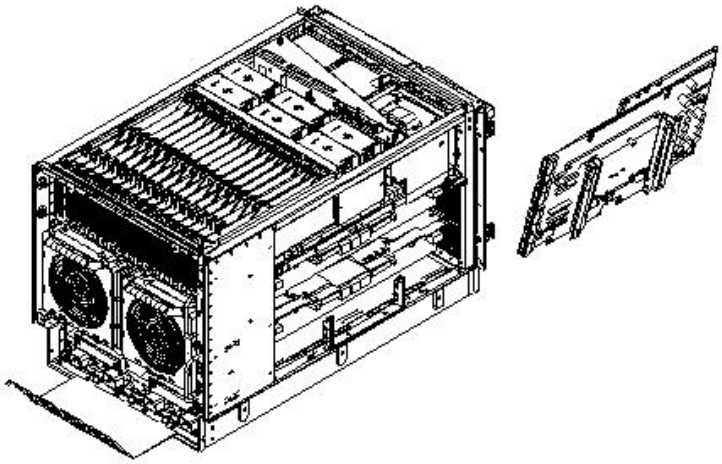
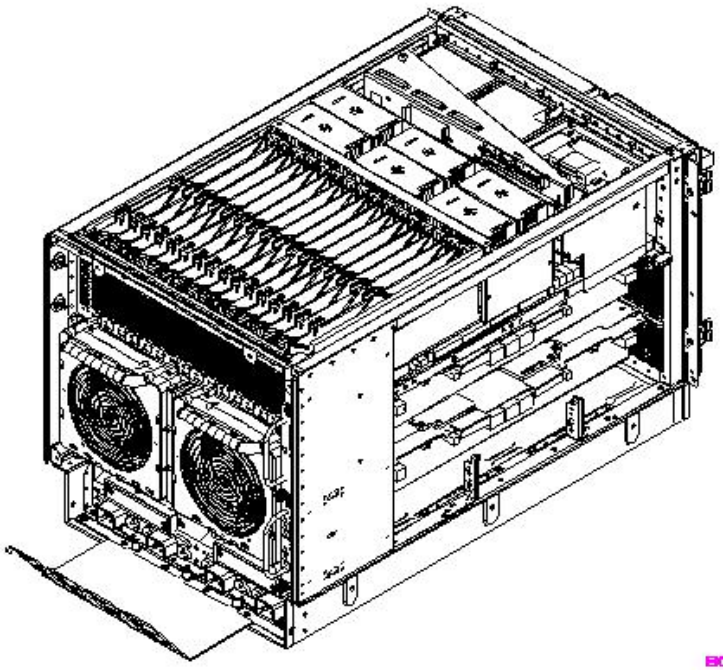


Figure 6-68 System Backplane Removed



To remove the system backplane, follow these steps:

1. Shut down the system partitions and remove all power cables.
2. Remove the side covers.
3. Extend all cell boards approximately four inches from system connectors.
4. Extend core MP/SCSI I/O board(s) approximately 1.5 inches from system connectors.
5. Label and disconnect all cables connected to the system backplane.
6. Remove hard attach brackets.
7. Support the system backplane and loosen the Jack screw until the system backplane releases from the chassis. Tilt the backplane back to a 45-degree angle and lift it out from the hinged bottom.

Replacing the System Backplane

To replace the system backplane, follow these steps:

1. Position the system backplane at a 45 degree angle in the chassis.
2. Align tabs at the bottom of the backplane with the slots on the bottom of the chassis.
3. Tilt the backplane forward until it is resting against the chassis.
4. Tighten the Jack screw.

NOTE: Watch for system board flex. Overcompression will break the board and render it useless.

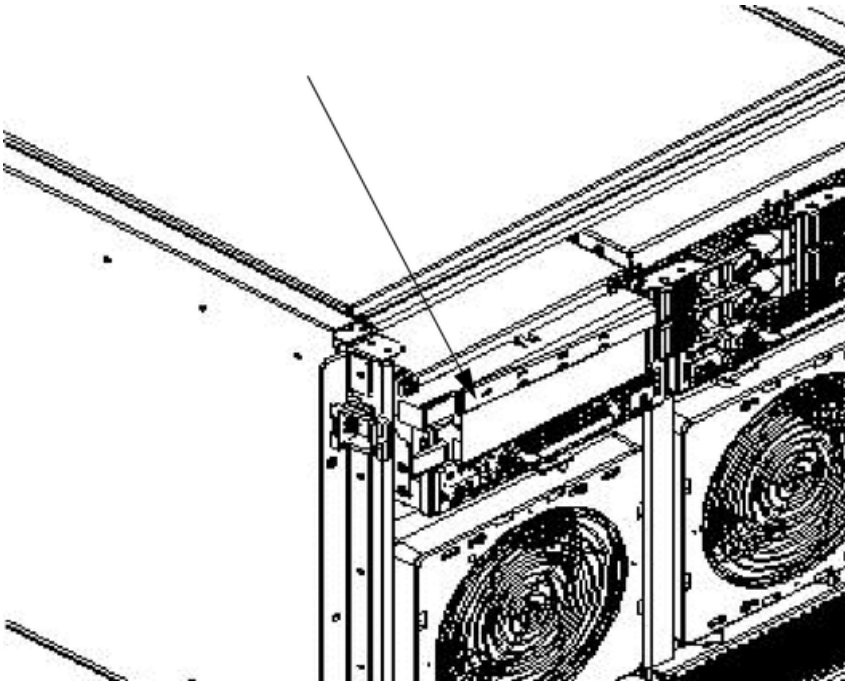
5. Install the hard attach brackets.
6. Reconnect all cables on the system backplane.
7. Reconnect core MP/SCSI I/O board(s).
8. Reconnect all cell boards.
9. Replace the side covers.
10. Power on the server.

Removing and Replacing the PCA Front Panel Board

The front panel board is located in the front of the chassis. You must remove all system power before attempting to remove or replace this component.

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Figure 6-69 Front Panel Assembly Location



Removing the PCA Front Panel Board

To remove the PCA front panel board, follow these steps:

1. Follow proper procedures to power off the server.
2. Remove the front bezel and the top and left side covers.
3. Disconnect the DVD power cable from the mass storage backplane.
4. Disconnect the front panel cable from the system backplane.
5. Unscrew the captive fastener on the common tray cage cover. The cover has two ferrites with cables attached to it.
6. Slide the common tray cage cover to the rear and lift. Place the cable as far back as possible to enhance access to the front panel.
7. Remove the front panel bezel by removing the two M3 screws. After the screws are removed, press the tab in the center of the bezel to release the bezel.
8. Remove the two screws revealed upon removing the bezel.
9. Place your right hand on the PCA front panel cable near the entrance to the cavity. With your left hand, reach over the top of the chassis and by curling your fingers, reach into the cavity containing the PCA front panel.
10. The PCA front panel bracket has a small sheet metal wall that acts as a handle. This handle is located at the center of the height and width relative to the cavity.

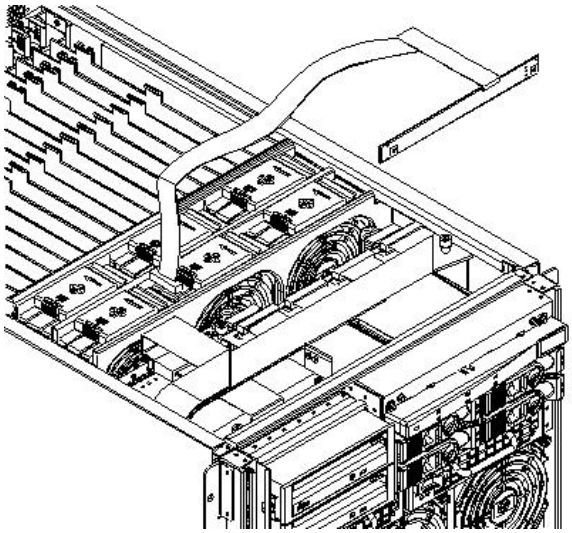
    Place your left hand under the handle and simultaneously, gently lift the handle upward and pull on the cable. This action disengages the tabs on the PCA front panel from the slots on the common tray cage.

11. Gently pull the cable and handle toward the rear of the chassis until the steel power button that was initially protruding though the chassis clears the hole.
12. Rotate the top edge of the board toward you about 30 degrees by lifting on the handle with your left hand.
13. Angle the board such that the right side with the cable moves away from you and the opposite side with the power connector moves toward you.

    Ensure that the power switch does not get stuck in one of the many holes in the front of the chassis. This rotation is best accomplished by gently pulling the cable with your right hand toward the rear of the cabinet.
14. Remove the cable end of the board first by gently pulling the cable with your right hand and adjusting the angle of the board with your left hand.

    After the first tab on the board is outside the cavity, removal should proceed easily.

Figure 6-70 Front Panel Board Detail



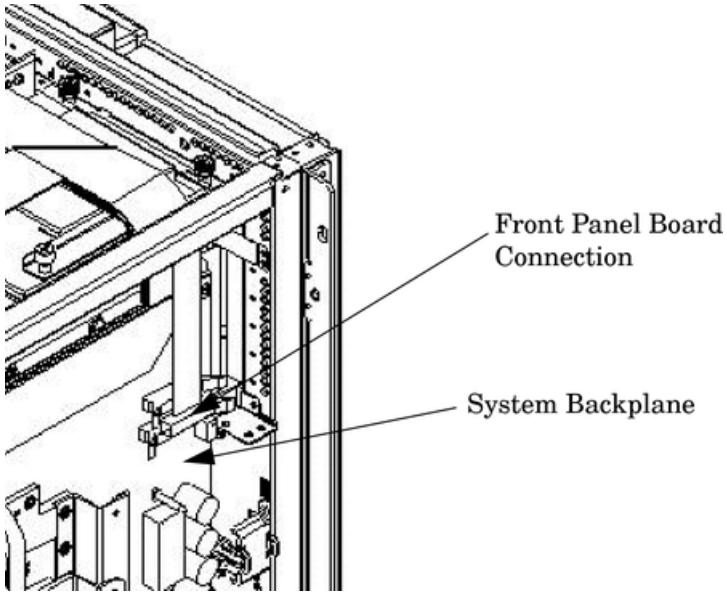
Replacing the Front Panel Board

To replace the front panel board, follow these steps:

1. Slide the front panel into its slot from inside the server.
2. Angle the board so that the right side is at an angle.

   Ensure that the power switch does not get caught in one of the many holes in the front of the chassis. Push the panel forward until the lock tabs click.
3. Attach the front panel bezel and tighten the two screws.
4. Replace the common tray cage cover.
5. Tighten the captive fastener on the common tray cage cover.
6. Attach the front panel cable to the system backplane.
7. Attach the DVD power cable.
8. Attach the data cable.
9. Replace the front bezel and the top and left side covers.
10. Follow proper procedures to power on the server.

Figure 6-71 Front Panel Board Cable Location on Backplane



A Parts and Accessories

Table A-1 HP Integrity rx7620 Server Field Replaceable Unit (FRU) List

FRU Description	Replacement Part Number	Exchange Part Number
36 GB 15K RPM SCSI Disk	A9896-64001	A9896-69001
73 GB 15K RPM SCSI Disk	A9897-64001	A9897-69001
146 GB 10K RPM SCSI Disk	A9898-64001	A9898-69001
1 GB DIMM (single)	A6098AX	A6098-69001
2 GB DIMM (single)	A6100-67001	A6100-69001
256 MB DIMM (single)	A6802AX	A6802-69001
512 MB DIMM (single)	A6097AX	A6097-69001
AC cord retention bracket	A6752-00123	None
AC Power Supply (qty 2 per system)	0950-4173	A6752-69113
Adaptor, SCSI	A6093-00239	None
Anti-tip Foot	A6752-67042	None
Assembly, Cell/PDH Riser/1.5GHz Madison Processor	A6913-67003	None
Assembly, Cell/PDH Riser/1.3GHz Madison Processor	A6913-67004	None
Assembly, Cell/PDH Riser/1.1GHz Hondo Processor	A6913-67008	A6913-69008
Assembly, Cell/PDH Riser/1.5GHz Mad9M A1	A6913-67009	A6913-69009
Assembly, Cell/PDH Riser/1.6GHz Mad9M A1	A6913-67011	A6913-69011
Assembly, Cell/PDH Riser/1.5GHz Mad9M A2	A6913-67009	A6913-69014
Assembly, Cell/PDH Riser/1.6GHz Mad9M A2	A6913-67011	A6913-69015
Assembly, Cover, Left Side	A9903-04007	None
Assembly, Cover, Right Side	A9903-04006	None
Assembly, Cover, Top	A9903-04008	None
Assembly, Front Bezel	A7025-04001	None
Assembly, Front Panel Plastic	A7025-04002	None
Assembly, Interlock Device	5065-5959	None
Assembly, Lift handle, left panel	A6752-04045	None
Assembly, Lift handle, right panel	A6752-04048	None
Assembly, PCI-X Card Cage	A6093-67013	A6093-69013
Assembly, PCI OLR	A6093-67014	None
Assembly, PCI OLR Paddle (MRL)	A6093-40041	None
Assembly, PCI Separator (W/Light Pipe)	5065-7443	None
Assembly, Slide rail, left	A6752-04058	None
Assembly, Slide rail, right	A6752-04059	None
Assembly, Smart Fan (Front/Rear) (4)	A6752-67029	None

Table A-1 HP Integrity rx7620 Server Field Replaceable Unit (FRU) List *(continued)*

FRU Description	Replacement Part Number	Exchange Part Number
Assembly, Smart Fan (PCI C/C) (6)	A6752-67030	None
Assembly, Front Bezel, No NamePlate	A7025-04001	
Ballast, J1479 (1 per system)	J1479-60001	None
Box, DVD Filler	A6912-00014	None
Cable Management Arm	5065-5951	None
Cable, DVD Power	A6752-67021	None
Cable, Internal Smart Array (RAID)	A7027-63001	None
Cable, Intrusion Switch	A6093-67025	None
Cable, Mass Storage Power #1 (short)	A6752-67019	None
Cable, Mass Storage Power #2 (long)	A6752-67020	None
Cable, PCI OLR Switch	AB297-63001	None
Cable, SCSI Bundle	A6752-63019	None
Cable, System Fan, External	A6752-67022	None
Cable, System Fan, Internal	A6752-67023	None
DC-to-DC Converter, Low-Voltage VRM	0950-4122	None
DC-to-DC Converter, High-Voltage VRM	0950-4123	None
DIMM Installer Tool	A5201-68003	None
DIMM Extractor Tool	A5201-68005	None
Fan, Turbo-Cooler	A6436-67001	None
Fan, Turbo-Cooler, dual-core processor	A9767-04008	None
Filler, Bulkhead Core I/O	A6752-04017	None
Filler, Internal Disk	A6198-60003	None
Harness, Main Power	A6752-67025	None
Intrusion Switch	5040-6317	None
Jumper, PDU-PDU 2.5 m C19/C20	8121-0802	None
Jumper, UPS-PDU 4.5 m C19/C20	8121-0806	None
Kit, Cell Board Air Baffle	A6913-67005	None
Kit, Removable Media Rail	A6752-67011	None
Kit, Side/Top Covers	A7027-67001	None
M-Cable	A6144-63001	None
Nameplate, HP Integrity rx7620 Server	A7027-40001	None
Panel, PCI, Upper Right Side	A6752-67036	None
PCA, Disk Backplane	A6752-67004	None
PCA, Front Panel (Display)[1]	A6752-67005	None
PCA, LAN/SCSI (Procurium)	A6794AX	A6794-69001

Table A-1 HP Integrity rx7620 Server Field Replaceable Unit (FRU) List *(continued)*

FRU Description	Replacement Part Number	Exchange Part Number
PCA, Mass Storage Backplane	A6752-67003	None
PCA, MP/SCSI (Core IO)	A9918-67001	A9918-69001
PCA, System Backplane	A6752-60101	A6752-69011
PCI Filler Plate	5001-6892	None
PCI Power Module (Brick)	0950-3819	A6093-69123
Power Cord, C19/GB 1002 4.5m Black CA Assembly	8121-0070	None
Power Cord, C19/IEC-309 4.5m Black CA Assembly	8120-6897	None
Power Cord, C19/L6-20 4.5m Black CA Assembly	8120-6903	None
Power Cord, C19/unterminated International-Europe	8120-6895	None
Removable DAT Tape Drive (DDS4)	C5686-67204	C5686-69204
Removable DVD Drive	A9879-67001	None
240 V N. American UPS 4.5m C19/L6-30P	8120-8494	None
Terminator (Processor)	A6912-67001	None
Static Mat, size 24” x 36” w/grnd strip	A5201-68004	None

1 Cable assembly is part of the FRU.

B System Specifications

This chapter describes the basic server configuration and its physical specifications and requirements.

