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http://h20341.www2.hp.com/integrity/w1/en/resources/warranty-information.html
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About this Document

This document covers the new HP Server Expansion Unit.
This document does not describe system software or partition configuration operations in any
detail. For information concerning those topics refer to the HP System Partitions Guide.

Book Layout

This document contains the following chapters and appendices:
• Chapter 1 - Overview
• Chapter 2- Server Site Preparation
• Chapter 3 - Installing the Server
• Chapter 4 - Troubleshooting
• Chapter 5- Removal and Replacement
• Appendix A - Replaceable Parts
• Appendix B - MP Commands
• Appendix C - Templates
• Index

Intended Audience

This document is intended to be used by customer engineers assigned to support the Server
Expansion Unit.

Printing History

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

<table>
<thead>
<tr>
<th>Edition</th>
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</tr>
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<tr>
<td>First Edition</td>
<td>March 2006</td>
</tr>
<tr>
<td>Third Edition</td>
<td>September 2007</td>
</tr>
<tr>
<td>Fourth Edition</td>
<td>February 2009</td>
</tr>
<tr>
<td>Fifth Edition</td>
<td>March 2010</td>
</tr>
</tbody>
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Related Information

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and diagnostic support tools in the following publications.

Web Site for HP Technical Documentation: The main Web site for HP technical documentation
is [http://www.hp.com/go/bizsupport](http://www.hp.com/go/bizsupport)

Server Hardware Information: The following website offers more information: [http://www.hp.com/go/integrity_servers-docs](http://www.hp.com/go/integrity_servers-docs). It provides HP nPartition server hardware management
details, including site preparation, installation, and more.

Windows Operating System Information: You can find information about administration of the
Microsoft® Windows® operating system at the following Web sites, among others:
• [http://docs.hp.com/windows_nt/](http://docs.hp.com/windows_nt/)
Diagnostics and Event Monitoring: Hardware Support Tools

Complete information about HP’s hardware support tools, including online and offline diagnostics and event monitoring tools, is at the following website: www.hp.com/go/bizsupport. This site has manuals, tutorials, FAQs, and other reference material.

Web Site for HP Technical Support:  HP’s IT resource center located at the following website: http://www13.itrc.hp.com/service/home/home.do?admit

It provides comprehensive support information for IT professionals on a wide variety of topics, including software, hardware, and networking.

Typographic Conventions

The following notational conventions are used in this publication.

⚠️ WARNING!  A warning lists requirements that you must meet to avoid personal injury.

⚠️ CAUTION:  A caution provides information required to avoid losing data or avoid losing system functionality.

👀 NOTE:  A note highlights useful information such as restrictions, recommendations, or important details about HP product features.

• Commands and options are represented using this font.
• Text that you type exactly as shown is represented using this font.
• Text to be replaced with text that you supply is represented using this font.

Example: “Enter the ls -l filename command” means you must replace filename with your own text.

• Keyboard keys and graphical interface items (such as buttons, tabs, and menu items) are represented using this font.

Examples: The Control key, the OK button, the General tab, the Options menu.

• Menu —→ Submenu represents a menu selection you can perform.

Example: “Select the Partition —→ Create Partition action” means you must select the Create Partition menu item from the Partition menu.

• Example screen output is represented using this font.

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Include the document title and manufacturing part number. All submissions become the property of HP.
1 Server Expansion Unit Overview

The Server Expansion Unit (SEU) is a member of the HP business-critical computing platform family: a 9U tall, mid-range, mid-volume I/O expansion cabinet. It provides additional I/O performance with the inclusion of 16 PCI-X slots or a combination of 8 PCI-X slots and 8 PCI-e slots, two additional core I/O cards, four more hard disk drives, and two removable media drives. The SEU connects to the HP Integrity rx8640 server, providing additional I/O slots to the server. There are no cell boards installed in the SEU. Its high-availability features include N+1 hot-plug fans and power, redundant power cords, hot-plug PCI cards and internal hard disk drives.

Differences from the previous SEU include the following:

- New PCI-X I/O Backplane
- New PCI-X/PCIe I/O Backplane
- New core I/O and core I/O backplane board
- New mass storage backplane
- New front panel display
- New system backplane
- New I/O cable assembly
- New backplane connectors

Figure 1-1 SEU (Front View)
Features include:

- Better availability and up time than previous SEU
- Depth optimized (shallower, fewer racking issues)
- Increased performance density
- Increased PCI-X performance
- Internal removable media
- Up to four additional internal disks
- Dual power cords enable N+1 redundancy on AC input
- Up to sixteen additional PCI-X slots
- Combination of eight additional PCI-X slots and eight additional PCI-e slots (with PCI-X/PCIe backplane).
- Core I/O functionality
- Up to two additional partitions for the server connected to the SEU

SEU System Backplane

The backplane provides inter-connection between the PCI backplane and the core I/O backplane. The backplane also provides a connection point for the system bus adapter (SBA) link and routes the SBA link signals to and from the PCI backplane board using a pair of high speed serial unidirectional links known as E-link cables. The backplane receives primary (48 V) and standby (12 V) power from the bulk power supplies and distributes this power to loads on the backplane and to the other boards connected to it. Besides providing interconnect, the backplane also
contains clock generation circuits, manageability circuits, DC-to-DC converters, power monitor logic, and fan control.

**Core I/O Backplane Module**

The core I/O backplane is housed in a separate sheet metal module holding the backplane and the core I/O boards. This module can be removed from the rear of the chassis for easy access to the core I/O backplane.

The module adapts the core I/O sockets in a horizontal mounting position to the system backplane, which is mounted vertically. It contains the lower bus adapter (LBA), PCI bridges that convert the ropes links from the PCI backplane to the PCI bus interface where the core I/O card is inserted. It also drives the PCI clocks and voltage regulators that provide domain power to the core I/O cards.

**Core I/O PCA**

There are two core I/O boards plugged into the SEU system when shipped. The core I/O boards are oriented horizontally and are accessed from the back of the SEU. They are not a standard PCI form factor. Each core I/O contains the required core functions to support a partition in a server. Each also contains a manageability processor (MP).

Neither of the MPs on the core I/O cards installed in the SEU can become the primary MP for the server and SEU combination. The primary MP for the server and SEU will always be one of the core I/O cards installed in the server.

When a server with an SEU is attached and configured for four partitions, there must be four core I/O boards, one for each partition. For this configuration, one core I/O card in the server is the primary MP and will provide all of the server management functions. The second core I/O in the server is the secondary MP. The third and fourth core I/O cards located in the SEU have similar primary and secondary characteristics but only within the SEU itself. Overall system management for the combination of the server and the SEU is managed by the primary core I/O in the server. Console data from the SEU is directed to the server.

The core I/O cards in the SEU support the mass storage and removable media devices and make them available to the server in the same manner as the servers internal devices. The core I/O card in the upper slot is the secondary core I/O card in the SEU and is associated with cell 3 in the main server cabinet. The core I/O card in the lower slot is the primary core I/O card in the SEU and is associated with cell 2 in the main server cabinet.

**Core I/O Boot Paths**

The SEU internal I/O devices are located on the core I/O. The following table outlines the paths assigned to the hard disk and removable media disk bays located on the front of the SEU cabinet. Core I/O card 2 refers to the core I/O located in the bottom slot at the rear of the system. Core I/O card 3 refers to the core I/O card located in the top slot at the rear of the system. Core I/O cards 0 and 1 are located in the server.

<table>
<thead>
<tr>
<th>Core I/O card</th>
<th>Device</th>
<th>Path</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1 Gb LAN</td>
<td>2/0/0/1/0</td>
<td>The SYS LAN connector located on core I/O 2.</td>
</tr>
<tr>
<td>2</td>
<td>SCSI drive</td>
<td>2/0/0/2/0.6.0</td>
<td>Hard drive located in the top left disk bay.</td>
</tr>
<tr>
<td>2</td>
<td>SCSI drive</td>
<td>2/0/0/2/1.X.0</td>
<td>Removable media DVD (X = 2) or DDS-4 (X = 3) tape drive located in the upper disk bay.</td>
</tr>
<tr>
<td>2</td>
<td>SCSI drive</td>
<td>2/0/0/3/0.6.0</td>
<td>Hard drive located in the top right disk bay.</td>
</tr>
<tr>
<td>2</td>
<td>SCSI drive</td>
<td>2/0/0/3/1</td>
<td>SCSI drive connected to the external SCSI Ultra3 connector on the core I/O card.</td>
</tr>
</tbody>
</table>
Table 1-1 SEU Core I/O Boot Path (continued)

<table>
<thead>
<tr>
<th>Core I/O card</th>
<th>Device</th>
<th>Path</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1 Gb LAN</td>
<td>3/0/0/1/0</td>
<td>The SYS LAN connector located on core I/O 3.</td>
</tr>
<tr>
<td>3</td>
<td>SCSI drive</td>
<td>3/0/0/2/0.6.0</td>
<td>Hard drive located in the bottom left disk bay.</td>
</tr>
<tr>
<td>3</td>
<td>SCSI drive</td>
<td>3/0/0/2/1.X.0</td>
<td>Removable media DVD (X = 2) or DDS-4 (X = 3) tape drive located in the upper disk bay.</td>
</tr>
<tr>
<td>3</td>
<td>SCSI drive</td>
<td>3/0/0/3/0.6.0</td>
<td>Hard drive located in the bottom right disk bay.</td>
</tr>
<tr>
<td>3</td>
<td>SCSI drive</td>
<td>3/0/0/3/1</td>
<td>SCSI drive connected to the external SCSI Ultra3 connector on the core I/O card.</td>
</tr>
</tbody>
</table>

PCI-X Backplane

The PCI-X board provides sixteen 64-bit, hot-swappable PCI-X slots. The application specific integrated circuit (ASIC) on each cell board in the server chassis has SBA link connections to communicate with one SBA controller. The ASIC in cell locations zero and one are connected to the SBA ASICs on the PCI board installed in the main server chassis through the printed circuit board routing. External E-link cables are used to connect the ASICs on cell boards residing in locations two and three of the server to the two SBA ASICs on the PCI-X board in the SEU.

