User Service Guide

HP 9000 rp8420 Server

Fourth Edition

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Revision History

First Edition	Initial release. December 2003.
Second Edition	Added Disk LED information to Chapter 2. June 2004.
Third Edition	Updated system power requirements information in Appendix B. October 2006.
Fourth Edition	Updated minimum BPS configuration, added MP/modem CR solution, and corrected Fig 5-10 graphic. May 2007.

READ ME

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1 Introduction

The HP 9000 rp8420 server is a member of the HP business-critical computing platform family mid-range, mid-volume servers positioned between the HP 9000 rp7420 and HP 9000 Superdome servers.

Overview

The HP 9000 rp8420 servers are 17 U[1] high, 16-socket symmetric multiprocessor (SMP) rack-mount, or stand-alone servers that accommodate up to 128GB of memory, PCI-X I/O, and internal peripherals including disks and DVD or tape drives. High-availability features include N+1 hot-swap fans and power, redundant power cords, and hot-plug PCI cards and hard disk drives. Both 900 MHz and 1 GHz processor speeds are available. Features of the server include:

- Up to 128GB of physical memory provided by dual in-line memory modules (DIMMs).
- Up to 32 processors with a maximum of eight processors per cell board with a maximum of four cell boards. There are four processor module sockets per cell board and each socket will accept a dual-core processor so each cell can hold up to eight processors.
- One cell controller (CC) per cell board.
- All CPUs and cell controllers on the cell boards are cooled with turbo cooler fans.
- Four embedded hard disk drives. Available sizes are 36GB, 73GB, and 146GB drives.
- Two internal DVD drives or one DVD drive and one 40GB DDS-4 DAT drive.
- Nine front chassis mounted N+1 fans.
- Twelve rear chassis mounted N+1 fans.
- Six N+1 PCI-X card cage fans.
- Six N+1 bulk power supplies.
- Two PCI power supplies.
- Sixteen PCI-X slots divided into two partitions. Each partition can accommodate up to eight PCI cards.
- Two core I/O cards.
- Four 220 VAC power plugs. Two are required and the other two provide power source redundancy.

1. The U is a unit of measurement specifying product height. 1 U is equal to 1.75 inches.

Figure 1-1 HP 9000 rp8420 server (Front View)

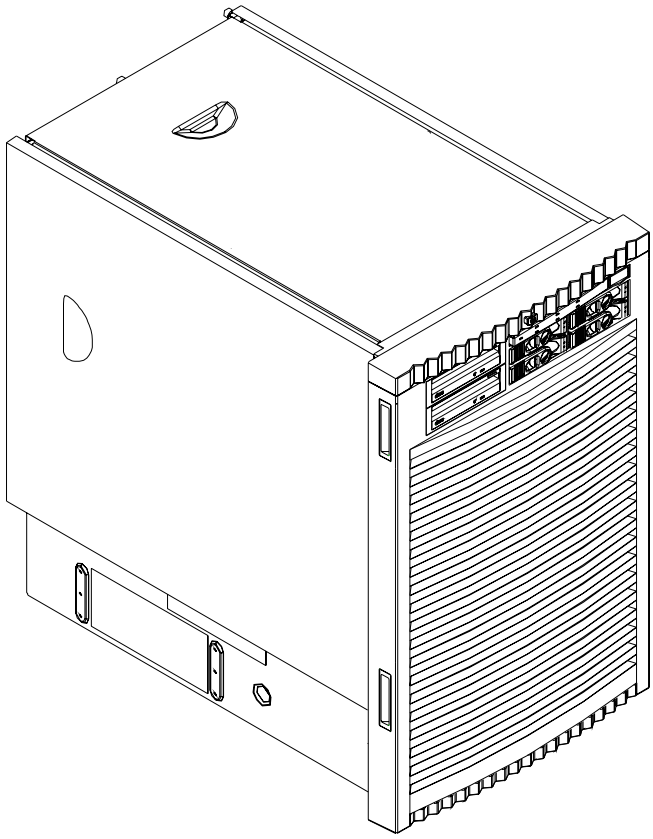
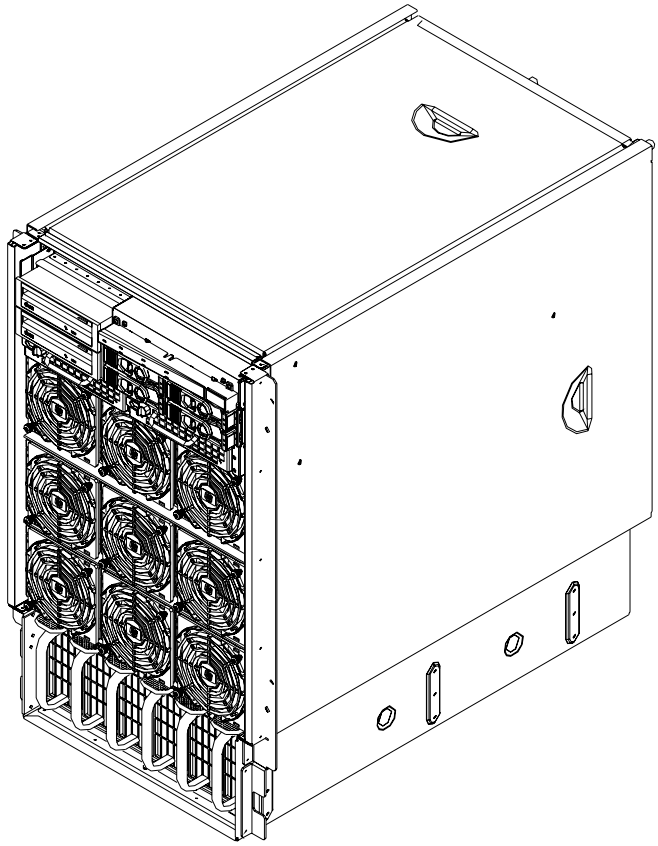


Figure 1-2 HP 9000 rp8420 server (Front View without Bezel)



Front Panel

Front Panel Indicators and Controls

The front panel, located on the front of the server, includes a power switch. See Figure 1-3.

Enclosure Status LEDs

The following status LEDs are on the front panel:

- Standby power status LED (green)
- Management processor (MP) status LED (green)
- Enclosure status run (green), fault (red), attention (yellow), and power (green) LEDs
- Remote port status LED (green)

Figure 1-3 Front Panel LEDs and Power Switch

Cell Board

The cell board contains the processors, main memory, and the CC application-specific integrated circuit (ASIC) that interfaces the processors and memory to the I/O. The CC provides a crossbar connection that allows communication with other cell boards in the system. It connects to the processor-dependent hardware (PDH) and micro controller hardware. Each cell board holds up to 16 DIMMS. There can be one to four cell boards installed in an HP 9000 rp8420 server. A cell board can be selectively powered down for cell replacement without affecting cells in other configured partitions.

System Backplane

The server backplane board contains a pair of crossbar chips (XBC), the clock generation logic, the reset generation logic, some power regulators, and two local bus adapter (LBA) chips that create internal PCI buses for communicating with the core I/O cards. The backplane also contains connectors for attaching the cell boards, PCI-X backplane, MP core I/O cards, SCSI cables, bulk power, chassis fans, front panel display, intrusion switches, external system bus adaptor (SBA) link connectors, and the system scan card.

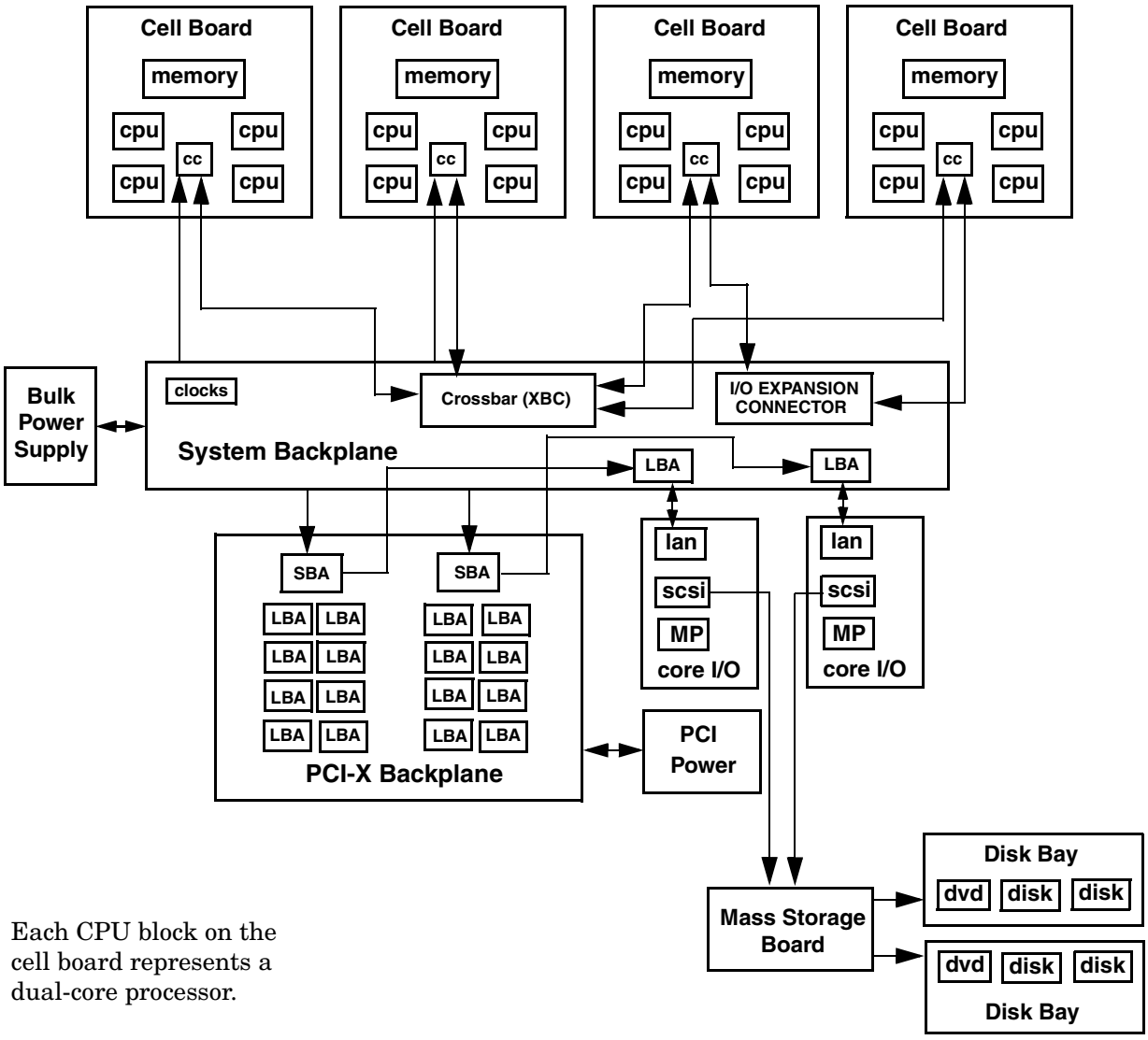
I/O Subsystem

All of the I/O is integrated into the system by way of the PCI busses. The CC on each cell board communicates with one SBA over the SBA link. The SBA link consists of both an inbound and an outbound link with an effective bandwidth of approximately 1GB/s. 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 links for a total aggregate bandwidth of approximately 4GB/s. The server supports a maximum of two SBAs with the capability of supporting an additional two SBAs in an externally connected I/O cabinet known as the HP Server Expansion Unit.

There are LBA chips on the PCI-X backplane that act 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.

Detailed HP 9000 rp8420 server Description

Figure 1-4 HP 9000 rp8420 server 16-Socket Block Diagram



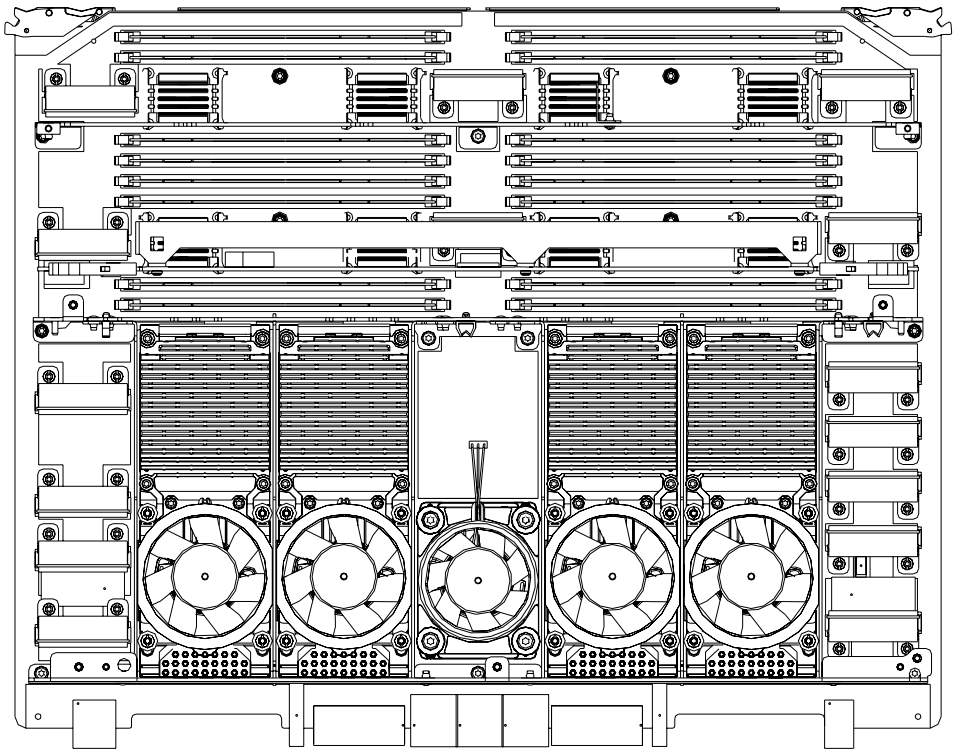
Each CPU block on the cell board represents a dual-core processor.

Cell Board

The cell board contains the processors, main memory, and the CC ASIC that interfaces the processors and memory to the I/O. The cell board is shown in Figure 1-5. The Cell Controller is the heart of the cell board, providing a crossbar connection that allows communication with other cell boards in the system. It connects

to the PDH and micro controller hardware. Each cell board holds up to 16 DIMMS. Between one to four cell boards can be installed in the server. A cell board can be selectively powered down for cell replacement without affecting cells in other configured partitions.

Figure 1-5 Cell Board



The server has a 48 V distributed power system and receives the 48 V 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.

The cell board contains several major buses including:

- Front side buses (FSB) to the processor module sockets
- Two memory buses (one going to each half of the main memory array)
- Incoming and outgoing I/O buses that goes off board to an SBA chip
- Incoming and outgoing crossbar buses that go off board to one or more cell boards
- PDH bus that goes to the PDH and micro controller circuitry

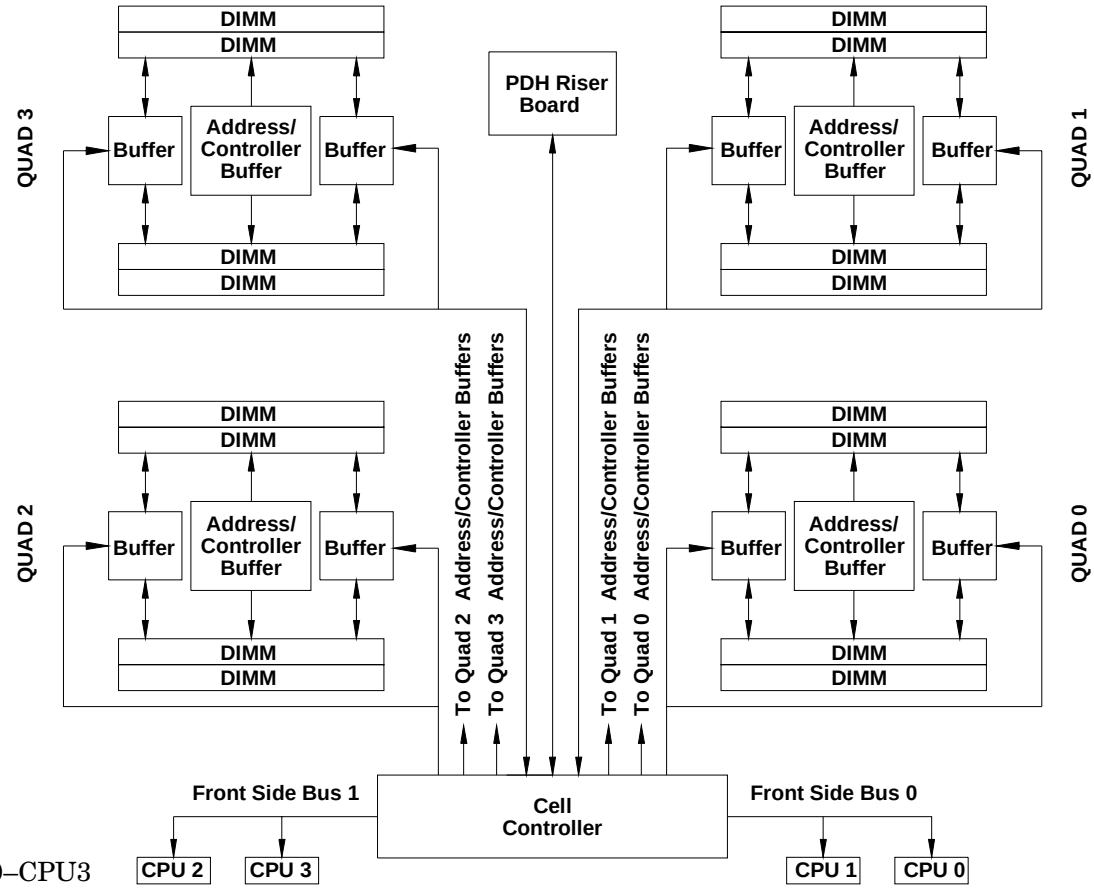
All of these buses come together at the CC chip.

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

Figure 1-6 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.

The memory subsystem is composed of four independent quadrants. Each quadrant has its own memory data bus connecting from the cell controller to the two buffers for the memory quadrant. Each quadrant also has two memory control buses, one for each buffer.

Figure 1-6 Memory Subsystem



The CPU0–CPU3 blocks represent dual-core processors.

PDH Riser Board

The HP 9000 rp8420 server PDH riser board is a small card that plugs into the cell board at a right angle. The PDH riser interface contains a microprocessor memory interface microcircuit, hardware including the processor-dependant code (PDC) flash memory, and a manageability microcontroller with associated circuitry. The PDH obtains cell board configuration information from cell board signals and from the cell board local power module (LPM).

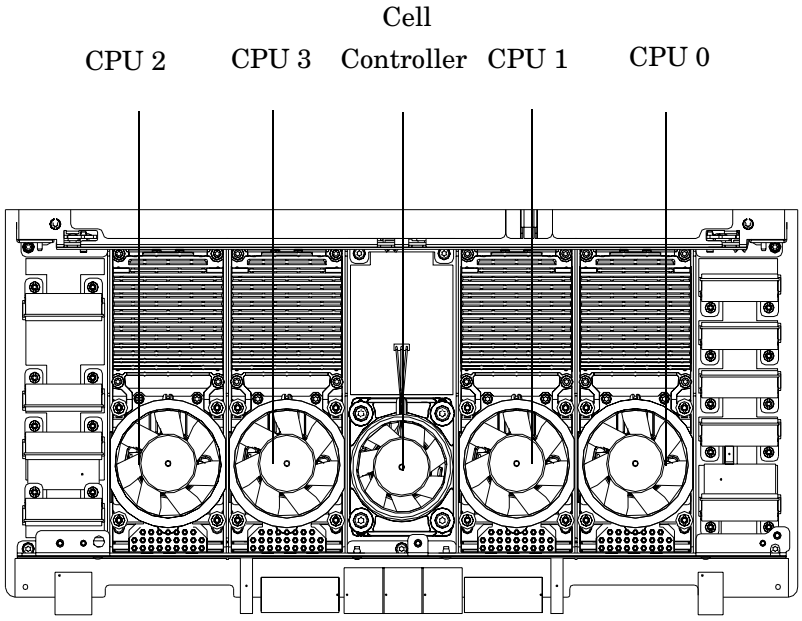
Central Processor Units

The cell board will hold up to eight CPUs and is populated with CPUs in increments of two after meeting the minimum of two CPUs installed on the cell board. Each CPU socket designated in Figure 1-7 as CPU 0, CPU 1, and so on contains two CPUs since there are two CPUs per processor module socket. On a cell board, the processors must be the same type and speed. For a partition, the processors must be the same type and speed. See Table 1-1 for the CPU load order that must be maintained when adding a processor module socket to the cell board. See Figure 1-7 for the locations on the cell board for installing processor module sockets.

Table 1-1 Cell Board CPU Load Order

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

Figure 1-7 CPU Socket Locations on Cell Board



DIMMS

The memory DIMMs used by the HP 9000 rp8420 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 will not support traditional DRAMs.

The HP 9000 rp8420 server will support DIMMs with densities of 256MB, 512MB, 1GB and 2GB. Table 1-2 shows each supported DIMM size, the resulting total server capacity, and the memory component density. Each DIMM is connected to two buffer chips on the cell board.

Table 1-2 HP 9000 rp8420 server DIMMs

DIMM Size	Total HP 9000 rp8420 server Capacity	Memory Component Density
256MB	16GB	64Mb
512MB	32GB	128Mb
1GB	64GB	256Mb
2GB	128GB	512Mb
4 GB	256GB	1Gb

Main Memory Performance

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

Valid Memory Configurations

The HP 9000 rp8420 server is capable of supporting as little as 0.5GB of main memory using two 256MB DIMMs installed on one of the cell boards and as much as 256 GB by filling all 16 DIMM slots on all four cell boards with 4GB 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 1-8 shows the DIMM slot layout on the cell board. See Table 1-3 and Figure 1-8 for DIMM load order and layout on the cell board.

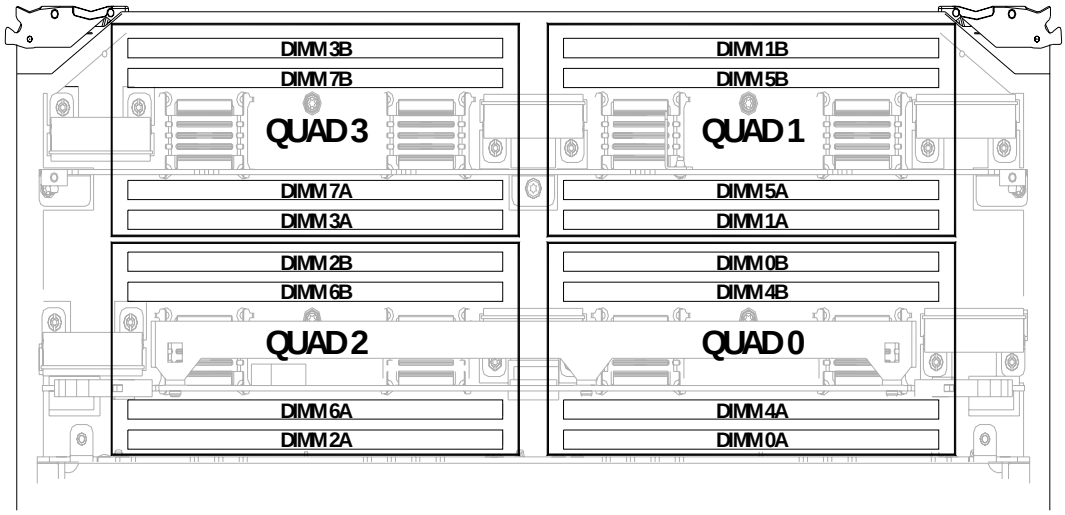
A quad, as seen in Figure 1-8, is a grouping of four DIMMs. Configurations with 8 or 16 DIMM slots loaded are recommended. The DIMM sizes in a quad can be different, but the DIMMs in an echelon must be the same size.

Table 1-3 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 1-8 DIMM Slot Layout

Front Edge of Cell Board



Rear Edge of Cell Board
(Plugs into Server Backplane)

Cells and nPartitions

An nPartition has one or more cells (containing processors and memory) that are assigned to the nPartition for its exclusive use. Any I/O chassis that is attached to a cell belonging to an nPartition also is assigned to the nPartition. Each I/O chassis has PCI card slots plus any I/O cards and attached devices, and has a core I/O card assigned to the I/O chassis.

On the HP 9000 rp8420 server, each nPartition has its own dedicated portion of the server hardware that can run a single instance of the operating system. Each nPartition can boot, reboot, and operate independently of any other nPartitions and hardware within the same server complex.

The server complex includes all hardware within an nPartition server: all cabinets, cells, I/O chassis, I/O devices and racks, management and interconnecting hardware, power supplies, and fans.

One or more nPartitions may be configured within a server complex, allowing the hardware to function as a single operating system or as many systems.

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

Refer to HP System Partitions Guide: Administration for nPartitions for details.

Internal Disk Devices for the HP 9000 rp8420 server

As Figure 1-9 shows, in an HP 9000 rp8420 server cabinet the top internal disk drives connect to cell 0 through the core I/O for cell 0. The bottom internal disk drives connect to cell 1 through the core I/O for cell 1.

The upper removable media drive connects to cell 0 through the core I/O card for cell 0 and the lower removable media drive connects to cell 1 through the core I/O card for cell 1.

Figure 1-9 Internal Disks

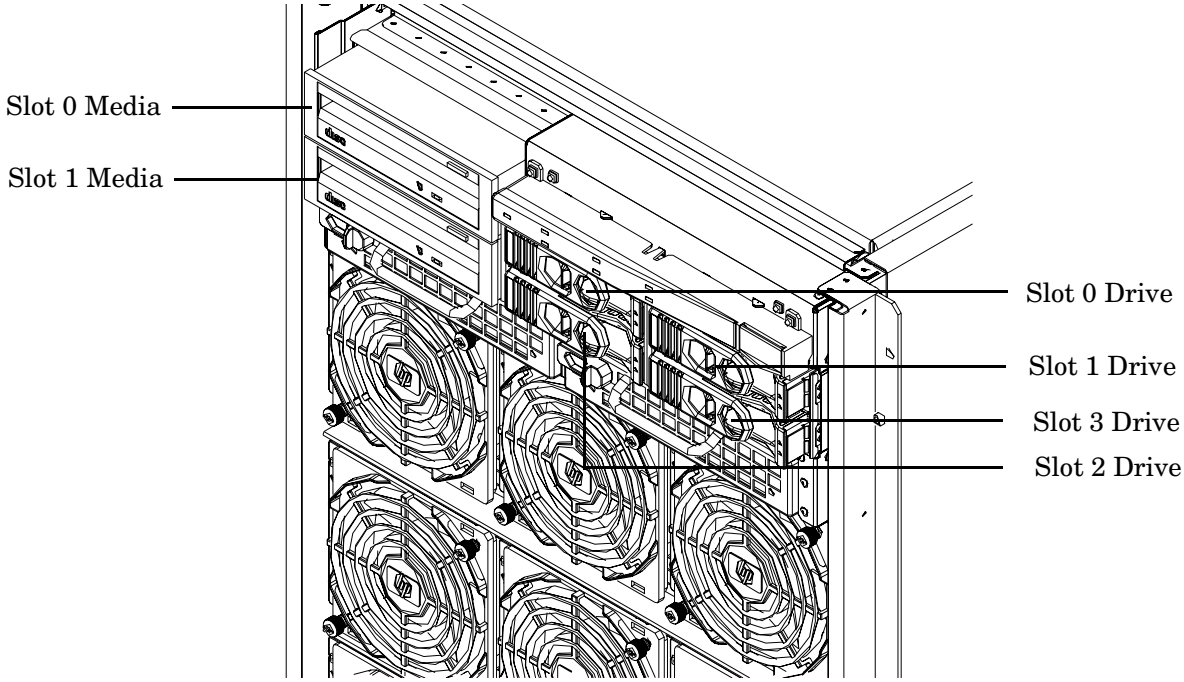


Table 1-4 Removable Media Drive Path

Removable Media	Path
Slot 0 Media	0/0/0/2/1.x[a].0
Slot 1 Media	1/0/0/2/1.x[a].0

a. X equals 2 for a DVD drive while X equals 3 for a DDS-4 DAT drive.

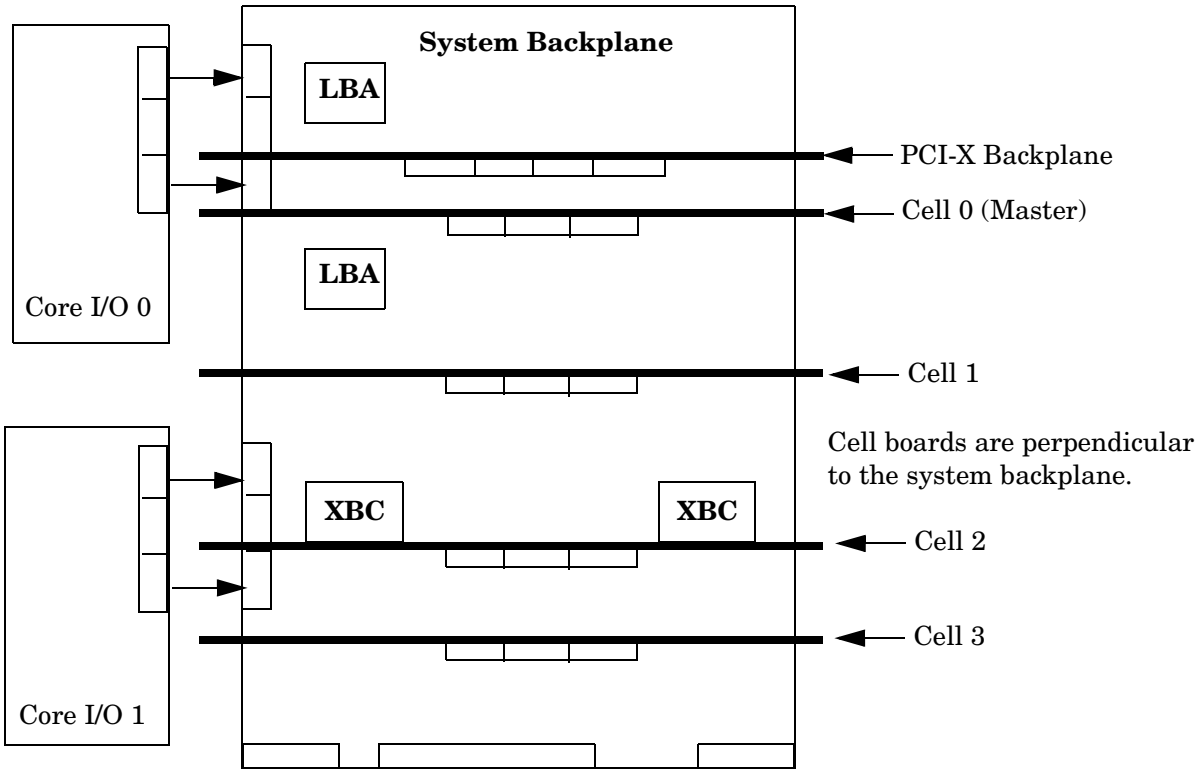
Table 1-5 Hard Disk Drive Path

Hard Drive	Path
Slot 0 Drive	0/0/0/2/0.6.0
Slot 1 Drive	0/0/0/3/0.6.0
Slot 2 Drive	1/0/0/2/0.6.0
Slot 3 Drive	1/0/0/3/0.6.0

System Backplane

The system backplane houses the system clock generation logic, the system reset generation logic, DC-to-DC converters, power monitor logic, and two LBA link-to-PCI converter ASICs. It is the point of connection for the cell boards, PCI-X backplane, core I/O cards, SCSI cables, bulk power, chassis fans, front panel display, intrusion switches, and the system scan card.

Figure 1-10 System Backplane Block Diagram



The LBA PCI bus controllers are placed on the system backplane to facilitate removal of the core I/O cards when standby power is applied. The partition for the core I/O card must be shut down before removing the card.

Having the SCSI connectors on the system backplane allows removal of the core I/O card without having to remove cables in the process. Hot-plug circuitry is located near the system backplane/core I/O card mating area.

System Backplane to Cell Board Connectivity

Four sets of vertical connectors serve as the point of connection for the cell boards. In addition, two vertical connectors per cell board carry signals from the CC on the cell board to the SBA chip on the PCI-X backplane, or an external I/O chassis PCI-X backplane, and back through the system backplane.

System Backplane to Core I/O Card Connectivity

The core I/O card connectors are right-angle connectors that mate with the system backplane. Three connectors per core I/O card carry one PCI bus from the system to the core I/O board and three single-ended SCSI busses from the core I/O to the system backplane. The system backplane contains two LBA PCI bus controllers, one per core I/O board, and six 68-pin SCSI connectors (three per core I/O board).

The LBA PCI bus controllers are placed on the system backplane to facilitate removal of the core I/O cards when standby power is on. The partition for the core I/O card must be shut down before removing the card.

Placement of the SCSI connectors on the system backplane also permits removal of a core I/O card without having to remove cables in the process. Hot-plug circuitry is located near the system backplane/core I/O card mating area.

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 CC 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.

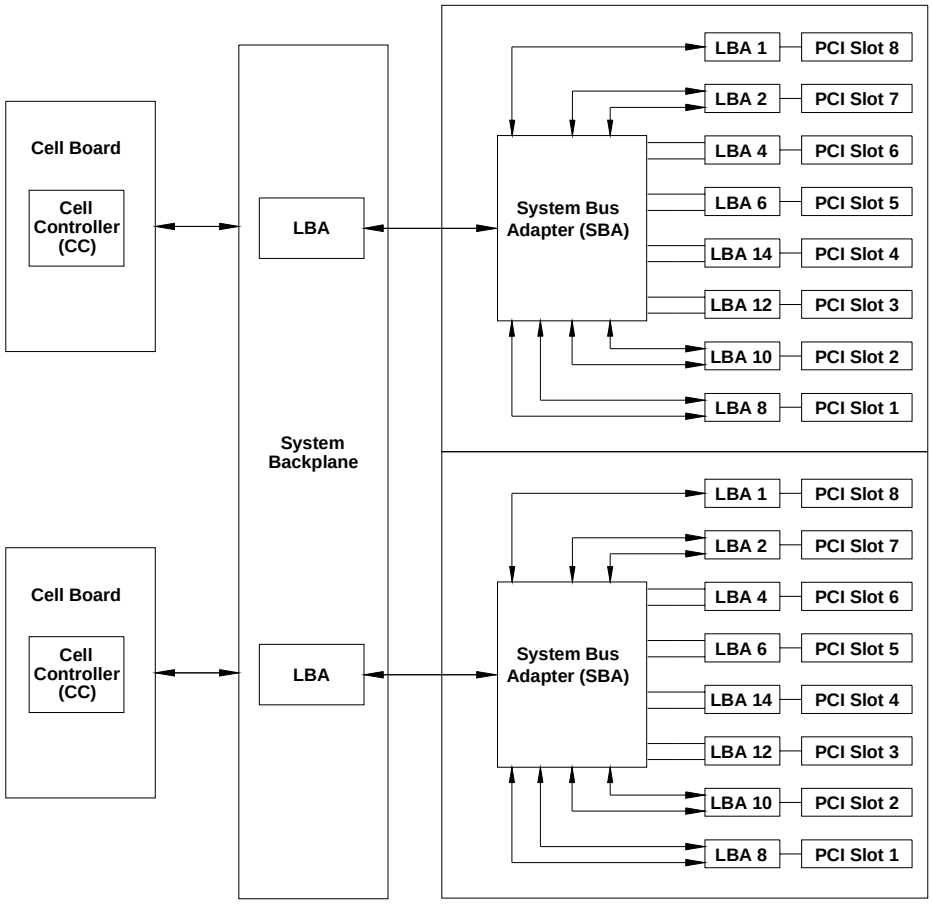
Clocks and Reset

The system backplane contains reset and clock circuitry that propagates through the whole system. The system backplane central clocks drive all major chip set clocks.

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 1-11. The CC on cell board 0 and cell board 1 communicates through an 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. When cell board 2 and cell board 3 are present, the cell boards attach to their own associated SBA and LBA chips on the PCI-X board in the Server Expansion Unit.

Figure 1-11 PCI-X Board to Cell Board Block Diagram



The HP 9000 rp8420 server supports two internal SBAs. The SBAs generate 32 rope buses (16 per SBA). The 32 available internal rope buses are divided in the following manner:

- Two ropes are routed as single rope bundles to support the core I/O boards through LBAs located on the core I/O backplane.
- Two ropes are routed as single rope bundles to two LBAs to support two slots for PCI and PCI-X cards.
- Twenty-eight ropes are bundled in two rope pairs to 14 LBAs to support 14 slots for PCI and PCI-X cards.

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 HP 9000 rp8420 server systems. It provides 16 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 16 slots is capable of 66MHz/33MHz PCI or 133MHz/66MHz PCI-X. All 16 PCI slots are keyed for 3.3 V connectors (accepting both Universal and 3.3 V cards). The PCI-X backplane does not provide any 5 V slots for the I/O cards.