Dimensions and Weights

This section provides dimensions and weights of the system components.

Table B-1 HP Integrity rx7620 Server Dimensions and Weights

	Standalone	Packaged
Height	17.3 in / 43.9 cm	35.75 in / 90.8 cm
Width	17.5 in / 44.4 cm	28.0 in / 71.1 cm
Depth	30.0 in / 76.2 cm	28.38 in / 72.0 cm
Weight - Pounds (kilograms)	220 lb / 100 kg	N/A

The shipping box, pallet, ramp, and container adds approximately 50 lb. to the total system weight. The size and number of miscellaneous pallets is determined by the equipment ordered.

Table B-2 HP Integrity rx7620 Server Component Weights

Quantity	Description	Weight (lb/kg.)
1 or 2	Cell board	27.80 lb / 12.61 kg
1	System backplane	12 lb (estimate) / 5.44 kg (estimate)
1	PCI-X backplane	20.4 lb / 9.25 kg
2	Bulk power supply	18 lb / 8.2 kg
1	Mass storage backplane	1 lb / 0.45 kg
2	PCI DC-to-DC converters	5 lb / 2.27 kg

Electrical Specifications

This section provides electrical specifications for HP Integrity rx7620 Servers.

Grounding

The site building shall provide a safety ground for each AC service entrance to all cabinets.

Install a protective earthing conductor that is identical in size, insulation material, and thickness to the branch-circuit supply conductors. The PE conductor must be green with yellow stripes. The earthing conductor must be connected from the unit to the building installation earth or, if supplied by a separately derived system, at the supply transformer or motor-generator set grounding point.

AC-Powered Systems

Circuit Breaker

The Marked Electrical for the HP Integrity rx7620 Server is 12 amps. The recommended circuit breaker size is 20 amps for North America. For countries outside North America, consult your local electrical authority having jurisdiction for the recommended circuit breaker size.

The HP Integrity rx7620 Server contains four C20 power receptacles located at the bottom rear bulkhead. A minimum of two power cords must be used to maintain normal operation of the HP Integrity rx7620 Server. A second set of two cords can be added to improve system availability

by protecting, for example, against power source failures or accidentally tripped circuit breakers. The HP Integrity rx7620 Server can receive AC input from two different AC power sources.

System AC Power Specifications

Power Cords

Table B-3 lists the various power cables available for use with a HP Integrity rx7620 Server. Each power cord is 15 feet (4.5 meters) in length with a IEC 60320-1 C19 female connector attached to one end.

Table B-3 Power Cords

Part Number	Description	Where Used
8120-6895	Stripped end, 240 volt	International-Other
8120-6897	Male IEC309, 240 volt	International-Europe
8121-0070	Male GB-1002, 240 volts	China
8120-6903	Male NEMA L6-20, 240 volt	North America/Japan

System Power Specifications

Table B-4 lists the AC power requirements for an HP Integrity rx7620 Server. These tables provide information to help determine the amount of AC power needed for your computer room.

Table B-4 AC Power Specifications

Requirements	Value	Comments
Nominal input voltage	200/208/220/230/240 (VAC rms)	
Frequency range (minimum - maximum)	50 - 60 (Hz)	
Number of phases	1	
Maximum input current	12 amps	Per line cord
Maximum inrush current	30 A peak for 15 ms	Per line cord
Power factor correction	>0.98 >0.95	At all loads of 50% - 100% of supply rating At all loads 0f 25% - 50% of supply rating
Ground leakage current (mA)	<3.0 (ma)	Per line cord

Power Required (50 - 60 Hz)	Watts	VA	Comments
Maximum Theoretical Power	3156	3220	See #1 below
Marked Electrical Power	---	2640	12A @ 220 VAC, see note #2
Typical Maximum Power	1989	2030	See note #3

1. **Maximum theoretical power** is used to describe input power at the AC input. It is expressed in Watts and Volt-Amps to take into account power factor correction. The calculated sum is the maximum worst case power consumption for every subsystem in the server. This number will not be exceeded by a properly functioning server for any combination of hardware and software.
2. **Marked electrical power** is the input power measured at the AC input expressed in Volt-Amps. The marked electrical power is the rating given on the chassis label and represents the input power required for facility AC power planning and wiring requirements. This number represents the expected maximum power consumption for the server based on the

power rating of the bulk power supplies. This number can safely be used to size AC circuits and breakers for the system.

3. **Typical maximum power** is the input power measured at the AC input expressed in Watts and Volt-Amps, and the measured maximum worst case power consumption. This number represents the largest power consumption for the server under laboratory conditions, using aggressive software applications designed specifically to work the system at maximum loads and power consumption.

DC-Powered Systems

DC-powered systems must be powered by a -48 VDC Telco power source. Follow your site-specific procedures for connecting the power and return lines to the server.

Environmental Specifications

This section provides the environmental, power dissipation, noise emission, and airflow specifications for HP Integrity rx7620 Servers.

Temperature and Humidity

The cabinet is actively cooled using forced convection in a Class C1-modified environment.

Operating Environment

The system is designed to run continuously and meet reliability goals in an ambient temperature of 5° to 35° C at sea level. The maximum allowable temperature is derated 1° C per 1000 feet of elevation above 5000 feet above sea level up to 30° C at 10,000 feet. For optimum reliability and performance, the recommended operating range is 20° to 25° C.

Environmental Temperature Sensor

To ensure that the system is operating within the published limits, the ambient operating temperature is measured using a sensor placed near the chassis inlet, between the cell boards. Data from the sensor is used to control the fan speed and to initiate system overtemp shutdown. (For more details, see the platform management section.)

Non-Operating Environment

The system is designed to withstand ambient temperatures between -40° to 70° C under non-operating conditions.

Cooling

Cell Section Cooling

The cabinet incorporates front to back airflow across the cell boards and system backplane. Two 150 mm fans, mounted externally on the front chassis wall behind the cosmetic front bezel, push air into the cell section; and two 150 mm fans housed in cosmetic plastic fan carriers and mounted externally to the rear chassis wall, pull air through the cell section.

Each cell area fan cooling is controlled by a smart fan control board, embedded in the fan module plastic housing. The smart fan control board receives fan control input from the system fan controller on the system backplane and returns fan status information to the system fan controller. The smart fan control board also controls the power and the pulse width modulated control signal to the fan and monitors the speed indicator back from the fan. The fan status LED is driven by the smart fan control board.

Bulk Power Supply Cooling

Cooling for the bulk power supplies is provided by two 60 mm fans contained within each BPS. Air flows into the front of the BPS and is exhausted out of the top of the power supply through upward facing vents near the rear of the supply. The air is then ducted out of the rear of the chassis with minimal leakage into the cell airflow plenum.

PCI/Mass Storage Section Cooling

Six 92 mm fans located between the mass storage devices and the PCI card cage provide airflow through these devices. The PCI fans are powered with housekeeping power and run at full speed at all times. The air is pulled through the mass storage devices and pushed through the PCI Card Cage. Perforation is provided between the PCI bulkheads to enable adequate exhaust ventilation and to help reduce the localized airflow dead spots that typically occur at the faceplate tail of each PCI card.

Standby Cooling

Several components within the chassis consume significant amounts of power while the system is in standby mode. The system fans run at 1541 rpm, or 38% of full speed, during standby to remove the resulting heat from the cabinet. The fans within the power supply operate at full speed during standby.

Typical Power Dissipation and Cooling

Table B-5 Typical HP Integrity rx7620 Server Configurations

Cell Boards	Memory Per Cell Board	PCI Cards (assumes 10 watts each)	DVDs	Hard Disk Drives	Core I/O	Bulk Power Supplies	Typical Power	Typical Cooling
Qty	GBytes	Qty	Qty	Qty	Qty	Qty	Watts	BTU/hr
2	16	16	2	4	2	2	2030	6930.42
2	8	8	0	2	2	2	1733	5916.46
2	4	8	0	2	2	2	1678	5728.69
1	4	8	0	1	1	2	1047	3574.46

The air conditioning data is derived using the following equations.

- Watts x (0.860) = kcal/hour
- Watts x (3.414) = Btu/hour
- Btu/hour divided by 12,000 = tons of refrigeration required

NOTE: When determining power requirements, you must consider any peripheral equipment that will be installed during initial installation or as a later update. See the applicable documentation for such devices to determine the power and air-conditioning that is required to support these devices.

Acoustic Noise Specification

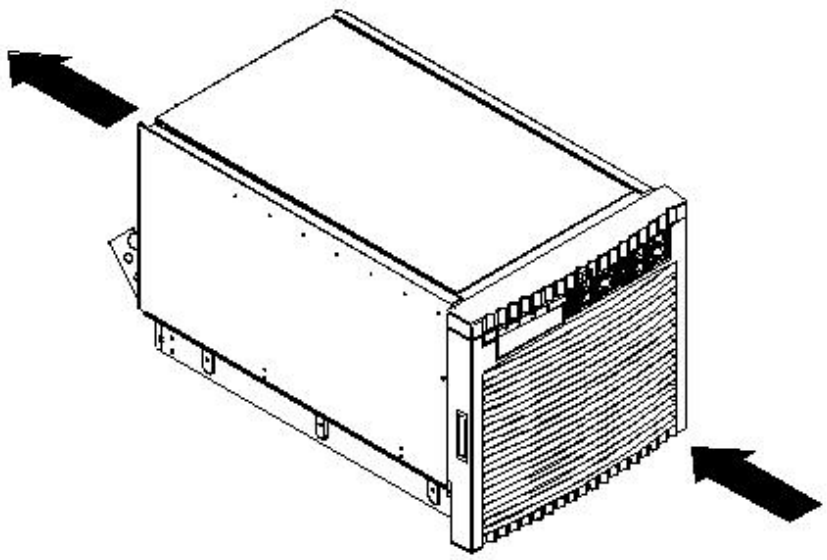
The acoustic noise specification for the HP Integrity rx7620 Server is 57.3 db (sound pressure level at bystander position) It is appropriate for dedicated computer room environments but not office environments. The LwA is 7.5 Bels. Be sure to understand the acoustic noise specifications relative to operator positions within the computer room or when adding servers to computer rooms with existing noise sources.

Airflow

The HP Integrity rx7620 Server requires that the cabinet air intake temperature be between 68° and 77° F (20° and 25° C) at 960 CFM.

Figure B-1 illustrates the location of the inlet and outlet airducts on a single cabinet.

Figure B-1 Airflow Diagram



System Requirements Summary

This appendix summarizes the requirements that must be considered in preparing the site for the HP Integrity rx7620 Server.

Power Consumption and Air Conditioning

To determine the power consumed and the air conditioning required, follow the guidelines in Table B-5.

NOTE: When determining power requirements, consider any peripheral equipment that will be installed during initial installation or as a later update. To determine the power and air conditioning that is required to support these devices, see the applicable documentation for such devices.

Maximum power is the sum of the worst case power consumption of every subsystem in the box and should be used to size worst case power consumption. Typical power consumption numbers are what HP engineers have measured when running power-intensive applications. These are generally lower than maximum power numbers because it is uncommon for all of the subsystems in the box to simultaneously draw maximum power for long durations.

Weight

To determine overall weight, follow the examples in Table B-6, then complete the entries in Table B-7.

Table B-6 Example Weight Summary

Component	Quantity	Multiply By	Weight
Cell Boards	2	27.80 lb / 12.61 kg	55.6 lb / 25.22 kg
PCI Card (varies - used A3739B here)	4	0.34 lb / 0.153 kg	1.36 lb / 0.61 kg
Power Supply (BPS)	2	18.0 lb / 8.2 kg	36 lb / 16.40 kg
DVD	1	2.2 lb / 1.0 kg	2.2 lb / 1.0 kg
Disk Drive	4	1.6 lb / 0.73 kg	6.40 lb / 2.90 kg

Table B-6 Example Weight Summary *(continued)*

Component	Quantity	Multiply By	Weight
Chassis with skins and front bezel cover	1	131 lb / 59.42 kg	131 lb / 59.42 kg
		Total weight	244.56 lbs (111.75)

Table B-7 Weight Summary

Component	Quantity	Multiply By	Weight (kg)
Cell Boards		27.8 lb / 12.61 kg	
PCI Card		weight varies	
Power Supply (BPS)		18 lb / 8.2 kg	
DVD		2.2 lb / 1.0 kg	
Disk Drive		1.6 lb / 0.73 kg	
Chassis with skins and front bezel cover		131 lb / 59.42 kg	
		Total weight	

C General Site Preparation Guidelines

Electrical Factors

NOTE: Electrical practices and suggestions in this guide are based on North American practices. For regions and areas outside North America, local electrical codes will take precedence over North American electrical codes.

An example would be the recommendation that the PE (Protective Earthing) conductor be green with yellow stripes. This requirement is a North American directive and does not override the local code requirements for a region or area outside North America.

Local Authority Has Jurisdiction (LAHJ) and should make the final decision regarding adherence to region-specific or area-specific electrical codes and guidelines. The LAHJ acronym is used throughout this section.

Proper design and installation of a power distribution system for the server requires specialized skills. Those responsible for this task must have a thorough knowledge and understanding of appropriate electrical codes and the limitations of the power systems for computer and data processing equipment.

In general, a well-designed power distribution system exceeds the requirements of most electrical codes. A good design, when coupled with proper installation practices, produces the most trouble-free operation.

A detailed discussion of power distribution system design and installation is beyond the scope of this document. However, electrical factors relating to power distribution system design and installation must be considered during the site preparation process. These factors include:

- Computer room safety
- Power consumption
- Electrical load requirements (circuit breaker sizing)
- Power quality
- Distribution hardware
- System installation guidelines

Computer Room Safety

Inside the computer room, fire protection and adequate lighting (for equipment servicing) are important safety considerations. Federal and local safety codes govern computer installations.

Fire Protection

The national Fire Protection Association's Standard for the Protection of Electronic Computer Data Processing Equipment, NFPA 75, contains information on safety monitoring equipment for computer rooms.

Most computer room installations are equipped with the following fire protection devices:

- Smoke detectors
- Fire and temperature alarms
- Fire extinguishing system

Additional safety devices are:

- Circuit breakers
- An emergency power cutoff switch
- Devices specific to the geographic location, such as earthquake protection

Lighting Requirements for Equipment Servicing

Adequate lighting and utility outlets in a computer room reduce the possibility of accidents during equipment servicing. Safer servicing is also more efficient and, therefore, less costly.

For example, it is difficult to see cable connection points on the hardware if lighting is inadequate. Adequate lighting reduces the chances of connector damage when cables are installed or removed.

The minimum recommended illumination level is 70 foot-candles (756 lumens per square meter) when the light level is measured at 30 inches (76.2 cm) above the floor.

Working Space for Server Access

The recommended working space for performing maintenance on the server is three feet. The work space will permit at least a 90 degree opening of equipment doors or hinged panels. When planning for the working space area, consider whether access to the server will be at the front, the side, or the rear of the server.

Power Consumption

When determining power requirements, you must consider any peripheral equipment that will be installed during initial installation or as a later update. To determine the power required to support these devices, see the applicable documentation for such devices.

Electrical Load Requirements (Circuit Breaker Sizing)

NOTE: LAHJ and should make the final decision regarding adherence to country-specific electrical codes and guidelines.

It is good practice to derate power distribution systems for the following reasons:

- To avoid nuisance tripping from load shifts or power transients, circuit protection devices should never be run above 80% of their root-mean-square (RMS) current ratings.
- Safety agencies derate most power connectors to 80% of their RMS current ratings.

Power Quality

The server is designed to operate over a wide range of voltages and frequencies. The server has been tested and shown to comply with EMC Specification EN50082. However, damage can occur if these ranges are exceeded. Severe electrical disturbances can exceed the design specifications of the equipment.