The SBA ASIC converts the SBA link protocol into ropes. Each SBA has 16 ropes that connect to LBA ASICs. The LBA ASICs convert ropes protocol into PCI/PCI-X bus protocol. Each PCI/PCI-X slot is connected to its own dedicated LBA. Of the 16 LBAs (one for each of the 16 slots), 14 LBAs have dual ropes connected from an SBA. The remaining two LBAs have a single rope connected from the SBA. Each of the 16 PCI/PCI-X slots is capable of 133 MHz PCI-X and 4 slots on each Core I/O rope are capable of 266 MHz PCI-X. All 16 PCI/PCI-X slots on the PCI-X backplane are keyed for 3.3 V connectors (accepting both Universal and 3.3 V cards). One rope from each of the two SBA ASICs connects to an LBA ASIC on the Core I/O Backplane board. Each of these two LBAs provides a PCI bus that connects to an associated core I/O board.

NOTE: There is one single rope PCI slot for each cell. Slots 0 and 8 have a single rope associated with them so the bandwidth is one-half the bandwidth for PCI cards installed in slots 1–7. Priority in installing PCI cards should be given to slots with double ropes since they have double the bandwidth of a single rope slot. See Table 1-3 “Cell 3 PCI Slot Boot Paths” for details.

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

The altimeter circuit is checked at power on by the MP. If an expected value is returned from the altimeter circuit, the altimeter is determined good. The altimeter reading is then set in non-volatile random access memory (NVRAM) on board the core I/O card. If the value is ever lost like for a core I/O replacement, the NVRAM will be updated at next boot provided the altimeter is functioning normally. If the altimeter has failed, and the stable storage value has been lost because of a core I/O failure or replacement, the MP will adjust the fan speeds for sea level operation.
NOTE: Fans driven to a high RPM in dense air cannot maintain expected RPM and will be considered bad by the MP leading to a “False Fan Failure” condition.

PCI-X Slot Boot Paths

Table 1-3 and Table 1-3 list the mapping of PCI-X slots to ropes and boot paths. Pathing will have to be modified for PCI cards that have different devices and functions. The cell column refers to the cell board installed in the server in cell slot 2 and in cell slot 3.

Table 1-2 Cell 2 PCI Slot Boot Paths

<table>
<thead>
<tr>
<th>Cell</th>
<th>PCI Slot</th>
<th>Ropes</th>
<th>Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1</td>
<td>8/9</td>
<td>2/0/8/1/0</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>10/11</td>
<td>2/0/10/1/0</td>
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<td>2</td>
<td>3</td>
<td>12/13</td>
<td>2/0/12/1/0</td>
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<tr>
<td>2</td>
<td>4</td>
<td>14/15</td>
<td>2/0/14/1/0</td>
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<tr>
<td>2</td>
<td>5</td>
<td>6/7</td>
<td>2/0/6/1/0</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>4/5</td>
<td>2/0/4/1/0</td>
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<tr>
<td>2</td>
<td>7</td>
<td>2/3</td>
<td>2/0/2/1/0</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>1</td>
<td>2/0/1/1/0</td>
</tr>
</tbody>
</table>

Table 1-3 Cell 3 PCI Slot Boot Paths

<table>
<thead>
<tr>
<th>Cell</th>
<th>PCI Slot</th>
<th>Ropes</th>
<th>Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1</td>
<td>8/9</td>
<td>3/0/8/1/0</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>10/11</td>
<td>3/0/10/1/0</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>12/13</td>
<td>3/0/12/1/0</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>14/15</td>
<td>3/0/14/1/0</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>6/7</td>
<td>3/0/6/1/0</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>4/5</td>
<td>3/0/4/1/0</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>2/3</td>
<td>3/0/2/1/0</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>1</td>
<td>3/0/1/1/0</td>
</tr>
</tbody>
</table>

PCI-X/PCIe I/O Backplane

The 16-slot (8 PCI and PCI-X; 8 PCI-Express) mixed PCI-X/PCI Express I/O backplane is heavily leveraged from the PCI-X backplane design. Only the differences will be described here. See “PCI-X Backplane” (page 18) for common content between the two boards.

NOTE: Troubleshooting instructions and card cage information for both backplanes is also the same.

The PCI-Express I/O Backplane comprises two logically independent I/O circuits (partitions) on one physical board:
- The I/O chip in cell location zero and its associated four PCI-X ASICs, four PCIe ASICs, and their respective PCI/PCI-X/PCIe slots form PCI-Express I/O partition 0 plus core I/O.
- The I/O chip in cell location one and its associated four PCI-X ASICs, four PCIe ASICs, and their respective PCI/PCI-X/PCIe slots form PCI-Express I/O partition 1 plus core I/O.
Each PCI/PCI-X slot has a host-to-PCI bridge associated with it, and each PCIe slot has a host-to-PCIe bridge associated with it. A dual slot hot swap controller chip and related logic is also associated with each pair of PCI or PCIe slots. The I/O chip on either cell location 0 or 1 is a primary I/O system interface. Upstream, the I/O chips communicate directly with the cell controller ASIC on the host cell board via a high bandwidth logical connection known as the HSS link. When installed in the SEU chassis within a fully configured system, the ASIC on cell location 0 connects to the cell controller chip on cell board 2 and the ASIC on cell location 1 connects to the cell controller chip on cell board 3 through external link cables.

Downstream, the ASIC spawns 16 logical ‘ropes’ that communicate with the core I/O bridge on the system backplane, PCI interface chips, and PCIe interface chips. Each PCI chip produces a single 64-bit PCI-X bus supporting a single PCI or PCI-X add-in card. Each PCIe chip produces a single x8 PCI-Express bus supporting a single PCIe add-in card.

The ropes in each I/O partition are distributed as follows:

One PCI-X ASIC is connected to each I/O chip with a single rope capable of peak data rates of 533MB/s (PCIX-66). Three PCI-X ASICs are connected to each I/O chip with dual ropes capable of peak data rates of 1.06 GB/s (PCIX-133). Four PCIe ASICs are connected to each I/O chip with dual fat ropes capable of peak data rates of 2.12 GB/s (PCIe x8). In addition, each I/O chip provides an external single rope connection for the core I/O.

Each PCI-Express slot on the PCI-X/PCIe I/O backplane is controlled by its own ASIC and is also independently supported by its own half of the dual hot swap controller. All PCIe slots are designed to be compliant with PCIe Rev.1.0. The PCI-Express I/O backplane will provide slot support for VAUX3.3, SMB*, and JTAG.

**PCI-X/PCIe I/O Backplane Slot Boot Paths**

PCI-X/PCIe I/O backplane slot boot paths are directly leveraged from the PCI-X backplane. See “PCI-X Slot Boot Paths” (page 19) for more details.

**Detailed SEU Description**

**Internal Disk Devices for the SEU**

As Figure 1-3 shows, in an SEU cabinet, the top internal disk drives connect to cell 2 in the server through the Core I/O for cell 2. The bottom internal disk drives connect to cell 3 through the core I/O for cell 3. The upper removable media drive connects to cell 2 through the core I/O card for cell 2 and the lower removable media drive connects to cell 3 through the core I/O card for cell 3.
System Backplane

The SEU system backplane provides inter-connection between the PCI backplane and the core I/O. The SEU backplane also provides a connection point for the E-link cables and routes the E-link cable signals to and from the PCI backplane. The backplane receives primary (48 V) and standby (12 V) power from the bulk power supplies and distributes this power to loads on the SEU backplane and to the other boards connected to it. Besides providing interconnect, the SEU backplane contains clock generation circuits and manageability circuits as well as other miscellaneous circuits.
The voltage regulator modules (VRMs) that provide 3.3 V and 3.3 V standby are located on this backplane. The backplane also has the connectors to provide a hardware interface to the SEU chassis.

Clocks and Reset

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

Server Expansion Unit Interconnect

Manageability data will be transferred between the server chassis and the SEU through the main E-link cables that tie cell boards in the server to SBA links in the SEU. This manageability link enables ethernet protocol communications between the manageability processors in the server and in the SEU.

PCI-X

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

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

The PCI-X backplane is the primary I/O interface for SEU systems. It provides 16 64-bit, hot-plug PCI/PCI-X slots. Fourteen of the slots have dual ropes connected to the LBA chips. The remaining two slots have a single rope connected to each LBA chip. Each of the 16 PCI/PCI-X slots is capable of 133 MHz PCI-X and 4 slots on each Core I/O rope are capable of 266 MHz PCI-X. All 16 PCI
slots are keyed for 3.3V connectors (accepting both Universal and 3.3V cards). The PCI-X backplane does not provide any 5V slots for the I/O cards.

The external link for the SEU attaches the cell controller on cell board 2 to SBA 0 and attaches the cell controller on cell board 3 to SBA 1 of the PCI-X board in the SEU cabinet.

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

**Table 1-7 PCI-X Slot Types**

<table>
<thead>
<tr>
<th>I/O Partition</th>
<th>Slot</th>
<th>Maximum Speed MHz</th>
<th>Ropes</th>
<th>Supported Cards</th>
<th>PCI Mode Supported</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>8(^2)</td>
<td>66</td>
<td>001</td>
<td>3.3 V</td>
<td>PCI or PCI-X Mode 1</td>
</tr>
<tr>
<td>7</td>
<td>133</td>
<td>002/003</td>
<td>3.3 V</td>
<td>PCI or PCI-X Mode 1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>266</td>
<td>004/005</td>
<td>3.3 V or 1.5 V</td>
<td>PCI-X Mode 2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>266</td>
<td>006/007</td>
<td>3.3 V or 1.5 V</td>
<td>PCI-X Mode 2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>266</td>
<td>014/015</td>
<td>3.3 V or 1.5 V</td>
<td>PCI-X Mode 2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>266</td>
<td>012/013</td>
<td>3.3 V or 1.5 V</td>
<td>PCI-X Mode 2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>133</td>
<td>010/011</td>
<td>3.3 V</td>
<td>PCI or PCI-X Mode 1</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>133</td>
<td>008/009</td>
<td>3.3 V</td>
<td>PCI or PCI-X Mode 1</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>8(^2)</td>
<td>66</td>
<td>001</td>
<td>3.3 V</td>
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<tr>
<td>6</td>
<td>266</td>
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<td></td>
</tr>
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<td>014/015</td>
<td>3.3 V or 1.5 V</td>
<td>PCI-X Mode 2</td>
<td></td>
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<tr>
<td>3</td>
<td>266</td>
<td>012/013</td>
<td>3.3 V or 1.5 V</td>
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</tr>
<tr>
<td>2</td>
<td>133</td>
<td>010/011</td>
<td>3.3 V</td>
<td>PCI or PCI-X Mode 1</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>133</td>
<td>008/009</td>
<td>3.3 V</td>
<td>PCI or PCI-X Mode 1</td>
<td></td>
</tr>
</tbody>
</table>

1 Each slot will auto select the proper speed for the card installed up to the maximum speed for the slot. Placing high speed cards into slow speed slots will cause the card to be driven at the slow speed.

