

# **User Guide**

## **rp5400 Family of Servers**

**First Edition**



i n v e n t

**Manufacturing Part Number : A5191-96018**

**November 2002**

USA

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## Preface

### Printing History

The Printing History below identifies the edition dates of this manual. Updates are made to this publication on an unscheduled, *as needed*, basis. The updates will consist of a complete replacement manual and pertinent on-line or CD-ROM documentation.

First Edition ..... November 2002

### What's New?

The, *Upgrade Guide, rp5400 Family of Servers*, is new and was developed to provide customers with system maintenance information for those components called customer replaceable units (CRUs). Maintenance of CRUs does not require HP customer engineering services, except when specifically cautioned. The cautions are shown primarily to protect customer product warranties.



---

# **1 Server Overview**

The rp5400 family of servers are 1-way to 4-way servers based on the PA-RISC processor architecture. The rp5400 family of servers accommodate up to 16GB of memory and internal peripherals including disks and DVD ROM/Tape. High availability features include HotSwap fans and power supplies, and HotPlug internal disk drives. The supported operating system is HP-UX.



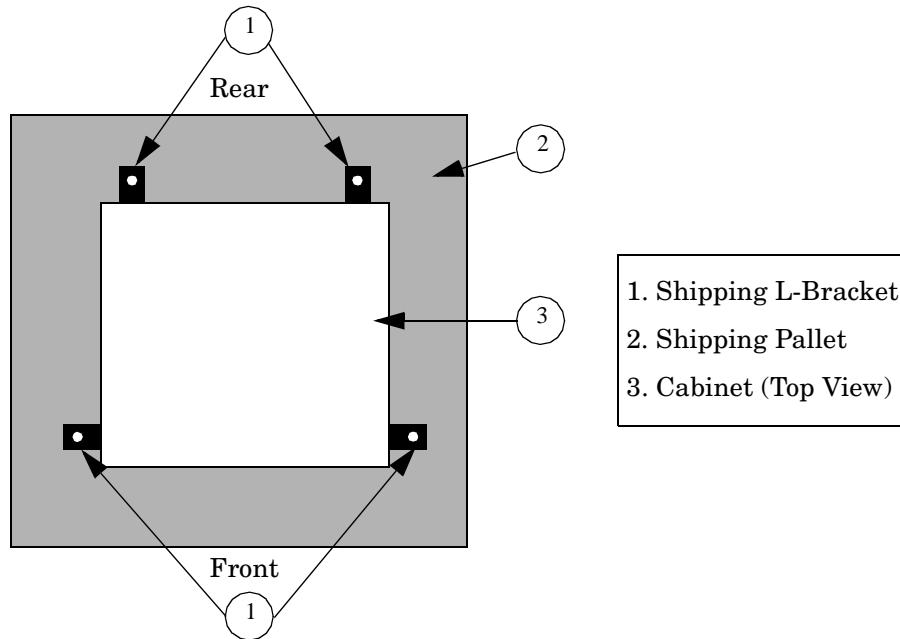
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## **2 Server Unpacking and Installation**

## Factory Integrated rp54xx Cabinet Installation

A factory integrated server is one in which the rp54xx server and associated components are pre-assembled and shipped from the factory already installed in a Hewlett-Packard E-Series cabinet. Factory integrated systems reduce the amount of time required to set-up and begin server operation.

1. Carefully remove the carton and anti-static bag from the pallet.
2. Remove the front two (2) L-brackets. Retain the 1/2-inch bolts for later use.



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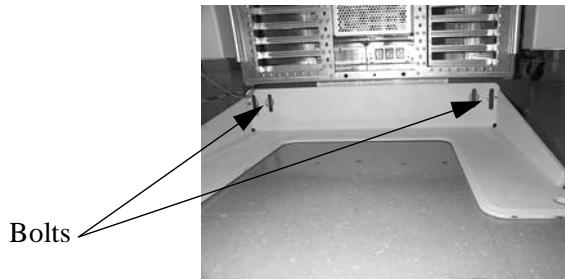
**NOTE**

As viewed from the front, one bracket is located on each side at the base of the cabinet near the front.

---

3. At the rear of the cabinet:

- a. Open the door.
- b. Remove the anti-tip foot by removing and retaining the two (2) 1/2-inch bolts.



For Shipping:  
L-brackets are  
mounted behind  
anti-tip foot.  
Same bolts  
secure both.

- c. Remove the two (2) L-brackets (revealed by removing the anti-tip foot).

4. Remove the two ramps from the pallet and carefully place them into the slots at the front of the pallet.

---

**WARNING** **Use extreme care when rolling the racked system down the ramps. A rack containing one rp54xx can weigh up to 418 lbs. Do not stand in front of the ramps when rolling the cabinet off the pallet or injury may occur. All but the smallest configurations require two persons to safely remove the rack from the pallet.**

**If anti-tip feet or ballast are not installed or are improperly installed the cabinet can tip. Failure to follow this precaution can cause injury to personnel or damage to equipment.**

---

5. Straighten the rollers on the cabinet base, if needed, and carefully roll it down the ramps.

---

**WARNING** *After removing the server from the pallet, Do not move the cabinet unless the anti-tip feet are installed! The cabinet can tip if care is not used. Due to their low ground clearance the feet may catch on irregularities on the floor, thresholds, or ramps.*

*Do not move the cabinet without first installing the anti-tip feet. The cabinet may tip if moved without the anti-tip feet or ballast installed.*

*Do not move the cabinet after installing the anti-tip feet unless they are in the fully-raised position. Once installed, the anti-tip feet must be fully raised to allow ground clearance.*

**Because of their low ground clearance, the fully-raised anti-tip feet may need to be removed temporarily to clear some obstacles such as door jambs, ramps, and other large irregularities or obstructions on the floor.**

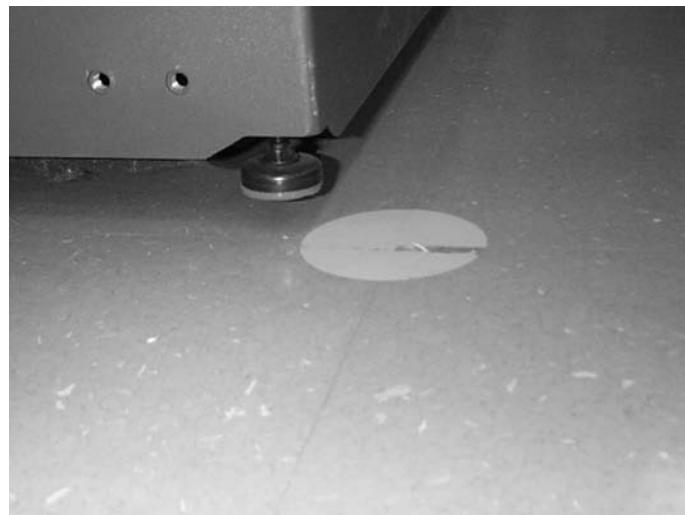
**If you must temporarily remove the anti-tip feet to clear an obstacle, use extreme caution when moving the cabinet. Always reinstall the anti-tip feet as soon as the obstacle has been cleared.**

**Lower and secure both the anti-tip feet and the cabinet leveling/stabilizer feet once the cabinet is in place.**

**Failure to follow these precautions can result in equipment damage or personal injury.**

---

6. Install the front and rear anti-tip feet using the 1/2 inch bolts provided. Ensure that the anti-tip feet are installed in the fully up position in the mounting slots. This will provide maximum ground clearance while moving the cabinet to its final position.
7. Carefully move the cabinet to its installation location.
8. Lower the anti-tip feet to the fully down position and adjust the cabinet leveling feet for best cabinet stability.



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## Receive and Unpack A Non-Integrated Server

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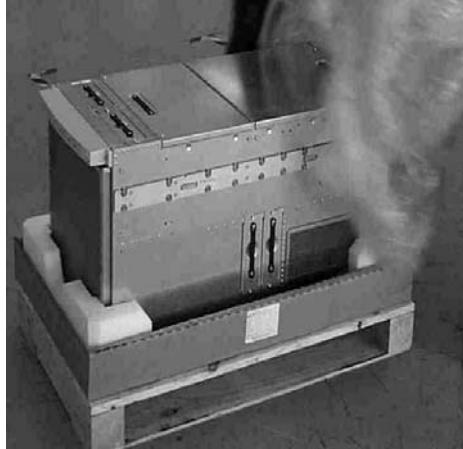
**WARNING** The typical rp54xx system can weigh up to 68kg (150lbs). *HP recommends using an approved lifting device.* Lift and move the server in accordance with all local safety regulations. Failure to follow this precaution can cause injury to personnel or damage to equipment.

---

### Unpacking the server

The following procedure describes the steps involved in unpacking the server, whether to function as a stand-alone Deskside unit, or to be integrated into a cabinet.

**Step 1.** Remove the shipping carton and anti-static bag from the server as depicted below.



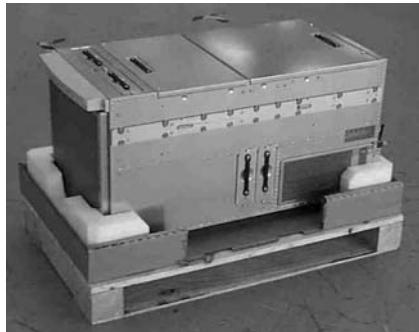
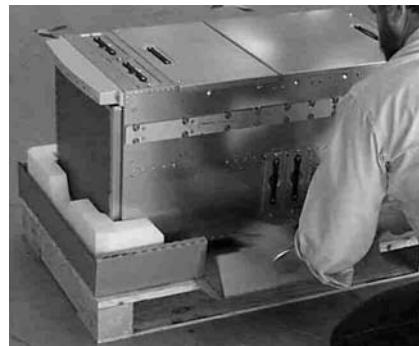
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**NOTE** The packaging for rp74xx and rp54xx servers is the same, rp74xx is shown.

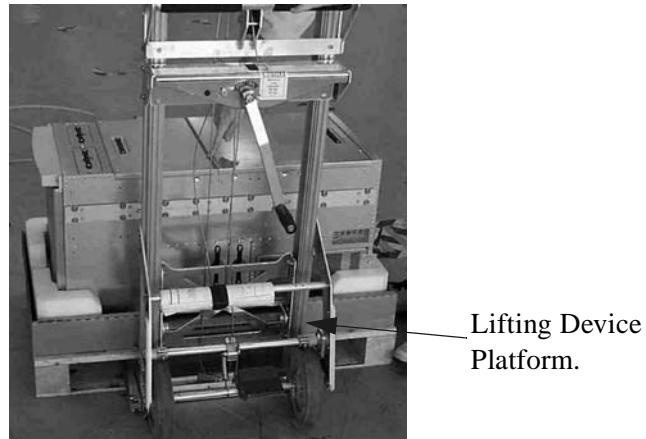
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**Step 2.** If you are moving the server manually, use three people to lift the server from the packing material and pallet. Carefully move the server to the selected location.

**Step 3.** If you are moving the server by an approved lifting device (such as Genie Lift™), remove the tear flap from the front lip of the carton bottom to allow access to the server, as illustrated below. Removal of the tear flap will reveal a slot between the bottom of the server and the inside bottom of the cardboard box.



**Step 4.** Carefully raise the lift's platform so that it will slide into the slot located ***under*** the center of the server, but ***over*** the top of the pallet.



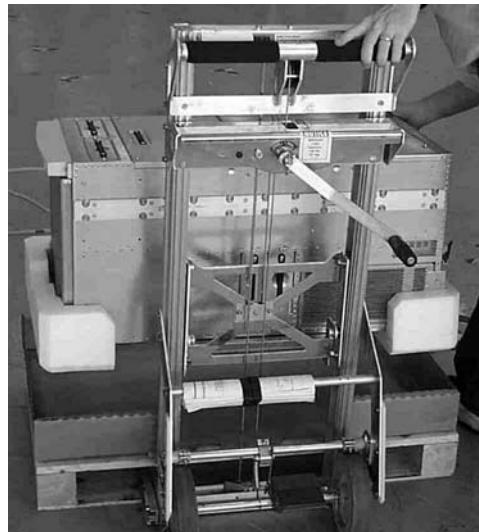
Lifting Device Platform.

---

**NOTE** The server's center of gravity will vary with the hardware configuration, but it is generally located slightly behind the middle of the server.

---

**Step 5.** Raise the lifting device platform enough for the server to clear the pallet and packing materials, as show below.



## Install Deskside Server

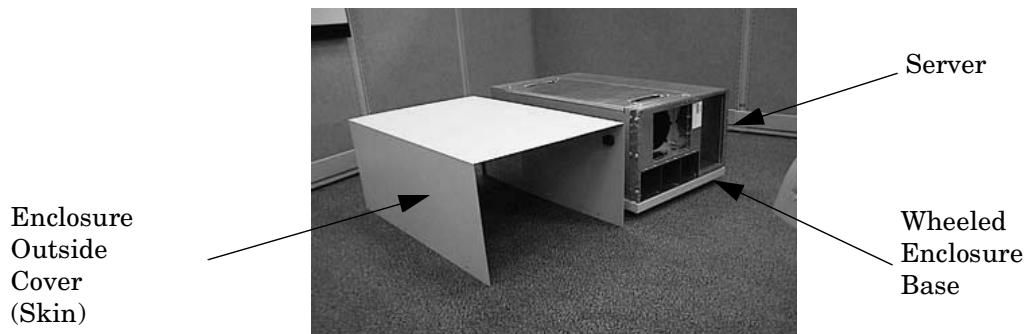
The following section describes the installation of a server into a Deskside enclosure for installation in an office environment.

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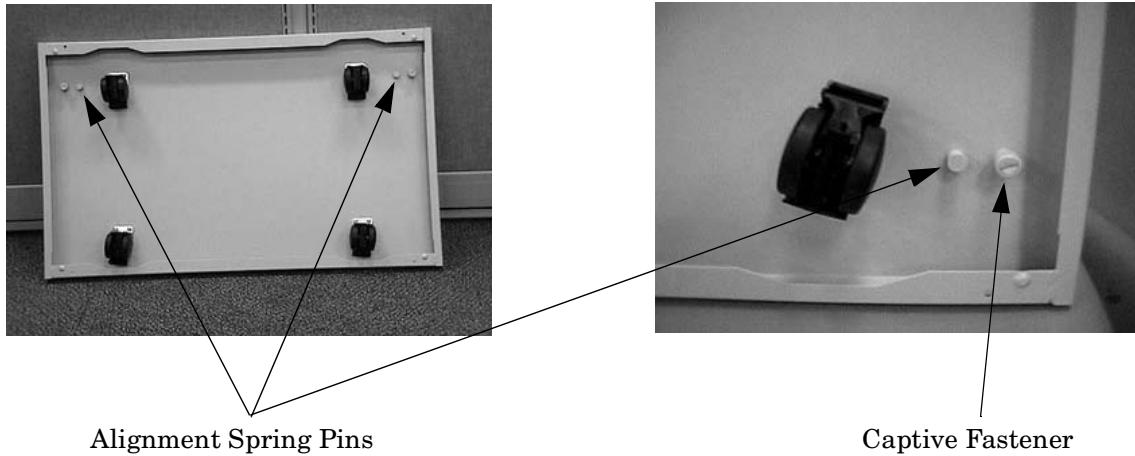
- WARNING** The typical rp54xx system can weigh up to 68kg (150lbs). *HP recommends using an approved lifting device.*
- Lift and move the server in accordance with all local safety regulations.
  - Do not attempt to lift the server by the plastic handles on the top and side covers.
- Failure to follow these precautions can cause injury to personnel or damage to equipment.**
- 

**Step 1.** Unpack the server.

**Step 2.** Unpack the deskside enclosure.



- 
- NOTE** Ensure that the positioning spring pins in the enclosure base align with the alignment holes in the bottom of the server.



**Step 3.** Position the server on the wheeled enclosure base.

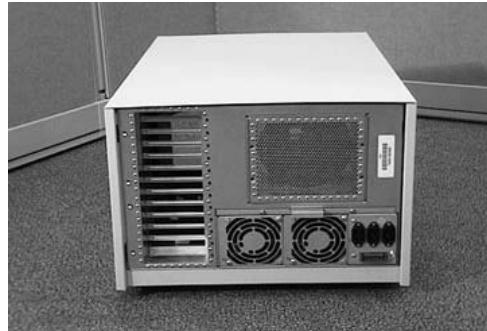
**Step 4.** Tighten the two captive screws in the enclosure base to secure the server to the base.

**Step 5.** Position the enclosure cover (outside skin) over the server and install and tighten the screws to secure it to the base.

---

**NOTE** The perforations and the lip of the outside skin should be toward the rear of the server.

---



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**WARNING** **Stacking rp54xx servers in deskside enclosures is *not* supported.**

**Stacking rp54xx servers in deskside enclosures can damage equipment, may cause injury to personnel, and may void your warranty or service contract.**

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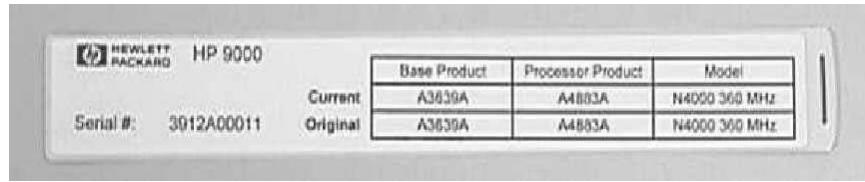
**Step 6.** Install the Front Bezel.

**Step 7.** Locate the two pull-tabs. One pull-tab is longer than the other. The shorter pull-tab is blank on both sides. The back of the shorter pull-tab provides a writable surface for Customer use.

**Install Deskside Server**

**Step 8.** Locate the plastic bag containing the label sheet (taped to the server).

**Step 9.** Remove the label containing serial number, base product, processor product, and model information from the label sheet and apply to the back of the longer pull-tab.



---

**NOTE**

Pull-tab and label shown above is for an rp74xx server. rp54xx uses the same style label and similar pull-tab.

---

**Step 10.** Insert the pull-tabs into the front bezel. Install the longer pull-tab in the left side plastic window in such a way that the rp54xx logo is visible. Install the shorter pull-tab in the right side plastic window with either surface visible. Refer to the diagram above for pull-tab locations.

## Install Stand-Alone Server in a Cabinet

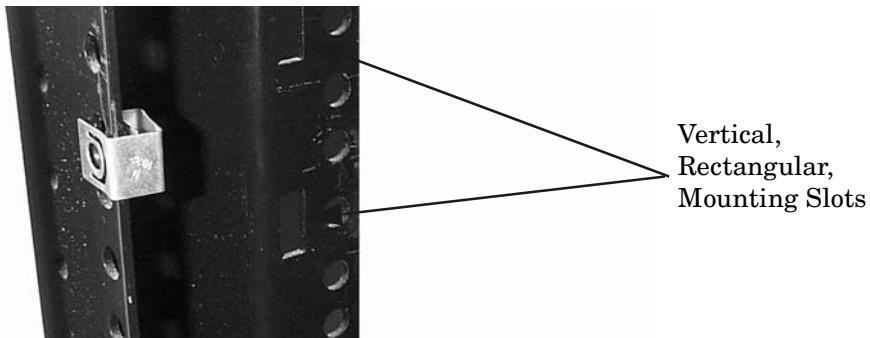
The following describes how to install the A5556A slide-tray assembly into an approved HP cabinet in preparation for installing an rp54xx server.

This slide-tray assembly can be installed in an HP E-Series cabinet or other HP cabinets approved for rp54xx system installation. To install the A5556A slide-tray assembly in an approved HP equipment cabinet, proceed as follows:

**Step 1.** Determine what type of cabinet you are installing the slide-tray assembly into.

a. E-Series cabinets have:

- Parchment white, plastic, sectional, side panels
- Black painted vertical frame posts with a partial return flange.



b. Approved, non-E-Series, cabinets have:

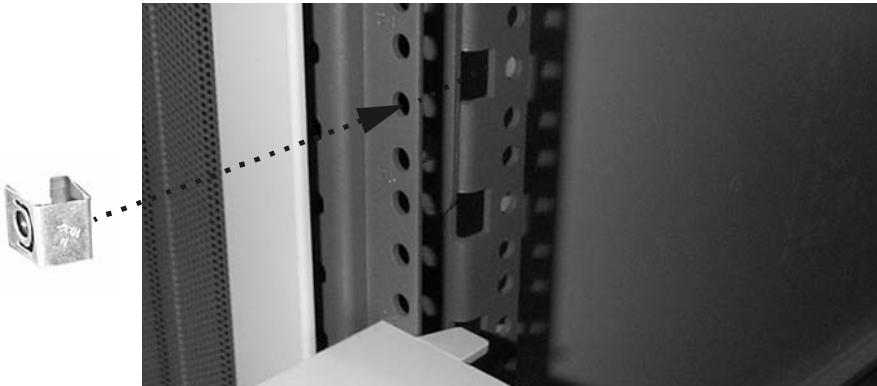
- Single piece metal side panels
- Gray painted vertical frame posts with full return flanges.



**Step 2.** Note the vertical, rectangular, slots in the return flanges on the vertical mounting posts. Determine into which of these vertical slots the slide/tray kit will be installed. This is done by counting down eight rectangular slots from the top of the cabinet or the bottom of the equipment above.

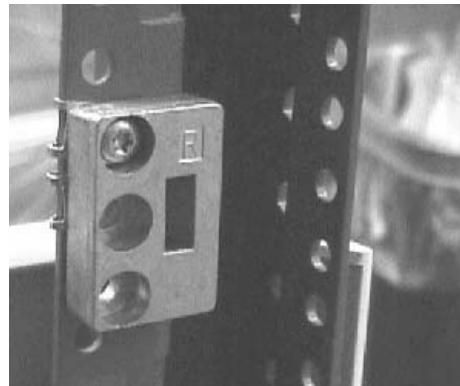
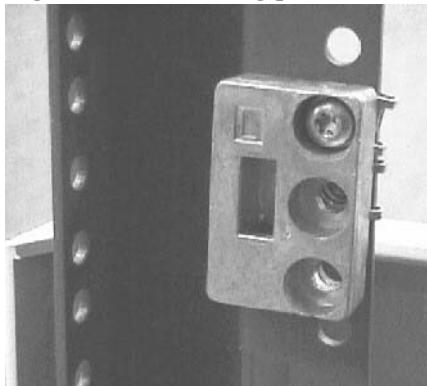
Install Stand-Alone Server in a Cabinet

- Step 3.** On the front vertical mounting posts *only*, slide M5 sheet metal nuts onto the posts over the holes immediately adjacent to the vertical slots determined in the previous step. Also place M5 sheet metal nuts on the holes directly above these. Orient the sheet metal nuts so that the threaded portion faces towards the outside of the cabinet. There should now be a total of four (4) sheet metal nuts installed.



- Step 4.** If the cabinet is a non-E-Series cabinet, discard the left hand and right hand aluminum spacers and two of the M5 x 16 screws with cress-cup washers and proceed to step 12.

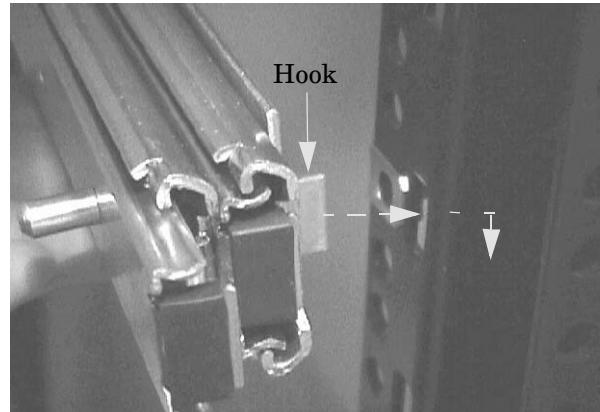
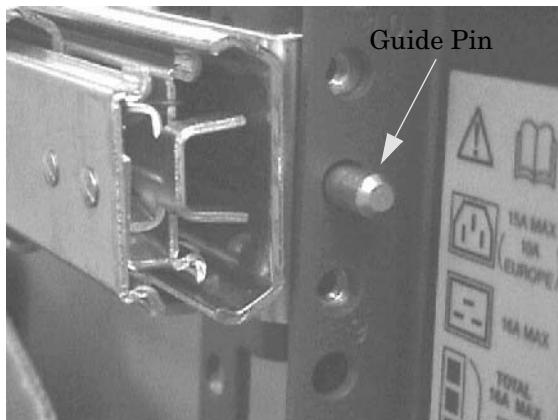
- Step 5.** If the cabinet is an E-Series cabinet, place the hook of the aluminum spacer marked "L" (5183-1864) into the appropriate vertical, rectangular slot on the front, left hand mounting post. The hook points downward. Similarly, place the spacer marked "R" (5183-1863) into the appropriate slot on the right hand mounting post.



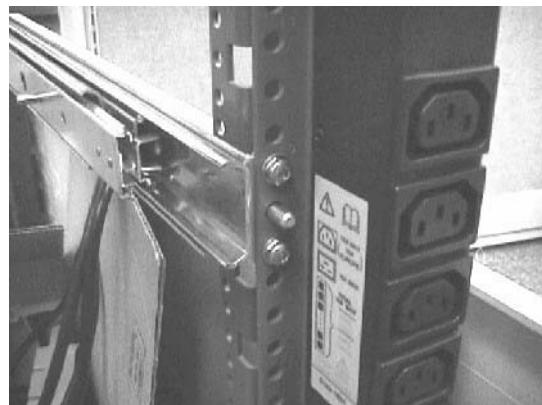
- Step 6.** Use one M5 x 16 screw with cress-cup washer to attach each spacer to its vertical post. Do this by inserting the screw through the top hole in the spacer, through the mounting rail and tightening it into the sheet metal nut located at that position.

- Step 7.** Take the left hand slide/bracket assembly (marked 337079-1L) and install it into the left hand vertical mounting posts. This is done by inserting the pin at the rear of the slide's mounting bracket into the 23rd hole in the rear vertical mounting post and inserting the hook at the front of the

bracket into the vertical, rectangular slot in the aluminum spacer. The slide should be positioned in the cabinet so that it is horizontal and level.



- Step 8.** Securely fasten the rear of the slide's mounting bracket to the rear vertical mounting post by installing and tightening two of the M5 x 16 screws with cress-cup washers thorough the mounting post, through the slides mounting bracket and into the threaded nuts attached to the mounting bracket.



**Install Stand-Alone Server in a Cabinet**

**Step 9.** Fully extend the slide so that it is locked in the fully open position.



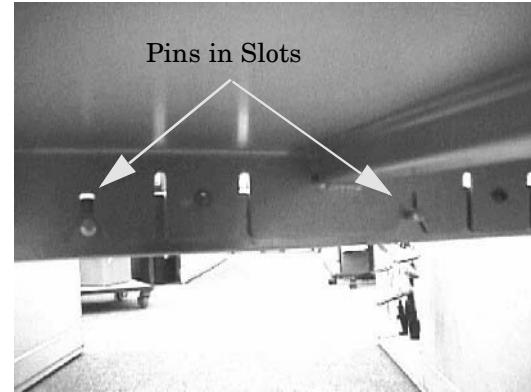
**Step 10.** Use an M5 x 30 screw with a cress cup washer to attach the front of the slide to the vertical mounting post. Insert the screw through the slide, through the center hole of the aluminum spacer, through the vertical mounting post, and tighten into the sheet metal nut located at that position.



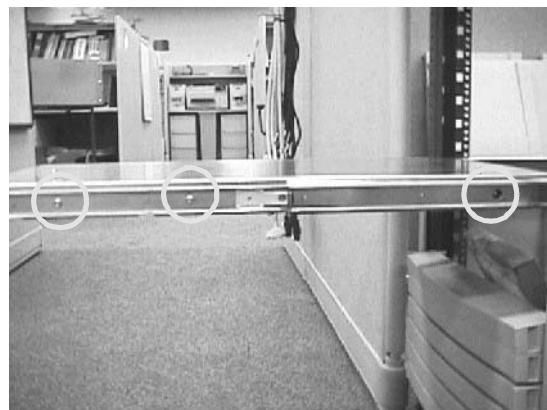
**Step 11.** Use a procedure similar to steps 7 through 10 to install the right hand slide/bracket assembly (marked 337079-1R) and then proceed to step 12.



**Step 12.** Take the tray and place it onto the pins that extend from the slides' inner members. The slots with wide lead-in guides on the side of the tray fit down onto the slides' pins. The flat part of the tray will be on top, and the mounting holes in the top of the tray will be located to the right of the center of the tray. Slide the tray all the way down on both sides so that the pins reach the top of the slots in the side of the tray.



**Step 13.** Use six, M5 x 12 screws (without washers) to attach the tray to the slides. Three screws are used to attach each slide. Insert the screws through the slides, through the tray and tighten into the threaded nuts located on the inside of the sides of the tray.



**Step 14.** From the bottom of the tray pull the plunger pin down and give it a 1/4 turn to hold it in place.



**Step 15.** Position the server on the tray aligning the plunger pins with the alignment holes in the chassis.



**Step 16.** Release the plunger pins to secure the server.

## Stationary L-Bracket Rail Assembly

rp54xx servers may be installed into E-Series and approved Non- E-Series cabinets using stationary L-bracket rail assembly kits listed below.

**NOTE** rp54xx servers are supported in Hewlett-Packard E-series and approved Non- E-series Hewlett-Packard cabinets, and approved rail kits.

For information on additional qualified 3rd party cabinets and rail kits, contact the nearest Hewlett-Packard Response Center.

Cabinet Type	Rail Kit Product Number
E-Series HP Cabinet	A5575A
Other Approved HP Cabinet	A5562A

## Identifying Approved Non-E-Series HP Cabinets

Approved Non- E-Series cabinets have black frames, one piece outside sheet metal skins, a partial return flange, and *requires* the installation of the aluminum spacer blocks, supplied with the rail kits.



Approved Non- E-Series cabinets include the following product numbers: A1883A, A1884A, A1896A, A1897A, C1897A, C2785A, C2786A, and C2787A.

## Identifying E-Series HP Cabinets

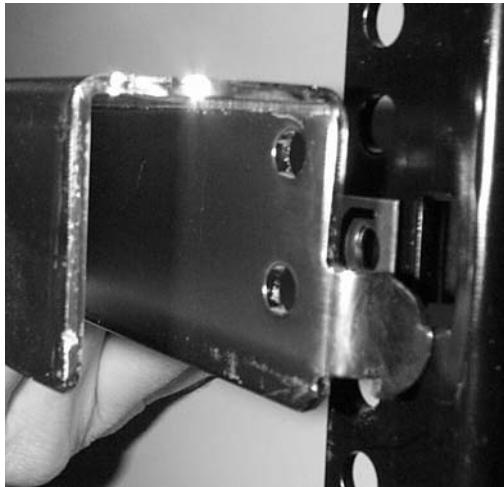
E-Series cabinets have light gray frames, sectioned, plastic outside “skins”, a full return flange, and does *not* require the installation of the aluminum spacer block supplied, with the rail kits.



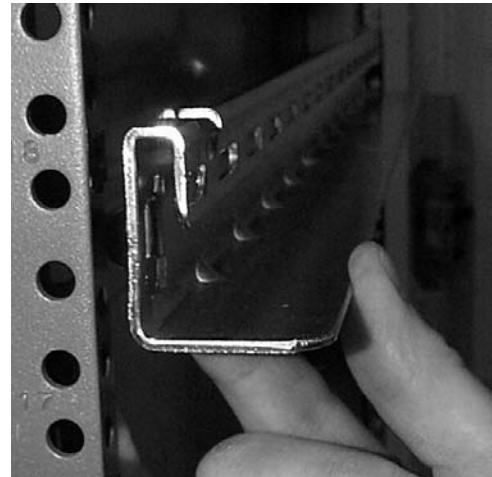
E-Series cabinets include the following product numbers: A5134A, A5136A, A5136A, A4900A, A4901A, A4902A, J1500A, J1502A, and J1502A.

## Identifying Static Rail Kit

Hewlett-Packard has currently approved two static rail kits for use in cabinet mounting the rp54xx server. They are illustrated below.



A5562A Kit Rail



A5575A Kit Rail

## Installing Stationary Rails

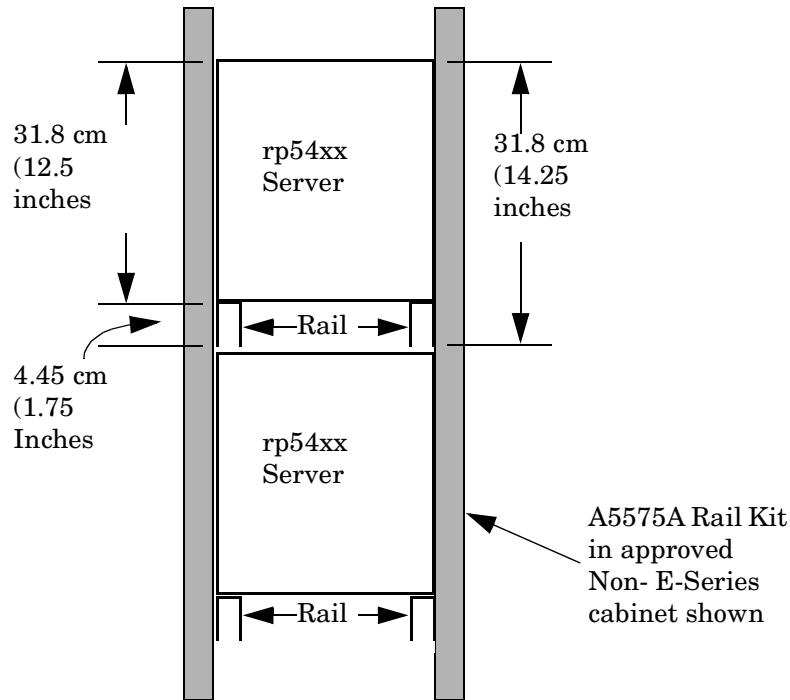
The installation of stationary rails is similar for most cabinet and rail combinations. The key considerations to are:

- Ensure that all safety precautions are read, understood, and observed
- Follow all installation instructions provided with the cabinet and rail kits, and
- Ensure that the rails extend out from the cabinet posts sufficiently to properly and safely support the equipment being installed.

To install an rp54xx server on stationary rails in an approved cabinet proceed as follows:

**Step 1.** Locate the rail mounting height in the cabinet. Allow for the following space requirements:

- For each rp54xx server, allow 31.8cm (12.5 inches) vertically (7 EIAs or Rack Units (RUs)).
- If installing the A5575A rail kit, allow an *additional* vertical 4.45cm (1.75 inches (1 EIA) each set of rails.



**Step 2.** Install sheet metal nut(s) in the vertical cabinet posts at the required height for the kit being installed:

- Install the first nut either:
  - 4.45 cm (1.75 Inches) above the top, or
  - 31.8 cm (12.5 inches) below the bottom of the last server.
- If installing a A5562A rail kit, install the second nut in the next frame hole below the first.

**Step 3.** Hold the rail in place and insert and tighten the screws.

Server Unpacking and Installation

**Stationary L-Bracket Rail Assembly**

For installation of other qualified cabinet and rail combinations refer to the safety precautions and instructions accompanying them.

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## **3** Installing Additional Components

## **Additional Components**

Some internal components are too delicate to be installed in the server prior to shipping. These internal components are shipped with the server, but are packed separately. They can be installed after the cabinet has been unpacked and positioned.

Some of the internal components that are packed separately are not user-installable. To maintain warranty validation, these items *must* be installed by a Hewlett-Packard Customer Engineer.

If you received either (or both) of the components listed below, contact your Hewlett-Packard provider to arrange for installation.

- Central Processing Units (CPUs)
- Power Distribution Units (PDUs)

## Installing Memory

### Memory Configuration Rules

rp54xx servers have 16 slots (8 DIMM pairs) for memory DIMMs. These slots are numbered 0a/b, 1a/b,... 7a/b. 8 of these slots (4a/b - 7a/b) are disabled on rp5400 servers. rp5450 servers can access all slots. rp5400 and rp5450 servers have DIMM slots located on the System Board.

rp5470 servers install DIMMs using Memory Carriers. The Memory Carriers fit into slots on the System Board.

The following rules govern the installation of memory DIMMs for rp5400, rp5450, and rp5470 servers:

- Memory must be installed in DIMM pairs.
- The capacity of DIMMs within a pair must be the same.
- Install DIMMs with the greatest capacity in the lowest slot numbers.
- Install DIMMs the following slot order: 0a/b, 1a/b, 2a/b, 3a/b, and so on.

### Installing rp5400 and/or rp5450 DIMMs

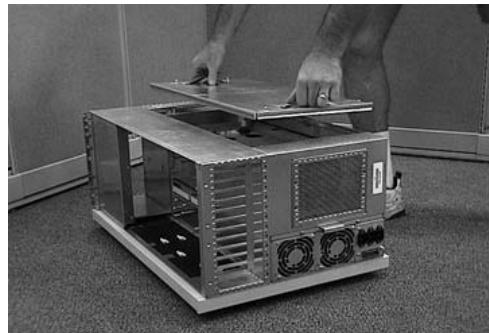
**Step 1.** Power down and *unplug* the rp54xx server.

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**CAUTION** DC voltages are present when the server is connected to AC power. Do not install or service rp54xx internal components while DC voltage is present. Failure to observe this precaution can result in damage to the server.

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**Step 2.** Loosen the captive T-15 screws that hold the top cover in place, then grasp the strap handle, raise the cover slightly, and pull the cover toward the front of the server to free the cover tabs from the slots in the chassis. The air baffle will be exposed.



**Step 3.** Make the top of the server accessible for service.

## Installing Memory

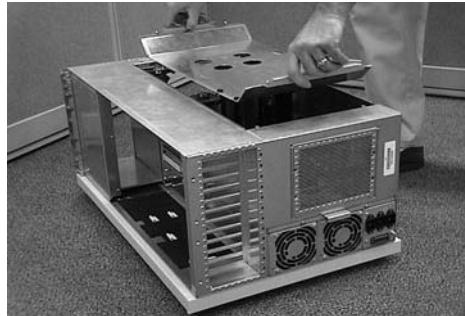
**Step 4.** Loosen the captive T-15 screws on the air baffle. Grasp the two handles on the baffle, and lift the baffle remove it.

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**CAUTION**

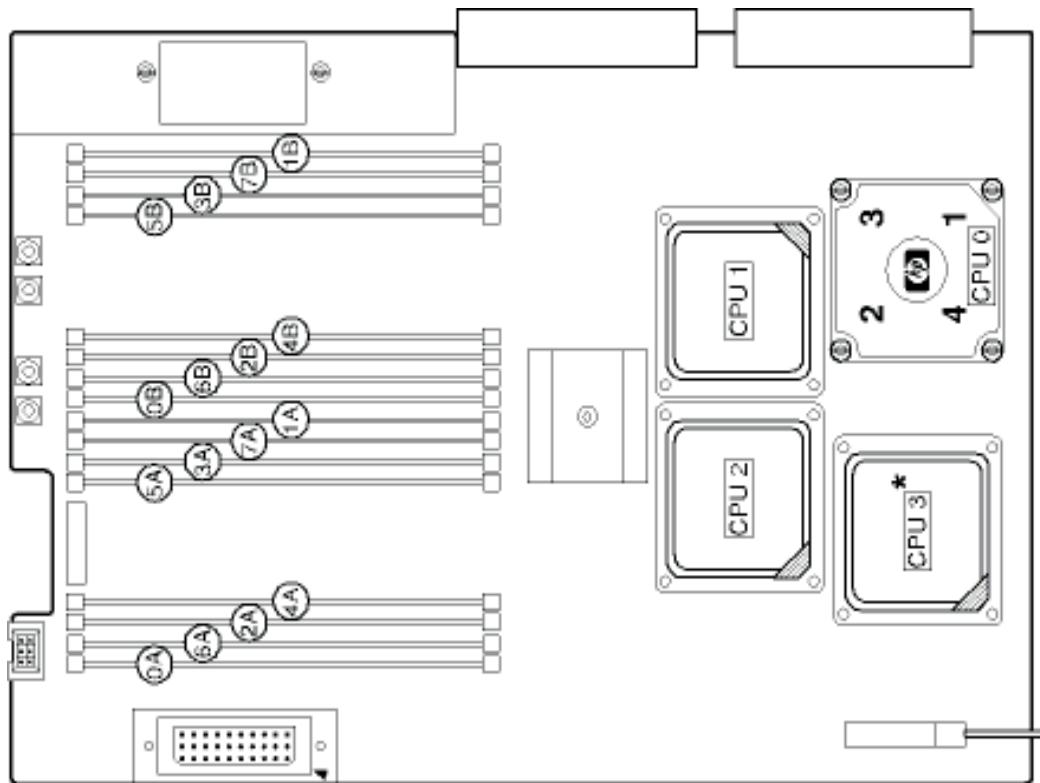
Observe all ElectroStatic Discharge (ESD) precautions Do not touch internal components. Failure to observe ESD precautions can cause damage to components.

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**Step 5.** Observe Electrostatic Discharge (ESD) precautions.

**Step 6.** Refer to the following graphic for memory slot locations.



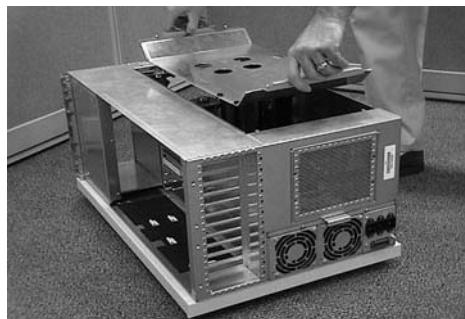
Locate the correct DIMM pair slots. Insert the DIMM connectors into the guides until the card snaps firmly in place. It may be necessary to apply downward force using the palm of your hand on the DIMM. Observe the top of the DIMM to make sure one side is not higher than the other.

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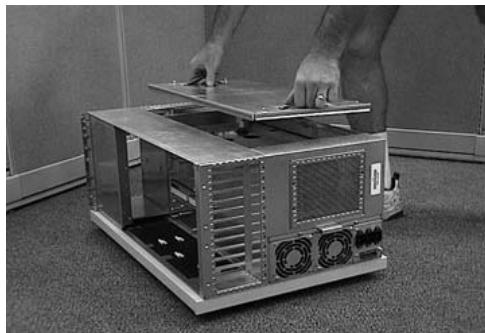
<b>NOTE</b>	It may be necessary to remove PSM 1 when installing a DIMM in slot 0a and PSM 0 when installing a DIMM in slot 1b. If either PSM is removed to install memory, ensure it is re-installed.
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**Step 7.** Replace the air baffle. Tighten the four captive screws to secure the air baffle in place.



**Step 8.** Replace the top cover. Tighten the four captive screws to secure the top cover in place.



**Step 9.** For rack configurations, insert the rp54xx server back into the rack.

**Step 10.** For deskside enclosure configurations, replace the deskside enclosure cover.

**Step 11.** Power the rp54xx server on.

**Step 12.** Use the BCH command in me to verify the system recognizes the memory that you have just added.

**Installing rp5470 DIMMs**

DIMMs for the rp5470 system are installed in memory carriers instead of the system board, as are the other rp54xx systems. However, rp5470 memory carriers are also located on the system board, so the method for opening and closing the system is the same. Procedures for removing and replacing the server top and baffle are listed below, without the pictures shown in the section titled, “*Installing rp5400 and/or rp5450 DIMMs.*” If you wish to review the pictures, please refer to the aforementioned section.