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/O partition. SBA 1 and its associated LBAs and eight PCI-X slots form the other I/O partition. One I/O partition can be powered down separate from the other I/O partition.

Table 1-6 PCI-X Slot Types

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

a. If the slot is used as a PCI slot, then either the 33MHz or 66MHz PCI frequency is supported. If the slot is used as a PCI-X slot, then either the 66MHz or 133MHz PCI-X frequency is supported.
b. This is a single rope between the SBA and LBA and not a dual rope like that seen for ropes 1–7.

Core I/O Card

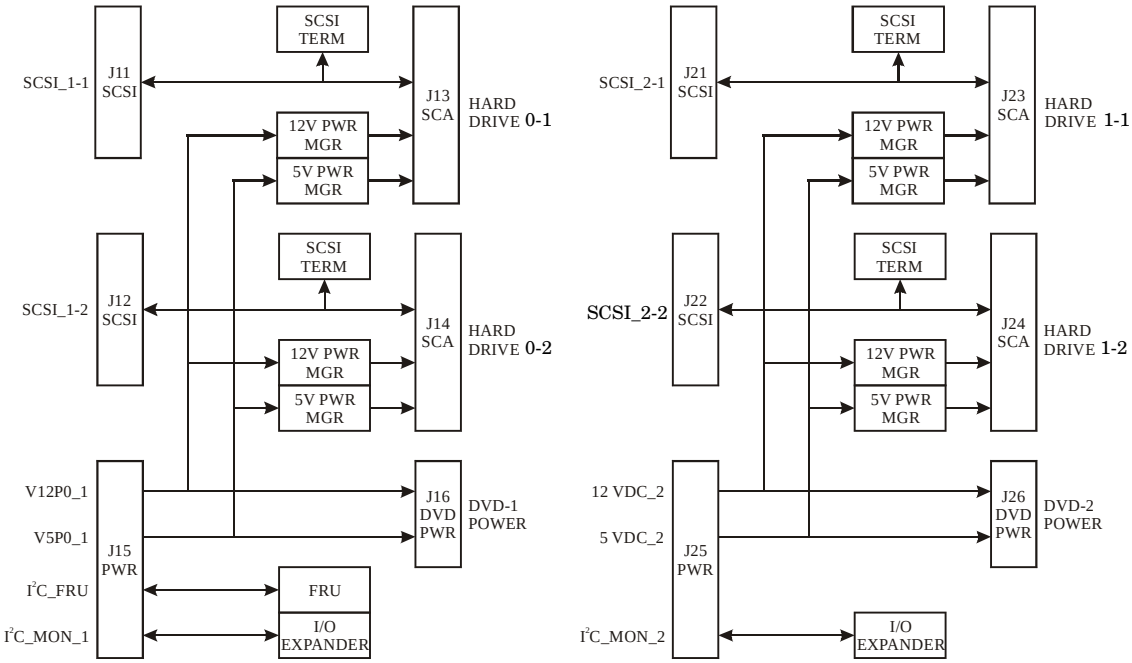
Up to two core I/O cards can be plugged into the HP 9000 rp8420 server. Two core I/O cards allows for two I/O partitions to exist in the HP 9000 rp8420 server. The server can have up to two partitions but the total number of partitions possible in a server with the Server Expansion Unit attached is four.

The core I/O card is can be replaced with standby power applied. The system power to the core I/O is handled in the hardware the same way a hot-plug PCI/PCI-X card is handled. Standby power to core I/O is handled by power manager devices to limit inrush current during insertion.

Mass Storage (Disk) Backplane

Internal mass storage connections to disks are routed on the mass storage backplane, having connectors and termination logic. All hard disks are hot-plug while removable media disks are not hot-plug. The HP 9000 rp8420 server accommodates two internal, removable media devices. Therefore, power connectors for a removable media device are required on the mass storage backplane. For more information, See Figure 1-12.

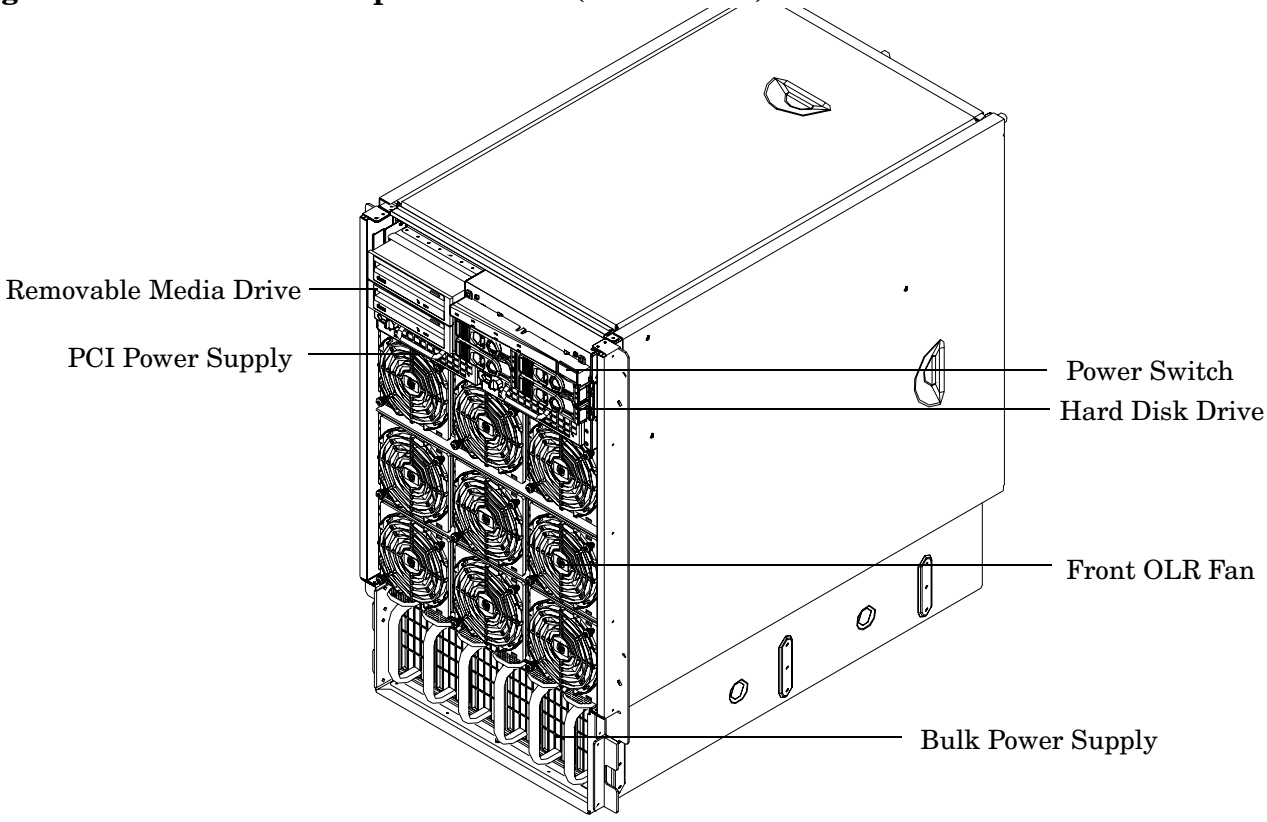
Figure 1-12 Mass Storage Block Diagram



HP 9000 rp8420 server Description

Dimensions and Components

Figure 1-13 HP 9000 rp8420 server (Front View)



- Depth: Defined by cable management constraints to fit into a standard 36-inch deep rack:

  25.5 inches from front rack column to PCI connector surface

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

  30 inches overall package dimension, including 2.7 inches protruding in front of the front rack columns
- *Width*: 17.5 inches, constrained by electronic industries alliance (EIA) standard 19-inch racks
- *Height*: 17U (29.55 inches), constrained by package density

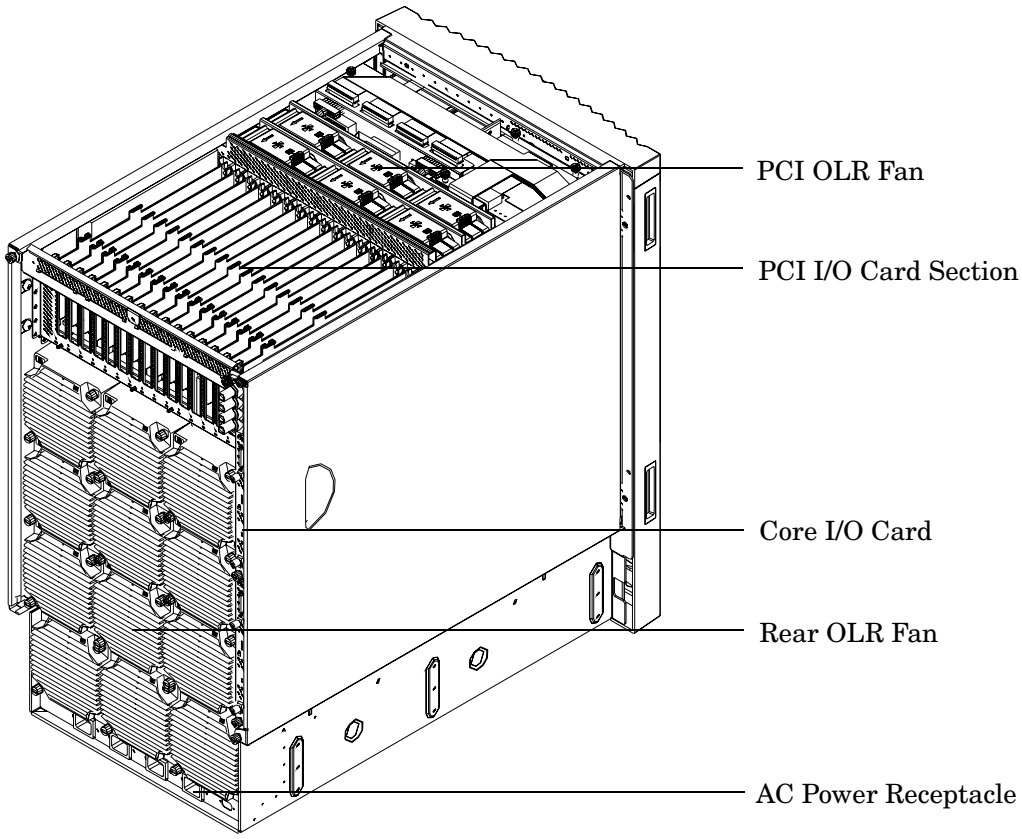
The mass storage section located in the front allows access to removable media drives without removal of the bezel (bezel not shown in figure). The mass storage bay accommodates two 5.25-inch removable media drives and up to four 3.5-inch hard disk drives. The front panel display, containing LEDs and the system power switch, is located directly above the hard drive media bays.

Below the mass storage section and behind a removable bezel are two PCI DC-to-DC power supplies. Each PCI power supply will power only one I/O partition.

Enclosed with protective finger guards are nine front online replace (OLR) fan modules.

The bulk power supply is partitioned through the use of a sealed metallic enclosure located in the bottom of the server. This enclosure houses the N+1 fully redundant bulk power supplies. These power supplies are installed from the front of the server after removing the front bezel. The power supply is 2.45 X 5.625 X 20.0 inches.

Figure 1-14 HP 9000 rp8420 server (Rear View)



The PCI I/O 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 cards. They are housed in plastic carriers.

The cell boards are located on the right side of the product behind a removable side cover. Rack front doors are more often hinged on the left, which restricts the large cell board to slide out from the right.

The two redundant core I/O cards are positioned vertically end-to-end at the rear of the chassis.

The PCI card bulkhead connectors are located at the rear top.

The 12 rear OLR fans attached external to the chassis house 120-mm exhaust fans.

Redundant line cords attach to the AC power receptacles at the bottom rear. Two 20-amp cords are required to power the HP 9000 rp8420 server. Two additional line cords provide redundancy.

Access the system backplane by removing the left side cover. The system backplane hinges from the lower edge and is anchored at the top with a single large jack screw assembly.

The SCSI ribbon cable assembly also routes across and fastens to the backside of the system backplane near the connectors that attach the core I/O boards.

The blue deployment handles hinge outward to help lift and move the server into a rack.

2 Installation

Inspect shipping containers when the equipment arrives at the site. Check equipment after the packing has been removed. This chapter discusses how to inspect and receive the HP 9000 rp8420 server.

Inspecting the Server Cabinet

NOTE The server will ship in one of three different configurations. The configurations are:

- on a pallet installed in a server cabinet
- on a pallet for rack mount into an existing cabinet on the customer site
- on a pallet with a wheel kit for installation as a stand-alone server

HP shipping containers are designed to protect their contents under normal shipping conditions. After the equipment arrives at the customer site, 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 will have two windows and each window under normal conditions will show four beads present. If a carton has been mishandled, accidentally dropped, or knocked against something, the tilt indicator will indicate 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 may 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 should complete the form and return it to the shipping representative.

NOTE The factory provides an installation warranty that is effective from the time the customer receives the shipment until Field Services turns the system over to the customer.

Upon inspection of a received system and during installation of the system, if any parts or accessories are missing or defective, they will be replaced directly from the factory by a priority process. To request replacement parts, the HP Installation Specialist must contact the local Order Fulfillment group which will coordinate the replacement with the factory.

Receiving the Server Cabinet

This section contains information about unpacking the server 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.**

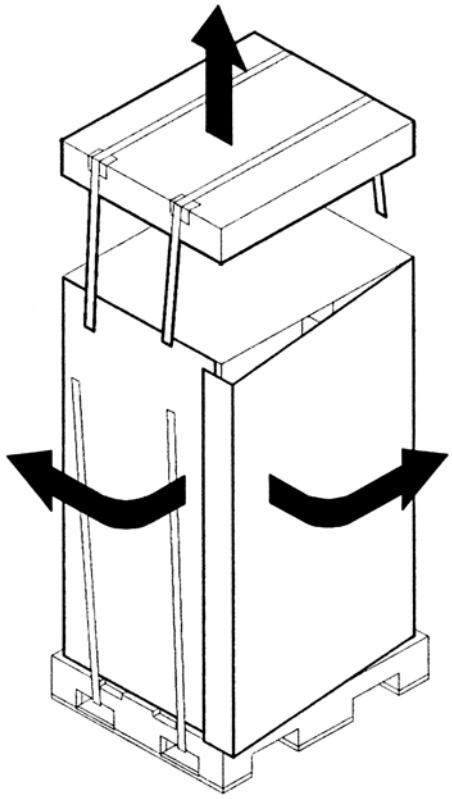
NOTE Position the pallet, allowing for enough space to roll the cabinet off the pallet before starting.

Remove the server cabinet using the following steps:

Step 1. Cut the polystrap bands around the shipping container.

Step 2. Lift the cardboard top cap from the shipping box.

Figure 2-1 Removing the Polystraps and Cardboard



Step 3. Remove the corrugated wrap from the pallet.

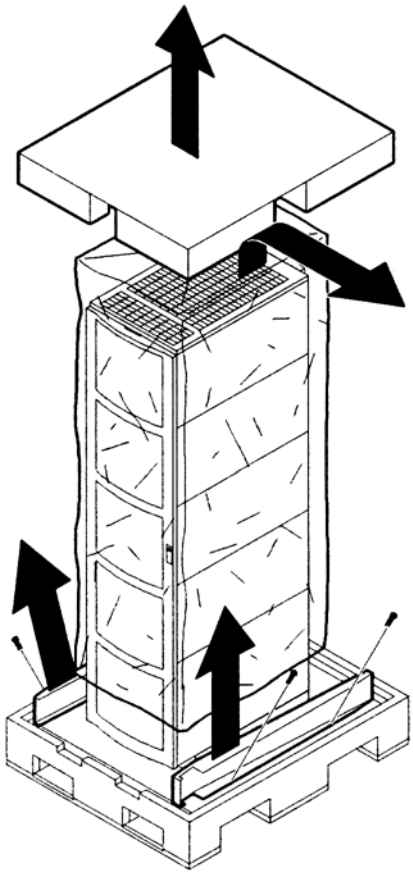
Step 4. Remove the packing materials.

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

Step 5. Remove the four bolts holding down the ramps and remove the ramps.

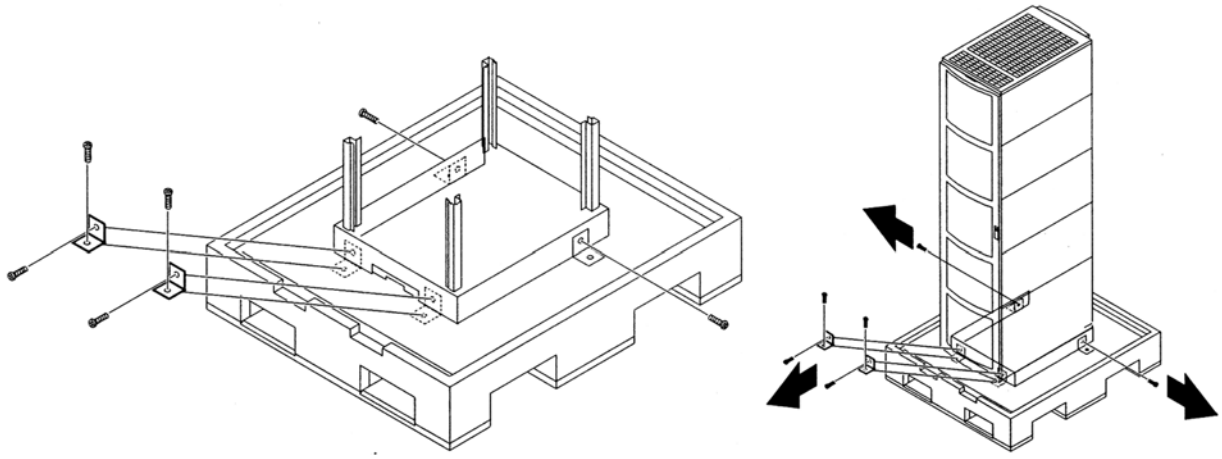
NOTE	Figure 2-2 shows one ramp attached to the pallet on either side of the cabinet with each ramp secured to the pallet using two bolts. There is another configuration where the ramps are secured together on one side of the cabinet with one bolt.

Figure 2-2 Removing the Shipping Bolts and Plastic Cover



Step 6. Remove the six bolts from the base attaching the rack to the pallet.

Figure 2-3 Preparing to Roll Off the Pallet

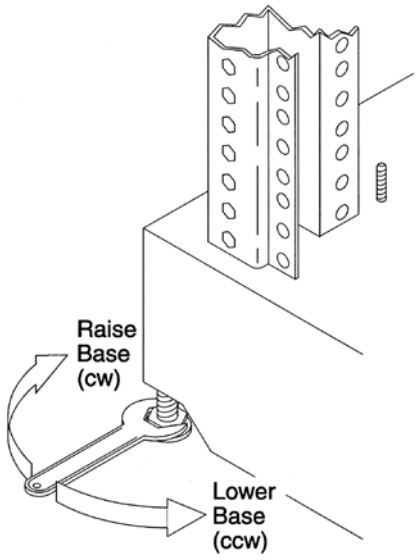


WARNING **Be sure that the leveling feet on the rack are raised before you roll the rack down the ramp, and any time you roll the rack on the casters. Use caution when rolling the cabinet off the ramp. A single server in the cabinet weighs approximately 813 lb. It is strongly recommended that two people 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 and install the anti-tip mechanisms on the bottom front and rear of the rack.

Figure 2-4 Securing the Cabinet



Rack Mount System Installation

Servers shipped as a *stand-alone* or in the *to be racked* configuration must have the core I/O *handles* and the PCI *towel bars* attached at system installation. Obtain and install the core I/O handles and PCI towel bars from the accessory kit A6093-04046. The towel bars and handles are the same part. Refer to service note A6093A-11. This is the same accessory kit used for the HP 9000 rp8400 server.

There are several documents written to help with rack mounting the server. This list is intended to guide the HP Installation Specialist to the documentation that has been written by the Rack Solutions team. The external Web site is http://www.hp.com/racksolutions. The internal Web site is http://racksolutions.corp.hp.com.

Rack System/E

Detailed rack information for the rack system/E covers the following topics:

- Safety and Regulatory Information
- Description of the Standard Racks and Physical Specifications
- Installation Guidelines
- Procedures

The part number for this user's manual is 5967-6409.

Rack System/E Stabilizer Feet

The stabilizer installation guide for the rack system/E covers the following topics:

- How to Install the Stabilizers
- Moving the Rack

The part number for this installation guide is A5805-96001.

HP J1528A Rack Integration Kit

The rack integration kit information covers installing the following products:

- Ballast Kit (J1479A)
- Anti-Tip Stabilizer Kit (A5540A)
- Slide Rails
- Cable Management Arm (CMA)
- Interlock Device Assembly

This installation guide provides a complete parts list of the hardware and tools required to perform the installation of the products mentioned. Installation of the products is illustrated in this guide. The part number for this installation guide is J1528-90001.

Manual Lifting

Use this procedure only if no HP approved lift is available.

This procedure should only be performed by four qualified HP Service Personnel utilizing proper lifting techniques and procedures.

System damage can occur through improper removal and re-installation of devices. This task must be performed by trained personnel only. Instructions for removing and re-installing these components can be found in the Removal and Replacement chapter of the *HP Service Guide: HP 9000 rp8420 server*.

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

Step 1. Reduce the weight by removing all bulk power supplies and cell boards.

Step 2. Locate the four positioning handles on the sides of the system. They are color coded blue and located close to each base corner of the unit.

Step 3. Ensure the vertical support brackets are in the down position so they rest on the slides when the server is lowered to the rack slides. There are two brackets on each side of the server chassis.

Step 4. Unfold the handles so they are extended out from the unit. The server is now ready for manual lifting by the four qualified HP Service Personnel.

Step 5. After the server is secured, re-install the previously removed cell boards and bulk power supplies.

Using the RonI Model 17000 SP 400 Lifting Device

A lifter designed by the RonI company is used to rack-mount the server. The lifter can raise 400 lb. to a height of five feet. The lifter can be broken down into several components. When completely broken down, no single component weighs more than 25 lb. The ability to break the lifter down makes it easy to transport from the office to the car and then to the customer site.

Documentation for the RonI lifter has been written by RonI and is on the HP intranet at the Cybrary Web site. Complete details on how to assemble the lifter, troubleshoot the lifter, and maintain the lifter are provided by RonI in the documentation.

Use the following procedure to unload the server from the pallet after the lifter is assembled.

WARNING **Use caution when using the 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.**

The server must be racked in the bottom of a cabinet for safety reasons. Never extend more than one server from the same cabinet while installing or servicing either an HP 9000 rp8420 server or another server product. Failure to follow these instructions could result in the cabinet tipping over.

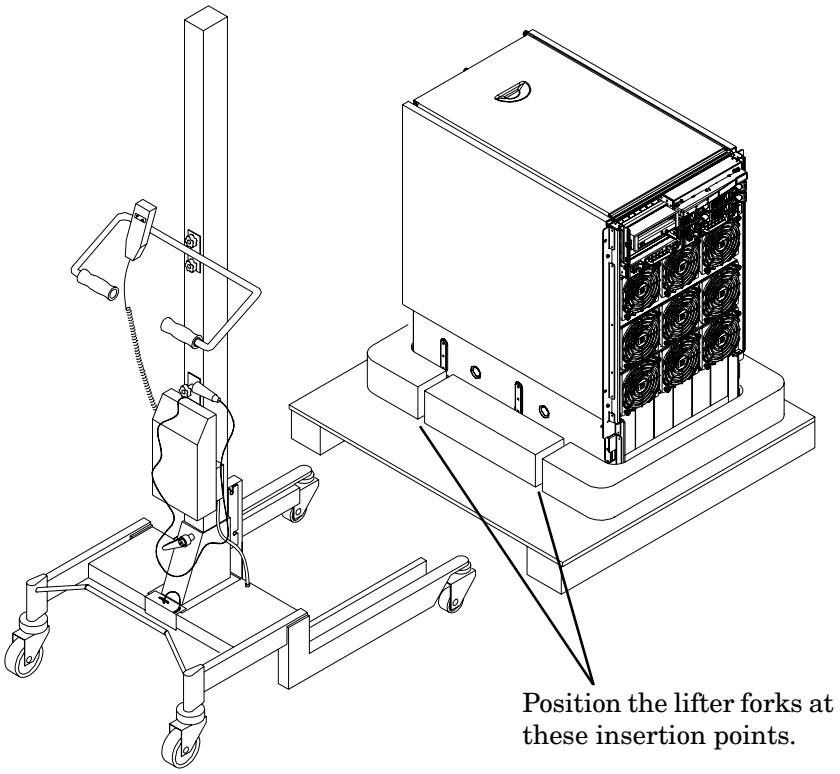
Step 1. Obtain the *HP J1528A Rack Integration Kit Installation Guide* before proceeding with the rack-mount procedure. This guide covers these important steps:

- Installing the anti-tip stabilizer kit (A5540A)
- Installing the ballast kit (J1479A)
- Installing the barrel nuts on the front and rear columns
- Installing the slides

Step 2. Follow the instructions on the outside of the server packaging to remove the banding and carton top from the server pallet.

Step 3. Insert the lifter forks between the cushions.

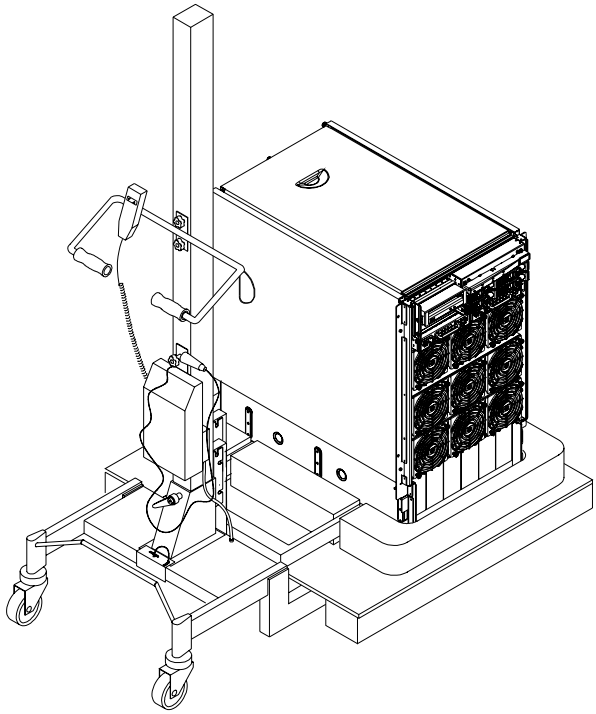
Figure 2-5 Positioning the Lifter to the Pallet



Step 4. Carefully roll the lift forward until it is fully positioned against the side of the server.

Step 5. Slowly raise the server off the pallet until it clears the pallet cushions.

Figure 2-6 Raising the Server off the Pallet Cushions



Step 6. Carefully 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.

Step 7. Follow the *HP J1528A Rack Integration Kit Installation Guide* to complete these steps:

- Mounting the server to the slides
- Installing the CMA
- Installing the interlock device assembly (if two servers are in the same cabinet)

Wheel Kit Installation

Compare the packing list with the contents of the wheel kit before beginning the installation.

Table 2-1 Wheel Kit Packing List

Part Number	Description	Quantity
A9904-04002	Caster Cover	2
A9904-04007	Right Side Cover	1
A9904-04008	Left Side Cover	1
A9904-04009	Top Cover	1
A6093-04082	Right Front Caster Assembly	1
A6093-04083	Right Rear Caster Assembly	1
A6093-04084	Left Front Caster Assembly	1
A6093-04085	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)	8
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.

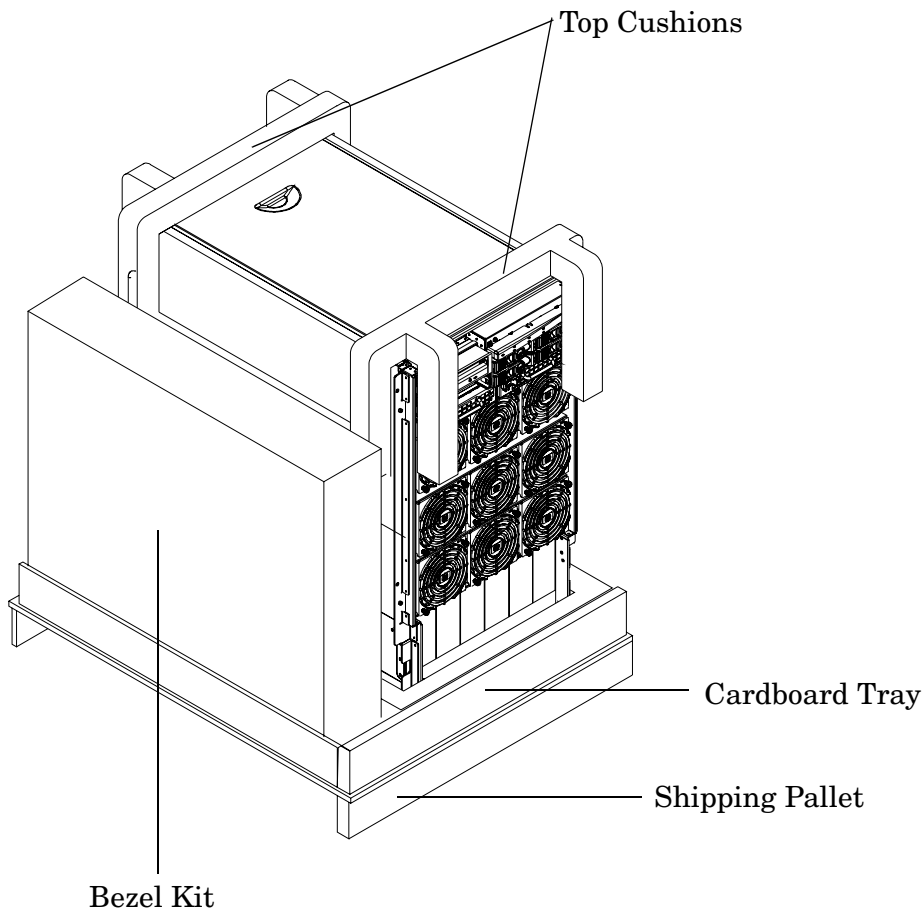
- Diagonal side cutters
- Safety glasses
- Torx driver with T-15 bit
- Phillips head screwdriver

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.**

Installing the Server Wheel Kit

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

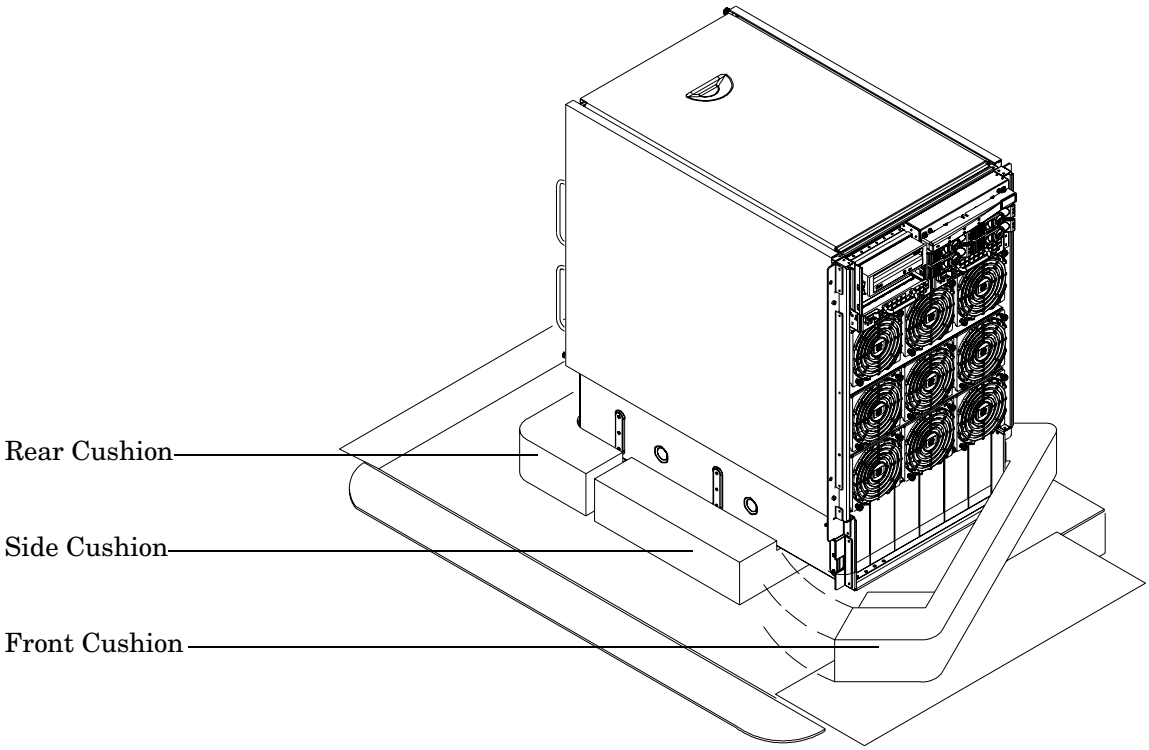
Figure 2-7 Server on Shipping Pallet



4. Unfold bottom cardboard tray.

5. Remove the front cushion only. Do not remove any other cushions until further instructed.

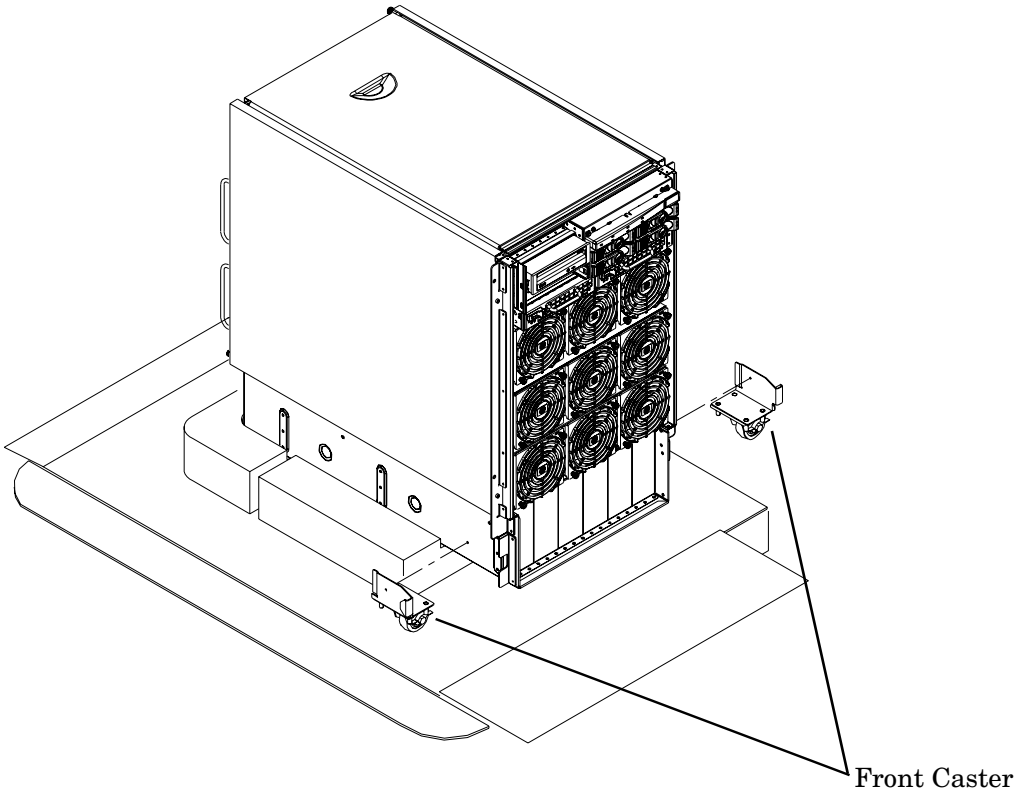
Figure 2-8 Removal of Cushion from Front Edge of Server



6. Open the wheel kit box and locate the two front casters. The front casters are shorter in length than the two rear casters. Each front caster is designed to fit only on one corner of the server. There is a right front caster and a left front caster.

7. Remove two of the eight screws from the plastic pouch. Attach one wheel caster to the front of the server.

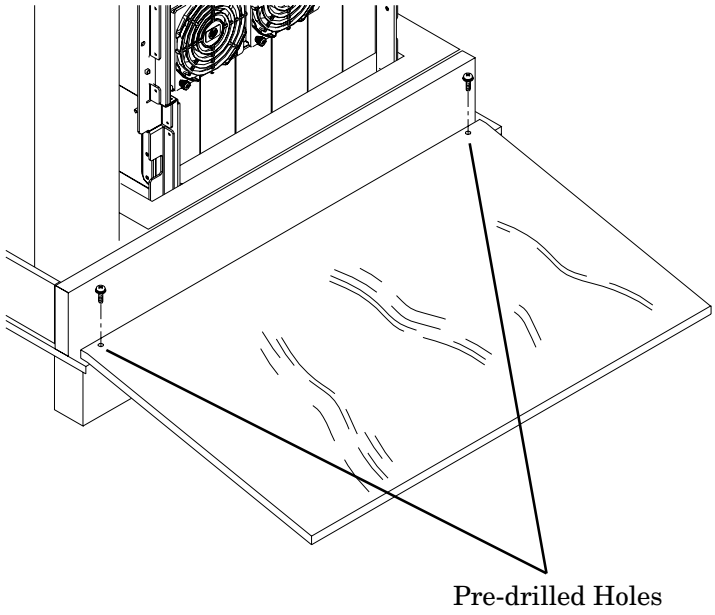
Figure 2-9 Attaching a Caster Wheel to the Server



8. Attach the remaining front caster to the server using two more screws supplied in the plastic pouch.
9. Remove the rear cushion at the rear of the server. Do not remove the remaining cushions.
10. Mount the two rear casters to the server using the remaining four screws.
11. Obtain the plywood ramp from the wheel kit.