2 Slot is driven by a single rope and has a maximum speed of 66 MHz.

**PCI-X/PCIe I/O Backplane**

The differences between the PCI-X/PCIe I/O backplane and the PCI-X backplane are as follows:

- Twelve ropes are bundled in two rope pairs to 6 LBAs to support 6 slots for PCI and PCI-X cards instead of 14. These ropes are capable of 133 MHz.
- Sixteen ropes are bundled into dual fat ropes to 8 LBAs to support 8 additional slots for PCIe cards. These ropes are capable of 266 MHz.

The PCI-X/PCIe I/O backplane is the primary I/O interface for SEU systems. It provides 8 64-bit, hot plug PCI/PCI-X slots. Six of the slots have dual ropes connected to the LBA chips and are capable of 133 MHz. The remaining two slots have a single rope connected to each LBA chip and are capable of 66 MHz. The PCI-X/PCIe I/O backplane also provides eight 8x, hot plug PCIe slots. All of the PCIe slots are driven by dual ropes and are all capable of 266 MHz. The PCI-Xe also provides eight 8x, hot plug PCIe slots. All of the PCIe slots are driven by dual ropes and are all capable of 266 MHz. All 16 slots are keyed for 3.3v connectors (accepting both Universal and 3.3v cards). The PCI-X/PCIe I/O backplane does not provide any 5v slots for the I/O cards.
<table>
<thead>
<tr>
<th>I/O Partition</th>
<th>Slot</th>
<th>Maximum Speed MHz</th>
<th>Ropes</th>
<th>Supported Cards</th>
<th>PCI Mode Supported</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>8[^2]</td>
<td>66</td>
<td>001</td>
<td>3.3 V</td>
<td>PCI or PCI-X Mode 1</td>
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<tr>
<td>7</td>
<td>133</td>
<td>002/003</td>
<td>3.3 V</td>
<td>PCI or PCI-X Mode 1</td>
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</tr>
<tr>
<td>6</td>
<td>266</td>
<td>004/005</td>
<td>3.3 V</td>
<td>PCIe</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>266</td>
<td>006/007</td>
<td>3.3 V</td>
<td>PCIe</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>266</td>
<td>014/015</td>
<td>3.3 V</td>
<td>PCIe</td>
<td></td>
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<tr>
<td>3</td>
<td>266</td>
<td>012/013</td>
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<td>2</td>
<td>133</td>
<td>010/011</td>
<td>3.3 V</td>
<td>PCI or PCI-X Mode 1</td>
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<tr>
<td>1</td>
<td>133</td>
<td>008/009</td>
<td>3.3 V</td>
<td>PCI or PCI-X Mode 1</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>8[^2]</td>
<td>66</td>
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<td>3.3 V</td>
<td>PCI or PCI-X Mode 1</td>
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<tr>
<td>7</td>
<td>133</td>
<td>002/003</td>
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<td>PCI or PCI-X Mode 1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>266</td>
<td>004/005</td>
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<td>PCIe</td>
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<td>012/013</td>
<td>3.3 V</td>
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</tr>
<tr>
<td>2</td>
<td>133</td>
<td>010/011</td>
<td>3.3 V</td>
<td>PCI or PCI-X Mode 1</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>133</td>
<td>008/009</td>
<td>3.3 V</td>
<td>PCI or PCI-X Mode 1</td>
<td></td>
</tr>
</tbody>
</table>

1 Each slot will auto select the proper speed for the card installed up to the maximum speed for the slot. Placing high speed cards into slow speed slots will cause the card to be driven at the slow speed.

2 Slot is driven by a single rope and has a maximum speed of 66 MHz.

MP Core I/O Board

The SEU core I/O card is the same one used in the server chassis. Up to two core I/O cards can be plugged into the SEU. Two core I/O cards enable two additional I/O partitions to be added to the number of partitions that exist in the server attached to the SEU. Since the server can have up to two partitions, the total number of partitions possible in a server with the SEU attached is four partitions.

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

Mass Storage (Disk) Backplane

Internal mass storage connections to disks are routed on the mass storage backplane, having connectors and termination logic. All hard disks are hot-plug while removable media drives are not hot-plug. The SEU accommodates two internal, removable media devices. Therefore, power connectors for a removable media drive are required on the mass storage backplane.

---

Table 1-8 PCI-X/PCIe I/O Backplane Slot Types
SEU Description

Dimensions

The dimensions of the SEU are as follows:

- **Width:** 17.5 inches, constrained by electronic industries alliance (EIA) standard 19-inch racks.
- **Depth:** Defined by cable management constraints to fit into a standard 36-inch deep rack:
  * 25.5 inches from front rack column to PCI connector surface.
  * 26.7 inches from front rack column to core I/O connector surface.
  * 30 inches overall package dimension, including 2.7 inches protruding in front of the front rack columns.
- **Height:** 9U (15.75 inches) constrained by package density.

System Chassis

Refer to Figure 1-5 “Left-Front View of SEU” during the following discussion.

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

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

The bulk power supply (BPS) section is partitioned by a sealed metallic enclosure located in the bottom of the package. This enclosure houses the two fully redundant BPSs.

---

**Figure 1-5 Left-Front View of SEU**

- PCI OLR Fans
- Front Panel
- Hard Drives
- Removable Media Drives
- PCI Power Supply
- Front OLR Fan
- BPS 0
- BPS 1
The PCI on-line replacement (OLR) fan modules are located in front of the PCI cards. These six fans are housed in plastic carriers. They are configured in two rows of three fans.

Four OLR system fan modules, externally attached to the chassis, are 120-mm (4.7-inch) fans. Two fans are mounted on the front surface of the chassis and two are mounted on the rear surface. A cable harness that connects from the rear of the BPSs to the system backplane provides DC power distribution.

The mass storage backplane obtains power from a cable connected to the PCI backplane.

Figure 1-6 Right-Rear View of the SEU

The PCI I/O card section, located toward the rear, is accessed by removing the top cover.

The core I/O cards are positioned horizontally at the rear of the chassis. One core I/O card is positioned directly above or below the other core I/O card. The SEU ships with both core I/O cards installed in the chassis.

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

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

Redundant line cords attach to the AC connector module at the bottom rear. One 20-amp cord is required to supply power to the SEU. One additional line cord provides power source redundancy.

Four OLR system fan modules, externally attached to the chassis, are 120-mm (4.7-inch) fans. Two fans are mounted on the front surface of the chassis and two are mounted on the rear surface. All manageability communications use the main cable assembly between the SEU and the server.
2 Server Site Preparation

This chapter describes the basic configuration, physical specifications and requirements for the server.

Dimensions and Weights

This section provides dimensions and weights of the Server Expansion Unit components.

Table 2-1 SEU Dimensions and Weights

<table>
<thead>
<tr>
<th></th>
<th>Standalone</th>
<th>Packaged</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height — Inches (cm)</td>
<td>15.8 (40.0)</td>
<td>28.0 (71.1)</td>
</tr>
<tr>
<td>Width — Inches (cm)</td>
<td>17.5 (44.5)</td>
<td>28.38 (72.1)</td>
</tr>
<tr>
<td>Depth — Inches (cm)</td>
<td>30.0 (76.2)</td>
<td>35.75 (90.8)</td>
</tr>
<tr>
<td>Weight$^1$ — Pounds (kg)</td>
<td>165 (74.8)</td>
<td>210.6 (95.53)</td>
</tr>
</tbody>
</table>

$^1$ Shipping box, pallet, and container adds approximately 45.6 lb to the total system weight when shipped. The size and number of miscellaneous pallets will be determined by the equipment ordered by the customer.

Table 2-2 SEU Component Weights

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Description</th>
<th>Weight (lb/kg.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Value added chassis</td>
<td>77.0 (34.93)</td>
</tr>
<tr>
<td>1</td>
<td>System backplane</td>
<td>3.7 (1.68)</td>
</tr>
<tr>
<td>1</td>
<td>PCI-X card cage assembly</td>
<td>20.4 (9.25)</td>
</tr>
<tr>
<td>2</td>
<td>PCI-X power supply</td>
<td>5.0 (2.27) each</td>
</tr>
<tr>
<td>2</td>
<td>Bulk power supply</td>
<td>12.0 (5.44) each</td>
</tr>
<tr>
<td>1</td>
<td>Mass storage backplane</td>
<td>1.0 (0.45)</td>
</tr>
<tr>
<td>1</td>
<td>Core I/O backplane assembly (the module core I/O cards slide into)</td>
<td>6.3 (2.86)</td>
</tr>
<tr>
<td>1–4</td>
<td>Hard disk drive</td>
<td>1.6 (0.73) each</td>
</tr>
<tr>
<td>1–2</td>
<td>Removable media disk drive</td>
<td>2.2 (1.0) each</td>
</tr>
</tbody>
</table>

Electrical Specifications

This section provides electrical specifications for the SEU.

Grounding

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

Install a protective earthing (PE) conductor that is identical in size, insulation material, and thickness to the branch-circuit supply conductors. The PE conductor must be green with yellow stripes. The earthing conductor described is to be connected from the unit to the building installation earth or, if supplied by a separately derived system, at the supply transformer or motor-generator set grounding point.
Circuit Breaker

The Marked Electrical for the SEU is 7A per line cord. The recommended circuit breaker size is 20 amps for North America. For countries outside North America, consult your local electrical authority that has jurisdiction for the recommended circuit breaker size.