**Step 1.** Power down and unplug the rp54xx server.

**NOTE**

DC voltages are present when the server is connected to AC power. Do not attempt to install or service: CPUs, Memory, PSMs, the Platform Monitor or PCI I/O cards installed in non-Turbo slots (1-6) while DC voltage is present. Failure to observe this warning may result in damage to the server.

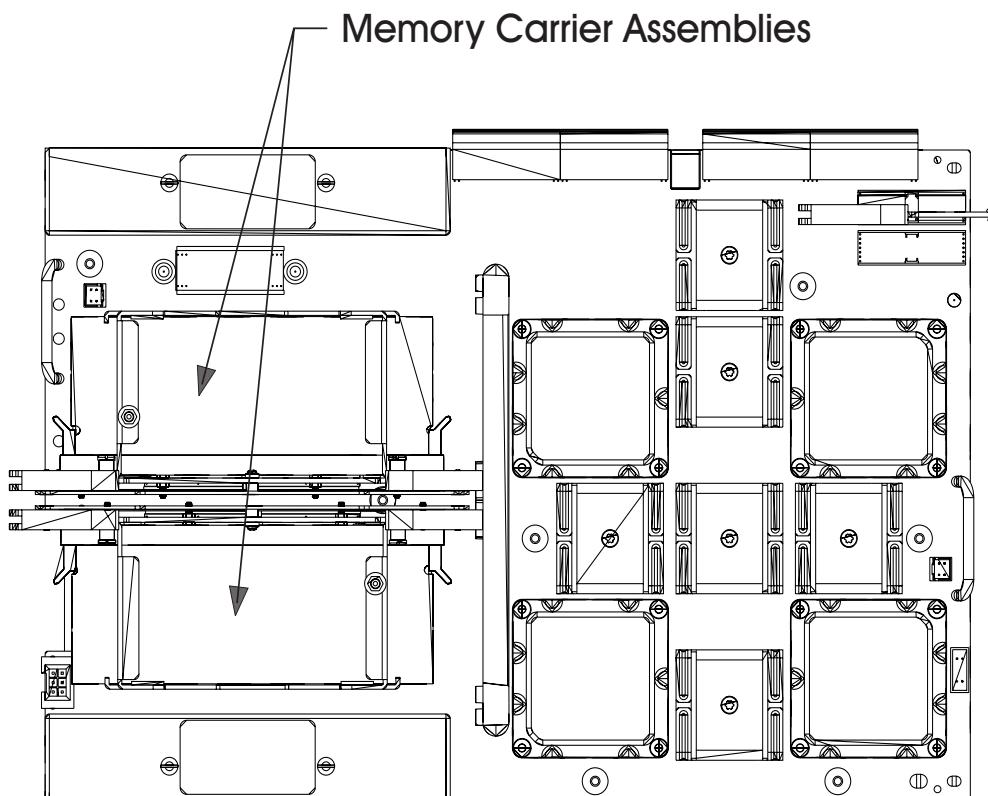
**Step 2.** Make the top of the server accessible for service.

**Step 3.** Loosen the captive T-15 screws that hold the top cover in place, then grasp the strap handle, raise the cover slightly, and pull the cover toward the front of the server to free the cover tabs from the slots in the chassis. The air baffle will be exposed.

**Step 4.** Loosen the four (4) captive T-15 screws on the air baffle. Grasp the two handles on the baffle, and lift and remove the baffle.

**Step 5.** Observe Electrostatic Discharge (ESD) precautions.

**Step 6.** Refer to the following graphic for Memory Carrier locations.



- a. Locate the Memory Carrier and pull up on the extractor levers on each end of the Memory Carrier to unseat the Memory Carrier from its socket.
- b. When the Memory Carrier unseats from the socket, pull it away from the System Board.
- c. Loosen the captive screws that secure the DIMM Clip and remove the DIMM Clip from the Memory Carrier.
- d. Seat the memory DIMM into its socket on the Memory Carrier.
- e. Press the extractor levers on each end of the memory DIMM slot inward until the levers snap into place.
- f. Attach the Memory Clip to the Memory Carrier with the DIMM slot markings on the top of the Memory Clip aligned with the DIMM slot markings on the Memory Carrier.
- g. Secure the Memory Clip using the captive screws.
- h. Seat the Memory Carrier into the appropriate slot on the System Board.
- i. Push down on the extractor levers and snap them into place.

**Step 7.** Replace the air baffle. Tighten the four captive screws to secure the air baffle in place.

**Step 8.** Replace the top cover. Slide the cover tabs into the slots in the chassis and close the cover. Tighten the two captive screws to secure the top cover in place.

**Step 9.** For rack configurations, insert the rp54xx server back into the rack.

**Step 10.** For deskside enclosure configurations, replace the deskside enclosure cover.

**Step 11.** Power the rp54xx server on.

**Step 12.** Use the BCH command in me to verify the system recognizes the memory that you have just added.

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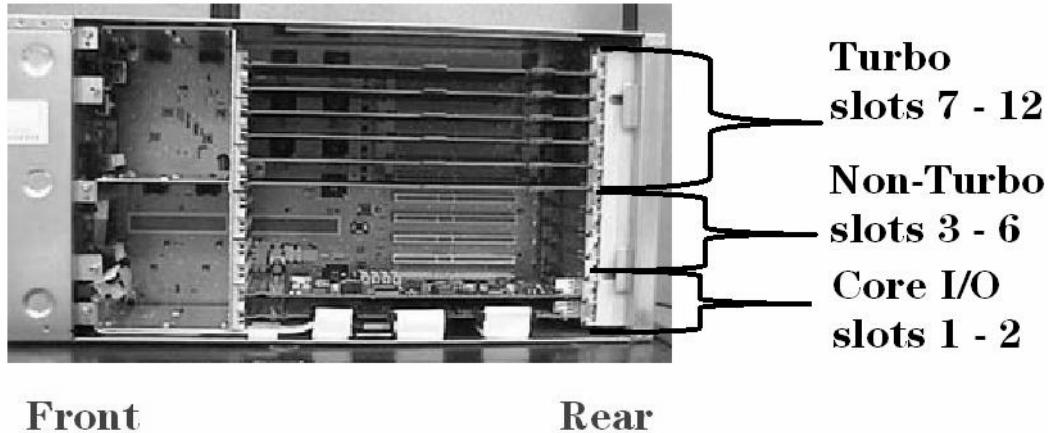
## Installing Peripheral Component Interconnect (PCI) Cards

rp54xx servers have a total of 12 PCI I/O slots. Slots 1 and 2 are reserved for the LAN/SCSI and GSP Core I/O cards, leaving 10 PCI I/O slots available for Customer use.

### rp5400/rp5450 PCI Card Slots

For rp5400 and rp5450 models, 10 PCI I/O slots consist of Turbo and non-Turbo slots. Server PCI slots are shown below.

### rp5400/rp5450 PCI Card Slots



- Slots 1 and 2 are reserved for the rp54xx LAN/SCSI and GSP (Guardian Service Processor) Core I/O cards, respectively. Slots 1 and 2 are non-Turbo slots. Non-Turbo slots share a single 250MB/s PCI bus and are incapable of HotPlug functionality. The server must be turned off prior to removing or installing the LAN/SCSI or GSP cards in these slots.
- Slots 3 - 6 are non-Turbo slots. These four Non-Turbo slots share a single 250MB/s PCI bus, run at 33MHz and support 32 and 64-bit PCI cards. Non-Turbo slots are incapable of HotPlug functionality. The server must be turned off prior to removing or installing PCI cards in these slots.
- Slots 7 - 12 are Turbo slots. Each Turbo slot has a dedicated 250MB/s PCI bus, run at 66MHz and support 32 and 64-bit PCI cards. Turbo slots are HotPlug capable. Below each Turbo slot is a plastic PCI card separator. The PCI card separator has two LEDs and a pull tab on the outer edge. The LED's provide power and status for the slot. The pull tab allows the PCI card to be easily removed.

rp5400 servers have access to slots 1, 2 and 8-12 while rp5450 servers have access to all (1-12) slots.

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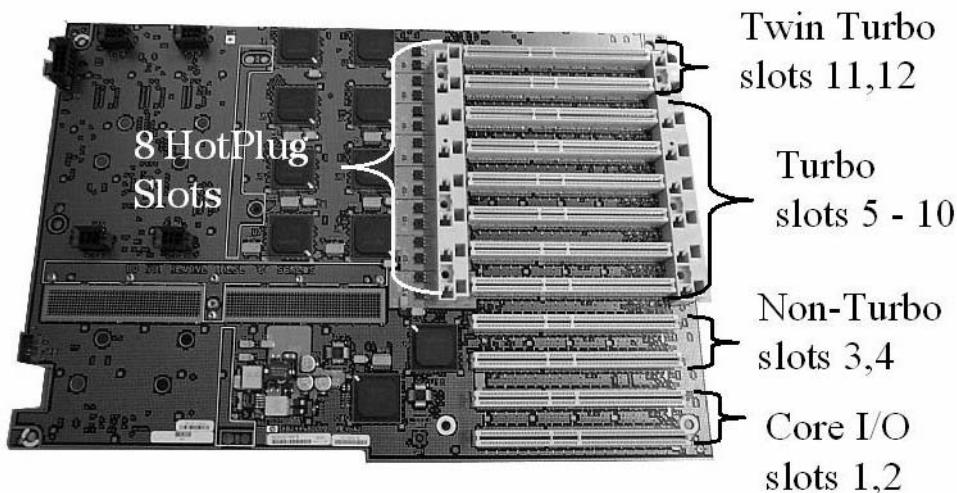
**NOTE** Slot 3 will become enabled on rp5400 servers with server firmware versions later than 40.48.

A slot 3 enabled label (A5576-84009) is available for rp5400 systems.

## rp5470 PCI Card Slots

For rp5470 models, the 10 PCI I/O slots consist of Twin Turbo, Turbo, and non-Turbo slots. The following illustration shows the PCI card slot layout.

## rp5470 PCI Slots



- Slots 1 and 2 are reserved for the rp54xx LAN/SCSI and GSP (Guardian Service Processor) Core I/O cards, respectively. Slots 1 and 2 are non-Turbo slots. Non-Turbo slots share a single 250MB/s PCI bus and are incapable of HotPlug functionality. The server must be turned off prior to removing or installing the LAN/SCSI or GSP cards in these slots.
- Slots 3 and 4 are non-Turbo slots. These two Non-Turbo slots share a single 250MB/s PCI bus, run at 33MHz and support 32 and 64-bit PCI cards. Non-Turbo slots are incapable of HotPlug functionality. The server must be turned off prior to removing or installing PCI cards in these slots.
- Slots 5 - 10 are Turbo slots. Each Turbo slot has a dedicated 250MB/s PCI bus, run at 66MHz and support 32 and 64-bit PCI cards. Turbo slots are HotPlug capable. Below each Turbo slot is a plastic PCI card separator. The PCI card separator has two LEDs and a pull tab on the outer edge. The LED's provide power and status for the slot. The pull tab allows the PCI card to be easily removed.
- Slots 11 and 12 are Twin Turbo slots. Each Twin Turbo slot has a dedicated 500MB/S PCI bus, runs at 66 MHz, and supports 32- and 64-bit PCI cards. Twin Turbo slots are HotPlug capable. Below each Twin Turbo slot is a plastic PCI card separator. The PCI card separator has two LEDs and a pull tab on the outer edge. The LED's provide power and status for the slot and the pull tab allows the PCI card to be easily removed.

rp5470 servers have access to all (1-12) slots.

## PCI I/O Card Installation Restrictions

Restrictions apply regarding the installation of PCI I/O cards which contain a PCI-to-PCI bridge:

- HP-UX boot is currently not supported for cards that contain a PCI-to-PCI bridge.
- HP-UX patches are required when more than one card containing a PCI-to-PCI bridge is installed in non-Turbo slots.

## PCI I/O Card Installation Order

The following table shows a standard factory PCI card installation that begins with slot 12. Use this table as a guideline for installing PCI I/O cards in the field.

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<b>NOTE</b>	A system shipped from the factory may have a different configuration than the same system built in the field. For example: The factory will install the graphics card in slot 12 and add other cards below. In the field, slot 12 may already be occupied by another PCI card. It is acceptable for the graphics card to be installed in any available Turbo slot.
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Product Number	Description (all are PCI cards)	Max	Boot	Load Order *	Part Number	Notes
A6150A	Graphics, Graphics Card	1	No	1	A4982-66501	3,8
A5838A	Combo		No	3	A5838-60001	9
A5483A	ATM 622Mbps MMF Adapter	10	No	4	A5483-60001	10
A4926A	1000Base SX PCI LAN Adapter	10	No	5	A4926-60001	
A4926A	1000Base TX PCI LAN Adapter	10	No	6	A4926-60001	
A6092A	HYPERFabric		No	7	A6092-60001	11
A5158A	FC Taclite		Y	8	A5846-60001	
A5486A	Praesidium Speed Card	10	No	9	A5486-60001	
A5506A	4 Port 100Base TX LAN Adapter	7/10	No	10	A5506-60101	1,2,6
A5506B	4 Port 100Base TX LAN Adapter	7/10	No	10	A5506-60102	
A5150A	Dual Port Ultra 2 SCSI adapter	10	Yes	11	A5150-60001	4
A5149A	Single Port Ultra 2 SCSI HBA	10	Yes	12	A5149-60001	
J3526A	High Perf 4 Ports Synchronous Adapter	10	No	13	5063-1322	7,5
A4800A	FWD SCSI-2 adapter	10	Yes	14	A4800-67002	
A5230A	100Base-T LAN Adapter	10	No	15	B5509-66001	
A3738A	10/100Base-T LAN Adapter	10	No	16	A3738-60001	
A3739A	Dual FDDI LAN Adapter	10	No	17	A3739-60001	
A5783A	Token Ring 4/16/100 Hardware Adapter	10	No	18	A5783-60101	

<b>Product Number</b>	<b>Description (all are PCI cards)</b>	<b>Max</b>	<b>Boot</b>	<b>Load Order *</b>	<b>Part Number</b>	<b>Notes</b>
J3525A	Dual Port Synchronous Adapter	10	No	19	J3525-60001	
J3593A	64 port Serial MUX system card	10	No	20	J3593-60001	
J3592A	8 Port PCI Serial MUX card	4	No	21	J3592-60101	
A6150A	Graphics, USB Card	1	No	22	A6150-60001	
A6150BX	Pinnacle 2 Graphics	1	No	1	A6150-60003	12,13
A6386A	Hyper Fabric 2 Interconnect	10	No	6	A3686-60001	
A5506A	Quad Port 10/100B-TX LAN	10	No	10	A5506-60102	14
A6749A	3.3v 64 Port Terminal MUX	10	No	24	A6749-60001	
A6748A	3.3v 8 Port Terminal MUX	10	No	25	A6748-60001	

\*In top down order.

**Notes:**

1. Card contains a PCI-to-PCI bridge.
2. Requires PHKL\_20123, PHKL\_20629 and PHNE\_19826 or their superseded equivalents.
3. Not supported in non-Turbo slots. Install in Turbo slots only.
4. Requires server firmware revision 39.46 or later.
5. Requires HP-UX 11.1
6. Maximum is 7 for HP-UX versions prior to 11.0. Maximum is 10 for HP-UX version 11.1 and later.
7. Requires PHKL\_19543 and PHKL\_19544 or their superseded equivalents.
8. Requires HP-UX 11.0 Support Plus (IPR) 0006, June 2000 or later. This product to be released 6/00.
9. Not supported in a shared slot (slots 3-4 for rp5470, slots 3-6 for rp5450, not applicable for rp5400).
10. If you are installing ATM 622 cards in an rp5470 configuration, do not install them in slots 3 and 4 (shared slots).
11. Requires 768 MB for first card and 512 MB for each additional card.
12. Not supported in shared slots.
13. Max of 1. Needs USB card for keyboard and mouse.
14. Contains PCI bridge.

## Installing a PCI Card

Follow these procedures to install a PCI card.

**Step 1.** Power down and unplug the rp54xx server.

**NOTE** DC voltages are present when the server is connected to AC power. Do not attempt to install or service: CPUs, Memory, PSMs, the Platform Monitor or PCI I/O cards installed in non-Turbo slots (1-6) while DC voltage is present. Failure to observe this warning may result in damage to the server.

**Step 2.** Make the right side of the server accessible for service.

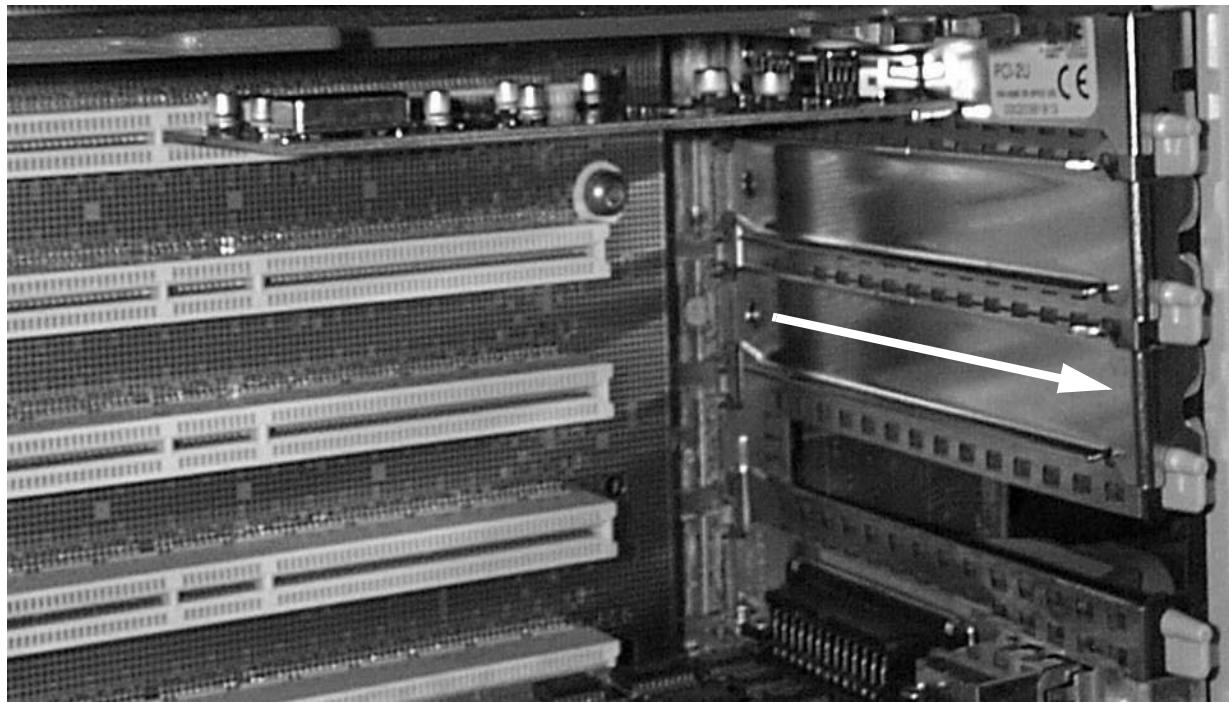
**Step 3.** Using a Torx 15 screwdriver, loosen the captive screws on the right side panel. This panel has a label which shows which PCI I/O slots are available and the corresponding paths. The PCI I/O slot paths for rp5400, rp5450, and rp5470 are shown below.

<b>Slot</b>	<b>rp5400</b>		<b>rp5450</b>		<b>rp5430/rp5470</b>	
	<b>Slot Type</b>	<b>Path</b>	<b>Slot/Type</b>	<b>Path</b>	<b>Slot Type</b>	<b>Path</b>
12	<b>Turbo</b>	<b>0/4/0</b>	<b>Turbo</b>	<b>0/4/0</b>	<b>Twin Turbo</b>	<b>0/10/0</b>
11	Turbo	0/7/0	Turbo	0/7/0	Twin Turbo	0/12/0
10	Turbo	0/3/0	Turbo	0/3/0	Turbo	0/8/0
9	Turbo	0/6/0	Turbo	0/6/0	Turbo	0/9/0
8	Turbo	0/2/0	Turbo	0/2/0	Turbo	0/3/0
7	Not Available		Turbo	0/5/0	Turbo <sup>a</sup>	0/1/0
6	Not Available		Shared	0/1/0	Turbo <sup>a</sup>	0/5/0
5	Not Available		Shared	0/1/1	Turbo <sup>a</sup>	0/2/0
4	Not Available		Shared	0/1/2	Shared <sup>a</sup>	0/4/0
3	Not Available <sup>b</sup>		Shared	0/1/3	Shared	0/4/2
2	GSP		GSP		GSP	
1	LAN/SCSI		LAN/SCSI		LAN/SCSI	

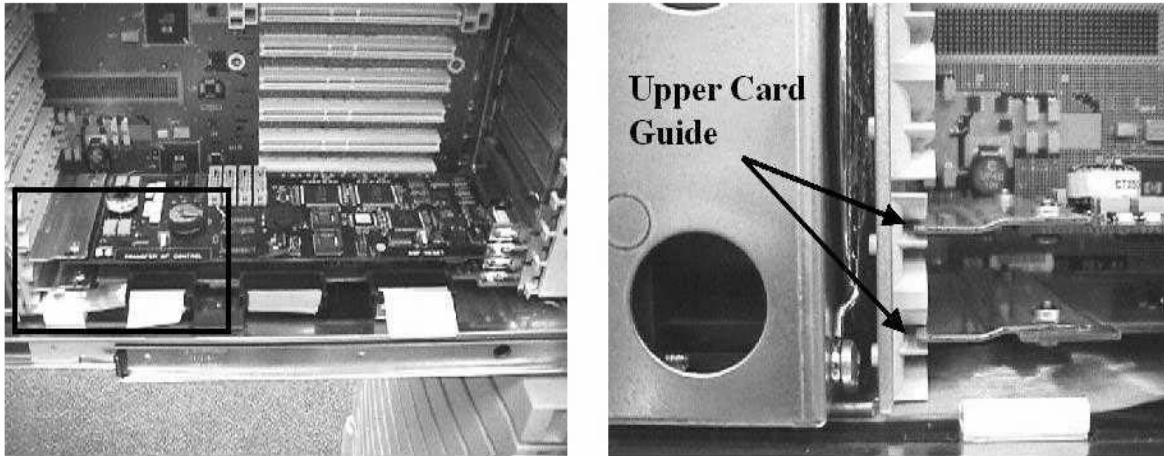
a. Slot is NOT AVAILABLE for rp5430.

b. Slot 3 becomes available with server firmware versions later than 40.48.

**Step 4.** Remove the PCI slot cover from the slot that will receive the PCI card. To remove the PCI slot cover, slide the PCI slot cover away from the server.



**Step 5.** Slide the PCI card connectors into the slot, snapping firmly in place. For full length (cards that extend to the left side card guides) PCI cards, use the UPPER card guide.



**Step 6.** At the rear of the chassis, connect the I/O cable to the card just installed.

**Step 7.** Replace the right side panel and tighten the captive screws.

**Step 8.** For rack configurations, insert the rp54xx server back into the rack.

**Step 9.** For deskside enclosure configurations, replace the deskside enclosure cover.

**Step 10.** Power the server on.

**Step 11.** Use the server firmware `in io` command to verify the PCI cards are recognized by the server. If AUTOBOOT is ON, it will be necessary to interrupt the boot process to get to the server firmware Main Menu: Enter command or menu > prompt.

**Step 12.** Boot HP-UX and run the `ioscan` utility to verify the system recognizes the new PCI card.

## Online Addition/Replacement (OLA/R) of PCI I/O cards

Beginning with HP-UX 11i (11.11) rp54xx servers support the on-line addition and replacement of PCI I/O cards. In order for this high availability feature to be fully implemented, the following server requirements must be met:

- rp5400A/rp5450A firmware must be later than 40.26 (rp5400B/rp5450B/rp5470A firmware will support OLA/R upon its release).
- HP-UX operating system must be 11i (11.11) or later.

There is a bit that the HP-UX operating system examines to determine if the server hardware and firmware is capable of OLA/R. This bit is controlled by server firmware. If the bit is ON, OLA/R is possible (when requirements have been met). The bit was mistakenly set to ON for all rp5400 and rp5450 revision A (rp5400A and rp5450A) servers. As a result, HP-UX may incorrectly identify these models as being OLA/R capable. In order to avoid this confusion, verify that the correct level of server firmware is installed.

## Installing Graphics

This section explains how to install rp54xx 2D graphics hardware. For a complete graphics solution, three products are required. The products listed below are the only products supported on rp54xx servers.

- A6150A rp54xx Graphics Package
  - Includes PCI graphics card
  - Includes PCI USB (Universal Serial Bus) card
- A4983B Keyboard and Mouse Kit
  - Includes mouse with 114" cable
  - Includes keyboard with 109" cable
- D8910W (19") or D2847W (21") Monitor
  - Includes localized power cord and 75" 15-pin video cable

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**NOTE** rp54xx graphics requires HP-UX 11.0 Support Plus (IPR) 0006, June 2000 or later.

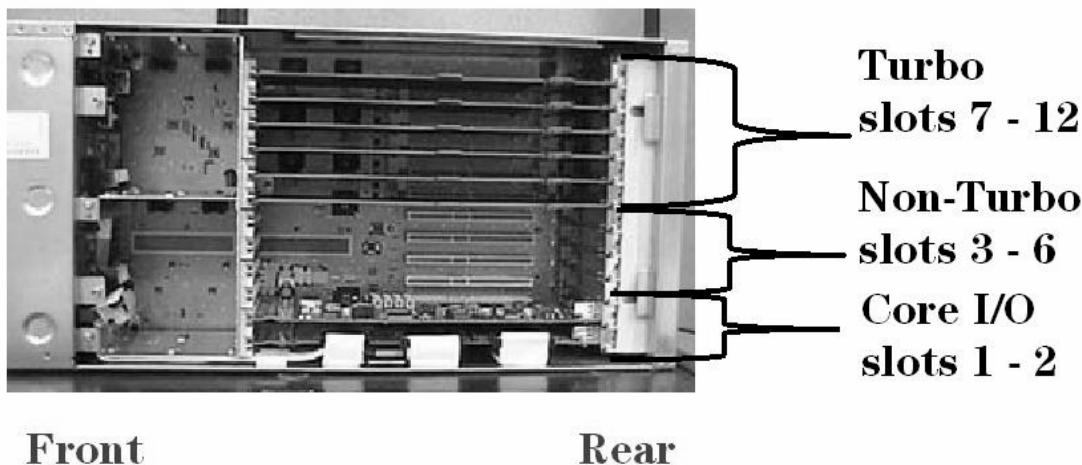
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The photo below includes the A6150A, A4983B and D8910W products. The video cable for the monitor is not shown. Black ESD mat not included.



**Installing Graphics**

rp54xx servers have a total of 12 PCI I/O slots. Slots 1 and 2 are reserved for the LAN/SCSI and GSP Core I/O cards, leaving 10 PCI I/O slots available for Customer use. These 10 PCI I/O slots consist of Turbo and non-Turbo slots.

**rp54xx PCI Slots**

- Slots 1 and 2 are reserved for the rp54xx LAN/SCSI and GSP (Guardian Service Processor) Core I/O cards, respectively. Slots 1 and 2 are non-Turbo slots. Non-Turbo slots share a single 250MB/s PCI bus. Non-Turbo slots are incapable of HotPlug functionality. The server must be turned off prior to removing or installing the LAN/SCSI or GSP cards in these slots.
- Slots 3 - 6 are non-Turbo slots. These four Non-Turbo slots share a single 250MB/s PCI bus, run at 33MHz and support 32 and 64-bit PCI cards. Non-Turbo slots are incapable of HotPlug functionality. The server must be turned off prior to removing or installing PCI cards in these slots.
- Slots 7 - 12 are Turbo slots. Each Turbo slot has a dedicated 250MB/s PCI bus, run at 66MHz and support 32 and 64-bit PCI cards. Turbo slots are HotPlug capable. Below each Turbo slot is a plastic PCI card separator. The PCI card separator has two LEDs and a pull tab on the outer edge. The LED's provide power and status for the slot. The pull tab allows the PCI card to be easily removed.

rp5400 servers can access PCI slots 1,2 and 8-12. rp5450/3000 servers can access all PCI slots.

Follow these procedures to install graphics cards.

- Step 1.** Install HP-UX 11.0 Support Plus (IPR) 0006, June 2000 or later. This step ensures the appropriate HP-UX drivers are installed.
- Step 2.** Power down and unplug the rp54xx server.

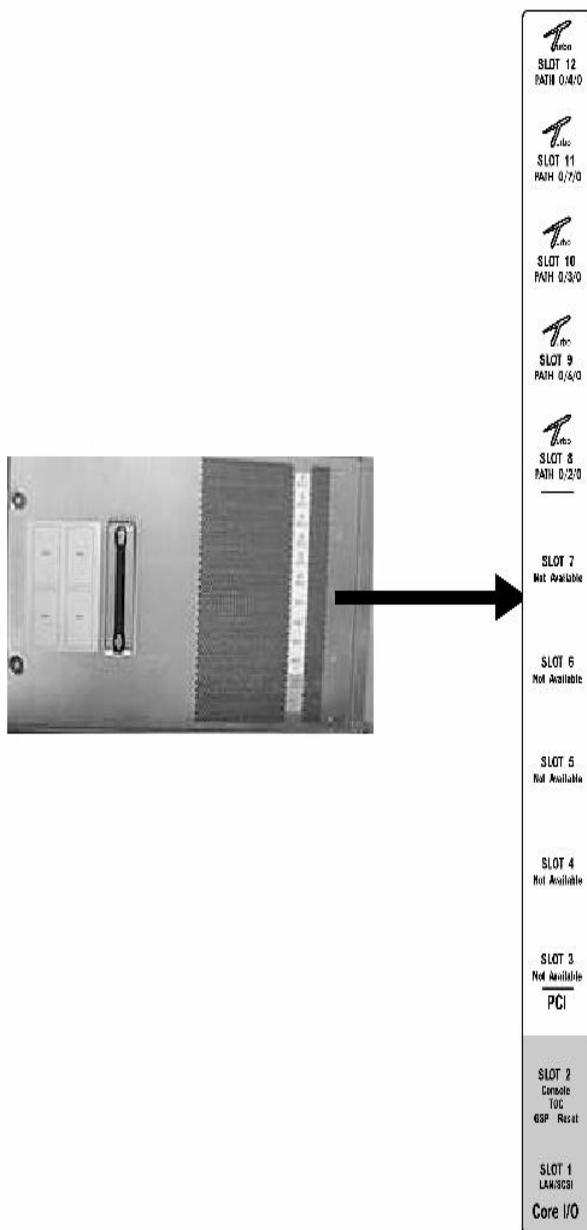
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<b>NOTE</b>	DC voltages are present when the server is connected to AC power. Do not attempt to install or service: CPUs, Memory, PSMs, the Platform Monitor or PCI I/O cards installed in non-Turbo slots (1-6) while DC voltage is present. Failure to observe this warning may result in damage to the server.
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**Step 3.** Make the right side of the server accessible for service.

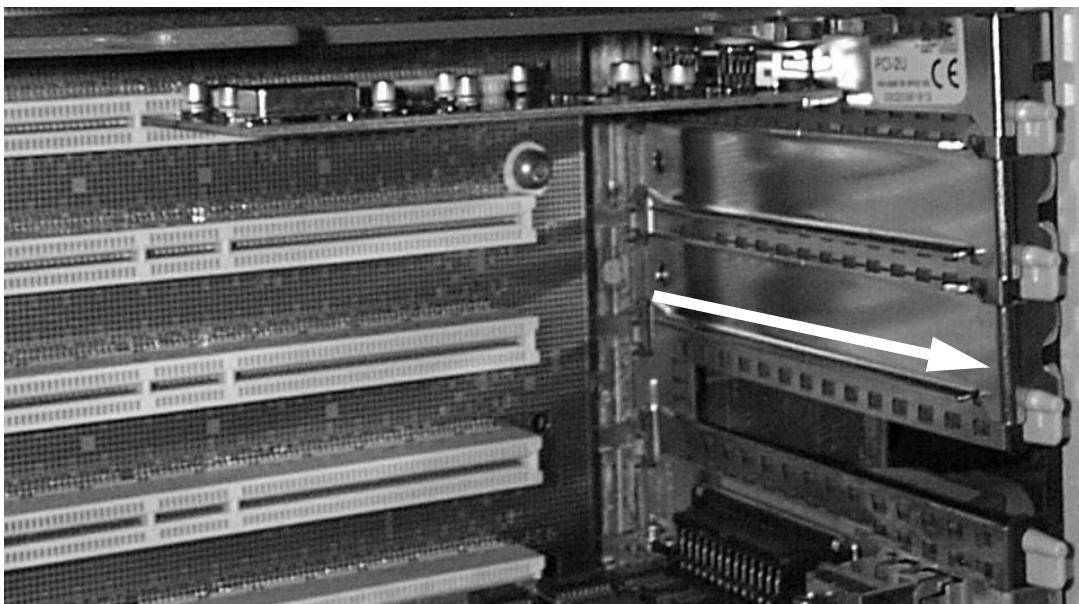
**Step 4.** Using a Torx 15 screwdriver, loosen the captive screws on the right side panel. This panel has a label which shows which PCI I/O slots are available and the corresponding paths. The label shown below is for an rp5400.



## Installing Graphics

**Step 5.** Grasp the handle on the right rear panel and remove the panel from the side of the chassis. The 12 PCI slots, numbered 1-12 from bottom to top, will be in view.

**Step 6.** Remove the PCI slot cover from the slot that will receive the PCI card. To remove the PCI slot cover, slide the PCI slot cover away from the server.



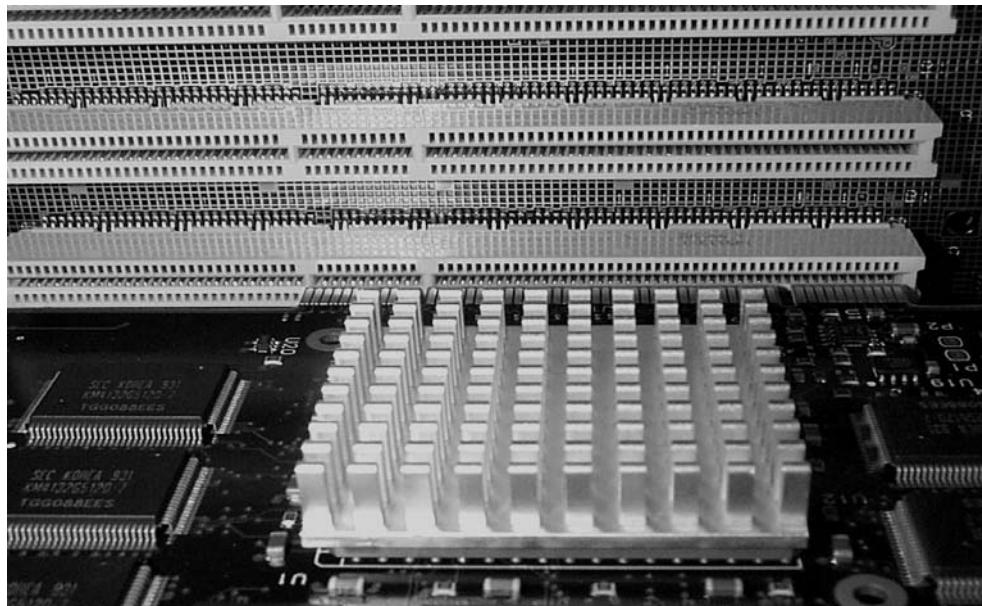
**Step 7.** Center the graphics card within the space created by removing the PCI I/O slot cover. Slide the card toward the edge connectors. Ensure the edge connectors on the card are in alignment with the connectors of the slot. Apply pressure to the card until it snaps firmly in place. Repeat process for USB card.

---

**NOTE**

The graphics card must be installed in any Turbo slot while the USB will work in any slot. To reserve Turbo slots for high performance I/O cards, install the USB card in a non-Turbo slot

---

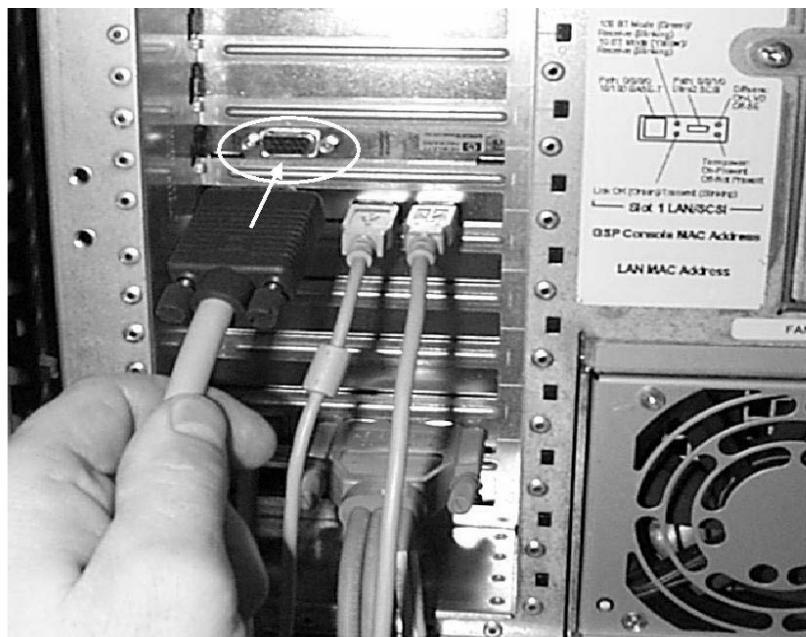


**Step 8.** At the rear of the chassis, connect the keyboard and mouse cables to the USB card. It does not matter which connector is used for the keyboard or mouse.



## Installing Graphics

**Step 9.** Connect one end of the 15-pin video cable connector on the graphics card. This connector is labeled “Graphics Display” and “Video Out”. Connect the other end of this cable to the graphics monitor.



**Step 10.** Replace the right side panel and tighten the captive screws.

**Step 11.** For rack configurations, insert the rp54xx server back into the rack.

**Step 12.** For deskside enclosure configurations, repalce the deskside enclosure cover.

**Step 13.** Power the server on.

**Step 14.** Use the server firmware in `io` command to verify the graphics cards are recognized by the server. If AUTOBOOT is ON, it will be necessary to interrupt the boot process to get to the server firmware Main Menu: Enter command or menu > prompt.

**Step 15.** Boot HP-UX and run the `ioscan` utility to verify the system recognizes the new PCI card.

**Step 16.** Logon as root and install X/CDE/Motif if not already installed.

## Graphics Troubleshooting

This section describes how to troubleshoot common problems encountered during installation or attempted use of graphics. The following system utilities can be used to display or set the graphics configuration:

- `/opt/graphics/common/bin/graphinfo` allows you to display the current graphics configuration and the graphics drivers that are being used.
- `/opt/graphics/common/bin/setmon` allows you to reconfigure the monitor type.
- The display menu of the HP-UX System Administration Manager (SAM) utility allows you to configure the X-Server and set the monitor type.
- On-line diagnostics provide information, verify and diagnose coverage for the graphics and USB cards. Off-line diagnostics do not exist for either the graphics or USB card.
- The HP-UX `ioscan` utility can be used to verify the HP-UX operating system recognized the hardware.

**Symptom: CDE will not come up.**

**Step 1.** Ensure `/dev/crt` was created. If not created, use `insf -e` to create.

**Step 2.** Ensure the system is at run level 3. Use `who -r` to determine run level. Use `init 3` to change to run level 3.

**Step 3.** Ensure `dt` is enabled. Use `/usr/dt/bin/dtconfig -e` to enable `dt`.

**Step 4.** Ensure `/etc/dt/config/Xservers` exists. If not, use `/usr/dt/config/dtrc.d/20_graph.conf` to create.

**Step 5.** Ensure the line: `* Local local@console /usr/bin/X11/X :0` is not commented out of the `/etc/dt/config/Xservers` file.