Sources of Voltage Fluctuations

Voltage fluctuations, sometimes called glitches, affect the quality of electrical power. Common sources of these disturbances are:

- Fluctuations occurring within the facility's distribution system
- Utility service low-voltage conditions (such as sags or brownouts)
- Wide and rapid variations in input voltage levels
- Wide and rapid variations in input power frequency
- Electrical storms
- Large inductive sources (such as motors and welders)
- Faults in the distribution system wiring (such as loose connections)
- Microwave, radar, radio, or cell phone transmissions

Power System Protection

The server can be protected from the sources of many of these electrical disturbances by using:

- A dedicated power distribution system
- Power conditioning equipment
- Over- and under-voltage detection and protection circuits
- Screening to cancel the effects of undesirable transmissions
- Lightning arresters on power cables to protect equipment from electrical storms

Every precaution has been taken during power distribution system design to provide immunity to power outages of less than one cycle. However, testing cannot conclusively rule out loss of service. Therefore, adherence to the following guidelines provides the best possible performance of power distribution systems for server equipment:

- A dedicated power source isolates the server power distribution system from other circuits in the facility.
- Missing-phase and low-voltage detectors automatically shuts equipment down when a severe power disruption occurs. For peripheral equipment, these devices are recommended but optional.
- An online uninterruptible power supply (UPS) keeps input voltage to devices constant and should be considered if outages of one-half cycle or more are common. For each situation, enlist the assistance of a qualified contractor or consultant.

Distribution Hardware

This section describes wire selection and the types of raceways (electrical conduits) used in the distribution system.

Wire Selection

Use copper conductors instead of aluminum because aluminum's coefficient of expansion differs significantly from that of other metals used in power hardware. Because of this difference, aluminum conductors can cause connector hardware to loosen, overheat, and fail.

Raceway Systems (Electrical Conduits)

Raceways (electrical conduits) form part of the protective ground path for personnel and equipment. Raceways protect the wiring from accidental damage and provide a heatsink for the wires.

Any of the following types can be used:

- Electrical Metallic Tubing (EMT) thin-wall tubing
- Rigid (metal) conduit
- Liquidtight with RFI strain relief (most commonly used with raised floors)

Building Distribution

All building feeders and branch circuitry should be in rigid metallic conduit with proper connectors (to provide ground continuity). Conduit that is exposed and subject to damage should be constructed of rigid galvanized steel.

Power Routing

Power drops and interface cables from the equipment are routed down from the power panel, through a grommet-protected opening (beneath the floor level), and under the floor panels.

Grounding Systems

The server requires two methods of grounding:

- Power distribution safety grounding
- High-frequency intercabinet grounding

Power Distribution Safety Grounding (LAHJ)

The power distribution safety grounding system consists of connecting various points in the power distribution system to earth ground using green (green/yellow) wire ground conductors. Having these ground connections tied to metal chassis parts that computer room personnel might touch protects them against shock hazard from current leakage and fault conditions.

Power distribution systems consist of several parts. HP recommends that these parts be solidly interconnected to provide an equipotential ground to all points.

Main Building Electrical Ground

The main electrical service entrance equipment should have an earth ground connection, as required by applicable codes. Connections, such as a grounding rod, building steel, or a conductive type cold water service pipe, provide an earth ground.

Electrical Conduit Ground

All electrical conduits should be made of rigid metallic conduit that is securely connected together or bonded to panels and electrical boxes to provide a continuous grounding system.

Power Panel Ground

Each power panel should be grounded to the electrical service entrance with green (green/yellow) wire ground conductors. The green (green/yellow) wire ground conductors should be sized per applicable codes (based on circuit over current device ratings).

NOTE: The green wire ground conductor can be a black wire marked with green tape. (LAHJ)

Computer Safety Ground

Ground all computer equipment with the green (green/yellow) wire included in the branch circuitry. The green (green/yellow) wire ground conductors should be connected to the appropriate power panel and should be sized per applicable codes (based on circuit over current device ratings).

Dual Power Source Grounding

When dual power sources are utilized, strong consideration should be given to measure voltage potentials. The use of dual power might create an electrical potential that can be hazardous to personnel and might cause performance issues for the equipment.

Dual power sources might originate from two different transformers or two different UPS devices. Voltage potentials from ground pin to ground pin for these sources should be measured and verified to be at or near 0.0 volts. Voltage levels that deviate or are measured above 3.0 volts should be further investigated. increased voltages might be hazardous to personnel, and should be further investigated.

Cabinet Performance Grounding (High-Frequency Ground)

Signal interconnects between system cabinets require high-frequency ground return paths. Connect all cabinets to site ground.

NOTE: In some cases, power distribution system green (green/yellow) wire ground conductors are too long and inductive to provide adequate high-frequency ground return paths. Therefore, the server is shipped with a ground strap for connecting the system cabinet to the site grounding grid (customer-supplied). When connecting this ground, ensure that the raised floor is properly grounded.

Power panels located in close proximity to the computer equipment should also be connected to the site grounding grid. Methods of providing a sufficiently high frequency ground grid are described in the next sections.

Raised Floor "High-Frequency Noise" Grounding

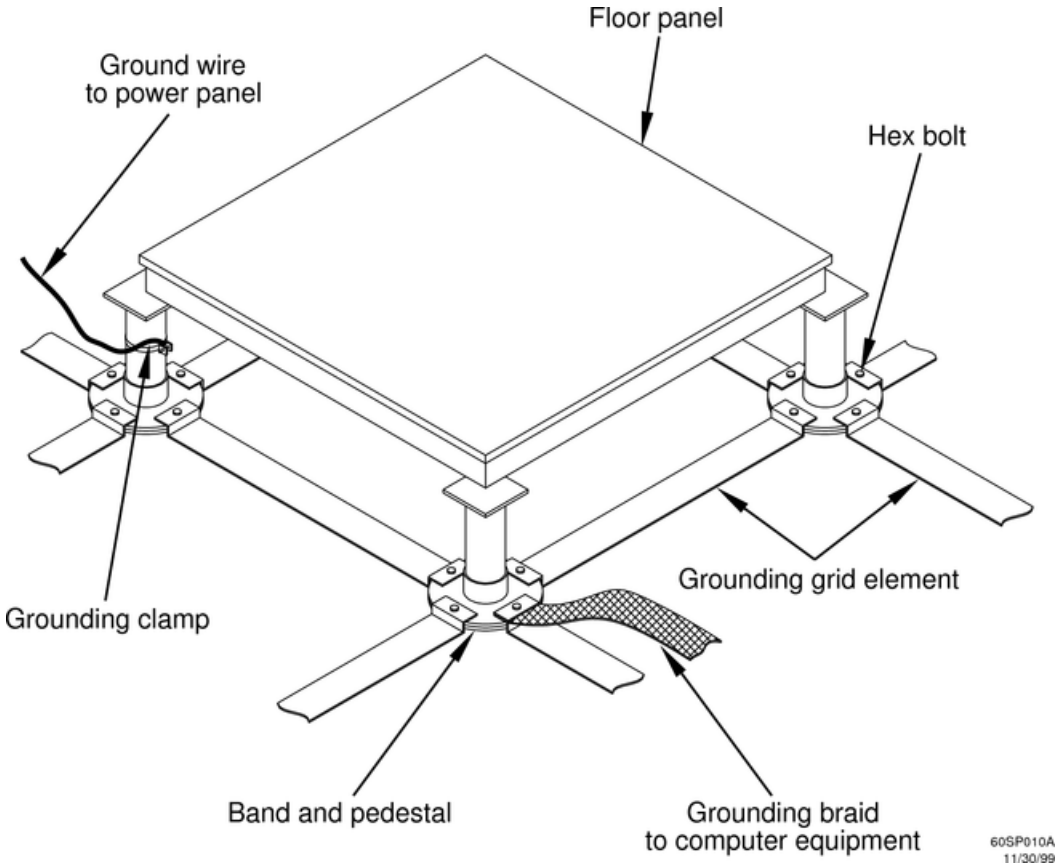
If a raised floor system is used, install a complete signal reference grid for maintaining equal potential over a broad band of frequencies. The grid should be connected to the equipment cabinet and electrical service entrance ground at multiple connection points using a minimum #6 AWG (16 mm) wire ground conductor. The following figure illustrates a metallic strip gounding system.

NOTE: Regardless of the grounding connection method used, the raised floor should be grounded as an absolute safety minimum.

HP recommends the following approaches:

Excellent	Add a signal reference grid to the subfloor. The grid should be made of aluminum strips mounted to the subfloor. The strips should be 0.032 in. (0.08 cm) thick and a minimum of 3.0 in. (8.0 cm) wide. Connect each pedestal to four strips using 0.25 in. (6.0 mm) bolts tightened to the manufacturer's torque recommendation.
Better	A grounded #6 AWG minimum copper wire grid mechanically clamped to floor pedestals and properly bonded to the building/site ground.
Good	Use the raised floor structure as a signal reference grid. In this case, the floor must be designed as a ground grid with bolted stringers and corrosion resistive plating (to provide low resistance and attachment points for connection to service entrance ground and server equipment). The use of conductive floor tiles with this style of grid further enhances ground performance. The structure needs to be mechanically bonded to a known good ground point.

Figure C-1 Raised Floor Ground System



Equipment Grounding Implementation Details

To connect all HP equipment cabinets to the site ground grid. follow these steps:

1. Attach one end of each ground strap to the applicable cabinet ground lug.
2. Attach the other end to the nearest pedestal base (raised floor) or cable trough ground point (nonraised floor).

3. Check that the braid contact on each end of the ground straps consists of a terminal and connection hardware (a 0.25 in. (6.0 mm) bolt, nuts, and washers).
4. Check that the braid contact connection points are free of paint or other insulating material and are treated with a contact enhancement compound (similar to Burndy Penetrox).

System Installation Guidelines

This section contains information about installation practices. Some common problems are highlighted. Both power cable and data communications cable installations are discussed.

NOTE: In domestic installations, the proper receptacles should be installed prior to the arrival of HP equipment. For installation procedures, see the appropriate installation guide.

Wiring Connections

Expansion and contraction rates vary among different metals. Therefore, the integrity of an electrical connection depends on the restraining force applied. Connections that are too tight compress or deform the hardware and causes it to weaken. This usually leads to high impedance causing circuit breakers to trip.

CAUTION: Connections that are too loose have a high resistance that can cause serious problems, such as erratic equipment operation. A high-resistance connection can overheat and cause fire or high temperatures that can destroy hard-to-replace components, such as distribution panels or system bus bars.

Wiring connections must be properly torqued. Many equipment manufacturers specify the proper connection torque values for their hardware.

Ground connections must only be made on a conductive, nonpainted surface. When equipment vibration is present, lockwashers must be used on all connections to prevent connection hardware from loosening.

Data Communications Cables

Power transformers and heavy foot traffic create high energy fields. Route data communications cables away from these areas. Use shielded data communications cables that meet approved industry standards to reduce the effects of external fields.

Environmental Elements

The following environmental elements can affect server installation:

- Computer room preparation
- Cooling requirements
- Humidity level
- Air conditioning ducts
- Dust and pollution control
- Metallic particle contamination
- Electrostatic discharge (ESD) prevention
- Acoustics (noise reduction)

Computer Room Preparation

The following guidelines are recommended when preparing a computer room for the server:

- Locate the computer room away from the exterior walls of the building to avoid the heat gain from windows and exterior wall surfaces.
- When exterior windows are unavoidable, use windows that are double- or triple-glazed and shaded to prevent direct sunlight from entering the computer room.
- Maintain the computer room at a positive pressure relative to surrounding spaces.

- Use a vapor barrier installed around the entire computer room envelope to restrain moisture migration.
- Caulk and vapor seal all pipes and cables that penetrate the envelope.
- Use at least a 12-inch raised floor system for the most favorable room air distribution system (underfloor distribution).
- Ensure a minimum ceiling height of 12 inches between the top of the server and the ceiling and that all ceiling clips are in place.
- Allow 18 inches (or local code minimum clearance) from the top of the server cabinet to the fire sprinkler heads.

Cooling Requirements

Air conditioning equipment requirements and recommendations are described in the following sections.

Basic Air Conditioning Equipment Requirements

The cooling capacity of the installed air conditioning equipment for the computer room should be sufficient to offset the computer equipment dissipation loads, as well as any space envelope heat gain. This equipment should include:

- Air filtration
- Cooling or dehumidification
- Humidification
- Reheating
- Air distribution
- System controls adequate to maintain the computer room within the operating range

Lighting and personnel must also be included. For example, a person dissipates about 450 Btu per hour while performing a typical computer room task.

At altitudes above 10,000 ft (3048 m), the lower air density reduces the cooling capability of air conditioning systems. If your facility is located above this altitude, the recommended temperature ranges might need to be modified. For each 1000 ft (305 m) increase in altitude above 10,000 feet (up to a maximum of 15,000 ft), subtract 1.5° F (0.83° C) from the upper limit of the temperature range.

Air Conditioning System Guidelines

The following guidelines are recommended when designing an air conditioning system and selecting the necessary equipment:

- The air conditioning system that serves the computer room should be capable of operating 24 hours a day, 365 days a year. It should also be independent of other systems in the building.
- Consider the long-term value of computer system availability, redundant air conditioning equipment, or capacity.
- The system should be capable of handling any future computer system expansion.
- Air conditioning equipment air filters should have a minimum rating of 45% (based on "ASHRAE Standard 52-76, Dust Spot Efficiency Test").
- Introduce only enough outside air into the system to meet building code requirements (for human occupancy) and to maintain a positive air pressure in the computer room.

Air Conditioning System Types

The following three air conditioning system types are listed in order of preference:

- Complete self-contained package units with remote condenser. These systems are available with up or down discharge and are usually located in the computer room.
- Chilled water package unit with remote chilled water plant. These systems are available with up or down discharge and are usually located in the computer room.

- Central station air handling units with remote refrigeration equipment. These systems are usually located outside the computer room.
- Scalable overhead distribution system. These systems distribute water overhead to air heat exchangers, which cool the air locally over the servers. A system called DataCool™ is primarily used in high density environments of 100 to 500 watts per square foot.

Basic Air Distribution Systems

A basic air distribution system includes supply air and return air.

An air distribution system should be zoned to deliver an adequate amount of supply air to the cooling air intake vents of the computer system equipment cabinets. Supply air temperature should be maintained within the following parameters:

- Ceiling supply system—From 55° to 60° F (12.8 το 15.6° C)
- Floor supply system—At least 60° F (15.6° C)

If a ceiling plenum return air system or a ducted ceiling return air system is used, the return air grilles in the ceiling should be located directly above the computer equipment cabinets.

The following three types of air distribution system are listed in order of recommendation:

- Underfloor air distribution system. Downflow air conditioning equipment located on the raised floor of the computer room uses the cavity beneath the raised floor as plenum for the supply air.

  Perforated floor panels (available from the raised floor manufacturer) should be located around the perimeter of the system cabinets. Supply air emitted though the perforated floor panels is then available near the cooling air intake vents of the computer system cabinets.

- Ceiling plenum air distribution system. Supply air is ducted into the ceiling plenum from upflow air conditioning equipment located in the computer room or from an air handling unit (remote).

  The ceiling construction should resist air leakage. Place perforated ceiling panels (with down discharge air flow characteristics) around the perimeter of the system cabinets. The supply air emitted downward from the perforated ceiling panels is then available near the cooling air intake vents of the computer system cabinets.

  Return air should be ducted back to the air conditioning equipment though the return air duct above the ceiling.

- Above ceiling ducted air distribution system. Supply air is ducted into a ceiling diffuser system from upflow air conditioning equipment located in the computer room or from an air handling unit (remote).

  Adjust the supply air diffuser system grilles to direct the cooling air downward around the perimeter of the computer system cabinets. The supply air is then available near the cooling air intake vents of the computer system cabinets.

Table C-1 Computer Room Environment

Parameter	Operating Limits	Recommended Operating Range	Maximum Rate of Change (per hour)	Non-Operating Ranges
Temperature[1]	41° to 95° F (5° to 35° C)	68° to 77° F (20° to 25° C)	20° C/hr (no tape media) 10° C/hr (with tape media)	-40° C to +70° C
Humidity	15% to 80% with no condensation (40% to 55% recommended)	40% to 55% RH non-condensing	30% RH/hour non-condensing	90% RH non-condensing @ 65° C (149° F)

1 The temperature ranges stated are at 0 to 5,000 ft. The maximum operating temperature must be derated by 1° C/1,000 ft from 5,000 to 10,000 ft.