The SEU contains two C20 power receptacles located at the bottom rear bulkhead. A minimum of one power cord must be used to maintain normal operation of the SEU. A second cord can be added to improve system availability by protecting, for example, against power source failures or accidentally tripped circuit breakers. The SEU can receive AC input from two different AC power sources.

System AC Power Specifications

Power Cords

Table 2-3 lists the various power cables available for use with an SEU. Each power cord is 15 feet (4.5 meters) in length with a IEC 60320-1 C19 female connector attached to one end.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Where Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>8120-6895</td>
<td>Stripped end, 240 V</td>
<td>International—Other</td>
</tr>
<tr>
<td>8120-6897</td>
<td>Male IEC309, 240 V</td>
<td>International</td>
</tr>
<tr>
<td>8121-0070</td>
<td>Male GB-1002, 240 V</td>
<td>China</td>
</tr>
<tr>
<td>8120-6903</td>
<td>Male NEMA L6-20, 240 V</td>
<td>North America/Japan</td>
</tr>
</tbody>
</table>

System Power Specifications

Table 2-4 and Table 2-5 list the AC power requirements for the SEU. These tables provide information to help determine the amount of AC power needed for your computer room.

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Value</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal input voltage</td>
<td>200 - 240 VAC</td>
<td></td>
</tr>
<tr>
<td>Minimum Operating Voltage</td>
<td>180 VAC</td>
<td></td>
</tr>
<tr>
<td>Maximum Operating Voltage</td>
<td>269 VAC</td>
<td></td>
</tr>
<tr>
<td>Frequency range (minimum–maximum)</td>
<td>50/60 Hz</td>
<td></td>
</tr>
<tr>
<td>Number of phases</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Rated line current</td>
<td>7 A</td>
<td>Per line cord</td>
</tr>
<tr>
<td>Maximum inrush current</td>
<td>36 A peak for 20 ms</td>
<td>Per line cord</td>
</tr>
<tr>
<td>Dropout carry-through time at minimum line voltage</td>
<td>20 ms</td>
<td></td>
</tr>
<tr>
<td>Circuit breaker rating</td>
<td>20 A</td>
<td>Per line cord</td>
</tr>
<tr>
<td>Power factor correction</td>
<td>&gt;0.98–0.95</td>
<td>At all loads at 50–100% of supply ratingAt all loads at 25–50% of supply rating</td>
</tr>
<tr>
<td>Ground leakage current (mA)</td>
<td>&lt; 3 mA</td>
<td>Per line cord</td>
</tr>
</tbody>
</table>
Table 2-5 System Power Requirements

<table>
<thead>
<tr>
<th>Power Required (50 - 60 Hz)</th>
<th>Watts</th>
<th>VA</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Theoretical Power</td>
<td>921</td>
<td>940</td>
<td>See Note 1</td>
</tr>
<tr>
<td>Marked Electrical Power</td>
<td>-</td>
<td>1300</td>
<td>30A @ 180 VAC, See Note 2</td>
</tr>
<tr>
<td>Typical Maximum Power</td>
<td>601</td>
<td>613</td>
<td>See Note 3</td>
</tr>
</tbody>
</table>

Note 1: Maximum Theoretical Power: or “Maximum Configuration” (Input power at the ac input expressed in Watts and Volt-Amps to take into account Power factor correction.) The calculated sum of the maximum worst case power consumption for every subsystem in the server. This number will never be exceeded by a functioning server for any combination of hardware and software under any conditions.

Note 2: Marked Electrical Power: (Input power at the ac input expressed in Volt-Amps.) The Marked Electrical Power is the rating given on the chassis label and represents the input power required for facility ac power planning and wiring requirements. This number represents the expected maximum power consumption for the server based on the power rating of the bulk power supplies. This number can safely be used to size ac circuits and breakers for the system under all conditions.

Note 3: Typical Maximum Power: or User Expected Maximum Power, (Input power at the ac input expressed in Watts and Volt-Amps.) The measured maximum worst case power consumption. This number represents the largest power consumption that HP engineers were able to produce for the server with any combination of hardware under laboratory conditions using aggressive software applications designed specifically to work the system at maximum load. This number can safely be used to compute thermal loads and power consumption for the system under all conditions.

Environmental Specifications

This section provides the environmental, power dissipation, noise emission, and air flow specifications for the SEU.

Temperature and Humidity

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

Operating Environment

The system is designed to run continuously and meet reliability goals in an ambient temperature of 5°C–32°C at sea level. The maximum allowable temperature is derated 1°C per 1000 feet of elevation above 3,000 feet above sea level up to 25°C at 10,000 feet. For optimum reliability and performance, the recommended operating range is from 20°C to 25°C. This meets or exceeds the requirements for Class 2 in the corporate and ASHRAE standard. See Table 2-6 (page 29) for an example of the ASHRAE thermal report.

Table 2-6 Example ASHRAE Thermal Report

<table>
<thead>
<tr>
<th>Condition</th>
<th>Voltage 208 Volts</th>
<th>Typical Heat Release</th>
<th>Airflow, nominal</th>
<th>Airflow, maximum at 32°C</th>
<th>Weight</th>
<th>Over System Dimensions(W x D x H)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Watts</td>
<td>cfm</td>
<td>(m3/hr)</td>
<td>lb</td>
<td>kg</td>
<td>Inches</td>
<td>mm</td>
</tr>
</tbody>
</table>

Environmental Specifications
Environmental Temperature Sensor

To ensure that the system is operating within the published limits, the ambient operating temperature is measured using a sensor placed near the chassis inlet, between the cell boards. Data from the sensor is used to control the fan speed and also to initiate system overtemp shutdown.

Non-Operating Environment

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

Cooling

Internal Chassis Cooling

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

Each fan is controlled by a smart fan control board, embedded in the fan module plastic housing. The smart fan control board receives fan control input from the system fan controller on the system backplane and returns fan status information to the system fan controller. The smart fan control board also controls the power and the pulse width modulated control signal to the fan and monitors the speed indicator back from the fan. The fan status LED is driven by the smart fan control board.

Bulk Power Supply Cooling

Cooling for the bulk power supplies is provided by two 60-mm fans contained within each BPS. Air flows into the front of the BPS and is exhausted out of the top of the power supply though upward facing vents near the rear of the supply. The air is then ducted out of the rear of the chassis.

PCI/Mass Storage Section Cooling

Six 92-mm fans located between the mass storage devices and the PCI card cage provide airflow through these devices. The PCI fans are powered off of housekeeping power and run at full speed at all times. The air is pulled through the mass storage devices and pushed through the PCI card cage. Perforation is provided between the PCI bulkheads to allow adequate exhaust.

---

### Table 2-6 Example ASHRAE Thermal Report (continued)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Full configuration</th>
<th>Typical configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>601 150 255 165</td>
<td>394 150 255 165</td>
</tr>
<tr>
<td></td>
<td>h=17.29 w=17.50 d=30.00</td>
<td>h=17.29 w=17.50 d=30.00</td>
</tr>
<tr>
<td></td>
<td>401.32 444.50 762.00</td>
<td>401.32 444.50 762.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ASHRAE class</th>
<th>Full configuration</th>
<th>Typical configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>16 I/O cards, 2 Core I/O cards, 4 hard disks</td>
<td>8 I/O cards, 1 Core I/O cards, 2 hard disks</td>
</tr>
</tbody>
</table>
ventilation and to help reduce the localized airflow dead spots that typically occur at the faceplate tail of each PCI card.

Standby Cooling

Several components within the chassis consume significant amounts of power while the system is in standby mode. The fans within the power supply operate at full speed during standby.

Typical Power Dissipation and Cooling

*Table 2-7* provides calculations for configurations exactly as described in the table.

**Table 2-7 Typical SEU Power Dissipation and Cooling**

<table>
<thead>
<tr>
<th>PCI Cards (Maximum 25W) Qty</th>
<th>DVDs Qty</th>
<th>Hard Disk Drives Qty</th>
<th>Core I/O Qty</th>
<th>Bulk Power Supplies Qty</th>
<th>Typical Power Watts</th>
<th>Typical Cooling BTUs/Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>564</td>
<td>1925</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>444</td>
<td>1516</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>394</td>
<td>1345</td>
</tr>
</tbody>
</table>

The air conditioning data in *Table 2-7* is derived using the following equations:
- Watts x (0.860) = kcal/hour
- Watts x (3.414) = Btu/hour
- BTU/hour divided by 12,000 = tons of refrigeration required

*NOTE:* When determining power requirements, you must consider any peripheral equipment that will be installed during initial installation or as a later update. Refer to the applicable documentation for such devices to determine the power and air-conditioning that is required to support these devices.

**Acoustic Noise Specification**

The acoustic noise specification for the SEU is 57.1 db (sound pressure level at bystander position) when connected to the HP Integrity rx8640 server as the host system. It is appropriate for dedicated computer room environments, not office environments. The LwA is 7.4 Bels. Care should be taken to understand the acoustic noise specifications relative to operator positions within the computer room or when adding servers to computer rooms with existing noise sources.

**Air Flow**

The SEU requires that the cabinet air intake temperature be between 68° F and 77° F (20° C and 25° C) at 150 CFM.

*Figure 2-1* illustrates the location of the inlet and outlet airducts on a single cabinet. Air is drawn into the front of the SEU and forced out the rear.
Figure 2-1 Airflow Diagram
3 Installing the Server Expansion Unit

The following instructions are included for unpacking a racked SEU. There are also instructions for unpacking a non-racked SEU.

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

Inspecting the Server Cabinet

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

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

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

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

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

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

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

Unpacking the Server Expansion Unit

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

Examine the SEU cabinet for visible shipping damage. After unpacking the cabinet, check for damage that may have been obscured by the shipping container. If damage is found after visual inspection, document the damage with photographs and contact the transport carrier immediately.
If the equipment has any damage, a damage claim form must be obtained by the customer from the shipping representative. The customer should complete the form and return it to the shipping representative.

NOTE: The SEU may come already racked or ready for rack installation.

Unpacking a Racked SEU

This section contains information about unpacking the cabinet.