**Step 6.** Reboot HP-UX.

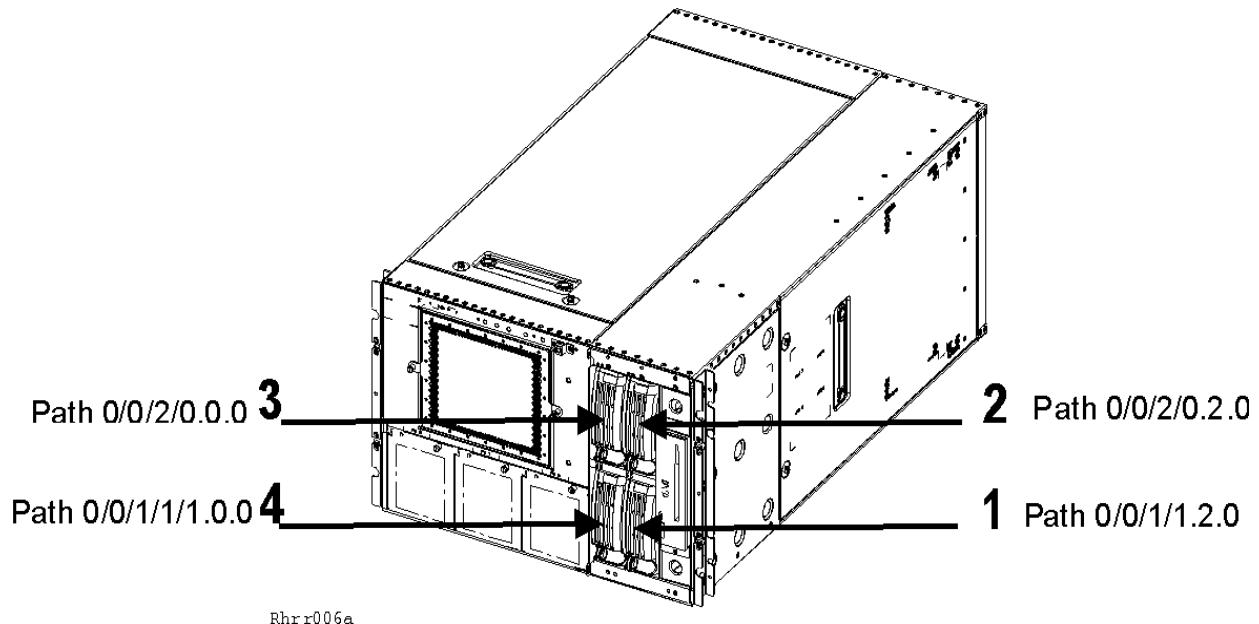
**Symptom: HP-UX does not recognize the graphics cards. `unknown` appears in the `ioscan` output for these cards**

**Step 1.** Examine the output of the `swlist` command to ensure the correct version of HP-UX is installed.

**Step 2.** Update HP-UX as necessary

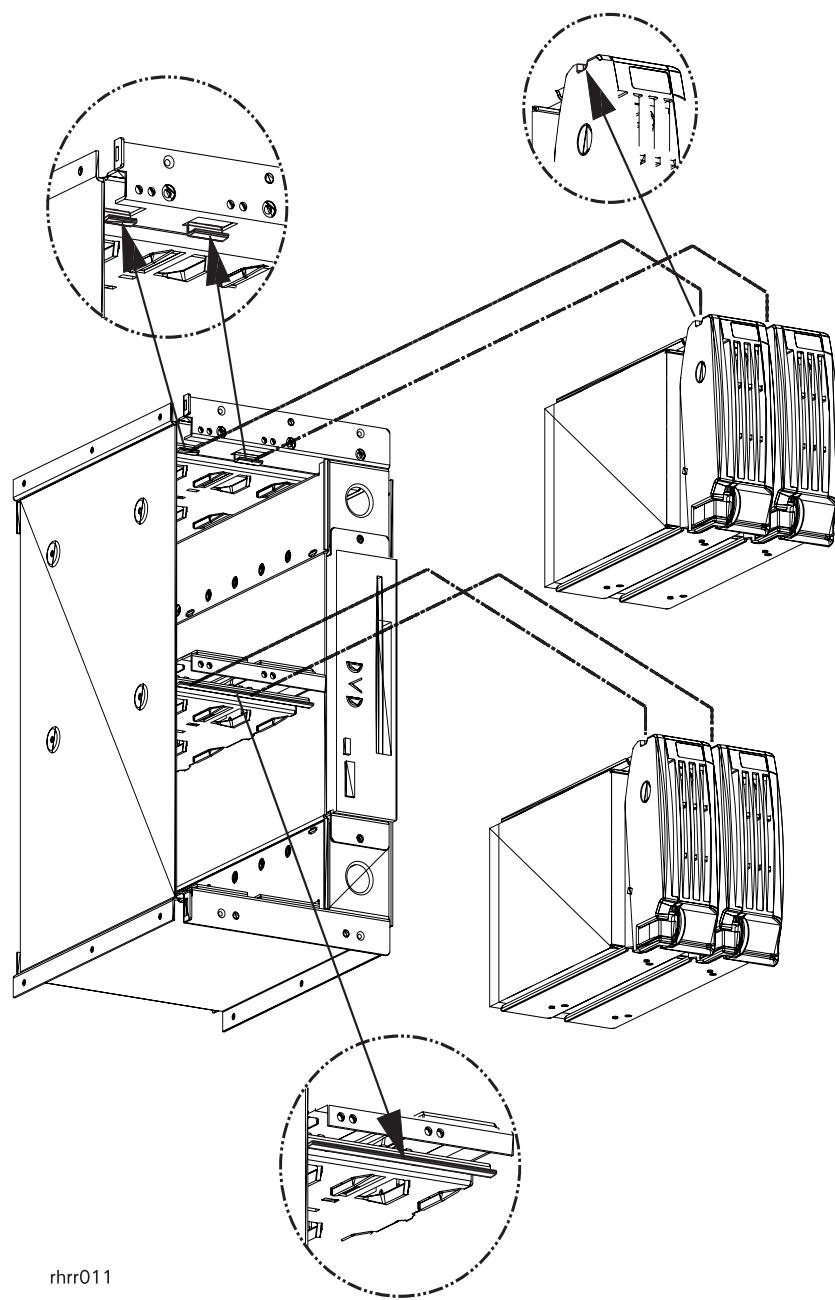
## Installing Disk Drives

rp54xx servers support up to four optional internal hard drives. These drives must be installed in the following sequence:



It is not necessary to shutdown the HP-UX operating system or power off the server to install a new disk. Follow this procedure to add internal hard disk drives to your rp54xx server.

- Step 1.** If a front bezel is installed on the face of the server, open the right-hand panel to gain access to the disk slots.
- Step 2.** Remove the disk drive slot cover.
- Step 3.** Insert the new disk drive into the slot until the rear connectors snap into place in the card guide. As shown in the following graphic, the notches at the top of the disk drives must snap over the small brackets in the disk bay to ensure a firm connection.



rhrr011

- Step 4.** Secure the connection by pushing the blue release lever closed.
- Step 5.** Refer to HP-UX documentation to configure the new disk.

Installing Additional Components

## Installing Disk Drives

---

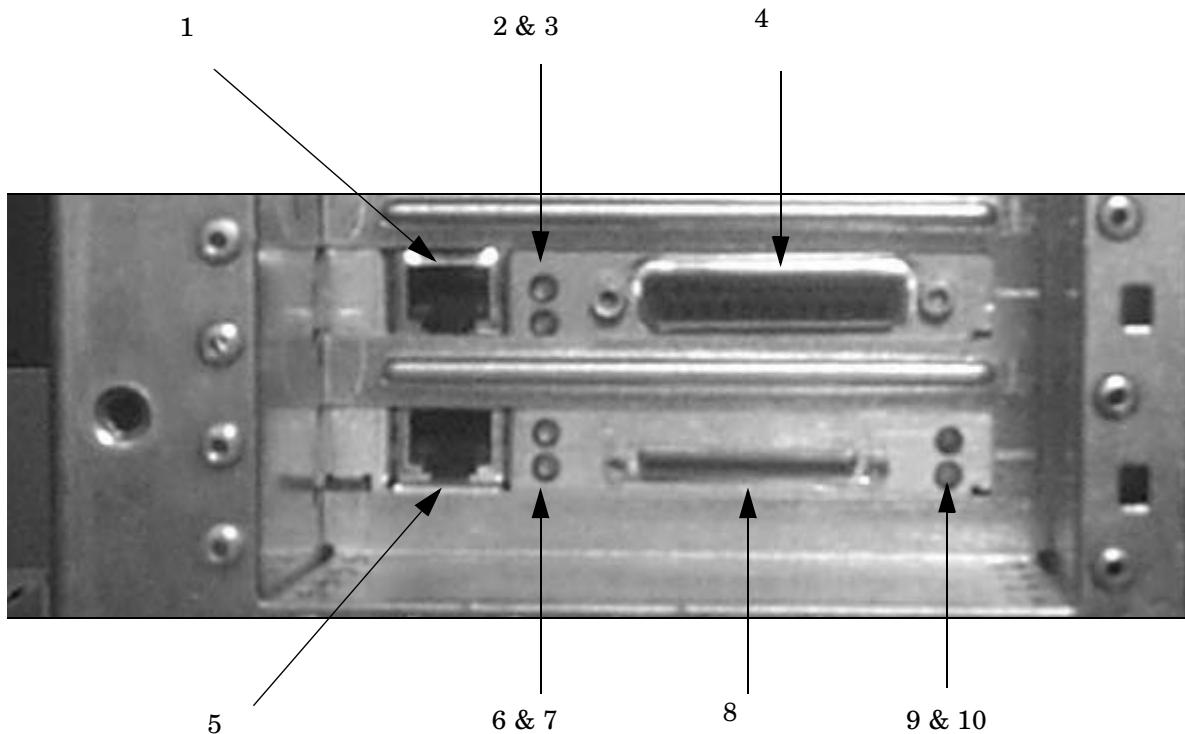
## **4** Cable Connections

## Core I/O Connections

The following paragraphs describe the indicators and connections of the rp54xx Core I/O. Core I/O consists of a LAN/SCSI card in slot 1 (lower slot in graphic) and a Guardian Service Processor (GSP) in slot 2 (upper slot in graphic). There are two versions of GSP, revision A and revision B.

### Revision A GSP

The following graphic shows the indicators and connectors for the revision A GSP and LAN/SCSI Core I/O boards.

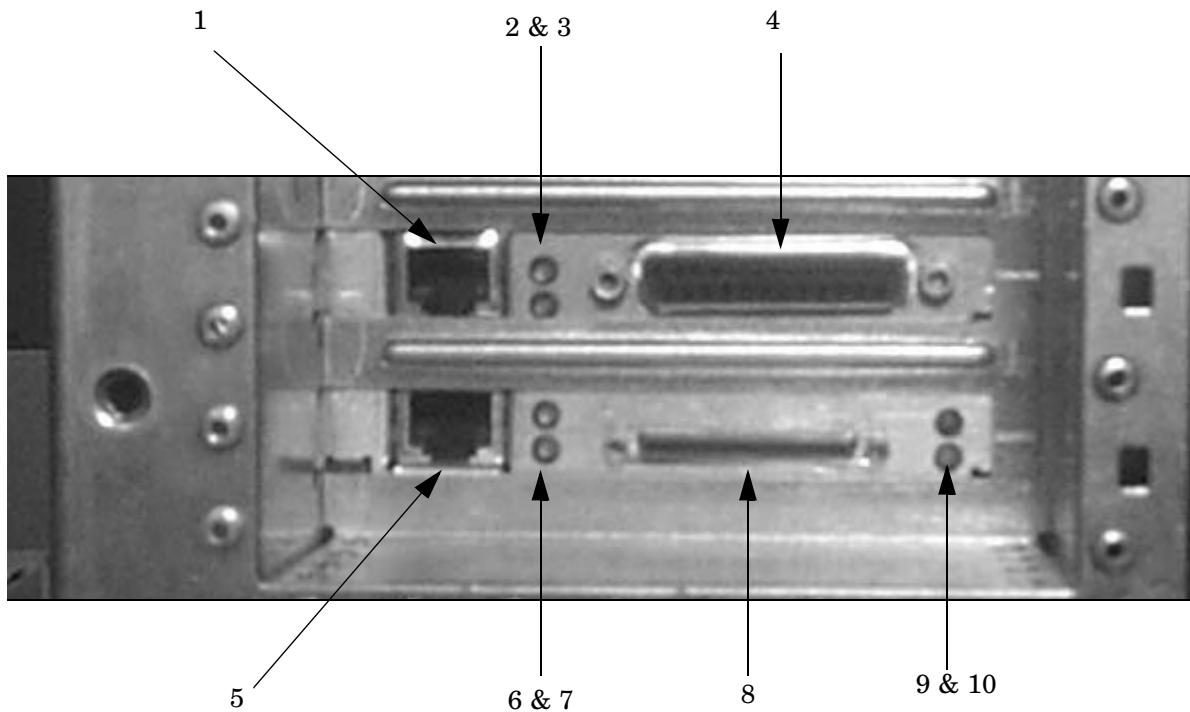


1. 10-Base-T LAN (RJ-45) Connector  
GSP LAN.
2. Green/Red (Upper LED)  
Green = GSP Power On.  
Flashing Green = LAN Receive.  
Red = Guardian Support Processor Test Failed.
3. Green/Red, (Lower LED)  
Green = Link OK.  
Flashing Green = LAN Transmit.  
Red = Guardian Support Processor Test Failed.
4. Console/UPS/Remote Connector (D-Type 25-Pin female).  
*Requires an A5191-63001 "W" adapter cable*
5. 10/100 Base-T = Primary LAN (RJ-45) Connection  
*Path 0/0/0/0*

6. Green/Yellow (Upper LED)  
Green = 100 Base-T Mode  
Green Blinking = 100 Base-T Receiving  
Amber = 10 Base-T Mode  
Amber Blinking = 10 Base-T Receiving
7. Green (Lower LED)  
Green = Link OK (10/100 Base-T Mode indicated by LED #6)  
Green Blinking = Transmitting
8. Ultra-2 SCSI Connector (68-Pin VHDCI SCSI)  
*Path 0/0/1/0*
9. SCSI Mode (Green, Upper LED)  
On = Low Voltage Differential (LVD) Mode.  
Off = Single Ended Mode.
10. SCSI Terminator Power (Amber, Lower LED)  
On = Terminator power present  
Off = Terminator power Not present.

## Revision B GSP

The following graphic shows the indicators and connectors for the revision B GSP and LAN/SCSI Core I/O boards.



1. 10/100-Base-T LAN (RJ-45) Connector.  
GSP LAN.
2. Green/Red (Upper LED).  
Green = GSP Power On.  
Red = Guardian Support Processor Test Failed.
3. Green/Yellow, (Lower LED).  
Green = 100 Base-T Link OK.  
Flashing Green = 100 Base-T LAN Activity.  
Yellow = 10 Base-T Link OK.  
Flashing Yellow = 10 Base -T LAN Activity.
4. Console/UPS/Remote Connector (D-Type 25-Pin female).  
*Requires an A6144-63001 "M" adapter cable.*
5. 10/100 Base-T = Primary LAN (RJ-45) Connection.  
*Path 0/0/0/0.*
6. Green/Yellow (Upper LED).  
Green = 100 Base-T Mode.  
Green Blinking = 100 Base-T Receiving.  
Amber = 10 Base-T Mode.  
Amber Blinking = 10 Base-T Receiving.
7. Green (Lower LED).  
Green = Link OK (10/100 Base-T Mode indicated by LED #6).  
Green Blinking = Transmitting.
8. Ultra-2 SCSI Connector (68-Pin VHDCI SCSI).  
*Path 0/0/1/0.*
9. SCSI Mode (Green, Upper LED)  
On = Low Voltage Differential (LVD) Mode.  
Off = Single Ended Mode.
10. SCSI Terminator Power (Amber, Lower LED)  
On = Terminator power present  
Off = Terminator power Not present.

## Guardian Service Processor (GSP) Overview

This section provides an overview of the Guardian Service Processor (GSP). The GSP is an always on, dedicated service processor that monitors system power, cooling and configuration, and provides console communications. Power and cooling information is obtained via an interface to the platform monitor card. Configuration information is obtained via connection to the Serial Presence Detect (SPD) bus. The GSP can only be installed in slot 2 and must be present for the server to power up.

The GSP has downloadable firmware which can be updated independent of the HP-UX operating system. GSP firmware updates can occur anytime the GSP is active. If the DC power switch is OFF, the GSP is still operational and GSP firmware updates can still occur. GSP firmware updates may be performed by customers.

If the GSP becomes hung, it is possible to reset the GSP without impacting the server. The GSP may be reset via the GSP RESET button on the right side of the card. The PCI cover panel (right side panel) must first be removed to allow access to the right side of the GSP card.

The GSP has two connectors on the bulkhead. An RJ-45 for LAN connections and a female DB25 connector for RS-232 connections. Attach either a "W" or an "M" cable to the DB25 connector to provide individual output for CONSOLE, REMOTE and UPS.

To access the GSP from the local ASCII console, type control b and the GSP> prompt will appear. It may be necessary to type control Ecf first. To exit the GSP, type GSP>co.

The GSP was originally a core component of the revision A rp5400 (A5576A) and rp5450 (A5191A) servers. Beginning with introduction of the revision B rp5400 (A5576B), rp5450 (A5191B), and rp5470 servers the GSP became a separate, must order product (A6696A).

There are two revisions of rp54xx GSP: rev A (A6696A) and rev B (A6696B). Both GSPs must be installed in order for the server to power up.

### GSP LAN

This LAN is exclusively for LAN console access and is not configurable via HP-UX. The LAN is configured via GSP commands. Hostname, IP, gateway and subnet mask parameters may be set via the GSP>lc command. The GSP may also initiate ping via the GSP>xd command.

### GSP RS-232

The DB25 connector on the GSP is used for RS-232 communications to a local console (via CONSOLE connector), a remote console via modem (REMOTE connector), and a UPS (UPS connector). The baud rate, term type, etc., of the CONSOLE and REMOTE ports are configured via GSP>ca command.

The GSP supports VT100 and HPTERM terminal emulation. For correct communications, the GSP and RS-232 device must use the same terminal emulation and baud rates.

### GSP Features

The revision A GSP provides a 10 base-T LAN connector for LAN console access and a DB-25 connector to which the A5191-63001 W-cable connects. The W-cable provides REMOTE, UPS, and CONSOLE DB-9 connectors.

Features of the revision A GSP are:

- 10 Base-T LAN connector for revision A GSP

- 10/100 Base-T LAN connector for revision B GSP
- On-board processor dedicated to GSP functions
- Error logging and notification
- Display of system alerts and selftest chassis codes
- Powered by 15 VDC housekeeping power that is present when the front panel switch is off
- Power and configuration monitoring
- RS-232, LAN, REMOTE and WEB console access
- Administrator and user security
- Alphanumeric paging.

There are two revisions of rp54xx GSP: revision A (A6696A) and revision B (A6696B). Due to significant hardware differences between the revision A and B GSP, each GSP requires its own firmware. Revision A GSP firmware can only be installed in a revision A GSP and revision B GSP firmware can only be installed in a revision B GSP. The hardware differences are necessary to incorporate the embedded web access, 10/100 Base-t LAN, and faster GSP processor.

The GSP provides four types of console access: RS-232, Remote, LAN and Web. Console information is mirrored to all four console types. Refer to *Configure System Console* for more information.

The GSP was originally a core component of the revision A rp5400 (A5576A) and rp5450 (A5191A) servers. Beginning with introduction of the revision B rp5400 (A5576B), rp5450 (A5191B), and rp5470 servers the GSP became a separate, must order product (A6696A).

## Revision A GSP

The revision A GSP is identified by product number A6696A and part numbers: A5191-60012, A5191-69012, and A5191-69112.

The revision A GSP requires a “W” cable to be attached to the DB25 connector. The part number of the “W” is A5191-63001. The “W” cable provides female DB9 connectors for CONSOLE, REMOTE and UPS. The maximum supported baud rate for the CONSOLE and REMOTE connectors is 19200 baud and 1200 baud for the UPS.

The paths for the CONSOLE, UPS, and REMOTE are 0/0/4/0.0, 0/0/4/0.1, and 0/0/4/0.2 respectively.

For the rev A GSP, the web console is accomplished by shipping one J3591A Secure Web Console with each rp54xx server. The Secure Web Console can be used in place of an ASCII console to provide console access via a web connection. If you are installing an rp54xx server that does not have an ASCII console, you may use the Secure Web Console as the console. However, you must first configure the Secure Web Console. Refer to *Secure Web Console Installation and Configuration* for more information on SWC Installation/Configuration.

## Revision B GSP

The revision B GSP is identified by product number A6696B and part numbers: A6144-60012, A6144-69012, and A6144-69112.

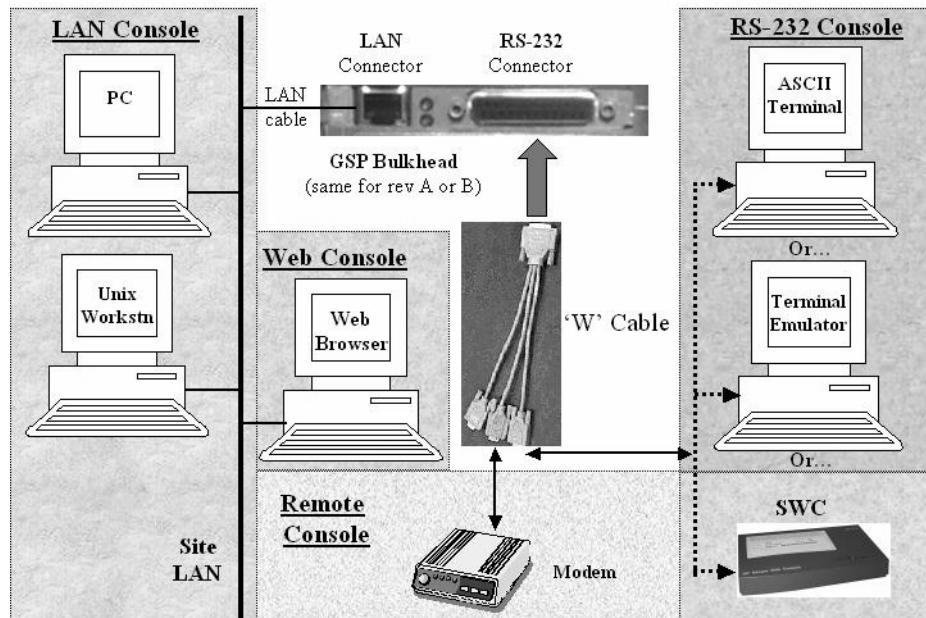
The revision B GSP requires an “M” cable to be attached to the DB25 connector. The part number of the “M” cable is A6144-63001. The “M” cable provides female DB9 connectors for CONSOLE, REMOTE, and UPS. The maximum supported baud rate for the CONSOLE and REMOTE connectors is 38400 baud and 1200 baud for the UPS.

The paths for the CONSOLE, UPS, and REMOTE are 0/0/4/1.0, 0/0/4/1.1 and 0/0/4/1.2 respectively.

## Configure System Consoles

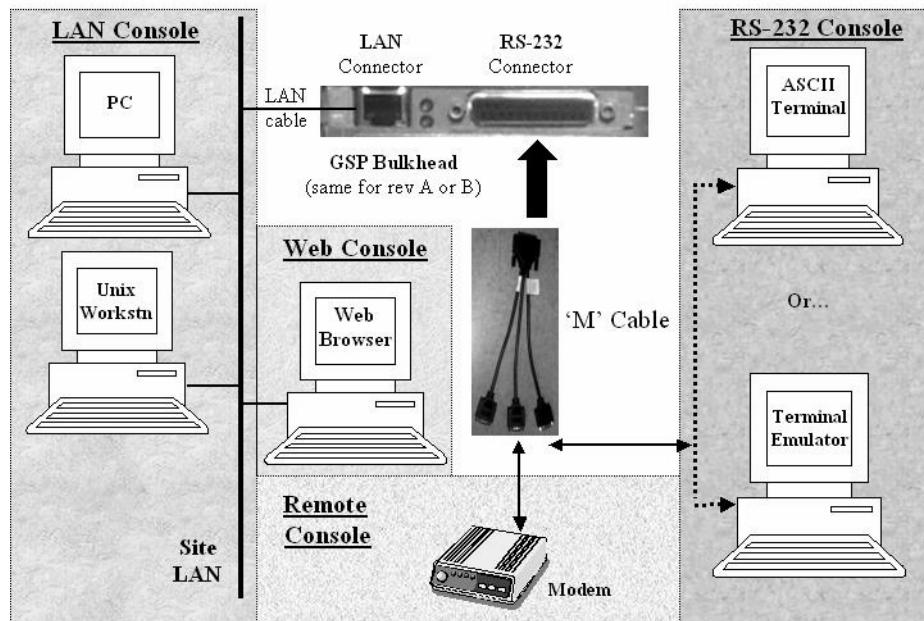
rp54xx servers provide RS-232, REMOTE, LAN and WEB console access. All console access involves the Guardian Service Processor (GSP). rp54xx servers use either a revision A or revision B GSP. Below is an illustration of the console access provided by the revision A GSP.

Revision A GSP Console Access



The revision B GSP has embedded web access, eliminating the need for an external Secure Web Console (SWC). Below is an illustration of the console access provided by the revision A GSP.

## Revision B GSP Console Access



### GSP Cables

Both the revision A and B GSPs provide a DB-25 connector for RS-232 communications. Connect the A5191-63001 W-cable to the revision A GSP DB25 connector or connect the A6144-63001 M-cable to the revision B GSP DB25 connector. These cables provide individual DB9 connectors for REMOTE, UPS and CONSOLE.

---

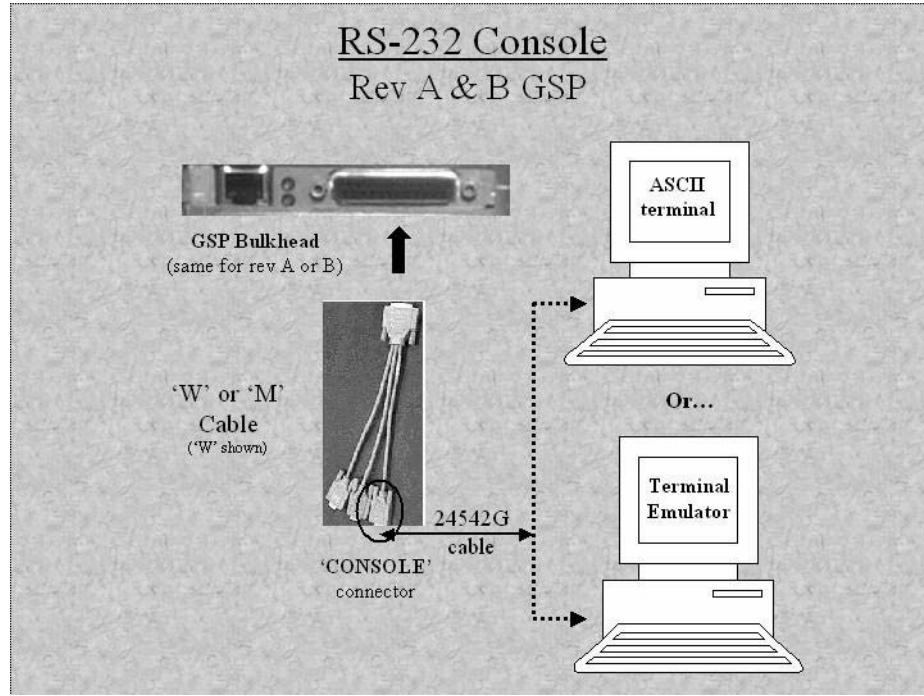
**NOTE** Use the A5191-63001 W-cable with revision A GSP and A6144-63001 M-cable with revision B GSP *only*. Failure to use the right cable can result in reduced functionality.

---

The W and M-cables are slightly different. The W-cable has full RS-232 capability on the REMOTE and CONSOLE connectors and partial RS-232 capability on the UPS connector. The M-cable has full RS-232 capability on the REMOTE and UPS connectors and partial RS-232 capability on the CONSOLE connector. The cable change is to be consistent with rp54xx functionality. The cables are different colors to easily tell them apart. The W-cable is gray and has part number A5191-63001. The M-cable is black and has part number A6144-63001.

### Configure RS-232 Console

The physical connections for an RS-232 console include attaching the correct cable to the GSP. Next, connect the 24542G cable (supplied) to the CONSOLE connector and the serial port of the ASCII console. A personal computer (PC) running terminal emulation software may be used in place of an ASCII console. Refer to the illustration below for RS-232 console.



- Step 1.** The GSP is located in slot 2 of the rp54xx' rear card cage. Connect the 25-pin end of:
- the A5191-63001 W-cable to the 25-pin connector on the revision A GSP card (A5191-60012) OR
  - the A6144-63001 M-cable to the 25-pin connector on the revision B GSP card (A6144-60012)
- Step 2.** Connect the 9-pin "Console" connector of either the W or M-cable to the 9-pin D-type connector of a 24542G RS-232 cable.
- Step 3.** Connect the 25-pin end of the 24542G serial cable to the serial/RS232 port on the ASCII console. (RS232 Serial Port labeling may vary depending on manufacturer.)
- Step 4.** Connect the System Console to input AC power.
- Step 5.** Turn the System Console AC power switch to ON.

After the physical connections have been made, configure the ASCII console. When using the C1099A Terminal Console, the default settings are recommended. Refer to the C1099A Terminal Console operating manual for instructions on how to obtain default settings.

The HP 700 series console may also be used as an ASCII console. Both the C1099A Terminal Console and S700 consoles support HPterm and VT100 emulations. The emulation of the GSP and ASCII console need not match for communications between them to occur. However, to ensure proper communications, HP recommends the ASCII console and GSP use the same emulation. HP also recommends that other configurable parameters on the GSP match those of the ASCII console. Baud rate, start/stop bits, etc... The default emulation of the GSP is VT100.

Below is a procedure to configure a HP 700 serial console for VT100 emulation.

## HP 700 Series System Console Configuration

The following describes the steps required to configure the HP 700 series terminal for VT-100 mode for operation with an rp54xx server.

Although any terminal capable of operating in VT-100 mode can be used, the HP700 series terminal is used here as an example because it is fairly common and its configuration is typical of many terminals currently in use.

**HP700 VT-100 Mode Configuration** The following procedure outlines the steps to configure the HP700 series terminal for VT100 operation.

---

**NOTE** You may use either the arrow keys or the tab key to move between the setting options on the screen.

---

1. Press [**config keys**] function key. [**f8**]
2. Press [**terminal config**] function key. [**f5**]
3. Move to *Terminal ID* and enter “vt100”.
4. Move to *Set TermMode* and, using the [**Prev**] and [**Next**] keys, select “EM100”.
5. Press the [**config keys**] function key. [**f8**]
6. Press the [**ansi config**] function key. [**f6**]
7. Move to “multipage” and, using the [**Prev**] and [**Next**] keys, select “yes”.  
(Enables screen scrolling).
8. Move to *Backspace Del* and, using the [**Prev**] and [**Next**] keys, select “Backspace/Del”.
9. Move to *EM100 ID* and, using the [**Prev**] and [**Next**] keys, select “EM100”.

### Configure the Asynchronous Values of the GSP

After the ASCII console has been configured and physical connections made, make any necessary changes to the asynchronous values of the GSP.

1. Access the GSP with the ctrl+b entry. The GSP will respond with a GSP> prompt.
2. At the GSP prompt, enter the Configure Asynchronous (ca) command:

The ca command will start a series of prompts. Respond to each prompt with the appropriate information.

#### **Example 4-1      CA command**

Leaving Console Mode - you may lose write access. When Console Mode returns, type ^Ecf to get console write access.

GSP Host Name: fesrhapgsp

GSP> ca

CA This command allows you to modify the local and remote modem serial portconfigurations.

Current configuration settings:

Local Console Serial Port bit rate: 9600 bits/s

Local Console Serial Port Flow Control: Software

```
Local Console Serial Port Terminal Type: vt100
Remote Console Serial Port Modem Protocol: CCITT  Remote Console Serial Port Modem
bit rate: 19200 bits/s
Remote Console Serial Port Modem Flow Control: Software
Remote Console Serial Port Modem Transmit Configuration Strings: Enabled
Remote Console Serial Port Modem Presence: always connected
Do you want to modify the Local Console Serial Port settings? (Y/[N])
Do you want to modify the Remote Console Serial Port Modem settings? (Y/[N])
GSP Host Name: fesrhapgsp
```

If necessary, use the GSP help facility by typing GSP>he. Once in the help facility, type the command need help with. Use LI for a list of commands.

The following baud rates are recommended for the revision A GSP:

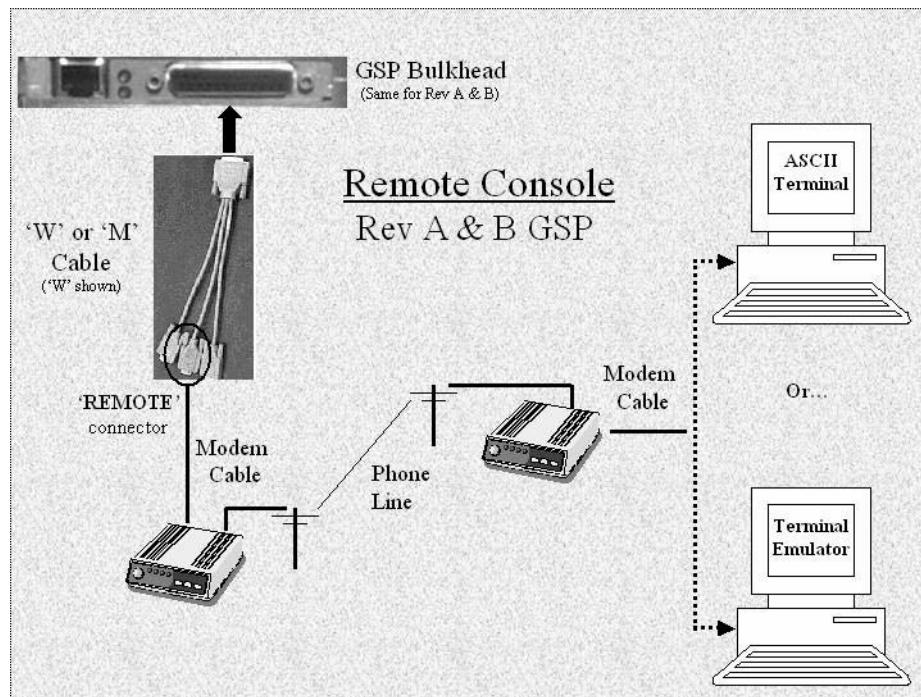
- Console: 19200
- Remote: 19200
- UPS: 1200

The following baud rates are recommended for the revision B GSP:

- Console: 38400
- Remote: 38400
- UPS: 1200

## Configure Remote Console

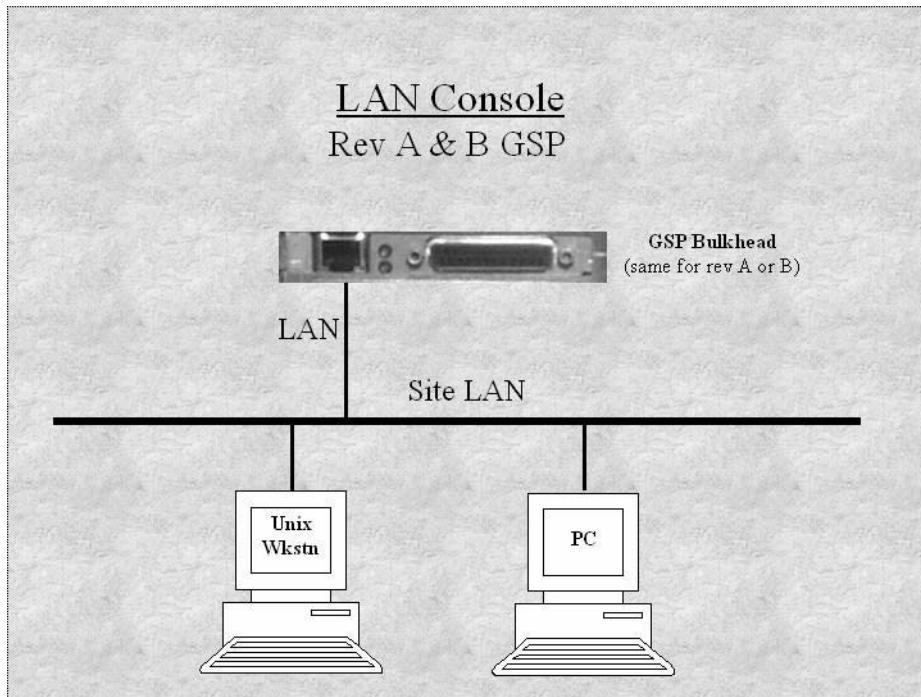
The remote console allows console access via modem connections. Below is an illustration of the REMOTE console.



The `GSP>ca` command is used to configure asynchronous settings for the REMOTE console. Baud rates and emulations should match between the modems, remote ASCII terminal and the GSP. Refer to, “Configure RS232 Console” for information about setting these values.

## Configure the LAN Console

The LAN console allows you to access the console from the LAN using TelNet or http (revision B GSP only) protocols. Below is an illustration of the LAN console.



The configuration of the LAN console of both the revision A and B GSPs may be done from either an ASCII console or the external Secure Web Console. For the revision B GSP, an IP may be assigned via LAN by pinging the LAN from a PC or workstation.

### Configuring the GSP LAN Port via an ASCII console

The LAN port of the GSP allows connection via TelNet or http connections. Once the LAN parameters are configured, the console may be accessed via a TelNet connection or via a web browser (revision B GSP only). The default IP of the GSP LAN is 127.0.0.1.

---

**NOTE** The GSP has a separate LAN port from the system LAN port. It will need a separate LAN drop, IP address, and networking information from the port used by HP-UX.  
Before starting this procedure, you will need to know the following information:

- I.P. address (for GSP)
  - Subnet mask
  - Gateway address
  - Hostname (this is used when messages are logged or printed)
- 

To configure the GSP LAN port, perform the following steps:

1. Access the GSP with the **ctrl+b** entry.
2. At the GSP prompt, enter the LAN Configuration (**lc**) command:

GSP> **lc**

The lc command will start a series of prompts. Respond to each prompt with the appropriate information.

#### **Example 4-2      LC command**

Leaving Console Mode - you may lose write access. When Console Mode returns, type ^Ecf to get console write access.

GSP Host Name: fesrhapgsp

GSP> lc

LC This command allows you to modify the LAN configuration.

Current configuration:

MAC Address: 0x00306e050a63

IP Address: 15.8.133.185

GSP Host Name: fesrhapgsp

Subnet Mask: 255.255.248.0

Gateway: 15.8.128.1

Web Console Port Number: 2023

Do you want to modify the LAN configuration? (Y/[N])

GSP Host Name: fesrhapgsp

The revision B GSP introduces a configurable Web Console Port Number parameter. The default value is 2023. Once the GSP LAN is configured, it is accessible via either TelNet or web connections.

#### **Configuring the GSP LAN Port via LAN**

The revision B GSP LAN port can be assigned an IP address without using the LAN Configuration (lc) command via an ASCII console. This section describes how to assign the IP address allowing web access. Once web access is accomplished, use the lc command to configure remaining network parameters.

---

**NOTE**      The GSP LAN port is separate from the system LAN port. It will need a separate LAN drop, IP address, and networking information from the port used by HP-UX.

Before starting this procedure, you will need to know the following information:

- I.P. address (for GSP)
  - Subnet mask
  - Gateway address
  - Hostname (this is used when messages are logged or printed)
- 

To configure the GSP LAN port via LAN, perform the following steps:

---

**NOTE**      The GSP *must* be on the same subnet as the system being used to remotely configure the LAN port. If it is not, the remote configuration will be unsuccessful.

---

**Step 6.** Determine the MAC address of the revision B GSP by examining the GSP MAC address label on the rear of the server.

**Step 7.** Use the route add command to add the I.P address of the GSP and remote system to the router.

**Step 8.** Use the arp command to add an ARP entry for the IP address using the GSP MAC address.

- For HP-UX systems, the format of the MAC address is 00:30:6e:05:0a:ea
- For MS DOS systems, the format of the MAC address is 00-30-6e-05-0a-ea

**Step 9.** Use the ping command to assign the I.P address for the GSP.

**Step 10.** The revision B GSP is now accessible via LAN. Access the GSP and configure remaining network parameters using the LAN Configuration (lc) command:

GSP> lc

The lc command will start a series of prompts. Respond to each prompt with the appropriate information.

#### Example 4-3 LAN Configuration from a PC

```
Microsoft Windows 2000 [Version 5.00.2195]
(C) Copyright 1985-1999 Microsoft Corp.

C:>route add 15.8.130.1 15.8.133.147
C:>arp -s 15.8.130.1 00-30-6e-05-0a-ea
C:>ping 15.8.130.1

Pinging 15.8.130.1 with 32 bytes of data:

Reply from 15.8.130.1: bytes=32 time<10ms TTL=63

Ping statistics for 15.8.130.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:>
```

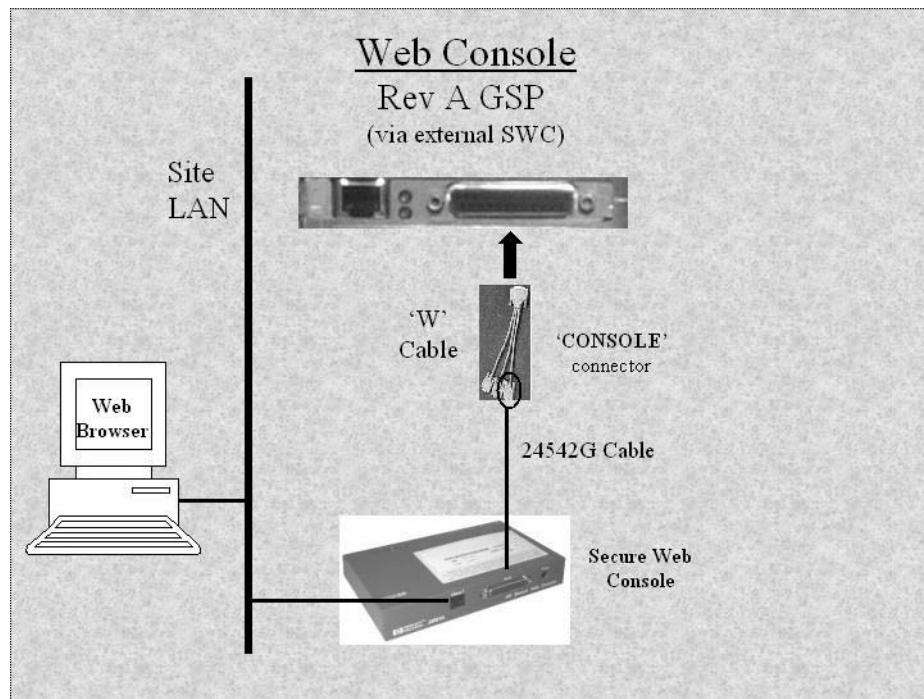
#### Configure the Web Console

For the revision A GSP, the web console is accomplished via the J3591A Secure Web Console. Below is an illustration of the web console for the revision A GSP.

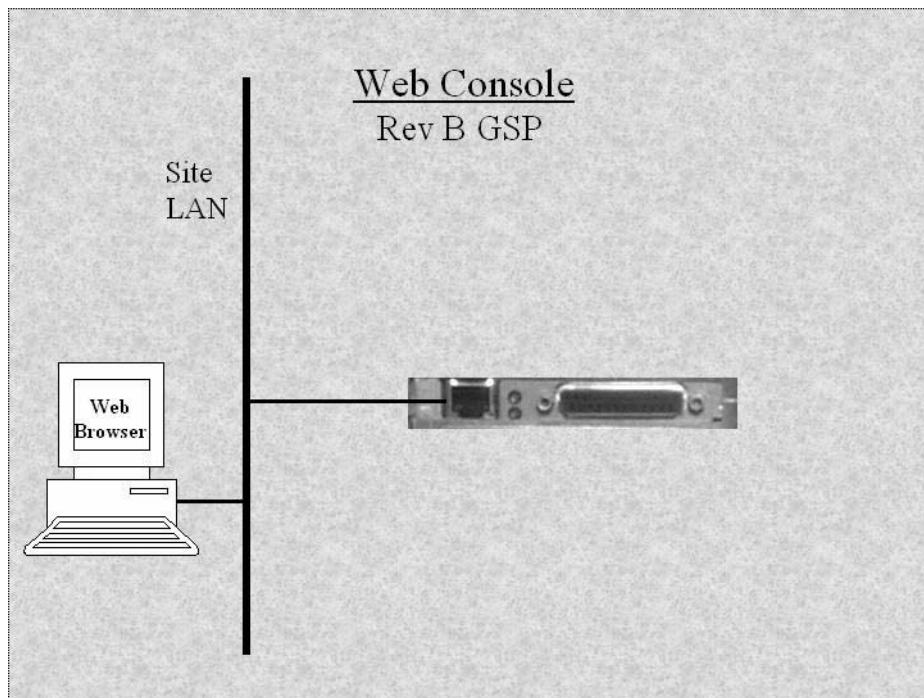
## Cable Connections

### Configure System Consoles

Refer to, “Install a Secure Web Console” for more information on Secure Web Console installation and configuration.



For the revision B GSP, the web console is an embedded feature. The steps to configure a web console are the same as configuring a LAN console. Refer to, “Configure the LAN Console.”



Once the LAN has been configured, access the web console by pointing a web browser, on the same subnet, to the IP of the GSP LAN.

Two browser windows will appear: a window with a white background and the HP invent logo and a separate GSP window with a black background.