Air Conditioning System Installation

All air conditioning equipment, materials, and installation must comply with any applicable construction codes. Installation of the various components of the air conditioning system must also conform to the air conditioning equipment manufacturer's recommendations.

Air Conditioning Ducts

Use separate computer room air conditioning duct work. If it is not separate from the rest of the building, it might be difficult to control cooling and air pressure levels. Duct work seals are important for maintaining a balanced air conditioning system and high static air pressure. Adequate cooling capacity means little if the direction and rate of air flow cannot be controlled because of poor duct sealing. Also, the ducts should not be exposed to warm air, or humidity levels may increase.

Humidity Level

Maintain proper humidity levels at 40 to 55% RH. High humidity causes galvanic actions to occur between some dissimilar metals. This eventually causes a high resistance between connections, leading to equipment failures. High humidity can also have an adverse affect on some magnetic tapes and paper media.

△ **CAUTION:** Low humidity contributes to undesirably high levels of electrostatic charges. This increases the ESD voltage potential. ESD can cause component damage during servicing operations. Paper feed problems on high-speed printers are usually encountered in low-humidity environments.

Low humidity levels are often the result of the facility heating system and occur during the cold season. Most heating systems cause air to have a low humidity level, unless the system has a built-in humidifier.

Dust and Pollution Control

Computer equipment can be adversely affected by dust and microscopic particles in the site environment.

Specifically, disk drives, tape drives, and some other mechanical devices can have bearing failures resulting from airborne abrasive particles. Dust might also blanket electronic components, like printed circuit boards, causing premature failure from excess heat and/or humidity build-up on the boards. Other failures to power supplies and other electronic components can be caused by metallically conductive particles. These metallic particles are conductive and can short circuit electronic components. Use every effort to ensure that the environment is as dust- and particulant-free as possible.

Smaller particles can pass though some filters and, over a period of time, can cause problems in mechanical parts. Small dust particles can be prevented from entering the computer room by maintaining its air conditioning system at a high-static air pressure level.

Other sources of dust, metallic, conductive, abrasive, or microscopic particles can be present. Some sources of these particulants are:

- Subfloor shedding
- Raised floor shedding
- Ceiling tile shedding

These pollutants are not always visible to the naked eye. Check the underside of the tiles to determine the presence of these pollutants. The tile should be shiny, galvanized, and free of rust.

The computer room should be kept clean. The following guidelines are recommended:

- Establish a no-smoking policy. Cigarette smoke particles are eight times larger than the clearance between disk drive read/write heads and the disk surface.
- Locate printers and paper products in a separate room to eliminate paper particulate problems.

- Establish a no eating or drinking policy. Spilled liquids can cause short circuits in equipment such as keyboards.
- Use a dust-absorbent cloth mop rather than a dry mop to clean tile floors.

Special precautions are necessary if the computer room is near a source of air pollution. Some air pollutants, especially hydrogen sulfide, are not only unpleasant but corrosive as well. Hydrogen sulfide damages wiring and delicate sound equipment. The use of activated charcoal filters reduces this form of air pollution.

Metallic Particle Contamination

Metallic particulates can be especially harmful around electronic equipment. This type of contamination can enter the data center environment from a variety of sources, including but not limited to raised floor tiles, worn air conditioning parts, heating ducts, rotor brushes in vacuum cleaners, or worn printer components. Because metallic particulates conduct electricity, they have an increased potential for creating short circuits in electronic equipment. This problem is exaggerated by the increasingly dense circuitry of electronic equipment.

Over time, very fine whiskers of pure metal can form on electroplated zinc, cadmium, or tin surfaces. If these whiskers are disturbed, they can break off and become airborne, possibly causing failures or operational interruptions. For over 50 years, the electronics industry has been aware of the relatively rare but possible threat posed by metallic particulate contamination. During recent years, a growing concern has developed in computer rooms where these conductive contaminants are formed on the bottom of some raised floor tiles.

Although this problem is relatively rare, it might be an issue within your computer room. Since metallic contamination can cause permanent or intermittent failures on your electronic equipment, HP strongly recommends that your site be evaluated for metallic particulate contamination before installation of electronic equipment.

Electrostatic Discharge Prevention

Static charges (voltage levels) occur when objects are separated or rubbed together. The voltage level of a static charge is determined by the following factors:

- Types of materials
- Relative humidity
- Rate of change or separation

Table C-2 lists charge levels based on personnel activities and humidity levels

Table C-2 Effect of Humidity on ESD Charge Levels

Personnel Activity[1]	Humidity[2] and Charge Levels[3]			
	26%	32%	40%	50%
Walking across a linoleum floor	6,150 V	5,750 V	4,625 V	3,700 V
Walking across a carpeted floor	18,450 V	17,250 V	13,875 V	11,100 V
Rising from a plastic chair	24,600 V	23,000 V	18,500 V	14,800 V

1 Source: B.A. Unger, Electrostatic Discharge Failures of Semiconductor Devices (Bell Laboratories, 1981)

2 For the same relative humidity level, a high rate of airflow produces higher static charges than a low airflow rate.

3 Some data in this table has been extrapolated.

Static Protection Measures

To minimize possible ESD-induced failures in the computer room, follow these precautions:

- Install conductive flooring (conductive adhesive must be used when laying tiles).
- Use conductive wax if waxed floors are necessary.
- Ensure that all equipment and flooring are properly grounded and are at the same ground potential.
- Use conductive tables and chairs.

- Use a grounded wrist strap (or other grounding method) when handling circuit boards.
- Store spare electronic modules in antistatic containers.
- Maintain recommended humidity level and airflow rates in the computer room.

Acoustics

Computer equipment and air conditioning blowers cause computer rooms to be noisy. Ambient noise level in a computer room can be reduced as follows:

- Cover the ceiling with a commercial grade of fire-resistant, acoustic rated, fiberglass ceiling tile.
- Cover the walls with curtains or other sound deadening material.
- Use foam rubber models as removable partitions for most effectiveness.

Facility Characteristics

This section contains information about facility characteristics that must be considered for the installation or operation of the server. Facility characteristics are:

- Floor loading
- Windows
- Altitude effects

Floor Loading

The computer room floor must be able to support the total weight of the installed computer system as well as the weight of the individual cabinets as they are moved into position.

Floor loading is usually not an issue in nonraised floor installations. The information presented in this section is directed toward raised floor installations.

NOTE: Any floor system under consideration for a server installation should be verified by an appropriate floor system consultant.

Raised Floor Loading

Raised floor loading is a function of the manufacturer's load specification and the positioning of the equipment relative to the raised floor grid. Though HP cannot assume responsibility for determining the suitability of a particular raised floor system, it does provide information and illustrations for the customer or local agencies to determine installation requirements.

The following guidelines are recommended:

- Because many raised floor systems do not have grid stringers between floor stands, the lateral support for the floor stands depends on adjacent panels being in place. To avoid compromising this type of floor system while gaining under floor access, remove only one floor panel at a time.
- Larger floor grids (bigger panels) are generally rated for lighter loads.

CAUTION: Do not install any raised floor system until you have carefully examined it to verify that it is adequate to support the appropriate installation.

Floor Loading Terms

Table C-3 defines floor loading terms.

Table C-3 Floor Loading Term Definitions

Term	Definition
Dead load	The weight of the raised panel floor system, including the understructure. Expressed in lb/ft2 (kg/m2).
Live load	The load that the floor system can safely support. Expressed in lb/ft2 (kg/m2).

Table C-3 Floor Loading Term Definitions *(continued)*

Term	Definition
Concentrated load	The load that a floor panel can support on a one square inch (6.45 cm2) area at the panel's weakest point (typically the center of the panel), without the surface of the panel deflecting more than a predetermined amount.
Ultimate load	The maximum load (per floor panel) that the floor system can support without failure. Failure expressed by floor panel(s) breaking or bending.Ultimate load is usually stated as load per floor panel.
Rolling load	The load a floor panel can support (without failure) when a wheel of specified diameter and width is rolled across the panel.
Average floor load	Computed by dividing total equipment weight by the area of its footprint. This value is expressed in lb/ft2 (kg/m2).

Average Floor Loading

The average floor load value, defined in Table C-4, is not appropriate for addressing raised floor ratings at the floor grid spacing level. However, it is useful for determining floor loading at the building level, such as the area of solid floor or span of raised floor tiles covered by the server footprint.

Typical Raised Floor Site

This section contains an example of a computer room raised floor system that is satisfactory for the installation of an HP Integrity rx7620 Server.

Based on specific information provided by HP, Tate Access Floors has approved its Series 800 all-steel access floor with bolt-together stringers and 24 in. (61.0 cm) by 24 in. (61.0 cm) floor panels.

In the event that the flooring is being replaced or a new floor is being installed, Tate Access Floors recommends its Series 1250 all-steel access floor with bolt-together stringers and 24 in. (61.0 cm) by 24 in. (61.0 cm) floor panels be used to support the server installation.

NOTE: If the specific floor being evaluated or considered is other than a Tate Series 800 floor, the specific floor manufacturer must be contacted to evaluate the floor being used.

Table C-4 lists specifications for the Tate Access Floors Series 800 raised floor system.

Table C-4 Typical Raised Floor Specifications

Item[1]	Rating
Dead load	7 lb/ft2 (34.2 kg/m2)
Live load	313 lb/ft2 (1528.3 kg/m2)
Concentrated load[2]	1250 lb (567 kg)
Ultimate load	4000 lb (1814 kg) per panel
Rolling load	400 lb (181 kg)
Average floor load	500 lb (227 kg)

1 From Table C-3 (page 191)

2 With 0.08 in. (0.2 cm) of span maximum deflection

Windows

Avoid housing computers in a room with windows. Sunlight entering a computer room can cause problems. Magnetic tape storage media is damaged if exposed to direct sunlight. Also, the heat generated by sunlight places an additional load on the cooling system.

Space Requirements

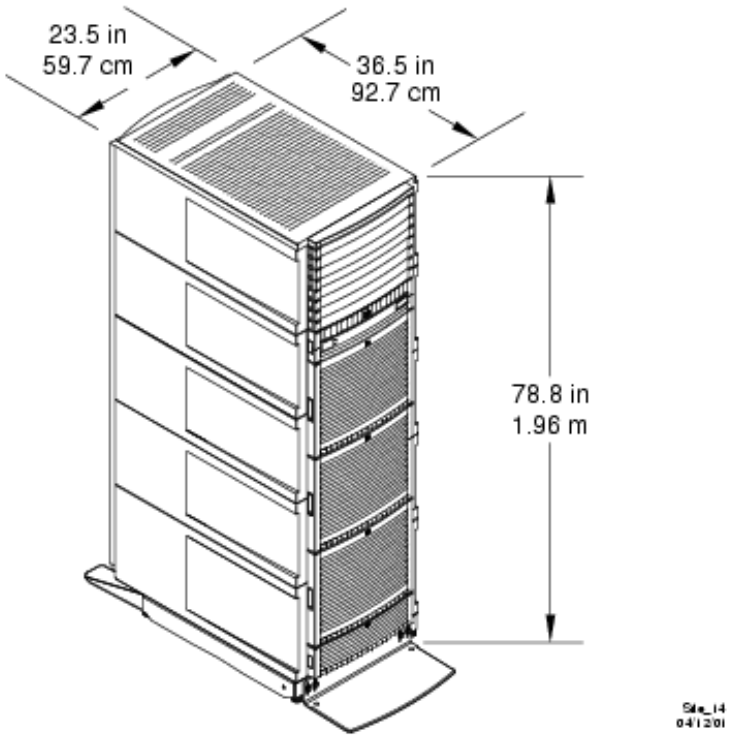
This section contains information about space requirements for an HP Integrity rx7620 Server. This data should be used as the basic guideline for space plan developments. Other factors, such as airflow, lighting, and equipment space requirements must also be considered.

Delivery Space Requirements

There should be enough clearance to move equipment safely from the receiving area to the computer room. Permanent obstructions, such as pillars or narrow doorways, can cause equipment damage.

Delivery plans should include the possible removal of walls or doors.

Figure C-2 Cabinet Dimensions



Operational Space Requirements

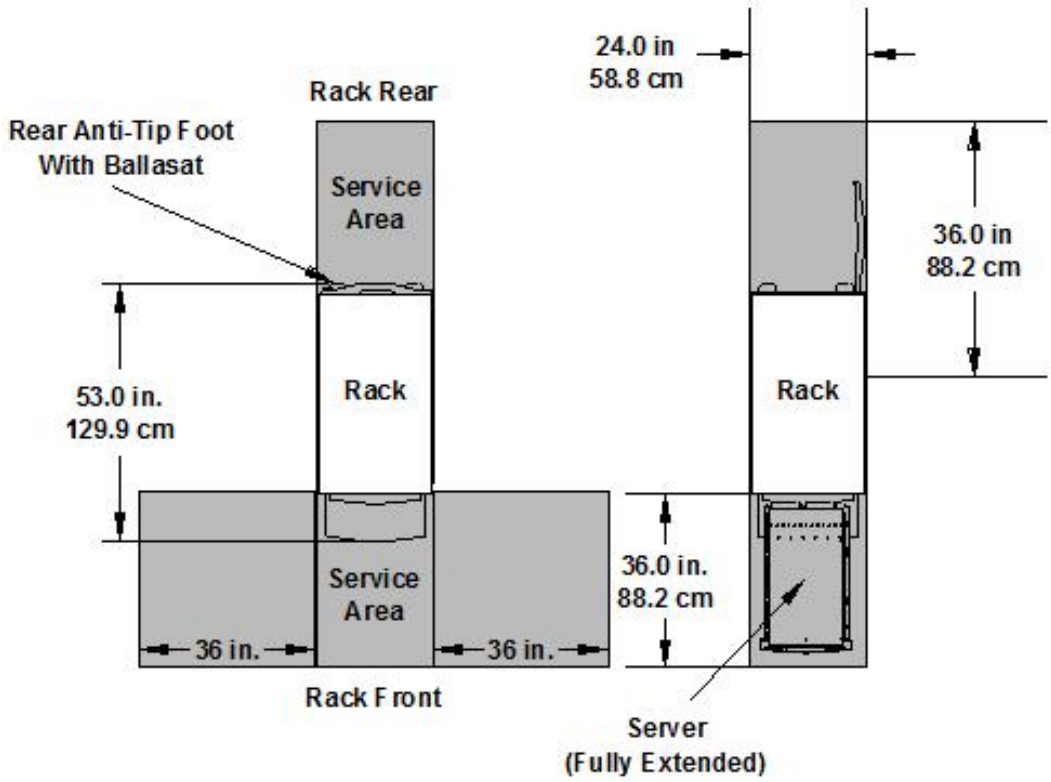
Other factors must be considered along with the basic equipment dimensions. Reduced airflow around equipment causes overheating, which can lead to equipment failure. Therefore, the location and orientation of air conditioning ducts, as well as airflow direction, are important. Obstructions to equipment intake or exhaust airflow must be eliminated.

The locations of lighting fixtures and utility outlets affect servicing operations. Plan equipment layout to take advantage of lighting and utility outlets. Do not forget to include clearance for opening and closing equipment doors.

Clearance around the cabinets must be provided for proper cooling airflow through the equipment.

The service area space requirements, shown in Figure C-3, are minimum dimensions. If other equipment is located so that it exhausts heated air near the cooling air intakes of the computer system cabinets, larger space requirements are needed to keep ambient air intake to the computer system cabinets within the specified temperature and humidity ranges.

Figure C-3 Footprint



Space planning should also include the possible addition of equipment or other changes in space requirements. Equipment layout plans should also include provisions for the following:

- Channels or fixtures used for routing data cables and power cables
- Access to air conditioning ducts, filters, lighting, and electrical power hardware
- Power conditioning equipment
- Cabinets for cleaning materials
- Maintenance area and spare parts

Equipment Footprint Templates

The equipment footprint template and floor plan grid are drawn to the same scale (0.25 in. = 1 ft). These templates are provided to show basic equipment dimensions and space requirements for servicing.