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

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

Remove the cabinet using the following procedure:
1. Cut the polystrap bands around the shipping container.
2. Lift the cardboard top cap from the shipping box. See Figure 3-1.
3. Remove the corrugated wrap from the pallet.
4. Remove the packing materials.

⚠️ **CAUTION:** The plastic wrapping material should be cut off rather than pulled off. Pulling the plastic covering off represents an electrostatic discharge (ESD) hazard.

*Figure 3-1 Removing the Polystraps and Cardboard*

5. Remove the four bolts securing the ramps to the pallet and remove the ramps. See *Figure 3-2*. 

---

Unpacking a Racked SEU 35
Figure 3-2 Removing the Shipping Bolts and Plastic Cover
6. Remove the six bolts from the base attaching the rack to the pallet. See Figure 3-3.

**Figure 3-3 Preparing to Roll Off the Pallet**

![Figure 3-3 Preparing to Roll Off the Pallet](image)

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

---

**Securing the Cabinet**

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

**Figure 3-4 Securing the Cabinet**

![Figure 3-4 Securing the Cabinet](image)

---

**Unpacking a Non-Racked SEU**

HP recommends the use of a lifter shown in Figure 3-5 such as a RonI Company model 17000 SP 400 lifting device when moving a non-racked system.
Unloading with a Lifter

Use the following procedure to unload the SEU from the pallet using a lifter.

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

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

**Figure 3-5 RonI Lifter**

![RonI Lifter](image)

**IMPORTANT:** The SEU must be mounted in the same rack as the server to which it will be connected. The unit must also be mounted directly above the server in the same rack cabinet.

Any SEU installed into a rack is shipped with equipment slides. The following Installation Guide is provided with every set of slides: *Installation Guide, HP J1530B, Rack Integration Kit (MPN J1530–90003).*

You may source this guide at the following website:


Follow the steps in this installation guide to determine where and how to place the SEU into the rack before proceeding with Step 1.

1. Follow the instructions on the outside of the server packaging to remove the banding and carton top from the server pallet.
2. Remove all cartons from the pallet, leaving only the SEU.
3. Position the RonI lifter as shown in Figure 3-6.
4. Insert the lifter forks under the SEU.
5. Carefully roll the lift forward until it is fully positioned against the side of the SEU.
6. Slowly raise the SEU off the pallet until it clears the pallet cushions.
7. Roll the lifter and SEU away from the pallet. Do not raise the SEU any higher than necessary when moving it over to the rack.

**Figure 3-7 Lifting the SEU into Position for Rack Installation**

---

**Installing the Cable Management Arm**

After the SEU is installed in the rack, the cable management arm (CMA) must be installed on the rear of the SEU. Follow the instructions for installing the CMA in the *Installation Guide, HP J1530B, Rack Integration Kit* (MPN J1530–90003), beginning on page 14. You may source this document at the following Website:


The CMA is attached to the rack using screws supplied in the kit. The other end of the CMA is attached to the SEU using custom nuts supplied in the kit.

---

**Installing the Rack Interlock Device Assembly**

Once the CMA is installed on the rear of the SEU then the interlock device assembly must be installed. Follow the instructions for installing the interlock device assembly in the *Installation Guide, HP J1530B, Rack Integration Kit*.

---

**Installing SEU without a Mechanical Lift**

Use this procedure only if an HP approved lift is not available.

This procedure should only be performed by two qualified HP Service technicians utilizing proper lifting techniques and procedures.
System damage can occur through improper removal and replacement of devices. This task must be performed by trained personnel only. Instructions for removing and replacing these components can be found in the Removal & Replacement chapter of the Service Guide.

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

Any HP SEU installed into a rack is shipped with equipment slides. The following Installation Guide is provided with every set of slides: *Installation Guide, HP J1530B, Rack Integration Kit (MPN J1530–90003)*. You may source this guide at the following website:


Follow the steps in this installation guide to determine where and how to place the SEU into the rack before proceeding with Step 1.

1. Reduce the weight by removing both bulk power supplies.
2. Locate the four positioning handles on the sides of the system. They are color coded blue and are located close to each base corner of the unit.
3. Unfold the handles so they extend out from the unit. The unit is now ready for manual lifting by two qualified HP Service technicians.
4. After the SEU is secured in the rack cabinet, re-install the previously removed bulk power supplies.

Installing Accessories

Additional accessories can be installed in the SEU, such as PCI I/O cards, hard disk drive storage, and removable media device storage.

Installing Additional Components

This section provides installation instructions and dependencies for add-on products ordered after installation.

Embedded Disks

When disks are installed, the top two hard disk drives are driven by cell 2, located in the server connected to the SEU. The bottom two hard disk drives are driven by cell 3, located in the server connected to the SEU.

A list of replacement drives for the SEU is located in Appendix A in the SEU Service Guide. The list contains both removable media drives and hard disk drives.
Hard Disk Drive Installation

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

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

1. Be sure the front locking latch is open, then position the disk drive in the chassis.
2. Slide the disk drive into the chassis; a slow, firm pressure is needed to properly seat the connector.
3. Press the front locking latch to secure the disk drive in the chassis.
4. Spin up the disk by entering one of the following commands:
   - `#diskinfo -v /dev/rdsk/cxtxdx`
   - `#ioscan -f`

Removable Media Drive Installation

The DVD drive or DDS-4 tape drive is located in the front of the chassis.

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

1. Remove filler panel.
2. Connect the cables to the rear of the removable media drive.
3. Install left and right media rails and clips.
4. Slide the drive in the chassis. Fold the cables out of the way.

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

PCI/PCI-X/PCIe I/O Cards

A number of I/O cards is supported in the SEU PCI-X assembly. Known cards supported at the release of this manual are shown in Table 3-1.
Table 3-1 covers cards supported in the SEU when connected to the respective server shown in the table. Refer to the Installation Guide for the server to obtain the number and type of PCI/PCI-X/PCIe cards supported in a server.

### Table 3-1 HP Integrity rx8640 SEU PCI-X/PCIe I/O Cards

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Card Description</th>
<th>HP-UX</th>
<th>Windows</th>
<th>Linux</th>
<th>VMS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PCI/PCI-X Cards</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A4926A</td>
<td>Gigabit Ethernet (1000b-SX)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A4929A</td>
<td>Gigabit Ethernet (1000b-T)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A5158A</td>
<td>FCMS - Tachlite</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A5230A</td>
<td>10/100b-TX (RJ45)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A5506B</td>
<td>4-port 10/100b-TX</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A5838A</td>
<td>2-port Ultra2 SCSI/2-Port 100b-T Combo</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A6386A</td>
<td>Hyperfabric II</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A6749A</td>
<td>64-port Terminal MUX</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A6795A</td>
<td>2G FC Tachlite</td>
<td></td>
<td></td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>A6825A</td>
<td>Next Gen 1000b-T</td>
<td></td>
<td>b</td>
<td>b</td>
<td></td>
</tr>
<tr>
<td>A6826A¹</td>
<td>2-port 2Gb FC</td>
<td></td>
<td>B</td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>A6828A</td>
<td>1-port U160 SCSI</td>
<td></td>
<td>B</td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>A6829A</td>
<td>2-port U160 SCSI</td>
<td></td>
<td>B</td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>A6847A</td>
<td>Next Gen 1000b-SX</td>
<td></td>
<td>b</td>
<td>b</td>
<td></td>
</tr>
<tr>
<td>A6869B²</td>
<td>A6869B VGA/USB</td>
<td></td>
<td>B</td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>AD307A</td>
<td>iLO (USB/VGA/RMP)</td>
<td></td>
<td>B</td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>A7011A</td>
<td>1000b-SX Dual Port</td>
<td></td>
<td>b</td>
<td>b</td>
<td>b</td>
</tr>
<tr>
<td>A7012A</td>
<td>1000b-T Dual Port</td>
<td></td>
<td>b</td>
<td></td>
<td>B</td>
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<td>A7173A</td>
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<tr>
<td>A9782A¹</td>
<td>1000b-T GigE/2G FC Combo</td>
<td></td>
<td>Bb</td>
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<tr>
<td>A9784A¹</td>
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<td>Bb</td>
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<td>B</td>
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<tr>
<td>A9890A</td>
<td>2-port Smart Array 6402 (U320)</td>
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<td>B</td>
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<tr>
<td>A9891A</td>
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<td>AB232A¹</td>
<td>Emulex 9802 Fibre Channel</td>
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<tr>
<td>AB286A</td>
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<td>AB286C</td>
<td>PCI-X 2-Port 4X InfiniBand HCA (HPC)-RoHS</td>
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<tr>
<td>AB287A</td>
<td>10 GbE - Fiber (PCI-X 133)</td>
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<tr>
<td>AB290A</td>
<td>U320 SCSI/GigE Combo Card</td>
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<tr>
<td>AB345A</td>
<td>PCI-X 2-port 4X InfiniBand HCA</td>
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<tr>
<td>AB378B¹</td>
<td>QLogic 1-port 4Gb FC card (PCI-X 266)</td>
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<td>AB378B</td>
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<tr>
<td>AB379B¹</td>
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### Table 3-1 HP Integrity rx8640 SEU PCI-X/PCIe I/O Cards (continued)

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Card Description</th>
<th>HP-UX</th>
<th>Windows</th>
<th>Linux</th>
<th>VMS</th>
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<tbody>
<tr>
<td>AB379B</td>
<td>QLogic 2-port 4Gb FC card (PCI-X 266)</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>AB429A</td>
<td>1-Port 4Gb FC QLogic – AB378A equivalent</td>
<td>B</td>
<td>B</td>
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<tr>
<td>AB465A</td>
<td>2-port 1000b-T 2Gb FC Combo</td>
<td>Bb</td>
<td></td>
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<tr>
<td>AB466A</td>
<td>Emulex 1050DC Fibre Channel</td>
<td>B</td>
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<tr>
<td>AB467A</td>
<td>Emulex 1050D Fibre Channel</td>
<td>B</td>
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<td>AB545A</td>
<td>4-Port 1000b-T Ethernet</td>
<td>b</td>
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<td>AD167A</td>
<td>Emulex 4Gb/s</td>
<td>B</td>
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<tr>
<td>AD193A</td>
<td>1-port 4Gb FC &amp; 1-port GbE HBA PCI-X</td>
<td>Bb</td>
<td></td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>AD194A</td>
<td>2-port 4Gb FC &amp; 2-port GbE HBA PCI-X</td>
<td>Bb</td>
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<td>B</td>
<td></td>
</tr>
<tr>
<td>AD168A</td>
<td>Emulex 4Gb/s DC</td>
<td>B</td>
<td></td>
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<tr>
<td>AD278A</td>
<td>8-Port Terminal MUX</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>J3525A</td>
<td>2-port Serial</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>337972-B21</td>
<td>SA P600 (Redstone)</td>
<td>B</td>
<td></td>
<td>B</td>
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<tr>
<td>374191-B21</td>
<td>Broadcom 5706 rNIC-SX</td>
<td></td>
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<tr>
<td>374193-B21</td>
<td>Broadcom 5706 rNIC-T</td>
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</tbody>
</table>