**Example 4-4      GSP Browser Window**

```
Service Processor login:  
Service Processor login:
```

Warning: Applet Window

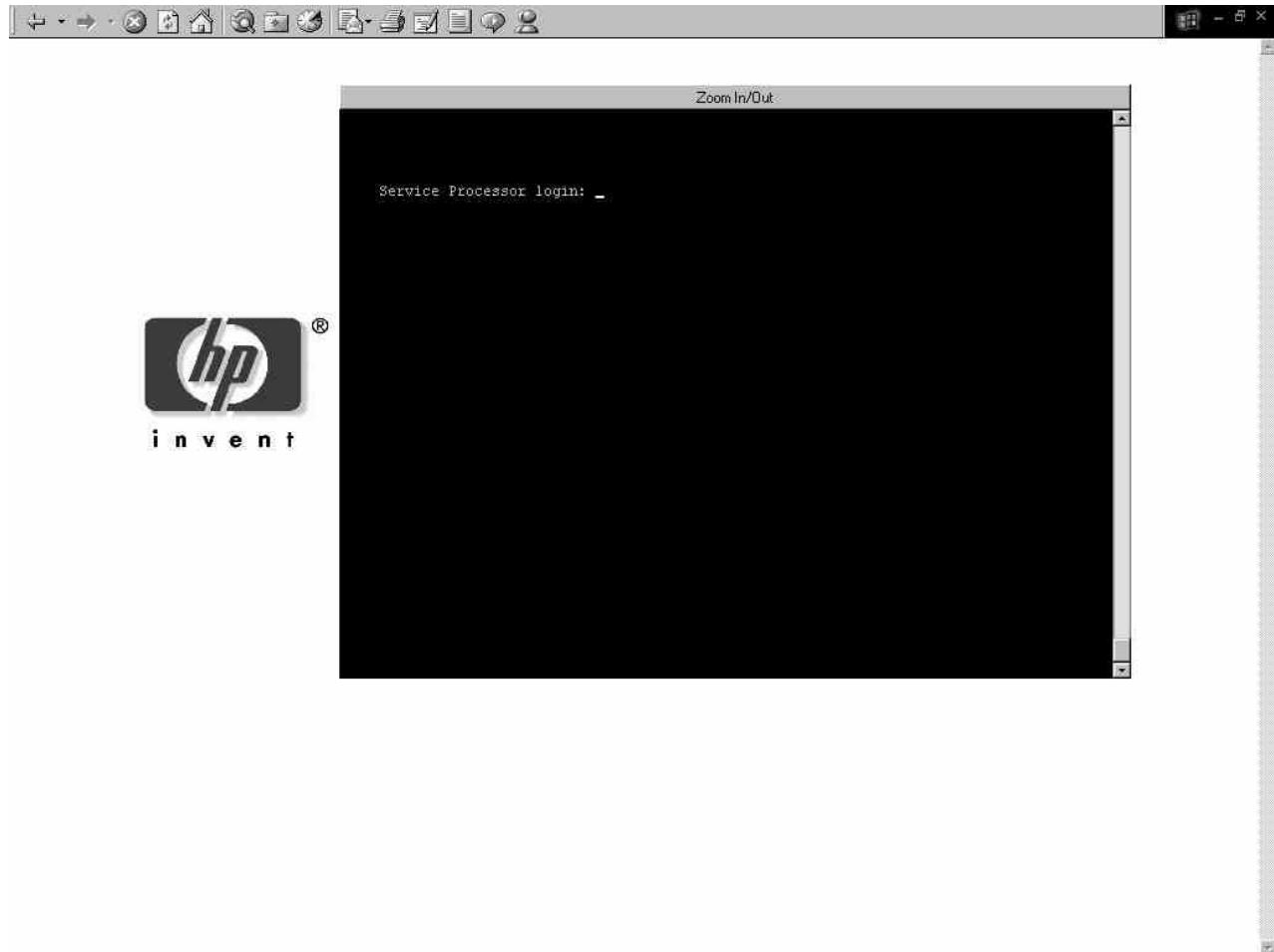
Use the SETTINGS menu bar to configure web browser emulation. The GSP window also has its own HELP facility.

**Example 4-5 GSP Web Browser Help Screen**



When the separate GSP window is closed, it appears in the HP invent window with Zoom In/Out above it. Click on the Zoom In/Out bar to generate a separate GSP window.

**Example 4-6      Combined GSP Browser Window**



There is not a separate administration “layer” when using the embedded web access of the revision B GSP. Web console access via the external Secure Web Console required that you first logon to the SWC, then click on ACCESS CONSOLE. User configuration was also performed at the Secure Web Console. However, the revision B GSP web console does not require this additional step. When you point the web browser at the IP of the GSP LAN, you are directly connected to the GSP. The web console part of the GSP employs the same users as the GSP.

## Secure Web Console Installation

The following section describes installation of the HP Secure Web Console on inside of the rear door of a rack-mounted rp54xx server.

For technical, installation, and configuration instructions for the Secure Web Console, refer to the following URLs on the Internet:

General information:

<http://www.hp.com/>

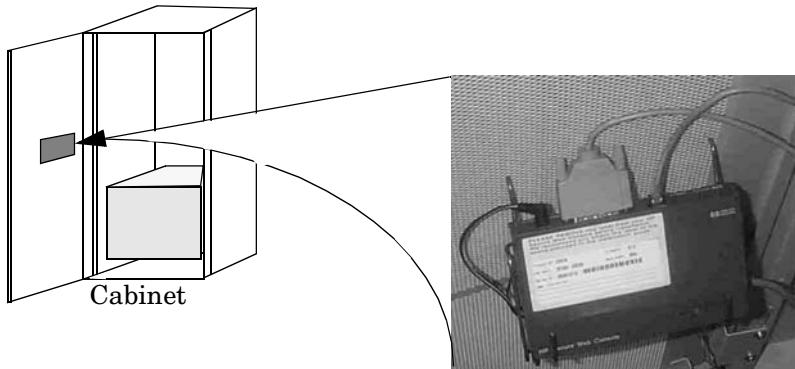
Documentation:

<http://www.docs.hp.com>

---

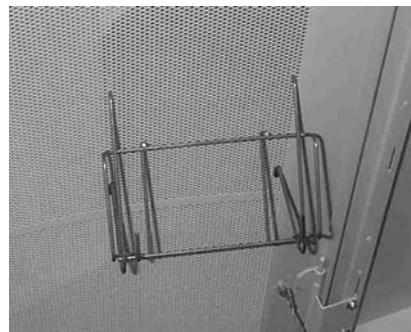
**NOTE** Either the system console (HP series 700 terminal) or the HP Secure Web Console may be installed on an rp54xx server, but not at the same time. Both console types use the same DB9 type LAN *Console* connector.

---



To install the HP Secure Web Console on an rp54xx server, refer to the previous figure and the HP Secure Web Console documentation, then proceed as follows:

**Step 1.** Install the wire mounting bracket by carefully inserting the two top prongs through the vent grill in the rear door of the cabinet as shown above. Position the bracket toward the hinge side of the door.

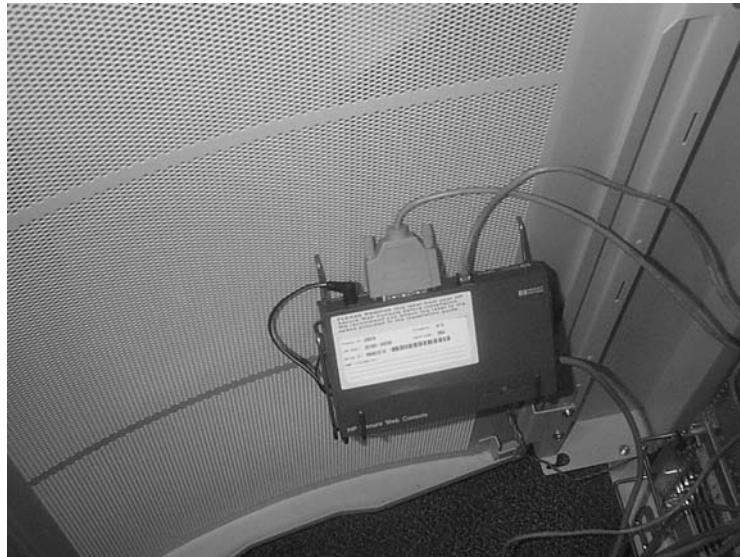


**Step 2.** Place the Secure Web Console power supply into the bottom portion of the wire mounting bracket as shown.



**Step 3.** Connect one end of the power cable to the power supply where indicated.

**Step 4.** Position the Secure Web Console unit in the mounting bracket.



**Step 5.** Connect the DC out cable from the power supply to the Secure Web Console.

**Step 6.** Connect one end of the AC power cord (supplied) to the Secure Web Console power supply.

**Step 7.** Connect the other end of the AC power cord to an available receptacle.

On a PDU if in a cabinet.

In an available wall outlet if in a Deskside enclosure.

**Step 8.** Connect the 9-pin end of the RS-232 cable (Supplied) to the connector labeled CONSOLE on the A5591-63002 “W-type” adapter cable.

---

**CAUTION** To prevent unauthorized access to your rp54xx system, do not connect the other end of the serial cable to the Secure Web Console until both the server and the Web Console have both been fully configured.

---

**Step 9.** Connect one end of a LAN cable to RJ-45 connector labeled 10-Base-T on the Secure Web Console.

**Step 10.** Connect the other end of the same LAN cable to your site LAN.

**Step 11.** Configure the Secure Web Console in accordance with the documentation that was provided with it or refer to <http://www.docs.hp.com>

**Step 12.** Once the Web Console has been properly configured, the remaining end of the serial cable between the server and the Web Console may be connected.

## GSP Configurable Parameters

Once a system console is configured, additional GSP parameters may be set. For a complete list use the GSP>he command to access the on-line help facility.

Examples of three configurable parameters follow.

### Adding Users

The GSP provides a maximum of 20 users (one administrator and 19 operators). By design, the first user added to the GSP becomes the GSP administrator. Only the GSP administrator can add or remove users or change the GSP configuration.

---

**NOTE** Before starting this procedure, you will need to know the following information:

- User's name
  - Organization's name
  - Login name
  - User's password
- 

To add a user, perform the following steps:

1. Access the GSP with the ctrl+b entry.
2. At the GSP prompt, enter the Security options and access control (SO) command:

GSP> so

3. The first prompt you will see with the so command is for GSP wide parameters:

GSP wide parameters are:

Login Timeout: 1 minutes.

- . Number of password Faults allowed: 3
- . Flow Control Timeout: 5 minutes.

Do you want to modify the GSP wide parameters? (Y / [N]) \_\_

At this point you can modify the GSP wide parameters, or continue with adding users. To add users, respond N for no.

---

**NOTE** If this is the first time users are being added, the first user added will be the GSP administrator.

If this is not the first time you are adding users (you are adding additional users), you will need to step through all current users to reach the next available user prompt.

---

4. The next prompt that appears will ask the following question:

Do you want to modify the user number 1 parameters? (Y/[N]/Q to quit) \_\_

Follow the series of prompts to enter all the required fields for adding a user.

**CAUTION** Be sure to read each prompt carefully and enter the correct response. A missed or incorrect entry could deny entry to that user.

---

The following is an example of an added user's information:

- . User's Name: Joe Smith
- . Organization's Name: IT Support
- . Dial-back configuration: Disabled
- . Access Level: Operator
- . Mode: multiple
- . User's state: enabled

For the number 1 user, the Access level is administrator. The Mode entry of single only allows entry for that user one time, then access will be denied. A Mode entry of multiple allows unlimited entries into the GSP.

## Removing Users

You can remove (disable) a GSP user with the same Security options and access control (SO) command used to add a user.

To remove a user, perform the following steps:

1. Access the GSP with the ctrl+b entry.
2. At the GSP prompt, enter the Security options and access control (SO) command:

GSP> so

3. The first prompt you will see with the SO command is for GSP-wide parameters:

GSP wide parameters are:

- . Login Timeout: 1 minutes.
- . Number of password Faults allowed: 3
- . Flow Control Timeout: 5 minutes.

Do you want to modify the GSP wide parameters? (Y / [N]) \_\_

At this point you can modify the GSP wide parameters, or continue with removing a user. To remove users, respond N for no.

---

**NOTE** You will have to step through each user number until you reach the user to be removed.

---

4. When you access the number of the user to be removed, you must change the data in the prompts for that number.

It is important that, at a minimum, you need to modify the User's state to Disabled.

## Return the GSP to Default Configurations

The Default Configuration (dc) command is used to reset all or some of the GSP values to the default values. To return GSP values to default configurations, perform the following steps:

1. Access the GSP with the ctrl+b entry.
2. At the GSP prompt, enter the Default Configuration (dc) command:

```
GSP> dc
```

3. Follow the prompts for the dc command, and be sure to have the change information available.

---

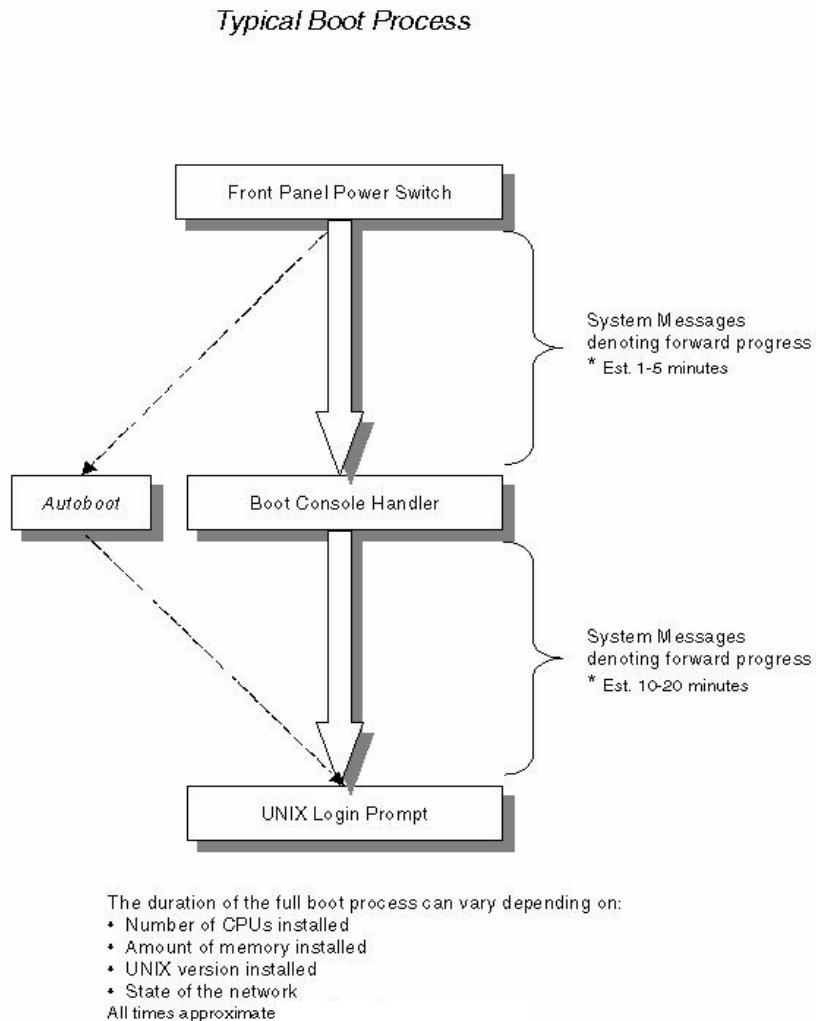
**CAUTION** When the Security configuration is reset, all users are removed, including the GSP administrator. It also disables the remote. Remote must be re-enabled through the main console using the Enable Remote (er) command.

---

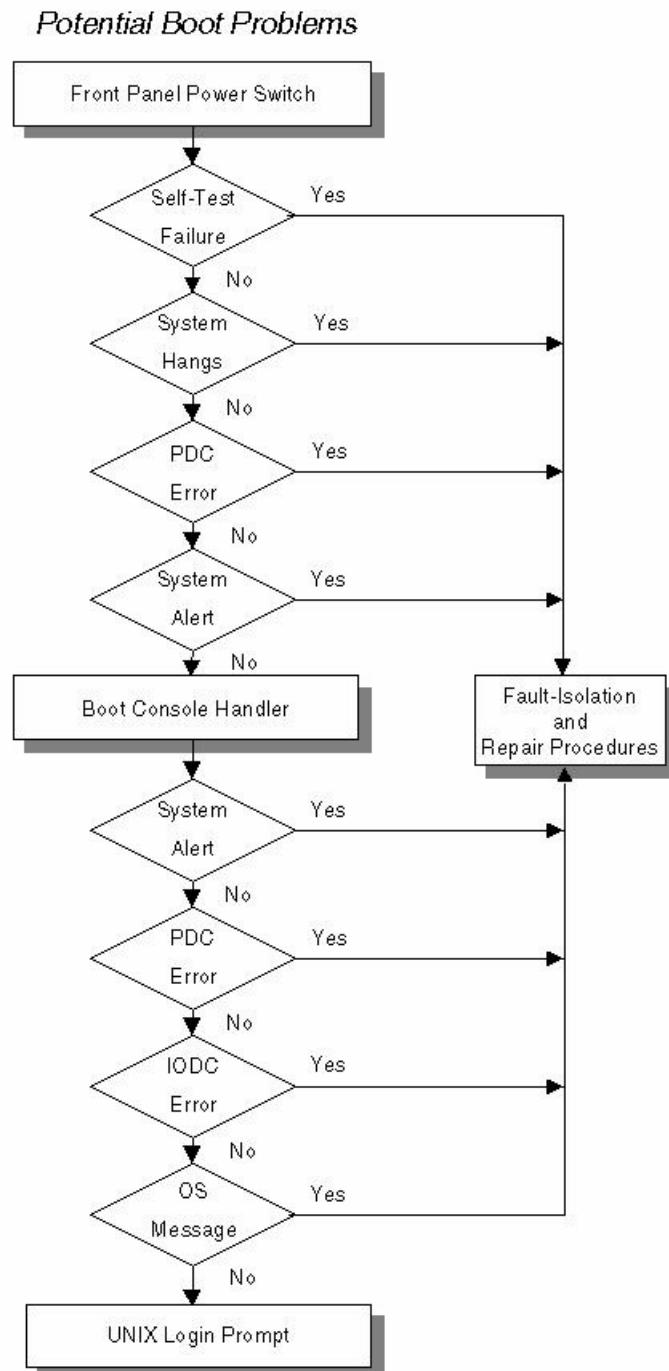
## rp54xx Server Boot Process

The length of time an rp54xx server will require to complete the boot process depends on the number of processors and the amount of RAM installed. Average configurations can take more than 20 minutes.

The boot process consists of the following main steps:



During the Boot process a variety of errors or problems can occur as shown below:

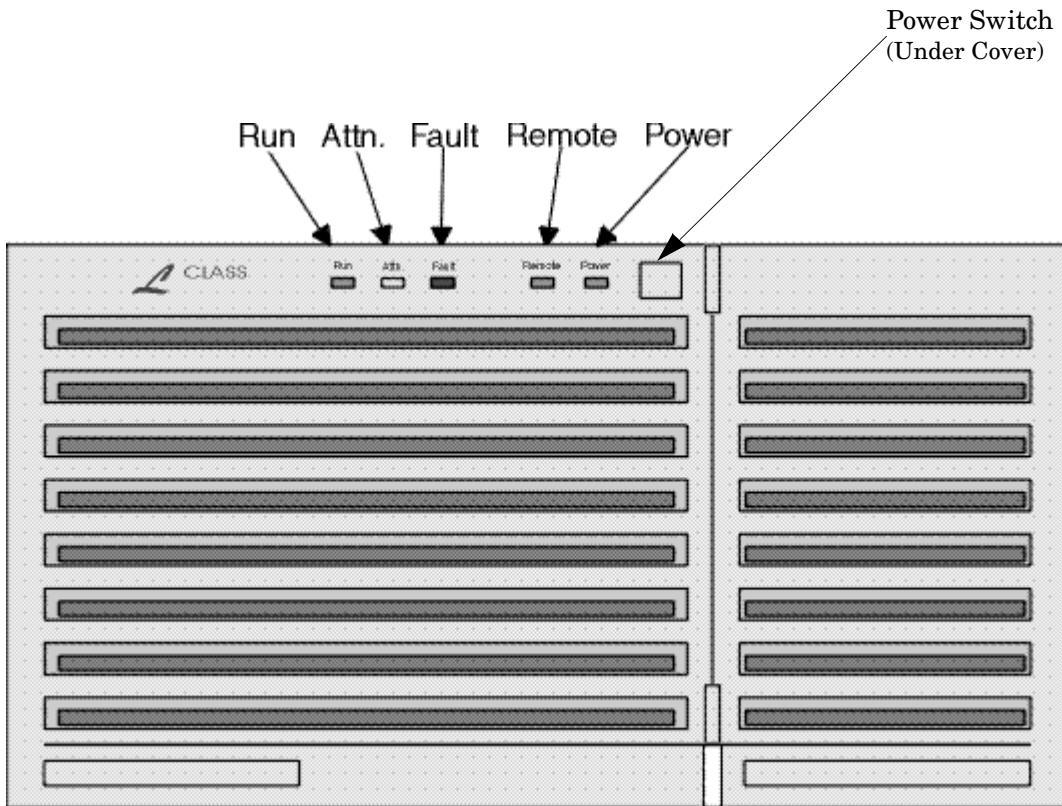


## Initial Power-up

The following section describes the process of applying power to the rp54xx server and booting the system to the UNIX Login prompt. The amount of time it takes to go through self-test then boot the system will vary widely depending on hardware configuration. The following provides a “typical” procedure. Yours may vary depending on software and hardware installed:

**Step 1.** Apply AC Power to the system console.

**Step 2.** Apply power to the rp54xx server by turning the front panel switch to ON.



**Step 3.** Several self-test boot progress screens will be displayed and will scroll rapidly up the screen. Some tests may pause for up to one minute while the test completes.

The following examples of the forward progress screens are typical of the screens displayed.

Brief

```
***** EARLY BOOT VFP *****
0x0000180089002380 00000000 00000000
Q/q: quit Virtual Front Panel Display
->Choice:
*****
```

Verbose

```
***** EARLY BOOT VFP *****
ALERT LEVEL: 0=No failure detected, forward progress
PROBLEM DETAIL: 0=no problem detail - SOURCE ID: 00
SYSTEM NAME: fespre2sas
MODEL NAME: MODEL STRING: S/N:
SPU POWER: ON
ACTIVITY/COMPLETION LEVEL: 0%
SYSTEM BOOT IS PENDING

LEDs: RUN ATTENTION FAULT REMOTE
      FLASH FLASH OFF ON

CALLER ACTIVITY: 1=test - CALLER SUBACTIVITY: A4=implementation dependent
REPORTING ENTITY TYPE: 0=system firmware - REPORTING ENTITY ID: 01
SOURCE: 7=memory - SOURCE DETAIL: 0=unknown, no source stated

0x7800180070001A42 00000000 00000001 - type 15 = Activity Level/Timeout

Q/q: quit Virtual Front Panel Display
->Choice:
*****
```

- Step 4.** When the initial power-up boot process completes in approximately one to five minutes, the BCH main menu will be displayed:

```
---- Main Menu ----

Command                                     Description
----
B0ot [PRI|ALTI<path>]                   Boot from specified path
PAth [PRI|ALTI|CON|KEY] [<path>]          Display or modify a path
SEArch [DIsplay|IPL] [<path>]              Search for boot devices

COnfiguration menu                         Displays or sets boot values
INformation menu                           Displays hardware information
SERvice menu                               Displays service commands
DeBug menu                                 Displays debug commands
MFG menu                                   Displays manufacturing commands

DIsplay                                     Redisplay the current menu
HElP [<menu>|<command>]                  Display help for menu or command
RESET                                      Restart the system

----
Main Menu: Enter command or menu >
```

- Step 5.** To start the boot process using the primary boot path, enter *BO PRI*, at Boot Console Handler BCH main menu prompt and press <ENTER>.

---

**NOTE**      Booting a system to a UNIX login prompt from BCH main menu can take 20 minutes or longer depending on your software and hardware configuration.

---

- Step 6.** Once the system reaches the UNIX login prompt the following will be displayed on the console screen::

```
HP-UX hprfes A.09.04 U 9000/897 (ttyp2)
login:
```

---

## **5 Utilities**

---

## Configuring the Rev A Guardian Service Processor (GSP)

The Rev A Guardian Service Processor (GSP) is a resident processor within the system that allows the local or remote system administrator to monitor and perform administrator functions. This section provides configuration procedures that will instruct you to:

- Configure the LAN port
- Add or delete users (maximum of 20)
- Change the default GSP configuration

Go to the appropriate section for the task that you wish to accomplish.

### Configuring the GSP LAN Port

Perform the LAN configuration from the systems local port (either console or the HP secure web console).

---

<b>NOTE</b>	The GSP has a separate LAN port from the system LAN port. It will need a separate LAN drop, IP address, and networking information from the port used by HP-UX. Before starting this procedure, you will need to know the following information: <ul style="list-style-type: none"><li>• I.P. address (for GSP)</li><li>• Subnet mask</li><li>• Gateway address</li><li>• Hostname (this is used when messages are logged or printed).</li></ul>
-------------	---

---

To configure the GSP LAN port, perform the following steps:

1. Go into the GSP with the ctrl+b entry.
2. At the GSP prompt, enter the LAN Configuration (lc) command:

GSP> lc

The lc command will start a series of prompts. Respond to each prompt with the appropriate information.

### Adding Users

The GSP can only have a maximum of 20 users (one administrator and 19 operators). By design, the first user added to the GSP becomes the GSP administrator. Only the GSP administrator can add or remove users or change the GSP configuration.

---

<b>NOTE</b>	Before starting this procedure, you will need to know the following information: <ul style="list-style-type: none"><li>• User's name</li><li>• Organization's name</li><li>• Login name</li><li>• User's password</li></ul>
-------------	---

---

To add a user, perform the following steps:

1. Enter the GSP with the **ctrl+b** entry.
2. At the GSP prompt, enter the Security options and access control (SO) command:

GSP> so

3. The first prompt you see with the so command is for GSP-wide parameters:

GSP wide parameters are:

Login Timeout: 1 minutes.

. Number of password Faults allowed: 3

. Flow Control Timeout: 5 minutes.

Do you want to modify the GSP wide parameters? (Y / [N]) \_\_

At this point you can modify the GSP-wide parameters or continue adding users. To add users, enter N for no.

---

**NOTE** If this is the first time users are being added, the first user added will be the GSP administrator.

If this is not the first time you are adding users (you are adding additional users), you will need to step through all current users to reach the next available user prompt.

---

4. The next prompt that appears will ask the following question:

Do you want to modify the user number 1 parameters? (Y/[N]/Q to quit) \_\_

Follow the series of prompts to enter all the required fields for adding a user.

---

**CAUTION** Be sure to read each prompt carefully and enter the correct response. A missed or incorrect entry will deny entry to that user.

---

The following is an example of an added users information:

- . User's Name: Joe Smith
- . Organization's Name: IT Support
- . Dial-back configuration: Disabled
- . Access Level: Operator
- . Mode: multiple
- . User's state: enabled

For the number 1 user, the Access level is administrator. The Mode entry of single only allows entry for that user one time, then access will be denied. A Mode entry of multiple allows unlimited entries into the GSP.

## Removing Users

You can remove (disable) a GSP user with the same Security options and access control (SO) command used to add a user.

To remove a user, perform the following steps:

1. Enter the GSP with the **ctrl+b** entry.
2. At the GSP prompt, enter the Security options and access control (SO) command:

```
GSP> so
```

3. The first prompt you see with the **so** command is for GSP-wide parameters:

GSP wide parameters are:

- . Login Timeout: 1 minutes.
- . Number of password Faults allowed: 3
- . Flow Control Timeout: 5 minutes.

```
Do you want to modify the GSP wide parameters? (Y / [N]) __
```

At this point you can modify the GSP-wide parameters, or continue with removing a user. To remove users, enter N for no.

---

**NOTE** You must step through each user number until you reach the user to be removed.

---

4. When you access the number of the user to be removed, you must change the data in the prompts for that number.

It is necessary that, at a minimum, you modify the User's state to Disabled.

## Changing the Default GSP Configuration

This section describes the process of changing GSP default configurations. To change the GSP default configuration, perform the following steps:

1. Enter the GSP with the **ctrl+b** entry.
2. At the GSP prompt, enter the Default Configuration (dc) command:

```
GSP> dc
```

3. Follow the prompts for the **dc** command, and have the change information available.

---

**CAUTION** When the Security configuration is reset, all users are removed, including the GSP administrator. The remote is disabled. The remote must be re-enabled through the main console using the Enable Remote (er) command.

---

---

## Configuring the Rev B Guardian Service Processor (GSP)

The Rev B Guardian Service Processor (GSP) is a resident processor within the system that allows the local or remote system administrator to monitor and perform administrator functions. This section provides configuration procedures that will instruct you to:

- Configure the LAN port
- Add or delete users (maximum of 20)
- Change the default GSP configuration

Go to the appropriate section for the task that you wish to accomplish.

### Configuring the GSP LAN Port

Perform the LAN configuration from the systems local port (either console or the HP secure web console).

---

<b>NOTE</b>	The GSP has a separate LAN port from the system LAN port. It will need a separate LAN drop, IP address, and networking information from the port used by HP-UX. Before starting this procedure, you will need to know the following information: <ul style="list-style-type: none"><li>• I.P. address (for GSP)</li><li>• Subnet mask</li><li>• Gateway address</li><li>• Hostname (this is used when messages are logged or printed)</li></ul>
-------------	--

---

To configure the GSP LAN port, perform the following steps:

1. Go into the GSP with the ctrl+b entry.
2. At the GSP prompt, enter the LAN Configuration (lc) command:

```
GSP> lc
```

The lc command will start a series of prompts. Respond to each prompt with the appropriate information.

### Adding Users

The GSP can only have a maximum of 20 users (one administrator and 19 operators). By design, the first user added to the GSP becomes the GSP administrator. Only the GSP administrator can add or remove users or change the GSP configuration.

---

<b>NOTE</b>	Before starting this procedure, you will need to know the following information: <ul style="list-style-type: none"><li>• User's name</li><li>• Organization's name</li><li>• Login name</li><li>• User's password</li></ul>
-------------	---

---

**Configuring the Rev B Guardian Service Processor (GSP)**

To add a user, perform the following steps:

1. Go into the GSP with the **ctrl+b** entry.
2. At the GSP prompt, enter the Security options and access control (SO) command:

GSP> so

3. The first prompt you will see with the so command is for GSP wide parameters:

GSP wide parameters are:

Login Timeout: 1 minutes.

. Number of password Faults allowed: 3

. Flow Control Timeout: 5 minutes.

Do you want to modify the GSP wide parameters? (Y / [N]) \_\_

At this point you can modify the GSP wide parameters, or continue with adding users. To add users, respond N for no.

---

**NOTE** If this is the first time users are being added, the first user added will be the GSP administrator.

If this is not the first time you are adding users (you are adding additional users), you will need to step through all current users to reach the next available user prompt.

---

4. The next prompt that appears will ask the following question:

Do you want to modify the user number 1 parameters? (Y/[N]/Q to quit) \_\_

Follow the series of prompts to enter all the required fields for adding a user.

---

**CAUTION** Be sure to read each prompt carefully and enter the correct response. A missed or incorrect entry could deny entry to that user.

---

An example of an added users information would be:

- . User's Name: Joe Smith
- . Organization's Name: IT Support
- . Dial-back configuration: Disabled
- . Access Level: Operator
- . Mode: multiple
- . User's state: enabled

For the number 1 user, the Access level is administrator. The Mode entry of single only allows entry for that user one time, then access will be denied. A Mode entry of multiple allows unlimited entries into the GSP.

## Removing Users

You can remove/disable a GSP user with the same Security options and access control (SO) command used to add a user.

To remove a user, perform the following steps:

1. Go into the GSP with the **ctrl+b** entry.
2. At the GSP prompt, enter the Security options and access control (SO) command:

```
GSP> so
```

3. The first prompt you will see with the **so** command is for GSP wide parameters:

GSP wide parameters are:

- . Login Timeout: 1 minutes.
- . Number of password Faults allowed: 3
- . Flow Control Timeout: 5 minutes.

```
Do you want to modify the GSP wide parameters? (Y / [N]) __
```

At this point you can modify the GSP wide parameters, or continue with removing a user. To remove users, respond N for no.

---

**NOTE** You will have to step through each user number until you reach the user to be removed.

---

4. When you access the number of the user to be removed, you must change the data in the prompts for that number.

It is important that, at a minimum, you need to modify the User's state to Disabled.

## Changing the Default GSP Configuration

This section describes the process of changing GSP default configurations. To change the GSP default configuration, perform the following steps:

1. Go into the GSP with the **ctrl+b** entry.
2. At the GSP prompt, enter the Default Configuration (dc) command:

```
GSP> dc
```

3. Follow the prompts for the **dc** command, and be sure to have the change information available.

---

**CAUTION** When the Security configuration is reset, all users are removed, including the GSP administrator. It also disables the remote. Remote must be re-enabled through the main console using the Enable Remote (er) command.

---

Utilities

## Configuring the Rev B Guardian Service Processor (GSP)

---

## **6 Troubleshooting**

## Determine Current System State

To determine the current system state of an rp54xx server, first note the state of all LED indicators on the front panel. Processing this information using the decoders provided can greatly reduce the amount of time required to repair a suspected system fault.

The following procedure lists the tools available to aid you in determining the current system state.

**Step 1.** Determine if you can get a system prompt and if so, what kind of prompt.

Software System	Screen Prompt
Boot Console Handler (BCH)	Main Menu: Enter command or menu>
Guardian Service Processor (GSP)	GSP>
Initial System Loader (ISL)	ISL>
HP UNIX (HP-UX)	<i>Prompt varies depending on UNIX state</i>

**Step 2.** Decode the Run/Attention/Fault LED States.

**Step 3.** Decode the PCI I/O LED States.

**Step 4.** Decode the Fan, Power Supply, and Disk LED States.

**Step 5.** Decode the GSP LED States.

**Step 6.** Decode the LAN/SCSI LED States.

## Troubleshooting and FRU identification

Once you have determined the current system state, you must troubleshoot the system to determine what the problem symptoms are and what repair actions to take.

### Problem Symptoms and Repair Actions

Use this guide to assist you in repairing the system by matching the problem symptom with the appropriate troubleshooting step.

**Table 6-1      Problem Symptoms and Repair Actions**

Problem or Symptom	Problem Indicators	Normal Functioning Indicators	Troubleshooting Steps	Potential FRUs
No indication of Housekeeping voltage present when AC connected and power switch in Standby position.	Front Panel Power LED OFF when AC is plugged into system.	<ul style="list-style-type: none"> <li>• Power switch Off.</li> <li>• Front Panel POWER LED should be FLASHING to indicate presence of Housekeeping voltage.</li> <li>• Power LED on GSP board should be lit solid green.</li> </ul>	<ol style="list-style-type: none"> <li>1. AC must be present. Check that PDU is plugged in.</li> <li>2. Ensure there are 2 working power supplies (1 supply for rp5400). The LED on each supply should be lit.</li> <li>3. Check for Service processor prompt (CTRL B at console).</li> </ol>	<ul style="list-style-type: none"> <li>• No AC present</li> <li>• Power Supplies</li> <li>• Power Converter</li> <li>• System Board</li> <li>• Display Board</li> </ul>

**Table 6-1 Problem Symptoms and Repair Actions (Continued)**

Problem or Symptom	Problem Indicators	Normal Functioning Indicators	Troubleshooting Steps	Potential FRUs
System won't power on when Front Panel Power switch is turned on.	Front Panel Power LED stays BLINKING when Power Switch is turned on.  ATTENTION LED may be FLASHING.	<ul style="list-style-type: none"> <li>• Power switch On.</li> <li>• Power LED on SOLID.</li> </ul>	<ol style="list-style-type: none"> <li>1. Check for remote power shutdown via GSP&gt;PC command.</li> <li>2. <i>Check Error Chassis Logs.</i> Look for Error Chassis Log with a Source Detail = Low Voltage DC Power. This indicates a failure of one of the CPU Support Modules. The failing CPU support module is indicated in the Source ID field.</li> <li>3. Ensure there are 2 working power supplies (1 supply for rp5400). The LED on each supply should be lit.</li> <li>4. Check to see if GSP can communicate with platform monitor. Execute the following GSP command:  GSP&gt;PC  You should get power monitor status information.</li> <li>5. Housekeeping 1 voltage present indication. Check that platform monitor power LED is lit.</li> <li>6. Platform Monitor functioning. Check platform monitor heartbeat LED is lit.</li> </ol>	<ul style="list-style-type: none"> <li>• Power Supplies</li> <li>• CPU Support Module</li> <li>• Platform Monitor</li> <li>• System Board</li> </ul>

**Table 6-1 Problem Symptoms and Repair Actions (Continued)**

Problem or Symptom	Problem Indicators	Normal Functioning Indicators	Troubleshooting Steps	Potential FRUs
No BCH Main Menu prompt.	<p>Front Panel RUN LED is not FLASHING.</p> <p>There is no forward progress chassis codes at the console.</p> <p>There is no BCH Main Menu prompt at the console.</p>	<ul style="list-style-type: none"> <li>• Flashing RUN LED.</li> <li>• Forward progress chassis codes.</li> <li>• BCH Main Menu prompt.</li> </ul>	<ol style="list-style-type: none"> <li>1. Check for red LED on GSP. If lit red, the problem is with the GSP.</li> <li>2. Check that the console is properly connected and can communicate with the Service Processor (CTRL B should get you the SP login prompt).</li> <li>3. Check Service Processor Error logs. Look for entries related to:           <ul style="list-style-type: none"> <li>• Processors</li> <li>• Processor Support Modules (known as low voltage DC supplies in chassis codes. Also known as power pods).</li> <li>• Memory</li> </ul> </li> <li>4. Reduce to minimum configuration and troubleshoot from there.</li> </ol>	<ul style="list-style-type: none"> <li>• Core I/O</li> <li>• Processors</li> <li>• Processor Support Modules</li> <li>• Memory</li> <li>• System Board</li> <li>• Console</li> </ul>

**Table 6-1 Problem Symptoms and Repair Actions (Continued)**

Problem or Symptom	Problem Indicators	Normal Functioning Indicators	Troubleshooting Steps	Potential FRUs
Can't boot to ISL.	Console messages indicating problems booting from the primary or alternate boot path.	<ul style="list-style-type: none"> <li>• Console messages and prompt indicating you are at ISL.</li> </ul>	<ol style="list-style-type: none"> <li>1. Use BCH commands to verify I/O and presence of valid LIF devices.</li> <li>2. Use BCH "Warn" command to determine if Boot is disabled.</li> <li>3. Check for IODC tombstones.</li> <li>4. Check SP chassis error logs.</li> </ol>	<ul style="list-style-type: none"> <li>• Disk Drive</li> <li>• Disk Media Backplane</li> <li>• LAN/SCSI Board</li> <li>• I/O Backplane</li> </ul>
Can't boot HP-UX.	HP-UX boot error messages. RUN LED BLINKING.	<ul style="list-style-type: none"> <li>• HP-UX boot messages.</li> <li>• HP-UX prompt.</li> <li>• RUN LED on SOLID.</li> </ul>	<ol style="list-style-type: none"> <li>1. Check SP chassis error logs.</li> <li>2. Run ODE diagnostics.</li> </ol>	<ul style="list-style-type: none"> <li>• Processor</li> <li>• Disk Drive</li> <li>• Disk Media backplane</li> <li>• LAN/SCSI</li> <li>• Corrupt HP-UX</li> </ul>

## Chassis Code to FRU Decode

This is a guide to identify failing FRUs from System Alerts and Error Chassis Logs. The guide includes the following information:

- Cross-Referencing Chassis Log Errors to rp54xx FRUs
- Interpreting System Alerts
- Interpreting Service Processor Error Chassis Logs

There is a detailed interpretation of Chassis Logs and System Alerts in the *Interpreting Chassis Logs in Detail* guide.

### Cross-Referencing Chassis Log Errors to rp54xx FRUs

Use the following table to identify the failing FRU from the Chassis Log information. You can also use the online Error Chassis Log-to-FRU Decoder utility.

1. Read the Chassis Log entry.
2. Match the **SOURCE**, **SOURCE DETAIL**, **SOURCE ID**, and **PROBLEM DETAIL** values (see table below) in the Chassis Log entry with the appropriate values in the table.
3. Read the table from left to right.

Use these examples to understand how to identify failing FRUs with the table:

- Power Supply Failure Example
- Processor Failure Example

**Table 6-2      Chassis Log Error to FRU Decoder**

Chassis Log Field Values and Descriptions from Log Entry					
Source	Source Detail	Source ID	Problem Detail	FRU	Action to Take
1 - Processor	Not Applicable (N/A)	N/A	N/A	Processor	From BCH Main Menu go to the Info Menu and execute the PR command to determine which processor is not functioning.
2 - Processor Cache	Not Applicable (N/A)	N/A	N/A	Processor	From BCH Main Menu go to the Info Menu and execute the PR command to determine which processor is not functioning.

**Table 6-2 Chassis Log Error to FRU Decoder (Continued)**

Chassis Log Field Values and Descriptions from Log Entry					
Source	Source Detail	Source ID	Problem Detail	FRU	Action to Take
3 - PDH	Not Applicable (N/A)	N/A	N/A	System Board	Replace the System Board.
4 - Power	1 - AC Mains	N/A	9 - Power Off	AC Power	Check that AC is being supplied to all power supplies.
4 - Power	3 - Low Voltage DC Power	CPU Support Module #	N/A	CPU Support Module	Replace the Processor Support Module (on the System Board) referenced in the Source ID.
4 - Power	4 - High Voltage DC Power	Power Supply #	N/A	Power Supply	Replace the Power Supply (in the front of the system behind the bezel) referenced in the Source ID.
6 - Platform	3 - Cabinet Fan	Fan #	N/A	Fan	Replace the Fan referenced in the Source ID.
6 - Platform	6 - Service Processor	N/A	N/A	Core I/O	The Service Processor is on the GSP I/O board. Replace the GSP
6 - Platform	7 - Power Monitor	N/A	N/A	Power Monitor	Replace Platform Monitor card.
7 - Memory	1 - Controller	N/A	N/A	System Board	Replace the System Board.
7 - Memory	4 - SIMM or DIMM	N/A	N/A	Memory DIMM	Isolate to failing DIMM using BCH (IN, ME) and ODE memory diagnostic.
8 - I/O	6 - Disk	N/A	Various Values	Disk Subsystem	Use BCH commands and ODE diagnostics to check disk subsystem.

## Power Supply Failure Example

```
GSP> s1
SL
Which buffer are you interested in :
Incoming, Activity, Error, Current boot or Last boot ? (I/A/E/C/L) e
e

Do you want to set up filter options on this buffer ? (Y/[N]) n
n

Type + CR and CR to go up (back in time),
Type - CR and CR to go down (forward in time),
Type Q to escape.

Log Entry # 0 :
ALERT LEVEL: 6=Boot possible, pending failure or environmental problem - action required
REPORTING ENTITY TYPE: 2=power monitor - REPORTING ENTITY ID: 00
CALLER ACTIVITY: 4=monitor - CALLER SUBACTIVITY: 04=low voltage power supply
SOURCE: 4=power - SOURCE DETAIL: 4=high voltage DC power - SOURCE ID: 02
PROBLEM DETAIL: A=unexpected - ACTIVITY STATUS: F
Data 0 : Low=00000000 : High=00000000 - type 0 = Data Field Unused
Data 1 : Low=0F152A28 : High=00006303 - type 11 - Timestamp 04/15/1999 21:42:40
```

## Problem Analysis

**Step 1.** Find the Source value. In this example, it is *SOURCE: 4=power*.

Use the **Power** row of the Error Chassis Log-to-FRU Decoder table.