The service areas shown on the template drawings are lightly shaded.

The equipment templates should be used with the floor plan grid to define the location of the equipment that will be installed in your computer room.

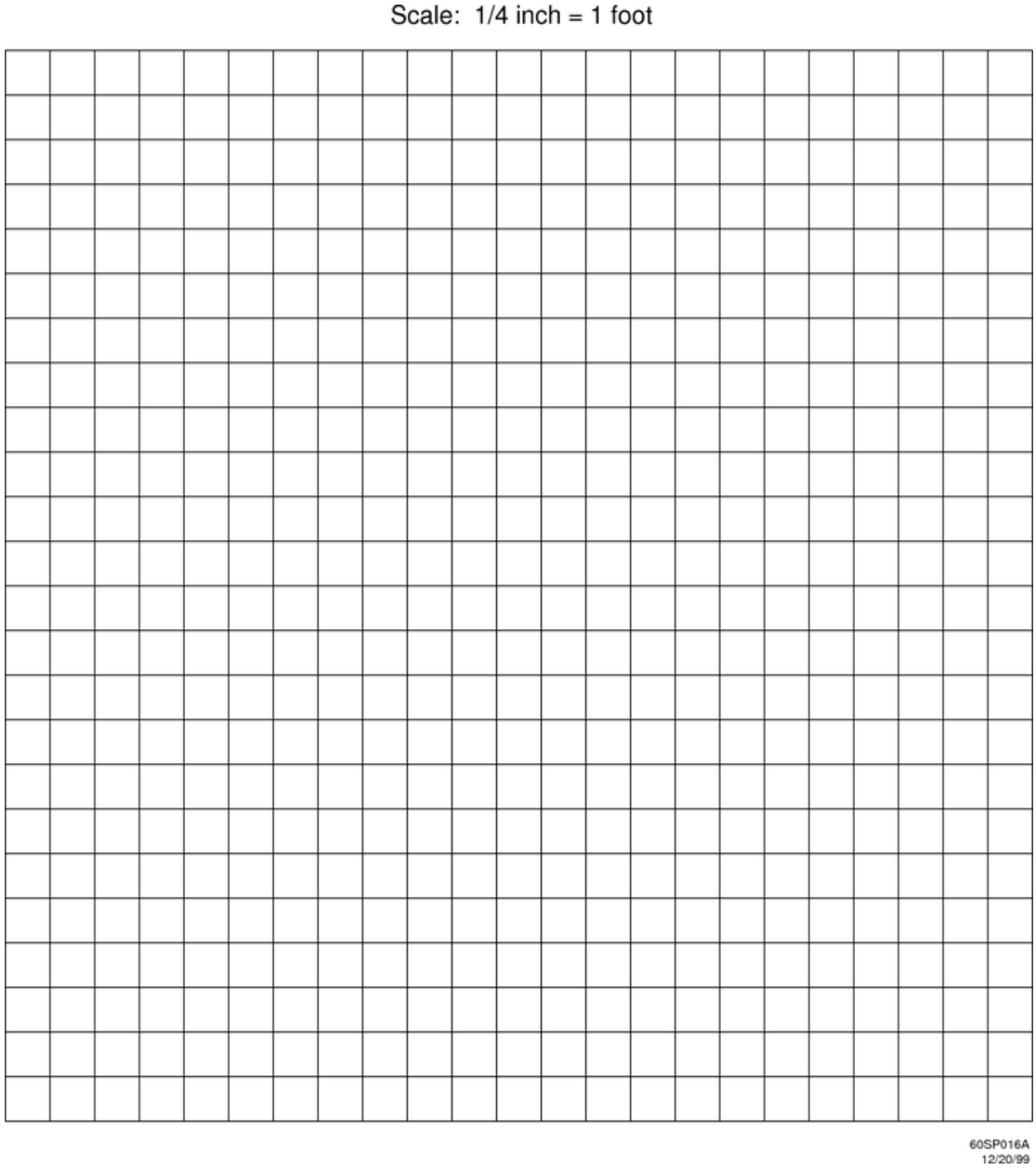
NOTE: Photocopying typically changes the scale of drawings copied. If any templates are copied, then all templates and floor plan grids must also be copied.

Computer Room Layout Plan

Use the following procedure to create a computer room layout plan:

1. Remove the floor plan grid from the document. See Figure C-4.
2. Remove a copy of each applicable equipment footprint template. See Figure C-3.
3. Cut out each template selected in step 2, then place it on the floor plan grid.
4. Position the pieces until the desired layout is obtained, then fasten the pieces to the grid. Mark locations of computer room doors, air conditioning floor vents, utility outlets, and so on.

Figure C-4 Planning Grid



Power Plug Configuration

There are several different power cables designed for use with HP servers. The region the server ships to will determine which power cable ships with the server. The following provides the site preparation specialist with the knowledge of what to expect to receive based on the regional shipping destination.

Female End of Power Cable

The female end of the HP server is a C19 type plug that mates with the C20 receptacle in each power supply installed in the HP server.

Figure C-5 C20 Male Receptacle (at power supply)

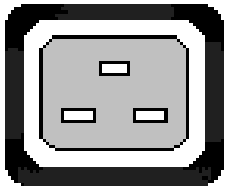
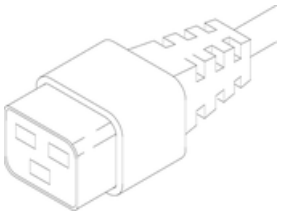


Figure C-6 C19 Female Plug (on one end of the power cord)



Male End of Power Cable

The male plug on the other end of the power cable will vary depending on the region the HP server is shipped to.

NOTE: Several examples follow though this list is not meant to be all inclusive nor is this list meant to imply every plug shown is one that is available for the server.

Figure C-7 Unterminated Plug

Figure C-8 L6-20 Plug

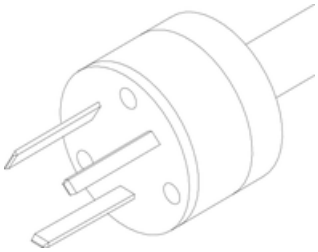


Figure C-9 IEC 309 Plug

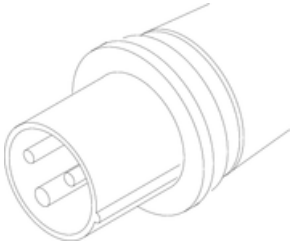


Figure C-10 CEE 7-7 Plug

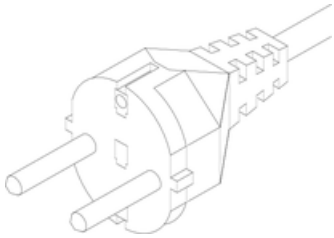


Figure C-11 L6-30 Plug

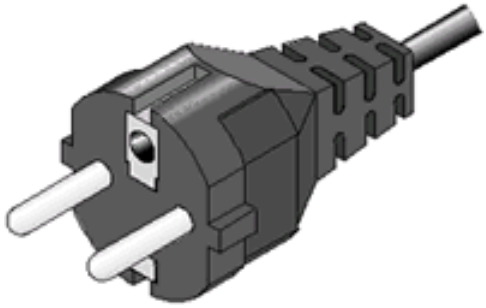


Figure C-12 NEMA 5-20P Plug on left (receptacle on right)

Figure C-13 ISI 32 Plug

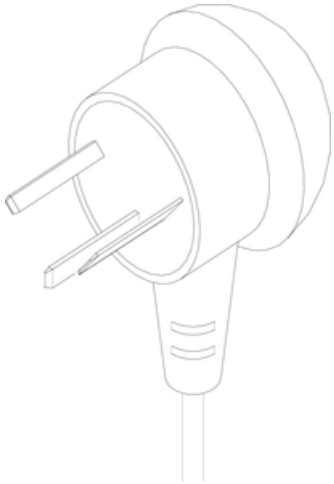
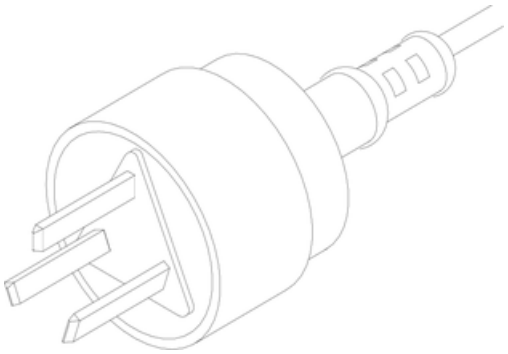


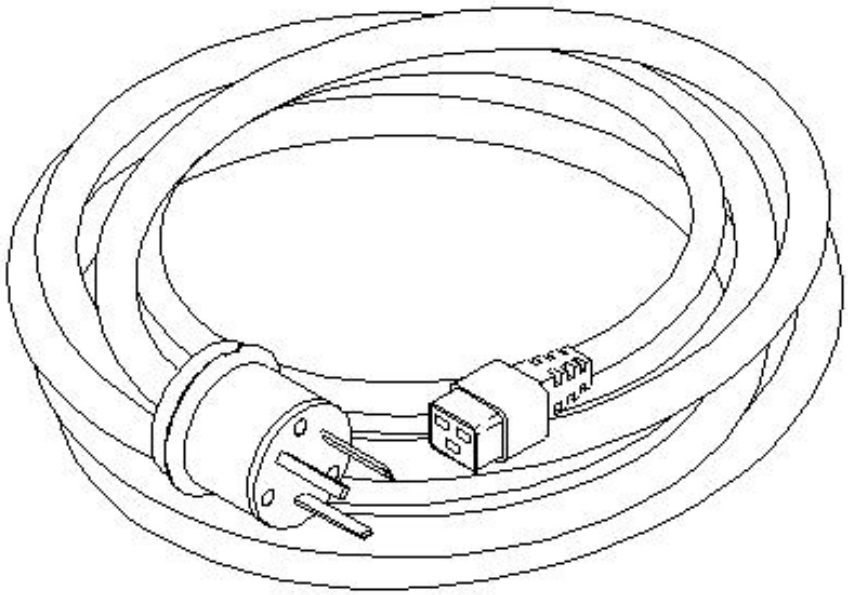
Figure C-14 GB 1002 Plug



Power Cable

The power cable length and configuration will vary based on the region the server ships to. This is an example of one power cable configuration used to supply power to the server.

Figure C-15 L6-20 Power Cable



Conversion Factors and Formulas

The conversion factors provided in this appendix are intended to ease data calculation for systems that do not conform specifically to the configurations listed in the *Site Preparation Guide*. Listed below are the conversion factors used in this document, as well as additional conversion factors which may be helpful in determining those factors required for site planning.

Conversion Factors

- Refrigeration
  - 1 watt = .86 kcal/h
  - 1 watt = 3.412 Btu/h
  - 1 watt = 2.843 x 10-4 tons
  - 1 ton = 200 Btu/min.

  - 1 ton = 12,000 Btu/h
  - 1 ton = 3,517.2 W
- Metric Equivalents
  - 1 centimeter = 0.3937 in
  - 1 meter = 3.28 ft.
  - 1 meter = 1.09 yds
  - 1 in. = 2.54 cm
  - 1 ft. = 0.305 m
  - 1 CFM = 1.7m3/h
- kVA Conversions

  Three phase

  kVA = V × A × √3 / 1000
- Single phase
  kVA = V × A / 1000

Formulas

- kVA = Voltage x Current (amps)
- Watts = VA x PF
- BTU = Watts x 3.41

Sample of an Installation Schedule

The following schedule lists the sequence of events for a typical system installation:

- 60 days before installation
  - Floor plan design completed and mailed to HP (if required to be an HP task)
- 30 days before installation
  - Primary power and air conditioning installation completed
  - Telephone and data cables installed
  - Fire protection equipment installed
  - Major facility changes completed
  - Special delivery requirements defined
  - Site inspection survey completed
  - Delivery survey completed

  - — A signed copy of the site inspection and delivery survey mailed to HP
  - — Site inspection and predelivery coordination meeting arranged with a HP representative to review the inspection checklist and arrange an installation schedule.
- 7 days before installation
  - — Final check made with an HP site preparation specialist to resolve any last minute problems

NOTE: Not all installations follow a schedule like the one noted above. Sometimes, a server is purchased through another vendor which can preclude a rigid schedule. Other conditions could also prevent following this schedule. For those situations, consider a milestone schedule.

- Site Preparation - schedule with the customer as soon as possible after the order is placed.
- Site Verification - schedule with the customer a minimum of one to two days before the product is scheduled to be installed.

Sample Site Inspection Checklist

Table C-5 Customer and HP Information

Customer Information	
Name:	Phone No:
Street Address:	City or Town:
State or Province:	Country
Zip or postal code:	
Primary customer contact:	Phone No.:
Secondary customer contact:	Phone No.:
Traffic coordinator:	Phone No.:
HP information	
Sales representative	Order No:
Representative making survey	Date:
Scheduled delivery date	

Table C-6 Site Inspection Checklist

Please check either Yes or No. If No, include comment# or date				**Comment or Date**
Computer room				
No.	Area or condition	Yes	No	
1.	Is there a completed floor plan?			
2.	Is there adequate space for maintenance needs? Front 36 in (91.4 cm) minimum, Rear 36 in (91.4 cm) minimum are recommended clearances.			
3.	Is access to the site or computer room restricted?			
4.	Is the computer room structurally complete? Expected date of completion?			
5.	Is a raised floor installed and in good condition?			
6.	Is the raised floor adequate for equipment loading?			
7.	Are there channels or cutouts for cable routing?			

Table C-6 Site Inspection Checklist *(continued)*

Please check either Yes or No. If No, include comment# or date				Comment or Date
8.	Is there a remote console telephone line available with an RJ11 jack?			
9.	Is a telephone line available?			
10.	Are customer supplied peripheral cables and LAN cables available and of the proper type?			
11.	Are floor tiles in good condition and properly braced?			
12.	Is floor tile underside shiny or painted? If painted, judge the need for particulate test.			
Power and lighting				
No.	Area or condition	Yes	No	
13.	Are lighting levels adequate for maintenance?			
14.	Are there AC outlets available for servicing needs? (i.e. vacuuming)			
15.	Does the input voltage correspond to equipment specifications?			
15A	Is dual source power used? If so, identify type(s) and evaluate grounding.			
16	Does the input frequency correspond to equipment specifications?			
17.	Are lightning arrestors installed inside the building?			
18.	Is power conditioning equipment installed?			
19.	Is there a dedicated branch circuit for equipment?			
20.	Is the dedicated branch circuit less than 250 feet (72.5 meters)?			
21.	Are the input circuit breakers adequate for equipment loads?			
Safety				
No.	Area or condition	Yes	No	
22.	Is there an emergency power shut-off switch?			
23.	Is there a telephone available for emergency purposes?			
24.	Is there a fire protection system in the computer room?			
25.	Is antistatic flooring installed?			
26.	Are there any equipment servicing hazards (loose ground wires, poor lighting, etc.)?			
Cooling				
No.	Area or condition	Yes	No	
27.	Can cooling be maintained between 20 °C and 55 °C (up to 5000 ft.)? Derate 1 °C/1000 ft. above 5000 ft. and up to 10,000 ft.			
28.	Can temperature changes be held to 10 °C per hour with tape media? Can temperature changes be held to 20 °C per hour without tape media?			
29.	Can humidity level be maintained at 40% to 60% at 35 °C noncondensing?			
30.	Are air conditioning filters installed and clean?			
Storage				

Table C-6 Site Inspection Checklist *(continued)*

Please check either Yes or No. If No, include comment# or date				Comment or Date
No.	Area or condition	Yes	No	
31.	Are cabinets available for tape and disc media?			
32.	Is shelving available for documentation?			
Training				
No.	Area or Condition			
33	Are personnel enrolled in the System Administrator's Course?			
34	Is on-site training required?			

Delivery Survey

The delivery survey forms list delivery or installation requirements. If any of the items on the list apply, enter the appropriate information in the areas provided on the form.