**PCIe Cards**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Card Description</th>
<th>HP-UX</th>
<th>Windows</th>
<th>Linux</th>
<th>VMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A8002A</td>
<td>Emulex 1-port 4Gb PCIe</td>
<td>B</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>A8003A</td>
<td>Emulex 2-port 4Gb PCIe</td>
<td>B</td>
<td></td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>AD299A</td>
<td>1-port 4Gb FC HBA PCIe (Emulex)</td>
<td>B</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>AD300A</td>
<td>2 port 4Gb FC PCIe (QLogic)</td>
<td>B</td>
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<td>B</td>
</tr>
<tr>
<td>AD313A</td>
<td>2 Ch 4X InfiniBand HCA PCIe</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>AD337A</td>
<td>2 port 1000BT NIC PCIe</td>
<td>b</td>
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<td>AD338A</td>
<td>2 port 1000B-SX NIC PCIe</td>
<td>b</td>
<td>b</td>
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<td></td>
</tr>
<tr>
<td>AE311A</td>
<td>1 port 4Gb FC PCIe (QLogic)</td>
<td>B</td>
<td></td>
<td>B</td>
<td></td>
</tr>
</tbody>
</table>

- B - Supports Mass Storage Boot
- b - Supports LAN Boot
- Bb - Support Mass Storage and LAN Boot

1. Factory integration (software load) of the OpenVMS, Windows, and Linux operating systems via Fibre Channel is NOT supported.
2. Boot support is limited to OS installation, updating, and repairing media.
PCI I/O Card Installation

**CAUTION:** While the installation process for PCI/PCI-X cards and PCIe cards is the same; PCIe cards are physically smaller than PCI-X cards and are not interchangeable with PCI/PCI-X cards. Check Table 1-8 (page 24) to verify the slot types and order.

**NOTE:** The PCI I/O card installation process varies depending on which version of the HP-UX operating system you are running on your system. PCI I/O card installation procedures should be downloaded from the [www.hp.com/go/bizsupport](http://www.hp.com/go/bizsupport) Web site. Background information and procedures for adding a new PCI I/O card using online addition are found in:

- nPartition Administrator’s Guide
- Interface Card OL* Support Guide for HP-UX 11.23

1. Consult the appropriate guide for instructions on preparing the operating system for the online addition of the PCI I/O card before attempting to insert a PCI I/O card into the PCI-X assembly backplane slot.
2. Remove the top cover.
3. Open the manual retention latch (MRL). See Figure 3-9 for details.

**Figure 3-9 Manual Retention Latch Detail**

4. Remove the PCI bulkhead filler panel.
5. Position and seat the PCI card in the slot.

**NOTE:** A slow, firm pressure is needed to properly seat the card into the connection.

6. Rotate the MRL to the closed position.
NOTE: The Server Expansion Unit implements manual retention latch (MRL) hardware for use in online add or replacement (OLAR) operations. If an MRL is left open while the server is booting, HP-UX can incorrectly cache PCI slot power status causing OLAR operations to fail. To prevent this situation, ensure all the MRLs are closed before booting the server.

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

7. Replace the top cover.
8. Connect all cables to the installed PCI card.

**HP Lights Out Advanced/KVM Card**

**Overview**

The Lights Out Advanced/KVM Card (LOA) is a PCI-X accessory card that can be installed into any sx2000–based Integrity server to enable the advanced virtual graphical console (vKVM) and virtual CD/DVD/ISO file (vMedia) features of the Integrity Lights Out Management Processor (iLO/MP). The LOA card is also a graphics/USB card that offers physical video functionality for servers running Windows, and USB functionality for servers running HP-UX, Windows, and OpenVMS. All Lights Out Advanced features are fully enabled on the LOA card — there is no additional “advanced pack” license to purchase. At present, vKVM is only available for servers running Windows and vMedia is available for servers running HP-UX, Windows, and OpenVMS. There are no current plans to support the LOA card under Linux.

For more information, see Chapter 5 of the *HP Integrity iLO 2 Operations Guide* (MPN 5991–8053–ed9).

You may source this document at the following website:

[www.hp.com/go/bizsupport](http://www.hp.com/go/bizsupport)

**Slotting Rules**

The LOA card has specific slotting requirements that must be followed for full card functionality, they are:

- Must be placed in a mode 1 PCI/PCI-X slot.
- Must be placed in an I/O chassis with a core I/O card.
- Must be only one LOA card on each partition.

NOTE: HP recommends that you place the LOA card in the lowest numbered slot possible.

**Cabling and Power Up**

This chapter describes how to install the cables between the server and the SEU. Four E-link cables must be installed. Two E-link cables provide cell to I/O connectivity for cell 2 in the server and the other two E-link cables provide cell connectivity for cell 3 in the server. When the cables are installed, the next steps are to configure the MP port, then apply 48V to the SEU and to the server.
NOTE: This section describes the installation of the E-link cables between the SEU and the server.

INSTALLATION NOTES BEFORE GETTING STARTED

- Before attaching the SEU, the server must be shut down. Schedule this with the customer prior to beginning the SEU installation.
- The SEU is only supported with servers containing a minimum of three cell boards. The cell boards must be loaded in the server in cell board slots 0, 1, and 2. Cell board slot 0 is the top-most slot in the server chassis.
- The SEU ships with both core I/O cards installed.
- If the server only has one core I/O card installed, another core I/O card must be installed in the server to support the SEU.
- When the SEU is installed in the same rack cabinet as the server, the SEU must be mounted directly above the server. This could require moving existing products to another rack cabinet.
- When the SEU is installed in an adjacent rack to the server, adhere to the following guidelines for installation:
  - Two SEUs can be installed in a single rack with proper anti-tip feet, system interlock rod, and ballast.
  - The two racks must be secured together with rack tie kits and the rear doors must be removed. The racks must be either 41U or 33U. A 25U rack is not permitted for SEU installation.
  - The top of the SEU must be at the same level as the top of the host server to enable a complete service loop accomplished by routing the cable out the back of one rack into the back of the other rack so both the host server and the SEU can be fully extended in the locked position simultaneously.
  - The space above and below the SEUs may be used, but care must be taken so equipment installed in this space does not interfere with the interlock mechanism or SBA cable routing.
- The server operating system will need to be updated.

Shutting Down nPartitions

This section describes how to properly shut down an nPartition.

For complete details on system administration for nPartitions, refer to the HP System Partitions Guide.

Shutting Down an nPartition

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

1. Advise the customer that the system (one or more nPartitions) must be shut down for repairs. Ensure that the customer has a current backup, and inform the customer of the anticipated downtime.
2. Login to the server MP.
3. Use the Virtual Front Panel (VFP) to view the current state of the nPartition that you will shut down.

From the MP Main menu, enter VFP to access the Virtual Front Panel menu, and select the nPartition whose boot state you want to view.
Type **Control-b (^B)** to exit the VFP display.

- If an nPartition has booted HP-UX, or if it is in the process of launching HP-UX, you must shut down HP-UX on the nPartition.
  
  When HP-UX is running on an nPartition, its VFP displays the “HP-UX heartbeat” with a blinking asterisk * to indicate its interactivity.

  In this case, proceed with the next step.

- If the nPartition is at its extensible firmware interface (EFI) shell, then HP-UX has already been shut down.

- If the nPartition currently is booting, then you should wait for it to reach the EFI shell and, if necessary, interrupt auto-boot when you see the **Attempting to boot and To discontinue, press any key within 10 seconds** messages in the console window.

  **NOTE:** The message **Attempting to boot and To discontinue, press any key within 10 seconds** appears in the console window and not in the VFP.

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

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

5. Login to HP-UX at the console for the nPartition and shut down the operating system.

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

   For example: The `shutdown -h 240` command will shut down and halt HP-UX on the nPartition after waiting for a grace period of four minutes (240 seconds).

   To reboot the nPartition after it is halted, use the RS command of MP Command menu to restart the nPartition. (This enables the nPartition to reset and boot to its EFI shell; if **auto-boot** is configured it also boots HP-UX.)

6. Disconnect all the power cords located on the back of the server to remove all power from the server.

**Top Cover Removal**

It is necessary to remove the top and side covers (on the left side of the server as you face the front of the server chassis) to route the cables and to gain access to the backplane.
Removing the Server Top Cover

1. Connect to ground with a wrist strap.
2. Loosen the blue retaining screws securing the cover to the chassis.
3. Slide the cover toward the rear of the chassis.
4. Lift the cover up and away from the chassis.
5. Place the cover in a safe location.
Side Cover Removal

Figure 3-11 Side Cover Removal

1. Loosen the blue retaining screw securing the side cover to the chassis. (See Figure 3-11.) The screw is located at the bottom of the server chassis.
2. Slide the cover from the chassis toward the rear of the system.
3. Place the cover in a safe location.

After removing the side cover, the system backplane is visible.
Connecting E-Link Cables to the Server

The cables will be routed inside the server chassis and connected to the shrouds on the server backplane.