**Step 2.** Find the Source Detail value. In this example, it is *SOURCE DETAIL: 4=high voltage DC power*.

Use the **High Voltage DC Power** row of the table.

**Step 3.** Find the Source ID value. In this example, it is *SOURCE ID: 02*.

The failing power supply is Power Supply #2.

**Step 4.** The Problem Detail for this row is not applicable.

**Step 5.** The FRU column of the table identifies the FRU as the Power Supply.

The correct action would be to replace Power Supply #2, located in the front of the system.

## Processor Failure Example

```
Log Entry # 1 :
ALERT LEVEL: 6=Boot possible, pending failure or environmental problem - action required
REPORTING ENTITY TYPE: 0=system firmware - REPORTING ENTITY ID: 01
CALLER ACTIVITY: 1=test - CALLER SUBACTIVITY: 62=implementation dependent
SOURCE: 1=processor - SOURCE DETAIL: 1=processor general - SOURCE ID: 00
PROBLEM DETAIL: 3=functional failure - ACTIVITY STATUS: 0
Data 0 : Low=00000003 : High=F7000000 - type 0 = Data Field Unused
Data 1 : Low=0F160920 : High=00006303 - type 11 - Timestamp 04/15/1999 22:09:32
```

## Problem Analysis

**Step 1.** Find the Source value. In this example, it is *SOURCE: 1=processor*.

Use the **Processor** row of the Error Chassis Log-to-FRU Decoder table.

**Step 2.** The Source Detail, the Source ID, and the Problem Detail values are all not applicable for the Processor row of the table.

**Step 3.** The FRU column of the table identifies the FRU as a failing processor.

**Step 4.** The Action column of the table instructs us to use the Info Menu and PR command of the BCH Main Menu to identify the failing processor.

Here is the output of Step 4 in our example:

```
Main Menu: Enter command or menu > in
----- Information Menu -----
Command                               Description
-----
ALL                                  Display all system information
BootInfo                            Display boot-related information
CAche                                Display cache information
ChipRevisions                       Display revisions of major VLSI
COprocessor                          Display coprocessor information
FRU                                 Display FRU information
FwrVersion                           Display firmware version
IO                                   Display I/O interface information
LanAddress                           Display Core LAN station address
MEmory                              Display memory information
PRocessor                            Display processor information
WAarnings                            Display selftest warning messages

-----
Information Menu: Enter command > pr
PROCESSOR INFORMATION
Processor    Speed      HVVERSION  SVERSION          Processor
              Model      Model/Op   CVERSION        State
-----
1           440 MHz    0x05c4    0x0491       2. 0  Active
3           440 MHz    0x05c4    0x0491       2. 0  Stopped:Nonresponding

Central Bus Speed (in MHz) : 82
Software ID (dec) : 1635329341
Software ID (hex) : 0x6179253d
Software Capability : 0x01100000f0

Information Menu: Enter command >
```

Processor #3 is Stopped:Nonresponding. Replace Processor #3.

## Interpreting System Alerts

System Alerts are reported to the system console when a problem is detected by the Service Processor. These alerts are stored in the Service Processor Error Logs. When this new alert is added to the log file, it will cause the front panel ATTENTION LED to blink.

## Interpreting System Alerts

Do one of the following:

1. No response: the alert will time out and the system will continue operating.
2. **A** - Responding with the letter **A** will inform the Service Processor that you have seen the entry. The system will continue to operate.
3. **X** - Responding with the letter **X** will inform the Service Processor to disable all future alert messages. This can be re-enabled with a Service Processor command.

### Sample System Alert

```
*****SYSTEM ALERT*****
ALERT LEVEL: 6=Boot possible, pending failure or environmental problem - action required
PROBLEM DETAIL: 4=fan failure - SOURCE ID: 04
SYSTEM NAME: fesrhapgsp

MODEL NAME: MODEL STRING: S/N:
SPU POWER: ON
ACTIVITY/COMPLETION LEVEL: 0%
SYSTEM BOOT IS PENDING

LEDs: RUN ATTENTION FAULT REMOTE
FLASH OFF OFF ON

CALLER ACTIVITY: 4=monitor - CALLER SUBACTIVITY: 05=fan
REPORTING ENTITY TYPE: 2=power monitor - REPORTING ENTITY ID: 00
SOURCE: 6=platform - SOURCE DETAIL: 3=cabinet fan

0x002008646304405F 00000000 00000000 - type 0 = Data Field Unused
0x582008646304405F 00006303 0F151D08 - type 11 = Timestamp 04/15/1999 21:29:08
A: ack read of this entry - X: Disable all future alert messages
Anything else skip redisplay the log entry
->Choice:a
```

### Key FRU Identification Fields for System Alerts

The following fields are used for FRU identification.

<i>Alert Level:</i>	How the problem has affected the system operation.
<i>Source:</i>	What major part of the system the alert is referring to (i.e, platform, memory, processor, etc...).
<i>Source Detail:</i>	What sub-part of the system the alert is referring to (i.e, cabinet fan, DIMM, high voltage DC power, etc...).
<i>Source ID:</i>	Specific FRU referred to in Source and Source Detail (i.e, cabinet fan #4).
<i>Problem Detail:</i>	Specific problem information (i.e, power off, functional failure, etc...).
<i>Timestamp:</i>	When the problem occurred.

The above sample system alert shows the following:

1. The problem does not affect system boot.
2. The problem is with platform cabinet fan #4.
3. The problem is a fan failure. Replace fan #4 to correct the problem.
4. The fan failed on April 15, 1999 at 9:29 PM.

## Interpreting Service Processor Error Chassis Logs

Accessing the Service Processor Error Chassis Logs will turn the **ATTENTION LED**, blinking on the front panel, OFF.

**Chassis Logs** (located in the Service Processor) contain low level logging information related to the following 5 categories:

- Incoming log: Contains all chassis logs coming into the Service Processor.
- Activity log: Contains all chassis logs related to system activity.
- Error log: Contains all error chassis logs.
- Current boot log: Contains all chassis logs associated with the current boot.
- Last boot log: Contains all chassis logs associated with the last boot.

The Error Chassis Logs are the ones you need to look at.

### Accessing Error Chassis Logs

Execute the following steps to access the Error Chassis Logs.

1. At the system console prompt, type **CTRL B**
2. Enter the Service Processor Login and Password
3. The screen will display: GSP>

At the GSP> prompt: type SL and press enter

4. The screen will display:

Which buffer are you interested in:

Incoming, Error, Current boot, Last boot? (I/A/E/C/L), type **E**, and press enter

5. The screen will display:

Do you want to set up filter options on this buffer? (Y/[N]), type **N**, and press enter

6. The most recent Error Log Entry (Log Entry #0) will be displayed. A carriage return after this will display the next log entry. Type **Q** to stop displaying the log entries. The screen will display: GSP>

7. At the GSP> prompt: type **CO**, and press enter to return to the console screen.

### Example of Accessing Error Logs

Here is an example of accessing the Error Logs from the Boot Console Handler (BCH) Main Menu prompt. User input is shown in *ITALICS*.

```
Main Menu: Enter command or menu > type CTRL B
Service Processor login: System Operator
Service Processor password: ***** (password hidden)

Welcome to HP Guardian Service Processor
System Name: fesrhapgsp

fesrhapgsp:
ALERT LEVEL: 6=Boot possible, pending failure or environmental problem - action required
SOURCE: 6=platform - SOURCE DETAIL: 3=cabinet fan
PROBLEM DETAIL: 4=fan failure
GSP>
```

HP Guardian Service Processor Command Interface  
Type HE to get the list of available commands

```
fesrhapgsp:  
ALERT LEVEL: 6=Boot possible, pending failure or environmental problem - action required  
SOURCE: 6=platform - SOURCE DETAIL: 3=cabinet fan  
PROBLEM DETAIL: 4=fan failure  
GSP> s1
```

SL

```
Which buffer are you interested in :  
Incoming, Activity, Error, Current boot or Last boot ? (I/A/E/C/L) e  
e
```

```
Do you want to set up filter options on this buffer ? (Y/[N]) n  
n
```

```
Type + CR and CR to go up (back in time),  
Type - CR and CR to go down (forward in time),  
Type Q CR to escape.
```

```
Log Entry # 0 :  
ALERT LEVEL: 6=Boot possible, pending failure or environmental problem - action required  
REPORTING ENTITY TYPE: 2=power monitor - REPORTING ENTITY ID: 00  
CALLER ACTIVITY: 4=monitor - CALLER SUBACTIVITY: 05=fan  
SOURCE: 6=platform - SOURCE DETAIL: 3=cabinet fan - SOURCE ID: 04  
PROBLEM DETAIL: 4=fan failure - ACTIVITY STATUS: F  
Data 0 : Low=00000000 : High=00000000 - type 0 = Data Field Unused  
Data 1 : Low=0F151D08 : High=00006303 - type 11 = Timestamp 04/15/1999 21:29:08
```

q

```
fesrhapgsp:  
ALERT LEVEL: 6=Boot possible, pending failure or environmental problem - action required  
SOURCE: 6=platform - SOURCE DETAIL: 3=cabinet fan  
PROBLEM DETAIL: 4=fan failure  
GSP> co
```

CO

You are now leaving the Guardian Service Processor Command Interface  
and returning to the console mode. Type Ctrl B to reactivate it.

Main Menu: Enter command or menu >

## Key FRU Identification Fields for Error Chassis Logs

The following fields are for FRU identification.

*Alert Level:* How the problem has affected the system operation.

*Source:* What major part of the system the alert is referring to (i.e., platform, memory, processor, etc.).

*Source Detail:* What sub-part of the system the alert is referring to (i.e., cabinet fan, DIMM, high voltage DC power, etc.).

*Source ID:* Specific FRU referred to in Source and Source Detail (i.e., fan #4).

*Problem Detail:* Specific problem information (i.e., power off, functional failure, etc.).

*Timestamp:* When the problem occurred.

The above sample system alert message shows the following:

1. The problem does not affect booting of the system.

2. The problem is with fan #4.
3. The problem is a fan failure.
4. The fan failed on April 15, 1999 at 9:29 PM.

In this example, fan #4 should be replaced to correct the problem.

## Interpreting Chassis Logs Using the chassis\_code.codes File

For chassis logs generated by system firmware (Reporting Entity Type 0), use the chassis\_code.codes file for chassis code definitions. Each revision of system firmware (AKA Processor Dependent Code or PDC) has a unique chassis\_code.codes file. This file is not part of either the PF\_Cxxxxx or PHSS\_xxxxx server firmware patches. The chassis\_code.codes files appear in the appendices of the *Interpreting Chassis Logs in Detail* guide.

The definition of a PDC reported chassis code is determined by locating either the last four digits of a chassis log or the last three digits of a selftest chassis code in the appropriate chassis\_code.codes file. Refer to the *Interpreting Chassis Logs in Detail* guide for definition and examples of selftest chassis codes.

---

**NOTE** Be sure to use the appropriate appendix as the PDC for rp5400/rp5450 is different than PDC for rp5470. Using the wrong appendix may result in a mis-interpretation of the chassis code.

---

To quickly learn the definition of a PDC reported chassis code, follow these four steps:

- Step 1.** Determine either the last 4 digits of the hex chassis code or the last 3 digits of the selftest chassis code.
- Step 2.** Go to the appropriate appendix in the *Interpreting Chassis Logs in Detail* guide.
- Step 3.** Locate the chassis code that matches the last 3 or 4 digits. If viewing via web browser or Adobe Acrobat, use the FIND feature to locate the chassis code.
- Step 4.** Take action as appropriate.

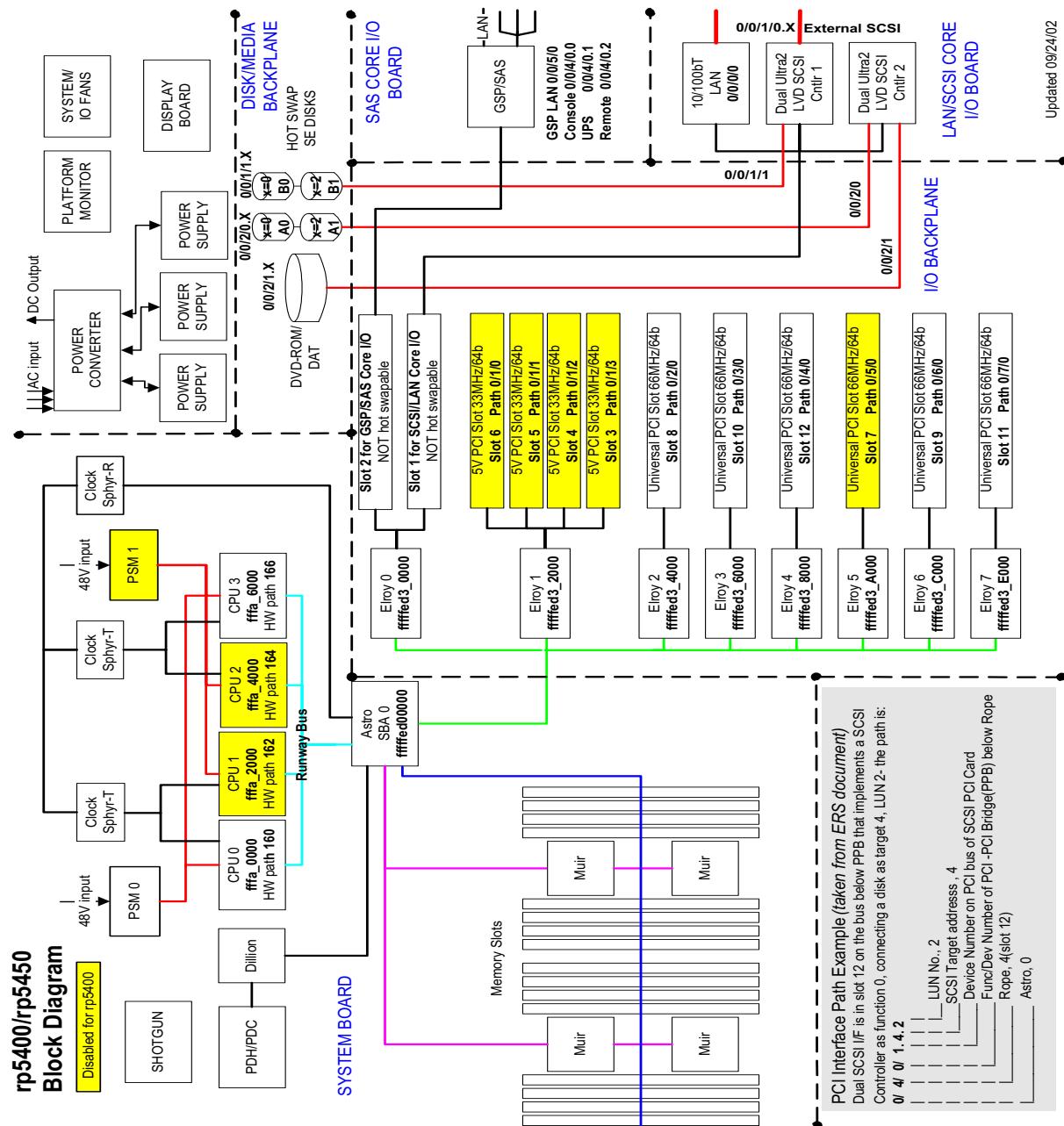
**Example 6-1      Chassis Log: Reporting Entity Type = System Firmware**

```
Log Entry # 0 :SYSTEM NAME: fesrhapgspDATE: 12/08/2000 TIME: 23:46:22ALERT LEVEL: 6
= Boot possible, pending failure - action requiredSOURCE: 3 = PDHSOURCE DETAIL: 0 =
unknown, no source stated SOURCE ID: 3PROBLEM DETAIL: 0 = no problem detailCALLER
ACTIVITY: 1 = test STATUS: 0CALLER SUBACTIVITY: 71 = implementation
dependentREPORTING ENTITY TYPE: 0 = system firmware REPORTING ENTITY ID:
030x0000306030031710 00000000 000000FE type 0 = Data Field Unused0x5800386030031710
0000640B 08172E16 type 11 = Timestamp 12/08/2000 23:46:22Type CR for next entry, Q CR
to quit.
```

Using the example above:

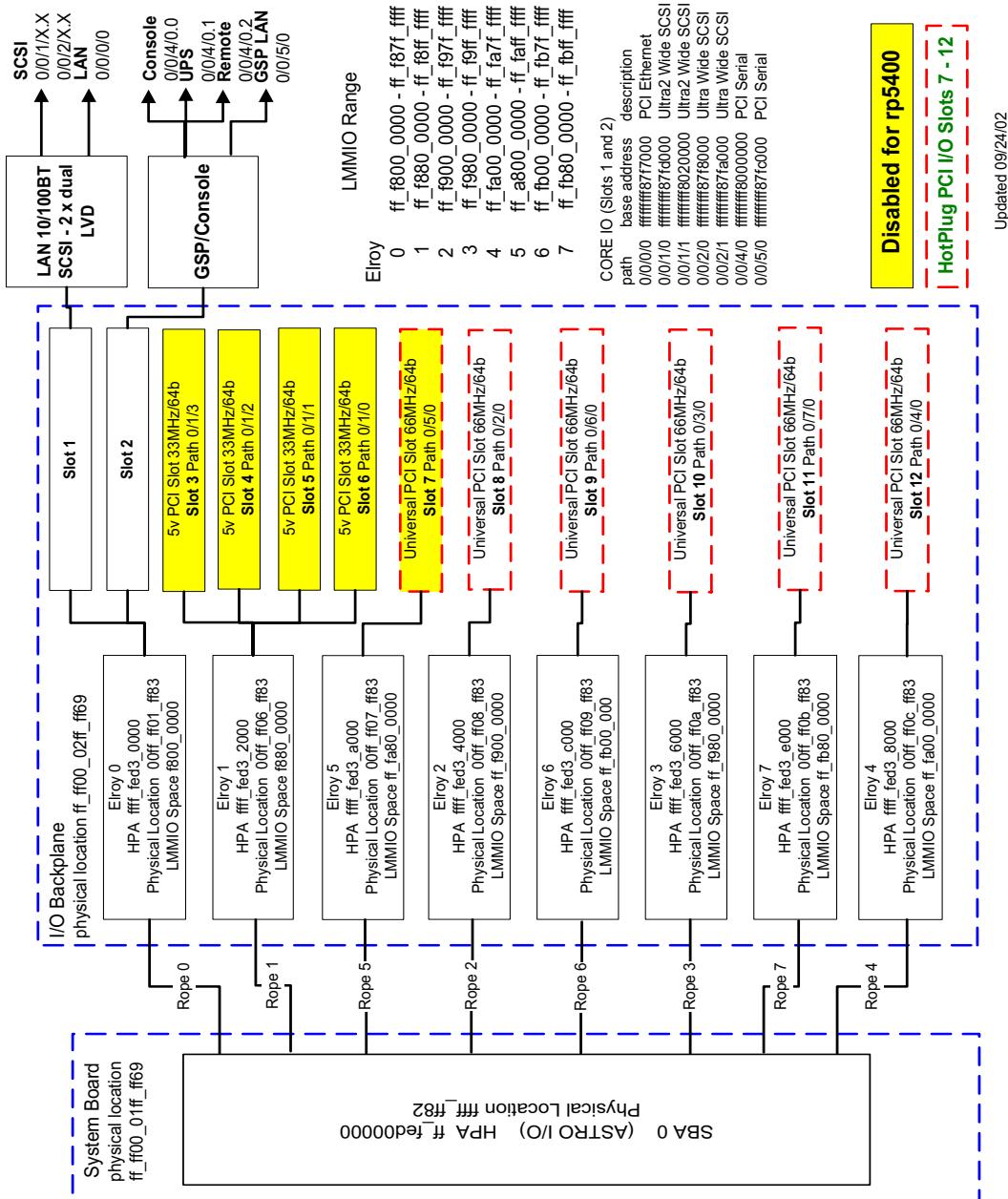
- Step 1.** The last 4 digits are 1710.
- Step 2.** This is an rp5450 so use Appendix B in the *Interpreting Chassis Logs in Detail* guide.
- Step 3.** Using the FIND feature to look up 1710 in Appendix B, we learn the definition is CC\_BOOT\_INVALID\_SPHYR\_SETTINGS.
- Step 4.** The appropriate action in this example would be to verify the switch settings on the system board are set correctly for the installed CPU's.

## rp5400 and rp5450 System Block Diagram

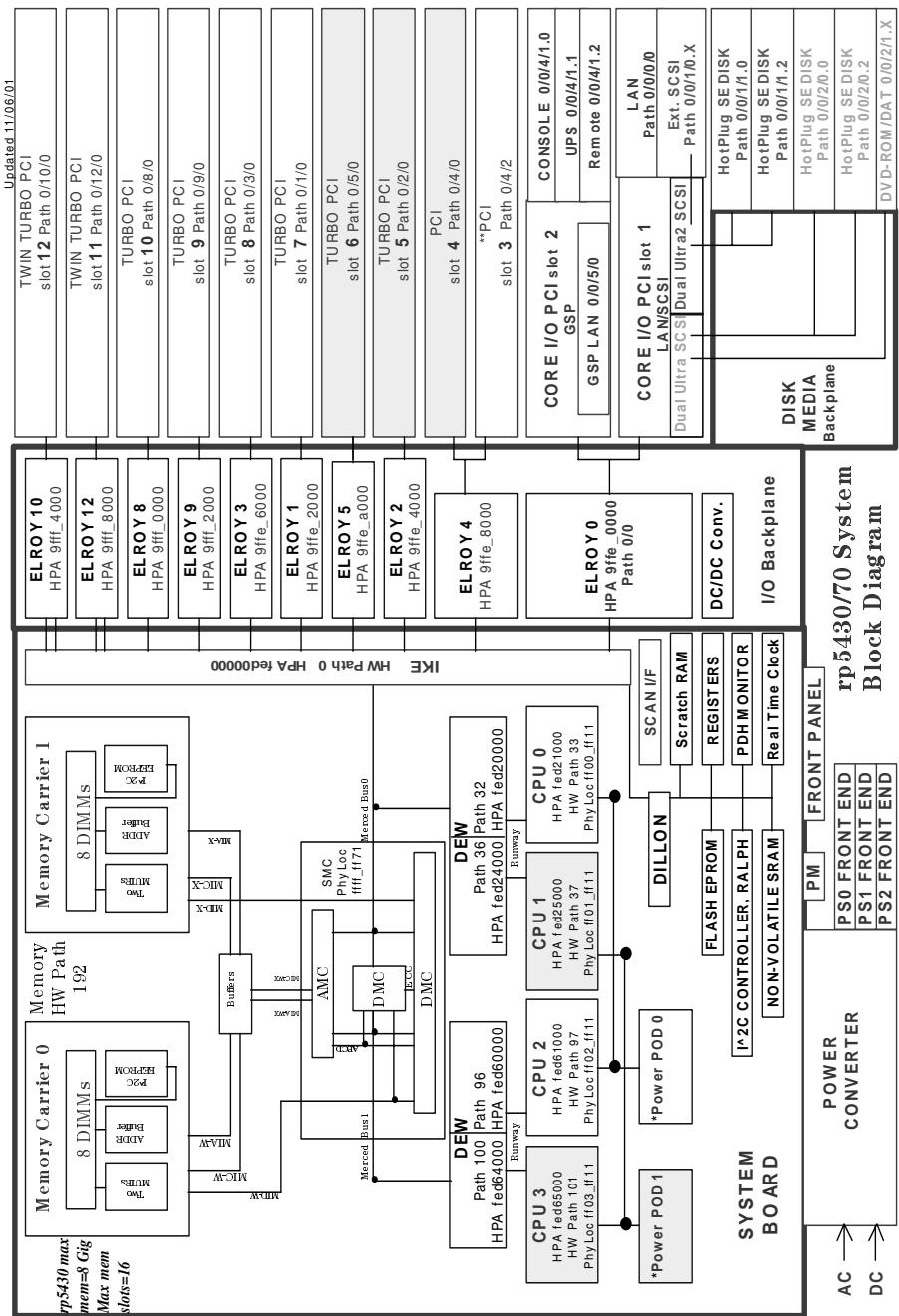


## rp5400 and rp5450 I/O Block Diagram

rp5400/rp5450 I/O Block Diagram



## rp5430 and rp5470 System Block Diagram



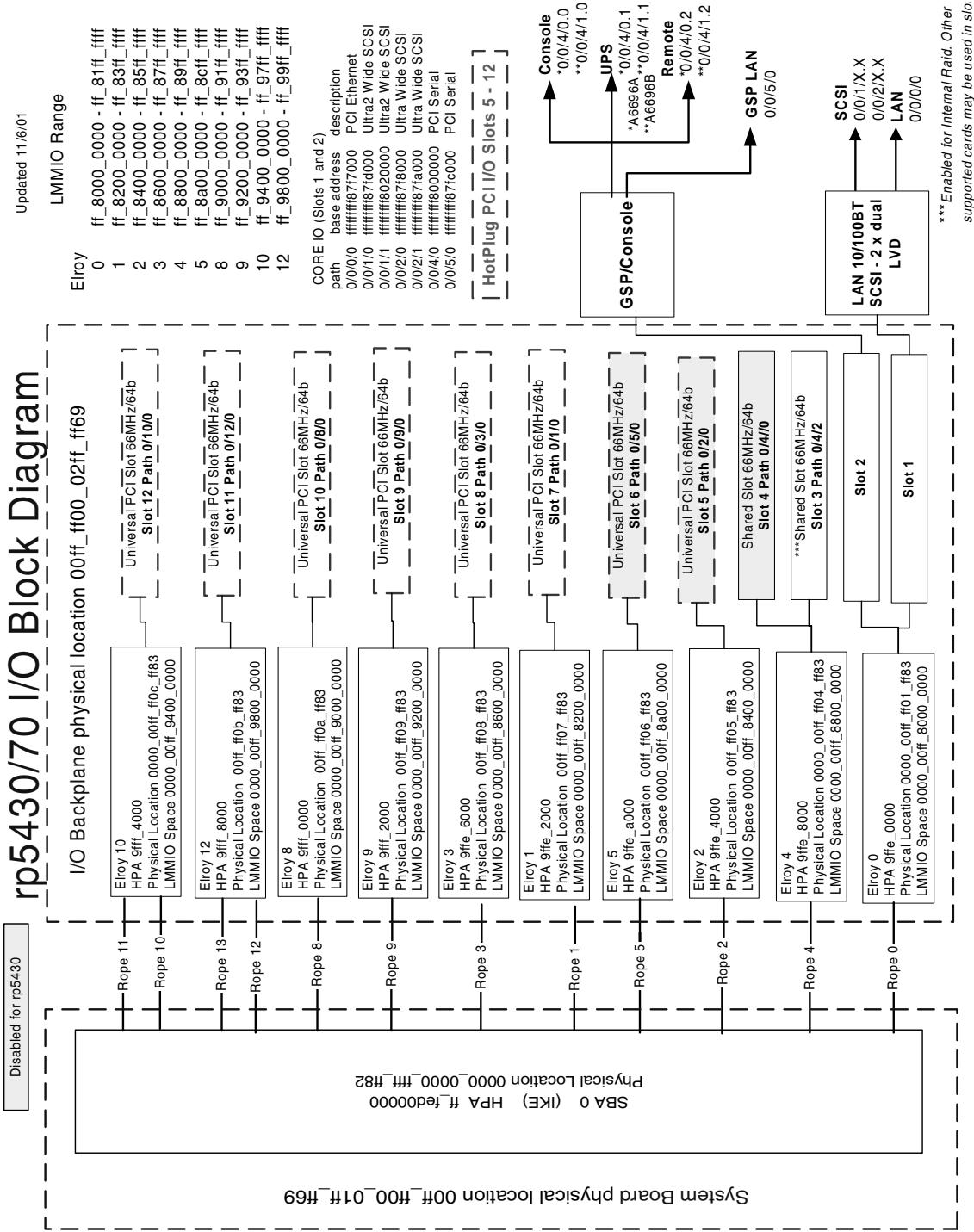
\*For 550MHz use 2.0Vdc Power POD  
For 650/750MHz use 1.6Vdc Power POD

\*\*Enabled for Internal Raid.  
Other supported cards may be used in slot

Disabled for rp5430

rp5430/70 System  
Block Diagram

## **rp5430 and rp5470 I/O Block Diagram**



## Run/Attention/Fault LED States

Run (Green)	Attn (Amber)	Fault (Red)	Description
On	Off	Off	<p>State:</p> <ul style="list-style-type: none"> <li>■ System running normally. You should expect an OS prompt, if not, system may be hung.</li> </ul> <p>Action:</p> <ul style="list-style-type: none"> <li>■ Attempt to get system prompt to determine if system is hung.</li> <li>■ Talk to customer to determine reason for call.</li> </ul>
On	Off	On	This is an invalid indication. Check the server's LEDs and try again.
On	Off	Flashing	<p>State:</p> <ul style="list-style-type: none"> <li>■ The system crashed and rebooted itself successfully</li> </ul> <p>Action:</p> <ul style="list-style-type: none"> <li>■ Check chassis error logs to determine probable cause of system crash (either HPMC or HP-UX System Panic)</li> <li>■ Check service processor console logs for potential error messages from the OS (ie. Panic messages)</li> </ul>
On	Flashing	Off	<p>State:</p> <ul style="list-style-type: none"> <li>■ There was a system interruption that did not take the system down</li> </ul> <p>Action:</p> <ul style="list-style-type: none"> <li>■ Check chassis error logs to determine probable cause</li> <li>■ Check Sentinel logs for probable cause</li> </ul>

Run (Green)	Attn (Amber)	Fault (Red)	Description
 On	 Flashing	 On	This is an invalid indication. Check the server's LEDs and try again.
			<p><b>State:</b></p> <ul style="list-style-type: none"> <li>□ System running, and</li> <li>□ A) unexpected reboot occurred, and</li> <li>□ B) a non-critical error has been detected</li> </ul> <p><b>Action:</b></p> <ul style="list-style-type: none"> <li>□ A) Check chassis error logs to determine probable cause of system crash (either HPMC or HP-UX System Panic)</li> <li>□ A) Check GSP console logs for potential error messages from the OS (ie. Panic messages)</li> <li>□ B) Check chassis error logs to determine probable cause of non-critical error</li> <li>□ B) Check Sentinel logs for probable cause of non-critical error</li> </ul>

Run (Green)	Attn (Amber)	Fault (Red)	Description
 Flashing	 Off	 Off	<p>State:</p> <ul style="list-style-type: none"> <li>□ Executing non-OS code - no problems detected</li> <li>□ System may be hung or waiting for BCH response</li> <li>□ Potential causes could be PDC never executed (problem with fetching code from PDH), HPMC while PDC was configuring system.</li> </ul> <p>Action:</p> <ul style="list-style-type: none"> <li>□ Check console for pending responses</li> <li>□ If system appears to be hung, execute TC from GSP prompt and check Last Boot Log for details of previous boot attempt. Pay attention to time stamps to ensure Last Boot Log reflects last boot attempt.</li> <li>□ If necessary, bring system down to minimum configuration, processors, memory, I/O, and troubleshoot.</li> </ul>

Run (Green)	Attn (Amber)	Fault (Red)	Description
 Flashing	 Off	 On	<p>State:</p> <ul style="list-style-type: none"> <li>□ Boot failed</li> <li>□ Executing non-OS code.</li> </ul> <p>Action:</p> <ul style="list-style-type: none"> <li>□ 1. Check chassis error logs</li> <li>□ 2. Read console messages for indications of problems ie. warnings from PDC</li> </ul>
 Flashing	 Off	 Flashing	<p>State:</p> <ul style="list-style-type: none"> <li>□ Unexpected reboot occurred</li> <li>□ Executing non-OS code.</li> </ul> <p>Action:</p> <ul style="list-style-type: none"> <li>□ 1. Check chassis error logs</li> <li>□ 2. Read console messages for indications of problems ie. warnings from PDC</li> </ul>
 Flashing	 Flashing	 Off	<p>State:</p> <ul style="list-style-type: none"> <li>□ Executing non-OS code.</li> <li>□ Non-critical error detected (ie. fan failure, power supply failure)</li> </ul> <p>Action:</p> <ul style="list-style-type: none"> <li>□ Read chassis error logs starting at entry 0 to determine cause of flashing amber LED and fix problem.</li> </ul>

Run (Green)	Attn (Amber)	Fault (Red)	Description
 Flashing	 Flashing	 On	<p>State:</p> <ul style="list-style-type: none"> <li>□ Boot failed</li> <li>□ Executing non-OS code.</li> <li>□ Non-critical error detected (ie. fan failure, power supply failure)</li> </ul> <p>Action:</p> <ul style="list-style-type: none"> <li>□ 1. Check chassis error logs</li> <li>□ 2. Read console messages for indications of problems ie. warnings from PDC</li> </ul>
 Flashing	 Flashing	 Flashing	<p>State:</p> <ul style="list-style-type: none"> <li>□ Unexpected reboot/system recovering.</li> <li>□ Executing non-OS code.</li> <li>□ Non-critical error detected (ie. fan failure, power supply failure)</li> </ul> <p>Action:</p> <ul style="list-style-type: none"> <li>□ 1. Check chassis error logs</li> <li>□ 2. Read console messages for indications of problems ie. warnings from PDC</li> </ul>

Run (Green)	Attn (Amber)	Fault (Red)	Description
 Off	 Off	 Off	<p>State:</p> <ul style="list-style-type: none"> <li>□ A) If Power LED Off</li> <li>□ B) If Power LED Flashing</li> <li>□ C) If Power LED On</li> </ul> <p>Action:</p> <ul style="list-style-type: none"> <li>□ A) Check Power Supply switches and LEDs           <ul style="list-style-type: none"> <li>□ Power supply switches should be on and LEDs should be on to indicate presence of AC. If Power Supply LEDs are on and the Front Panel LED is off, replace Power Monitor.</li> <li>□ Check AC power at source</li> </ul> </li> <li>□ B) Turn Front Panel Power Switch on - LED should be on solid           <ul style="list-style-type: none"> <li>□ If LED continues to flash, system has been remotely powered off by the service processor or the power monitor has failed.</li> <li>□ Execute service processor PC command: type CTRL B, log into the service processor, and type PC at the prompt.</li> <li>□ If this doesn't cause the LED to go on solid, problem is most likely with the power monitor.</li> </ul> </li> <li>□ C) Cannot execute PDC. If more than one processor installed, the problem is most likely a failed system board. If only one processor installed, problem could be either the processor or system board.</li> </ul>

Run (Green)	Attn (Amber)	Fault (Red)	Description
 Off	 Off	 On	<p>State:</p> <ul style="list-style-type: none"> <li>□ Boot failed</li> <li>□ OS not up and running, PDC has detected a failure that is preventing boot from occurring.</li> </ul> <p>Action:</p> <ul style="list-style-type: none"> <li>□ 1. Check chassis error logs</li> <li>□ 2. Read console messages for indications of problems ie. warnings from PDC</li> </ul>
 Off	 Off	 Flashing	This is an invalid indication. Check the server's LEDs and try again.
 Off	 Flashing	 Off	<p>State:</p> <ul style="list-style-type: none"> <li>□ No code is executing (PDC, OS or Diagnostics)</li> <li>□ Non-critical error detected (ie. fan failure, power supply failure) (Double fault situation)</li> </ul> <p>Action:</p> <ul style="list-style-type: none"> <li>□ Cannot execute PDC. If more than one processor installed, the problem is most likely a failed system board. If only one processor installed, problem could be either the processor or system board.</li> <li>□ Check chassis error logs to determine the source of non-critical error.</li> </ul>

Run (Green)	Attn (Amber)	Fault (Red)	Description
 Off	 Flashing	 On	<p>State:</p> <ul style="list-style-type: none"> <li>□ Boot failed</li> <li>□ OS not up and running, PDC has detected a failure that is preventing boot from occurring.</li> <li>□ Non-critical error detected (ie. fan failure, power supply failure)</li> </ul> <p>Action:</p> <ul style="list-style-type: none"> <li>□ 1. Check chassis logs</li> <li>□ 2. Read console messages for indications of problems ie. warnings from PDC</li> </ul>
 Off	 Flashing	 Flashing	This is an invalid indication. Check the server's LEDs and try again.
	 On		Any combination with amber on is an invalid indication since amber is never on solid.

## PCI I/O LED States

Power (green)	Attention (amber)	State
 On	 Off	<p>State:</p> <ul style="list-style-type: none"><li>□ Normal operation</li></ul>
 On	 On	<p>State:</p> <ul style="list-style-type: none"><li>□ Slot selected &lt;or&gt; slot located</li><li>□ Power on</li></ul> <p>Action:</p> <ul style="list-style-type: none"><li>□ Not ready for OLRAD</li></ul>
 Off	 On	<p>State:</p> <ul style="list-style-type: none"><li>□ Slot selected &lt;or&gt; slot located</li><li>□ Power is off</li></ul> <p>Action:</p> <ul style="list-style-type: none"><li>□ Ready for OLRAD</li></ul>
 On	 Flashing	<p>State:</p> <ul style="list-style-type: none"><li>□ Fault detected</li><li>□ Power on</li></ul>

Power (green)	Attention (amber)	State
 Off	 Flashing	State: <ul style="list-style-type: none"><li>□ Fault detected</li><li>□ Power off</li></ul>
 Off	 Off	State: <ul style="list-style-type: none"><li>□ Slot available</li></ul>

## Expansion I/O LED States

Power (green)	Attention (amber)	State
 On	 On	<p>State:</p> <ul style="list-style-type: none"> <li>□ Slot selected &lt;or&gt; slot located</li> <li>□ Power on</li> </ul> <p>Action:</p> <ul style="list-style-type: none"> <li>□ Not ready for OLRAD</li> </ul>
 On	 Off	<p>State:</p> <ul style="list-style-type: none"> <li>□ Normal operation</li> </ul>
 On	 Flashing	<p>State:</p> <ul style="list-style-type: none"> <li>□ Fault detected</li> <li>□ Power on</li> </ul>
 Off	 On	<p>State:</p> <ul style="list-style-type: none"> <li>□ Slot selected &lt;or&gt; slot located</li> <li>□ Power is off</li> </ul> <p>Action:</p> <ul style="list-style-type: none"> <li>□ Ready for OLRAD</li> </ul>

Power (green)	Attention (amber)	State
 Off	 Off	State: <ul style="list-style-type: none"><li>□ Slot available</li></ul>
Power (green)	Attention (amber)	State
 Off	 Flashing	State: <ul style="list-style-type: none"><li>□ Fault detected</li><li>□ Power off</li></ul>

## GSP LED States

### GSP - Revision A

Type	Status	State
GSP Upper	 On Green	State: <ul style="list-style-type: none"><li>□ GSP Power OK</li></ul>
	 Flashing Green	State: <ul style="list-style-type: none"><li>□ GSP LAN receive</li></ul>
	 On Red	State: <ul style="list-style-type: none"><li>□ GSP Failure</li></ul>
GSP Lower	 On Green	State: <ul style="list-style-type: none"><li>□ Link OK</li></ul>
	 Flashing Green	State: <ul style="list-style-type: none"><li>□ GSP LAN transmit</li></ul>
	 On Red	State: <ul style="list-style-type: none"><li>□ GSP Failure</li></ul>

## GSP - Revision B

Type	Status	State
GSP Upper	 On Green	State: <ul style="list-style-type: none"><li>□ GSP Power OK</li></ul>
	 Flashing Green	State: <ul style="list-style-type: none"><li>□ GSP LAN receive</li></ul>
	 On Red	State: <ul style="list-style-type: none"><li>□ GSP Failure</li></ul>
GSP Lower	 On Amber	State: <ul style="list-style-type: none"><li>□ 10 Base-T Link OK</li></ul>
	 Flashing Amber	State: <ul style="list-style-type: none"><li>□ 10 Base-T Activity</li></ul>
	 On Green	State: <ul style="list-style-type: none"><li>□ 10 Base-T Link OK</li></ul>
	 Flashing Green	State: <ul style="list-style-type: none"><li>□ 10 Base-T Activity</li></ul>

## LAN/SCSI LED States

Type	Status		State
LAN Upper		- or -	 State: <ul style="list-style-type: none"><li>■ 100bT Mode</li></ul>
		- or -	 State: <ul style="list-style-type: none"><li>■ 10bT Mode</li></ul>
LAN Lower		- or -	 State: <ul style="list-style-type: none"><li>■ LAN Transmit</li></ul>
SCSI Upper			 State: <ul style="list-style-type: none"><li>■ LVD Mode</li></ul>
			 State: <ul style="list-style-type: none"><li>■ Single Ended Mode</li></ul>
SCSI Lower			 State: <ul style="list-style-type: none"><li>■ Termpower Present</li></ul>
			 State: <ul style="list-style-type: none"><li>■ Termpower Absent</li></ul>

## Fan, Power Supply, and Disk LED States

Type	Status	State
Fan	 On Amber	State: <ul style="list-style-type: none"><li>□ Fan Failure</li></ul>
	 Off	State: <ul style="list-style-type: none"><li>□ Normal operation</li></ul>
Power Supply	 On Green	State: <ul style="list-style-type: none"><li>□ Normal operation</li></ul>
	 Off	State: <ul style="list-style-type: none"><li>□ Power Supply Failure</li></ul>
Disk Activity	 On Green Or	State: <ul style="list-style-type: none"><li>□ Normal Activity</li></ul>
	 Flashing Green	
Disk Attention	 Off	State: <ul style="list-style-type: none"><li>□ No Activity - Normal</li></ul>
	 On Amber	State: <ul style="list-style-type: none"><li>□ Ready for HotPlug</li></ul>
	 Off	State: <ul style="list-style-type: none"><li>□ Normal</li></ul>

Troubleshooting  
**Fan, Power Supply, and Disk LED States**

---

## **7 Removing and Replacing Components**

The following list of parts can be changed when required to keep the system running properly. The remove/replace components shown under each part indicates the path required for access to each.

## List of Changeable Parts with Remove and Replace Components

---

**NOTE** When viewed in PDF format, component remove/replace instructions may be accessed directly by clicking on the component title listed under each part.