Special instructions or recommendations should be entered on the special instructions or recommendations form. The following list gives examples of special instructions or issues:

- Packaging restrictions at the facility, such as size and weight limitations
- Special delivery procedures
- Special equipment required for installation, such as tracking or hoists
- What time the facility is available for installation (after the equipment is unloaded)
- Special security requirements applicable to the facility, such as security clearance

Figure C-16 Delivery Survey (Part 1)

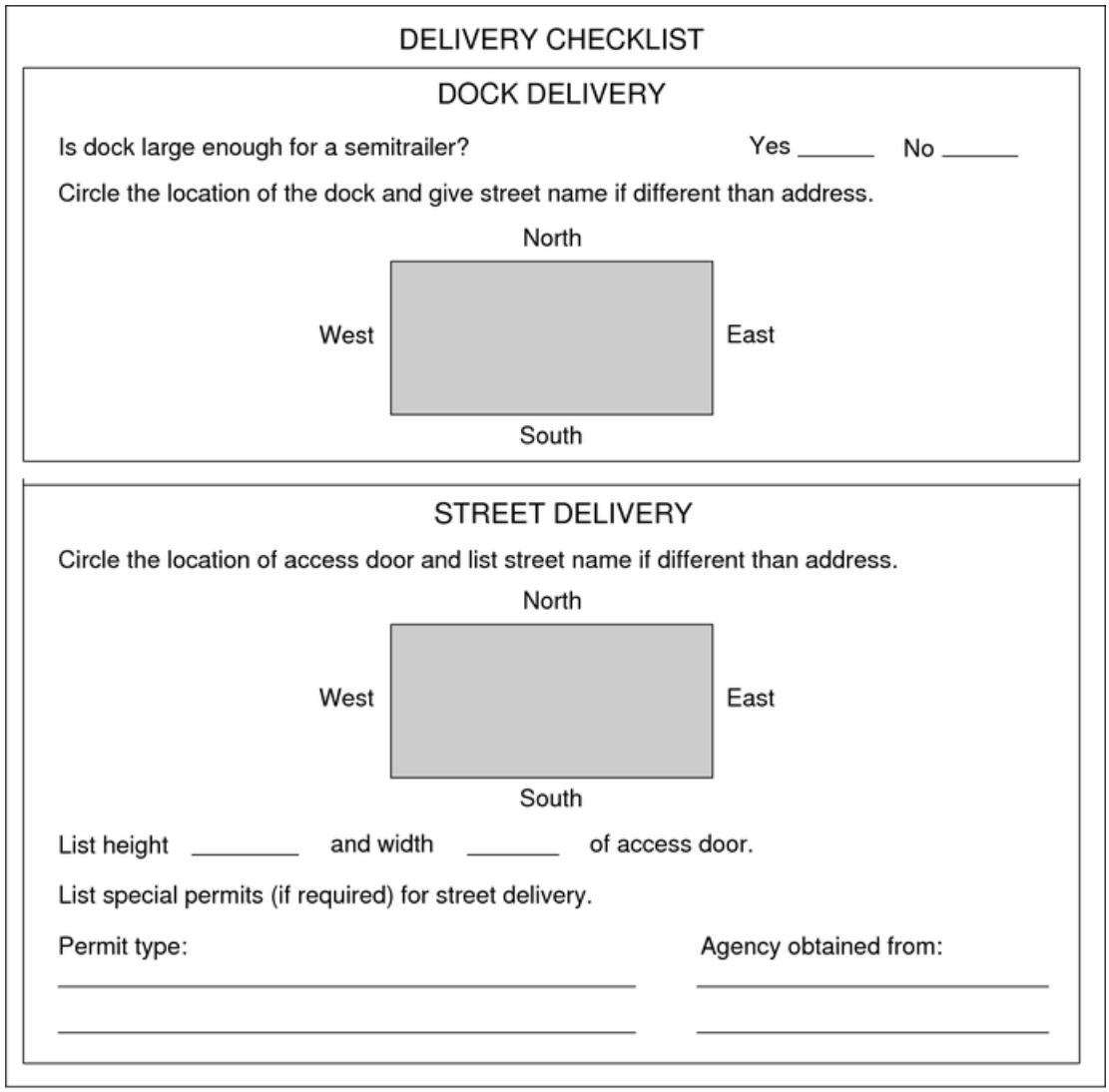
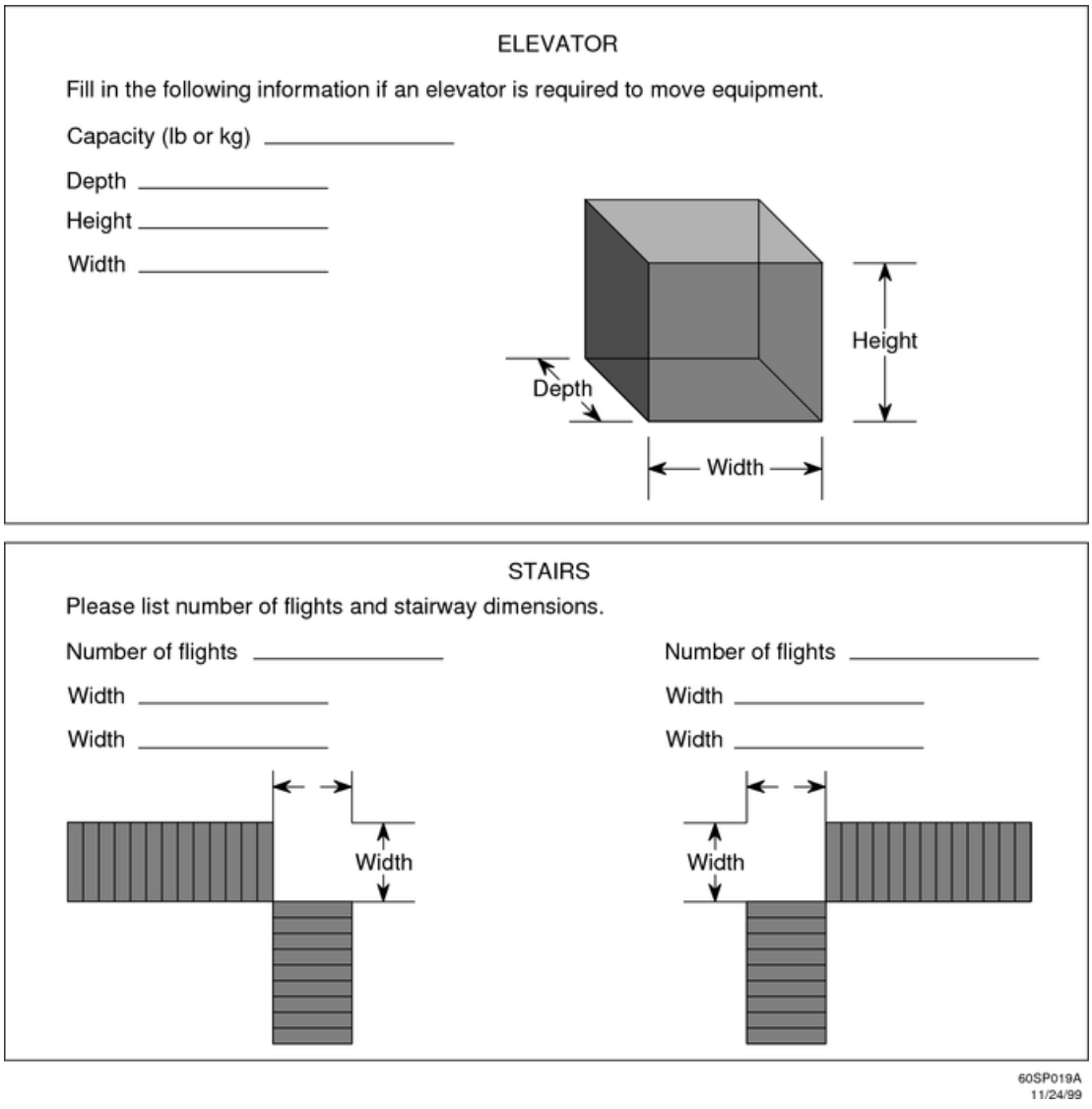


Figure C-17 Delivery Survey (Part 2)



D Operating System Boot and Shutdown

This appendix covers procedures for booting an operating system (OS) on an nPartition (hardware partition) and procedures for shutting down the OS.

Operating Systems Supported on HP nPartition-capable Servers

HP supports nPartitions on HP Integrity servers. The following list describes the operating systems supported on nPartition-capable models.

- HP Integrity servers have Intel Itanium 2 processors and include the following nPartition-capable models:
  - HP Integrity Superdome (SD16A, SD32A, and SD64A models)
  - HP rx8620
  - HP rx7620

  These HP Integrity servers run the following operating systems:
  - HP-UX 11i Version 2 (B.11.23) — See "Booting HP-UX" (page 207) .
  - Microsoft® Windows® Server 2003 — See "Booting the Microsoft Windows Operating System" (page 211).
  - Red Hat Enterprise Linux 3 Update 2 and Red Hat Enterprise Linux 3 Update 3 — See "Booting the Red Hat Linux Operating System" (page 212).
  - SuSE Linux Enterprise Server 9 — See "Booting the SuSE Linux Enterprise Server Operating System" (page 213) .

System Boot Configuration Options

This section briefly discusses the system boot options you can configure on nPartition-capable servers. You can configure boot options that are specific to each nPartition in the server complex.

HP Integrity Boot Configuration Options

On nPartition-capable HP Integrity servers, you must properly specify the ACPI configuration value, which affects the OS startup process and on some servers can affect the shutdown behavior. You also can configure boot device paths and the autoboot setting for the nPartition. Details are given in the following list.

- **Boot Options List—HP Integrity Server Boot Device Paths** You can manage the boot options list for each nPartition either by using the `bcfg` command at the EFI Shell, or by using the Add a Boot Option, Delete Boot Option(s), and Change Boot Order menu items at the EFI Boot Option Maintenance menu.

  To set boot options from HP-UX use the `setboot` command.

- **Autoboot Setting** You can configure the autoboot setting for each nPartition either by using the `autoboot` command at the EFI Shell, or by using the Set Auto Boot TimeOut menu item at the EFI Boot Option Maintenance menu.

  To set autoboot from HP-UX use the `setboot` command.

- **ACPI Configuration Value—HP Integrity Server OS Boot** On nPartition-capable HP Integrity servers, you must set the proper ACPI configuration for the OS that will be booted on the nPartition.

  To check the ACPI configuration value, issue the `acpiconfig` command with no arguments at the EFI Shell.

  To set the ACPI configuration value, issue the `acpiconfig` *value* command at the EFI Shell, where *value* is either `default`, `windows`, or `single-pci-domain`. For the setting to take effect, reset the nPartition by issuing the `reset` EFI Shell command.

The ACPI configuration settings for the supported operating systems are in the following list.

— **HP-UX ACPI Configuration: default** On nPartition-capable HP Integrity servers, to boot or install the HP-UX operating system an nPartition must have its ACPI configuration value set to `default`.

For details see "ACPI Configuration for HP-UX Must Be "default"" (page 207).

— **Windows ACPI Configuration: windows** On nPartition-capable HP Integrity servers, to boot or install the Windows operating system an nPartition must have its ACPI configuration value set to `windows`.

For details see "ACPI Configuration for Windows Must Be "windows"" (page 211).

— **Red Hat Linux 3 ACPI Configuration: single-pci-domain** On nPartition-capable HP Integrity servers, to boot or install the Red Hat Linux 3 operating system an nPartition must have its ACPI configuration value set to `single-pci-domain`.

For details see "ACPI Configuration for Red Hat Linux 3 Must Be "single-pci-domain"" (page 212).

— **SuSE Linux Enterprise Server ACPI Configuration: default** On nPartition-capable HP Integrity servers, to boot or install the SuSE Linux Enterprise Server operating system an nPartition must have its ACPI configuration value set to `default`.

For details, see "ACPI Configuration for SuSE Linux Enterprise Server Must Be "default"" (page 213).

- **ACPI "Softpowerdown" Configuration - OS Shutdown Behavior** You can configure the nPartition behavior when an OS is shutdown and halted. The two options are to have hardware power off when the OS is halted, or to have the nPartition be made inactive (all cells are in a boot-is-blocked state). The normal OS shutdown behavior depends on the ACPI configuration for the nPartition.

  You can run the `acpiconfig` command with no arguments to check the current ACPI configuration setting; however, soft powerdown information displays only when different from normal behavior.

  To change the nPartition behavior when an OS is shutdown and halted, use either the `acpiconfig enable softpowerdown` EFI Shell command or the `acpiconfig disable softpowerdown` command and then reset the nPartition to make the ACPI configuration change take effect.

  — **acpiconfig enable softpowerdown** When set, `acpiconfig enable softpowerdown` causes nPartition hardware to be powered off when the operating system issues a shutdown for reconfig command (for example, `shutdown -h` or `shutdown /s`).

  This is the normal behavior with a `windows` ACPI configuration setting.

  When softpowerdown is enabled on an rx7620 server, if one nPartition is defined in the server, halting the operating system powers off the server cabinet (including all cells and I/O chassis). On an rx7620 server with multiple nPartitions, halting the operating system from an nPartition with softpowerdown enabled causes only the resources on the local nPartition to be powered off.

  To power on hardware that has been powered off, use the `PE` command at the MP command menu.

  — **acpiconfig disable softpowerdown** When set, `acpiconfig disable softpowerdown` causes nPartition cells to remain at a boot-is-blocked state when the operating system issues a shutdown for reconfig command (for example, `shutdown -h` or `shutdown /s`). In this case an OS shutdown for reconfig makes the nPartition inactive.

  This is the normal behavior on rx7620 servers with an ACPI configuration setting of `default` or `single-pci-domain`.

  To make an inactive nPartition active, use the MP `BO` command to boot the nPartition past the boot-is-blocked state.

Booting HP-UX

This section covers the following methods of booting HP-UX:

HP-UX Booting	The standard ways to boot HP-UX. Typically this results in booting HP-UX in multi-user mode.
Single-User Mode HP-UX Booting	How to boot HP-UX in single-user mode.
LVM-Maintenance Mode HP-UX Booting	How to boot HP-UX in LVM-maintenance mode.

For details on shutting down the HP-UX operating system, see "Shutting Down HP-UX" (page 214).

△ **CAUTION:**

ACPI Configuration for HP-UX Must Be "default" On nPartition-capable HP Integrity servers, to boot the HP-UX operating system, an nPartition must have its ACPI configuration value set to `default`.

At the EFI Shell interface, enter the `acpiconfig` command with no arguments to list the current ACPI configuration. If the `acpiconfig` value is not set to `default`, HP-UX cannot boot. In this situation, you must reconfigure `acpiconfig` or booting is interrupted with a panic when launching the HP-UX kernel.

To set the ACPI configuration for HP-UX: at the EFI Shell interface enter the `acpiconfig default` command, and then enter the `reset` command for the nPartition to reboot with the proper (`default`) configuration for HP-UX.

HP-UX Booting

You can boot HP-UX by using any one of the following procedures:

- "HP-UX Booting [EFI Boot Manager]" (page 207)

  The EFI system boot environment is provided on HP Integrity servers.
- "HP-UX Booting [EFI Shell]" (page 208)

  The EFI system boot environment is provided on HP Integrity servers.

Procedure D-1 HP-UX Booting [EFI Boot Manager]

From the EFI Boot Manager menu, select an item from the boot options list to boot HP-UX using the selected boot option.

For required configuration details, see "ACPI Configuration for HP-UX Must Be "default"" (page 207).

1. Access the EFI Boot Manager menu for the nPartition on which you want to boot HP-UX.

   Login to the service processor (MP or GSP) and enter **`CO`** to access the Console list. Select the nPartition console.

   When accessing the console, confirm that you are at the EFI Boot Manager menu (the main EFI menu). If at another EFI menu, select **`Exit`** from the sub-menus until you return to the screen with the `EFI Boot Manager` heading.
2. At the EFI Boot Manager menu, select an item from the boot options list.

   Each item in the boot options list references a specific boot device and provides a specific set of boot options or arguments to be used when booting the device.
3. To initiate booting using the selected boot option, press **Return** or **Enter**.
4. Exit the console and service processor interfaces when finished using them.

   To exit the EFI environment, enter **`^B`** (**Control-B**); this exits the nPartition console and returns to the service processor Main Menu. To exit the service processor, enter **`X`** at the Main Menu.