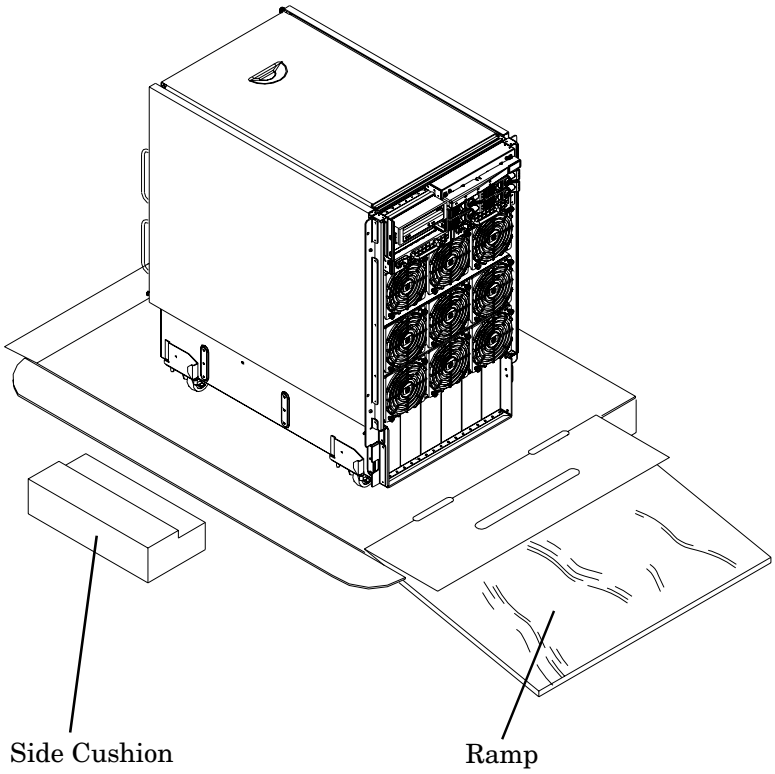
12. Attach the ramp to the edge of the pallet. Note there are two pre-drilled holes in the ramp. Use the two screws taped to the ramp and attach it to the pallet.

Figure 2-10 Attaching the Ramp to the Pallet



13. Remove the two side cushions from the server and unfold the cardboard tray so that it lays flat on the pallet.

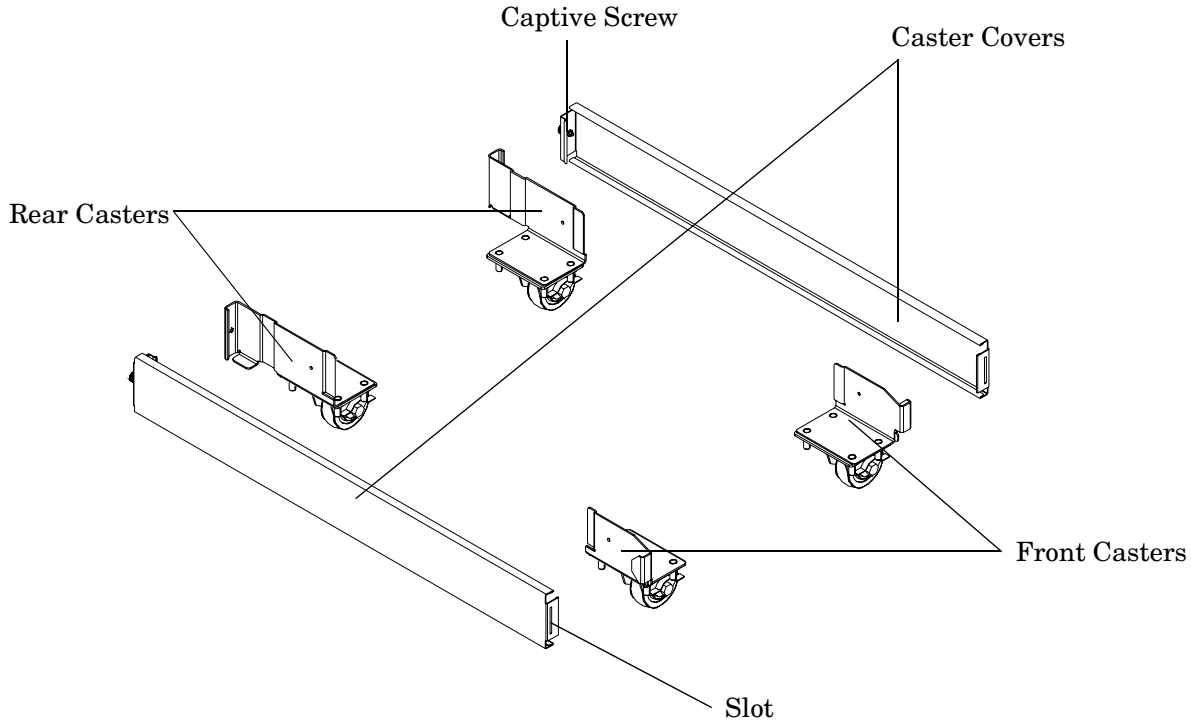
Figure 2-11 Side Cushion Removal from Server



14. Carefully roll the server off the pallet and down the ramp.
15. Obtain the caster covers from the wheel kit. Note that the caster covers are designed to fit on either side of the server.

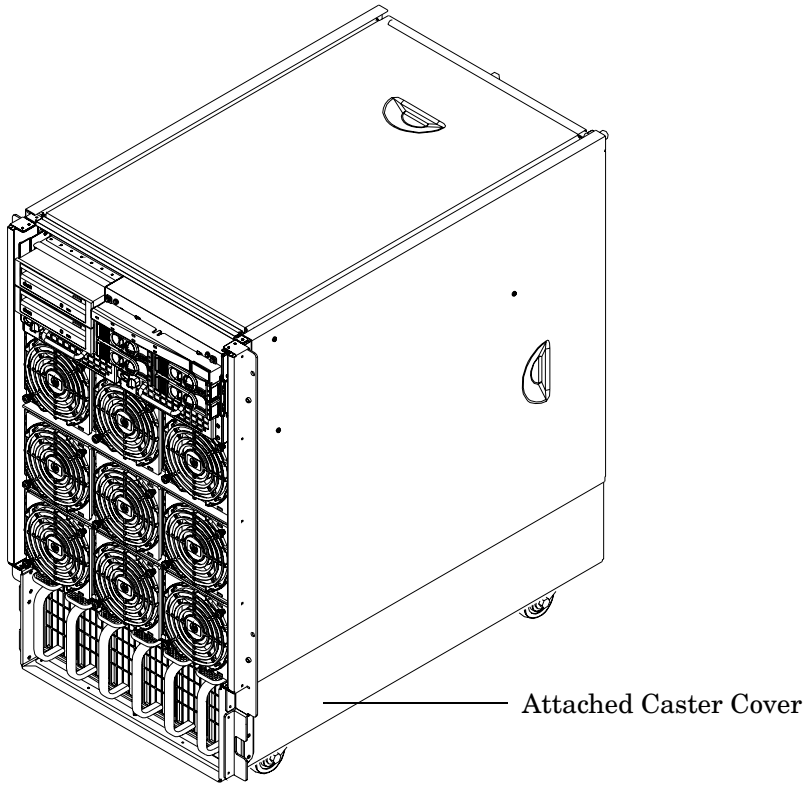
16. Insert the slot on the caster cover into the front caster. Secure the caster cover to the server by tightening the captive screw on the cover at the rear of the server.

Figure 2-12 Securing Each Caster Cover to the Server



17. Wheel kit installation is complete after both caster covers are attached to the server and the bezel cover is snapped into place on the front of the server.

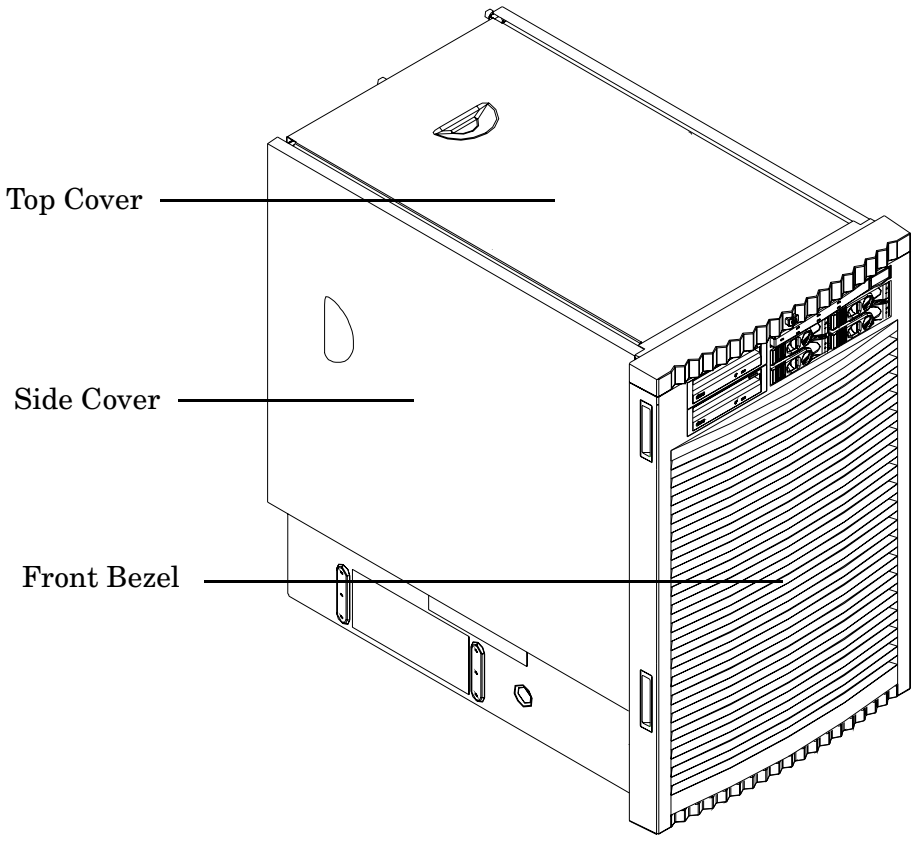
Figure 2-13 Completed Wheel Kit Installation



Top and Side Cover Installation

NOTE It might be necessary to remove existing top and side covers installed on the server before installing the covers shipped with the wheel kit. If cover removal is not needed, go directly to the sections for installing the top and side cover.

Figure 2-14 Cover Locations



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

Removing the Top Cover

Step 1. Connect to ground with a wrist strap.

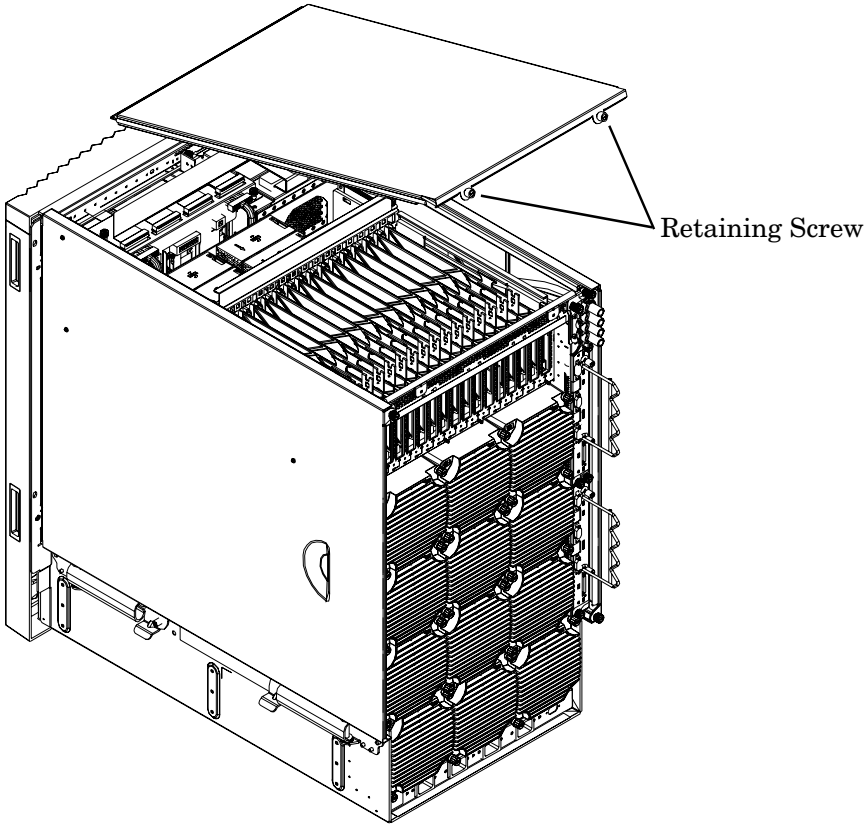
Step 2. Loosen the blue retaining screws securing the cover to the chassis.

Step 3. Slide the cover toward the rear of the chassis.

Step 4. Lift the cover up and away from the chassis.

Step 5. Place the cover in a safe location.

Figure 2-15 Top Cover Detail



Installing the Top Cover

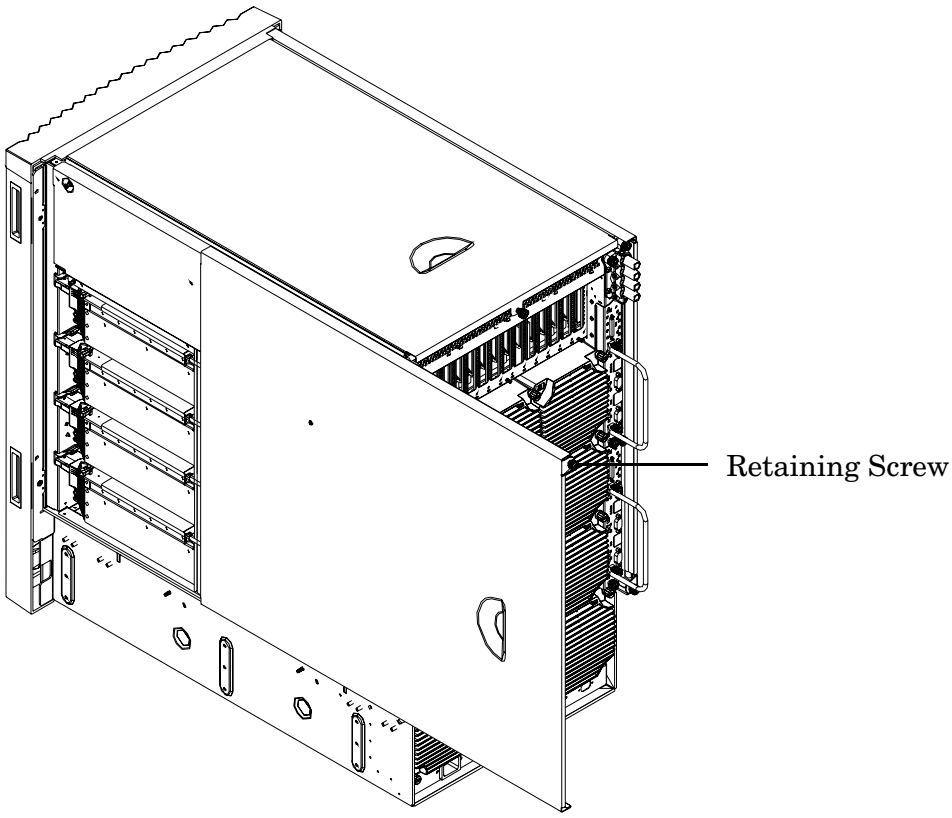
Step 1. Orient the cover according to its position on the chassis.

Step 2. Slide the cover into position using a slow, firm pressure to properly seat the cover.

Step 3. Tighten the blue retaining screws securing the cover to the chassis.

Removing the Side Cover

Figure 2-16 Side Cover Detail



Step 1. Connect to ground with a wrist strap.

Step 2. Loosen the blue retaining screw securing the cover to the chassis. See Figure 2-16.

Step 3. Slide the cover from the chassis toward the rear of the system.

Step 4. Place the cover in a safe location.

Installing the Side Cover

Step 1. Orient the cover according to its position on the chassis.

Step 2. Slide the cover into position using a slow, firm pressure to properly seat the cover.

Step 3. Tighten the blue retaining screw securing the cover to the chassis.

Power Distribution Unit

The server may ship with a power distribution unit (PDU). There are two 60A PDUs available for the HP 9000 rp8420 server. Each PDU is mounted horizontally between the rear columns of the server cabinet. The 60A PDUs are delivered with an IEC-309 60A plug.

The 60A NEMA[1] PDU has four 20A circuit breakers and is constructed for North American use. Each of the four circuit breakers has two IEC[2]-320 C19 outlets providing a total of eight IEC-320 C19 outlets.

The 60A IEC PDU has four 16A circuit breakers and is constructed for International use. Each of the four circuit breakers has two IEC-320 C19 outlets providing a total of eight IEC-320 C19 outlets.

Each PDU is 3U high and is rack-mounted in the server cabinet.

Documentation for installation will accompany the PDU. The documentation can also be found at the external Rack Solutions Web site at http://www.hp.com/racksolutions. This PDU might be referred to as a Relocatable Power Tap outside HP.

The PDU installation kit contains the:

- PDU with cord and plug
- Mounting hardware
- Installation instructions

1. NEMA — National Electrical Manufacturers Association

2. IEC — International Electrotechnical Commission

3 Installing Accessories

The following options can be installed in the HP 9000 rp8420 server:

- additional hard disk drive storage
- additional removable media device storage
- PCI and PCI-X I/O cards

Installing Add-On Products

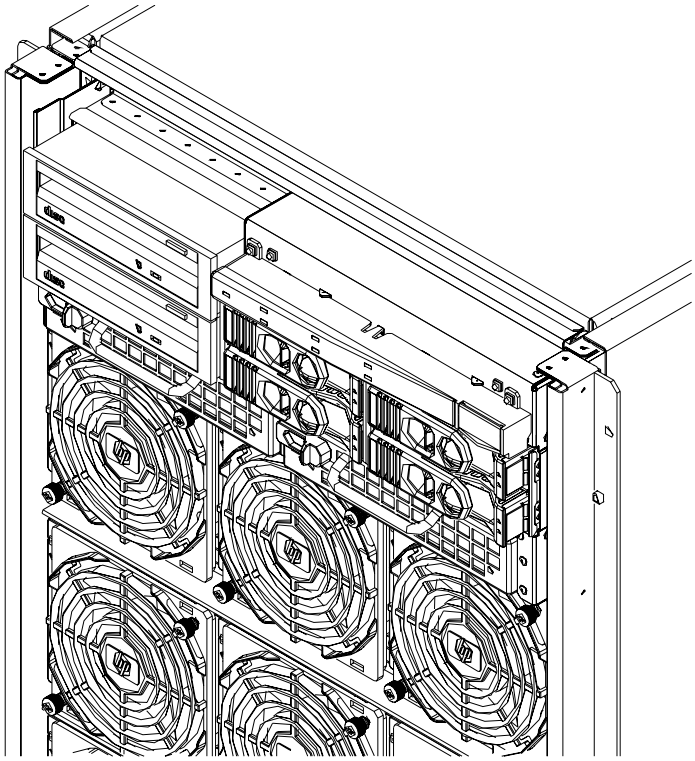
This section provides information on additional products ordered after installation and any dependencies for these add-on products.

Embedded Disks

When disks are installed, the top two hard disk drives are driven by cell 0 located in the HP 9000 rp8420 server. The bottom two hard disk drives are driven by cell 1 located in the HP 9000 rp8420 server.

A list of replacement disk drives for the HP 9000 rp8420 server is in Appendix A of the Service Guide for the HP 9000 rp8420 server. The list contains both removable media disk drives and hard disk drives.

Figure 3-1 Embedded Disks



Hard Disk Drive Installation

The disk drives are located in the front of the chassis. The hard disk drives are hot-plug drives.

CAUTION Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could result in damage to the HP 9000 rp8420 server.

Step 1. Be sure the front locking latch is open, then position the disk drive in the chassis.

Step 2. Slide the disk drive into the chassis; a slow, firm pressure is needed to properly seat the connector.

Step 3. Press the front locking latch to secure the disk drive in the chassis.

Step 4. Spin up the disk by entering one of the following commands:

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

#ioscan -f
```

Removable Media Drive Installation

The DVD drive or DDS-4 tape drive is located in the front of the chassis. The server power must be turned off before attempting to install it. Refer to "Shutting Down nPartitions and Powering Off Hardware Components" in the Service Guide for the HP 9000 rp8420 server for more information.

CAUTION Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could result in damage to the HP 9000 rp8420 server.

If an upper drive is installed, it will need to be removed before installing a lower drive.

Step 1. Remove filler panel.

Step 2. Connect the cables to the rear of the drive.

Step 3. Install left and right media rails and clips.

Step 4. Slide the drive in the chassis. Fold the cables out of the way.

The drive easily slides into the chassis; however, a slow, firm pressure is needed for proper seating. The front locking tab will latch to secure the drive in the chassis.

PCI/PCI-X Card Cage Assembly I/O Cards

A number of PCI and PCI-X I/O cards are supported in the HP 9000 rp8420 server. Known cards supported at the release of this manual are shown in Table 3-1.

Table 3-1 HP 9000 rp8420 server I/O Cards

Part Number	Card Description	Number of Cards Supported (B-Bootable)
A3739B	FDDI Dual Attach	16
A4800A	FWD SCSI	16
A4926A	Gigabit Ethernet (1000B-SX)	16
A4929A	Gigabit Ethernet (1000B-T)	16
A5483A	ATM 622 (MMF connector)	16
A5515A	ATM 155 (UTP5 connector)	16
A6847A	Next Generation 1000B-SX	16[a]
A6825A	Next Generation 1000B-T	16[a]
A6826A	PCI-X Dual Channel 2 GB Fibre Channel HBA	16[b]
A5149A	Ultra2 SCSI	16
A5150A	2-port Ultra2 SCSI	16
A5158A	Fibre Channel PCI Adapter	16[c]
A5159B	2-port FWD SCSI	16B
A5230A	10/100B-TX (RJ45)	16
A5506B	4-port 10/100B-TX	16
A5513A	ATM 155 (MMF connector)	16
A5783A	Token Ring (4/16/100 Mb/s)	16
A5838A	2-port Ultra2-SCSI + 2-port 100T	16
A5856A	RAID 4Si	12B
A6092A	Hyperfabric (PCI 4X)	8
A6386A	Hyperfabric II	8
A6826A	PCI-X Dual Channel 2Gb Fibre Channel HBA	16B
A6748A	8-port Terminal MUX	16
A6749A	64-port Terminal MUX	16

Table 3-1 HP 9000 rp8420 server I/O Cards (Continued)

Part Number	Card Description	Number of Cards Supported (B-Bootable)
A6795A	2G FC Tachlite	16B
A6828A	1-port U160 SCSI	16B
A6829A	2-port U160 SCSI	16B
A7011A	PCI-X 2 port 1000BaseSX Dual Port (Intel chip)	16
A7012A	PCI-X 2 port 1000BaseT Dual Port (Intel chip)	16
A7143A	U160 RAID - SmartArray 5304	8
A7173A	2 port U320 SCSI	16B
A9782A	PCI-X 1000B-T GB FC GigE-SX	16B
A9784A	PCI-X 1000B-T GigE/2 G FC combo	16B
A9890A	SmartArray 6402 2-channel RAID	12
A9891A	SmartArray 6404 4-channel RAID	12
AB286A	PCI-X 2 port 4X InfiniBand HCA (HPC)	2
AB287A	10G Ethernet	2
AB290A	U320 SCSI/GigE Combo Card	16B
AB378A	1-port 4Gb FC card PCI-X	16B
AB379A	2-port 4Gb FC card PCI-X	16B
AB545A	4-port 1000B-T Ethernet	16
AB465A	PCI-X 2-port 1000B-T/2-port 2Gb FC Combo	16B
J3525A	2-port serial (X25/FR/SDLC)	16
J3526A	4-port serial (X25/FR)	16
Z7340A	8-port PCI ACC	16

a. Supports a pre-OS network boot (IODC or EFI) for the purpose of OS installation (ignite, RIS).
b. Supports a pre-OS network boot (IODC or EFI) for the purpose of OS installation (ignite, RIS).
c. This I/O card will be supported at the first update of the HP-UX B.11.23 release.

PCI I/O Card Installation

HP 9000 rp8420 servers implement manual retention 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 will allow future OLAR operations to succeed on this PCI slot.

IMPORTANT PCI I/O card installation procedures should be downloaded from the http://docs.hp.com Web site. Background information and procedures for adding a new PCI I/O card using online addition are found in the Interface Card OL* Support Guide.

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

The prerequisites for this procedure are:

- 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.
- Refer to the host bus adapter (HBA) documentation for details on card installation.
- Run the `olrad -q` command to determine the status of all the PCI I/O slots.
- 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 before attempting to insert a PCI I/O card into the PCI-X card cage assembly backplane slot.

CAUTION Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could 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 OLAR. The attention button is also referred to as the doorbell.

Step 1. Remove the top cover.

Step 2. Remove the PCI bulkhead filler panel.

Step 3. Flip the PCI manual release latch for the card slot to the open position. Refer to Figure 3-2.

Step 4. Install the new PCI card in the slot.

NOTE A slow, firm pressure is needed to properly seat the card into the backplane.

Step 5. Flip the PCI manual release latch for the card slot to the closed position.

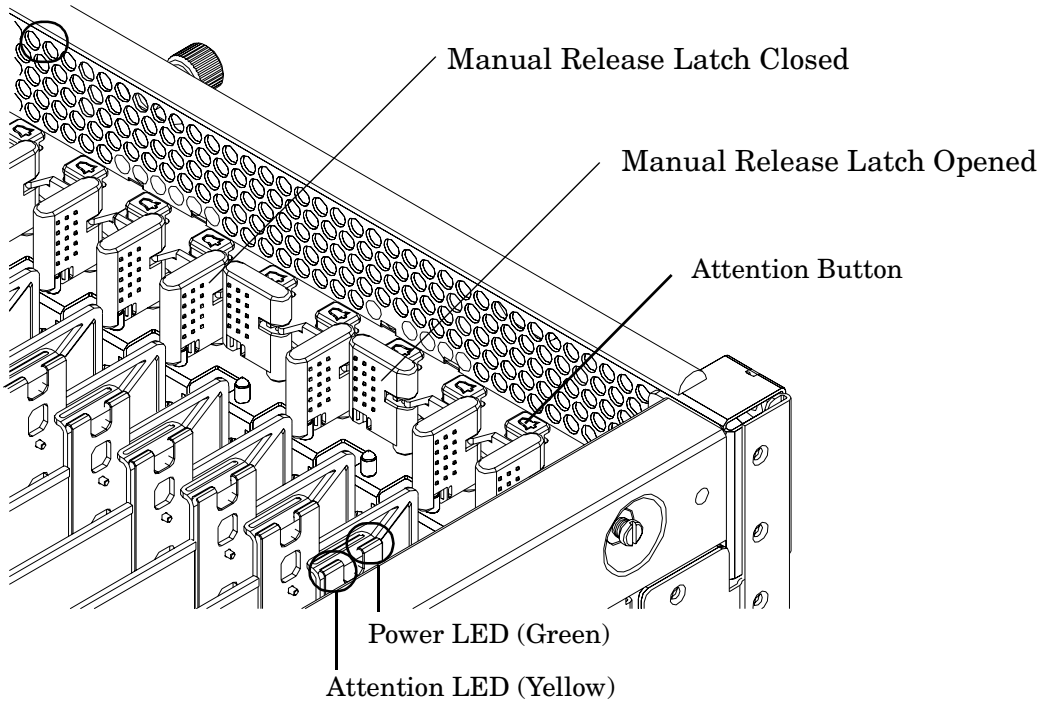
CAUTION Working out of sequence or not completing the actions within each step could cause the system to crash.

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

Step 6. Press the attention button.

The green power LED will start to blink.

Figure 3-2 PCI I/O Slot Details



Step 7. Wait for the green power LED to stop blinking and remain solid green.

Step 8. Check for errors in the hotplugd 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. Refer to the Interface Card OL* Support Guide located on the Web at http://docs.hp.com for details.

Step 9. Replace the top cover.

Step 10. Connect all cables to the installed PCI card.

4 Cabling and Power Up

After the system has been unpacked and moved into position, it must be connected to a source of AC power. The AC power must be checked for the proper voltage before the system is powered up. This chapter describes these activities.

Voltage Check

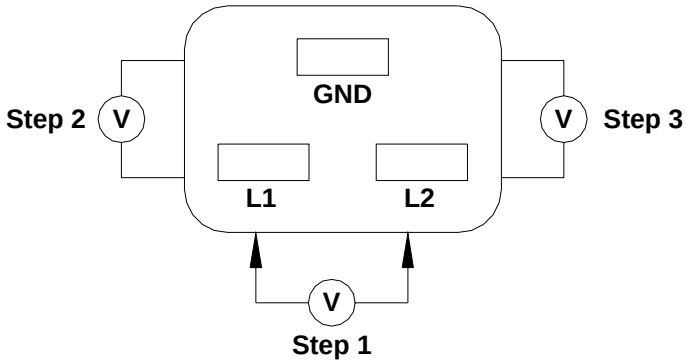
This section provides voltage check information for use on the customer site. The emphasis is on measuring the voltages at the power cord plug end specified as an IEC-320 C19 type plug. This is the end that plugs directly into the back of the server cabinet.

NOTE These procedures need to be performed for each power cord that will be plugged directly into the back of the server cabinet. If the expected results from this procedure are not observed during the voltage check, See the section titled “Voltage Check (Additional Procedure)” on page 72.

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. See Figure 4-1 for voltage reference points when performing the following measurements.

Figure 4-1 Voltage Reference Points for IEC-320 C19 Plug



IMPORTANT These measurements must be performed for every power cord that plugs into the HP 9000 rp8420 server.

Step 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 should be between 200–240 VAC regardless of the geographic region.

Step 2. Measure the voltage between L1 and ground. In North America, verify this voltage is between 100–120 VAC. In Europe and certain parts of Asia-Pacific, verify this voltage is between 200–240 VAC.

Step 3. Measure the voltage between L2 and ground. In North America, verify this voltage is between 100–120 VAC. In Europe and certain parts of Asia-Pacific, verify this voltage is 0 (zero) VAC.

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

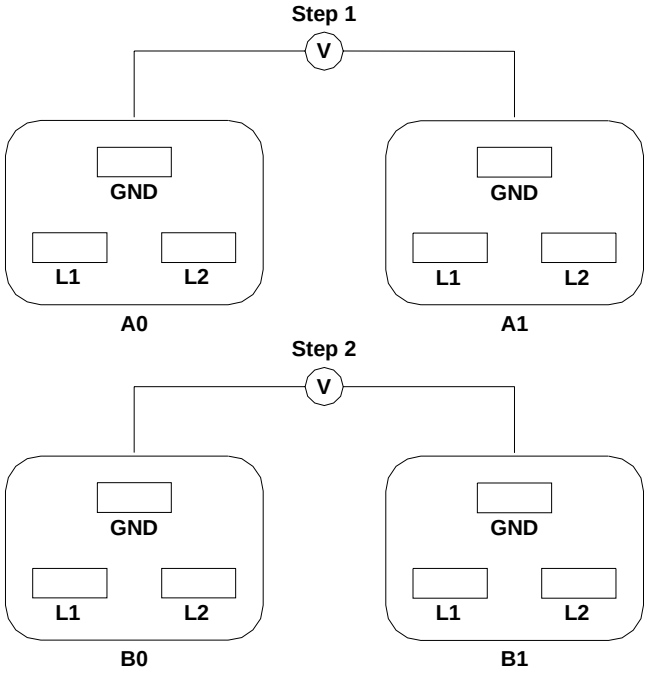
	Japan	North America	Europe[a]
L1-L2	210V	208V or 240V	230V
L1-GND	105V	120V	230V
L2-GND	105V	120V	0V

a. In some European countries there might not be a polarization.

Safety Ground Verification (Single Power Source)

This procedure measures the voltage level between A0 and A1. The voltage level between B0 and B1 will also be verified. All measurements will be taken between ground pins. See Figure 4-2 for ground reference points when performing these measurements.

Figure 4-2 Safety Ground Reference Check—Single Power Source



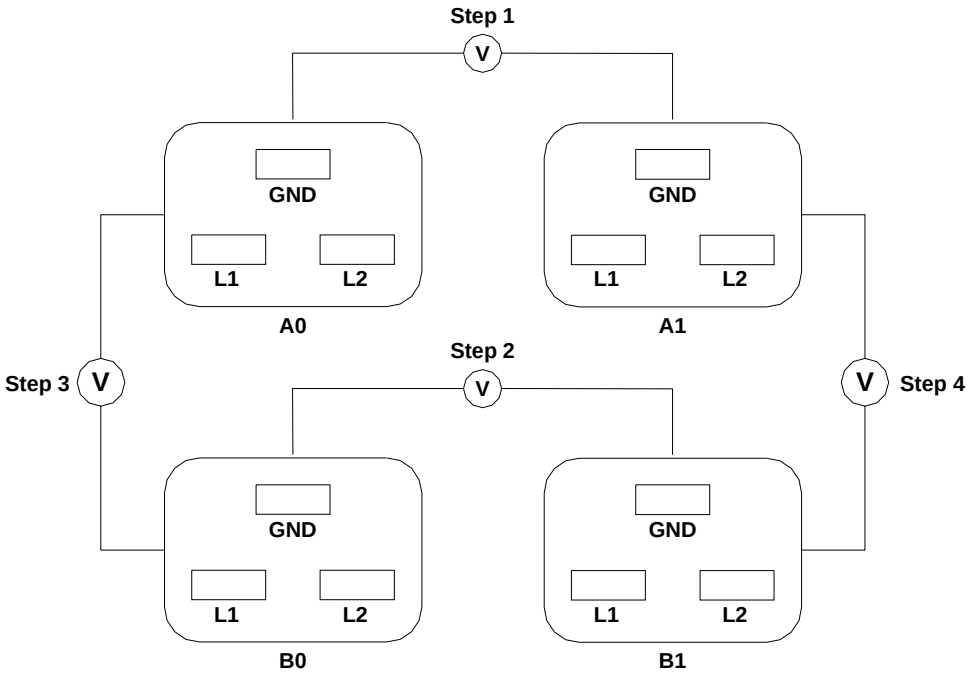
Step 1. Measure the voltage between A0 and A1. Take the AC voltage down to the lowest scale on the volt meter. One probe is inserted into the ground pin for A0. The other probe is inserted into the ground pin for A1. Verify that the measurement is between 0–5 VAC. If the measurement is 5 V or greater, escalate the situation. Do not attempt to plug the power cords into the server cabinet.

Step 2. Measure the voltage between B0 and B1. Take the AC voltage down to the lowest scale on the volt meter. One probe will be inserted into the ground pin for B0. The other probe will be inserted into the ground pin for B1. Verify that the measurement is between 0–5 VAC. If the measurement is 5 V or greater, escalate the situation. Do not attempt to plug the power cords into the server cabinet.

Safety Ground Verification (Dual Power Source)

This procedure measures the voltage level between A0 and A1, between B0 and B1, between A0 and B0, and between A1 and B1. All measurements will be taken between ground pins. See Figure 4-3 for ground reference points when performing these measurements.

Figure 4-3 Safety Ground Reference Check—Dual Power Source



Step 1. Measure the voltage between A0 and A1. Take the AC voltage down to the lowest scale on the volt meter. One probe is inserted into the ground pin for A0. The other probe is inserted into the ground pin for A1. Verify that the measurement is between 0–5 VAC. If the measurement is 5 V or greater, escalate the situation. Do not attempt to plug the power cords into the server cabinet.

Step 2. Measure the voltage between B0 and B1. Take the AC voltage down to the lowest scale on the volt meter. One probe is inserted into the ground pin for B0. The other probe is inserted into the ground pin for B1. Verify that the measurement is between 0–5 VAC. If the measurement is 5 V or greater, escalate the situation. Do not attempt to plug the power cords into the server cabinet.

Step 3. Measure the voltage between A0 and B0. Take the AC voltage down to the lowest scale on the volt meter. One probe is inserted into the ground pin for A0. The other probe is inserted into the ground pin for B0. Verify that the measurement is between 0–5 VAC. If the measurement is 5 V or greater, escalate the situation. Do not attempt to plug the power cords into the server cabinet.

Step 4. Measure the voltage between A1 and B1. Take the AC voltage down to the lowest scale on the volt meter. One probe is inserted into the ground pin for A1. The other probe is inserted into the ground pin for B1. Verify that the measurement is between 0–5 VAC. If the measurement is 5 V or greater, escalate the situation. Do not attempt to plug the power cords into the server cabinet.

Voltage Check (Additional Procedure)

The 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.

Perform this procedure if the previous voltage check procedure did not yield the expected results as previously outlined.

NOTE If a UPS is used, refer to applicable UPS documentation for information on connecting the server and checking the UPS output voltage. UPS User Manual documentation is shipped with the UPS. Documentation can also be found at http://www.hp.com/racksolutions

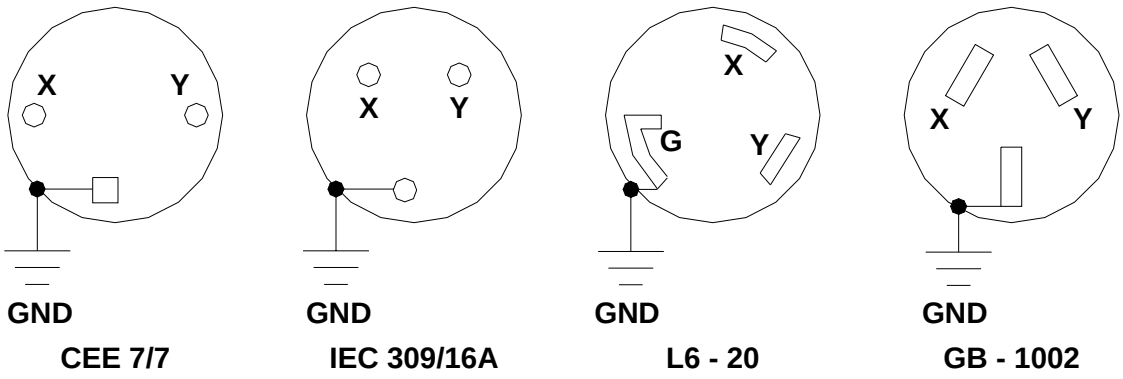
Step 1. Verify that site power is **OFF**.

Step 2. Open the site circuit breakers.

Step 3. Verify that the receptacle ground connector is connected to ground. See Figure 4-4 for connector details.

Step 4. Set the site power circuit breaker to **ON**.

Figure 4-4 Wall Receptacle Pinouts



Step 5. Verify that the voltage between receptacle pins X and Y is between 200–240 VAC.

Step 6. Set the site power circuit breaker to **OFF**.

Step 7. Ensure that power is removed from the server.

Step 8. Route and connect the server power connector to the site power receptacle.

a. For locking type receptacles, line up the key on the plug with the groove in the receptacle.

b. 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.**

Step 9. Set the site power circuit breaker to **ON**.

WARNING **SHOCK HAZARD**
Risk of shock hazard while testing primary power.
Use properly insulated probes.
Be sure to replace access cover when finished testing primary power.

Step 10. Set the server power to **ON**.

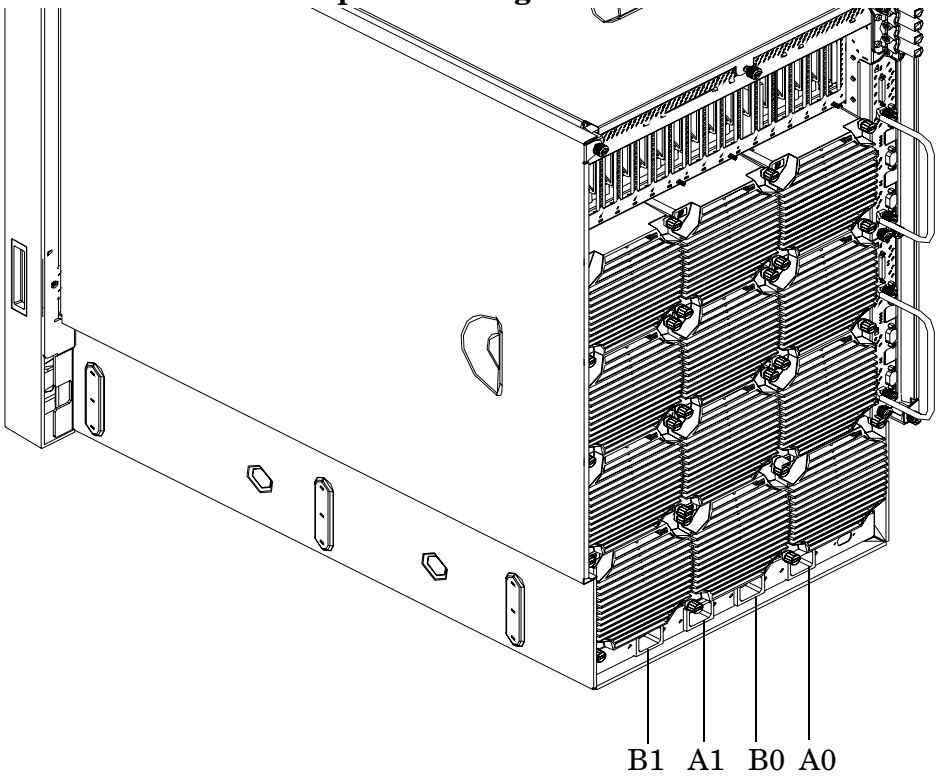
Step 11. Check that the indicator light on each power supply is lit.

Connecting AC Input Power

The server can receive AC input from two different AC power sources. If two separate power sources are available, each source can be plugged into the server, increasing system reliability if one power source fails. The main power source is defined to be A0 and A1. The redundant power source is defined to be B0 and B1. See Figure 4-5 for the AC power input label scheme.

IMPORTANT When running the server with a single power source, you must use A0 and A1. Selecting redundant power requires all four power cords connected to A0-A1-B0-B1.

Figure 4-5 AC Power Input Labeling

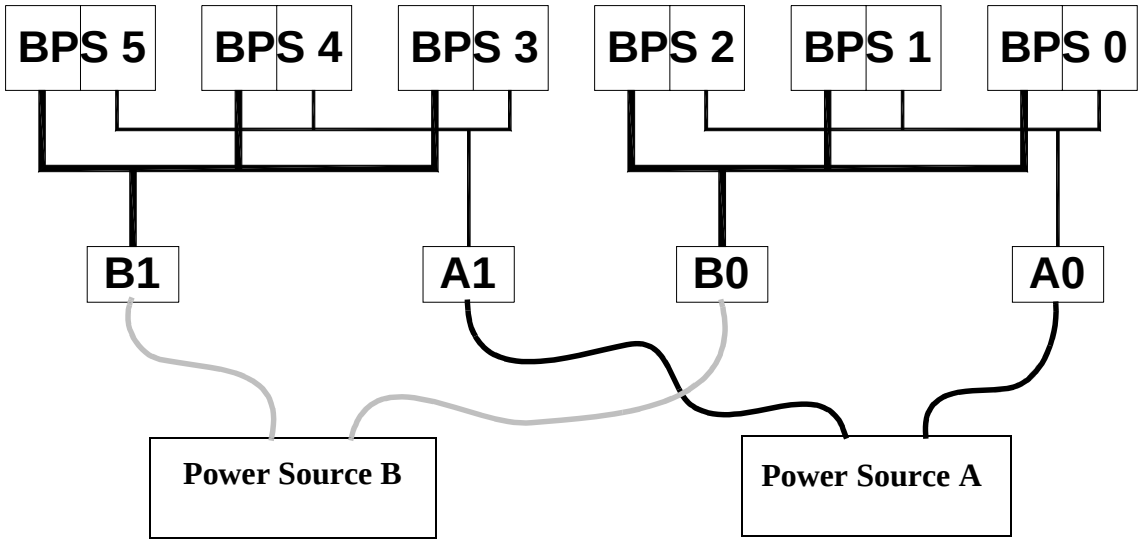


The power distribution for the bulk power supplies (BPS) follows:

- A0 input provides power to BPS 0, BPS 1, and BPS 2
- A1 input provides power to BPS 3, BPS 4, and BPS 5
- B0 input provides power to BPS 0, BPS 1, and BPS 2
- B1 input provides power to BPS 3, BPS 4, and BPS 5

For information on how input power cords supply power to each BPS, see Figure 4-6.

Figure 4-6 Distribution of Input Power for Each BPS



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 comply could result in personal injury or damage to equipment.**

CAUTION Do not route data and power cables together in the same cable management arm.

Do not route data and power cables in parallel paths in close proximity to each other. The suggested minimum distance that the data and power cables should be apart is 3 inches (7.62 cm).

The power cord has current flowing through it, which creates a magnetic field. The potential to induce electromagnetic interference in the data cables exist, which can cause data corruption.

The server can accomodate a total of six BPSs. N+1 BPS capability describes the server having adequate BPSs plus one additional module installed. If one BPS fails, adequate power will still be supplied to the cell board(s) to keep the server partition(s) operational. Replace the failed BPS promptly to restore N+1 functionality.

A minimum of two BPS are required to bring up a single cell board installed in the server. This minimum configuration is not N+1 capable. See Table 4-2 for BPS to cell board N+1 configurations.

IMPORTANT The minimum supported N+1 BPS configuration for one cell board must have BPS slots 0, 1, and 3 populated. When selecting a single power source, the power cords are connected into A0 and A1.

Table 4-2 BPS to Cell Board Configuration to Achieve N+1

Number of Cell Boards Installed in the Server	Number of Operational BPS Installed to Achieve N+1 Functionality
1	3
2	4
3	5
4	6

NOTE Label the AC power cords during the installation. One suggestion is to use tie wraps that have the flag molded into the tie wrap. The flag can be labeled using the appropriate two characters to represent the particular AC power input (for example, A0). Another suggestion would be to use color-coded plastic bands. Use one color to represent the first pair A0/A1 and another color to represent the second pair B0/B1 (provided a second power source is available at the customer site).

Applying Power to the HP 9000 rp8420 server

Observe the functionality of the server before attaching any LAN or serial cables, the system console, or any peripherals to the server. Then, after applying an active AC power source to the server, make the following observations at three different intervals, or points in time.

INTERVAL ONE

The power has just been applied to the server but the front panel **On/Off** switch is **Off**. The front air intake fans will flash a dim red color, the BPS will flash amber and an amber light is present on the hard disk drives.

INTERVAL TWO

After the power has been plugged into the server for about 30 seconds, the standby power turns on and the front intake fan LED indicators turn solid green. The BPS will flash green and the amber light is still present on the hard disk drives. The front panel **On/Off** switch is **Off** at this interval. Housekeeping power is up at this point.

INTERVAL THREE

With the **On/Off** switch on the front of the server set to **On**, the intake fans spin up and become noticeably audible while the LED indicator remains solid green. The BPS LED indicator turns a solid green and the PCI backplane power supply LED indicators turn solid green. The hard disk drive LED turns green briefly and then the LED turns off.

Installing the Line Cord Anchor (rack mounted servers)

The line cord anchor is attached to the rear of the server when rack mounted. It provides a method to secure the line cords to the server, preventing accidental removal of the cords from the server.

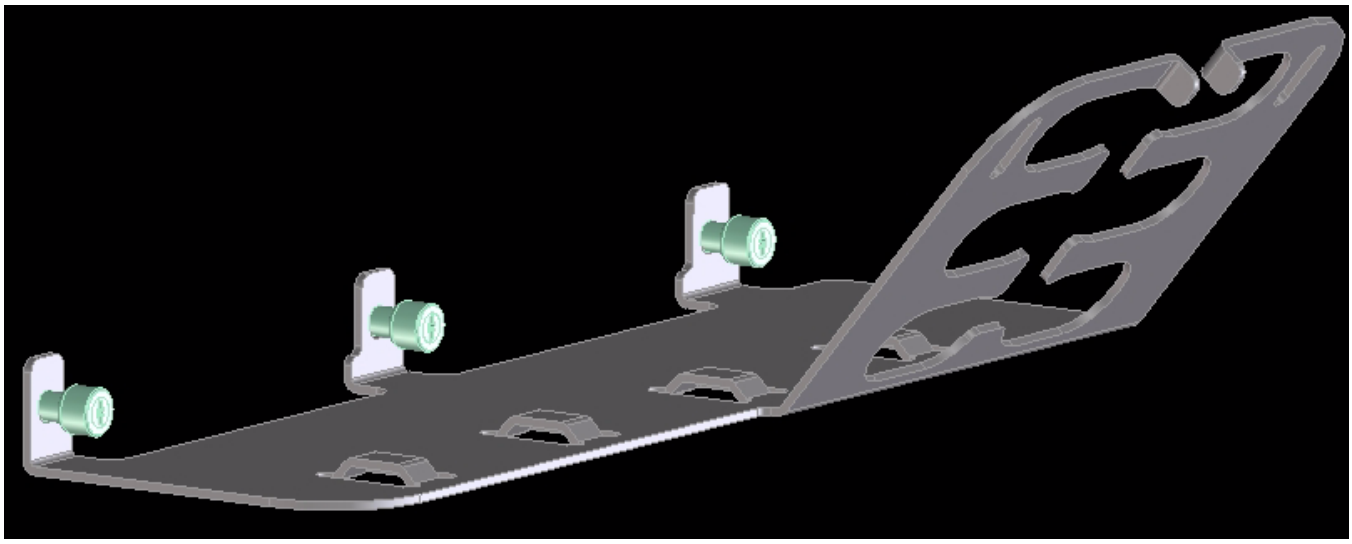
Four Cell Server Installation (rp8400, rp8420, rp8440, rx8620, rx8640)

There are holes pre-drilled, and captive nuts pre-installed in the server chassis.

To install the line cord anchor:

1. Align the line cord anchor thumbscrews with the corresponding captive nuts at the rear of the chassis. Refer to Figure 4-7, “Four Cell Line Cord Anchor (rp8400, rp8420, rp8440, rx8620, rx8640),”

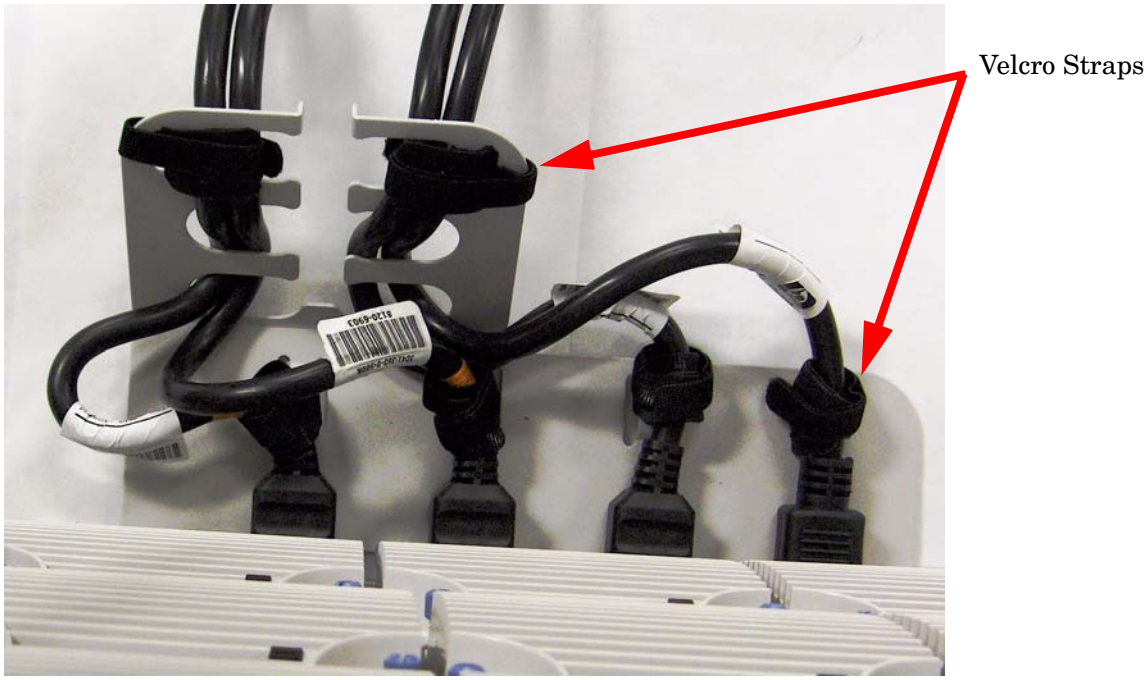
Figure 4-7 Four Cell Line Cord Anchor (rp8400, rp8420, rp8440, rx8620, rx8640)



2. Tighten the captive thumbscrews to secure the line cord anchor to the chassis.
3. Weave the power cables through the line cord anchor. Leave enough slack that the plugs can be disconnected from the receptacles without removing the cords from the line cord anchor

4. Use the supplied Velcro straps to attach the cords to the anchor. See Figure 4-8, “Line Cord Anchor and Velcro Straps,”

Figure 4-8 Line Cord Anchor and Velcro Straps



MP Core I/O Connections

Each HP 9000 rp8420 server has at least one core I/O card installed. Each core I/O card has a management processor (MP). If two core I/O cards are installed, this allows for two partitions to be configured or enables core I/O redundancy in a single partition configuration. Each core I/O card is oriented vertically and accessed from the back of the server.

The core I/O board is used to update firmware, access the console, turn partition power on and off, and utilize other features of the system.

External connections to the core I/O board include the following:

- One Ultra3 (160MB/sec) 68-pin SCSI port for connection to external SCSI devices by a very high density cable interconnect (VHDCI) connector.
- One RJ-45 style 10Base-T/100Base-T/1000Base-T system LAN connector. This LAN uses standby power and is active when AC is present and the front panel power switch is off.
- One RJ-45 style 10Base-T/100Base-T MP LAN connector. This LAN uses standby power and is active when AC is present and the front panel power switch is off. This LAN is also active when the front power switch is on.
- Three RS-232 connectors provide connections for a local console, remote console, and a UPS.

  UPS port—A system serial port for connection to a UPS or another system application. The port is located near the top of the core I/O card near the external SCSI connector when the card is installed in the server chassis.

  Remote console port—A remote serial port for connection to a modem. The port is located in the middle of the three RS-232 connectors.

  Local console port—A local serial port for connection to a terminal. The port is located at the bottom of the core I/O card when the card is installed in the server chassis.

Internal connections for the core I/O board include the following:

- Three single-ended (SE) internal SCSI buses for internal devices. These buses are routed to the system board where they are cabled to a mass storage backplane.

Setting Up the CE Tool (PC)

The CE Tool is usually a laptop. It allows communication with the MP in the 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 core I/O card.

Setting CE Tool Parameters

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

- 8/none (parity)
- 9600 baud
- None (receive)
- None (transmit)

If the CE Tool is a laptop using Reflection 1, check or change these communications settings using the following procedure:

1. From the Reflection 1 Main screen, pull down the **Connection** menu 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 the VT100 HP terminal type.
8. Click **Apply**.

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

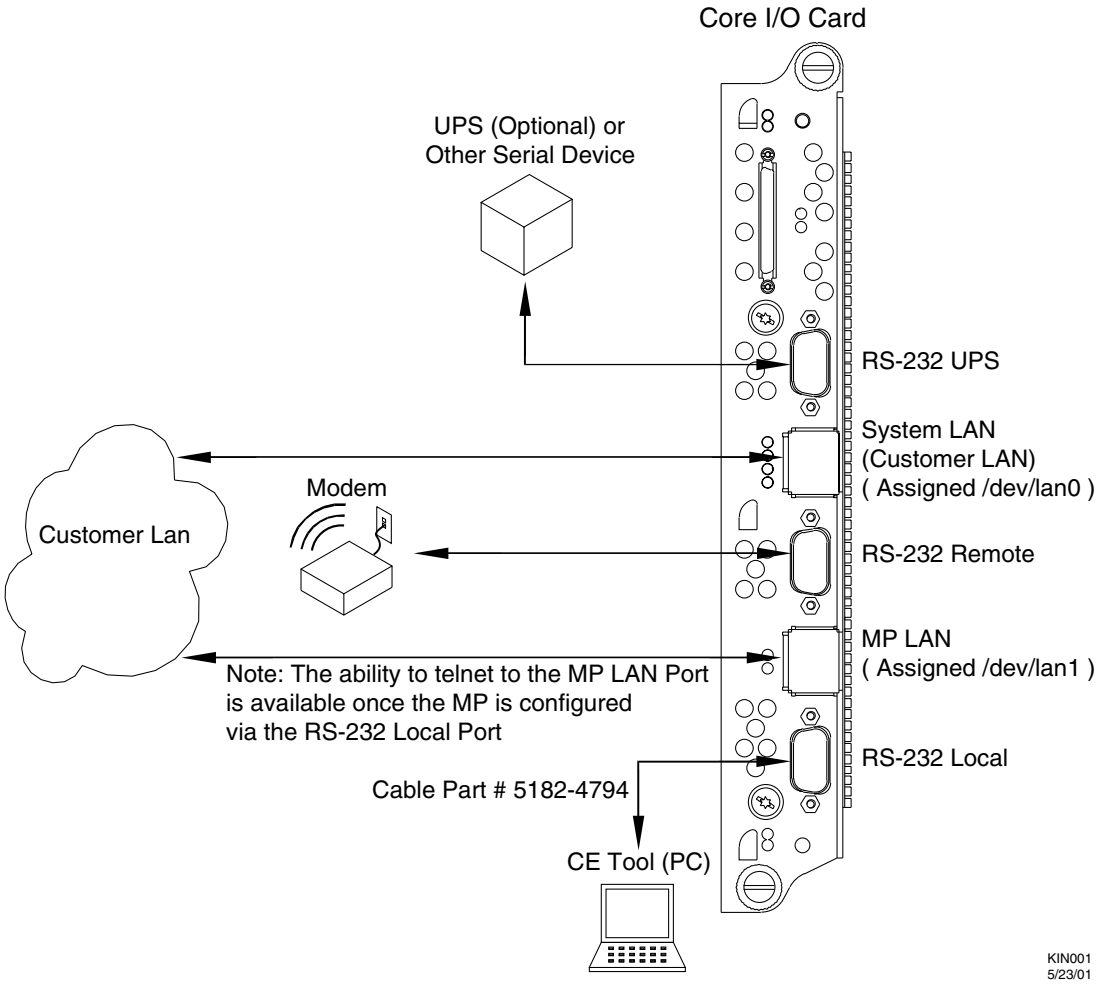
Connecting the CE Tool to the Local RS-232 Port on the MP

This connection allows 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.

Use the following procedure to connect the CE Tool to the local RS-232 port on the MP:

1. Connect one end of a null modem cable (9-pin to 9-pin) (Part Number 5182-4794) to the **Local RS-232** port on the core I/O card (the DB9 connector located at the bottom of the core I/O card).

Figure 4-9 LAN and RS-232 Connectors on the Core I/O Board



2. Connect the other end of the RS-232 cable to the CE Tool.

Turning On Housekeeping Power and Logging In to the MP

After connecting the serial display device, the power to the server cabinet is ready to be supplied to get a login prompt for the MP. Connecting the power cords allows power to flow to the BPS located at the front of the server cabinet, which in turn provides housekeeping power (HKP).

Before powering up the server cabinet for the first time:

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

   The preferred tool is the CE Tool running Reflection 1.

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

1. Apply power to the server cabinet.

   Apply power to any other server cabinets that were shipped to the customer site.

   On the front of the server, a solid green **Standby Power**, and a solid green **MP Present** light will illuminate after about 30 seconds.

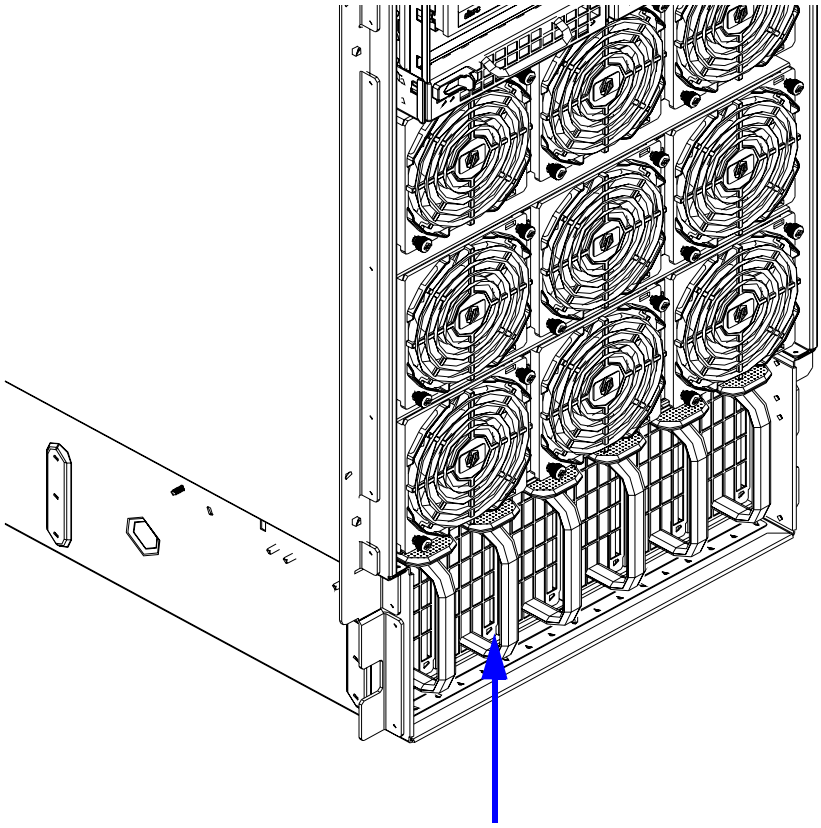
   Figure 4-10 Front Panel Display

2. Check the BPS LED for each BPS. See Figure 4-11 for the LED location.

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

   - When power is first applied. Observe the BPS LEDs will be flashing amber.
   - After 30 seconds have elapsed. Observe the flashing amber BPS LED for each BPS becomes a flashing green LED.

Figure 4-11 BPS LED Location



BPS LED Location

3. Log in to the MP:

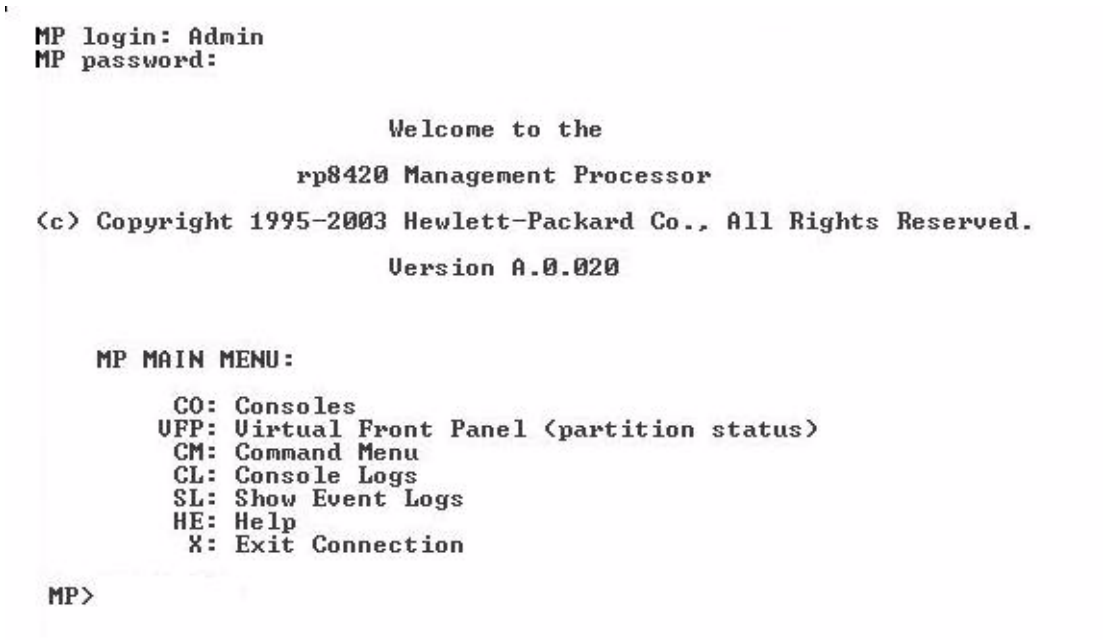
   a. Enter **`Admin`** at the login prompt. (This term is case-sensitive.)

      It takes a few moments for the MP prompt to appear. If it does not, be sure the laptop serial device settings are correct: 8 bits, no parity, 9600 baud, and None for both Receive and Transmit. Then, try again.

   b. Enter **`Admin`** at the password prompt. (This term is case-sensitive.)

      The MP Main Menu is displayed:

Figure 4-12 MP Main Menu



Configuring LAN Information for the MP

This section describes how to set and verify the server MP LAN port information. LAN information includes the MP network name, the MP IP address, the subnet mask, and gateway address. This information is provided by the customer.

To set the MP LAN IP address:

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

   The screen displays the default values and asks if you want to modify them. Write down the information or log it to a file, as 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 the ***Return*** key. The following screen is displayed:

Figure 4-13 The lc Command Screen

```
MP:CM> lc

This command modifies the LAN parameters.

Current configuration of MP LAN interface
  MAC address    : 00:30:6e:4b:19:01
  IP address     : 15.11.129.82     (0x0f0b8152)
  Hostname       : krmt27a
  Subnet mask    : 255.255.248.0    (0xfffff800)
  Gateway        : 15.11.128.1      (0x0f0b8001)
  Status         : UP and RUNNING
  AutoNegotiate  : Enabled
  Data Rate      : 100 Mb/s
  Duplex         : Half
  Error Count    : 3
  Last Error     : frame miss

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

NOTE The value in the “IP address” field has been set at the factory. Obtain the LAN IP address from the customer.

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

   The current IP address is shown; then the following prompt is displayed: *Do you want to modify it? (Y/[N])*

3. Enter **y**.
4. Enter the new IP address.

   The customer shall provide this address for network interface 0.
5. Confirm the new address.
6. Enter the MP Hostname.

   This is the hostname for the customer LAN. The name can be as many as 64 characters, and include alpha numerics, **-** (dash), _ (under bar), **.** (period), or a space. It is recommended that the name be a derivative of the complex name. For example, **Acme.com_MP**.
7. Enter the LAN parameters for *Subnet mask* and *Gateway address*.

   This information shall come from the customer.
8. When step 7 is completed, the system will indicate the parameters have been updated and return to the MP Command Menu prompt (*MP:CM>*).
9. To check the LAN parameters and status, enter the **ls** command at the MP Command Menu prompt (*MP:CM>*).
10. A screen similar to the following will display allowing verification of the settings:

Figure 4-14 The 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>
```

To return to the MP main menu, enter **ma**.

To exit the MP, enter **x** at the MP main menu.

Accessing the Management Processor through a Web Browser

Web browser access is an embedded feature of the MP. The Web browser allows 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
- Hostname (this is used when messages are logged or printed)

To configure the LAN port for a Web browser, perform the following steps:

Step 1. Connect to the MP using a serial connection.

Step 2. Configure the MP LAN. Refer to “Configuring LAN Information for the MP”.

Step 3. Type **CM** to enter the Command Menu.

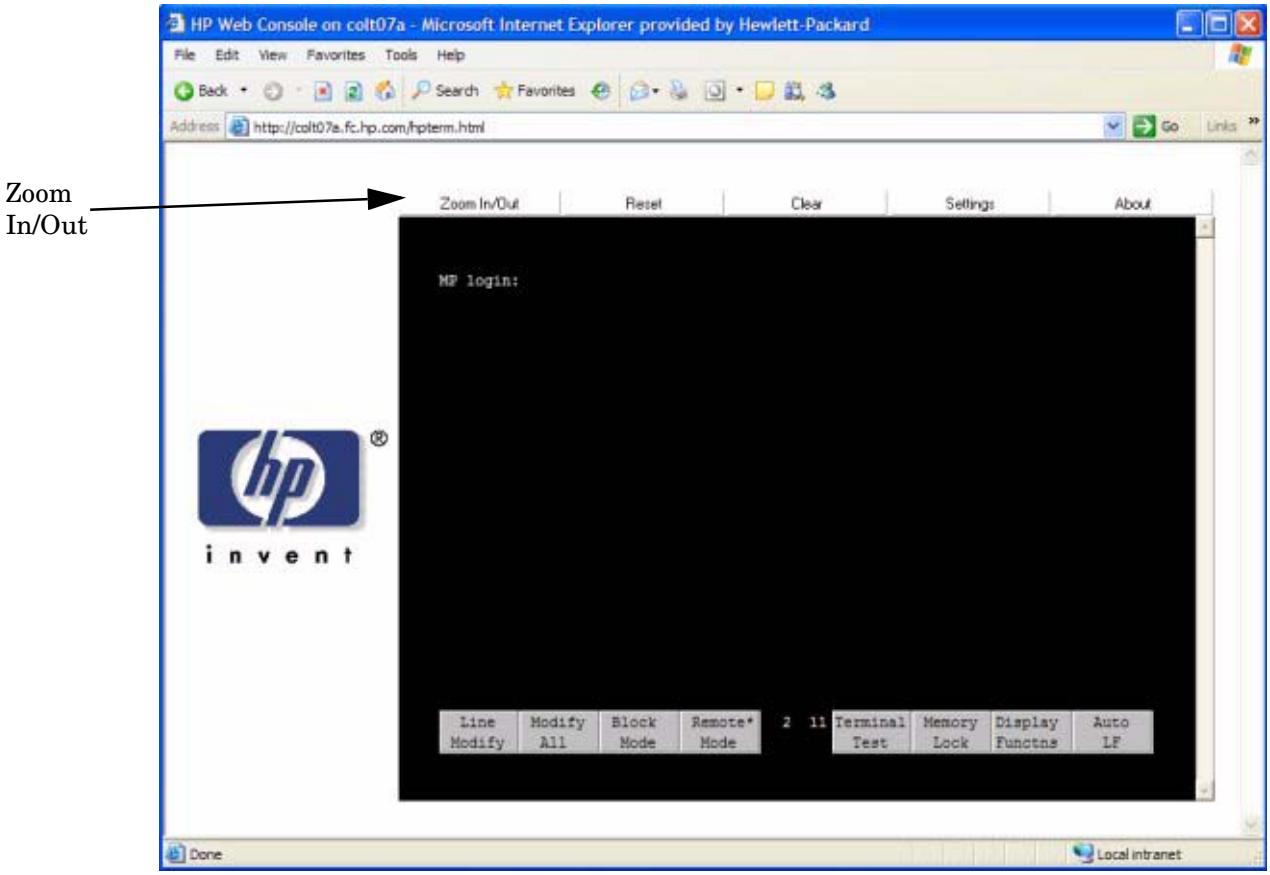
Step 4. Type **SA** at the MP:CM> prompt to display and set MP remote access.

Figure 4-15 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:
```

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

Figure 4-16 Browser Window



Step 6. Click on the Zoom In/Out tab to generate a full screen MP window.

Step 7. Select the emulation type you want to use.

Step 8. Login to the MP when the login window appears.

Access to the MP via a Web browser is now possible.

Verifying Presence of the Cell Boards

To perform this activity, either connect to the MP over the customer 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 server cabinet. It is important for the MP to detect the cell boards. If it does not, the partitions will not boot.

To determine if the MP detects the cell boards:

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

   This displays the Command Menu. Among other things, the Command Menu allows one to view or modify the configuration and look at utilities controlled by the MP.

   To look at a list of the commands available, enter **he**. You might have to press **Enter** to see more than one screen of commands. 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 is displayed:

   Figure 4-17 The du Command Screen

```
MP:CM> du

The following MP bus devices were found:
+---+-----+------+--------+--------+------------+
|   |     |      |        |        |            |
|   |     | Sys  |        |   IO   | Bulk Pwr   |
|Cab| MP  |Bkpln | Cells  |Chassis | Supplies   |
| # |M  S|      |0 1 2 3| 0   1  |0 1 2 3 4 5|
+---+-----+------+--------+--------+------------+
| 0 |*  *|  *   |* * * *| *   *  |* * * * *  |
+---+-----+------+--------+--------+------------+
```

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

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

   Figure 4-17 shows that cells are installed in slots 0, 1, 2, and 3 in cabinet 0. In the server cabinet, there should be cells physically located in slots 0, 1, 2, and 3.

Configuring AC Line Status

The MP utilities can detect if power is applied to each of the AC input cords for the server, by sampling the status of the bulk power supplies. During installation, use the following procedure to check the configuration for the AC line status and configure it to match the customer's environment.

Selecting the *Grid A only* option directs the MP utilities to sense locations A0 and A1 for active power. Selecting the *Grid B only* option directs the MP utilities to sense locations B0 and B1 for active power. Selecting the *Grids A & B* option directs the MP utilities to sense active power at locations A0-A1-B0-B1.

Step 1. At the MP prompt, enter **cm**. This will display the Command Menu and allow for viewing and configuring various utilities controlled by the MP.

Step 2. From the command prompt (MP:CM>), enter **pwrgrd**. The `pwrgrd` command displays the current power configuration. This command can also be used to change the power grid configuration. A screen similar to the following is displayed:

Figure 4-18 The pwrgrd Command Screen

```
MP:CM> pwrgrd

The current power configuration is: Grids A & B

Power grid configuration preference.

       1. Grid A only
       2. Grid B only
       3. Grids A & B

          Select Option: 3

Power grid configuration set to grids A & B


MP:CM>
```

Step 3. Verify that the power grid configuration is correct by examining the output from the `pwrgrd` command. The preceding power configuration indicates that both grid A and grid B have been configured.