1. Remove the E-link cable bridge bracket, located at the rear of the server chassis in the upper right side, by turning the two thumbscrews counterclockwise. Lift the U-shaped SBA hold-down bracket positioned behind the E-link cable bridge bracket up and away from the chassis. With a screwdriver, gently pop the filler plates away from the chassis. Discard the parts just removed from the server.
2. Insert the E-link cable assembly bracket tab into the corresponding slot in the server chassis.
3. Screw the E-link cable assembly bracket attached to the cables into the server chassis.
4. Route each cable along the outside of the backplane down to the shrouds. Match each cable to the shroud connector using the key on the REO Cable Instructions label affixed to the chassis on the upper left-hand side as you face the backplane.

**NOTE:** The term REO on the REO Cable Instructions label has the same meaning as the term SBA.

5. Snap each cable under the cable clamps provided on the chassis frame. For cable to cable clamp positioning, refer to Figure 3-15 (page 54).
6. Push the cable on the connector and secure the cable attached to the shroud by tightening the captive screw attached to the cable.
7. Complete the procedure by securing the remaining three E-link cables in place with the captive screw located on each cable. See Figure 3-13 for E-link cable orientation.

**Figure 3-13 E-link Cable Orientation on Server**

---

### Connecting E-link Cables to the SEU

1. Remove the top and left side covers from the SEU.
2. Remove the E-link cable bridge bracket, hold-down bracket, and filler plates at the rear of the SEU in the upper right corner. Discard the parts just removed from the SEU.
3. Route the cable bundle up to the SEU and then inside the chassis.
4. Insert the cable assembly bracket tab into the corresponding slot in the chassis.
5. Screw the cable assembly bracket attached to the cable bundle into the chassis.
6. Route cables along the outside of the system backplane and match the cables to the connectors using the REO Cable Instructions label affixed to the chassis.

**NOTE:** The term REO on the REO Cable Instructions label has the same meaning as the term SBA.

7. Push the cable onto the connector and tighten the screw for each cable to secure the cable in place to the backplane.
8. Reinstall the top and side covers.
E-Link Cable Routing for SEU Installed in Same Cabinet as the Server

The E-link cable bundle must be routed on the right side of the cabinet using the path shown in Figure 3-16 when the SEU is installed in the same rack cabinet with the server.
**E-Link Cable Routing for SEU Installed in Adjacent Cabinet to the Server**

The E-link cable bundle must be routed using the path shown in Figure 3-17 when the SEU is installed in a rack cabinet adjacent to the server.
When the SEU is installed in an adjacent rack to the server, adhere to the following guidelines for installation:
- Two SEUs can be installed in a single rack cabinet.
- The racks must be either 41U or 33U. A 25U rack is not permitted for SEU installation.
- The rack cabinets must be installed with proper anti-tip feet, system interlock rods, and ballast.
- The two rack cabinets must be secured together with rack tie together kits and the rear doors of each rack cabinet must be removed.
- The top of the SEU must be at the same level as the top of the host server to enable a complete SBA cable service loop. This is accomplished by routing the cable out the back of one rack cabinet into the back of the other rack cabinet so both the host server and the SEU can be fully extended in the locked position simultaneously.
- The space above and below the SEUs may be used, but care must be taken so equipment installed in this space does not interfere with the interlock mechanism or SBA cable routing.

**Cabinet Label Placement**  There are two cabinet labels that need to be attached to the server and to the SEU if they were not already attached at the factory. The label “Cabinet 8” must be attached to the SEU and is installed to the left of the PCI slot label. The label “Cabinet 0” must be attached to the server and is installed to the left of the PCI slot label. See Figure 3-18 for label placement.
Voltage Check

This section provides voltage check information for use on the customer site. The emphasis focuses on measuring the voltages at the power cord plug end specified as an IEC-320 C19 type plug. This is the end that plugs directly into the back of the SEU chassis.
NOTE: These procedures must be performed for each power cord that will be plugged directly into the back of the SEU. If the expected results from this procedure are not observed during the voltage check, refer to the next section titled “Voltage Check (Additional Procedure).”

Voltage Range Verification of Receptacle

This measures the voltage between L1 and L2, L1 to ground, and L2 to ground. Three separate measurements are performed during this procedure. Refer to Figure 3-19 for voltage reference points when performing the following measurements.

Figure 3-19 Voltage Reference Points for IEC 320 C19 Plug

IMPORTANT: These measurements must be performed for every power cord that plugs into the SEU.

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

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

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

Table 3-2 provides single phase voltage measurement examples dependent on the geographic region where these measurements are taken.

Table 3-2 Single Phase Voltage Examples

<table>
<thead>
<tr>
<th></th>
<th>Japan</th>
<th>North America</th>
<th>Europe ¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1-L2</td>
<td>210V</td>
<td>208V or 240V</td>
<td>230V</td>
</tr>
<tr>
<td>L1-GND</td>
<td>105V</td>
<td>120V</td>
<td>230V</td>
</tr>
<tr>
<td>L2-GND</td>
<td>105V</td>
<td>120V</td>
<td>0V</td>
</tr>
</tbody>
</table>

¹ In some European countries there might not be a polarization.
Safety Ground Verification

This measures the voltage level between B0 and A0. The measurement is taken between ground pins of the two power cords. Refer to Figure 3-20 for ground reference points when performing this measurement.

Figure 3-20 Safety Ground Reference Check

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

Voltage Check (Additional Procedure)

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

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

NOTE: If a UPS is used, refer to applicable UPS documentation for information to connect the server and to check the UPS output voltage. UPS User Manual documentation is shipped with the UPS. Documentation may also be found at the following website:

www.hp.com/go/bizsupport

1. Verify that site power is OFF.
2. Open the site circuit breakers.
3. Verify that the receptacle ground connector is connected to ground. Refer to Figure 3-21 for connector details.
4. Set the site power circuit breaker to ON.
Figure 3-21 Wall Receptacle Pinouts

![Diagram of wall receptacle pinouts]

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

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

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

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

**Connecting AC Input Power**

The SEU has two line cord configurations:
- The preferred configuration is line cords B0 and A0 plugged into the SEU. This configuration provides power supply redundancy when each power cord is plugged into a different power source.
- The other configuration is line cord A0 plugged into the SEU. Use the A0 power cord receptacle when only one power source is available to supply power to the SEU.
Power cord receptacles are identified using a label at the rear side of the chassis indicating which receptacle is B0 and which receptacle is A0.

The SEU follows the power configuration that is selected for the server. So, if grid A0 & B0 are selected for the server, the SEU needs to have both power cords connected. Otherwise, power fault messages are logged. You cannot select one power configuration for the SEU and another power configuration for the server.

**NOTE:** If only one power cord receptacle is used, always plug the power cord into A0.

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

The AC input for power receptacle A0 connects to both BPS 0 and BPS 1. The AC input for power receptacle B0 connects to both BPS 0 and BPS 1. Refer to Figure 3-23 for details.
Figure 3-23 Power Source versus Power Distribution

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

1. Insert the power cords into the SEU after the voltage has been verified using the “Voltage Check” (page 57). Do not press the power switch yet.
2. Ensure the power cords are inserted in the server. Do not press the power switch yet.
3. Continue with the “MP Core I/O Connections” (page 63).

Installing The Line Cord Anchor (rack mounted servers)

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

IO Expander Installation

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

To install the line cord anchor

1. Align the line cord anchor thumbscrews with the corresponding captive nuts at the rear of the chassis. Refer to Figure 3-24: “IO Expander Line Cord Anchor”,
2. Tighten the captive thumbscrews to secure the line cord anchor to the chassis.
3. Weave the power cables through the line cord anchor. Leave enough slack that the plugs can be disconnected from the receptacles without removing the cords from the line cord anchor
4. Use the supplied Velcro straps to attach the cords to the anchor. Refer to Figure 3-24: “IO Expander Line Cord Anchor”,
MP Core I/O Connections

Each SEU has two core I/O cards installed and each core I/O card has a management processor (MP). This enables two partitions to operate, or enables MP core I/O redundancy in a single partition configuration. Each MP core I/O board is oriented horizontally and accessed from the back of the server.

**IMPORTANT:** The MP LAN, local and remote console ports are never functional for a core I/O card installed in the SEU.

The system LAN port is not functional until the operating system is configured and running.

External connections to the core I/O board include the following:
• One Ultra 320 (320Mb/second) 68-pin SCSI port—A connection for external SCSI devices (by way of a VHDCI connector). VHDCI is an industry-standard term that stands for Very High-Density Cable Interconnect.

• One RJ-45 style 10Base-T/100Base-T/1000Base-T system LAN connector—This LAN uses standby power and is active when AC is present and the front panel power switch is off.

• One RJ-45 style 10Base-T/100Base-T MP LAN connector—This LAN port is not functional when the core I/O is installed in the SEU.

• One RS-232 connector which provides local console. This port is non-functional on the SEU.

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

• Two low voltage differential (LVD) internal SCSI buses for internal hard drives and one single-ended (SE) internal SCSI bus for internal media.

Management Processor Access

NOTE: This procedure for accessing the MP LAN refers to the core I/O card installed in the server. Direct access to the MP LAN port on either core I/O card in the SEU is not possible.

The following procedure enables direct access to the management processor (MP) LAN port on the core I/O card installed in the server. You will be able to telnet directly from your laptop to the MP. Your laptop will need a copy of the Reflection terminal emulation software already loaded. A crossover cable, or a serial cable will be needed to connect from the laptop LAN port directly to the MP LAN port on the core I/O card.

Setting Up the CE Tool (PC)

The CE Tool is usually a laptop. It enables communication with the MP in the server. The MP monitors the activity of a one partition or a multiple partition configuration.

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

• Verifying that the components are present and installed correctly

• Setting LAN IP addresses

• Shutting down cell board power

Communication with the MP is established by connecting the CE Tool to the MP LAN port on the core I/O card.

Connecting the CE Tool

To connect the CE Tool to the LAN Port within the server cabinet:

1. Connect one end of the crossover cable to the MP LAN port on the top core I/O card.

2. Connect the other end of the crossover cable to the CE Tool LAN card adapter.

Setting CE Tool Parameters

If the CE Tool is a laptop using Reflection, verify or establish these communications settings using the following procedure:

1. From the Reflection Main screen, click on the New... button.

2. Enter an arbitrary name in the Connection name: window.

3. Click the Save button to store the name you chose.

4. Click the Connect button.

5. In the Host/Service name: window, enter the IP address for the MP LAN port. The factory default LAN IP address for the LAN port is 192.168.1.1

6. Click OK to connect to the MP and receive a MP login: prompt.
Standby Power and Logging in to the MP

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

NOTE: Connection to the MP is performed through the core I/O card installed in the server.