Procedure D-2 HP-UX Booting [EFI Shell]

From the EFI Shell environment, to boot HP-UX on a device first access the EFI System Partition (for example `fs0:`) for the root device and then enter **`HPUX`** to invoke the loader.

For required configuration details, see "ACPI Configuration for HP-UX Must Be "default"" (page 207).

1. Access the EFI Shell environment for the nPartition on which you want to boot HP-UX.

   Login to the service processor (MP or GSP) and enter **`CO`** to access the Console list. Select the nPartition console.

   When accessing the console, confirm that you are at the EFI Boot Manager menu (the main EFI menu). If at another EFI menu, select the **Exit** option from the sub-menus until you return to the screen with the `EFI Boot Manager` heading.

   From the EFI Boot Manager menu, select the **EFI Shell** menu option to access the EFI Shell environment.

2. At the EFI Shell environment, issue the `acpiconfig` command to list the current ACPI configuration for the local nPartition.

   On nPartition-capable HP Integrity servers, to boot the HP-UX operating system, an nPartition must have its ACPI configuration value set to `default`. If the `acpiconfig` value is not set to `default`, HP-UX cannot boot. In this situation, you must reconfigure `acpiconfig` or booting is interrupted with a panic when launching the HP-UX kernel.

   To set the ACPI configuration for HP-UX: at the EFI Shell interface, enter the `acpiconfig default` command, and then enter the `reset` command for the nPartition to reboot with the proper (`default`) configuration for HP-UX.

3. At the EFI Shell environment, issue the `map` command to list all currently mapped bootable devices.

   The bootable filesystems of interest typically are listed as `fs0:`, `fs1:`, and so on.

4. Access the EFI System Partition (`fs`*X*`:` where *X* is the filesystem number) for the device from which you want to boot HP-UX.

   For example, enter **`fs2:`** to access the EFI System Partition for the bootable filesystem number `2`. Note that the EFI Shell prompt changes to reflect the filesystem currently accessed.

   Also note that the filesystem number may change each time it is mapped (for example, when the nPartition boots, or when the `map -r` command is issued).

5. When accessing the EFI System Partition for the desired boot device, issue the `HPUX` command to invoke the `HPUX.EFI` loader on the selected device.

   The full path for the loader is `\EFI\HPUX\HPUX.EFI`; and when invoked, it references the `\EFI\HPUX\AUTO` file and proceeds to boot HP-UX using the default boot behavior specified in the `AUTO` file.

   You are given ten seconds to interrupt the automatic booting of the default boot behavior. Pressing a key during this ten-second period stops the HP-UX boot process and enables you to interact with the `HPUX.EFI` loader. To exit the loader (the `HPUX>` prompt), enter **`exit`**. This brings you back to the EFI Shell.

   To boot the HP-UX operating system, do not enter anything during the ten-second period given for stopping at the `HPUX.EFI` loader.

```
Shell> map
Device mapping table
  fs0  : Acpi(000222F0,269)/Pci(0|0)/Scsi(Pun8,Lun0)/HD(Part1,Sig72550000)
  blk0 : Acpi(000222F0,269)/Pci(0|0)/Scsi(Pun8,Lun0)
  blk1 : Acpi(000222F0,269)/Pci(0|0)/Scsi(Pun8,Lun0)/HD(Part1,Sig72550000)
  blk2 : Acpi(000222F0,269)/Pci(0|0)/Scsi(Pun8,Lun0)/HD(Part2,Sig72550000)
  blk3 : Acpi(000222F0,2A8)/Pci(0|0)/Scsi(Pun8,Lun0)
  blk4 : Acpi(000222F0,2A8)/Pci(0|1)/Scsi(Pun2,Lun0)

Shell> fs0:

fs0:\> hpux
```

```
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HP-UX Boot Loader for IA64  Revision 1.723

Press Any Key to interrupt Autoboot
\efi\hpux\AUTO ==> boot vmunix
Seconds left till autoboot -   9
```

6. Exit the console and service processor interfaces when finished using them.

   To exit the EFI environment, enter **^B** (**Control-B**). This exits the nPartition console and returns to the service processor Main Menu. To exit the service processor, enter **X** at the Main Menu.

Single-User Mode HP-UX Booting

You can boot HP-UX in single-user mode by using the following procedure:

Procedure D-3 Single-User Mode HP-UX Booting [EFI Shell]

From the EFI Shell environment, boot in single-user mode by stopping the boot process at the `HPUX.EFI` interface (the HP-UX Boot Loader prompt, `HPUX>`) entering the `boot -is vmunix` command.

For required configuration details, see "ACPI Configuration for HP-UX Must Be "default"" (page 207).

1. Access the EFI Shell environment for the nPartition on which you want to boot HP-UX in single-user mode.

   Login to the service processor (MP or GSP) and enter **CO** to access the console list. Select the nPartition console.

   When accessing the console, confirm that you are at the EFI Boot Manager menu (the main EFI menu). If at another EFI menu, select **Exit** from the sub-menus until you return to the screen with the `EFI Boot Manager` heading.

   From the EFI Boot Manager menu, select the **EFI Shell** menu option to access the EFI Shell environment.

2. Access the EFI System Partition (`fs`*X*`:` where *X* is the filesystem number) for the device from which you want to boot HP-UX.
3. When accessing the EFI System Partition for the desired boot device, issue the `HPUX` command to invoke the `\EFI\HPUX\HPUX.EFI` loader on the selected devive.
4. Boot to the HP-UX Boot Loader prompt (`HPUX>`) by pressing any key within the ten seconds given for interrupting the HP-UX boot process. You will use the `HPUX.EFI` loader to boot HP-UX in single-user mode in the next step.

   After you press a key, the `HPUX.EFI` interface (the HP-UX Boot Loader prompt, `HPUX>`) is provided. For help using the `HPUX.EFI` loader, enter the **help** command. To return to the EFI Shell, enter **exit**.

```
fs0:\> hpux

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All rights reserved

HP-UX Boot Loader for IA64  Revision 1.723

Press Any Key to interrupt Autoboot
\efi\hpux\AUTO ==> boot vmunix
Seconds left till autoboot -   9
```

[User Types A Key to Stop the HP-UX Boot Process and Access the HPUX.EFI Loader]

```
   Type 'help' for help

HPUX>
```

5. At the HPUX.EFI interface (the HP-UX Boot Loader prompt, HPUX>) enter the **boot -is vmunix** command to boot HP-UX (the /stand/vmunix kernel) in single-user (-is) mode.

```
HPUX> boot -is vmunix
> System Memory = 4063 MB
loading section 0
.............................................. (complete)
loading section 1
........ (complete)
loading symbol table
loading System Directory(boot.sys) to MFS
....
loading MFSFILES Directory(bootfs) to MFS
......
Launching /stand/vmunix
SIZE: Text:25953K + Data:3715K + BSS:3637K = Total:33306K

Console is on a Serial Device
Booting kernel...
```

6. Exit the console and service processor interfaces when finished using them.

   To exit the EFI environment, enter **^B** (**Control-B**). This exits the nPartition console and returns to the service processor Main Menu. To exit the service processor, enter **X** at the Main Menu.

LVM-Maintenance Mode HP-UX Booting

You can boot HP-UX in LVM-maintenance mode by using the following procedure:

Procedure D-4 LVM-Maintenance Mode HP-UX Booting [EFI Shell]

From the EFI Shell environment, boot in LVM-maintenance mode by stopping the boot process at the HPUX.EFI interface (the HP-UX Boot Loader prompt, HPUX>). Enter the **boot -lm vmunix** command.

For required configuration details, see "ACPI Configuration for HP-UX Must Be "default"" (page 207).

1. Access the EFI Shell environment for the nPartition on which you want to boot HP-UX in LVM-maintenance mode.

   Login to the service processor (MP or GSP) and enter **CO** to access the Console list. Select the nPartition console.

   When accessing the console, confirm that you are at the EFI Boot Manager menu (the main EFI menu). If at another EFI menu, select **Exit** from the sub-menus until you return to the screen with the EFI Boot Manager heading.

   From the EFI Boot Manager menu, select the **EFI Shell** menu option to access the EFI Shell environment.

2. Access the EFI System Partition (fs*X*: where *X* is the filesystem number) for the device from which you want to boot HP-UX.
3. When accessing the EFI System Partition for the desired boot device, issue the HPUX command to invoke the \EFI\HPUX\HPUX.EFI loader on the selected device.
4. Press any key within the ten seconds given for interrupting the HP-UX boot process. This stops the boot process at the HPUX.EFI interface (the HP-UX Boot Loader prompt, HPUX>).
5. At the HPUX.EFI interface, enter the **boot -lm vmunix** command to boot HP-UX (the /stand/vmunix kernel) in LVM-maintenance (-lm) mode.
6. Exit the console and service processor interfaces when finished using them.

   To exit the EFI environment, enter **^B** (**Control-B**). This exits the nPartition console and returns to the service processor Main Menu. To exit the service processor, enter **X** at the Main Menu.

Booting the Microsoft Windows Operating System

You can boot the Windows™ Server 2003 operating system on an HP Integrity server by using the EFI Boot Manager to select the appropriate Windows item from the boot options list.

For details on shutting down the Windows operating system, see "Shutting Down Microsoft Windows" (page 215).

CAUTION:

ACPI Configuration for Windows Must Be "windows" On nPartition-capable HP Integrity servers, to boot the Windows operating system, an nPartition must have its ACPI configuration value set to `windows`.

At the EFI Shell, enter the **`acpiconfig`** command with no arguments to list the current ACPI configuration. If the `acpiconfig` value is not set to `windows`, Windows cannot boot. In this situation, you must reconfigure `acpiconfig` or booting is interrupted with a panic when launching Windows.

To set the ACPI configuration for Windows: at the EFI Shell enter the **`acpiconfig windows`** command, and then enter the **`reset`** command for the nPartition to reboot with the proper (`windows`) configuration for Windows.

NOTE:

Microsoft Windows Booting on HP Integrity Servers The recommended method for booting Windows is to use the EFI Boot Manager menu to select a Windows entry from the boot options list. Using the `ia64ldr.efi` Windows loader from the EFI Shell is not recommended.

Procedure D-5 Windows Booting

From the EFI Boot Manager menu, select an item from the boot options list to boot Windows using the selected boot option.

For required configuration details, see "ACPI Configuration for Windows Must Be "windows"" (page 211).

1. Access the EFI Boot Manager menu for the system on which you want to boot Windows.

   To access the Console list, log in to the MP and enter **`CO`**. Select the nPartition console.

   When accessing the console, confirm that you are at the EFI Boot Manager menu (the main EFI menu). If you are at another EFI menu, select **`Exit`** from the sub-menus until you return to the screen with the `EFI Boot Manager` heading.

2. At the EFI Boot Manager menu, select an item from the boot options list.

   Each item in the boot options list references a specific boot device and provides a specific set of boot options or arguments to be used when booting the device.

3. To initiate booting using the selected boot option, press **Return** or **Enter**.
4. Once Windows begins loading, wait for the Special Administration Console (SAC) to become available.

   The SAC interface provides a text-based administration tool that is available from the nPartition console. For details see the SAC online help (enter **`?`** at the `SAC>` prompt).

```
Loading.: Windows Server 2003, Datacenter
Starting: Windows Server 2003, Datacenter



                                Starting Windows...
********************************************************************************

Computer is booting, SAC started and initialized.

Use the "ch -?" command for information about using channels.
Use the "?" command for general help.
```

```
SAC>
```

5. Exit the console and MP interfaces if finished using them.

   To exit the console environment, enter **^B** (**Control-B**). This exits the console and returns to the MP Main menu. To exit the MP, enter **x** at the Main Menu.

Booting the Red Hat Linux Operating System

You can boot the Red Hat Linux operating system on HP Integrity servers using either of the methods described in this section.

For details on shutting down the Red Hat Linux operating system, see "Shutting Down Linux" (page 216).

CAUTION:

ACPI Configuration for Red Hat Linux 3 Must Be "single-pci-domain" On nPartition-capable HP Integrity servers, to boot the Red Hat Linux 3 operating system, an nPartition must have its ACPI configuration value set to `single-pci-domain`.

At the EFI Shell, enter the **`acpiconfig`** command with no arguments to list the current ACPI configuration. If the `acpiconfig` value is not set to `single-pci-domain`, Red Hat Linux could panic. In this situation, you must reconfigure `acpiconfig` to eliminate any bus address conflicts and ensure all I/O slots have unique addresses.

To set the ACPI configuration for Red Hat Linux 3: at the EFI Shell, enter the **`acpiconfig single-pci-domain`** command, and then enter the **`reset`** command for the nPartition to reboot with the proper (`single-pci-domain`) configuration for Red Hat Linux 3.

Use either of these methods to boot Red Hat Linux:

- Select a Red Hat Linux entry from the EFI Boot Manager menu.

  To load the Red Hat Linux operating system at the EFI Boot Manager menu, select its entry from the list of boot options.

  Selecting a Linux entry from the boot options list boots the operating system using `ELILO.EFI` loader and the `elilo.conf` file.

- Invoke the `ELILO.EFI` Linux loader from the EFI Shell.

  For details, see "Red Hat Linux Operating System Booting from the EFI Shell" (page 212).

  On a Red Hat Linux boot device EFI System Partition, the full paths to the loader and configuration files are: `\EFI\redhat\elilo.efi` `\EFI\redhat\elilo.conf`

  After selecting the filesystem for the boot device (for example, `fs0:`) you can invoke the Linux loader from the EFI Shell prompt by entering the full path for the `ELILO.EFI` loader.

By default the `ELILO.EFI` loader boots Linux using the kernel image and parameters specified by the default entry in the `elilo.conf` file on the EFI System Partition for the boot device.

To interact with the `ELILO.EFI` loader, interrupt the boot process (for example, enter a space) at the `ELILO boot` prompt. To exit the `ELILO.EFI` loader use the `exit` command.

Procedure D-6 Red Hat Linux Operating System Booting from the EFI Shell

To boot Red Hat Linux from the EFI Shell, follow these steps:

For required configuration details, see "ACPI Configuration for Red Hat Linux 3 Must Be "single-pci-domain"" (page 212).

1. Access the EFI Shell.

   From the system console, select the **EFI Shell** entry from the EFI Boot Manager menu to access the shell.

2. Access the EFI System Partition for the Red Hat Linux boot device.

   Use the `map` EFI Shell command to list the filesystems (`fs0`, `fs1`, and so on) that are known and have been mapped.

To select a filesystem to use, enter its mapped name followed by a colon (`:`). For example, to operate with the boot device that is mapped as `fs3`, enter **`fs3:`** at the EFI Shell prompt.

3. Enter **`ELILO`** at the EFI Shell command prompt to launch the `ELILO.EFI` loader.

   If needed, you can specify the loader's full path by entering **`\EFI\redhat\elilo`** at the EFI Shell command prompt.

4. Allow the `ELILO.EFI` loader to proceed with booting the Red Hat Linux kernel.

   By default, the `ELILO.EFI` loader boots the kernel image and options specified by the default item in the `elilo.conf` file.

   To interact with the `ELILO.EFI` loader, interrupt the boot process (for example, enter a space) at the `ELILO boot` prompt. To exit the loader, use the `exit` command.

Booting the SuSE Linux Enterprise Server Operating System

You can boot the SuSE Linux Enterprise Server 9 operating system on HP Integrity servers using either of the methods described in this section.

For details on shutting down the SuSE Linux Enterprise Server operating system, see "Shutting Down Linux" (page 216).

△ **CAUTION:**

ACPI Configuration for SuSE Linux Enterprise Server Must Be "default" On nPartition-capable HP Integrity servers, to boot the SuSE Linux Enterprise Server operating system an nPartition must have its ACPI configuration value set to `default`.

At the EFI Shell, enter the **`acpiconfig`** command with no arguments to list the current ACPI configuration. If the `acpiconfig` value is not set to `default`, SuSE Linux Enterprise Server could panic.

To set the ACPI configuration for SuSE Linux Enterprise Server: at the EFI Shell enter the **`acpiconfig default`** command, and then enter the **`reset`** command for the nPartition to reboot with the proper (`default`) configuration for SuSE Linux Enterprise Server.

To boot SuSE Linux Enterprise Server, use either of these methods:

- Select a SuSE Linux Enterprise Server entry from the EFI Boot Manager menu.