Step 4. To change the configuration, select the proper response and enter the appropriate numeric value when `Select Option:` displays on the screen. If no change is desired, enter **q** and press the **Enter** key. After the value has been entered, the MP will respond and indicate the change has taken effect.

Booting the HP 9000 rp8420 server

Powering on the server can be accomplished by either pressing the power switch on the front panel or by using the PE command to power up the cabinet or complex at the MP command menu.

If using a LAN crossover cable with the laptop, review server activity for each partition configured while the server powers up 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 manual causes a window to be open at startup.

  To display activity for the complex:

  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 up:

  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:

1. If there is a Server Expansion Unit attached to the server, both the server and the SEU power switch needs to be pressed. Alternatively, at the `MP:CM>` prompt, the PE **`X`** command can be used to power on the complex or the PE **`T`** command can be used for each cabinet. The following events occur:
   - Power is applied to the server.
   - PDC starts to run on each cell.
   - The cell self test executes.
   - Hardware initializes for the server.
   - Console communication is established.
2. Once the cell has joined the partition or once boot is blocked (BIB) is displayed at the virtual front panel (VFP), return to the MP Main Menu by entering **`Ctrl-B`**.
3. Enter **`co`** to enter console mode.
4. Enter the partition number of the partition to boot.
5. Press **Enter**.

Selecting a Boot Partition Using the Management Processor

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 the configuration can be verified.

After the DC power 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. Enter the console by typing **co** at the MP Main Menu.

To exit the MP, the **x** command is used to return to the Boot Console Handler Main Menu.

Verifying the System Configuration Using Boot Console Handler

From the Boot Console Handler (BCH) Main Menu, enter **in** to go the Information Menu. Use the corresponding command from the menu to verify the type and quantity of processors, memory, and I/O cards:

- `pr` (Processors)
- `me` (Memory)
- `io` (Check the PCI device information to determine if the values match the devices installed in the server)

Once the parameters have been verified, use the `ma` command to return to the BCH Main Menu.

Booting HP-UX Using Boot Console Handler

If Instant Ignition was ordered, HP-UX will have been installed in the factory at the Primary Path address. If HP-UX is at a path other than the Primary Path, use the **pa** (path) command (from the Configuration Menu) to set boot path.

1. Main Menu: Enter command or Menu> **co**
2. Configuration Menu> **pa pri** `xx/xx/xx`
3. Configuration Menu> **ma**

Once the Primary Path has been set, use the `bo` (boot) command (from the Main Menu) to boot HP-UX.

1. Main Menu: Enter command or Menu> **bo pri**
2. The following prompt is displayed:

   ```
   Do you wish to stop at the ISL prompt prior to booting (y/n)?
   ```

   Enter **n**.

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.

Adding Processors with Instant Capacity On Demand

The Instant Capacity On Demand (iCOD) program provides access to additional CPU resources beyond the amount that was purchased for the server. This provides the ability to activate additional CPU power for unexpected growth and unexpected spikes in workloads.

Internally, iCOD systems physically have more CPUs, called iCOD CPUs, than the number of CPUs actually purchased. These iCOD CPUs reside in the purchased system, but they belong to HP and therefore are HP assets. A nominal “Right-To-Access Fee” is paid to HP for each iCOD processor in the system. At any time, any number of iCOD CPUs can be “activated.” Activating an iCOD CPU automatically and instantaneously transforms the iCOD CPU into an instantly ordered and fulfilled CPU upgrade that requires payment. After the iCOD CPU is activated and paid for, it is no longer an iCOD CPU, but is now an ordered and delivered CPU upgrade for the system.

The most current information on installing, configuring, and troubleshooting iCOD can be found at http://docs.hp.com

NOTE Ensure that the customer is aware of the iCOD email requirements. Refer to http://docs.hp.com for further details.

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 allows 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 4-3 Factory-Integrated Installation Checklist

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

Table 4-3 Factory-Integrated Installation Checklist (Continued) (Continued)

PROCEDURE		IN-PROCESS		COMPLETED	
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					
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)					

Table 4-3 Factory-Integrated Installation Checklist (Continued) (Continued)

PROCEDURE		IN-PROCESS		COMPLETED	
	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 contains information about the various status LEDs on the HP 9000 rp8420 server and other troubleshooting information.

Common Installation Problems

The following sections contain general procedures to help you locate installation problems.

CAUTION Do not operate the server with the top cover removed for an extended period of time. Overheating can damage chips, boards, and mass storage devices. However, you can safely remove the top cover while the server is running to remove and replace PCI hot-plug cards.

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

To troubleshoot an installation problem:

Step 1. Check all cable and power connections, including those in the rack, and so on.

Step 2. Ensure the server is configured properly.

Step 3. Verify all cables and boards are securely plugged into the appropriate connectors or slots.

Step 4. Remove all extra options, such as disk drives, one at a time, checking its affect on the server.

Step 5. Unplug the power cords, wait 20 seconds, plug the power cords in again, and restart the server.

Step 6. If you suspect a hardware error:

a. Log users off the LAN and power down the server.

b. Simplify the server to the minimum configuration.

Step 7. Remove all third-party options, and reinstall each one, one at a time, checking the server after each installation.

Step 8. Boot the server and if it does not function properly, refer to the following procedures.

The Server Does Not Power On

To check for power-related problems:

Step 1. Check the LED for each BPS.

The LED is located in the lower left-hand corner of the power supply face. Table 5-2 shows the states of the LEDs.

Step 2. Check that the power supply and a minimum of two power cords are plugged into the chassis.

NOTE Two power cords must be connected to A0 and A1 or B0 and B1.

Step 3. Remove and replace any suspect BPS.

The Server Powers On but Then Shuts Down with a Fault Light

To check for the following problems when the server powers on and then off:

Step 1. Check for fault LEDs and check the MP logs for errors.

Step 2. Check that a conductive item has not been dropped or left inside the server chassis.

Step 3. Check the connections on all boards.

Step 4. Check the cables for bent pins.

Step 5. Check the processors for bent pins if processors were just added and the problem has been isolated to the cell board.

Step 6. Minimize configuration to isolate a potential bad device.

The Server Powers On but Fails Power-On Self Test

To check for the following problems when the server fails power-on self test (POST):

Step 1. Check for error messages on the system console.

Step 2. Check for fault LEDs.

Step 3. Check for error messages in the MP logs.

HP 9000 rp8420 server LED Indicators

The HP 9000 rp8420 server has LEDs that indicate system health. This section defines those LEDs.

Front Panel LEDs

There are seven LEDs located on the front panel.

Figure 5-1 Front Panel with LED Indicators

Table 5-1 Front Panel LEDs

LED	Driven By	State	Description
Power	GPM[a]	On Green	48 V good (LED works even if MP is not installed, or installed and is not active)
		Off	48 V off
Standby Power	GPM	On Green	3.3 V standby good (LED works even if MP is not installed, or installed and is not active)
		Off	3.3 V standby off
MP[b] 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 by way of GPM	On Green	Dial-in (remote) console enabled
		Off	Dial-in (remote) console is disabled, or MP is not installed, or MP is installed and not active
Attention	MP by way of GPM	Flash Yellow	Chassis log alert unread
		Off	No alert, or MP is not installed, or MP is installed and not active
Run	PDC[c]/MP by way of GPM	On Green	One or more partitions running
		Off	No partition running, or MP is not installed, or MP is installed and not active
Fault	PDC/MP by way of GPM	Flash Red	One or more partitions have reported a fault
		Off	No partitions running, or MP is not installed, or MP is installed and not active

a. GPM stands for global power monitor
b. MP stands for manageability processor
c. PDC stands for processor dependent code

BPS LEDs

There is a single, three-color LED located on each BPS.

Figure 5-2 BPS LED Location

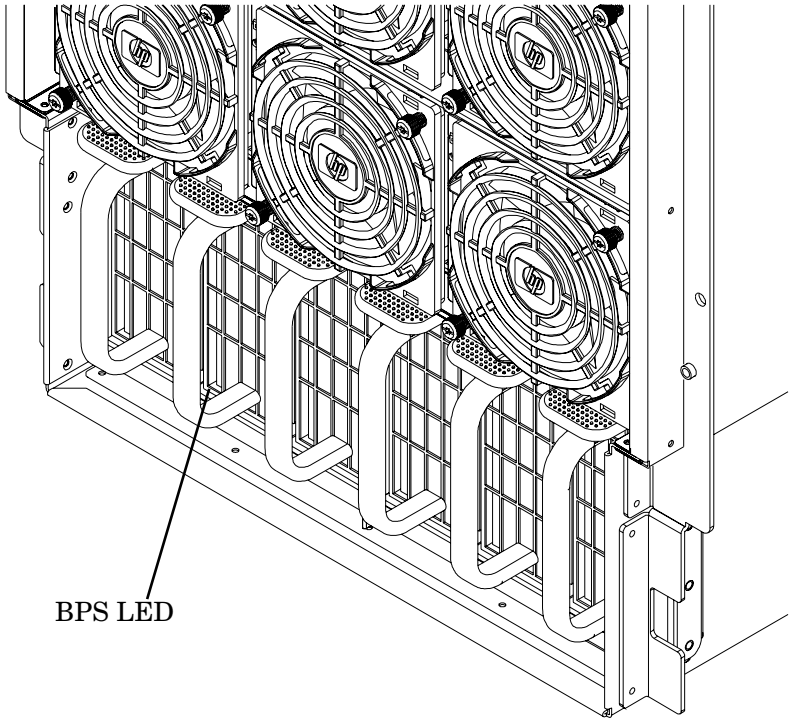


Table 5-2 BPS LEDs

LED Indication	Description
Blink Green	BPS in standby state and no faults or warnings
Green	BPS in run state (48 V output enabled) and no faults or warnings
Blink Yellow	BPS in standby or run state and warnings present but no faults
Yellow	BPS in standby state and recoverable faults present but no non-recoverable faults
Blink Red	BPS state may be unknown, non-recoverable faults present
Red	This LED state is not used
Off	BPS fault or failure, no power cords installed or no power to chassis

PCI Power Supply LEDs

There are three LEDs on the PCI power supply. The green power LED reports overall power status for the PCI power supply. The yellow attention LED is not currently used for status. The multi-colored fault LED reports faults and warnings.

Figure 5-3 PCI Power Supply LED Locations

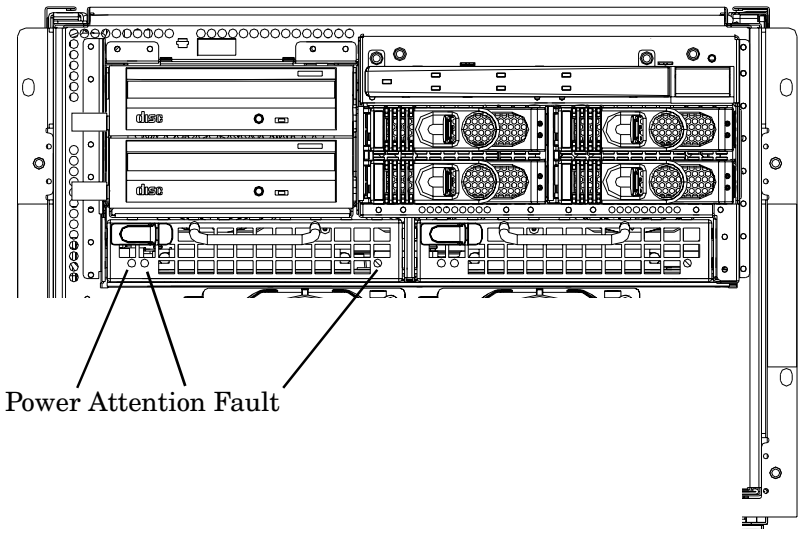


Table 5-3 PCI Power Supply LEDs

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[a]	Yellow	Not currently used for status.
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 because of an over temperature condition, a failure to regulate the power within expected limits, or a current-limit condition.
		Off	Normal operation.

a. LPM stands for local power monitor

System and I/O Fan LEDs

There is a single, three-color LED located on the front OLR fan, the rear OLR fan and the PCI I/O fan.

Figure 5-4 Fan LED Locations

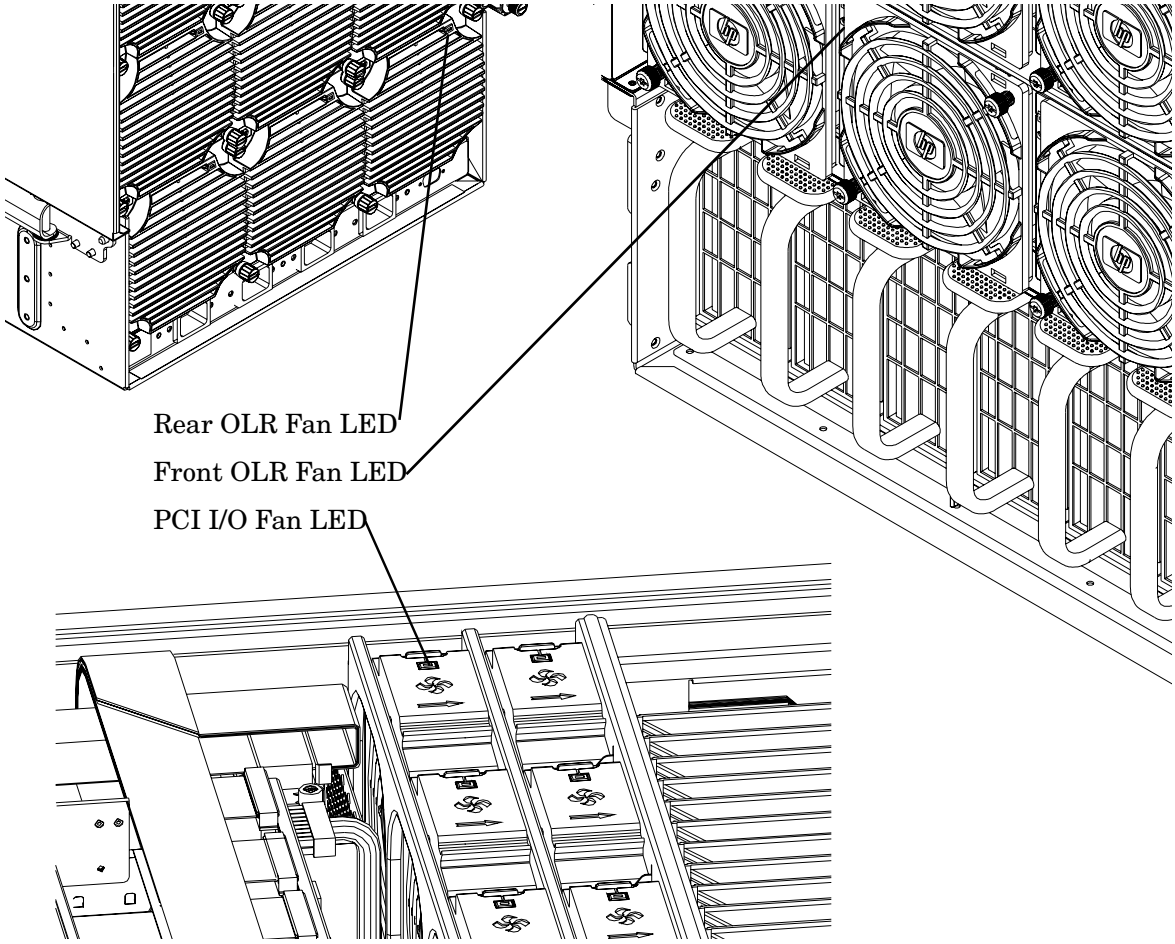


Table 5-4 Front, Rear, and I/O Fan LEDs

LED	Driven By	State	Description
Fan Status	Fan	Solid Green	Normal
		Flash Yellow	Predictive failure
		Flash 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. When the yellow attention LED is flashing, it is safe to remove the cell board from the server.

Figure 5-5 Cell Board LED Locations

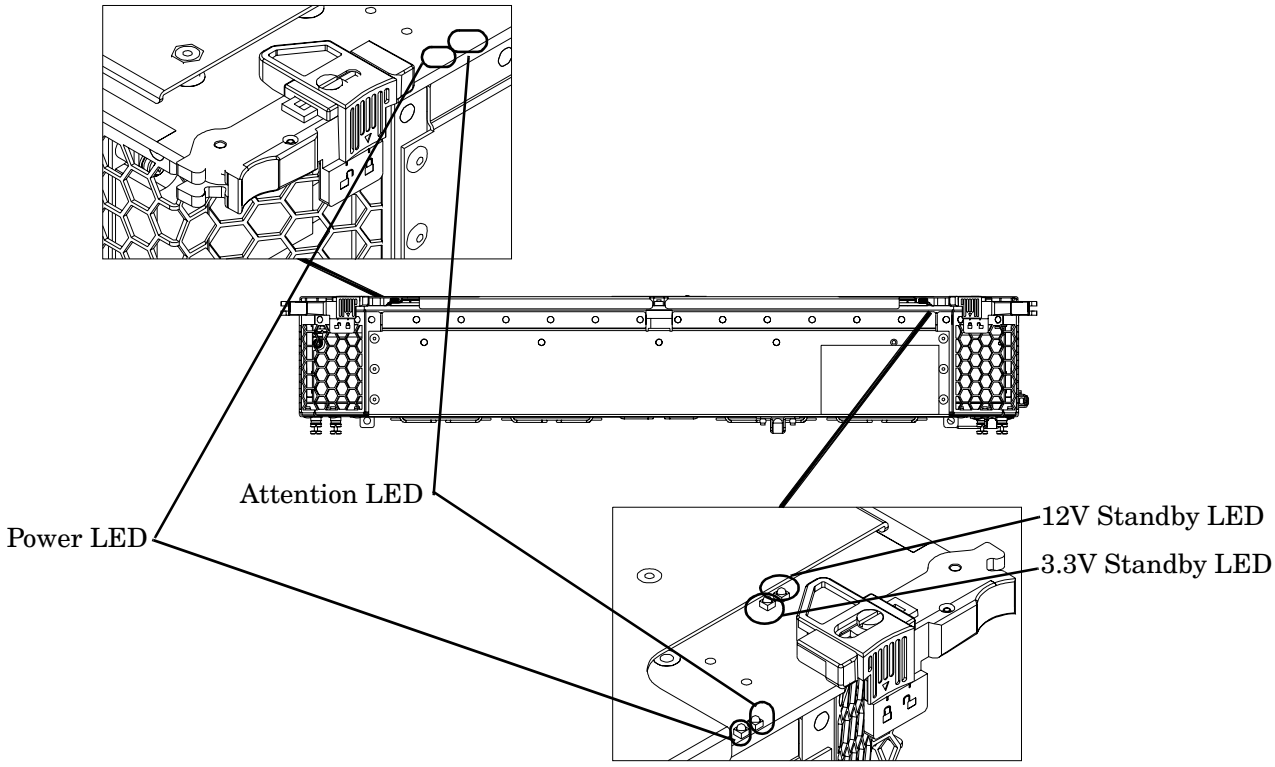


Table 5-5 Cell Board OL* LED Indicators

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

PCI OL* Card Divider LEDs

The PCI OL* card LEDs are located on each of the 16 PCI 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 5-6 on page 107 in combination with whether power is being supplied to the card or not.

Figure 5-6 PCI OL* LED Locations

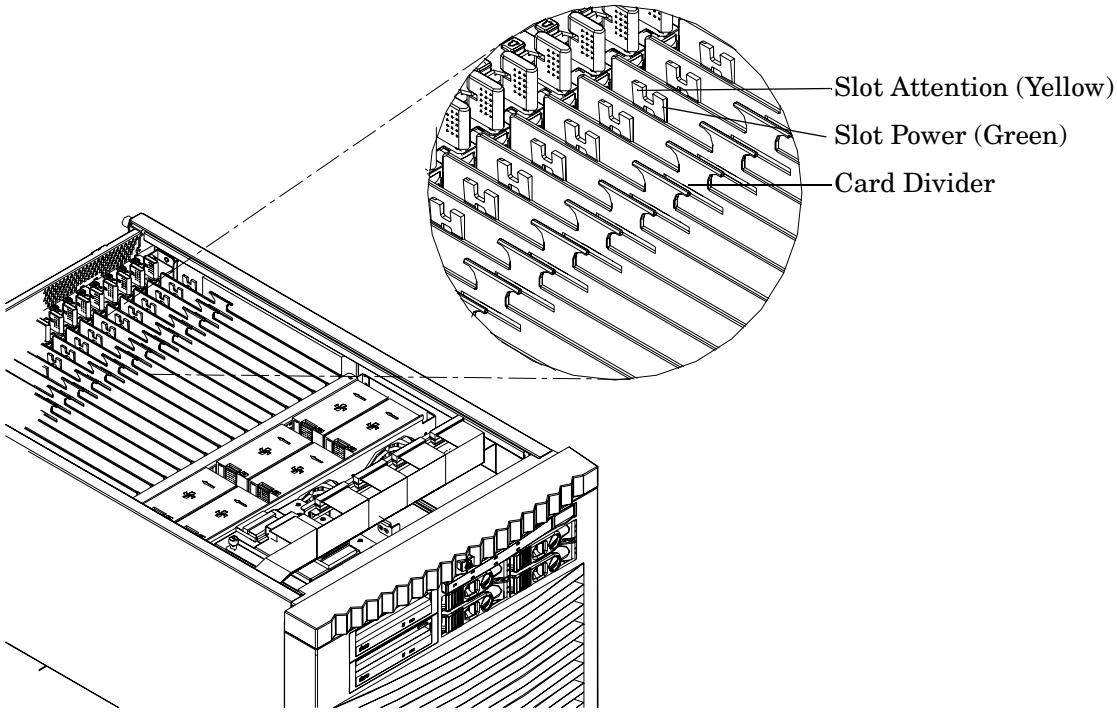


Table 5-6 OL* LED States

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

Core I/O LEDs

The core I/O LEDs in Table 5-7 on page 109 are located on the bulkhead of the installed core I/O PCA. There is a DIP switch on the core I/O card that is used to select which MP firmware set (indicated by the MP SEL LED) is selected for loading. The DIP switch is only visible when the core I/O card is removed from the system and is located in the center of the PCA.

Figure 5-7 Core I/O Card Bulkhead LEDs

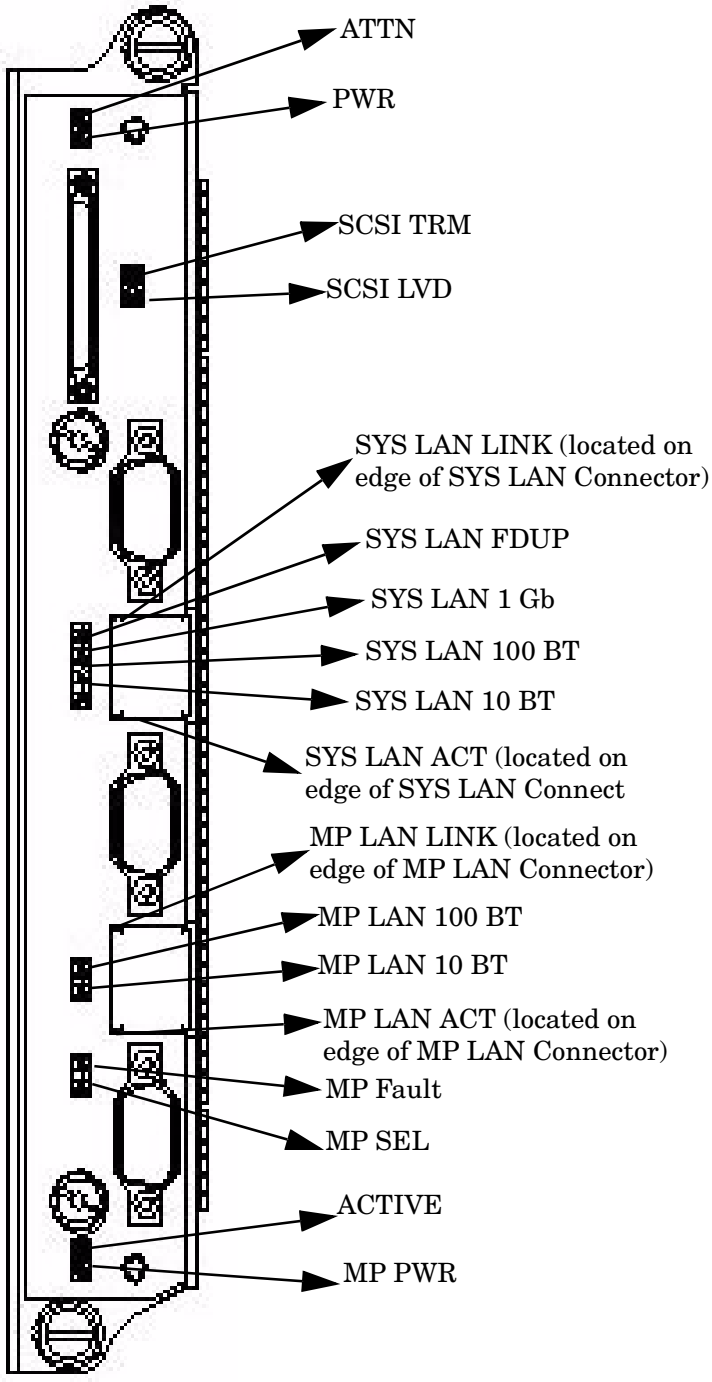


Table 5-7 Core I/O LEDs

LED (as silk-screened on the bulkhead)	Driven by	State	Description
MP PWR	3.3 V standby power rail	On Green	Indicates standby power is on
ACTIVE	Management processor	On Green	This core I/O is managing the system.
MP SEL		On Green	Both switches are in position F1 (silk-screened on the core I/O board) for systems other than the rp8400.
		Off	Both switches are in position F0 (silk-screened on the core I/O board) for rp8400 systems.
MP FAULT		On Yellow	Core I/O not fully seated or the MP processor is being reset
MP LAN ACT	MP LAN controller	On Green	Indicates MP LAN activity
MP LAN 10 BT	MP firmware controlled	On Green	MP LAN in 10 BT mode
MP LAN 100 BT	MP firmware controlled	On Green	MP LAN in 100 BT mode
MP LAN LINK	MP LAN controller	On Green	MP LAN link is ok
SYS LAN ACT	System LAN controller	On Green	Indicates SYS LAN activity
SYS LAN 10 BT	System LAN controller	On Green	SYS LAN in 10 BT mode
SYS LAN 100 BT	System LAN controller	On Green	SYS LAN in 100 BT mode
SYS LAN 1Gb	System LAN controller	On Green	SYS LAN in 1Gb mode
SYS LAN FDUP	System LAN controller	On Green	SYS LAN full duplex activity
SYS LAN LINK	System LAN controller	On Green	SYS LAN link is ok
SCSI LVD	System SCSI controller	On Green	SCSI LVD mode (on = LVD, off = SE)
SCSI TRM	System SCSI controller	On Green	SCSI termpower is on
PWR	LBA on system backplane	On Green	I/O power on
ATTN	LBA on system backplane	On Yellow	PCI attention

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 5-8 Core I/O Button Location

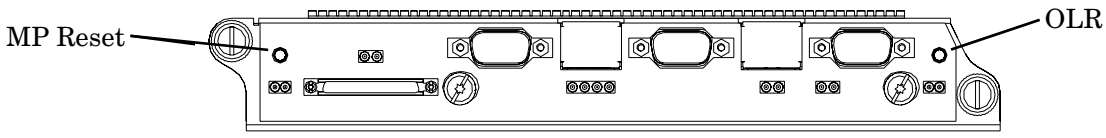


Table 5-8 Core I/O Buttons

Button Identification (as silk-screened on the bulkhead)	Location	Function
MP RESET	To the far left side of the core I/O card	Resets the MP **NOTE:** If the MP RESET button is held for longer than five seconds, it will clear the MP password and reset the LAN, RS-232 (serial port), and modem port parameters to their default values. The default password for the MP is **`Admin`** (upper case A intended) when the MP is reset. **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

Table 5-8 Core I/O Buttons (Continued)

Button Identification (as silk-screened on the bulkhead)	Location	Function
OLR (Symbol next to button is shown below) 	To the far right side 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.

Interlock Switches

There are three interlock switches located in the HP 9000 rp8420 server. Both side covers and the top cover have an interlock switch located underneath each cover.

- Side Covers—If either side cover is removed while the system is powered on, the system fans on the front and rear increase in speed to ensure adequate cooling. An event code is generated to indicate a side cover was removed.
- Top Cover—If the top cover is removed while the system power is on, the PCI-X card cage assembly I/O fan speed will not change. An event code is generated to indicate the top cover was removed.

Server Management Subsystem Hardware Overview

Server management for the HP 9000 rp8420 server series 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 allows 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 management processor 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 will also contain 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 will be disabled.

For high availability (HA), the server powers up and powers down 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.

A new Login prompt regains control by following these steps:

Step 1. Enter `Admin` (case sensitive) and press <**enter** >< **ctrl** + **enter**> keys.

Step 2. A new Login prompt is created.

Step 3. Re-enter `Admin` <**ctrl + enter**> to move on to the Password prompt.

Step 4. Enter `Admin` <**ctrl + enter**> to reach the Main Menu.

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 allows 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 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

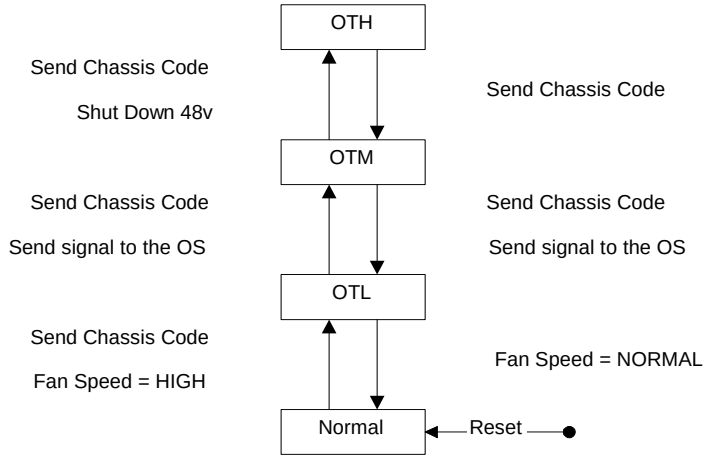
Server Management Behavior

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 5-9 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 5-9 Temperature States



On large temperature swings, the server will transition through all 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 will be shut 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 will be running 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 Figure 5-9, the fan behavior is related to the temperature state. The fans will be set to high speed when the ambient temperature is anywhere above the normal operating range. The front and rear fans will be 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 nine front fans, twelve 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 will be updated at 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 will adjust the fan speeds for sea-level operation.

NOTE Fans driven to a high RPM in dense air cannot maintain expected RPM and will be 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.

Server Management Commands

Table 5-9 lists the server management commands.

Table 5-9 Management 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 5-10 lists the server status commands

Table 5-10 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 5-11 lists the server system and access configuration commands

Table 5-11 System and Access Configuration Commands

Command	Description
CA	Configure Asynchronous and Modem parameters
CC	Initiate a Complex Configuration

Table 5-11 System and Access Configuration Commands (Continued)

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	Allows user 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

Firmware Updating

The server MP pulls a firmware update from an FTP server over the management LAN.

Instructions

- The user logs in to the server console through the LAN, local serial, or remote serial locations.
- The user types the `FW` command to start the firmware update.

NOTE The LAN configuration for the server must be set for the FTP connection to function correctly regardless of whether the console LAN, local serial, or other connection is used to issue the FW command.

FW—Firmware Update

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

DFW—Duplicate Firmware

- Access Level: Administrator
- Scope: Complex
- Description: This command allows field support personnel to copy firmware already installed on the system to an equivalent entity in the same complex.

Figure 5-10 illustrates the output and questions requiring responses. After the user replies **`Y`** to the confirmation request, the firmware update makes the connection to the FTP server at the IP address given using the user and password details supplied. The appropriate files will be 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 before burning the image into the flash memory.

CAUTION Instructions for updating the firmware are contained in the firmware release notes for each version of firmware. The procedure should be followed exactly for each firmware update otherwise the system could be left in an unbootable state. Figure 5-10 should not be used as an upgrade procedure and is provided only as an example.

Figure 5-10 Firmware Update Command Example

```
 *****                                                                *****
 *****  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         0     MP 0          0        0          5.010       Master
    2         0     MP 1          1        1          5.010       Slave
    3         0   PDHC 0          0      256          3.006          -
    4         0    SFW 0          0      320          0.018          -
    5         0   PDHC 1          1      257          3.006          -
    6         0    SFW 1          1      321          0.018          -
    7         0   PDHC 2         -1      258          3.006          -
    8         0    SFW 2         -1      322          0.018          -
    9         0   PDHC 3         -1      259          3.006          -
    10        0    SFW 3         -1      323          0.018          -

Enter the Entities to be upgraded (Ex: 3,4,10) :2
Enter your user name: anonymous
Enter 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/version1
Enter the filename of the firmware image for the MP: mp_A.5.11.0.bin
Are you sure that you want to continue(Y/N): y
```

Possible Error Messages

- Could not ping host
- Could not validate cyclic redundancy check (CRC) of packet
- Could not find firmware update
- Invalid password

PDC Code CRU Reporting

The PDC interface defines the locations for the CRUs. These locations are denoted in the following figures to aid in physically locating the CRU when the diagnostics point to a specific CRU that has failed or might be failing in the near future.

Figure 5-11 HP 9000 rp8420 server Cabinet CRUs (Front View)

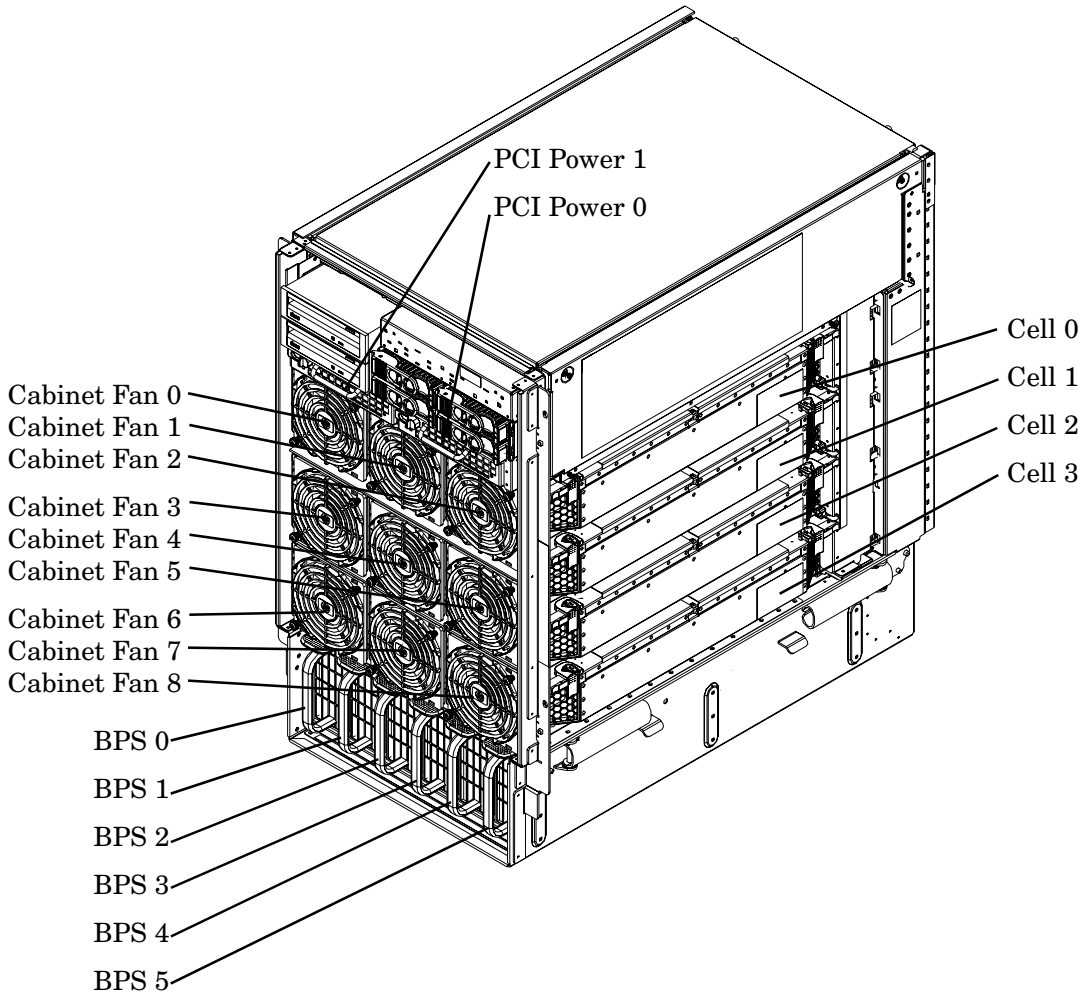
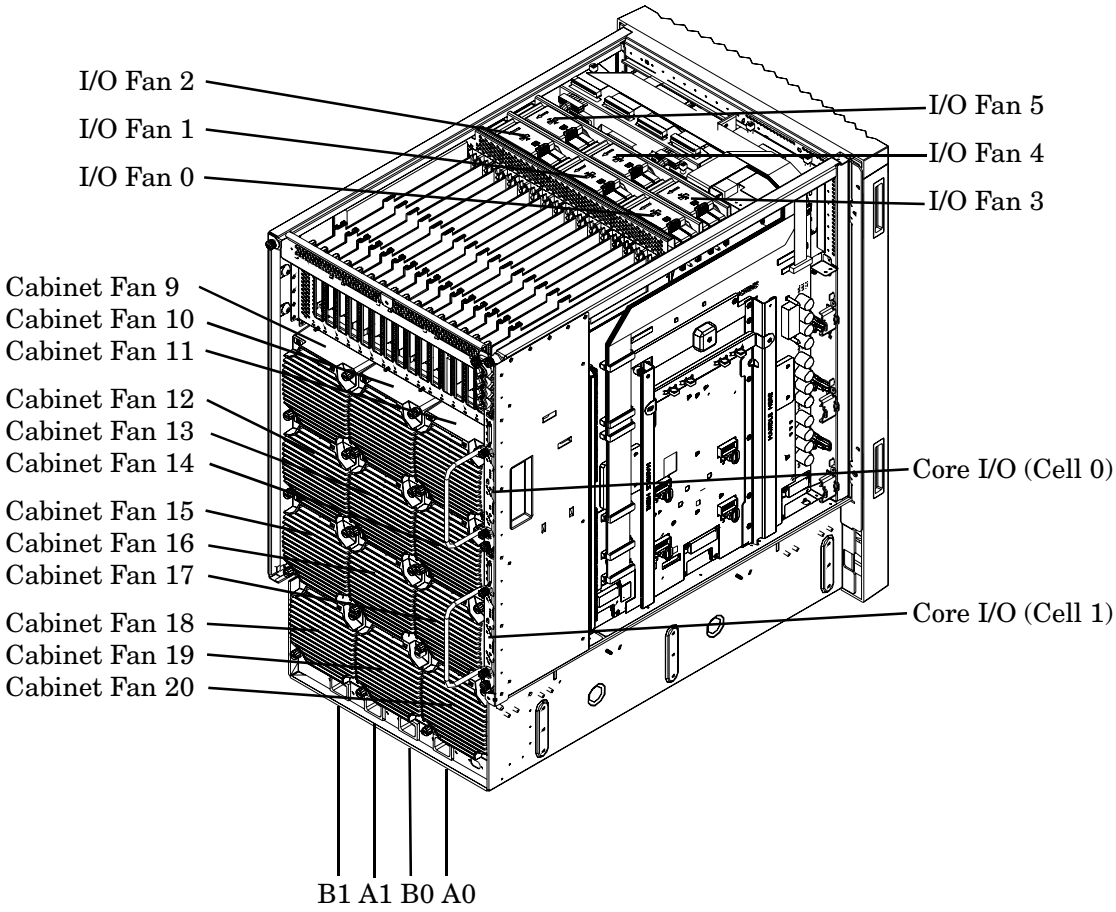


Figure 5-12 HP 9000 rp8420 server Cabinet CRUs (Rear View)



Verifying Cell Board Insertion

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 for the cell board to power up and function properly.