---

### **Cardcage Fan**

Extend the Server out the Front (If Racked)

Stand-alone Server Cover Removal (If Not Racked)

Side Cover Removal

HotSwap Card Cage Fan Removal

HotSwap Card Cage Fan Replacement

Side Cover Replacement

Stand-alone Server Cover Replacement (If Not Racked)

Insert the Server from the Front (If Racked)

### **Core I/O**

Extend the Server out the Front (If Racked)

Stand-alone Server Cover Removal (If Not Racked)

Side Cover Removal

Core I/O Removal

Core I/O Replacement

Side Cover Replacement

Stand-alone Server Cover Replacement (If Not Racked)

Insert the Server from the Front (If Racked)

### **HotSwap Chassis Fan**

Front Bezel Removal (Single Piece)

Front Bezel Removal (Two Piece)

HotSwap Chassis Fan Cover Removal

HotSwap Chassis Fan Removal

HotSwap Chassis Fan Replacement

HotSwap Chassis Fan Cover Replacement

Front Bezel Replacement (Single Piece)

Front Bezel Replacement (Two Piece)

## Disk Drive

Front Bezel Removal (Single Piece)  
Front Bezel Removal (Two Piece)  
HotPlug Disk Drive Removal  
HotPlug Disk Drive Replacement  
Front Bezel Replacement (Single Piece)  
Front Bezel Replacement (Two Piece)

## Display Board

Front Bezel Removal (Single Piece)  
Front Bezel Removal (Two Piece)  
HotSwap Chassis Fan Cover Removal  
HotSwap Chassis Fan Removal  
Display Board Removal  
Display Board Replacement  
HotSwap Chassis Fan Replacement  
HotSwap Chassis Fan Cover Replacement  
Front Bezel Replacement (Single Piece)  
Front Bezel Replacement (Two Piece)

## Front Bezel

Front Bezel Removal (Single Piece)  
Front Bezel Removal (Two Piece)  
Front Bezel Replacement (Single Piece)  
Front Bezel Replacement (Two Piece)  
One Piece Bezel Install

## Memory DIMM

Extend the Server out the Front (If Racked)  
Stand-alone Server Cover Removal (If Not Racked)  
Top Cover Removal  
Memory DIMM Removal  
Memory DIMM Replacement  
Top Cover Replacement  
Stand-alone Server Cover Removal (If Not Racked)  
Insert the Server from the Front (If Racked)

Removing and Replacing Components

List of Changeable Parts with Remove and Replace Components

## **PCI I/O Card**

Extend the Server out the Front (If Racked)

Stand-alone Server Cover Removal (If Not Racked)

Side Cover Removal

PCI I/O Card Removal

PCI Card Separator/Extractor Removal

PCI Card Separator/Extractor Replacement

PCI I/O Card Replacement

Side Cover Replacement

Stand-alone Server Cover Replacement (If Not Racked)

Insert the Server from the Front (If Racked)

## **Power Supply**

Front Bezel Removal (Single Piece)

Front Bezel Removal (Two Piece)

HotSwap Power Supply Removal

HotSwap Power Supply Replacement

Front Bezel Replacement (Single Piece)

Front Bezel Replacement (Two Piece)

## **HotSwap Power Converter Fan**

HotSwap Power Converter Fan Removal

HotSwap Power Converter Fan Replacement

## **Platform Monitor**

Extend the Server out the Front (If Racked)

Stand-alone Server Cover Removal (If Not Racked)

Top Cover Removal

Platform Monitor Removal

Platform Monitor Replacement

Top Cover Replacement

Stand-alone Server Cover Replacement (If Not Racked)

Insert the Server from the Front (If Racked)

## **Processor Support Module**

Extend the Server out the Front (If Racked)

Stand-alone Server Cover Removal (If Not Racked)

Top Cover Removal

Processor Support Module Removal

Processor Support Module Replacement

Top Cover Replacement

Stand-alone Server Cover Removal (If Not Racked)

Insert the Server from the Front (If Racked)

## Individual Component Remove/Replace Instructions

Each component has instructions for removal followed by instructions for replacement.

### Extend the Server out the Front

rp54xx servers are available in two housings: rack-mounted or stand-alone. Access to servers mounted in an HP-supported rack is covered in this section.

---

**NOTE** Ensure that there is enough area (Approximately 1.5 meters (4.5 ft) to fully extend the server out the front and work on it.

---

**WARNING** **Ensure that all anti-tip features (front and rear anti-tip feet installed; adequate ballast properly placed, etc.) are employed prior to extending the server.**

---

To extend the server, perform the following steps:

1. Remove the four T-25 screws that fasten the server to the rack.
2. Grasp the server chassis and slowly pull forward. The server is fully extended when the rail clips are locked in place. When fully extended, the top and side service bays are fully accessible.

The following graphic shows the server extended and indicates the rail clip location.

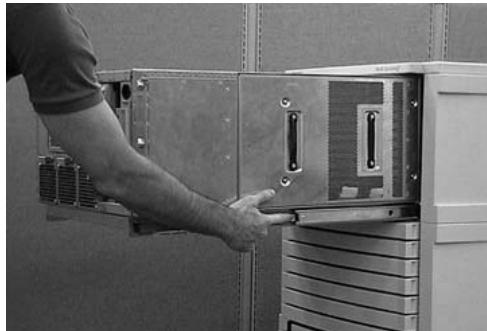


## Insert the Server from the Front

rp54xx servers are available in two housings: rack-mounted or stand-alone. Access to servers mounted in an HP-supported rack is covered in this section.

To return the server into the rack, press the rail clips on either side of the server in and push the server into the rack until it stops.

The following graphic shows the server extended and indicates the rail clip location.



## Stand-alone Server Cover Removal

The rp54xx server can be ordered as a stand-alone unit. In this configuration, the server has a one-piece protective cover over it and sits on a platform with locking wheels attached.

To remove the cover from a stand-alone server, perform the following procedures:

1. Unfasten and remove the screws (with captive washers) located near the bottom edge of both sides of the server cover.
2. Lift the protective cover off of the server and set it aside.

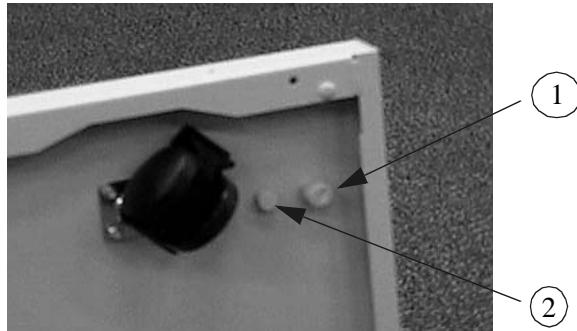
---

**WARNING** **The stand-alone server weights 69 kg (150 lbs). Removing the stand-alone server from its platform requires three people or a suitable lifting device. Failure to heed this precaution can result in serious personal injury or destruction of the server.**

---

To remove the server from its wheeled platform, perform the following procedure:

1. Facing the front of the server, reach under the platform on the right side and unfasten the knurl-knobbed, spring-loaded pin (item 1). The pin will retract when it is free. Perform the same step at the rear of the server. The rear knurl-knobbed, spring-loaded pin is aligned behind the front pin, but at the rear of the server.



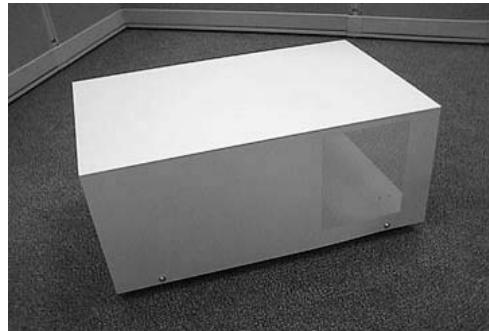
2. From the back of the server, reach under the platform, behind the knurl-knobbed, spring-loaded pin, and locate the flat head of the second spring-loaded pin (item 2). This pin is spring-loaded to stay up and keep the server from sliding on the platform. Pull the pin down and twist one quarter turn to the left to lock the pin down and out of the way. Perform the same step at the front of the server.
3. The server is now free from its wheeled platform and can be removed from it.

---

**WARNING** **The stand-alone server weights 69 kg (150 lbs). Removing the stand-alone server from its platform requires three people or a suitable lifting device. Failure to heed this precaution can result in serious personal injury or destruction of the server.**

---

The following graphic shows the protective cover.



## Stand-alone Server Cover Replacement

The rp54xx server can be ordered as a stand-alone unit. In this configuration, the server has a one-piece protective cover over it and sits on a platform with locking wheels attached.

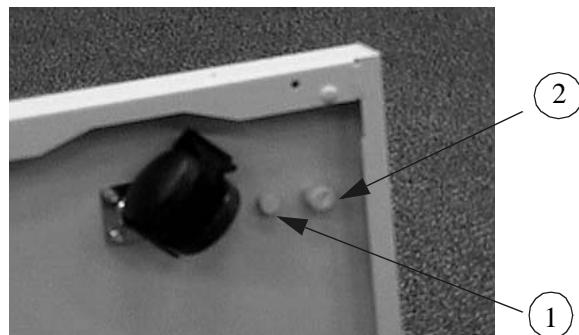
To place the server on its wheeled platform, perform the following procedure:

---

**WARNING** **The stand-alone server weights 69 kg (150 lbs). Placing the stand-alone server on its platform requires three people or a suitable lifting device. Failure to heed this precaution can result in serious personal injury or destruction of the server.**

---

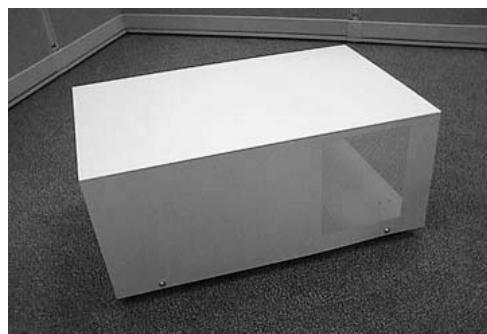
1. Lift the platform and turn both of the spring-loaded, flat-headed pins (item 1) a quarter turn to the right to lock them out of the way before placing the server on the platform.
2. Using a lifting devise or a minimum of three people, lift the server onto the platform. Align the server and platform so that the pins will lock.
3. Reach under the platform, locate the spring-loaded, flat headed pins and turn them one quarter turn to the left to unlock them. Gently slide the server around on the platform until the spring-loaded flat-head pins snap into their holes.
4. Once again, reach under the platform on the right side and fasten both front and back knurl-knobbed, spring-loaded pins (item 2).



To place the cover on a stand-alone server, perform the following procedures:

1. Set the protective cover on the server and align the holes located near the bottom edge of both sides of the server cover.
2. Fasten the screws (with captive washers) through the cover, into the platform.

The following graphic shows the protective cover.



## Top Cover Removal

The power to the server does not have to be off to remove the top cover and air baffle. However, operation of the server without the top cover in place can make it susceptible to EMI problems.

Follow the steps listed below to remove the top cover:

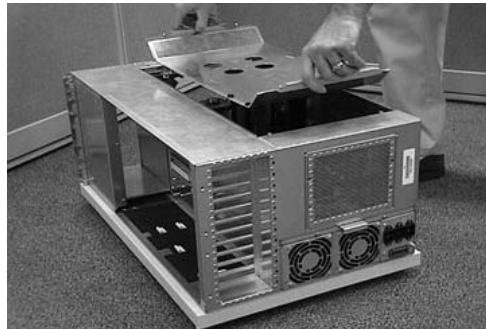
1. Loosen the captive T-15 screws that hold the top cover in place.
2. Grasp the strap handles, raise the cover slightly, and pull the cover toward the front of the server to free the cover tabs from the slots in the chassis. The air baffle will be exposed.

Loosen the captive T-15 screws that hold the air baffle in place then lift the air baffle off of the server.

The following graphics show the top service bay cover and the air baffle. The first graphic shows the top service bay cover.



The second shows the air baffle.



## Top Cover Replacement

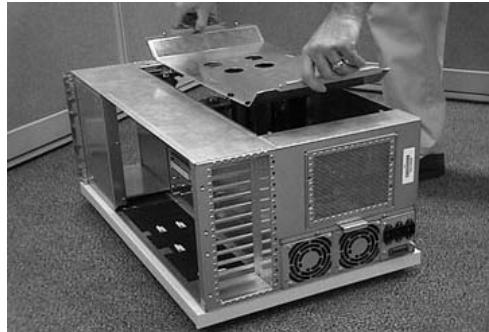
The power to the server does not have to be off to remove or replace the top service bay cover and air baffle. However, operation of the server without the top cover in place can make it susceptible to EMI problems.

Set the air baffle in place over the opening for the top service bay and tighten the captive T-15 screws.

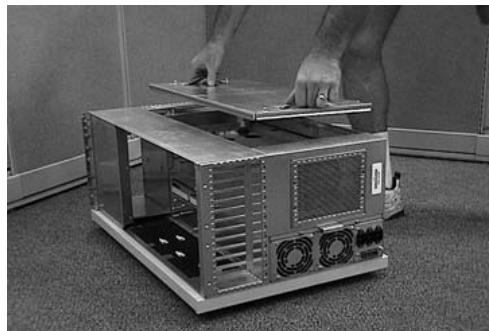
Follow the steps listed below to replace the top cover:

1. Align the tabs on the end of the top cover with the corresponding slots in the chassis and seat the tabs fully into the slots.
2. Seat the top cover in the top of the service bay and tighten the captive T-15 screws that hold the cover in place.

The following graphics show the air baffle and the top service bay cover. The first graphic shows the air baffle.



The second graphic shows the top service bay cover.



## Side Cover Removal

The Side Cover protects the side service bay. The power to the server does not have to be off to remove the side cover. However, operation of the server without the side cover in place can make it susceptible to EMI problems.

Loosen the captive T-15 screws that hold the side cover in place, then grasp the strap handle and pull the cover away from the server.

The following graphic shows the side cover with captive screw locations.



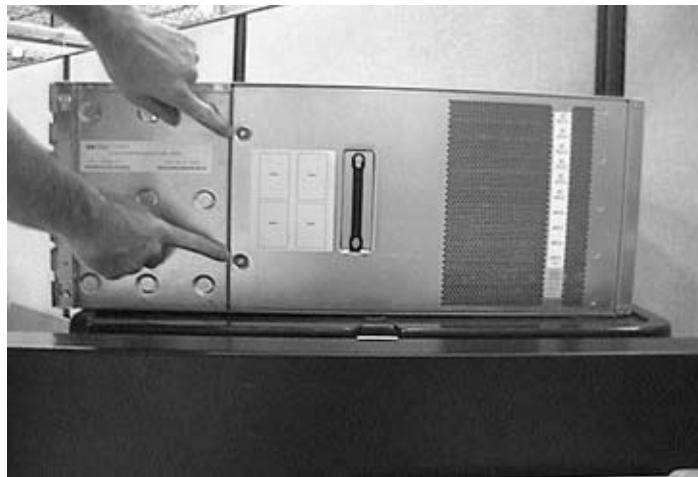
## Side Cover Replacement

The power to the server does not have to be off to replace the side cover. However, operation of the server without the side cover in place can make it susceptible to EMI problems.

Replace the side cover according to the following steps:

1. Grasp the strap handle and insert the tabbed end of the cover into the server chassis slots on the right side of the side service bay.
2. Push the cover into the side service bay opening and fasten the captive T-15 screws that hold the side cover in place.

The following graphic shows the side cover with captive screw locations.



## Front Bezel Removal (Single Piece)

The rp54xx server front bezel is hinged on the left (facing the front of the server). The server does not have to be turned off to open or to completely remove the bezel.

Opening the door provides access to the following components:

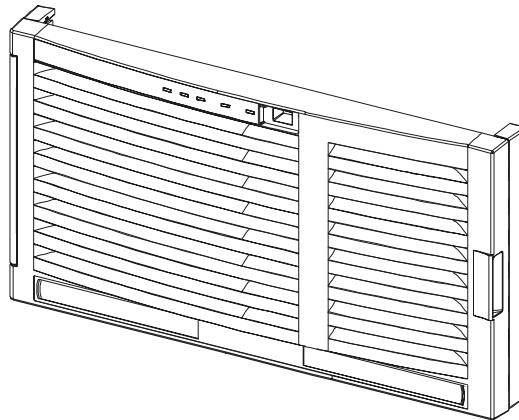
- HotPlug Disks (A0, A1, and B0, B1).
- Removable Media (CD-ROM drive, etc.).
- HotSwap Chassis Fan cover.
- HotSwap Chassis Fan 0.
- HotSwap Power Supplies (up to three).

To open the front bezel, grasp the right edge of the bezel and pull out. The bezel will swing away from the chassis.

To remove the entire bezel, perform the following steps:

1. Open the front bezel and swing it to the left as far as possible.
2. Pry the hinge cover, located on the left side of the server, off the chassis.
3. While supporting the bezel, remove the screws that secure the bezel hinge to the left side of the server.
4. Grasp the left side of the bezel and pull it loose.

The following graphic shows the front bezel.



## Front Bezel Replacement (Single Piece)

The rp54xx server front bezel is hinged on the left (facing the front of the server). The server does not have to be turned off to open or to completely remove the bezel.

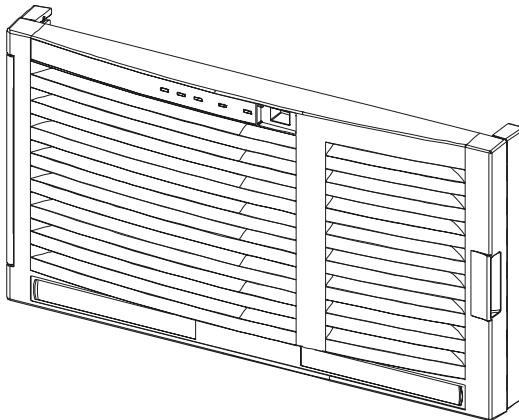
The bezel encloses the following components:

- HotPlug Disks (A0, A1, and B0, B1).
- Removable Media (CD-ROM drive, etc.).
- HotSwap Chassis Fan cover.
- HotSwap Chassis Fan 0.
- HotSwap Power Supplies (up to three).

To attach the bezel, perform the following steps:

1. Screw the bezel hinge to the threaded inserts on the left side of the server.
2. Install the hinge cover by aligning the notch in the top of the cover with the top of the assembly cover and press firmly into place.

The following graphic shows the front bezel.



## Front Bezel Removal (Two Piece)

The rp54xx server front bezel is divided and hinged on the right (facing the front of the server) side to provide a door for Disk Media Bay access. The server does not have to be turned off to open the access door or to completely remove the bezel.

Opening the door provides access to the following components:

- HotPlug Disks (A0, A1, and B0, B1).
- Removable Media (CD-ROM drive, etc.).

Removing the entire bezel provides access to the components listed above and the following:

- HotSwap Chassis Fan cover.
- HotSwap Chassis Fan 0.
- HotSwap Power Supplies (up to three).

To open the Disk Media access door, grasp the right edge of the door and pull out. The door will swing away from the chassis, exposing the Disk Media Bay.

To remove the entire bezel, perform the following steps:

1. Open the Disk Media access door, exposing the plastic bezel pins inserted in the clips at the top and bottom of the Disk Media bay on the left side.
2. Grasp the left side of the bezel and pull it loose.

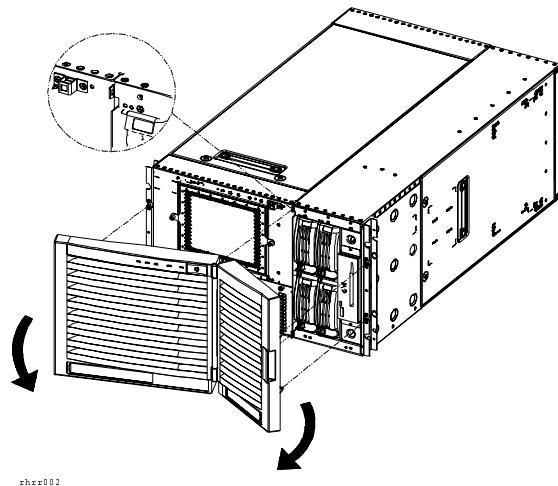
---

**CAUTION** DO NOT try to pull the bezel off of the server at this point. The plastic pins holding the bezel on the right side are inserted in metal clips on the Disk Media bay and if the plastic pins are bent, they will break off.

---

3. Grasp the bezel with both hands and carefully slide the bezel to the left until both plastic pins clear the metal clips on the Disk Media bay.
4. Pull the bezel away from the server and set it aside.

The following graphic shows the front bezel.



## Front Bezel Replacement (Two Piece)

The rp54xx server front bezel is divided and hinged on the right (facing the front of the server) side to provide a door for Disk Media Bay access. The server does not have to be turned off to open the access door or to completely remove the bezel.

The Disk Media Bay door encloses the following components:

- HotPlug Disks (A0, A1, and B0, B1).
- Removable Media (CD-ROM drive, etc.).

The left side of the front bezel encloses the following components:

- HotSwap Chassis Fan cover.
- HotSwap Chassis Fan 0.
- HotSwap Power Supplies (up to three).

To attach the bezel, perform the following steps:

1. Swing the Disk Media access door open so that the plastic pins that go into the metal clips on the Disk Media bay are exposed.

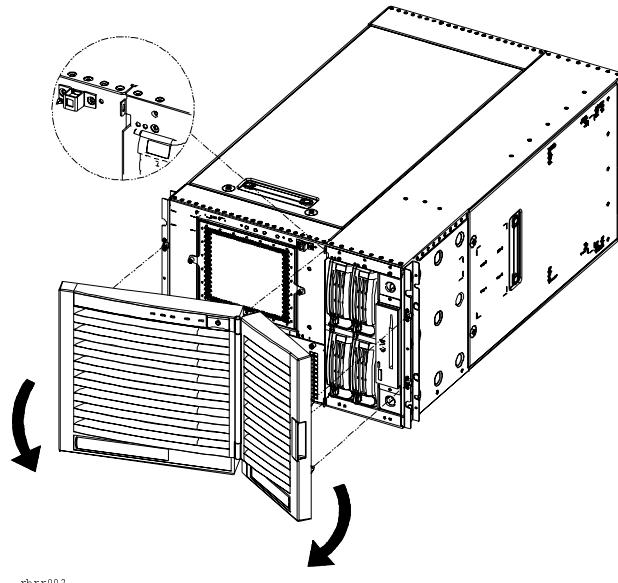
---

**CAUTION** The plastic pins holding the bezel on the right side are inserted into metal clips on the Disk Media bay. DO NOT bend the plastic pins or they will break off.

---

2. Holding the bezel with both hands, align the bezel pins with the metal clips on the Disk Media bay and carefully slide the bezel pins into the clips.
3. Attach the left side of the bezel to the server chassis by aligning the bezel pins with the chassis clips and press the bezel into the chassis until the pins snap into the clips.

The following graphic shows the front bezel.



4. Swing the Disk Media access door closed and attach it to the right side of the server chassis.

## Core I/O Removal

rp54xx Core I/O functions are contained on the GSP revision A/B and LAN/SCSI cards. Both cards are located on the PCI Backplane in the side service bay. The LAN/SCSI card is in I/O slot 1 and the GSP revision A/B card is in I/O slot 2.

Before removing either of the Core I/O cards from the server, perform the following tasks:

- Power down the server.
- Detach all power cords from the server.

To remove a Core I/O card from the server, perform the following steps:

1. Remove all cables attached to the Core I/O card at the rear bulkhead.

---

**NOTE**

Be sure to label the cables before removing them.

2. Disconnect any ribbon cable connectors attached to the Core I/O card in the side service bay.
3. Grasp the edge of the Core I/O card and pull it out of the server.

The following graphic shows both Core I/O cards in the side service bay.



## Core I/O Replacement

rp54xx Core I/O functions are contained on the GSP and LAN/SCSI cards. Both cards are located on the PCI Backplane in the side service bay. The LAN/SCSI card is in I/O slot 1 and the GSP card is in slot 2.

Before replacing either of the Core I/O cards, perform the following tasks:

- Power down the server.
- Detach all power cords from the server.

---

**NOTE** For revision B GSP only, remove *one* of the MAC address labels and place on the rear of the server as shown in the following graphics.

---



To replace a Core I/O card, perform the following steps:

1. Orient the I/O card in its guide and push it into the server until the card connector seats in the I/O Backplane card slot.
2. Connect the I/O cable attached to the I/O card at the rear PCI bulkhead.
3. Connect any ribbon cable connectors attached to the I/O card in the side service bay.

The following graphic shows an I/O card being replaced.



## PCI Card Separator/Extractor Removal

PCI card separator/extractors are located in the Side Service Bay, between the PCI cards. PCI card separator/extractors are plastic cards with two tab handles and two LEDs.

Before removing a PCI card separator/extractor from the server, perform the following tasks:

- Shut down the server.
- Remove the corresponding PCI card.

To remove a PCI card separator/extractor, perform the following steps:

1. Carefully slide a long shaft, medium width, flat blade screw driver (item 1) into the Side Service Bay along the side of the PCI card separator/extractor, and insert it into the slot in the hook tab (item 2).



2. At the point where the PCI card separator/extractor inserts into the PCI backplane connector (item 2), there are two slotted, hook tab connectors on the PCI card separator/extractor, one on either side of the PCI Backplane connector. Press one then the other to disengage the card from the backplane.
3. With the two connection points pressed, slide the PCI card separator/extractor out of the PCI card cage.

## PCI Card Separator/Extractor Replacement

PCI card separator/extractors are located in the Side Service Bay on the PCI Backplane, between PCI cards. PCI card separator/extractors are plastic cards with two tab handles and two LEDs.

To replace a PCI card separator/extractor, perform the following steps:

1. Insert the PCI card separator/extractor into the available slot and slide it into the PCI backplane connector.
2. Be sure the two hook tabs on the PCI card separator/extractor insert into the connector blocks on either side of the PCI backplane.

Once you have completed replacement of the PCI card separator/extractor into the server, perform the following tasks:

- Replace the PCI card, if necessary.
- Power up the server.

## HotPlug Disk Drive Removal

The internal disk drives (up to four) are located at the front right side of the server (as you are facing it). When proper software and hardware procedures are followed, internal disk drives can be removed and replaced while the server is running.

The procedures in this section are in two parts, a HotSwap Software Procedure and a HotPlug Hardware Procedure, for removing the disk from the server.

Before starting these procedures, you must have an up-to-date configuration backup file. Configuration backup is performed by default each time an LVM command changes the LVM configuration. The default backup files path is:

/etc/lvmconf/base\_vg\_name.conf .

The replacement disk drive must be the same product ID as the disk drive that is being replaced.

---

<b>NOTE</b>	HP often uses different manufacturers for disks that have the same product number. The HotSwap and HotPlug procedures will not update the disk drive's internal information to that of the replaced disk drive.
-------------	---

---

The replacement disk drive will have the same capacity and blocksize as the defective disk because they have the same product number. The only field that can be incorrect is the string specifying the vendor's name. This will not affect the behavior of the LVM. If you desire to update the manufacturer's name, the disks volume group must be deactivated and reactivated.

### HotSwap Software Procedure

Perform these software procedural steps to replace a HotPlug disk drive device:

**Step 1.** Determine whether LVM found the physical volume to be defective when the volume group was activated.

If the volume was defective when the volume group was activated, *vgchange* will generate the following message to the console:

WARNING

VGCHANGE: WARNING: COULDN'T ATTACH TO THE VOLUME GROUP PHYSICAL VOLUME "/DEV/DSK/cXtXdX"

VGCHANGE: WARNING: COULDN'T ATTACH TO THE VOLUME GROUP PHYSICAL VOLUME "/DEV/DSK/cXtXdX"

THE PATH OF THE PHYSICAL VOLUME REFERS TO A DEVICE THAT DOES NOT EXIST, OR IS NOT CONFIGURED INTO THE KERNEL.

If you are unsure of the status of *vgchange*, check it with the *vgdisplay* command:

#*vgdisplay* <VG name>

For example:

# *vgdisplay /dev/vg00*

If the disk was defective when the *vgchange* command was entered, the following message will be printed one or more times:

**WARNING:**

```
VGDISPLAY: WARNING: COULDN'T QUERY PHYSICAL VOLUME "/DEV/DSK/cXtXdX"  
THE SPECIFIED PATH DOES NOT CORRESPOND TO PHYSICAL VOLUME ATTACHED TO THE  
VOLUME GROUP.
```

```
VGDISPLAY: WARNING: COULDN'T QUERY ALL OF THE PHYSICAL VOLUMES.
```

If you see these messages, the disk was defective at the time the volume group was activated. Remove the bad disk as described in step 9 of this procedure, then follow the instructions in for replacing the disk and perform the *HotSwap Procedure for Unattached Physical Volumes* described there.

Otherwise, the disk drive became defective after *vgchange* was run. Proceed to Step 2.

- Step 2.** Display the names of all the logical volumes on this volume group with the *vgdisplay* command. For example:

```
#vgdisplay /dev/vg00
```

- Step 3.** Determine which logical volumes have mirrors with the *lvdisplay* command. For example:

```
#lvdiskdisplay /dev/vg00/lvol# | grep -ie "LV Name" -e "Mirror"
```

- Step 4.** Determine the *pvkey* command status for the mirrored logical volume, again using the *lvdisplay* command with the *-k* option. Compare the output to the *lvdisplay* command with the *-v* option to determine the device file to *pvkey* mapping. For example,

```
# lvdiskdisplay -v -k /dev/vg00/lvol1  
--- Logical volumes ---  
LV Name                  /dev/vg00/lvol1  
VG Name                  /dev/vg00  
LV Permission             read/write  
LV Status                available/syncd  
Mirror copies             1  
Consistency Recovery      MWC  
Schedule                 parallel  
LV Size (Mbytes)          256  
Current LE                64  
Allocated PE              128  
Stripes                  0  
Stripe Size (Kbytes)      0  
Bad block                 off  
Allocation                strict/contiguous  
IO Timeout (Seconds)      default  
  
--- Distribution of logical volume ---  
PV Name      LE on PV  PE on PV  
/dev/dsk/c1t6d0  64      64  
/dev/dsk/c2t6d0  64      64  
  
--- Logical extents ---  
LE    PV1      PE1    Status 1 PV2      PE2    Status 2  
00000  0       00000  current   1       00000  current  
00001  0       00001  current   1       00001  current  
00002  0       00002  current   1       00002  current
```

## Removing and Replacing Components

### Individual Component Remove/Replace Instructions

```
00003      0          00003 current      1          00003 current
00004      0          00004 current      1          00004 current
00005      0          00005 current      1          00005 current
00006      0          00006 current      1          00006 current
00007      0          00007 current      1          00007 current
00008      0          00008 current      1          00008 current

(etc.)

# lvdisplay -v /dev/vg00/lvol1
--- Logical volumes ---
LV Name           /dev/vg00/lvol1
VG Name           /dev/vg00
LV Permission     read/write
LV Status         available/syncd
Mirror copies    1
Consistency Recovery MWC
Schedule          parallel
LV Size (Mbytes) 256
Current LE        64
Allocated PE      128
Stripes           0
Stripe Size (Kbytes) 0
Bad block         off
Allocation        strict/contiguous
IO Timeout (Seconds) default

--- Distribution of logical volume ---
PV Name          LE on PV  PE on PV
/dev/dsk/c1t6d0   64      64
/dev/dsk/c2t6d0   64      64

--- Logical extents ---
LE    PV1          PE1  Status 1 PV2          PE2  Status 2
00000 /dev/dsk/c1t6d0 00000 current  /dev/dsk/c2t6d0 00000 current
00001 /dev/dsk/c1t6d0 00001 current  /dev/dsk/c2t6d0 00001 current
00002 /dev/dsk/c1t6d0 00002 current  /dev/dsk/c2t6d0 00002 current
00003 /dev/dsk/c1t6d0 00003 current  /dev/dsk/c2t6d0 00003 current
00004 /dev/dsk/c1t6d0 00004 current  /dev/dsk/c2t6d0 00004 current
00005 /dev/dsk/c1t6d0 00005 current  /dev/dsk/c2t6d0 00005 current
00006 /dev/dsk/c1t6d0 00006 current  /dev/dsk/c2t6d0 00006 current
00007 /dev/dsk/c1t6d0 00007 current  /dev/dsk/c2t6d0 00007 current
00008 /dev/dsk/c1t6d0 00008 current  /dev/dsk/c2t6d0 00008 current
```

The *pvkey* status (0 or 1 in this example) shown in the first command, maps to the device file names (*/dev/dsk/c1t6d0* or */dev/dsk/c2t6d0*) in the second command under columns *PV1* and *PV2*, respectively.

- Step 5.** Reduce any logical volumes that have mirror copies on the faulty disk drive so that they no longer mirror onto that disk drive (note the *-A n* option):

```
# lvreduce -m 0 -A n -k <LV name> /dev/dsk/cXtXcX <pvkey#>&
```

(for 1 way mirroring)

OR

```
# lvreduce -m 1 -A n -k <LV name> /dev/dsk/cXtXcX <pvkey#>&
```

(for 2way mirroring)

For example, enter:

```
# lvreduce -m 0 -A n -k /dev/vg00/lvol4 /dev/dsk/c2t4d0 1&
```

The following message will appear:

```
Logical volume /dev/vg00/lvol4 has been successfully reduced.  
lvolboot: Logical Volume has no extents.
```

---

**NOTE**

It is important to include the ampersand (&) at the end of the command line. Otherwise, the *lvreduce* process will hang, and you will need terminal control to negate the command. Once the ‘successfully reduced’ message has been generated, manually end the process using the *kill -9* command.

---

**Step 1.** Use the *ps* command to find the PID for the *lvreduce* process.

```
# ps -ef | grep lvreduce
```

**Step 2.** Manually end the process with the *Kill -9* command (It may take several minutes for the process to end.).

```
# kill -9 <PID>
```

**Step 3.** Repeat steps 4 and 5 for all logical volumes.

**Step 4.** With all logical volumes reduced, now reduce the volume group using the *vgreduce* command. For example:

```
# vgreduce /dev/vg00 /dev/dsk/c2t6d0
```

---

**CAUTION**

The *vgreduce* procedure may take a long time to complete. Do NOT terminate this process.

---

**Step 5.** Update the disk BDRA using the *lvolboot* command.

```
# lvolboot -R
```

**Step 6.** Proceed to the *HotPlug Hardware Procedure* to remove the bad disk drive from the server.

**HotPlug Hardware Procedure**

---

**CAUTION**

Disk Drives can be removed or installed with the server still powered on. This is referred to as a “manual HotPlug”.

---

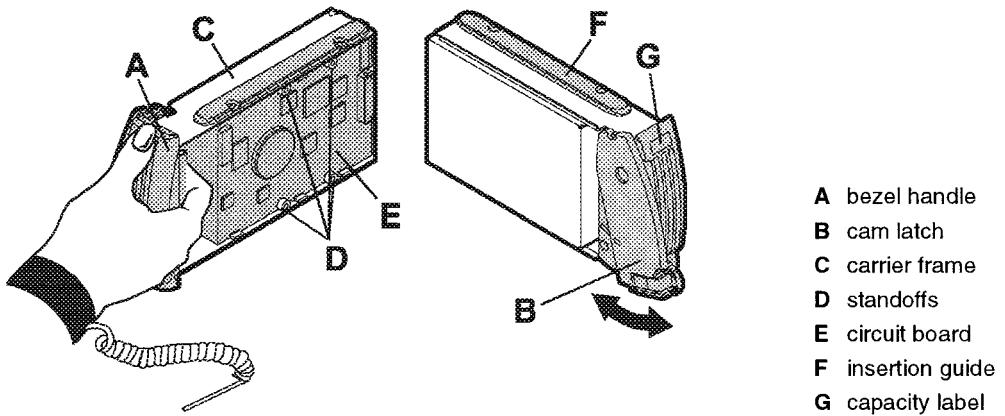
To remove a disk drive from the server, perform the following step:

## Removing and Replacing Components

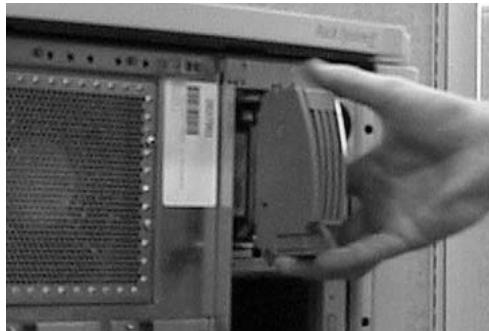
### Individual Component Remove/Replace Instructions

Grasp the tab at the bottom of the cam latch on the selected disk drive, then push the button inside the cam latch and pull the cam latch out and up. The disk drive will unlock. Pull gently until it slides completely free.

The following graphic shows disk features.



The next graphic depicts disk removal/replacement.



## HotPlug Disk Drive Replacement

The internal disk drives (up to four) are located at the front right side of the server (as you are facing it). When proper software and hardware procedures are followed, internal disk drives can be removed and replaced while the server is running.

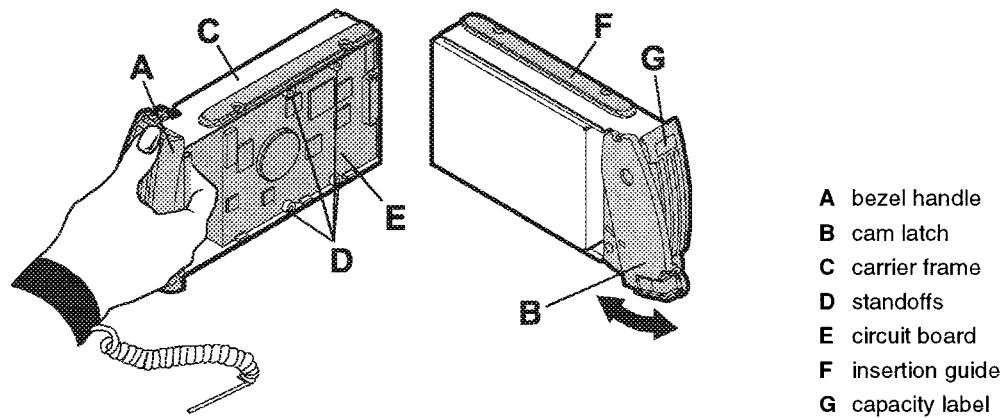
**CAUTION** Disk Drives can be removed or installed with the server still powered on. This is referred to as a “manual HotPlug”.

However, DO NOT replace a HotPlug disk drive until a controlled shutdown of the operating system has been performed.

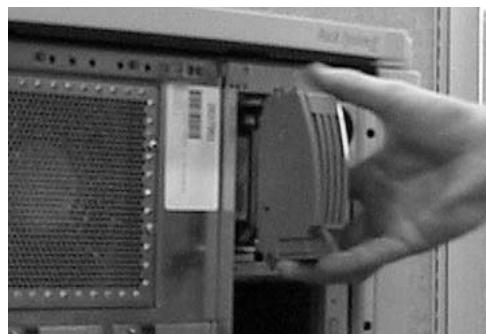
### Hardware HotPlug Procedure

To replace a disk drive in the server, grasp the tab at the bottom of the cam latch on the selected disk drive, push the button inside the cam latch, and pull the cam latch out and up. The disk drive will unlock. Pull gently until it slides completely free.

The following graphic shows disk features.



The next graphic depicts disk removal/replacement.



## Hot Swap Software Procedure for Attached Physical Volumes

The following procedure is an example of how to recover from replacing a disk that was recognized as an attached physical volume. Be sure that all the software procedures in the *Disk Drive Removal* section have been completed prior to starting these steps. This example assumes that the disk was mirrored.

**NOTE** HP often uses different manufacturers for disks, but assigns the same product number. The hot swap manual procedure will not update disk driver internal information to that of the replaced disk drive.

- Step 1.** Perform an *ioscan* on the replaced disk drive to ensure that it is accessible (claimed), to double check that it is a proper replacement, and that the device files are present. Refer to the above note.

For example: # **ioscan -fnC disk**

- Step 2.** Use the following procedure to mirror the root disk:

- Create the new physical volume using the *pvcreate* command.

For example: # **pvccreate -B /dev/rdsk/cXtXdX**

- Extend the volume group to include the new physical volume using the *vgextend* command:

For example: # **vgextend /dev/vg00 /dev/dsk/cXtXdX**

- The *mkboot* command must be run to make the device bootable.

For example: # **mkboot /dev/rdsk/cXtXdX**

- Use the *mkboot* command again to add the HP-UX auto-file-string.

For example: # **mkboot -a "hpx" /dev/rdsk/cXtXdX**

- Run *lvolnboot* with the following command: # **lvolnboot -R**

- Run *lvextend* to put a mirror into the replaced disk drive. It may take several minutes to copy the original copy of the data to the mirrored extents. The logical volume(s) will still be accessible to user applications during this operation.

For example:

# **lvextend -m 1 <LV name> /dev/dsk/cXtXdX**

OR

# **lvextend -m 2 <LV name> /dev/dsk/cXtXdX (for 3 way mirroring)**

For example:

# **lvextend -m 1 /dev/vg00/lvol4 /dev/dsk/cXtXdX**

OR

# **lvextend -m 1 /dev/vg00/lvol5 /dev/dsk/cXtXdX**

Repeat this for each logical volume to be mirrored.

Verify that the mirror is bootable and AUTO file is correct.

For example:

# **lifls -l /dev/rdsk/cXtXdX**

OR

# **lifcp /dev/rdsk/cXtXdX:AUTO -**

- g. Verify that the mirroring is set up properly.

For example:

```
# vgdisplay -v /dev/vg00
# lvdiskdisplay /dev/vg00/lvol1 - lvol8
# lvlnboot -v /dev/vg00
```

Both disks should list as “Boot Disk” and both should appear in the *lvol* lists.

At this point the system will be fully functional.

## Hot Swap Procedure for Unattached Physical Volumes

The following steps are an example of how to replace a HotPlug disk drive for unattached physical volumes. This example assumes the disks are mirrored.

---

**NOTE** HP often uses different manufacturers for disks, but assigns the same product number. The hot swap manual procedure will not update disk driver internal information to that of the replaced disk drive.

---

**Step 1.** Perform an *ioscan* on the replaced disk drive to ensure that it is accessible (claimed), to double check that it is a proper replacement, and that the device files are present. Refer to the above note.

For example: # *ioscan -fnC disk*

**Step 2.** Restore the LVM configuration/headers onto the replaced disk drive from your backup of the LVM configuration with the following entry:

```
# vgcfgrestore -n <volume group name> /dev/rdsck/cXtXdx
```

For example: # *vgcfgrestore -n /dev/vg00 /dev/rdsck/cXtXdx*

**Step 3.** Attach the new disk drive to the active volume group with the following *vgchange* command:

```
# vgchange -A y <volume group name>
```

For example: # *vgchange -A y /dev/vg00*

**Step 4.** Use the *mkboot* command to make the device bootable.

For example: # *mkboot /dev/rdsck/cXtXdx*

**Step 5.** Use the *mkboot* command again to add the HP-UX auto-file-string. For example: # *mkboot -a "hpx" /dev/rdsck/cXtXdx*

**Step 6.** Run *lvlnboot* with the following command: # *lvlnboot -R*

**Step 7.** Resynchronize the mirrors of the replaced disk drive with the following command. It may take several minutes to copy all the data from the original copy of the data to the mirrored extents. The logical volume(s) are still accessible to users' applications during this command.

```
# vgsync <VG name>
```

For example: # *vgsync /dev/vg00*

At this point the system will be fully functional.

## HotSwap Chassis Fan Cover Removal

Power to the server does not have to be off to remove or replace a HotSwap Chassis fan cover. Fan number 0 is in the front of the server and fan number 1 is at the rear of the server.

To remove a fan cover from the server, perform the following steps:

1. Loosen the captive T-15 screws from the sides of the cover.
2. Gently pry the cover away from the server and set it aside.

The following graphic shows a Chassis Fan Cover in place.



## HotSwap Chassis Fan Cover Replacement

The power to the server does not have to be off to remove or replace a HotSwap Chassis Fan cover. Fan number 0 is located in the front of the server and fan number 1 is located at the rear of the server.