  To load the SuSE Linux Enterprise Server operating system at the EFI Boot Manager menu, select its entry from the list of boot options.

  Selecting a Linux entry from the boot options list boots the operating system using `ELILO.EFI` loader and the `elilo.conf` file.

- Invoke the `ELILO.EFI` Linux loader from the EFI Shell.

  For details, see "SuSE Linux Enterprise Server Operating System Booting from the EFI Shell" (page 213).

  On a SuSE Linux Enterprise Server boot device EFI System Partition, the full paths to the loader and configuration files are: `\efi\SuSE\elilo.efi\efi\SuSE\elilo.conf`

  After selecting the filesystem for the boot device (for example, `fs0:`) you can invoke the Linux loader from the EFI Shell prompt by entering the full path for the `ELILO.EFI` loader.

By default, the `ELILO.EFI` loader boots Linux using the kernel image and parameters specified by the default entry in the `elilo.conf` file on the EFI System Partition for the boot device.

To interact with the `ELILO.EFI` loader, interrupt the boot process (for example, enter a space) at the `ELILO boot` prompt. To exit the `ELILO.EFI` loader, use the `exit` command.

Procedure D-7 SuSE Linux Enterprise Server Operating System Booting from the EFI Shell

To boot SuSE Linux Enterprise Server 9 from the EFI Shell, follow these steps:

For required configuration details, see "ACPI Configuration for SuSE Linux Enterprise Server Must Be "default"" (page 213).

1. Access the EFI Shell.

   From the system console, select the **EFI Shell** entry from the EFI Boot Manager menu to access the shell.

2. Access the EFI System Partition for the SuSE Linux Enterprise Server boot device.

   Use the `map` EFI Shell command to list the filesystems (`fs0`, `fs1`, and so on) that are known and have been mapped.

   To select a filesystem to use, enter its mapped name followed by a colon (`:`). For example, to operate with the boot device that is mapped as `fs3`, enter **`fs3:`** at the EFI Shell prompt.

3. Enter **`ELILO`** at the EFI Shell command prompt to launch the `ELILO.EFI` loader.

   If needed, you can specify the loader's full path by entering **`\efi\SuSE\elilo`** at the EFI Shell command prompt.

4. Allow the `ELILO.EFI` loader to proceed with booting the Red Hat Linux kernel.

   By default, the `ELILO.EFI` loader boots the kernel image and options specified by the default item in the `elilo.conf` file.

   To interact with the `ELILO.EFI` loader, interrupt the boot process (for example, enter a space) at the `ELILO boot` prompt. To exit the loader, use the `exit` command.

Shutting Down HP-UX

When HP-UX is running on an nPartition, you can shut down HP-UX using the `shutdown` command.

On nPartitions you have the following options when shutting down HP-UX:

- To shut down HP-UX and reboot an nPartition: **`shutdown -r`**

  On nPartition-capable HP Integrity servers, the `shutdown -r` command is equivalent to the `shutdown -R` command.

- To shut down HP-UX and halt an nPartition: **`shutdown -h`**

  On nPartition-capable HP Integrity servers, the `shutdown -h` command is equivalent to the `shutdown -R -H` command.

- To perform a reboot for reconfig of an nPartition: **`shutdown -R`**
- To hold an nPartition at a shutdown for reconfig state: **`shutdown -R -H`**

For details, see the *shutdown*(1M) manpage.

NOTE: You can configure the nPartition behavior when an OS is shutdown and halted (`shutdown -h` or `shutdown -R -H`). The two options are to have hardware power off when the OS is halted, or to have the nPartition be made inactive (all cells are in a boot-is-blocked state).

The normal behavior for HP-UX shutdown and halt is for the nPartition be made inactive.

For details see "ACPI "Softpowerdown" Configuration - OS Shutdown Behavior" (page 206).

Procedure D-8 Shutting Down HP-UX [`/sbin/shutdown` command]

From the HP-UX command line, issue the `shutdown` command to shut down the HP-UX operating system.

1. Login to HP-UX running on the nPartition that you want to shut down.

   You can login to HP-UX on the nPartition either by directly connecting (with the `Telnet` or `rlogin` commands) or by logging in to the service processor (GSP or MP) for the complex where it resides and using the Console menu to access the nPartition console.

   Accessing the console through the service processor enables you to maintain console access to the nPartition after HP-UX has shut down.

2. Issue the **shutdown** command with the appropriate command-line options.

   The command-line options you specify dictate the way in which HP-UX is shut down, whether the nPartition is rebooted, and whether any nPartition configuration changes (adding or removing cells) take place.

   Use the following list to choose an HP-UX shut down option for your nPartition.

   - Shut down HP-UX and halt the nPartition.

     On nPartition-capable HP Integrity servers, the `shutdown -h` command puts an nPartition into the shutdown for reconfig state; for details see the discussion of `shutdown -R -H` in this list.

   - Shut down HP-UX and reboot the nPartition.

     Issue the **`shutdown -r`** command to shut down and reboot the nPartition.

     On nPartition-capable HP Integrity servers, the `shutdown -r` command is equivalent to the `shutdown -R` command.

   - Perform a reboot for reconfig of the nPartition.

     Issue the HP-UX **`shutdown -R`** command to perform a reboot for reconfig.

     This shuts down HP-UX, reconfigures the nPartition if needed, and reboots the nPartition.

   - Reboot the nPartition and put it in to the shutdown for reconfig state.

     Use the HP-UX **`shutdown -R -H`** command to hold the nPartition in the shutdown for reconfig state.

     This leaves the nPartition and all its cells in an inactive state (the nPartition can be reconfigured remotely), unless the normal behavior has been modified. For details on changing OS halt behavior, see "ACPI "Softpowerdown" Configuration - OS Shutdown Behavior" (page 206).

     To reboot the nPartition, you must do so manually by using the `BO` command at the MP Command menu.

   If HP-UX is halted on the nPartition, thus not allowing you to use the `shutdown` command, you can reboot or reset the nPartition by issuing commands from the MP Command menu.

Shutting Down Microsoft Windows

You can shut down the Windows operating system on HP Integrity servers using the Start menu or the `shutdown` command.

△ **CAUTION:** Do not shut down Windows using Special Administration Console (SAC) `restart` or `shutdown` commands under normal circumstances.

Issuing `restart` or `shutdown` at the `SAC>` prompt causes the system to restart or shutdown immediately and can result in the loss of data.

Instead use the Windows Start menu or the `shutdown` command to shut down gracefully.

To shut down Windows, use either of the following methods.

- Select **Shut Down** from the Start menu and choose either **Restart** or **Shut down** from the pull-down menu.

  The Restart menu item shuts down and restart the system. The Shut down menu item shuts down the system.

  You can use this method when using a graphical interface to the system.

- Issue the `shutdown` command from the Windows command line.

  For details, see "Windows Shutdown From the Command Line" (page 216).

  You can issue this command from a command prompt through the Special Administration Console (SAC) or from any other command line.

The Windows `shutdown` command includes the following options:

`/s` Shut down the system. This is the equivalent of Start—>Shut Down, Shut down.

`/r` Shut down and restart the system. This is the equivalent of Start—>Shut Down, Restart.

`/a` Abort a system shutdown.

`/t xxx` Set the timeout period before shutdown to *xxx* seconds. The timeout period can be 0–600, with a default of 30.

For details, see the `help shutdown` Windows command.

NOTE: Performing a shutdown using `shutdown /s` (or the equivalent **Start—>Shut Down, Shut down**) powers off the server cabinet or powers off the cells and I/O chassis assigned to the nPartition. This behavior can be customized. For details see "ACPI "Softpowerdown" Configuration - OS Shutdown Behavior" (page 206).

Procedure D-9 Windows Shutdown From the Command Line

From the Windows command line, issue the **`shutdown`** command to shut down the operating system.

1. Login to Windows running on the system that you want to shut down.

   For example, access the system console and use the Windows SAC interface to start a command prompt, from which you can issue Windows commands to shut down the system.

2. Check to see whether any users are logged in.

   Use the `query user` or `query session` command.

3. Issue the `shutdown` command and the appropriate options to shut down the Windows Server 2003 on the system.

   You have the following options when shutting down Windows:

   - To shut down Windows and reboot: use **`shutdown /r`** or select the **Start —> Shut Down** action and choose **Restart** from the pull-down menu.
   - To shut down Windows and not reboot (either power off server hardware or put an nPartition into a shutdown for reconfig state): use **`shutdown /s`** or select the **Start —> Shut Down** action and choose **Shut down** from the pull-down menu.
   - To abort a shutdown (stop a shutdown that has been initiated): use **`shutdown /a`**

   For example:

   ```
   shutdown /r /t 60 /c "Shut down in one minute."
   ```

   This command initiates a Windows system shutdown-and-reboot after a timeout period of 60 seconds. The `/c` option specifies a message that is broadcast to any other users of the system.

Shutting Down Linux

Use the `shutdown` command to shut down the Red Hat Linux or the SuSE Linux Enterprise Server operating system.

The Red Hat Linux and SuSE Linux Enterprise Server `shutdown` command includes the following options:

`-h` Halt after shutdown.

On nPartition-capable HP Integrity servers, this will either power off server hardware or put the nPartition into a shutdown for reconfigure state.

Use the `PE` command at the MP Command menu to manually power on or power off server hardware, as needed.

`-r` Reboot after shutdown.

`-c` Cancel an already running shutdown.

time When to shut down. (Required.) *time* can be specified in any of the following ways:

- Absolute time in the format *hh*:*mm*, in which *hh* is the hour (one or two digits) and *mm* is the minute of the hour (two digits).
- Number of minutes to wait in the format +*m*, in which *m* is the number of minutes.
- `now` to immediately shut down; this is equivalent to using `+0` to wait zero minutes.

For details, see the *shutdown* (8) Linux manpage. See also the Linux manpage for the `poweroff` command.

NOTE: You can configure the nPartition behavior when an OS is shutdown and halted (`shutdown -h` or `poweroff`). The two options are to have hardware power off when the OS is halted, or to have the nPartition be made inactive (all cells are in a boot-is-blocked state).

The normal behavior for Red Hat Linux or SuSE Linux Enterprise Server shutdown and halt is for the nPartition be made inactive.

For details see "ACPI "Softpowerdown" Configuration - OS Shutdown Behavior" (page 206).

Procedure D-10 Linux Shutdown

From the command line for Red Hat Linux or SuSE Linux Enterprise Server, issue the **`shutdown`** command to shut down the operating system.

1. Login to Linux running on the system you want to shut down.
2. Issue the **`shutdown`** command with the desired command-line options, and include the required *time* argument to specify when the operating shutdown is to occur.

   For example, `shutdown -r +20` will shutdown and reboot the system starting in twenty minutes.

Site Preparation Glossary

A-B

Apparent power	A value of power for AC circuits that is calculated as the product of RMS current times RMS voltage, without taking the power factor into account.
ASHRAE Standard 52-76	Industry standard for air filtration efficiency set forth by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc.
ASL	Above sea level.
board	A printed circuit assembly (PCA). Also called a card or adapter.
Btu/h	The abbreviation for British thermal units. The amount of heat required to raise one pound of water one degree fahrenheit per hour, a common measure of heat transfer rate.

C

CFM	The abbreviation for cubic feet per minute, commonly used to measure the rate of air flow in an air conditioning system.
Chilled water system	A type of air conditioning system that has no refrigerant in the unit itself. The refrigerant is contained in a chiller, which is located remotely. The chiller cools water, which is piped to the air conditioner to cool the space.
CompactPCI	The newest specification for PCI-based industrial computers is called CompactPCI. It is electrically a superset of desktop PCI with a different physical form factor.

D-K

Dehumidification	The process of removing moisture from the air within a critical space.
Derate	To lower the rated capability of an electrical or mechanical apparatus.
Downflow	Refers to a type of air conditioning system that discharges air downward, directly beneath a raised floor, commonly found in computer rooms and modern office spaces.
EIA unit	The Electronic Industries Association (EIA) defines this unit of measurement to be 1.75 inches in height. So then, 1U equals 1.75 inches (1U equals 44.45 mm).
Humidification	The process of adding moisture to the air within a critical space.
Inrush current	The peak current flowing into a power supply the instant AC power is applied. This peak is usually much higher than the typical input current due to the charging of the input filter capacitors. When switching power supplies are first turned on, they present high initial currents as a result of filter capacitor impedance. These large filter capacitors act like a short circuit, producing an immediate inrush surge current with a fast rise time. The peak inrush current can be several orders of magnitude greater than the supply's typical current.
KVA	Abbreviation for kilovolt-amperes. (1000 x volt-amperes)

L-N

Latent cooling capacity	An air conditioning system's capability to remove heat from the air.
Leakage current	A term relating to current flowing between the AC supply wires and earth ground. The term does not necessarily denote a fault condition. In power supplies, leakage current usually refers to the 60 Hertz current, which flows through the EMI filter capacitors that are connected between the AC lines and ground.
Maximum input current	The operating current of the product equal to the maximum load divided by the minimum input voltage.
NEBS	All electronic equipment has the potential to interfere with other electronic equipment. Interference can be caused by electromagnetic radiation, the grounding system, the electrical power connection, excessive heat or blocking the natural airflow, and connecting wires or cables. The FCC (Federal Communications Commission) regulates a portion of this problem

through Part 15 of their rules and regulations. Even more stringent than the FCC Part 15 requirements, Network Equipment Building Standards (NEBS) covers a large range of requirements including criteria for personnel safety, protection of property, and operational continuity. The documents cover both physical requirements including: Space Planning, Temperature, Humidity, Fire, Earthquake, Vibration, Transportation, Acoustical, Air Quality and Illumination; and electrical criteria including: Electrostatic Discharge (ESD), Electromagnetic Interference (EMI), Lightning and AC Power Fault, Steady State Power Induction, Corrosion, DC Potential Difference, Electrical Safety and Bonding and Grounding.

O-R

PCA Abbreviation for Printed Circuit Assembly also referred to as a Printed Circuit Board (PCB).

PCI Currently, the most popular local I/O bus, the Peripheral Component Interconnect (PCI) bus was developed by Intel and introduced in 1993.

PICMG A consortium of companies involved in utilizing PCI for embedded applications. The PCI Industrial Computer Manufacturers Group (PICMG) controls the PICMG specification.

Power factor The ratio of true power to apparent power in an AC circuit. In power conversion technology, power factor is used in conjunction with describing the AC input current to the power supply.

RMS Root-mean-square (rms) refers to the most common mathematical method of defining the effective voltage or current of an AC wave. To determine rms value, three mathematical operations are carried out on the function representing the AC waveform: (1) The square of the waveform function (usually a sine wave) is determined. (2) The function resulting from step (1) is averaged over time. (3) The square root of the function resulting from step (2) is found.

S-T

Theoretical maximum power consumption Represents the maximum wattage of a given configuration, assuming worst-case conditions (thermal tolerances, workloads, and so forth) on all system components. It is extremely unlikely that any customer will experience this level of power consumption.

Tonnage The unit of measure used in air conditioning to describe the heating or cooling capacity of a system. One ton of heat represents the amount of heat needed to melt one ton (2000 lbs.) of ice in one hour. 12,000 Btu/hr equals one ton of heat.

True power In an AC circuit, true power is the actual power consumed. It is distinguished from apparent power by eliminating the reactive power component that may be present.

Typical input current The operating current of the product measured using a typical load and target voltage.

Typical power consumption Represents the expected power consumption of a given configuration. The typical value is the approximate power consumption that a customer will most likely experience and can use for power budgeting purposes.

U-Z

Vapor seal A vapor seal is an essential part of preventing moisture infiltration into or migration out of a critical space, such as a data processing center or other room that contains sensitive electronic instrumentation. Essentially, a vapor seal is a barrier that prevents air, moisture, and contaminants from migrating through tiny cracks or pores in the walls, floor, and ceiling into the critical space. Vapor barriers may be created using plastic film, vapor-retardant paint, vinyl wall coverings and vinyl floor systems, in combination with careful sealing of all openings (doors and windows) into the room.

Watt A unit of electricity consumption representing the product of amperage and voltage. When the power requirement of a product is listed in watts, you can convert to amps by dividing the wattage by the voltage. (e.g., 1200 watts divided by 120 volts is 10 amps.

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