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

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

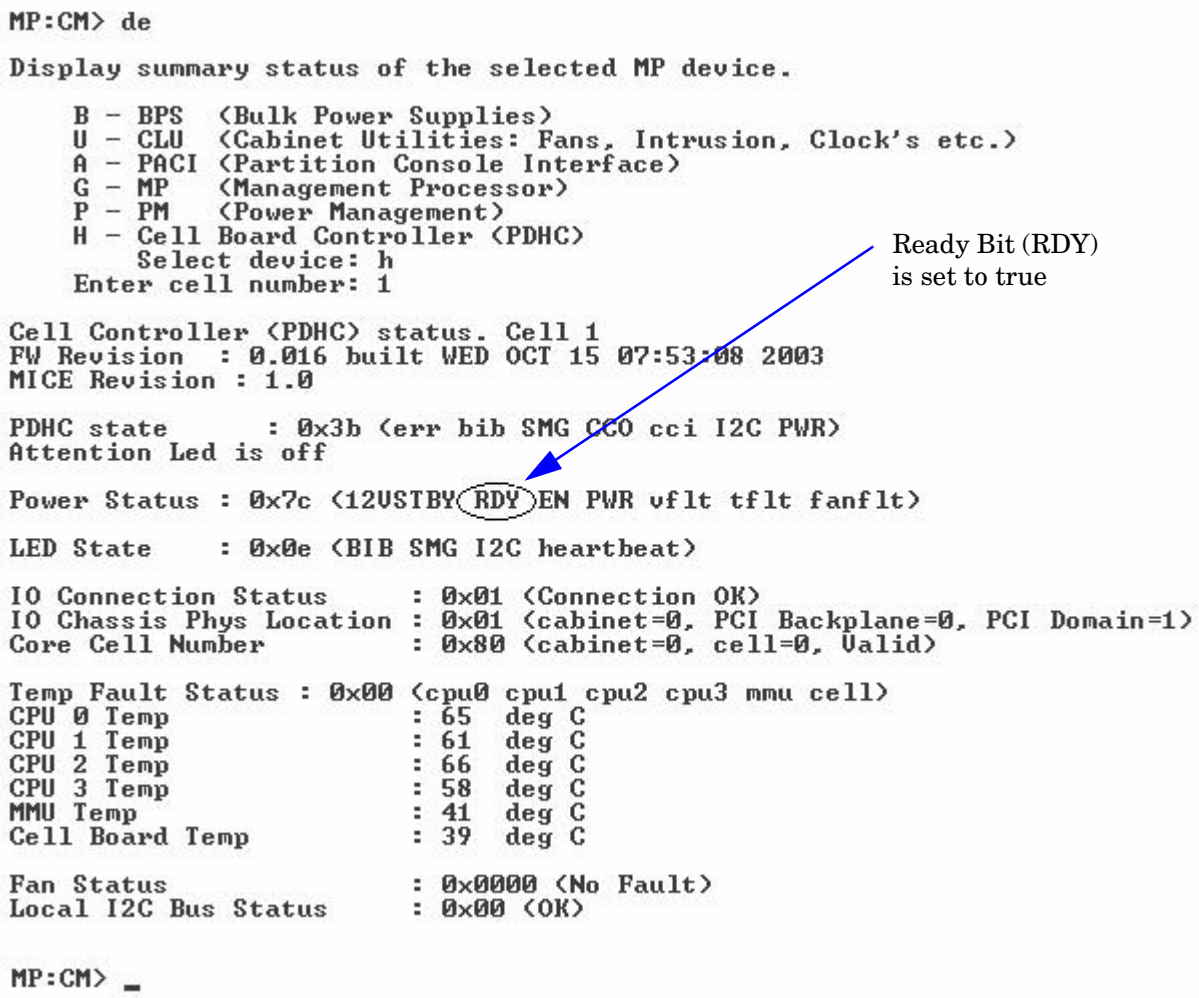
The lever status can be determined by issuing the `MP:CM>`**`DE`** command and viewing the power status of the cell board controller (PDHC). The "ready" bit will only be true when both levers are locked and all VRMs are installed. This status can be used to determine if both levers are locked and the cell board is properly installed in the chassis. See Figure 5-13 on page 123 for a sample of the output.

If the state is `RDY` as denoted by capital letters in the computer output, then the "ready bit" is true. If the state is "`rdy`" as denoted by lower case letters in the computer output, then the "ready bit" is false. See Table 5-12 for details.

Table 5-12 Ready Bit States

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

Figure 5-13 de Command Output



6 Removal and Replacement

This chapter provides a detailed description of the HP 9000 rp8420 server customer replaceable unit (CRU) replacement procedures. The sections contained in this chapter are:

- “HP 9000 rp8420 server CRUs”
- “Safety and Environmental Considerations”

- “Powering down Hardware Components and Powering on the Server”
- “Removing and Replacing Covers”
- “Removing and Replacing the Front Smart Fan Assembly”
- “Removing and Replacing the Rear Smart Fan Assembly”
- “Removing and Replacing a Disk Drive”
- “Removing and Replacing the Core I/O”
- “Removing and Replacing a PCI Card”
- “Removing and Replacing a PCI Smart Fan Assembly”
- “Removing and Replacing a PCI Power Supply”
- “Removing and Replacing a BPS”

HP 9000 rp8420 server CRUs

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

Hot-Plug CRUs

A CRU is defined as hot-plug if it can be removed from the chassis while the system remains operational, but requires software intervention before removing the CRU.

The following CRUs are hot-plug:

- Removing and Replacing a Disk Drive
- Removing and Replacing a PCI Card

Hot-Swap CRUs

A CRU is hot-swap if it can be removed from the chassis while the server remains operational and requires no software intervention before removing the CRU.

The following list identifies the hot-swap CRUs in the HP 9000 rp8420 server.

- Removing and Replacing the Front Smart Fan Assembly
- Removing and Replacing the Rear Smart Fan Assembly
- Removing and Replacing a PCI Smart Fan Assembly
- Removing and Replacing a BPS

Other CRUs

To remove and replace the CRUs that are neither hot-plug nor hot-swap, HP-UX must be shut down in the nPartition where the CRU resides, and power to the CRU must be turned off before removing it. See “Powering down Hardware Components and Powering on the Server” on page 130 for complete instructions.

These CRUs include:

- Removing and Replacing the Core I/O
- Removing and Replacing a PCI Power Supply

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 these precautions:

- Use only shielded cables.
- Install and route the cables according to 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

CAUTION Connect to ground with a wrist strap. Connection can 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.

CAUTION Observe all ESD safety precautions before attempting these procedures. Failure to follow ESD safety precautions could result in damage to the server.

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

Take these 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 system, keep the accessories in the conductive plastic bags until they are ready to be installed.
- Avoid working in carpeted areas, and keep body movement to a minimum while installing accessories.

Powering down Hardware Components and Powering on the Server

When you remove and replace hardware, you may need to power off hardware components as part of the remove and replace procedure.

This section gives details on how to power off and on hardware components.

Powering Off Hardware Components

To power off individual components or the entire cabinet:

Step 1. Log in to the management processor (MP) of the server.

Step 2. If the component you will power off is assigned to an nPartition, then use the Virtual Front Panel (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 E “Operating System Boot and Shutdown”.

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

Refer to Appendix E “Operating System Boot and Shutdown” for details on determining the nPartition boot state and shutting down HP-UX.

Step 3. Access the MP Command menu.

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

Step 4. Use the MP Command menu **PS** command to check details about the hardware component you plan to power off.

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.

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

Using the PE command, you can power on or off the cabinet (including all cells and I/O in the cabinet), 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.

Step 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.

Step 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:

Step 1. If needed, reconnect all power cords to the appropriate receptacles and power on the system.

Step 2. Use the MP Command menu `PE` command to power on the hardware component that was powered off and replaced.

Step 3. Use the `PS` command to verify that power is enabled to the newly replaced part. For example: Enter **`C`** from within the `PS` command to select cell.

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

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

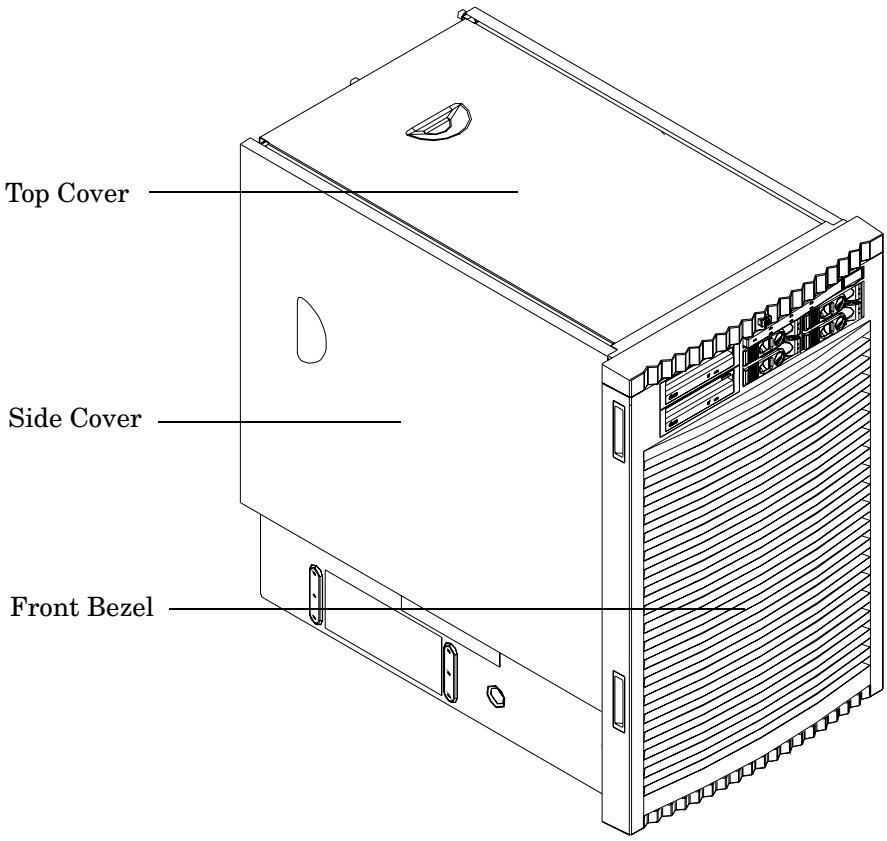
Step 4. Reboot each nPartition. See Appendix E “Operating System Boot and Shutdown”.

Step 5. Verify system functionality by using the On-line Diagnostic Support Tools Manager (STM) exerciser.

Removing and Replacing Covers

It is necessary to remove one or more of the covers to access many of the CRUs within the HP 9000 rp8420 server chassis.

Figure 6-1 Cover Locations



Removing the Top Cover

Step 1. Connect to ground with a wrist strap. See “Electrostatic Discharge” on page 128 for more information.

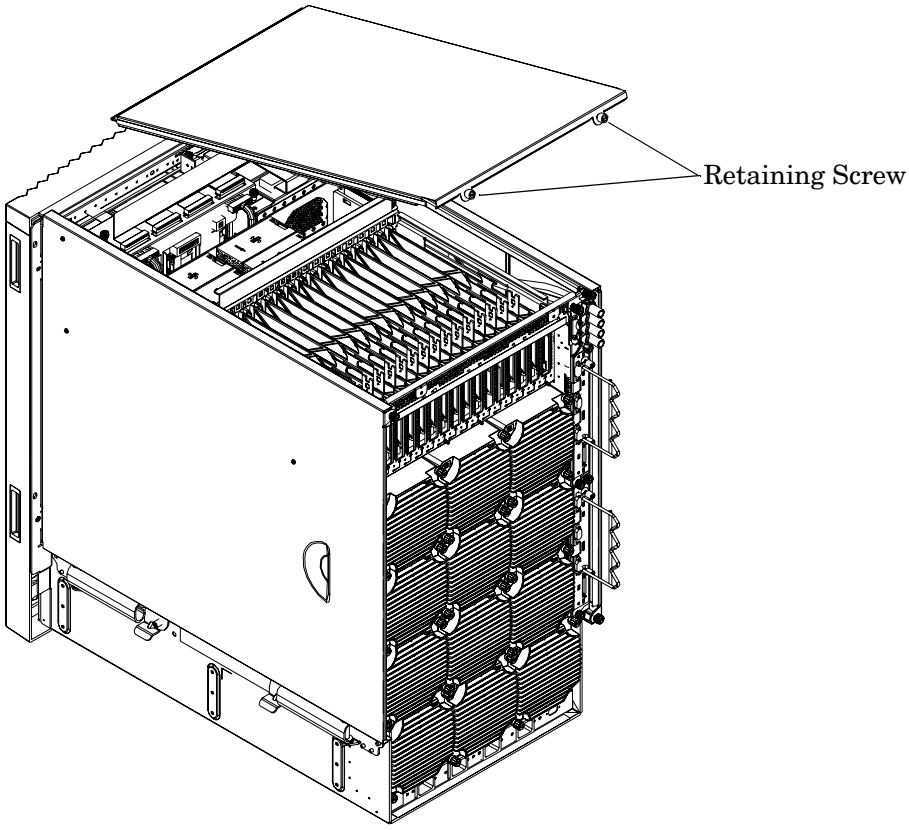
Step 2. Loosen the blue retaining screws securing the cover to the chassis.

Step 3. Slide the cover toward the rear of the chassis.

Step 4. Lift the cover up and away from the chassis.

Step 5. Place the cover in a safe location.

Figure 6-2 Top Cover Removed



Replacing the Top Cover

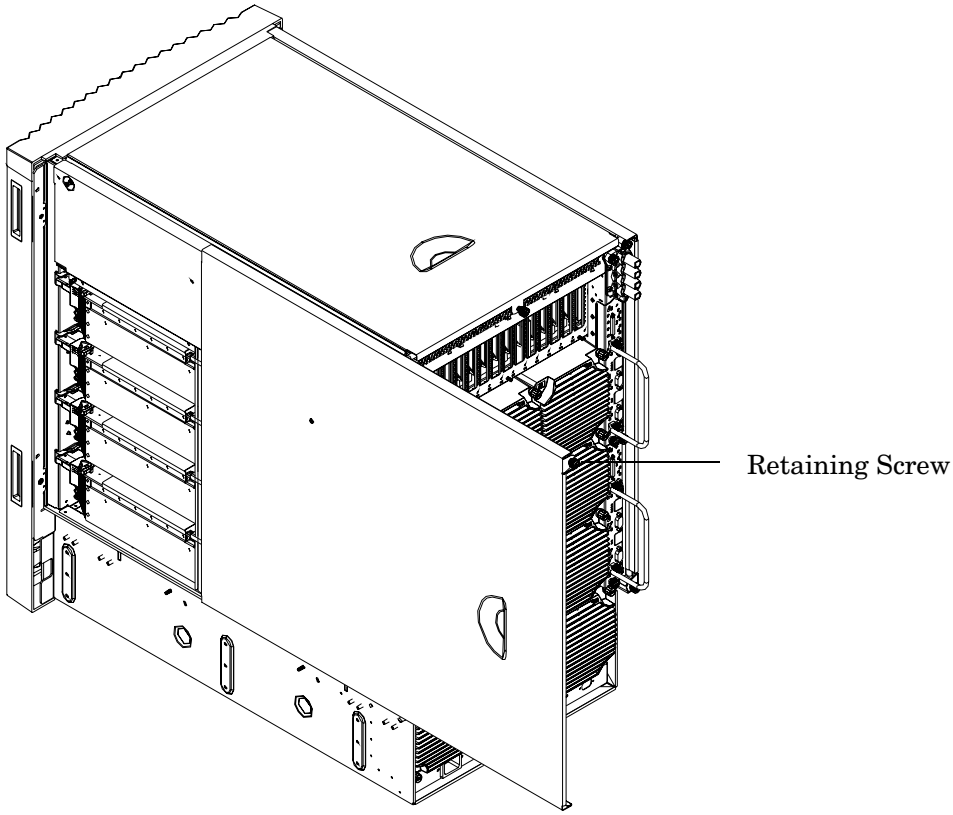
Step 1. Orient the cover according to its position on the chassis.

Step 2. Slide the cover into position using a slow, firm pressure to properly seat the cover.

Step 3. Tighten the blue retaining screws securing the cover to the chassis.

Removing the Side Cover

Figure 6-3 Side Cover Removal Detail



Step 1. Connect to ground with a wrist strap. See “Electrostatic Discharge” on page 128 for more information.

Step 2. Loosen the blue retaining screw securing the cover to the chassis. See Figure 6-3.

Step 3. Slide the cover from the chassis toward the rear of the system.

Step 4. Place the cover in a safe location.

Replacing the Side Cover

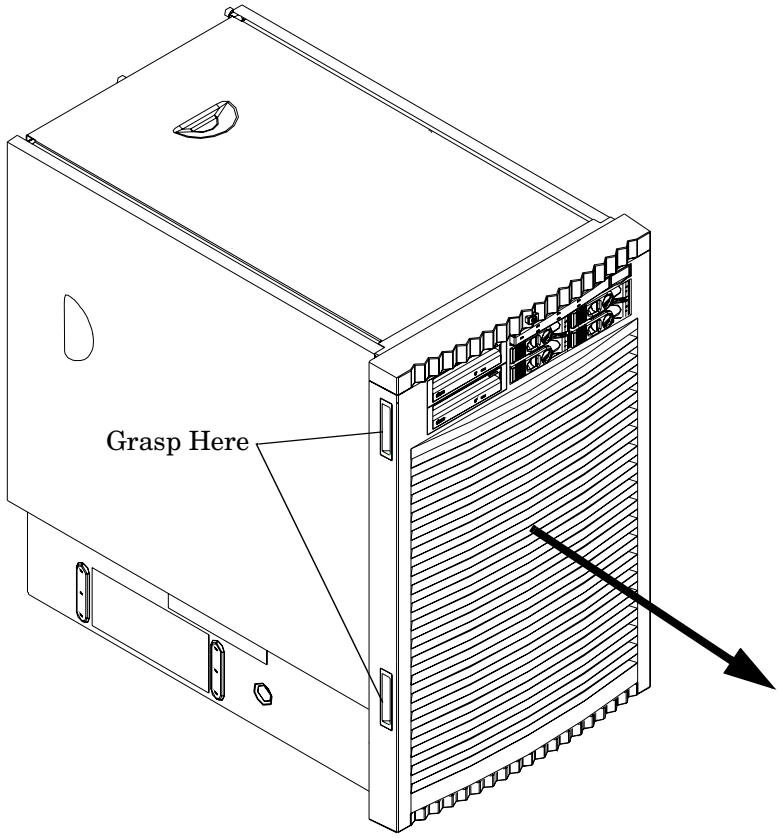
Step 1. Orient the cover according to its position on the chassis.

Step 2. Slide the cover into position using a slow, firm pressure to properly seat the cover.

Step 3. Tighten the blue retaining screw securing the cover to the chassis.

Removing the Front Bezel

Figure 6-4 HP 9000 rp8420 server Bezel Removal and Replacement



Step 1. From the front of the server, grasp both sides of the bezel and pull firmly toward you. The catches will release and the bezel will pull free.

Replacing the Front Bezel

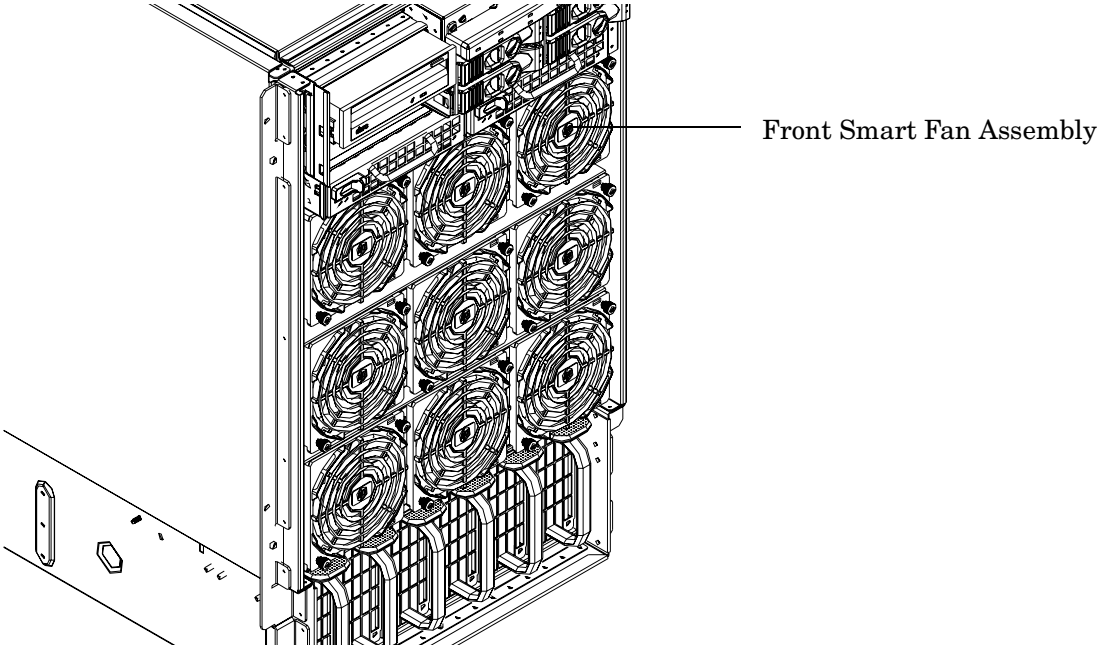
Step 1. If the bezel is being replaced, visually inspect the replacement part for the proper part number.

Step 2. 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 Front Smart Fan Assembly

The front smart fan assembly is located in the front of the chassis. The fan assembly is a **hot-swap** component. See “Hot-Swap CRUs” on page 127 for a list and description of hot-swap CRUs.

Figure 6-5 Front Smart Fan Assembly Location



Preliminary Procedures

These procedures must be completed before removing the front smart fan assembly.

Step 1. Identify the failed fan assembly. Table 6-1 defines the fan LED states.

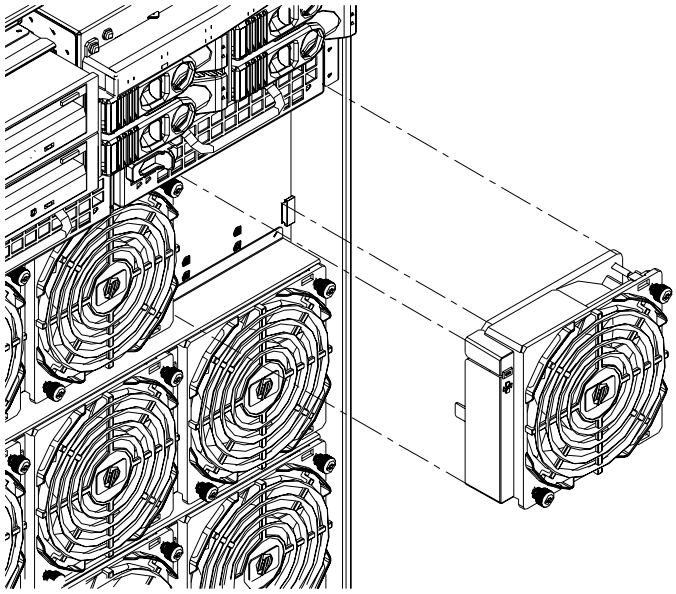
Step 2. Remove the front bezel.

Table 6-1 Smart Fan Assembly LED definitions

LED State	Meaning
On Green	Fan is at speed and in sync or not at speed less than 12 seconds.
Flash Yellow	Fan is not keeping up with speed/sync pulse for greater than 12 seconds.
Red	Fan failed or stalled, has run slow, or fast for greater than 12 seconds.
Off	Fan is not present, or no power is applied to fan, or the fan has failed.

Removing the Front Smart Fan Assembly

Figure 6-6 Front Fan Removal



Step 1. Loosen the two thumb screws securing the fan to the chassis.

Step 2. Slide the fan from the chassis.

Replacing the Front Smart Fan Assembly

Step 1. Position the fan assembly in the chassis.

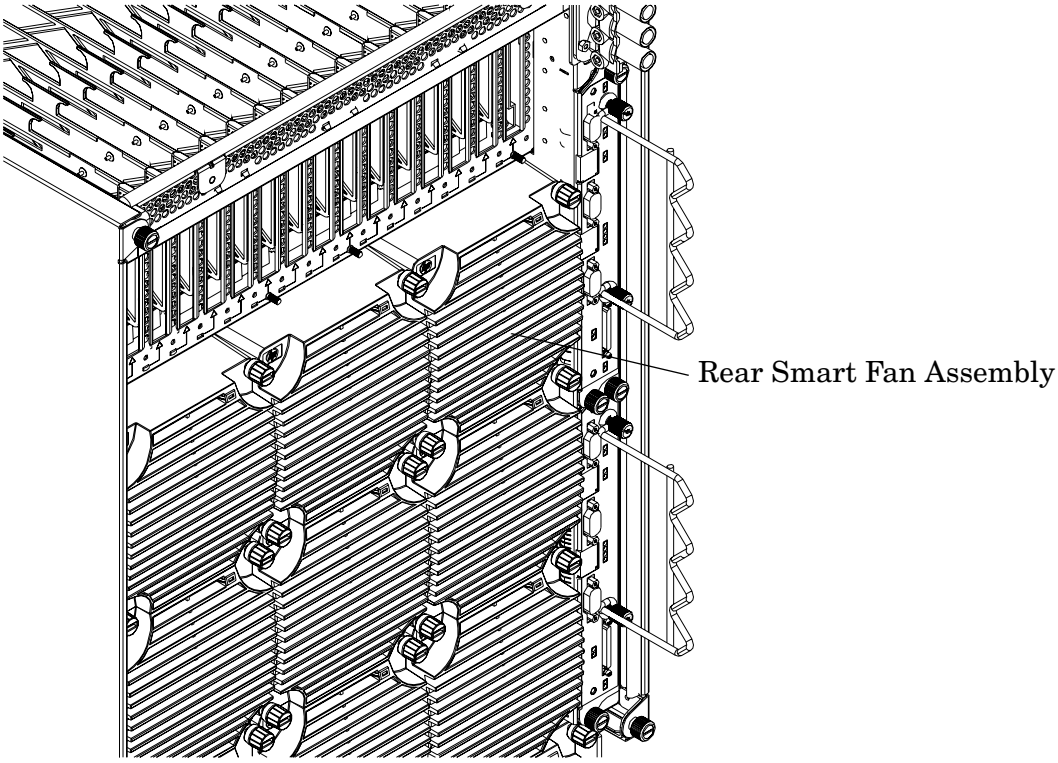
Step 2. Tighten the two thumb screws to secure the fan to the chassis.

Step 3. Check the fan status LED. It should be GREEN. See Table 6-1 for LED definitions.

Removing and Replacing the Rear Smart Fan Assembly

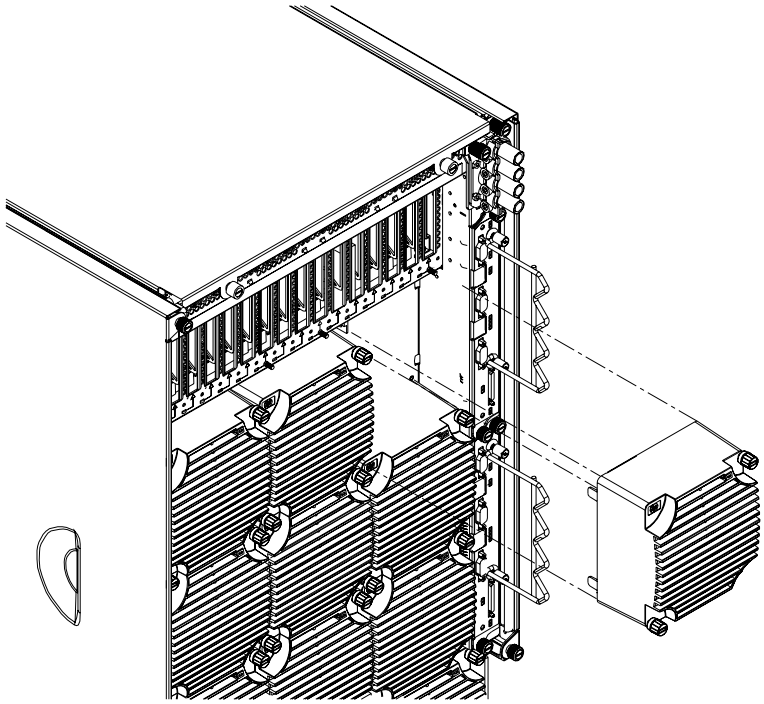
The rear smart fan assembly is located in the rear of the chassis. The fan assembly is a **hot-swap** component. See “Hot-Swap CRUs” on page 127 for a list and description of hot-swap CRUs.

Figure 6-7 Rear Smart Fan Assembly Location



Removing the Rear Smart Fan Assembly

Figure 6-8 Rear Fan Detail



Step 1. Identify the failed fan assembly. Table 6-2 defines the fan LED states.

Table 6-2 Smart Fan Assembly LED Indications

LED State	Meaning
On Green	Fan is at speed and in sync or not at speed less than 12 seconds.
Flash Yellow	Fan is not keeping up with speed/sync pulse for greater than 12 seconds.
Red	Fan failed or stalled, has run slow, or fast for greater than 12 seconds.
Off	Fan is not present, or no power is applied to fan, or the fan has failed.

Step 2. Loosen the two thumb screws securing the fan to the chassis.

Step 3. Slide the fan from the chassis.

Replacing the Rear Smart Fan Assembly

Step 1. Position the fan assembly in the chassis.

Step 2. Slide the fan into the connector.

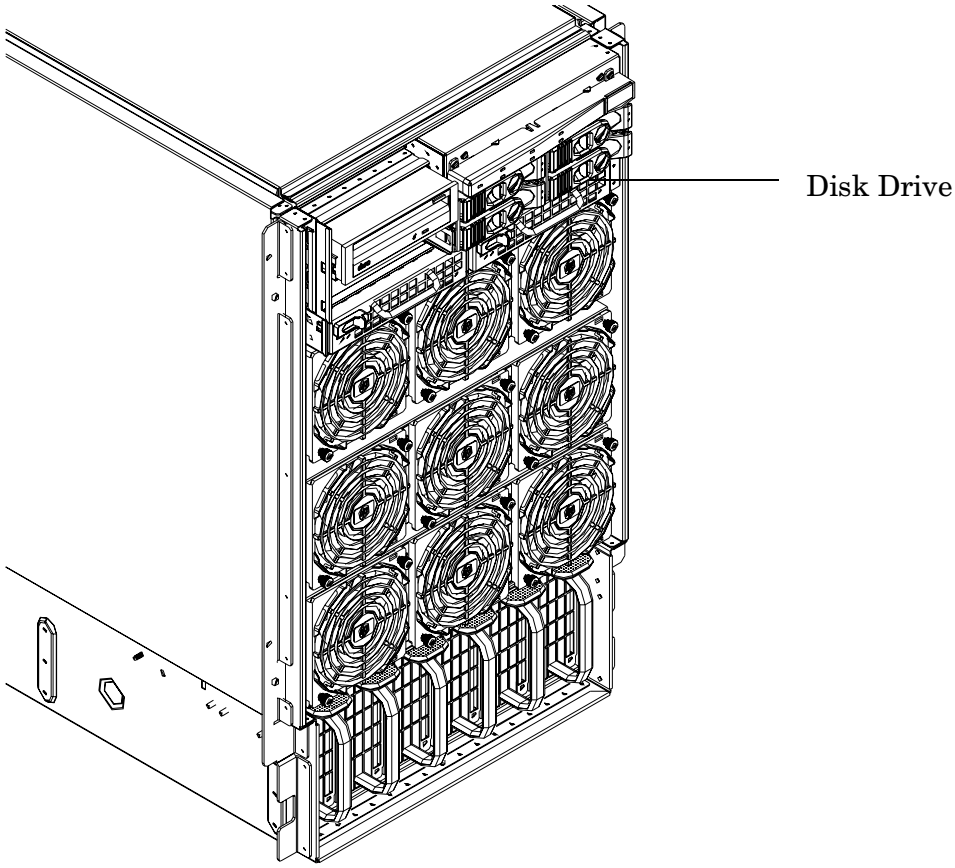
Step 3. Tighten the two thumb screws to secure the fan to the chassis.

The LED should be on solid green. See Table 6-2 on page 139 for a listing of LED definitions.

Removing and Replacing a Disk Drive

The disk drive is located in the front of the chassis. Internal disk drives are **hot-plug** components. See “Hot-Plug CRUs” on page 127 for a list and description of hot-plug CRUs. The top drives correspond to the I/O for Cell 0 and the bottom drives correspond to the I/O for Cell 1.

Figure 6-9 Disk Drive Location

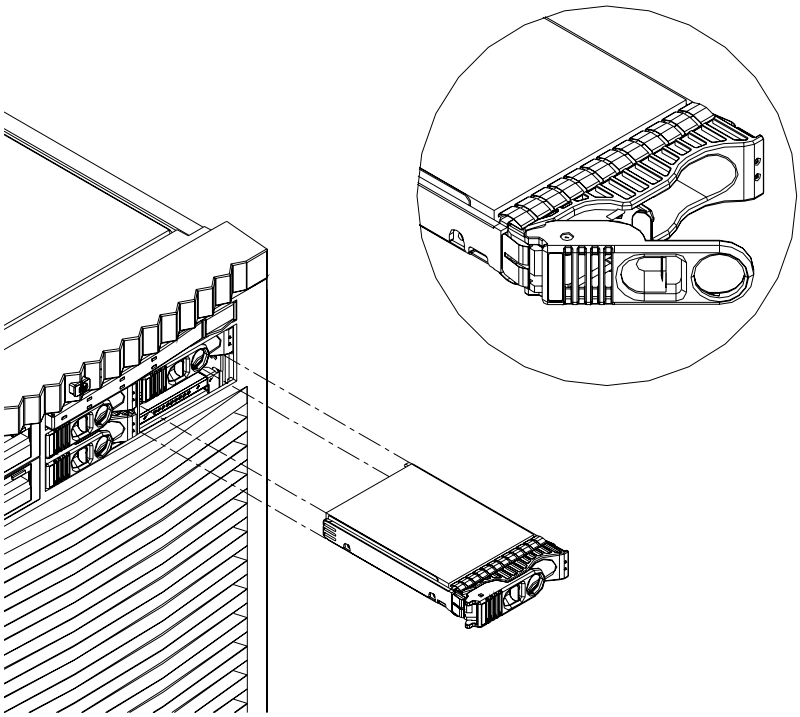


Removing the Disk Drive

Step 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.