To replace a chassis fan cover, perform the following tasks:

1. Insert the cover into position in front of the fan.
2. Tighten the captive T-15 screws on each side of the cover.

The following graphic shows a HotSwap Chassis Fan Cover.



## HotSwap Chassis Fan Removal

The power to the server does not have to be off to remove or replace a HotSwap Chassis fan. Fan number 0 is in the front of the server and fan number 1 is at the rear of the server.

To remove a fan from the server, perform the following steps:

1. Check the fan LED located on the fan. If the LED is illuminated, the fan has failed.

---

**NOTE** When one fan has failed (or is removed from the server), the system automatically puts the remaining fan into high speed mode. The noise level of the server will increase.

---

2. Grasp the fan grill and gently pull toward you. The fan assembly will unplug from the electrical outlet and slide out of the server.

---

**CAUTION** Running the server for extended periods of time with a cooling fan removed may create hot spots inside the server and possibly shorten component life.

If the other fan fails when one fan is removed, the system will halt.

---

The following graphic shows a HotSwap Chassis Fan.



## HotSwap Chassis Fan Replacement

The power to the server does not have to be off to remove or replace a HotSwap Chassis fan. Fan number 0 is located in the front of the server and fan number 1 is located at the rear of the server.

To replace a fan, perform the following steps:

1. Orient the fan assembly to ensure that the chassis outlet connects with the fan assembly. If the fan power connector is covered by the protective cover (see item 1 in the graphic), slide it down to remove it and slide it over the power connection on the other side of the fan. Push the fan firmly into the housing. The fan assembly will plug into the electrical outlet automatically.
2. Check the LED located on the fan.
  - When the fan is functioning normally, the LED is OFF.
  - When the fan fails, the LED is ON.

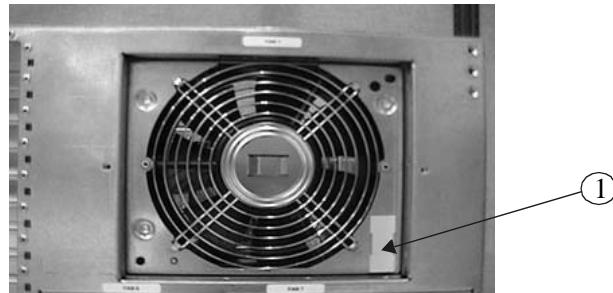
---

**NOTE** when one fan has failed (or is removed from the server), the system automatically puts the remaining fan into high speed mode. The noise level of the server will increase.

---

3. Replace the HotSwap Chassis fan cover.

The following graphic shows a HotSwap Chassis Fan.



## HotSwap Card Cage Fan Removal

The power to the server does not have to be off to remove or replace a HotSwap Card Cage fan. Fans numbered 2, 3, 4, and 5 are located in a four-fan assembly housing located on the left side of the server's side service bay.

---

**CAUTION** Running the server for extended periods of time with a cooling fan removed may create hot spots inside the server and shorten component life.

If other fans fail when one fan is removed, the system will halt.

---

To remove a fan from the server, perform the following step:

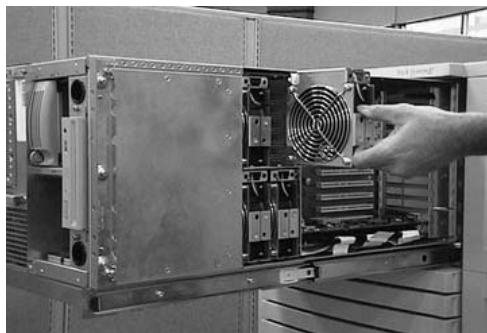
Identify the fan to be removed and pull it out of the Side Fan Assembly Housing. It will automatically disconnect from its electrical outlet on the I/O Backplane.

---

**NOTE** When one fan has failed (or is removed from the server) during operation, the system automatically puts the remaining fans into high speed mode. The noise level of the server will increase.

---

The following graphic shows a card cage fan being removed/replaced.

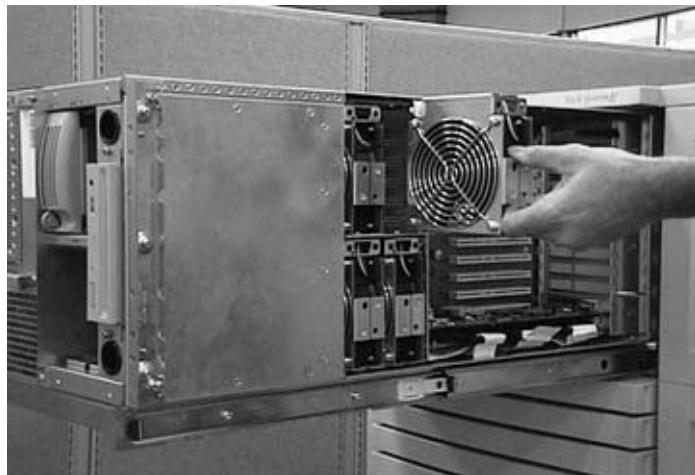


## HotSwap Card Cage Fan Replacement

The power to the server does not have to be off to remove or replace a HotSwap Card Cage fan. Fans numbered 2, 3, 4, and 5 are located in a four-fan assembly housing located on the left side of the server's side service bay.

To replace a fan in the server, orient the replacement fan into its slot in the Side Fan Assembly Housing and carefully push it in until it connects with its electrical outlet on the I/O Backplane.

The following graphic shows a card cage fan being removed/replaced.



## HotSwap Power Supply Removal

Up to three power supplies (0 through 2), located across the bottom front of the server, can be installed in the server without removing power.

To remove a power supply from the server, perform the following step:

1. Remove the T-15 mounting screw located to the right of the handle near the top of the power supply.

---

**CAUTION** Be careful when pulling the power supply out of the server. It is heavier than it appears.

---

2. Grasp the handle and pull the power supply out of the server.

The following graphic shows a front and rear view of a HotSwap Power Supply.



## HotSwap Power Supply Replacement

Up to three power supplies (0 through 2), located across the bottom front of the server, can be installed in the server without removing power.

To replace a power supply, perform the following steps:

---

**CAUTION** Be careful when putting the power supply into the server. It is heavier than it appears.

---

1. Grasp the handle in one hand and support the power supply with the other. Slide the power supply into the server. The Power Supply LED should illuminate immediately.
2. Replace the T-15 mounting screw located to the right of the handle near the top of the power supply.

The following graphic shows a front and rear view of a HotSwap Power Supply.



## HotSwap Power Converter Fan Removal

The power to the server does not have to be off to remove or replace a HotSwap Power Converter fan. Fans numbered 6 and 7 are located in the rear of the server.

To remove a fan from the server, perform the following steps:

---

**NOTE** When one fan has failed (or is removed from the server), the system automatically puts the remaining fan into high speed mode. The noise level of the server will increase.

---

1. There are four screws attached to each corner of each fan. Loosen only the captive Torx-head screws located diagonally across the face of the fan (upper left, lower right sides).
2. Grasp the extended screw-heads (or the fan grill) and gently pull toward you. The fan assembly will unplug from the electrical outlet and slide out of the server.

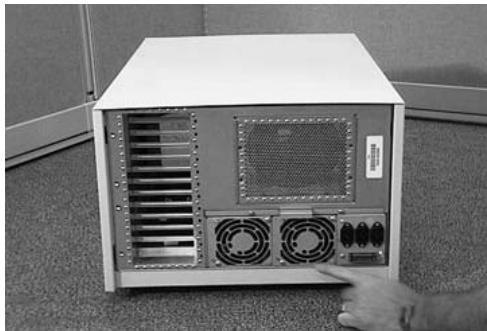
---

**CAUTION** Running the server for extended periods of time with a cooling fan removed may create hot spots inside the server and possibly shorten component life.

If the other fan fails when one fan is removed, the system will halt.

---

The following graphic shows where HotSwap Power Converter Fans are located.



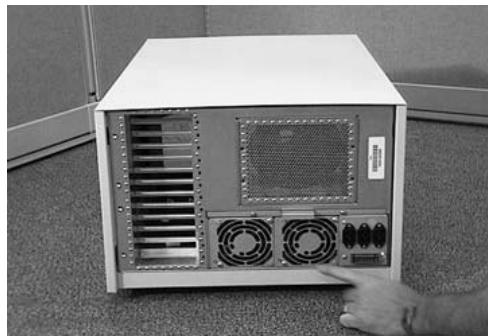
## HotSwap Power Converter Fan Replacement

The power to the server does not have to be off to remove or replace a HotSwap Power Converter fan. Fans numbered 6 and 7 are located in the rear of the server.

To replace a fan into the server, perform the following steps:

1. Orient the fan assembly so that the electrical plug will connect, then grasp the extended screw-heads (or the fan grill) and gently push the fan assembly into its housing. The fan assembly plug will connect with the electrical outlet in back of the housing.
2. Tighten the captive T-15 screws located diagonally across the face of the fan (upper left, lower right sides).

The following graphic shows where HotSwap Power Converter Fans are located.



## Processor Support Module Removal

Processor Support Modules (PSMs) reside on the System Board and are accessed via the Top Service Bay. Looking into the Top Service Bay from the front, PSMs are located on either side of the server, at the front. There can be two PSMs, numbered 0 and 1.

To remove a PSM from the server, perform the following steps:

1. Loosen the two captive mounting screws that hold the PSM in place.

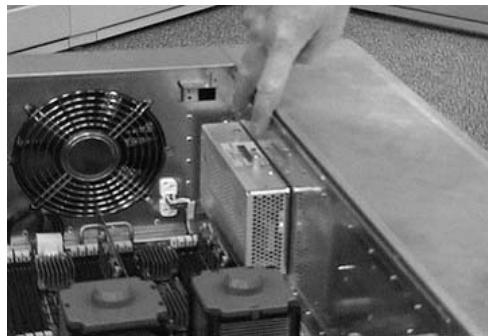
---

**NOTE** For the rp5470, the mounting screws have been replaced by posts and the air baffle is used to secure the PSM's.

---

2. Grasp the two captive mounting screws and lift the PSM out of the server.

The following graphic shows a PSM in the server.



## Processor Support Module Replacement

Processor Support Modules (PSMs) (there can be two PSMs, numbered 0 and 1) reside on the System Board and are accessed via the Top Service Bay. Looking into the Top Service Bay from the front, PSMs are located on either side of the server, at the front.

To replace a PSM, perform the following steps:

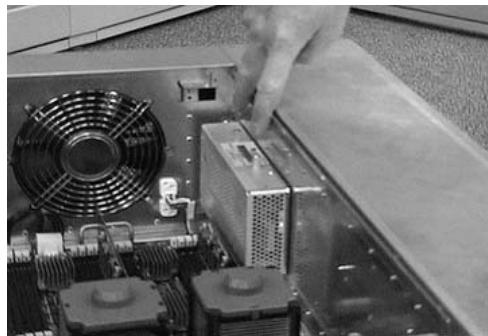
1. Seat the PSM into its socket.
2. Tighten the two captive mounting screws that hold the PSM in place.

---

**NOTE** For the rp5470, the mounting screws have been replaced by posts and the air baffle is used to secure the PSM's.

---

The following graphic shows a PSM in the server.



## Memory DIMM Removal

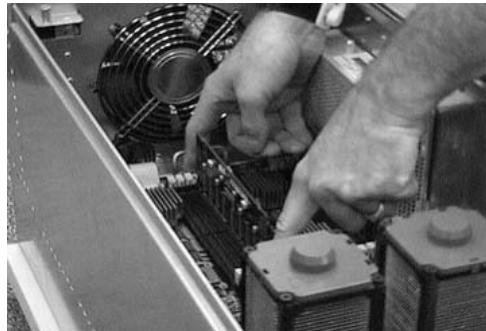
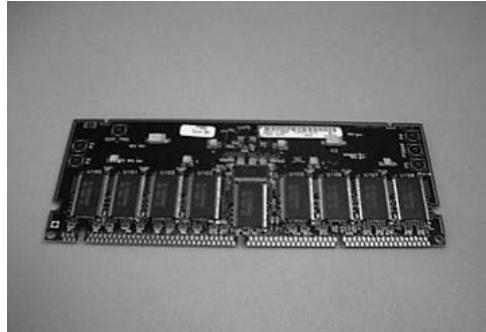
Memory DIMMs reside in slots (up to eight) located on the System Board. They are loaded in DIMM pairs of equal size.

### Removing rp5400 Memory DIMMs

To remove an rp5400 memory DIMM, perform the following steps:

1. Press down on the extractor levers on each end of the selected memory DIMM to unseat the DIMM from its socket.
2. When the memory DIMM unseats from the socket, pull it up and away from the System Board.

The following graphics show a memory DIMM, followed by a display of a DIMM being removed/replaced.



### Removing rp5470 Memory DIMMs

To remove an rp5470 memory DIMM, perform the following steps:

1. Pull up on the extractor levers on each end of the Memory Carrier to unseat the Memory Carrier from its socket.
2. When the Memory Carrier unseats from the socket, pull it up and away from the System Board.
3. Loosen the captive screws that secure the DIMM Clip and remove DIMM Clip from the Memory Carrier.
4. Press down on the extractor levers on each end of the selected memory DIMM to unseat the DIMM from its socket.
5. When the memory DIMM unseats from the socket, pull it up and away from the Memory Carrier.

## Memory DIMM Replacement

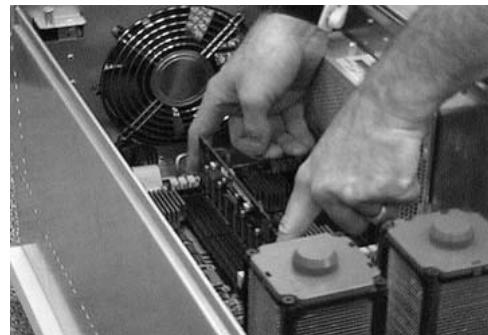
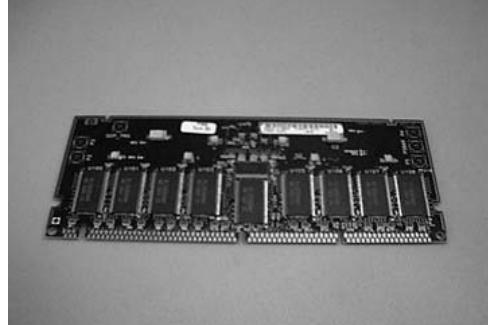
Memory DIMMs reside in slots located on the System Board (up to eight). They are loaded in DIMM pairs of equal size.

### Replacing rp5400 and/or rp5450 Memory DIMMs

To replace a memory DIMM, perform the following steps:

1. Seat the memory DIMM into its socket.
2. Press the extractor levers on each end of the memory DIMM slot inward until the levers snap into place.

The following graphics show a memory DIMM and a display of DIMM removal/replacement.



### Replacing rp5470 Memory DIMMs

To replace an rp5470 memory DIMM, perform the following steps:

1. Seat the memory DIMM into its socket on the Memory Carrier.
2. Press the extractor levers on each end of the memory DIMM slot inward until the levers snap into place.
3. Attach the Memory Clip to the Memory Carrier with the DIMM slot markings on the top of the Memory Clip aligned with the DIMM slot markings on the Memory Carrier. Secure the Memory Clip using the captive screws.
4. Seat the Memory Carrier into the slot on the System Board.
5. Push down on the extractor levers and snap them into place.

## Display Board Removal

The Display Board contains the server's ON/OFF switch and five LEDs that indicate server status when power is applied.

---

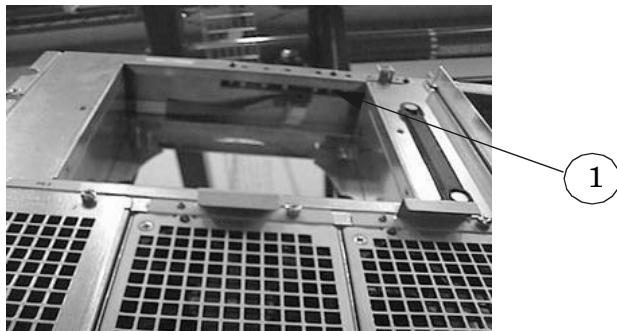
**CAUTION** The Display Board is not a HotSwap or HotPlug unit. Ensure that the server is powered-down prior to removal.

---

To remove the Display Board, perform the following tasks:

1. Remove the three T-10 screws that hold the Display Board in place near the top of the chassis front.
2. Remove the two T-15 screws that hold the front Chassis Fan in place and extract the fan from the server.
3. Reach up through the top of the Chassis Fan cavity and carefully pull the Display Board back to free the LEDs and the On/Off switch from their chassis openings. Pull the Display Board down through the Chassis Fan cavity.
4. Disconnect the ribbon cable from the Display Board, and place the display board on a suitable work surface.

The following graphic shows the Display Board access location (item 1) (looking up from the bottom of the front of the server).



The next graphic shows the Display Board module.



## Display Board Replacement

The Display Board contains the server's ON/OFF switch and five LEDs that indicate server status when power is applied.

---

**CAUTION** The Display Board is not a HotSwap or HotPlug unit. Ensure that it is powered-down prior to removal.

---

To replace the Display Board, perform the following tasks:

1. Reconnect the ribbon cable to the Display Board.
2. Carefully push the Display Board up through the top of the Chassis Fan cavity and insert the LEDs and On/Off switch into their respective chassis openings.
3. Replace three T-10 screws.

The following graphic shows the Display Board location (item 1) (looking up from the bottom of the front of the server).



The next graphic shows the Display Board module.



## Platform Monitor Removal

The Platform Monitor resides on the System Board and is accessed via the Top Service Bay.

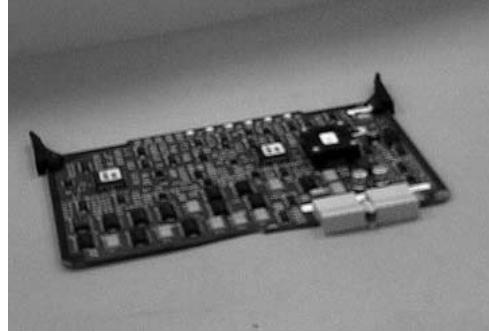
### Removing rp5400 and/or rp5450 Model Platform Monitors

Looking into the Top Service Bay from the front, the rp5400/rp5450 model Platform Monitor is located on the left side at the front of the server.

To remove the rp5400/rp5450 model Platform Monitor, perform the following steps:

1. Pull up on the extractor levers on each end of the Platform Monitor to unseat it from its socket.
2. When the Platform Monitor unseats from the socket, pull it up and away from the System Board.

The following graphics show a Platform Monitor board followed by a display of Platform Monitor removal/replacement.



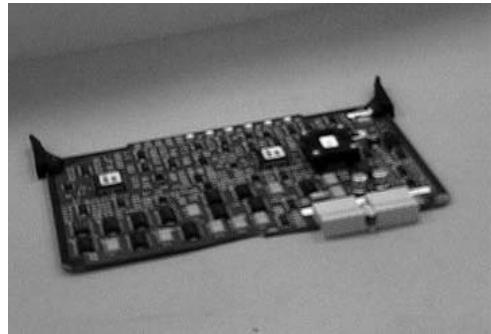
### Removing The rp5470 Model Platform Monitor

Looking into the Top Service Bay from the front, the rp5470 model Platform Monitor is located on the right side at the front of the server.

To remove an rp5470 model Platform Monitor, perform the following steps:

1. Pull up on the extractor levers on each end of the Platform Monitor to unseat it from its socket.
2. When the Platform Monitor unseats from the socket, pull it up and away from the System Board.

The following graphics show a Platform Monitor board followed by a display of Platform Monitor removal/replacement.



## Platform Monitor Replacement

The Platform Monitor resides on the System Board and is accessed via the Top Service Bay.

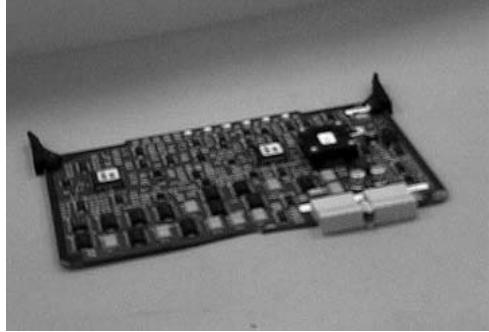
### Replacing rp5400 and/or rp5450 Platform Monitors

Looking into the Top Service Bay from the front, the rp5400/rp5450 model Platform Monitor is located on the left side at the front of the server.

To replace a Platform Monitor, perform the following steps:

1. Seat the Platform Monitor into its socket.
2. Lift the extractor levers and press them onto each end of the Platform Monitor until the levers snap into place.

The following graphics show a Platform Monitor board followed by a display of Platform Monitor removal/replacement.



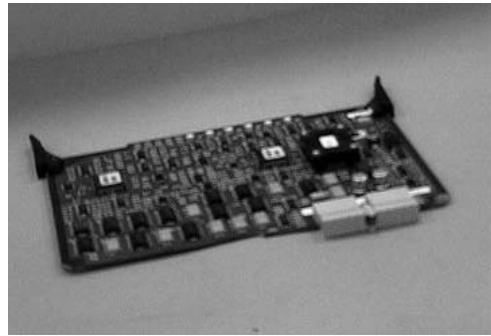
### Replacing rp5470 Platform Monitor

Looking into the Top Service Bay from the front, the rp5470 model Platform Monitor is located on the right side at the front of the server.

To replace a Platform Monitor, perform the following steps:

1. Seat the Platform Monitor into its socket.
2. Lift the extractor levers and press them onto each end of the Platform Monitor until the levers snap into place.

The following graphics show a Platform Monitor board followed by a display of Platform Monitor removal/replacement.



## PCI I/O Card Removal

The side service bay contains card slots for ten PCI I/O cards (slots 3 through 12) and two Core I/O cards (slots 1 and 2).

Perform the following tasks prior to removing PCI I/O cards:

- Power down the server.
- Detach all power cords from the server.

To remove a PCI I/O card from the server, perform the following steps:

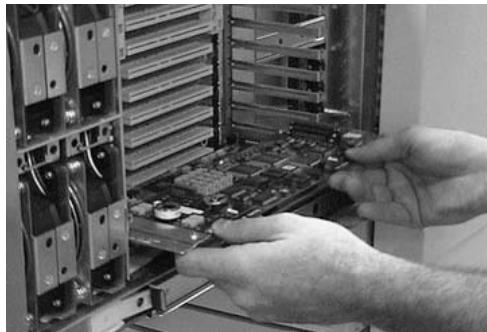
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**NOTE** Record the location of all PCI cards as they are removed. Replacing them in a different location will require system reconfiguration and could cause boot failure.

---

1. Disconnect the I/O cable attached to the I/O card at the rear PCI bulkhead.
2. Disconnect any ribbon cable connectors attached to the I/O card in the side service bay.
3. Grasp the edge of the I/O card and pull it out of the server.

The following graphic shows an I/O card being removed.



## PCI I/O Card Replacement

The side service bay contains card slots for 10 PCI I/O cards (slots 3 through 12) and 2 Core I/O cards (slots 1 and 2).

Prior to replacing PCI cards, perform the steps listed below:

- Power down the server.
- Detach all power cords from the server.

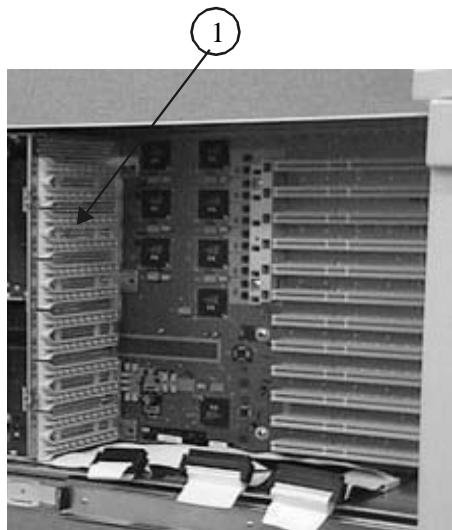
To replace a Core or PCI I/O card, perform the following steps:

1. Locate the I/O card guide (item 1) on the outside of the Fan Assembly Housing. Orient the I/O card into its guide slot and push it into the server until the card connector seats in the I/O Backplane card connector.

---

**NOTE**

Each I/O card guide contains two slots. The top slot is aligned with the I/O Backplane card connector.



2. Connect the I/O cable attached to the I/O card at the rear PCI bulkhead.
3. Connect any ribbon cable connectors attached to the I/O card in the side service bay.

## Removing and Replacing Components

### Individual Component Remove/Replace Instructions

The following graphic shows an I/O card being replaced.



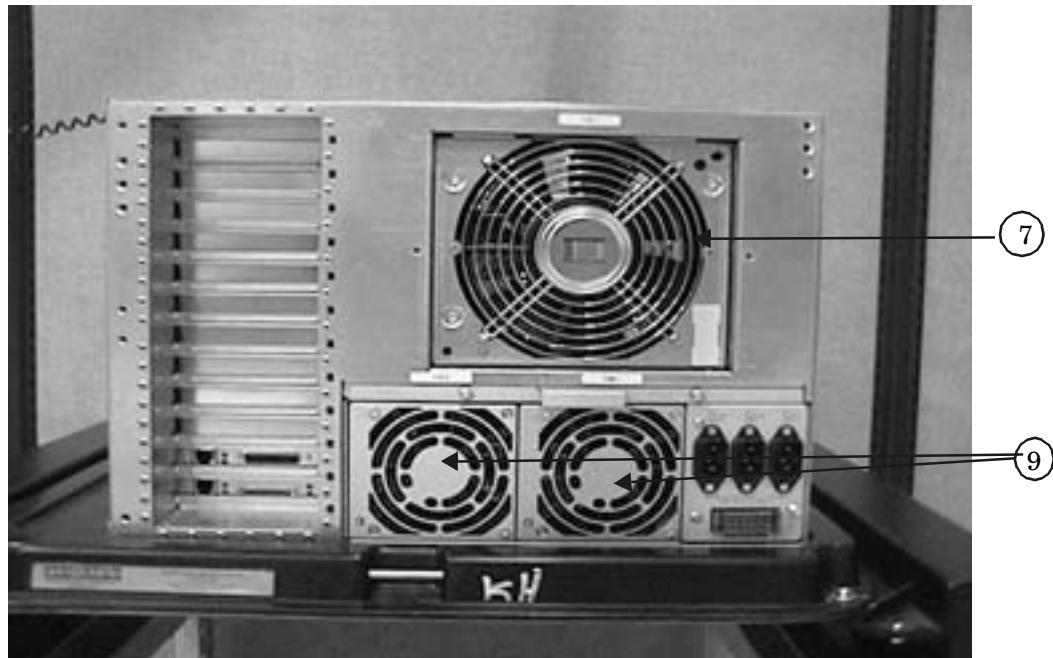
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## **A Parts and Accessories**

## CRU Physical Location

This section contains views of the rp54xx computer. The locator numbers in the diagrams correspond to the numbers in the CRU Part Number section.

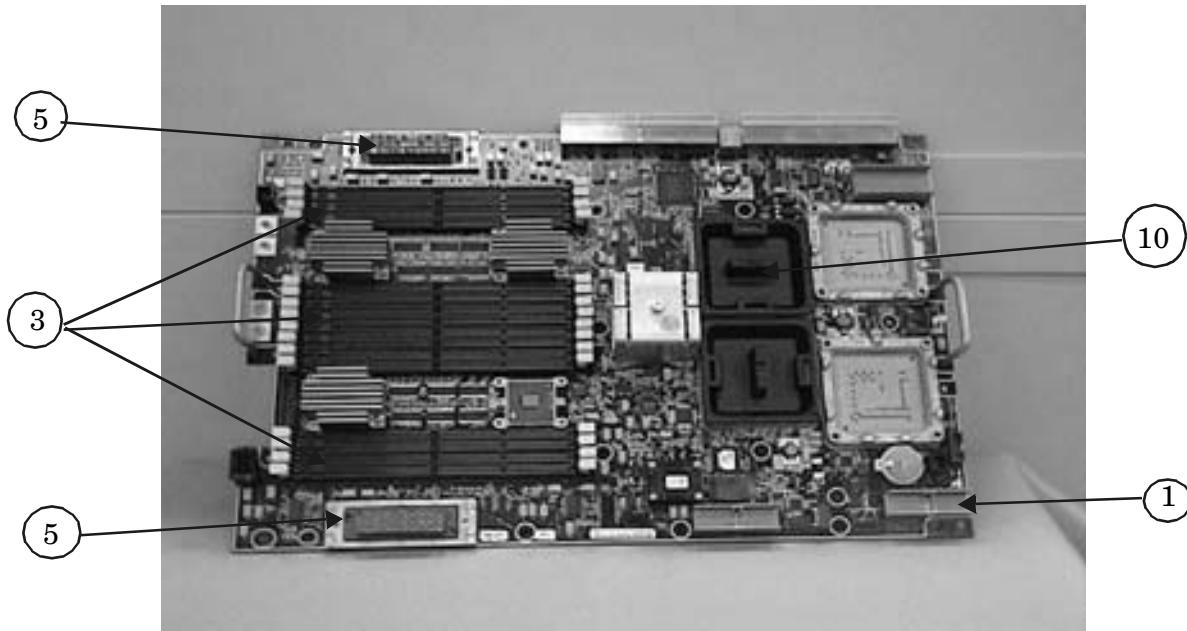
**Figure A-1** Server Rear View



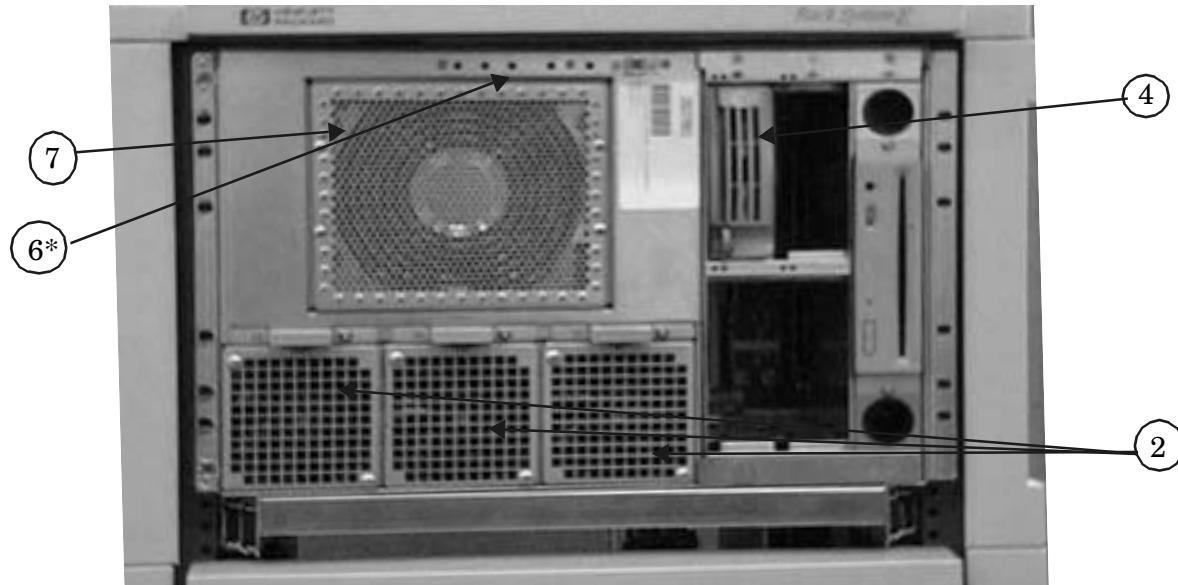
**Figure A-2 Side Service Bay**



**Figure A-3 System Board (Access via Top Service Bay)**



**Figure A-4 Server Front**



\*The Display Board is accessed by removing the Chassis Fan screen and fan (item 7). The Display Board is located through a slot in the inside top of the Chassis Fan cavity.

## Customer Replaceable Unit Part Numbers

The following tables list all Customer Replaceable Units (CRUs) for the rp54xx computer system. The following tables list both new and exchange part numbers.

**Table A-1 Exchange CRUs**

<b>Product #</b>	<b>New Part #</b>	<b>Exch. Part #</b>	<b>Description</b>	<b>Loc #</b>
A5191A/B A5576A/B A6144A/B A6797B	A5191-60010	A5191-69010	Platform Monitor Board	1
A5527A	0950-3471	A5527-69001	Power Supply	2
A6155A	A6155-60001	A6155-69001	Memory Carrier	NA
A6115A	A6115-60001	A6115-69001	1024 MB Memory DIMM	3
A5798A	A5798-60001	A5798-69001	512 MB Memory DIMM	
A5797A	A5797-60001	A5797-69001	256 MB Memory DIMM	
A5554A	A5554-60002	A5554-69002	128 MB Memory DIMM	
A5802A	A5802-67001	A5802-69001	9 GB HotPlug Disk Assembly	4
A5803A	A5803-67001	A5803-69001	18 GB HotPlug Disk Assembly	
A6110A	A6110-67001	A6110-69001	36 GB HotPlug Disk Assembly	
A5796A	A3639-60012	A3639-69012	PA-8500/8600 Processor Support Module	5
A6799A	0950-3908	A3639-69033	PA-8700 Processor Support Module	5
A6696A	A5191-60012	A5191-69012	Revision A GSP	NA
A6696B	A6144-60012	A6144-69012	Revision B GSP	NA

**Table A-2 Non-Exchange CRUs**

<b>Product #</b>	<b>Part #</b>	<b>Description</b>	<b>Loc #</b>
A5191A/B A5576A/B A6144A/B A6797B	A5191-60013	Display Board	6
	A5191-04002	Fan, Chassis (172m)	7
	A5191-04003	Fan, Card Cage (119m)	8
	A5191-67006	Fan, Power Converter	9
	0515-0664	Processor Cover Plate	10
	A5236-40024	Disk Filler Panel	NA
	A5191-00107	Power Supply Filler Panel	NA
	A3639-04024	PCI Separator/Extractor	11
A5576A/B A5191A/B A6144A	A5191-04008	Plastic Front Bezel, old style (split door)	NA
A5576A/B A5191A/B A6144A/B	A5191-04012 <sup>a</sup>	Plastic Front Bezel, new style rp54xx (solid piece)	NA
A6797B	A5191-04013 <sup>a</sup>	Plastic Front Bezel, rp54xx (solid piece)	NA
A5576A/B A5191A/B A6144A/B A6797B	A5191-70010	Bezel Hardware Kit	NA
A6696A	A5191-63001	W-Cable (beige color), use with revision A GSP (A5191-60012/69012) only	NA
A6696B	A6144-63001	M-Cable (black color), use with revision B GSP (A6144-60012/69012) only	NA

a. When replacing the split door bezel (A5191-04008) with a solid piece bezel, the Bezel Hardware Kit (A5191-70010) is required.

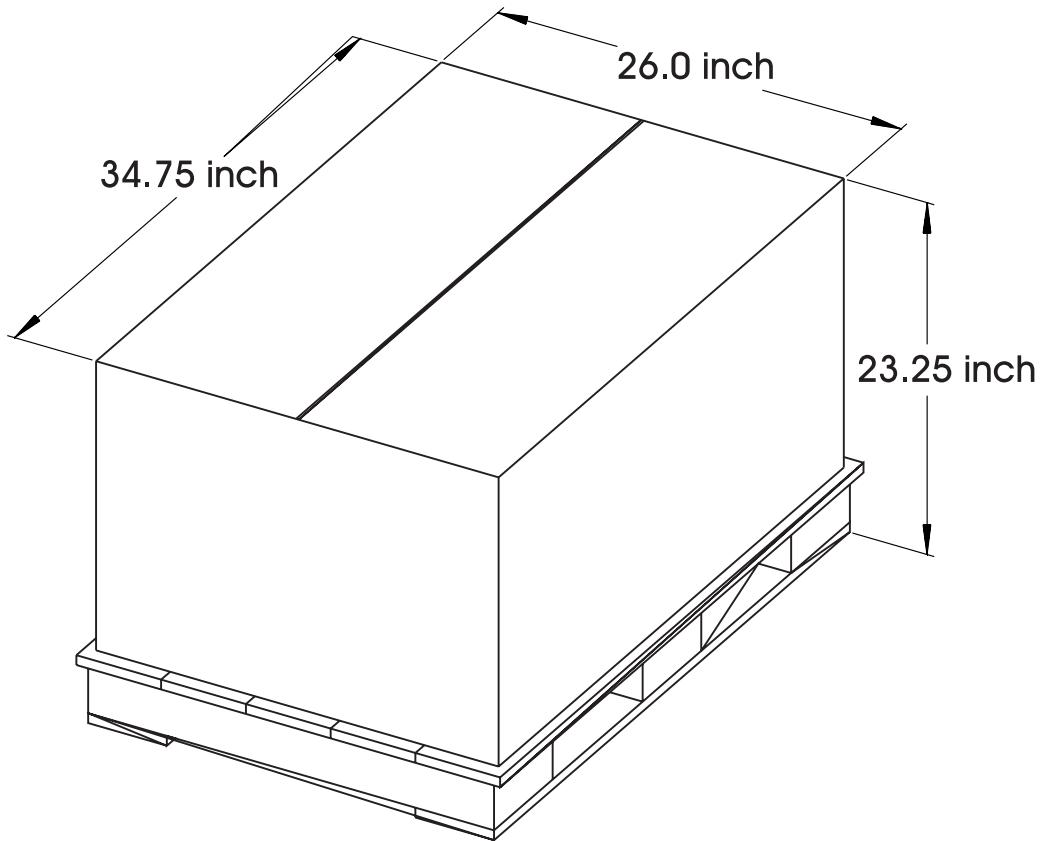
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## **B System Specifications**

## Dimensions

### Uncrating Space

rp54xx systems are shipped in boxes on a 34.75 in. x 26 in. (88.25 cm. x 66 cm.) pallet. The combined height of the packaged container and the pallets is 23.25 in. (59 cm.).



rhrr004

Allow a circular area approximately 5 ft. (2 m.) in diameter room for uncrating the system. Allow additional space for temporary storage of the shipping containers and packing materials.

### Space Requirements

A minimum access area of 2 ft. (0.7 m.) in all directions is required for serviceability.

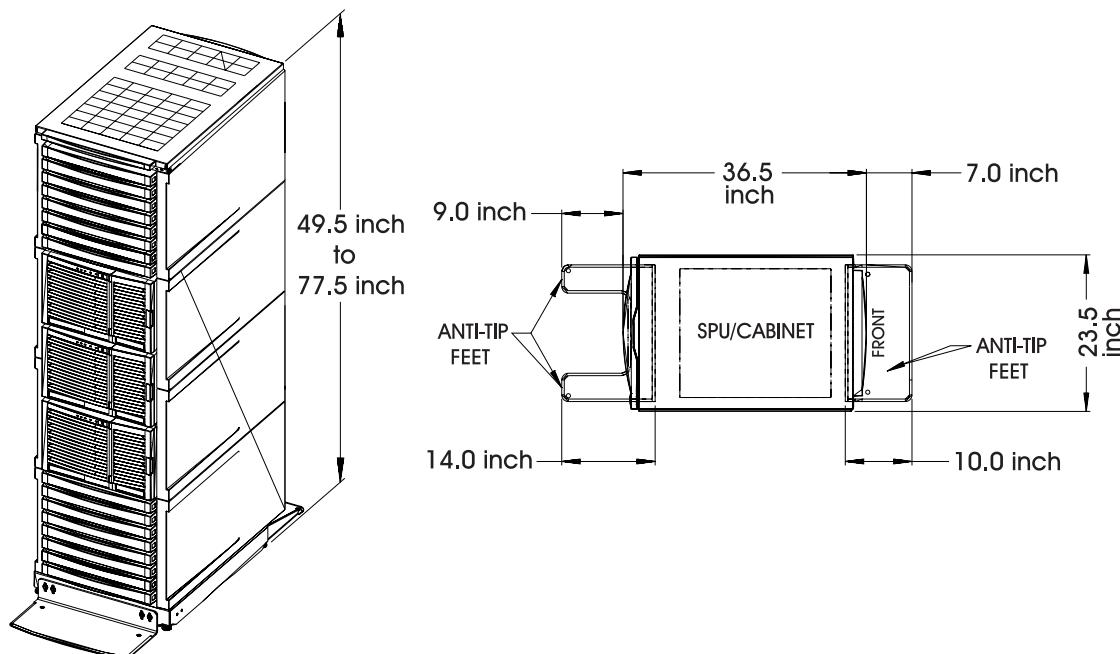
## Computer Room Physical Space Requirements

### Server

The A5537A, A5538A, or A5539A cabinets in which the server resides is 38.5" deep by 23.5" wide, with heights as follows:

- A5537A 1.2 meter rack - 49.5"
- A5538A 1.6 meter rack - 63.5"
- A5539A 2.0 meter rack - 77.5"

The cabinet anti-tip feet (required for safety) extend the depth an additional 10" in the front and 14" in the back. The minimum standalone physical space for the rp54xx server in a cabinet is shown in the following illustration:



rhrr005

For service access, the server slides on rails 28" beyond the edge of the chassis in the front. An additional minimum of 3' of workspace on all sides is required for servicing the server.

### Aisle Space

The minimum aisle space between rows of installed HP rp54xx server/cabinets is 3 feet, front and back, for airflow and serviceability.

## Computer Room Unpacking Space

### Specify Uncrating Space

rp54xx Systems are shipped in integrated cabinets on a 34.75" (88.25 cm.) x 26" (66 cm.) pallet. The combined height of the packaged container and the pallets are as follows:

- 1.1 meter rack - 60 inches
- 1.6 meter rack - 73 inches
- 2.0 meter rack - 87 inches

Allow room (a circular area approximately 12 feet (3.5 meters) in diameter) for uncrating the system and rolling the cabinet off the pallet on rails. Allow additional space for temporary storage of the shipping containers and packing materials..

## Electrical

The HP rp54xx power system is comprised of one, two or three autoranging, 12A/10A/5A, 930W hot-swappable system power supplies, depending on how the system is configured. The maximum power needed by fully-configured server is 1200W. Each power supply requires a dedicated 20A branch circuit.

---

**CAUTION** HP does not recommend and does not support the use of “ferro-active” or “ferro-resonant” power correction in conjunction with the rp54xx server. These type of line conditioners represent an older technology that is not compatible with the most recent designs in active PFC power supplies such as those in the HP rp54xx servers. “Ferro-active” or “ferro-resonant” line conditioners may cause an increase in total harmonic distortion and may produce significant and unpredictable voltage regulation anomalies.

---

## Office High Availability Requirements

### Server-level Enhanced Power Availability

At the server level, enhanced power availability is achieved through the n+1 hot-swappable power supplies.

One power supply is required for a minimally configured rp54xx system operation and in order to allow the system to boot. If a second power supply is present, one of the two power supplies can fail without the system shutting down. Similarly, two power supplies are required for a more heavily-configured rp54xx server. If a third power supply is present, one of the two power supplies can fail without the system shutting down.

If a third (redundant) power supply is present, all three power supplies become hot-swappable. Any one of the power supplies can fail without affecting system performance, and can be replaced while the system is on-line. Single point of failure is reduced to the local wall circuit or PowerTrust UPS to which the power supply power cords are connected.

### Power Protection

Power protection is provided through the use of HP PowerTrust UPSs (Uninterruptible Power Supplies). The only supported models for rp54xx systems are the 3.0kVA and 5.5kVA models. Recommendations for other manufacturers and models are not yet determined.