Step 2. Pull forward on the front locking latch and carefully slide the disk drive from the chassis.

Figure 6-10 Disk Drive Detail



Replacing the Disk Drive

Step 1. Sometimes `diskinfo` and `ioscan` will display cached data. Running `diskinfo` on the device without a disk installed clears the cached data. Enter the following commands. For the `diskinfo` command, the 'x' s are replaced with actual values.

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

#ioscan -f
```

Step 2. Be sure the front locking latch is open, then carefully position the disk drive in the chassis.

Step 3. Slide the disk drive into the chassis; a slow, firm pressure is needed to properly seat the connection.

Step 4. Depress the front locking latch to secure the disk drive in the chassis.

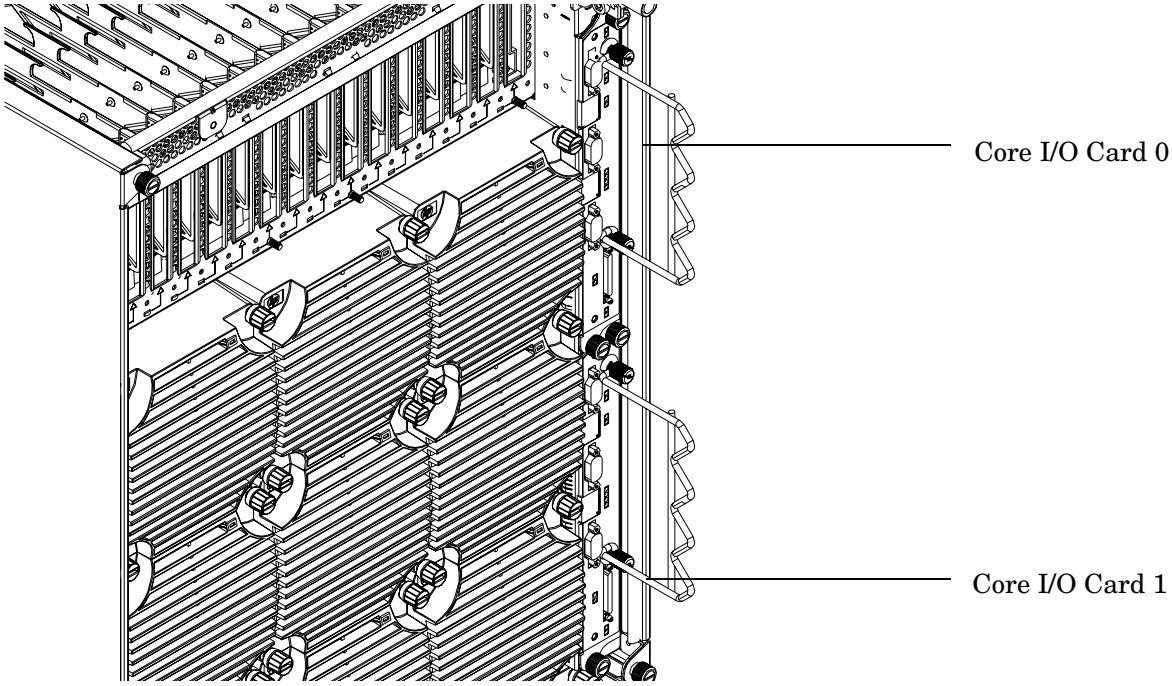
Step 5. Spin up the disk by entering one of the following commands. For the `diskinfo` command, the 'x' s are replaced with actual values.

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

#ioscan -f
```

Removing and Replacing the Core I/O

The core I/O is located in the rear of the chassis. There can be two core I/O boards installed in the server, core I/O 0 and core I/O 1. The core I/O can be replaced while standby power is applied. However, the operating system on the nPartition must be shut down to replace the CRU.

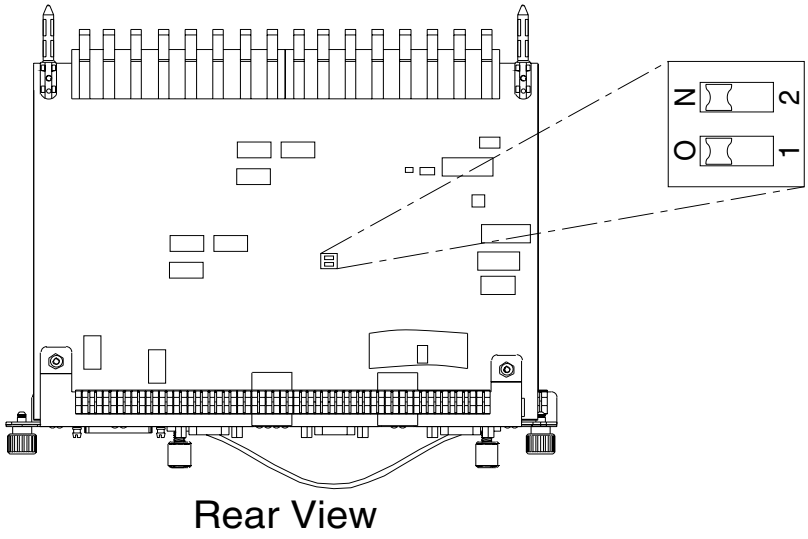
Figure 6-11 Core I/O Location



The core I/O card has a DIP switch positioned at the location shown in Figure 6-12, Core I/O Card Bottom with DIP Switch Location Shown, that must be set prior to operation of the server.

NOTE The Server Expansion Unit (SEU) uses the same core I/O card with DIP switch as the host server. The DIP switch on the core I/O cards installed in the SEU must be set to the same position as the host server.

Figure 6-12 Core I/O Card Bottom with DIP Switch Location Shown



Refer to the following table for the correct switch settings.

System	Dip Switch 1	Dip Switch 2
HP 9000 rp8400 server	On	On
All other servers	Off	Off

IMPORTANT If the igelan and c8xx drivers are not already in the kernel, they must be added before installing the A7109A core I/O cards in the server. The HWE bundle required to enable the card is HWE 0603.

Removing the Core I/O

Step 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.

Step 2. Use the MP:CM> PS, or the MP:CM> DE commands with option G, to determine core I/O board status. Refer to Figure 6-13 and Figure 6-14.

Figure 6-13 PS Command

```
MP:CM> ps

Display detailed status of the selected MP bus device.


The following MP bus devices were found:
+---+----+-----+-------+-------+-----------+
|   |    |     |       |       |           |
|   |    | Sys |       |  IO   | Bulk Pwr  |
|Cab| MP |Bkpln| Cells |Chassis| Supplies  |
| # |M  S|     |0 1 2 3| 0   1 |0 1 2 3 4 5|
+---+----+-----+-------+-------+-----------+
| 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/rp8420

MP is failed over

Attention LED is off
Remote LED is OFF

Battery state is good

Last MP software reset occurred MON JUN 21 10:21:18 2004

MP firmware rev 5.017, built on Jan 14 2004 11:07:23

MP:CM>
```

Figure 6-14 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     :   5.017 built on Jan 14 2004 at 11:07:23
MP failed over  : TRUE
Battery state   : good
Attention LED   : off
Remote LED      : off
Cabinet type    : rp8420

MP Reset Registry
Timestamp      :  MON JUN 21 10:21:18 2004
Task name      :  tTtyContlr
Function name  :  subReset
Line number    :  202
Module errno   :  0
VxWorks errno  :  0x3d0004
Error level    :  Crash
Parameter1     :  0xffffffff
Parameter2     :  0xffffffff

MP:CM> _
```

Step 3. Label and remove all cables connected to the core I/O to be removed.

Step 4. Loosen the two retaining screws securing the assembly to the chassis.

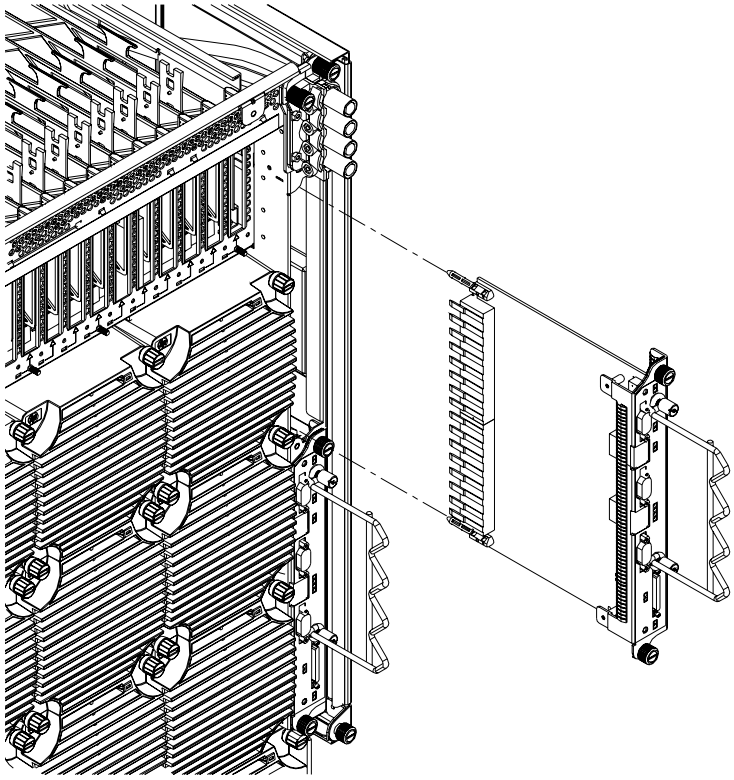
Step 5. Securely grasp the cable strain relief on the core I/O assembly.

Step 6. Slide the core I/O from the chassis.

The core I/O can be gently rocked up and down as it is pulled out of the server to help loosen the core I/O from the server backplane.

Step 7. Remove the cable strain relief from the core I/O assembly and transfer it to the new core I/O assembly.

Figure 6-15 Core I/O Detail



Replacing the Core I/O Assembly

Step 1. Locate the battery on the new MP. Remove the insulating mylar strip. If there is no mylar strip then momentarily break the battery connection to clear any previously stored data that could conflict with your current configuration.

Step 2. Slide the core I/O into the chassis while rocking it gently up and down to mate the two connectors.

Step 3. Tighten the two retaining screws securing the assembly to the chassis.

Step 4. Connect the cables that were labeled and detached during removal of the core I/O.

Step 5. Reset the nPartition with the MP **RR** command. This command will stop the boot process at BIB and allow 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 its 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 Management Processor Network Settings

Table 6-3 lists the default customer LAN network settings for the server.

Table 6-3 Default Configuration for Management Processor Customer LAN

Customer LAN IP Address	192.168.1.1
Customer LAN Host Name	gsp0
Customer LAN Subnet Mask	255.255.255.0
Customer LAN Gateway	192.168.1.1

This procedure (Command Menu, **LC** command) configures the MP's customer LAN network settings from the MP Command Menu.

Step 1. Connect to the server complex MP and enter **CM** to access the Command Menu.

Use `telnet` to connect to the MP, 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. The procedure to modify networking and connect is:

  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:

     `route add 192.168.1.1` *`ClientName`*

     On an HP-UX workstation log in as `root` and use this command:

`/usr/sbin/route add 192.168.1.1 ClientName`

     After reconfiguring the MP networking, remove these network routing table changes with the `route delete` command.

  3. Enter this command to confirm the new network connection to the MP:

```
ping 198.168.1.1 -n 2
```

4. Use the **telnet 192.168.1.1** command from the PC or workstation to connect to the management processor.

Step 2. From the management processor Command menu, enter **LS** to *list* the current network settings, and, if needed, use the **LC** command to *reconfigure* the network settings for the management processor.

The LC command enables modifications to the customer LAN and/or the private LAN configuration.

Cancel all changes to the management Processor LAN configuration at any time by replying **Q** to any of the LC command prompts.

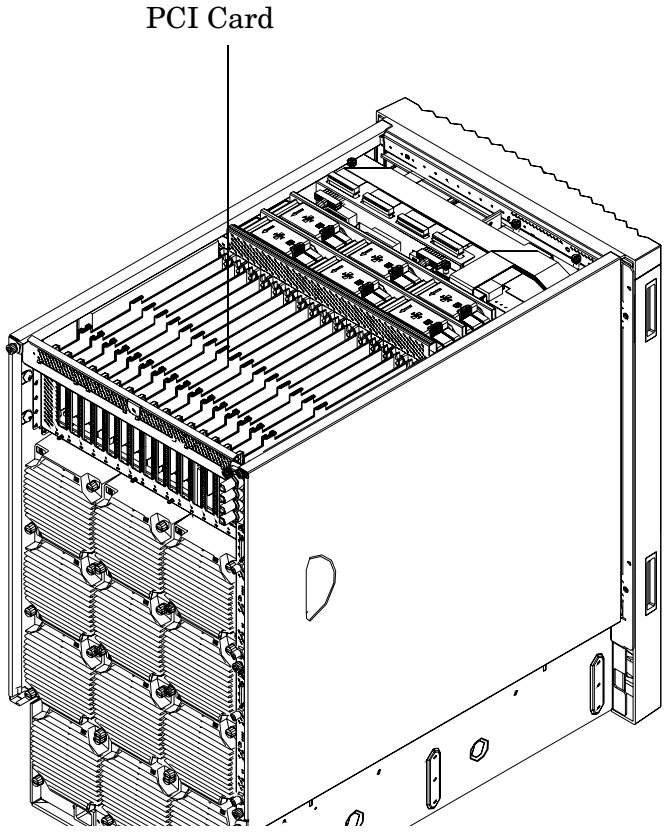
Step 3. Ensure that the MP networking configuration is correct. See “Configuring MP Network Settings” on page 147.

Removing and Replacing a PCI Card

The PCI cards are located in the rear of the chassis in the PCI card cage. PCI cards are **hot-plug** components. See “Hot-Plug CRUs” on page 127 for a list and description of hot-plug CRUs.

IMPORTANT Complete information regarding OL* for I/O cards is on the Web at http://docs.hp.com. Refer to the Interface Card OL* Support Guide for details. It is strongly recommended that you obtain a copy of this guide and refer to it before beginning the removal and replacement of PCI cards.

Figure 6-16 PCI Card Location



Removing the PCI Card

This procedure describes how to perform an ***online replacement*** 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.

NOTE HP 9000 rp8420 servers implement manual retention 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 will allow future OLAR operations to succeed on this PCI slot.

Prerequisites for this procedure:

- The card to be replaced uses the same drivers and is of the same type as the card being replaced.
- The green power LED is steady **ON**.
- The yellow attention LED if steady **OFF** or is blinking if a user has requested the slot location.
- Run the `olrad -q` command to determine the status of all the PCI I/O slots.

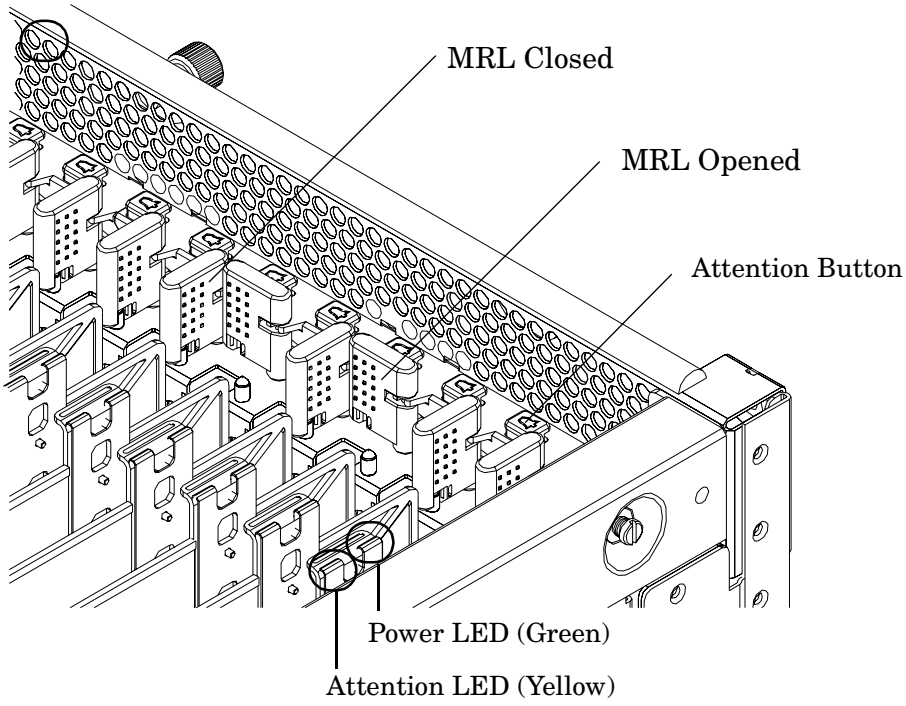
Step 1. Remove the top cover. See “Removing and Replacing Covers” on page 132 for the procedure.

Step 2. Press the attention button. Refer to Figure 6-17.

The green power LED will start to blink and then turn steady **OFF**. If the green power LED does not go **OFF**, then check the hotplugd daemon log file (default: /var/adm/hotplugd.log) for errors and do not proceed further.

NOTE If the attention button is pressed a second time during the first five seconds while the green LED is blinking, the operation is cancelled and the power to the slot will remain on.

Figure 6-17 PCI I/O Slot Details



Step 3. Label and remove the cables connected to the PCI card to be removed.

Step 4. Flip the PCI MRL for the card slot to the open position.

Step 5. Firmly pull up on the tabs on the PCI card separator.

Step 6. Remove the card from the PCI slot.

Replacing the PCI Card

Step 1. Install the new replacement PCI card in the slot.

NOTE Online addition using the attention button does not perform the pre-add sequence of olrad which uses the `olrad -a` command.

Step 2. Flip the PCI MRL for the card slot to the closed position.

Step 3. Press the attention button.

The green power LED will start to blink.

Step 4. Wait for the green power LED to stop blinking and turn solid green.

Step 5. Check for errors in the hotplugd daemon log file (default: /var/adm/hotplugd.log).

Step 6. Connect all cables to the replacement PCI card.

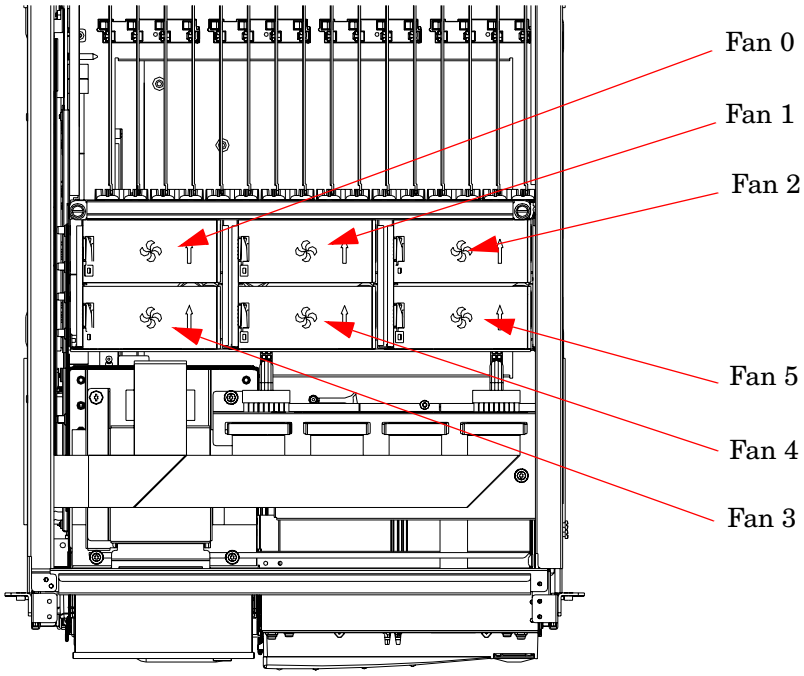
Step 7. Replace the top cover. See “Replacing the Top Cover” on page 133.

The critical resource analysis (CRA) performed while doing an attention button initiated replace 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. Refer to the Interface Card OL* Support Guide located on the Web at http://docs.hp.com for details.

Removing and Replacing a PCI Smart Fan Assembly

The PCI smart fan assembly is located in front of the PCI card cage. The fan assembly is a **hot-swap** component. See “Hot-Swap CRUs” on page 127 for a list and description of hot-swap CRUs.

Figure 6-18 PCI Smart Fan Assembly Location



Preliminary Procedures

These procedures must be completed before removing the PCI smart fan assembly.

Step 1. Identify the failed fan assembly. Table 6-4 on page 154 defines the fan LED states.

Step 2. Connect to ground with a wrist strap. See “Electrostatic Discharge” on page 128 for more information.

Step 3. Remove the top cover. See “Removing and Replacing Covers” on page 132.

Table 6-4 Smart Fan Assembly LED Indications

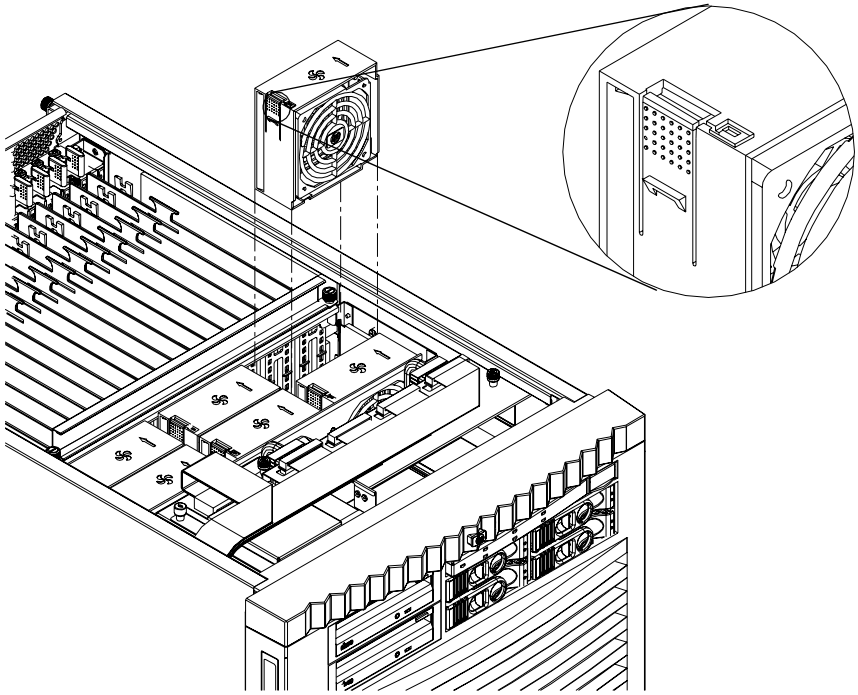
LED State	Meaning
On Green	Fan is at speed and in sync or not at speed less than 12 seconds.
Flash Yellow	Fan is not keeping up with speed/sync pulse for greater than 12 seconds.
Red	Fan failed/stalled, has run slow, or fast for greater than 12 seconds.
Off	Fan is not present, or no power is applied to fan, or the fan has failed.

Removing the PCI Smart Fan Assembly

Step 1. Securely grasp the two thumb holds on the fan assembly.

Step 2. Slide the fan upward from the chassis.

Figure 6-19 PCI Smart Fan Assembly Detail



Replacing the PCI Smart Fan Assembly

Step 1. Position the fan assembly in the chassis.

Step 2. The fan easily slides into the chassis; however, a slow, firm pressure is needed to properly seat the connection.

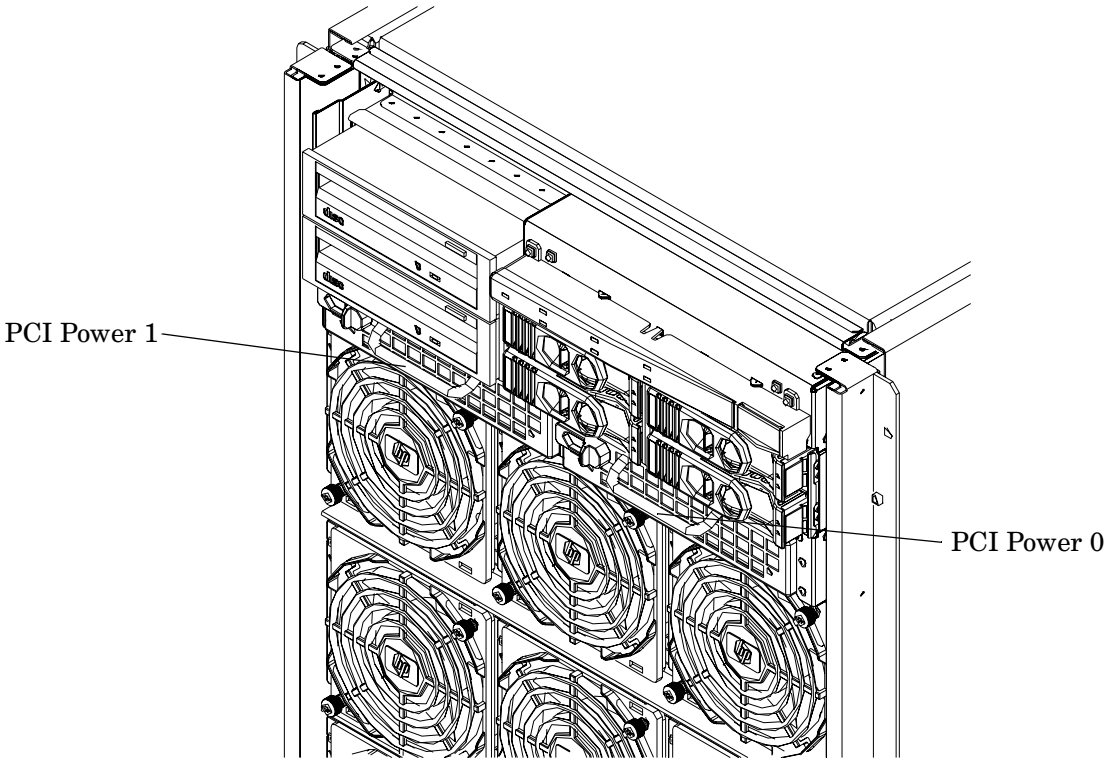
Step 3. Fan status LED should be GREEN when 48V is supplied.

Step 4. Replace the top cover. See “Removing and Replacing Covers” on page 132.

Removing and Replacing a PCI Power Supply

The PCI power supply is located in the front of the chassis. The system power must be removed to replace this CRU. See “Powering down Hardware Components and Powering on the Server” on page 130.

Figure 6-20 PCI Power Supply Location



Preliminary Procedures

These procedures must be completed before removing the PCI power supply.

Step 1. Identify the failed power supply. Table 6-5 identifies the meaning of the PCI power supply LED state.

Table 6-5 PCI Power Supply LED Indications

LED	LED State	Meaning
Power LED (Green)		
	Off	Power supply failure or the power to the respective I/O chassis is OFF.
	On	Normal operation
Fault LED (Multi-color)	Off	Normal operation
	Blink amber	Over temperature condition internal to supply
	Amber	Imminent failure detected
	Blink red	Module internal failure

Step 2. Connect to ground with a wrist strap. See “Electrostatic Discharge” on page 128 for more information.

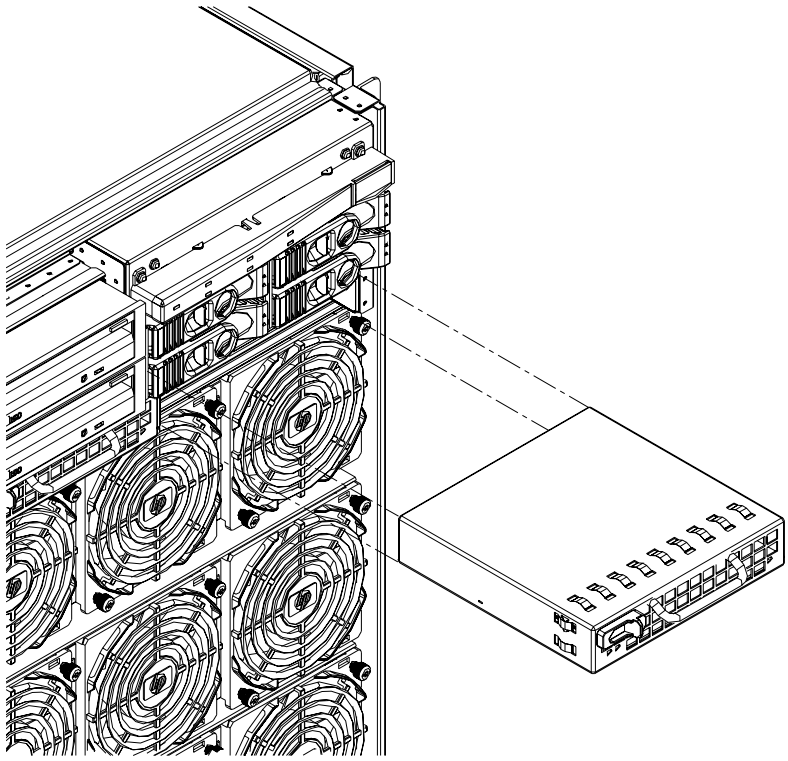
Step 3. Visually inspect the replacement part for proper part number and revision.

Step 4. Shut down the partition and power off the PCI domain.

Step 5. Remove the front bezel. See “Removing the Front Bezel” on page 135.

Removing the PCI Power Supply

Figure 6-21 PCI Power Supply Detail



Step 1. Securely grasp the handle on the front of the power supply.

Step 2. Firmly depress the securing thumb latch.

Step 3. Slide the module from the chassis.

Replacing the PCI Power Supply

Step 1. Slide the power supply in the chassis until the thumb latch clicks into the locked position.

Step 2. The module easily slides into the chassis; however, a slow, firm pressure is needed to properly seat the connection.

Step 3. Release the thumb latch.

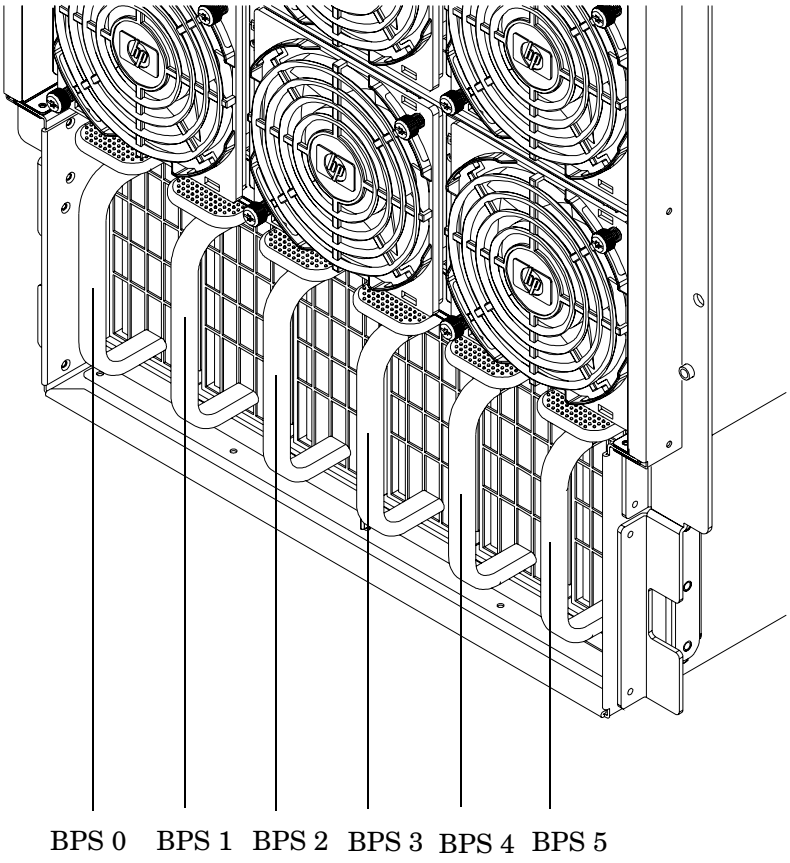
Step 4. Power on the system. Use `PE` and `PS` commands to confirm success.

Step 5. Note the status of the power supply LEDs. Green LED should be ON and the fault LED should be OFF.

Removing and Replacing a BPS

The BPS is located in the front of the chassis. The BPS is a **hot-swap** component. See “Hot-Swap CRUs” on page 127 for a list and description of hot-swap CRUs.

Figure 6-22 BPS Location (Front Bezel Removed)



Removing the BPS

Step 1. Isolate the failing BPS. Table 6-6 defines the states of the single multicolored LED on the BPS.

Table 6-6 BPS LED Definitions

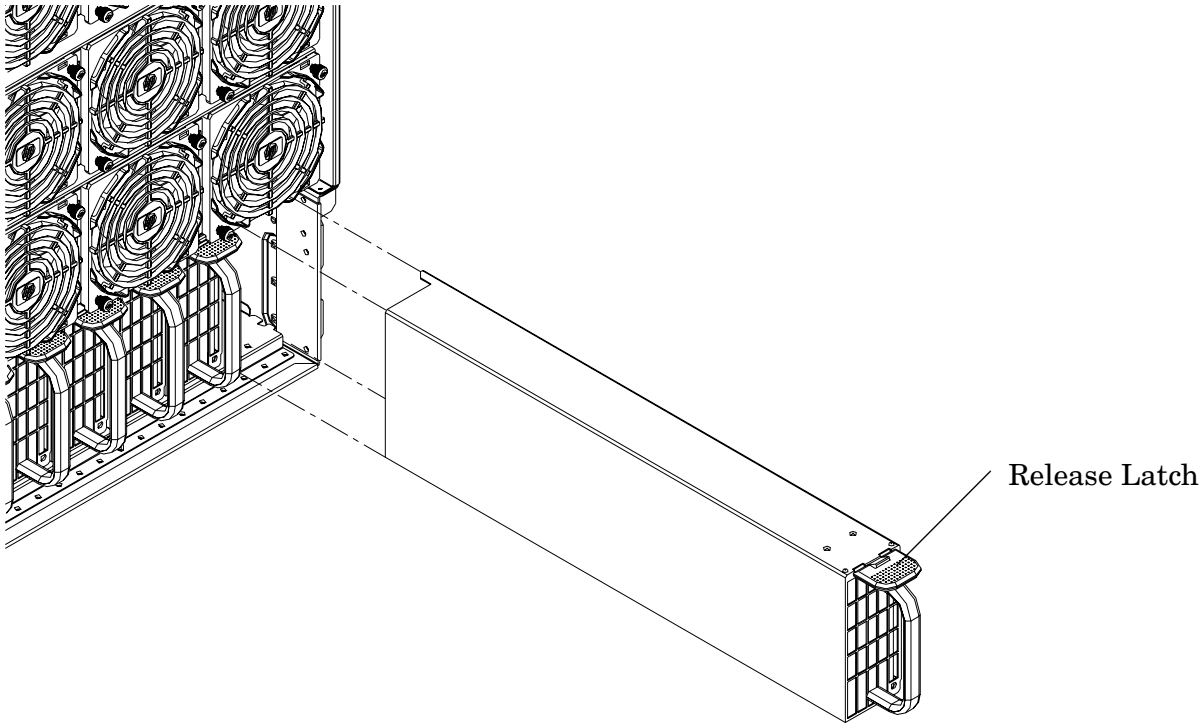
LED State	Description
Blink Green	BPS in standby state and no faults or warnings
Green	BPS in run state (48V output enabled) and no faults or warnings
Blink Yellow	BPS in standby or run state and warnings present but no faults
Yellow	BPS in standby state and recoverable faults present but no non-recoverable faults
Blink RED	BPS state may be unknown, non-recoverable faults present
Red	This LED state is not used
Off	BPS fault or failure (unless AC power is not connected to server)

Step 2. Remove the front bezel.

Step 3. Depress the release latch on the upper-front center portion of the BPS.

Step 4. Slide the BPS forward using the handle to remove it from the chassis.

Figure 6-23 BPS Detail



Replacing the BPS

Step 1. Grip the handle with one hand while supporting the rear of BPS in the other hand.

NOTE The BPS easily slides into the chassis; however, a slow, firm pressure is needed to properly seat the connection.

Step 2. Slide the power supply into the slot until fully seated.

When seated, the release latch will click and lock into place.

Step 3. Note the status of the BPS LED. The LED should be green.

NOTE When a BPS fails and is replaced online, the PS command will sometimes display the cached status data of the BPS. Use the CM>**DE** command to verify the actual state of the BPS.

A Replaceable Parts

This appendix contains the HP 9000 rp8420 server CRU list.

Table A-1 HP 9000 rp8420 server CRU List

CRU Description	Replace Part Number	Exchange Part Number
CABLES		
Power Cord, C19/unterminated International-Europe	8120-6895	N/A
Power Cord, C19/IEC-309 4.5m	8120-6897	N/A
Power Cord, C19/L6-20 4.5m	8120-6903	N/A
Power Cord, C19/GB 1002 4.5m	8121-0070	N/A
C19/C20 4.5m—Jumper	8120-6961	N/A
C19/C20 2.5m—Jumper	8120-6884	N/A
RS-485 Interface Cable (external cable)	A6434-63003	N/A
DISKs and REMOVABLE MEDIA		
Removable DVD Drive	A9879-67001	N/A
36GB 15K RPM SCSI Disk (A9880A)	A9896-64001	A9896-69001
72GB 15K RPM SCSI Disk (A9881A)	A9897-64001	A9897-69001
146GB 10K RPM Disk (A9882A)	A9898-64001	A9898-69001
Removable DAT 40i (DDS4) Tape Drive	C5686-67204	C5686-67204
FANS		
Front Smart Fan Assembly	A6093-67017	N/A
Rear Smart Fan Assembly	A6093-67018	N/A
KITS		
Cable Management Towel Rack Kit	A6093-04046	N/A
Removable Media Rail Kit	A6752-67011	N/A
AC Cable Strain Relief Kit	N/A	A6093-67029
POWER SUPPLIES		
rp8400 Power Supply (Exchange)	0950-3794	A6093-69021
PCI Power Module	0950-3819	A6093-69123
MISCELLANEOUS		
PCI Filler Plate	5001-6892	N/A
Top Cover Assembly	A6093-04120	N/A
Internal Disk Filler	A6198-60003	N/A
DVD Filler Box	A6912-00014	N/A

Table A-1 HP 9000 rp8420 server CRU List (Continued)

CRU Description	Replace Part Number	Exchange Part Number
Bezel (graphite color)	A6912-04009	N/A
rp8420 Nameplate	A6912-40002	N/A
Snap Bezel Attach	C2786-40002	N/A

B System Specifications

This chapter describes the basic system configuration and its physical specifications and requirements.

Dimensions and Weights

This section provides dimensions and weights of the server and server components.

Table B-1 HP 9000 rp8420 server Dimensions and Weights

	Stand-alone	Packaged
Height–Inches (centimeters)	29.55 (75.00)	86.50 (219.70)
Width–Inches (centimeters)	17.50 (44.50)	40.00 (101.60)
Depth–Inches (centimeters)	30.00 (76.20)	48.00 (122.00)
Weight–Pounds (kilograms)	368.00[a] (166.92)	813.00[b] (368.77)

a. This weight represents a fully-configured server before it is installed in a rack.
b. The packaged weight represents a server installed in a 2-m rack. The packaged weight includes a fully configured server in a 2-m rack with a rear door, rail slide kit, line cord anchor kit, interlock assembly, cable management arm, 120 lb ballast kit, and a 60A PDU. The shipping box, pallet, and container, not included in the packaged weight in Table B-1, adds approximately 150 lb to the total system weight when shipped. The size and number of miscellaneous pallets will be determined by the equipment ordered by the customer.

Table B-2 provides component weights for calculating the weight of a server not fully configured. Table B-6 on page 174 provides an example of how to calculate the weight. Table B-7 on page 174 is a blank worksheet for calculating the weight of the server.

Table B-2 HP 9000 rp8420 server Component Weights

Quantity	Description	Weight (lb/kg)
1	Chassis	131.00 (59.42)
1	System backplane	20.0 (9.07)
1	PCI-X card cage assembly	20.40 (9.25)
2	PCI-X power supply	5.00 (2.27) each
6	Bulk power supply	12.00 (5.44) each
1	Mass storage backplane	1.00 (0.45)
1–4	Cell board	27.80 (12.61) each
1–4	Hard disk drive	1.60 (0.73) each
1–2	Removable media disk drive	2.20 (1.00) each

Electrical Specifications

This section provides electrical specifications for the HP 9000 rp8420 server.

Grounding

The site building shall provide a safety ground and protective earth for each AC service entrance to all cabinets.

Install a protective earthing (PE) 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 described is to 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.

Circuit Breaker

The Marked Electrical for the HP 9000 rp8420 server is 15 amps per line cord. 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 9000 rp8420 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 9000 rp8420 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 9000 rp8420 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 an HP 9000 rp8420 server system. Each power cord is 15 feet (4.5m) in length with an 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
8120-6903	Male NEMA L6-20, 240 volt	North America/Japan
8121-0070	Male GB-1002, 240 volt	China

System Power Specifications

Table B-4 and Table B-4 list the AC power requirements for the HP 9000 rp8420 server. These tables provide information to help determine the amount of AC power needed for your computer room.

Table B-4 Power Requirements

Requirements	Value	Comments
Nominal input voltage	200–240 VAC	
Minimum operating voltage	180 VAC	
Maximum operating voltage	269 VAC	
Frequency range (minimum–maximum)	50/60 Hz	
Number of phases	1	
Rated line current	15 A	Per line cord
Maximum inrush current	54 A peak for 20 ms	Per line cord
Dropout carry-through time at minimum line voltage	20 ms	
Circuit breaker rating	20A	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	5000	5100	See #1 below
Marked Electrical Power	---	5400	30A @ 180 VAC, see note #2
Typical Maximum Power	3489	3560	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.

Environmental Specifications

This section provides the environmental, power dissipation, noise emission, and air flow specifications for the HP 9000 rp8420 server.

Temperature and Humidity

The cabinet is actively cooled using forced convection in a Class C1-modified environment. The recommended humidity level for Class C1 is 40 to 55% relative humidity (RH).

Operating Environment

The system is designed to run continuously and meet reliability goals in an ambient temperature of 5° C–35° C at sea level. The maximum allowable temperature is derated 1° C per 1,000 feet of elevation above 5,000 feet above sea level up to 30° C at 10,000 feet. For optimum reliability and performance, the recommended operating range is 20° C to 25° C. This meets or exceeds the requirements for Class 2 in the corporate and ASHRAE standard.

Environmental Temperature Sensor

To ensure that the system is operating within the published limits, the ambient operating temperature is measured using a sensor placed on the server backplane. Data from the sensor is used to control the fan speed and also to initiate system overtemp shutdown.

Non-Operating Environment

The system is designed to withstand ambient temperatures between -40° C to 70° C under non-operating conditions.

Cooling

Internal Chassis Cooling

The cabinet incorporates front-to-back airflow across the system backplane. Nine 120-mm fans mounted externally on the front chassis wall behind the cosmetic front bezel push air into the unit. Twelve 120-mm fans housed in cosmetic plastic fan carriers and mounted externally to the rear chassis wall pull air through the unit.

Each fan 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 (BPS) 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 though upward facing vents near the rear of the supply. The air is then ducted out of the rear of the chassis.

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 off of 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. Separation is provided between the PCI bulkheads to allow 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 will run at a portion of full speed during standby to remove the resulting heat from the cabinet. The fans within the power supply will operate at full speed during standby.

Typical Power Dissipation and Cooling

Table B-5 provides calculations for configurations as described in the table.

Table B-5 Typical HP 9000 rp8420 server Configurations

Cell Board	Memory per Cell Board	PCI Cards (assumes 10W each)	DVDs	Hard Disk Drives	Core I/O	Bulk Power Supplies	Typical Power	Typical Cooling
Qty	GBytes	Qty	Qty	Qty	Qty	Qty	Watts	BTU/hour
4	16	16	2	4	2	6	3560	12154
4	8	16	2	4	2	6	3140	10720
4	4	8	0	2	2	6	2857	9754
2	16	16	2	4	2	4	2185	7460
2	8	8	0	2	2	4	1809	6176
2	4	8	0	2	2	4	1750	5975
1	4	8	0	1	1	3	1134	3871

The air-conditioning data in Table B-5 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. Refer to the applicable documentation for such devices to determine the power and air conditioning that is required to support these devices.

Acoustic Noise Specification

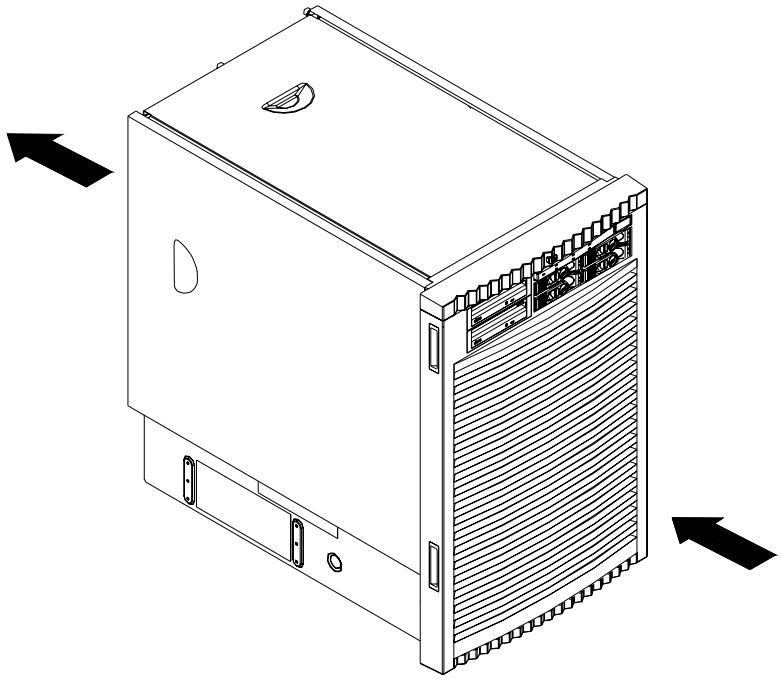
The acoustic noise specification for the HP 9000 rp8420 server is 55.6 db (sound pressure level at bystander position). It is appropriate for dedicated computer room environments, not office environments. The LwA is 7.4 Bels. Care should be taken to understand the acoustic noise specifications relative to operator positions within the computer room or when adding servers to computer rooms with existing noise sources.

Air Flow

The recommended HP 9000 rp8420 server cabinet air intake temperature is between 68° F and 77° F (20° C and 25° C) at 560 CFM.

illustrates the location of the inlet and outlet airducts on a single cabinet. Air is drawn into the front of the HP 9000 rp8420 server and forced out the rear.

Figure B-1 Air Flow Diagram



Power Distribution Unit

The server may ship with a power distribution unit (PDU). There are two 60A PDUs available for the HP 9000 rp8420 server. Each PDU is mounted horizontally between the rear columns of the server cabinet. The 60A PDUs are delivered with an IEC-309 60A plug.

The 60A NEMA[1] PDU has four 20A circuit breakers and is constructed for North American use. Each of the four circuit breakers has two IEC[2]-320 C19 outlets providing a total of eight IEC-320 C19 outlets.

The 60A IEC PDU has four 16A circuit breakers and is constructed for International use. Each of the four circuit breakers has two IEC-320 C19 outlets providing a total of eight IEC-320 C19 outlets.

Each PDU is 3U high and is rack-mounted in the server cabinet.

Documentation for installation will accompany the PDU. The documentation can also be found at the external Rack Solutions Web site at http://www.hp.com/racksolutions. This PDU might be referred to as a Relocatable Power Tap outside HP.

The PDU installation kit contains the:

- PDU with cord and plug
- Mounting hardware
- Installation instructions

1. The acronym NEMA stands for National Electrical Manufacturers Association.

2. The acronym IEC stands for International Electrotechnical Commission.

Weight

To determine overall weight, follow the example in Table B-6, then complete the entries in Table B-7.

Table B-6 Example Weight Summary

Component	Quantity	Multiply By	Weight (kg)
Cell Board	4	27.8 lb (12.6)	107.20 lb (48.64)
PCI Card (varies—used sample value)	4	0.34 lb (0.153)	1.36 lb (0.61)
Bulk Power Supply (BPS)	6	12 lb (5.44)	72 lb (32.66)
DVD Drive	2	2.2 lb (1.0)	4.4 lb (2.0)
Hard Disk Drive	4	1.6 lb (0.73)	6.40 lb (2.90)
Chassis with skins and front bezel cover	1	131 lb (59.42)	131 lb (59.42)
		Total weight	322.36 lb (146.22)

Table B-7 Weight Summary

Component	Quantity	Multiply By	Weight (kg)
Cell Board		27.8 lb (12.6)	lb ( )
PCI Card		varies lb (varies)	lb ( )
Bulk Power Supply (BPS)		12 lb (5.44)	lb ( )
DVD Drive		2.2 lb (1.0)	lb ( )
Hard Disk Drive		1.6 lb (0.73)	lb ( )
Chassis with skins and front bezel cover		131 lb (59.42)	lb ( )
		Total weight	lb ( )

C MP Commands

This appendix contains a list of the Server Management Commands.

Server Management Commands

Table C-1 lists the server management commands.

Table C-1 Service Commands

Command	Description
BO	Boot a partition
DATE	Set the time and date
DF	Display FRU Information of an entity
MA	Return to Main Menu
PE	Power entities on or off
PWRGRD	Allows user to configure the power grid
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
LOC	Display and Set Locator LED status

Table C-2 lists the server status commands

Table C-2 Status Commands

Command	Description
CP	Display partition cell assignments
DE	Display entity status
DU	Display devices on bus
HE	Display the list of available commands
LS	Display LAN connected console status
PS	Display detailed power and hardware configuration status

Table C-3 lists the server system and access config commands

Table C-3 System and Access Config Commands

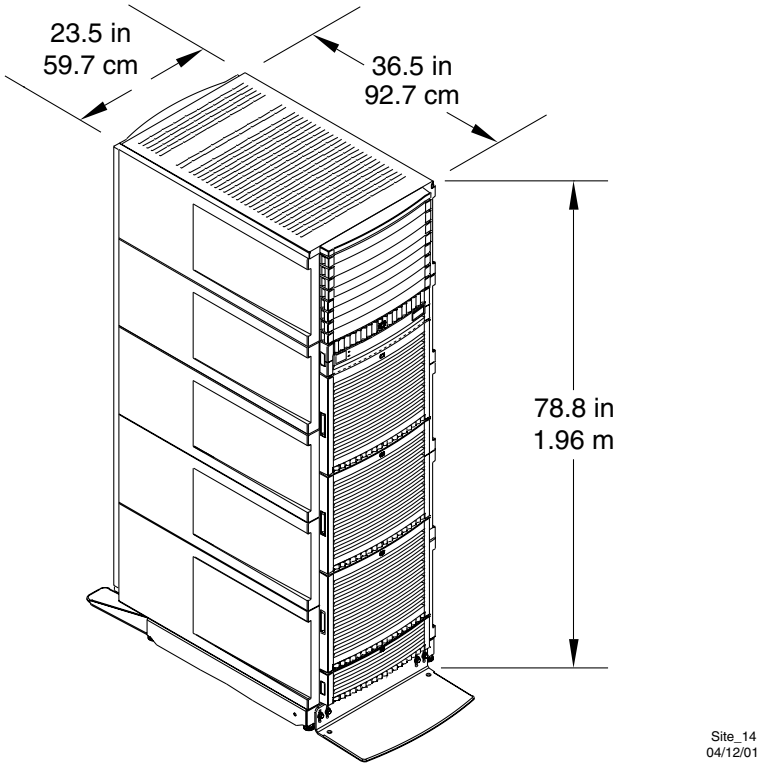
Command	Description
CA	Only displays local rs232 parameters
CC	Initiate a Complex Configuration
UPS	Set parameters for ups monitoring via SNMP
SNMP	Set SNMP daemon parameters
CP	Display partition cell assignments
DC	Reset parameters to default configuration
DI	Disconnect Remote or LAN console
ID	Change 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
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

D Templates

This appendix contains blank floor plan grids and equipment templates. Combine the necessary number of floor plan grid sheets to create a scaled version of the computer room floor plan.

Figure D-1 illustrates the overall dimensions required for an HP 9000 rp8420 server.

Figure D-1 HP 9000 rp8420 server Space Requirements



Equipment Footprint Templates

Equipment footprint templates are drawn to the same scale as the floor plan grid (1/4 inch = 1 foot). These templates 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:

Step 1. Remove several copies of the floor plan grid.

Step 2. Cut and join them together (as necessary) to create a scale model floor plan of your computer room.

Step 3. Remove a copy of each applicable equipment footprint template.

Step 4. Cut out each template selected in step 3; then place it on the floor plan grid created in step 2.

Step 5. Position 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.

NOTE Attach a reduced copy of the completed floor plan to the site survey. HP installation specialists use this floor plan during equipment installation.

Figure D-2 HP 9000 rp8420 server Cabinet Template

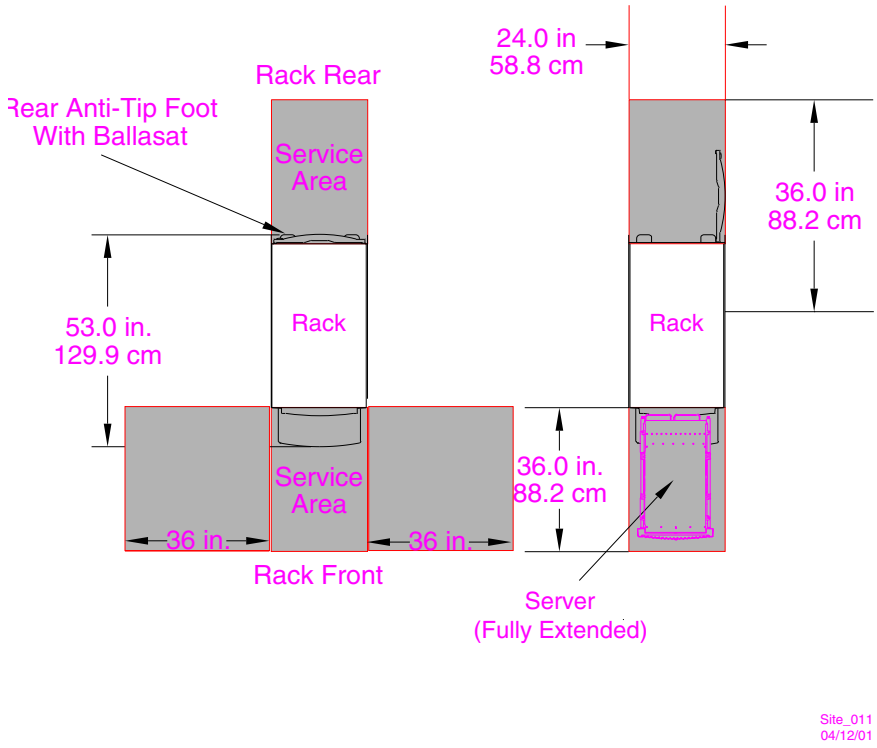
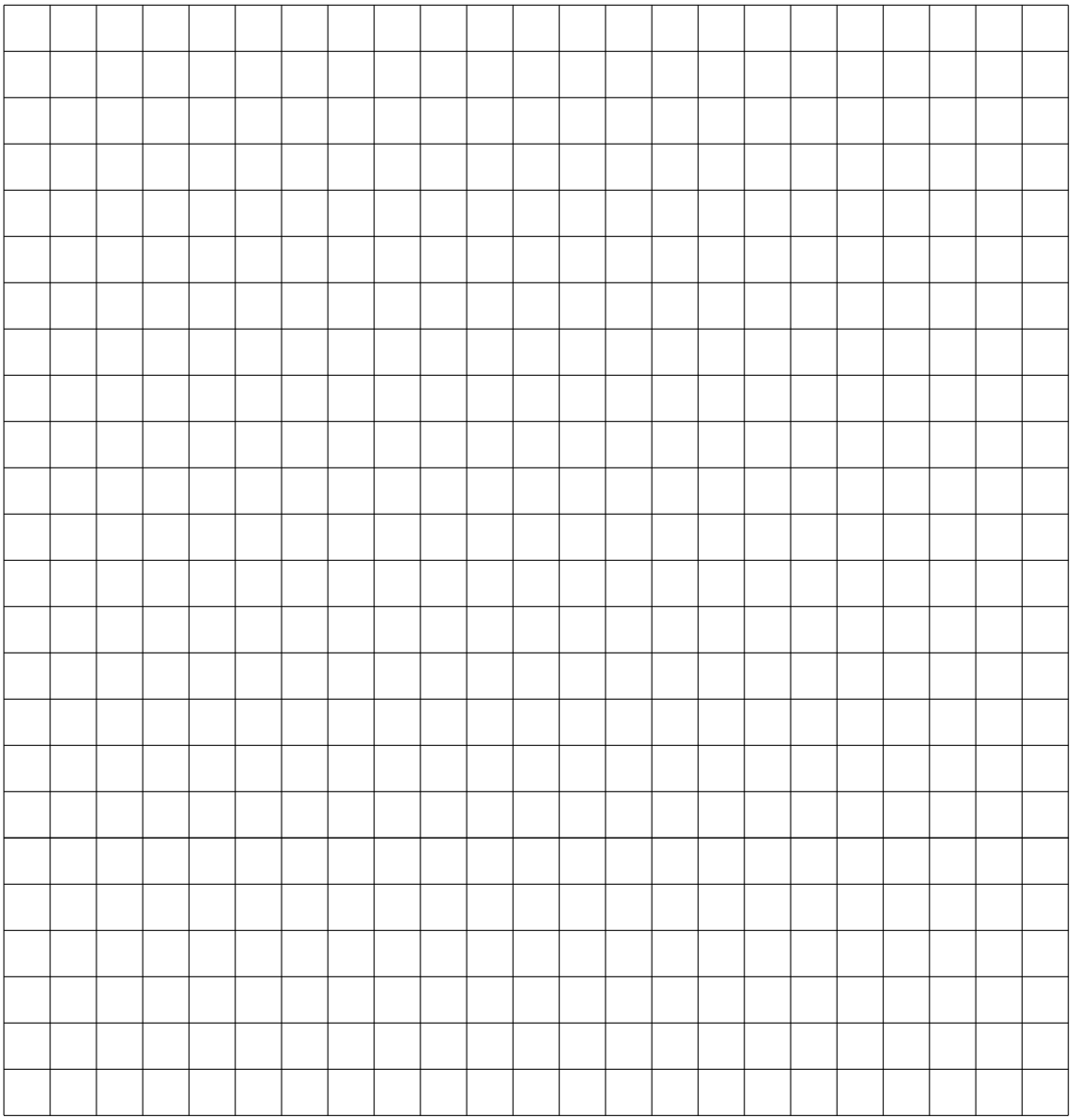


Figure D-3 Planning Grid

Scale: 1/4 inch = 1 foot



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12/20/99

Figure D-4 Planning Grid

Scale: 1/4 inch = 1 foot

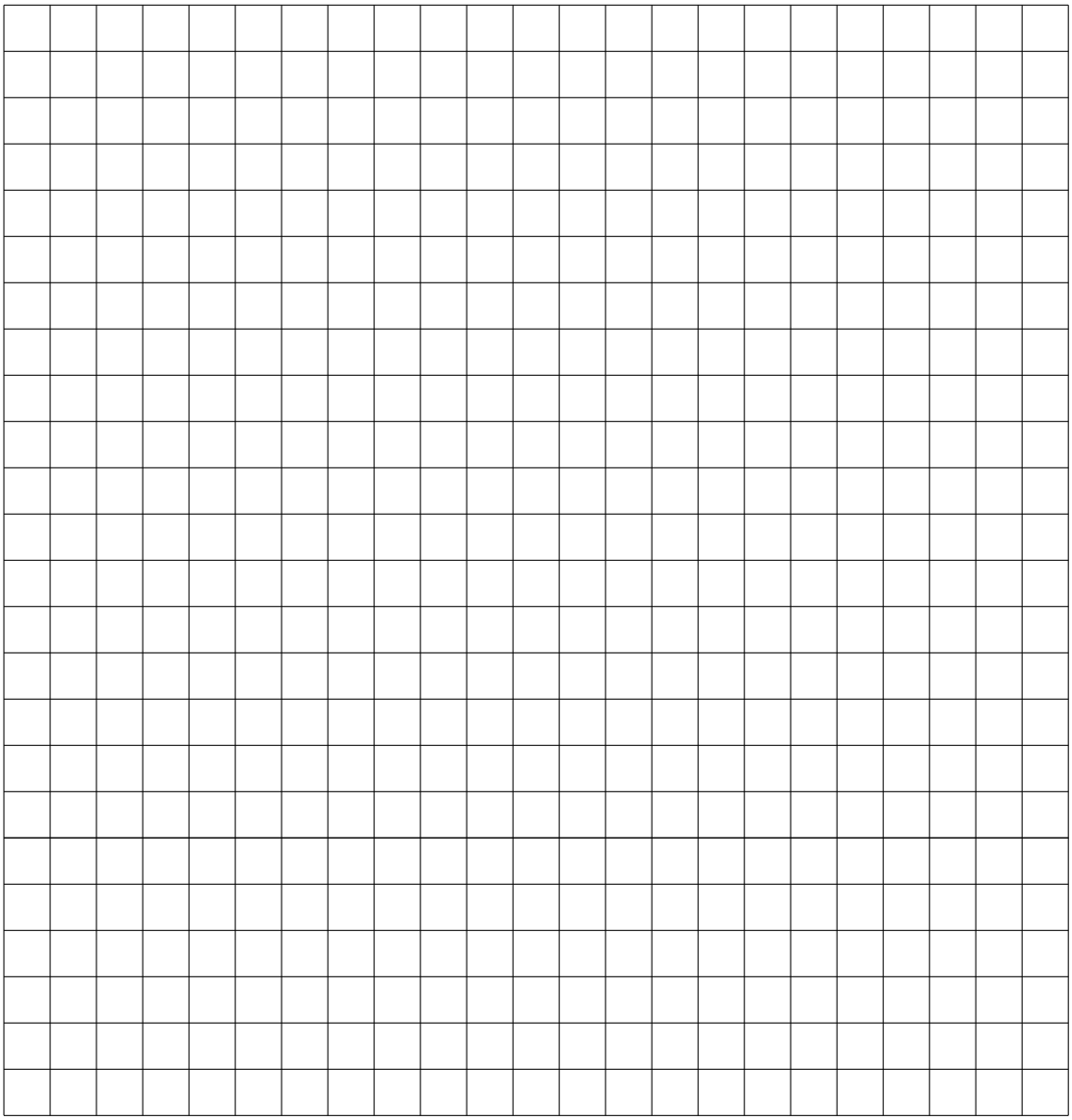

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Figure D-5 Planning Grid

Scale: 1/4 inch = 1 foot

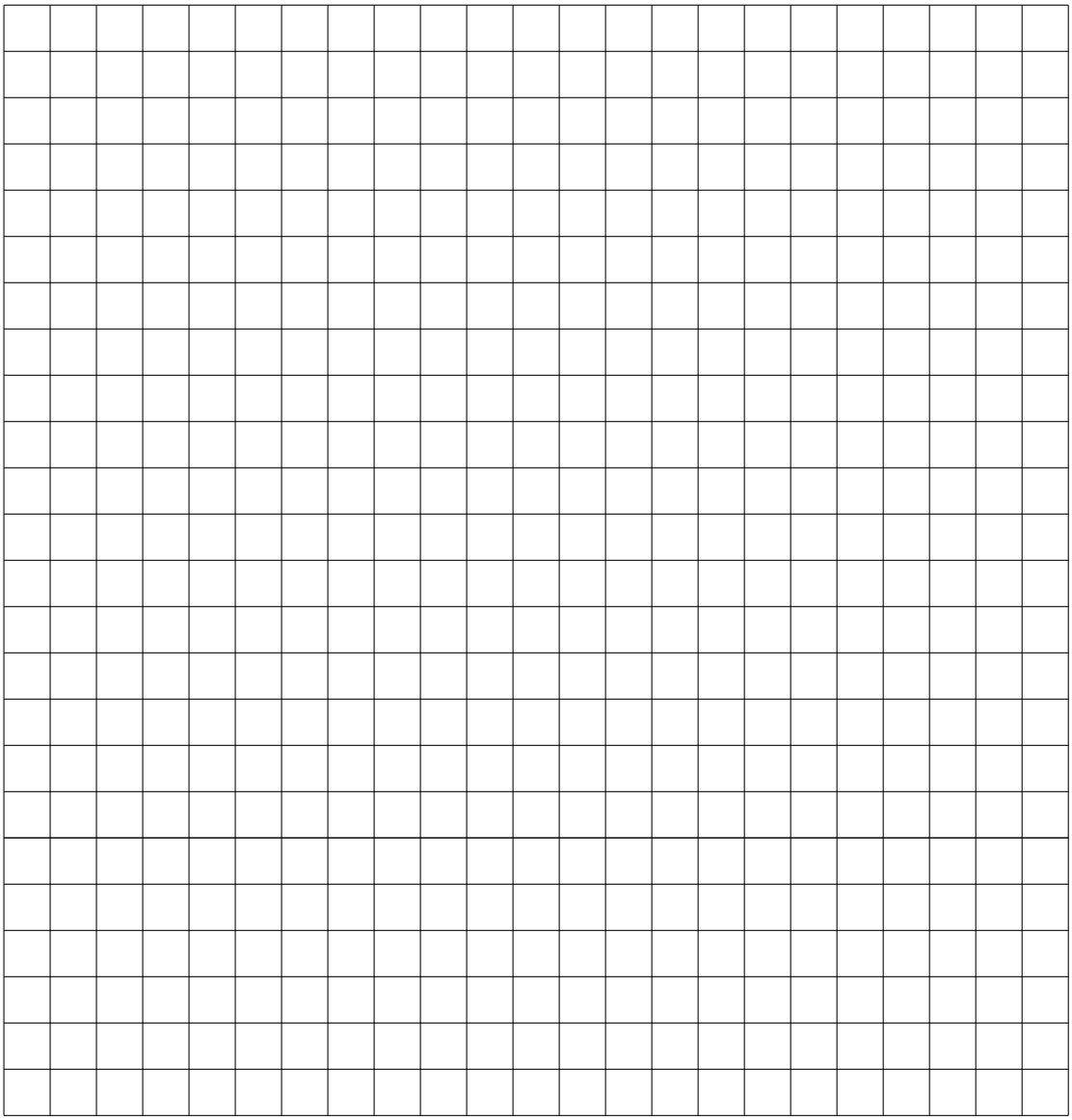

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Figure D-6 Planning Grid

Scale: 1/4 inch = 1 foot

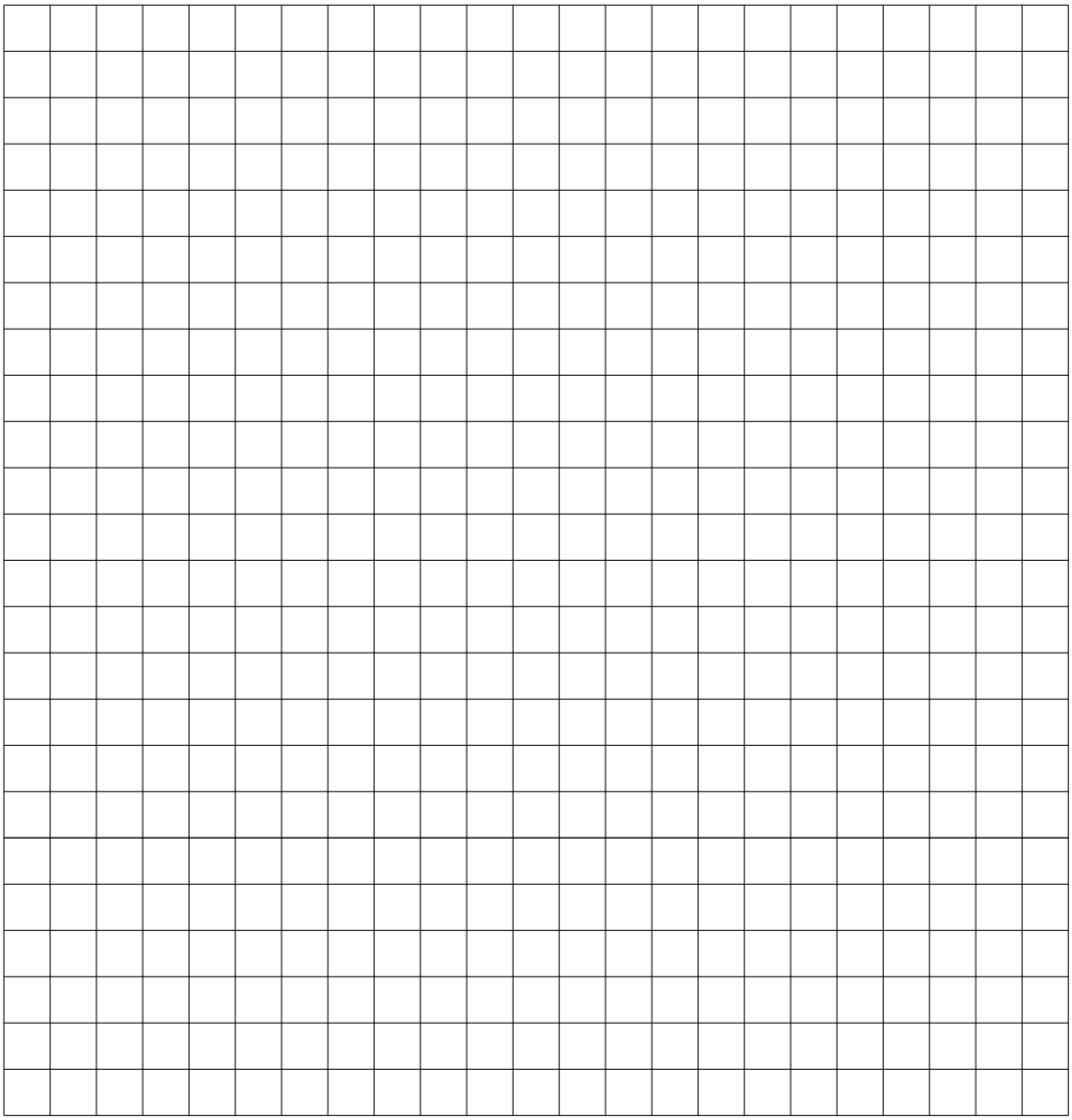

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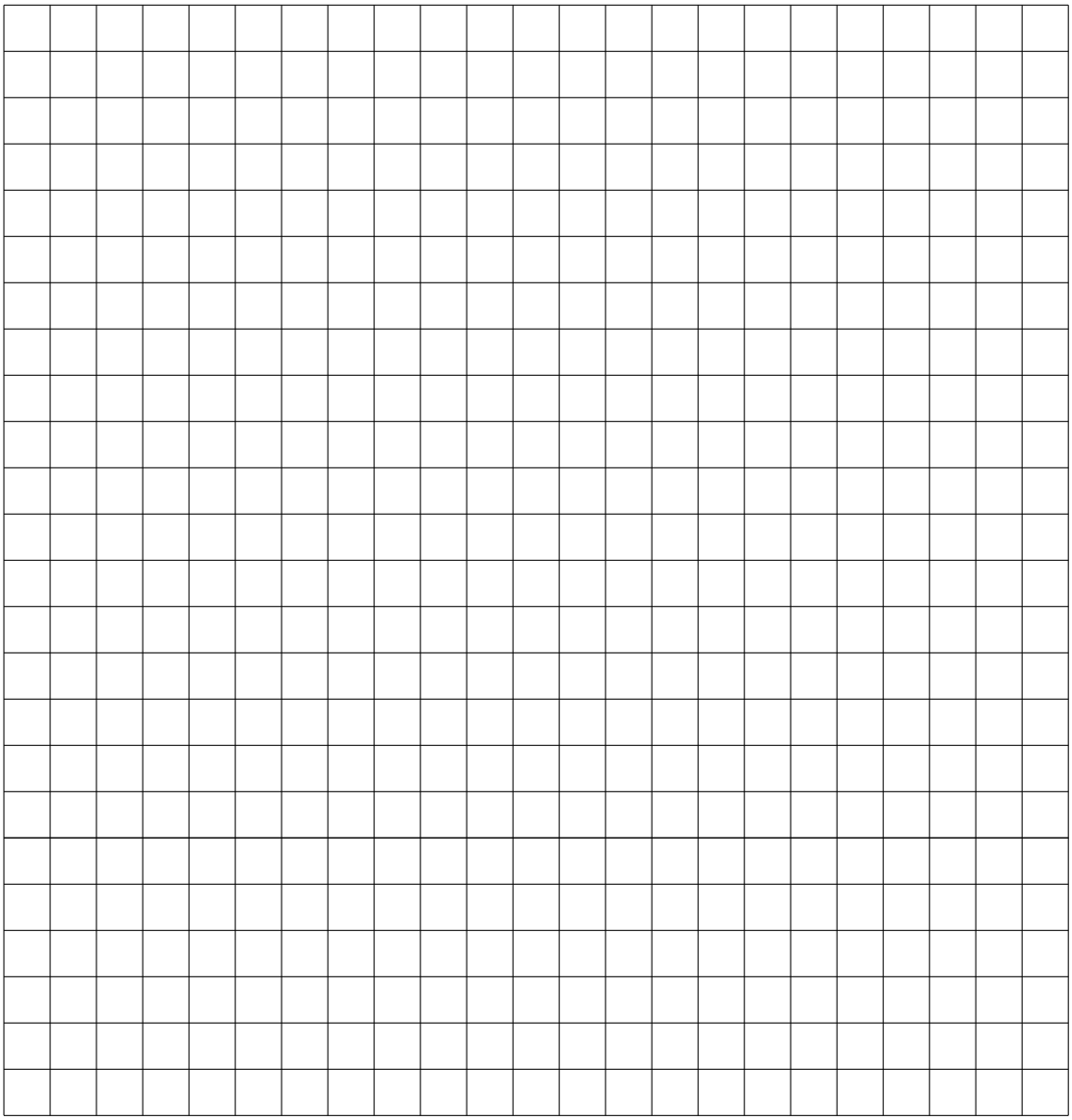
Figure D-7 Planning Grid

Scale: 1/4 inch = 1 foot



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12/20/99