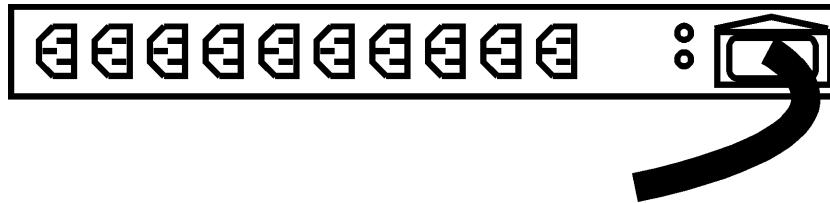
HP rp54xx server power supplies may be plugged directly into the customer’s site UPS. However, customers are advised against plugging the power supply into an HP PowerTrust UPS and then connecting that UPS to the site UPS.

## Modular PDUs

**NOTE** The acronym PDU (Power Distribution Unit) in this document refers to the power strips attached to the HP rp54xx cabinet.

Three modular PDUs are available for use with the rp54xx product:

- 20A modular PDU, HP product number E7674A. This PDU has seven C13 outlets and one C19 outlet. Note that if this PDU is used to power the rp54xx server, any other peripherals must have their power supplied by additional PDUs in the cabinet. The PDU power cord (HP part number 8120-6903) has an L6-20P plug which must be plugged into an L6-20R wall or floor receptacle.



- 30A modular PDU, HP product number E7681A (North America) or E7682A (International). This PDU has eight C13 outlets and two C19 outlets, split across two 20A branch circuits (max. 30A available). The PDU power cord has an L6-30 plug.



- 60A modular PDU, HP product number E7683A (North America) or E7667A (International). FINAL DESIGN ON THIS PRODUCT IS NOT YET AVAILABLE.

## System Power Requirements

**Table B-1 Power Requirements**

Requirements	Value	Comments
Nominal input voltage	100-240 VAC	
Frequency range (minimum - maximum)	50 - 60 HZ	
Number of phases	1	
Theoretical maximum current	12.0 A	Per line cord
Maximum inrush current	69.0 A	Per line cord
Ground leakage current (mA)	< 3.6 mA	Per line cord

## LAN and Telephone

rp54xx servers provide remote console access via the secure web console, which may be connected to the RS-232 serial port or 10Base-T RJ45 LAN port on the GSP (Guardian Service Processor) card in I/O slot #2. The same connectors may also be used to connect directly to a hard console.

---

<b>NOTE</b>	The RJ45 LAN port should be used ONLY for remote console access and not as a production LAN port.
-------------	---

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rp54xx servers may require as many as three unique IP addresses:

- The rp54xx server requires its own IP address.
- The Guardian Service Processor, as a separate network device, has to have its own IP address, gateway, and subnet mask configured at the site in order to be separately addressed. The service processor does not support DHCP, so the IP address must be assigned out of a separate pool from any that are assigned dynamically.
- The remote web console, if used, requires its own IP address.

---

<b>NOTE</b>	Check with your local telephone company to be sure the telephone service at the site can accommodate modem/data quality transmission.
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## Acoustic Safety Standards

The acoustic specifications for the rp54xx server are as follows:

Sound power	7.0 Bels LwA maximum at >31° C
Sound pressure	60 dB maximum at > 31° C
	No prominent tones

## Altitude Operation Standards

Maximum Altitude	
Operational	3000 meters above sea level
Non-operational	4572 meters above sea level

### Effects of Altitude

Some old models of tape drives, including those supplied by Hewlett-Packard, have vacuum column transport mechanisms that are affected by atmospheric pressure. Adjustments to these mechanisms may be required to compensate for the lower atmospheric pressure at higher altitudes.

## Temperature and Humidity Operating Standards

The following table lists the temperature and humidity specifications for rp54xx servers.

Temperature and Humidity Specifications				
Parameter	Operational Limits	Recommended Operating Range	Maximum Rate of Change (per hour)	Non-Operating Ranges
Temperature <sup>a</sup>	5°C to 35°C (41°F to 95°F) <sup>b</sup>	20°C to 25°C (68°F to 77°F)	10°C (50°F) per hour (With tape media)  20°C (68°F) per hour (Without tape media)	-40°C to +70°C (-40°F to +158°F)
Operating Humidity	15 to 80% Relative humidity (Non-condensing) at 35°C (95°F)	40 to 60% Relative humidity (Non-condensing)	30% Per hour Relative humidity (Non-condensing)	90% Relative humidity (Non-condensing) at 65°C (149°F)

- a. The rp54xx has been designed to operate within the above specific temperature and relative humidity operational limits. In general, operating any electronic equipment within the recommended ranges of temperature and humidity will produce optimal reliability.
- b. Temperature ranges stated above are at sea level. Maximum operating temperature is derated (reduced) by 2°C for each 1000 meters above sea level up to a maximum of 3000 meters.

---

**NOTE** Operating ranges refer to the ambient air temperature and humidity measured at the cabinet cooling air intake vents.

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## Thermal Protection Features

If the cabinet temperature approaches 35°C, thermal protection will be invoked. At 35°C +/- 2°C a warning message will be displayed on the system console. At 40°C +/- 2°C an ungraceful shutdown will occur.

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## **C General Site Preparation Guidelines**

The following information provides general principles and practices to consider before the installation or operation of an hp server.

## **Electrical Factors**

Proper design and installation of a power distribution system for an hp server requires specialized skills. Those responsible for this task must have a thorough knowledge and understanding of appropriate electrical codes and the limitations of the power systems for computer and data processing equipment.

In general, a well-designed power distribution system exceeds the requirements of most electrical codes. A good design, when coupled with proper installation practices, produces the most trouble-free operation.

A detailed discussion of power distribution system design and installation is beyond the scope of this information. However, electrical factors relating to power distribution system design and installation must be considered during the site preparation process.

The electrical factors discussed in this section are:

- Computer room safety
- Power Consumption
- Electrical load requirements (circuit breaker sizing)
- Power quality
- Distribution hardware
- System installation guidelines

### **Computer Room Safety**

Inside the computer room, fire protection and adequate lighting (for equipment servicing) are important safety considerations. Federal and local safety codes govern computer installations.

#### **Fire Protection**

The National Fire Protection Association's Standard for the Protection of Electronic Computer Data Processing Equipment, NFPA 75, contains information on safety monitoring equipment for computer rooms.

Most computer room installations are equipped with the following fire protection devices:

- Smoke detectors
- Fire and temperature alarms
- Fire extinguishing system

Additional safety devices are:

- Circuit breakers
- An emergency power cutoff switch
- Devices specific to the geographic location i.e., earthquake protection

#### **Lighting Requirements for Equipment Servicing**

Adequate lighting and utility outlets in a computer room reduce the possibility of accidents during equipment servicing. Safer servicing is also more efficient and, therefore, less costly.

For example, adequate lighting reduces the chances of connector damage when cables are installed or removed.

The minimum recommended illumination level is 70 foot-candles (756 lumens per square meter) when the light level is measured at 30 inches (76.2 cm) above the floor.

## Power Consumption

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 required to support these devices.

## Electrical Load Requirements (Circuit Breaker Sizing)

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**NOTE** Local authority has jurisdiction [LAHJ] and should make the final decision regarding adherence to country- specific electrical codes and guidelines.

---

It is good practice to derate power distribution systems for one or more of the following reasons:

- To avoid nuisance tripping from load shifts or power transients, circuit protection devices should never be run above 80% of their root-mean-square (RMS) current ratings.
- Safety agencies derate most power connectors to 80% of their RMS current ratings.

## Power Quality

The hp server is designed to operate over a wide range of voltages and frequencies. The server is tested and shown to comply with EMC Specification EN50082. However, damage can occur if these ranges are exceeded. Severe electrical disturbances can exceed the design specifications of the equipment.

### Sources of Voltage Fluctuations

Voltage fluctuations, sometimes called glitches, affect the quality of electrical power. Common sources of these disturbances are:

- Fluctuations occurring within the facility's distribution system
- Utility service low-voltage conditions (such as sags or brownouts)
- Wide and rapid variations in input voltage levels
- Wide and rapid variations in input power frequency
- Electrical storms
- Large inductive sources (such as motors and welders)
- Faults in the distribution system wiring (such as loose connections)
- Microwave, radar, radio, or cell phone transmissions

## Power System Protection

The hp server can be protected from the sources of many of these electrical disturbances by using:

- A dedicated power distribution system
- Power conditioning equipment
- Over- and under-voltage detection and protection circuits
- Screening to cancel out the effects of undesirable transmissions
- Lightning arresters on power cables to protect equipment against electrical storms

Precautions have been taken during power distribution system design to provide immunity to power outages of less than one cycle. However, testing cannot conclusively rule out loss of service. Therefore, adherence to the following guidelines provides the best possible performance of power distribution systems for hp computer equipment:

- Dedicated power source—Isolates an hp server power distribution system from other circuits in the facility.
- Missing-phase and low-voltage detectors—Shuts equipment down automatically when a severe power disruption occurs. For peripheral equipment, these devices are recommended but optional.
- Online uninterruptible power supply (UPS)—Keeps input voltage to devices constant and should be considered if outages of one-half cycle or more are common. Refer to qualified contractors or consultants for each situation.

## Distribution Hardware

This section describes wire selection and the types of raceways (electrical conduits) used in the distribution system.

### Wire Selection

Use copper conductors instead of aluminum, as aluminum's coefficient of expansion differs significantly from that of other metals used in power hardware. Because of this difference, aluminum conductors can cause connector hardware to work loose, overheat, and fail.

### Raceway Systems (electrical conduits) [LAHJ]

Raceways (electrical conduits) form part of the protective ground path for personnel and equipment. Raceways protect the wiring from accidental damage and also provide a heatsink for the wires.

Any of the following types may be used:

- Electrical metallic tubing (EMT) thin-wall tubing
- Rigid (metal) conduit
- Liquidtight with RFI shield grounded (most commonly used under raised floors)

### Building Distribution

All building feeders and branch circuitry should be in rigid metallic conduit with proper connectors (to provide ground continuity). Conduit that is exposed and subject to damage should be constructed of rigid galvanized steel.

## Grounding Systems

An hp server requires two methods of grounding:

- Power distribution safety grounding
- High frequency intercabinet grounding

### Power Distribution Safety Grounding [LAHJ]

The power distribution safety grounding system consists of connecting various points in the power distribution system to earth ground using green (green/yellow) wire ground conductors. Having these ground connections tied to metal chassis parts that may be touched by computer room personnel protects them against shock hazard from current leakage and fault conditions.

Power distribution systems consist of several parts. Hewlett-Packard recommends that these parts be solidly interconnected to provide an equipotential ground to all points.

**Main Building Electrical Ground** The main electrical service entrance equipment should have an earth ground connection, as required by applicable codes. Connections such as a grounding rod, building steel, or a conductive type cold water service pipe provide an earth ground.

**Electrical Conduit Ground** All electrical conduits should be made of rigid metallic conduit that is securely connected together or bonded to panels and electrical boxes, so as to provide a continuous grounding system.

**Power Panel Ground** Each power panel should be grounded to the electrical service entrance with green (green/yellow) wire ground conductors. The green (green/yellow) wire ground conductors should be sized per applicable codes (based on circuit over current device ratings).

---

**NOTE** The green wire ground conductor mentioned above may be a black wire marked with green tape. [LAHJ]

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**Computer Safety Ground** Ground all computer equipment with the green (green/yellow) wire included in the branch circuitry. The green (green/yellow) wire ground conductors should be connected to the appropriate power panel and should be sized per applicable codes (based on circuit over current device ratings).

### Cabinet Performance Grounding (High Frequency Ground)

Signal interconnects between system cabinets require high frequency ground return paths. Connect all cabinets to site ground.

---

**NOTE** In some cases power distribution system green (green/yellow) wire ground conductors are too long and inductive to provide adequate high frequency ground return paths. Therefore, a ground strap (customer-supplied) should be used for connecting the system cabinet to the site grounding grid (customer-supplied). When connecting this ground, ensure that the raised floor is properly grounded for high frequency.

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Power panels located in close proximity to the computer equipment should also be connected to the site grounding grid. Methods of providing a sufficiently high frequency ground grid are described in the next sections.

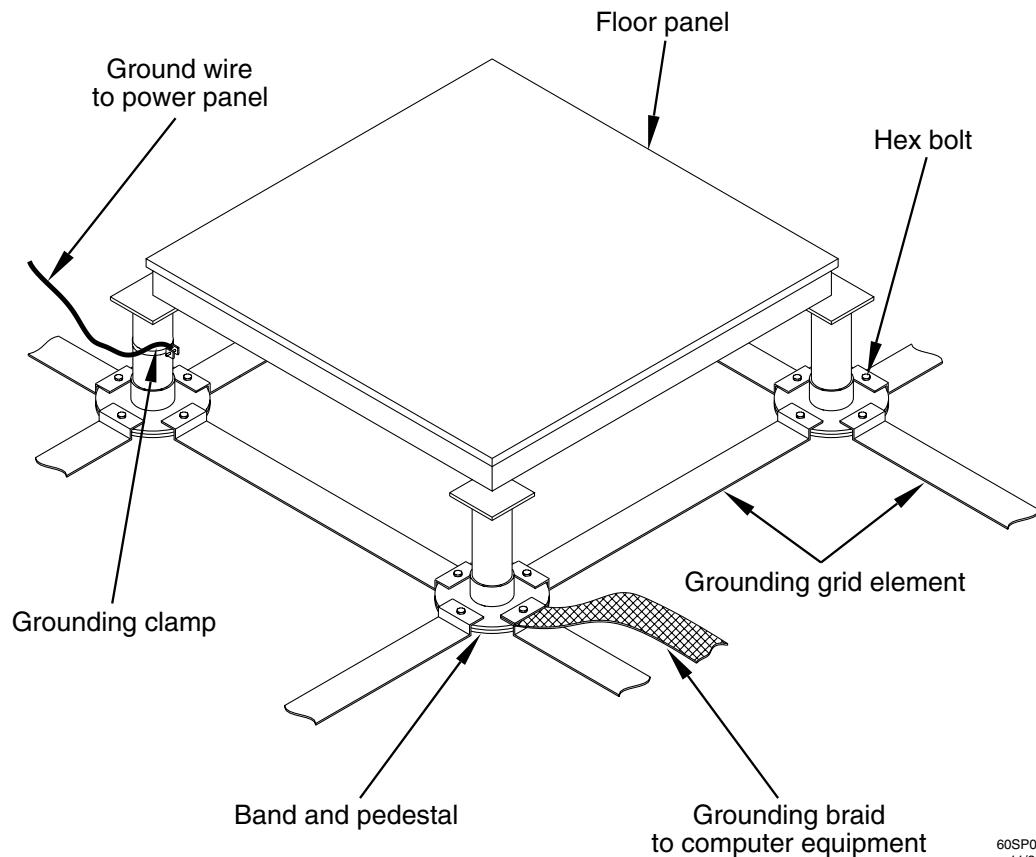
### Raised Floor “High Frequency Noise” Grounding

If a raised floor system is used, install a complete signal grounding grid for maintaining equal potential over a broad band of frequencies. The grounding grid should be connected to the equipment cabinet and electrical service entrance ground at multiple connection points using a minimum #6 AWG (16mm<sup>2</sup>) wire ground conductor. The following figure illustrates a metallic strip grounding system.

Hewlett-Packard recommends the following approaches:

- Excellent—Add a grounding grid to the subfloor. The grounding grid should be made of copper strips mounted to the subfloor. The strips should be 0.032 in. (0.08 cm) thick and a minimum of 3.0 in. (8.0 cm) wide.  
Connect each pedestal to four strips using 1/4 in. (6.0 mm) bolts tightened to the manufacturer's torque recommendation.
- Better - A grounded #6 AWG minimum copper wire grid mechanically clamped to floor pedestals and properly bonded to the building/site ground.
- Good—Use the raised floor structure as a ground grid. In this case, the floor must be designed as a ground grid with bolted down stringers and corrosion resistive plating (to provide low resistance and attachment points for connection to service entrance ground and hp computer equipment). The use of conductive floor tiles with this style of grid further enhances ground performance.

**Figure C-1      Raised Floor Metal Strip Ground System**



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## Equipment Grounding Implementation Details

Connect all Hewlett-Packard equipment cabinets to the site ground grid as follows:

- Step 1.** Attach one end of each ground strap to the applicable cabinet ground lug.
- Step 2.** Attach the other end to the nearest pedestal base (raised floor) or cable trough ground point (nonraised floor).
- Step 3.** Check that the braid contact on each end of the ground strap consists of a terminal and connection hardware (a 1/4-in. (6.0-mm) bolt, nuts, and washers).
- Step 4.** Check that the braid contact connection points are free of paint or other insulating material and treated with a contact enhancement compound (similar to Burndy Penetrox).

## System Installation Guidelines

This section contains information about installation practices. Some common pitfalls are highlighted. Both power cable and data communications cable installations are discussed.

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**NOTE** In domestic installations, the proper receptacles should be installed prior to the arrival of Hewlett-Packard equipment. Refer to the appropriate installation guide for installation procedures.

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### Wiring Connections

Expansion and contraction rates vary among different metals. Therefore, the integrity of an electrical connection depends on the restraining force applied. Connections that are too tight compress or deform the hardware and causes it to weaken. This usually leads to high impedance preventing circuit breakers from tripping when needed or can contribute to a buildup of high frequency noise.

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**CAUTION** Connections that are too loose or too tight can have a high impedance that cause serious problems, such as erratic equipment operation. A high impedance connection overheats and sometimes causes fire or high temperatures that can destroy hard-to-replace components such as distribution panels or system bus bars.

---

Wiring connections must be properly torqued. Many equipment manufacturers specify the proper connection torque values for their hardware.

Ground connections must only be made on a conductive, nonpainted surface. When equipment vibration is present, lock washers must be used on all connections to prevent connection hardware from working loose.

### Data Communications Cables

Power transformers create high-energy fields in the form of electromagnetic interference (EMI). Heavy foot traffic can create electrostatic discharge (ESD) that can damage electronic components. Route data communications cables away from these areas. Use shielded data communications cables that meet approved industry standards to reduce the effects of external fields.

## **Environmental Elements**

The following environmental elements can affect an hp server installation:

- Computer room preparation
- Cooling requirements
- Humidity level
- Air conditioning ducts
- Dust and pollution control
- Electrostatic discharge (ESD) prevention
- Acoustics (noise reduction)

## **Computer Room Preparation**

The following guidelines are recommended when preparing a computer room for an hp server:

- Locate the computer room away from the exterior walls of the building to avoid the heat gain from windows and exterior wall surfaces.
- When exterior windows are unavoidable, use windows that are double or triple glazed and shaded to prevent direct sunlight from entering the computer room.
- Maintain the computer room at a positive pressure relative to surrounding spaces.
- Use a vapor barrier installed around the entire computer room envelope to restrain moisture migration.
- Caulk and vapor seal all pipes and cables that penetrate the envelope.
- Use at least a 12-inch raised floor system for minimum favorable room air distribution system (underfloor distribution).
- Ensure a minimum clearance of 12 inches between the top of the hp server cabinet and the ceiling to allow for return air flow and ensure that all ceiling tiles are in place.
- Allow 18 inches (or local code minimum clearance) from the top of the hp server cabinet to the fire sprinkler heads.

## **Cooling Requirements**

Air conditioning equipment requirements and recommendations are described in the following sections.

### **Basic Air Conditioning Equipment Requirements**

The cooling capacity of the installed air conditioning equipment for the computer room should be sufficient to offset the computer equipment dissipation loads, as well as any space envelope heat gain. This equipment should include:

- Air filtration
- Cooling or dehumidification
- Humidification
- Reheating

- Air distribution
- System controls adequate to maintain the computer room within specified operating ranges.

Lighting and personnel must also be included. For example, a person dissipates about 450 BTUs per hour while performing a typical computer room task.

At altitudes above 10,000 feet (3048 m), the lower air density reduces the cooling capability of air conditioning systems. If your facility is located above this altitude, the recommended temperature ranges may need to be modified. For each 1000 feet (305 m) increase in altitude above 10,000 feet (up to a maximum of 15,000 feet), subtract 1.5° F (0.83° C) from the upper limit of the temperature range.

### Air Conditioning System Guidelines

The following guidelines are recommended when designing an air conditioning system and selecting the necessary equipment:

- The air conditioning system that serves the computer room should be capable of operating 24 hours a day, 365 days a year. It should also be independent of other systems in the building.
- Consider the long-term value of hp server availability, redundant air conditioning equipment or capacity.
- The system should be capable of handling any future hp server expansion.
- Air conditioning equipment air filters should have a minimum rating of 45% (based on “ASHRAE Standard 52-76, Dust Spot Efficiency Test”).
- Introduce only enough outside air into the system to meet building code requirements (for human occupancy) and to maintain a positive air pressure in the computer room.

### Air Conditioning System Types

The following three air conditioning system types are listed in order of preference:

- Complete self-contained package unit(s) with remote condenser(s). These systems are available with up or down discharge and are usually located in the computer room.
- Chilled water package unit with remote chilled water plant. These systems are available with up or down discharge and are usually located in the computer room.
- Central station air handling units with remote refrigeration equipment. These systems are usually located outside the computer room.

### Basic Air Distribution Systems

A basic air distribution system includes supply air and return air.

An air distribution system should be zoned to deliver an adequate amount of supply air to the cooling air intake vents of the hp server equipment cabinets. Supply air temperature should be maintained within the following parameters:

- Ceiling supply system—From 55° F (12.8° C) to 60° F (15.6° C)
- Floor supply system—at least 60° F (15.6° C)

If a ceiling plenum return air system or a ducted ceiling return air system is used, the return air grill(s) in the ceiling should be above the exhaust area or the exhaust row.

The following three types of air distribution system are listed in order of recommendation:

- Underfloor air distribution system—Downflow air conditioning equipment located on the raised floor of the computer room uses the cavity beneath the raised floor as plenum for the supply air.

Perforated floor panels (available from the raised floor manufacturer) should be located around the front of the system cabinets. Supply air emitted through the perforated floor panels is then available near the cooling air intake vents of the hp server cabinets.

- Ceiling plenum air distribution system—Supply air is ducted into the ceiling plenum from upflow air conditioning equipment located in the computer room or from an air handling unit (remote).

The ceiling construction should resist air leakage. Place perforated ceiling panels (with down discharge air flow characteristics) around the front of the system cabinets. The supply air emitted downward from the perforated ceiling panels is then available near the cooling air intake vents of the hp server cabinets.

Return air should be ducted back to the air conditioning equipment through the return air duct above the ceiling.

- Above ceiling ducted air distribution system—Supply air is ducted into a ceiling diffuser system from upflow air conditioning equipment located in the computer room or from an air handling unit (remote).

Adjust the supply air diffuser system grilles to direct the cooling air downward around the front of the hp server cabinets. The supply air is then available near the cooling air intake vents of the hp server cabinets.

## Air Conditioning System Installation

All air conditioning equipment, materials, and installation must comply with any applicable construction codes. Installation of the various components of the air conditioning system must also conform to the air conditioning equipment manufacturer's recommendations.

## Air Conditioning Ducts

Use separate computer room air conditioning duct work. If it is not separate from the rest of the building, it might be difficult to control cooling and air pressure levels. Duct work seals are important for maintaining a balanced air conditioning system and high static air pressure. Adequate cooling capacity means little if the direction and rate of air flow cannot be controlled because of poor duct sealing. Also, the ducts should not be exposed to warm air, or humidity levels may increase.

## Humidity Level

Maintain proper humidity levels at 40 to 60% RH. High humidity causes galvanic actions to occur between some dissimilar metals. This eventually causes a high resistance between connections, leading to equipment failures. High humidity can also have an adverse affect on some magnetic tapes and paper media.

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<b>CAUTION</b>	Low humidity contributes to undesirably high levels of electrostatic charges. This increases the electrostatic discharge (ESD) voltage potential. ESD can cause component damage during servicing operations. Paper feed problems on high-speed printers are usually encountered in low-humidity environments.
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Low humidity levels are often the result of the facility heating system and occur during the cold season. Most heating systems cause air to have a low humidity level, unless the system has a built-in humidifier.

## Dust and Pollution Control

Computer equipment can be adversely affected by dust and microscopic particles in the site environment.

Specifically, disk drives, tape drives, and some other mechanical devices can have bearing failures resulting from airborne abrasive particles. Dust may also blanket electronic components like printed circuit boards causing premature failure due to excess heat and/or humidity build up on the boards. Other failures to power

supplies and other electronic components can be caused by metallically conductive particles, including zinc whiskers. These metallic particles are conductive and can short circuit electronic components. Use every effort to ensure that the environment is as dust and particulate free as possible. See the following heading titled "Metallic Particulate Contamination" for additional details.

Smaller particles can pass through some filters and over a period of time, cause problems in mechanical parts. Small dust particles can be prevented from entering the computer room by maintaining the air conditioning system at a high static air pressure level.

Other sources of dust, metallic, conductive, abrasive, and/or microscopic particles can be present. Some sources of these particulates are:

- Subfloor shedding
- Raised floor shedding
- Ceiling tile shedding

These particulates are not always visible to the naked eye. A good check to determine their possible presence is to check the underside of the tiles. The tile should be shiny, galvanized, and free from rust.

The computer room should be kept clean. The following guidelines are recommended:

- Smoking—Establish a no-smoking policy. Cigarette smoke particles are eight times larger than the clearance between disk drive read/write heads and the disk surface.
- Printer—Locate printers and paper products in a separate room to eliminate paper particulate problems.
- Eating or drinking—Establish a no-eating or drinking policy. Spilled liquids can cause short circuits in equipment such as keyboards.
- Tile floors—Use a dust-absorbent cloth mop rather than a dry mop to clean tile floors.

Special precautions are necessary if the computer room is near a source of air pollution. Some air pollutants, especially hydrogen sulfide ( $H_2S$ ), are not only unpleasant but corrosive as well. Hydrogen sulfide damages wiring and delicate sound equipment. The use of activated charcoal filters reduces this form of air pollution.

## Metallic Particulate Contamination

Metallic particulates can be especially harmful around electronic equipment. This type of contamination may enter the data center environment from a variety of sources, including but not limited to raised floor tiles, worn air conditioning parts, heating ducts, rotor brushes in vacuum cleaners or printer component wear. Because metallic particulates conduct electricity, they have an increased potential for creating short circuits in electronic equipment. This problem is exaggerated by the increasingly dense circuitry of electronic equipment.

Over time, very fine whiskers of pure metal can form on electroplated zinc, cadmium, or tin surfaces. If these whiskers are disturbed, they may break off and become airborne, possibly causing failures or operational interruptions. For over 50 years, the electronics industry has been aware of the relatively rare but possible threat posed by metallic particulate contamination. During recent years, a growing concern has developed in computer rooms where these conductive contaminants are formed on the bottom of some raised floor tiles.

Although this problem is relatively rare, it may be an issue within your computer room. Since metallic contamination can cause permanent or intermittent failures on your electronic equipment, Hewlett-Packard strongly recommends that your site be evaluated for metallic particulate contamination before installation of electronic equipment.

## Electrostatic Discharge (ESD) Prevention

Static charges (voltage levels) occur when objects are separated or rubbed together. The voltage level of a static charge is determined by the following factors:

- Types of materials
- Relative humidity
- Rate of change or separation

**Table C-1      Effect of Humidity on ESD Charge Levels**

Personnel Activity <sup>a</sup>	Humidity <sup>b</sup> and Charge Levels (voltages) <sup>c</sup>			
	26%	32%	40%	50%
<b>Person walking across a linoleum floor</b>	<b>6,150 V</b>	<b>5,750 V</b>	<b>4,625 V</b>	<b>3,700 V</b>
Person walking across a carpeted floor	18,450 V	17,250 V	13,875 V	11,100 V
Person getting up from a plastic chair	24,600 V	23,000 V	18,500 V	14,800 V

a. Source: B.A. Unger, Electrostatic Discharge Failures of Semiconductor Devices (Bell Laboratories, 1981)

b. For the same relative humidity level, a high rate of airflow produces higher static charges than a low airflow rate.

c. Some data in this table has been extrapolated.

## Static Protection Measures

Follow these precautions to minimize possible ESD-induced failures in the computer room:

- Maintain recommended humidity level and airflow rates in the computer room.
- Install conductive flooring (conductive adhesive must be used when laying tiles).
- Use conductive wax if waxed floors are necessary.
- Ensure that all equipment and flooring are properly grounded and are at the same ground potential.
- Use conductive tables and chairs.
- Use a grounded wrist strap (or other grounding method) when handling circuit boards.
- Store spare electronic modules in antistatic containers.

## Acoustics

Computer equipment and air conditioning blowers cause computer rooms to be noisy. Ambient noise level in a computer room can be reduced as follows:

- Dropped ceiling—Cover with a commercial grade of fire-resistant, acoustic rated, fiberglass ceiling tile.
- Sound deadening—Cover the walls with curtains or other sound deadening material.
- Removable partitions—Use foam rubber models for most effectiveness.

## Facility Characteristics

This section contains information about facility characteristics that must be considered for the installation or operation of an hp server. Facility characteristics are:

- Floor loading
- Windows
- Altitude effects

### Floor Loading

The computer room floor must be able to support the total weight of the installed hp server as well as the weight of the individual cabinets as they are moved into position.

Floor loading is usually not an issue in nonraised floor installations. The information presented in this section is directed toward raised floor installations.

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**NOTE** An appropriate floor system consultant should verify any floor system under consideration for an hp server installation.

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#### Raised Floor Loading

Raised floor loading is a function of the manufacturer's load specification and the positioning of the equipment relative to the raised floor grid. While Hewlett-Packard cannot assume responsibility for determining the suitability of a particular raised floor system, it does provide information and illustrations for the customer or local agencies to determine installation requirements.

The following guidelines are recommended:

- Because many raised floor systems do not have grid stringers between floor stands, the lateral support for the floor stands depends on adjacent panels being in place. To avoid compromising this type of floor system while gaining under floor access, remove only one floor panel at a time.
- Larger floor grids (bigger panels) are generally rated for lighter loads.

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**CAUTION** Do not position or install any equipment cabinets on the raised floor system until you have carefully examined it to verify that it is adequate to support the appropriate installation.

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#### Floor Loading Terms

**Table C-2**      **Floor Loading Term Definitions**

Term	Definition
Dead load	The weight of the raised panel floor system, including the understructure. Expressed in lb/ft <sup>2</sup> (kg/m <sup>2</sup> ).
Live load	The load that the floor system can safely support. Expressed in lb/ft <sup>2</sup> (kg/m <sup>2</sup> ).

**Table C-2      Floor Loading Term Definitions (Continued)**

<b>Term</b>	<b>Definition</b>
Concentrated load	The load that a floor panel can support on a 1-in <sup>2</sup> (6.45 cm <sup>2</sup> ) area at the panel's weakest point (typically the center of the panel), without the surface of the panel deflecting more than a predetermined amount.
Ultimate load	The maximum load (per floor panel) that the floor system can support without failure. Failure expressed by floor panel(s) breaking or bending.  Ultimate load is usually stated as load per floor panel.
Rolling load	The load a floor panel can support (without failure) when a wheel of specified diameter and width is rolled across the panel.
Average floor load	Computed by dividing total equipment weight by the area of its footprint. This value is expressed in lb/ft <sup>2</sup> (kg/m <sup>2</sup> ).

**Average Floor Loading**

The average floor load value is not appropriate for addressing raised floor ratings at the floor grid spacing level. However, it is useful for determining floor loading at the building level, such as the area of solid floor or span of raised floor tiles covered by the hp server footprint.

**Typical Raised Floor Site**

This section contains an example of a computer room raised floor system that is satisfactory for the installation of an hp server.

Based on specific information provided by Hewlett-Packard, Tate Access Floors has approved its Series 800 all-steel access floor with bolt-together stringers and 24 in. (61.0 cm) by 24 in. (61.0 cm) floor panels.

In the event that the flooring is being replaced or a new floor is being installed, Tate Access Floors recommends its Series 1250 all-steel access floor with bolt-together stringers and 24 in. (61.0 cm) by 24 in. (61.0 cm) floor panels be used to support the hp installation.

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**NOTE** If the specific floor being evaluated or considered is other than a Tate Series 800 floor, the specific floor manufacturer must be contacted to evaluate the floor being used.

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The following table lists specifications for the Tate Access Floors Series 800 raised floor system.

**Table C-3      Typical Raised Floor Specifications**

<b>Item<sup>a</sup></b>	<b>Rating</b>
Dead load	7 lb/ft <sup>2</sup> (34.2 kg/m <sup>2</sup> )
Live load	313 lb/ft <sup>2</sup> (1528.3 kg/m <sup>2</sup> )
Concentrated load <sup>b</sup>	1250 lb (567 kg)

**Table C-3      Typical Raised Floor Specifications (Continued)**

Item <sup>a</sup>	Rating
Ultimate load	4000 lb (1814 kg) per panel
Rolling load	400 lb (181 kg)
Average floor load	500 lb (227 kg)

- a. From Table C-2 on page 203
- b. With 0.08 in (0.2 cm) of span maximum deflection

## **Windows**

Avoid housing computers in a room with windows. Sunlight entering a computer room may cause problems. Magnetic tape storage media is damaged if exposed to direct sunlight. Also, the heat generated by sunlight places an additional load on the cooling system.

## **Space Requirements**

This section contains information about space requirements for an hp server. This data should be used as the basic guideline for space plan developments. Other factors, such as airflow, lighting, and equipment space requirements must also be considered.

### **Delivery Space Requirements**

There should be enough clearance to move equipment safely from the receiving area to the computer room. Permanent obstructions, such as pillars or narrow doorways, can cause equipment damage.

Delivery plans should include the possible removal of walls or doors.

### **Operational Space Requirements**

Other factors must be considered along with the basic equipment dimensions. Reduced airflow around equipment causes overheating, which can lead to equipment failure. Therefore, the location and orientation of air conditioning ducts, as well as airflow direction, are important. Obstructions to equipment intake or exhaust airflow must be eliminated.

The locations of lighting fixtures and utility outlets affect servicing operations. Plan equipment layout to take advantage of lighting and utility outlets. Do not forget to include clearance for opening and closing equipment doors.

Clearance around the cabinets must be provided for proper cooling airflow through the equipment.

If other equipment is located so that it exhausts heated air near the cooling air intakes of the hp server cabinets, larger space requirements are needed to keep ambient air intake to the hp server cabinets within the specified temperature and humidity ranges.

Space planning should also include the possible addition of equipment or other changes in space requirements. Equipment layout plans should also include provisions for the following:

- Channels or fixtures used for routing data cables and power cables
- Access to air conditioning ducts, filters, lighting, and electrical power hardware
- Power conditioning equipment
- Cabinets for cleaning materials
- Maintenance area and spare parts

### **Floor Plan Grid**

A floor plan grid is used to plan the location of equipment in the computer room. In addition to its use for planning, the floor plan grid should also be used when planning the locations of the following items:

- Air conditioning vents
- Lighting fixtures
- Utility outlets
- Doors
- Access areas for power wiring, air conditioning filters and equipment cable routing.

## Typical Installation Schedule

The following schedule lists the sequence of events for a typical system installation:

- 60 days before installation
  - Floor plan design completed and mailed to Hewlett-Packard (if required to be an HP task)
- 30 days before installation
  - Primary power and air conditioning installation completed
  - Telephone and data cables installed
  - Fire protection equipment installed
  - Major facility changes completed
  - Special delivery requirements defined
  - Site inspection survey completed
  - Delivery survey completed
  - A signed copy of the site inspection and delivery survey mailed to Hewlett-Packard
  - Site inspection and predelivery coordination meeting arranged with a Hewlett-Packard representative to review the inspection checklist and arrange an installation schedule.
- 7 days before installation
  - Final check made with an Hewlett-Packard site preparation specialist to resolve any last minute problems

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<b>NOTE</b>	Not all installations follow a schedule like the one noted above. Sometimes, an hp server is purchased through another vendor which can preclude a rigid schedule. Other conditions could also prevent following this schedule. For those situations, consider a milestone schedule. <ul style="list-style-type: none"><li>• Site Preparation - schedule with the customer as soon as possible after the order is placed.</li><li>• Site Verification - schedule with the customer a minimum of one to two days before the hp server is scheduled to be installed.</li></ul>
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## Site Inspection

**Table C-4 Customer and Hewlett-Packard Information**

<b>Customer Information</b>	
Name:	Phone No.:
Street Address:	City or Town:
State or Province:	Country
Zip or postal code:	
Primary customer contact:	Phone No.:
Secondary customer contact:	Phone No.:
Traffic coordinator:	Phone No.:
Hewlett-Packard information	
Sales representative	Order No.:
Representative making survey	Date:
Scheduled delivery date	

**Table C-5      Site Inspection Checklist**

<b>Please check either Yes or No. If No, include comment# or date</b>				<b>Comment or Date</b>
<b>Computer room</b>				
No.	Area or condition	Yes	No	
1.	Is there a completed floor plan?			
2.	Is there adequate space for maintenance needs? Front 36 in (91.4 cm) minimum, Rear 36 in (91.4 cm) minimum are recommended clearances.			
3.	Is access to the site or computer room restricted?			
4.	Is the computer room structurally complete? Expected date of completion?			
5.	Is a raised floor installed and in good condition?			
6.	Is the raised floor adequate for equipment loading?			
7.	Are there channels or cutouts for cable routing?			
8.	Is there a remote console telephone line available with an RJ11 jack?			
9.	Is a telephone line available?			
10.	Are customer supplied peripheral cables and LAN cables available and of the proper type?			
11.	Are floor tiles in good condition and properly braced?			
12.	Is floor tile underside shiny or painted? If painted, judge the need for particulate test.			
<b>Power and lighting</b>				
No.	Area or condition	Yes	No	
13.	Are lighting levels adequate for maintenance?			
14.	Are there AC outlets available for servicing needs? (i.e. vacuuming)			
15.	Does the input voltage correspond to equipment specifications?			
15A	Is dual source power used? If so, identify type(s) and evaluate grounding.			

**Table C-5      Site Inspection Checklist (Continued)**

<b>Please check either Yes or No. If No, include comment# or date</b>				<b>Comment or Date</b>
16	Does the input frequency correspond to equipment specifications?			
17.	Are lightning arrestors installed inside the building?			
18.	Is power conditioning equipment installed?			
19.	Is there a dedicated branch circuit for equipment?			
20.	Is the dedicated branch circuit less than 250 feet (72.5 meters)?			
21.	Are the input circuit breakers adequate for equipment loads?			
<b>Safety</b>				
No.	Area or condition	Yes	No	
22.	Is there an emergency power shut-off switch?			
23.	Is there a telephone available for emergency purposes?			
24.	Is there a fire protection system in the computer room?			
25.	Is antistatic flooring installed?			
26.	Are there any equipment servicing hazards (loose ground wires, poor lighting, etc.)?			
<b>Cooling</b>				
No.	Area or condition	Yes	No	
27.	Can cooling be maintained between 20 °C and 55 °C (up to 5000 ft.)? Derate 1 °C/1000 ft. above 5000 ft. and up to 10,000 ft.			
28.	Can temperature changes be held to 10 °C per hour with tape media? Can temperature changes be held to 20 °C per hour without tape media?			
29.	Can humidity level be maintained at 40% to 60% at 35 °C noncondensing?			
30.	Are air conditioning filters installed and clean?			
<b>Storage</b>				

**Table C-5      Site Inspection Checklist (Continued)**

<b>Please check either Yes or No. If No, include comment# or date</b>				<b>Comment or Date</b>
No.	Area or condition	Yes	No	
31.	Are cabinets available for tape and disc media?			
32.	Is shelving available for documentation?			
Training				
No.	Area or Condition			
33	Are personnel enrolled in the System Administrator's Course?			
34	Is on-site training required?			

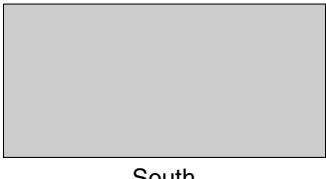
## **Delivery Survey**

The delivery survey forms list delivery or installation requirements. If any of the items on the list apply, enter the appropriate information in the areas provided on the form.

Special instructions or recommendations should be entered on the special instructions or recommendations form. The following list gives examples of special instructions or issues:

- Packaging restrictions at the facility, such as size and weight limitations
- Special delivery procedures
- Special equipment required for installation, such as tracking or hoists
- What time the facility is available for installation (after the equipment is unloaded)
- Special security requirements applicable to the facility, such as security clearance

**Figure C-2      Delivery Survey (Part 1)**

DELIVERY CHECKLIST	
DOCK DELIVERY	
Is dock large enough for a semitrailer?	Yes _____ No _____
Circle the location of the dock and give street name if different than address.	
	
STREET DELIVERY	
Circle the location of access door and list street name if different than address.	
	
List height _____ and width _____ of access door.	
List special permits (if required) for street delivery.	
Permit type:	Agency obtained from:
_____	_____
_____	_____

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**Figure C-3      Delivery Survey (Part 2)**

**ELEVATOR**

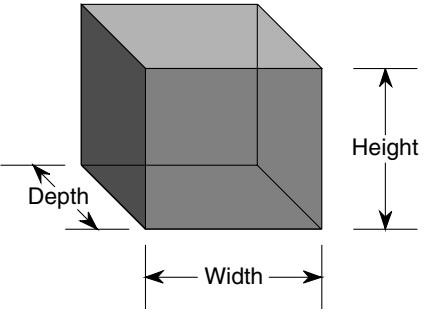
Fill in the following information if an elevator is required to move equipment.

Capacity (lb or kg) \_\_\_\_\_

Depth \_\_\_\_\_

Height \_\_\_\_\_

Width \_\_\_\_\_



The diagram shows a three-dimensional perspective view of a rectangular prism representing an elevator. Arrows indicate the dimensions: 'Depth' points along the front edge, 'Width' points across the base, and 'Height' points vertically from the base to the top edge.

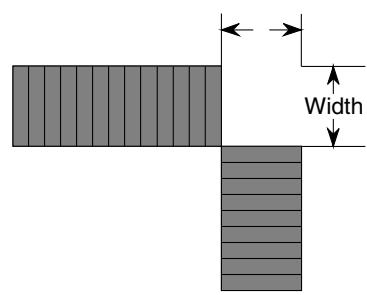
**STAIRS**

Please list number of flights and stairway dimensions.

Number of flights \_\_\_\_\_

Width \_\_\_\_\_

Width \_\_\_\_\_

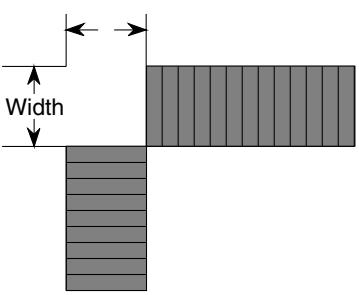


The diagram shows a straight staircase with two flights of stairs. Arrows indicate the total width of the stairs and the width of one individual flight.

Number of flights \_\_\_\_\_

Width \_\_\_\_\_

Width \_\_\_\_\_



The diagram shows a U-shaped staircase with two flights of stairs. Arrows indicate the total width of the stairs and the width of one individual flight.

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