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

   ![Figure 3-26 Front Panel Display](image)

2. Verify the bulk power supply LED for each BPS.
   When on, the breakers distribute power to the BPSs. AC power is present at the BPSs under the following conditions:
   
   - When power is first applied, the BPS LEDs will be flashing amber.
   - After 30 seconds has elapsed the flashing amber BPS LED for each BPS becomes a flashing green LED

3. Login to the server MP:
   a. Enter **Admin** at the login prompt. This term is case sensitive.
   b. Enter **Admin** at the password prompt. This term is case sensitive.

   The MP Main Menu appears:

   ![Figure 3-27 MP Main Menu](image)

   **MP MAIN MENU:**

   CO: Consoles
   VFP: Virtual Front Panel
   CM: Command Menu
   CL: Console Logs
   SL: Show Event Logs
   FW: Firmware Update
   HE: Help
   X: Exit Connection

   \[\text{metro-s}] MP>
Configuring LAN Information for the MP

To set the server MP LAN IP address:

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

   The screen lists the default values and asks if you want to modify them. It is a good idea to write down the information, as it may be required for future troubleshooting.

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

Enter lc and press the Return key. The following screen appears:

![Figure 3-28 The lc Command Screen](image)

```
[metro-s] MP:CM> lc
```

This command modifies the LAN parameters.

Current configuration of MP customer LAN interface

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAC address</td>
<td>00:12:79:04:03:02</td>
</tr>
<tr>
<td>IP address</td>
<td>15.99.93.50</td>
</tr>
<tr>
<td>Hostname</td>
<td>metro-s</td>
</tr>
<tr>
<td>Subnet mask</td>
<td>255.255.248.0</td>
</tr>
<tr>
<td>Gateway</td>
<td>15.99.95.254</td>
</tr>
<tr>
<td>Status</td>
<td>UP and RUNNING</td>
</tr>
</tbody>
</table>

**NOTE:** The value in the IP address field was set at the factory. The customer must provide the actual LAN IP address.

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

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

4. Enter y.

5. Enter the new IP address.

   The customer will provide this address for network interface 0.

6. Confirm the new address.

7. Enter the MP Network name.

   This is the host name for the customer LAN. The name can be as many as 64 characters, and include alpha numerics, - (dash), _ (under bar), . (period), or a space. It is recommended that the name be a derivative of the complex name, for example, Acme.com_MP.

8. Enter the LAN parameters for Subnet mask and Gateway address.

   This information will come from the customer.

9. When step 7 is complete, the system indicates the parameters have been updated and returns to the MP Command Menu prompt MP:CM>

10. To check the LAN parameters and status, enter the ls command at the server MP Command Menu prompt MP:CM>.
11. A screen similar to the following appears allowing verification of the settings:

**Figure 3-29 The `ls` Command Screen**

```
[metro-s] MP:CM> ls

Current configuration of MP customer LAN interface
MAC address : 00:12:79:b4:03:02
IP address   : 15.99.49.26       0xf63311a
Hostname     : metro-s
Subnet mask : 255.255.248.0     0xffffff800
Gateway      : 15.99.49.254      0xf6331fe
Status       : UP and RUNNING
```

To return to the server MP main menu, enter `ma`.
To exit the server MP, enter `x` at the MP main menu.

**Examining the MP Bus Devices**

To determine what is seen by the MP in the system:

1. At the server MP prompt, enter `cm`.
   
The Command Menu is displayed. With the Command Menu, you can view or modify the configuration and look at utilities controlled by the MP.
   
   To look at a list of the commands available, enter `he`. You may have to press Enter to see more than one screen of commands. Use the **Page Up** and **Page Down** keys to view the previous or next screen of commands. To exit the Help Menu, enter `q`.

2. From the command prompt `MP:CM>`, enter `du`.
   
The `du` command displays the MP bus topology. A screen similar to the following appears:

**Figure 3-30 The `du` Command Screen**

```
MP:CM> du

Display detailed status of the selected MP bus device.
```

3. Verify there is an asterisk * in the columns under the MP heading for Cab# 8. You will also see entries for the system backplane, the IO chassis and the bulk power supplies.

**Configuring AC Line Status**

Utilities can detect if power is applied to each of the AC input cords for the SEU. This detection is achieved by sampling the status of the bulk power supplies. During installation, use the
following procedure to check the configuration for the AC line status and configure it to match the customer’s environment.

**NOTE:** Connection to the MP is performed through the core I/O card installed in the server. The SEU follows the power configuration selected for the server.

1. At the server MP prompt, enter `cm`. The command menu is displayed, and allowing the viewing and configuring of various utilities controlled by the MP.

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

**Figure 3-31 The pwrgrd Command Screen**

```
[metro-s] MP:CM> pwrgrd

The current power configuration is: Single grid

Power grid configuration preference.

1. Single grid
2. Dual grid

Select Option: 1

Power grid configuration set to single grid
```

3. Verify that the power grid configuration is correct by examining the output from the `pwrgrd` command. The previous power configuration indicates that only grid A has been configured.

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

**Applying 48V Power to the SEU and to the HP Integrity rx8640 Server**

48V power will be supplied to the server and the SEU after pressing the power switch. Core I/O card FPGA and MP revisions will be verified in the following procedure.

1. Press the power switch on the front of the SEU.
2. Press the power switch on the front of the server.
NOTE: After turning on the 48V sub system, wait 1–2 minutes for the partition configuration (complex A, B & C configurations) information to be transferred to the core I/O cards. To determine this has been accomplished, log in to the MP and view the MP Main Menu selections available. The CO: Consoles option is not available until the transfer of partition configuration is complete. See examples below.

**Partition Configuration Information Has Not Been Transferred**

MP MAIN MENU:

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

MP>

**Partition Configuration Information Has Been Transferred**

Press the enter key to refresh the screen and receive a similar screen below.

MP MAIN MENU:

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

MP>

3. Verify the firmware revisions using the sysrev command.

MP:CM> sysrev

    Cabinet firmware revision report

PROGRAMMABLE HARDWARE :

<table>
<thead>
<tr>
<th>System Backplane</th>
<th>GPM</th>
<th>EMMUX</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>001.002.000</td>
<td>001.000.000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IO Backplane</th>
<th>IO_LPM-0</th>
<th>IO_LPM-1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>001.003.000</td>
<td>001.003.000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Core IO</th>
<th>CIO-0</th>
<th>CIO-1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>001.002.000</td>
<td>001.002.000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CELL_LPM</th>
<th>CELL_JTAG</th>
<th>CELL_PDH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Cell 0    | 001.002.000  | 001.002.000   | 001.005.001   |
| Cell 1    | 001.002.000  | 001.002.000   | 001.005.001   |
Cell 2: 001.002.000 001.002.000 001.005.001
Cell 3: 001.002.000 001.002.000 001.005.001

FIRMWARE:

Core IO
MP-0: B.002.005.012
ED-0: 002.007.000
MP-1: B.002.005.012
ED-1: 002.007.000

Cell 0
PDHC: B.023.003.038 - Active
PDHC: B.023.003.037
PDC_FW: 043.006.000 - Active
PDC_FW: 043.005.000

Cell 1
PDHC: B.023.003.038 - Active
PDHC: B.023.003.037
PDC_FW: 043.006.000 - Active
PDC_FW: 043.005.000

Cell 2
PDHC: B.023.003.038 - Active
PDHC: B.023.003.037
PDC_FW: 043.006.000 - Active
PDC_FW: 043.005.000

Cell 3
PDHC: B.023.003.038 - Active
PDHC: B.023.003.037
PDC_FW: 043.006.000 - Active
PDC_FW: 043.005.000

IO Cabinet FPGA and Firmware revision report

PROGRAMMABLE HARDWARE:

System Backplane:  GPM      EMMUX
                   ---------------  ---------------
                   001.002.000  001.000.000

IO Backplane:     IO_LPM-0  IO_LPM-1
                   ---------------  ---------------
                   001.003.000  001.003.000

Core IO:          CIO-0      CIO-1
                   ---------------  ---------------
                   001.002.000  001.002.000

FIRMWARE:

Core IO
MP-0: B.002.005.012
ED-0: 002.007.000
MP-1: B.002.005.012
ED-1: 002.007.000

4. Boot the server to the HP-UX operating system login prompt.
5. Log in and execute the ioscan (using the desired options) command to verify the new SEU I/O paths are available for use.
4 Troubleshooting

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

Common Installation Problems

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

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

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

1. Check all cable and power connections, including those in the rack, and so on.
2. Ensure the SEU is configured properly.
3. Verify all cables and boards are securely plugged into the appropriate connectors or slots.
4. Remove all extra options, such as disk drives, one at a time, checking its effect on the SEU.
5. Unplug the power cord, wait 20 seconds, plug the power cord in again, and restart the SEU.
6. If you suspect a hardware error:
   a. Log users off the LAN and power down the SEU.
   b. To remove PCI cards, extend the SEU out of the rack and remove the top cover.
   c. Simplify the server to the minimum configuration.
      The minimum configuration consists of the following:
      • One core I/O card installed in the lower slot of the core I/O backplane
      • System backplane
      • PCI-X backplane
      • One BPS (A0)
      • Two PCI power modules
      • One power cord (A0)
7. Remove all third-party options, and reinstall each one, one at a time, checking the SEU after each installation.
8. Replace the top cover and reconnect the power cord and other cables.
9. Boot up the SEU and if it does not function properly, refer to the following procedures.

The Server Does Not Power On

To check for power related problems:

1. Check each LED of the bulk power supply (BPS).
   The LED is located on the BPS at the front of the SEU. Remove the front bezel to see the BPS LED. Table 4-2 shows the states of the LEDs.

2. Check that the BPS and power cords are plugged into the chassis.

The SEU Powers On But Then Shuts Down with a Fault Light

To check for the following problems when the SEU powers on and then off:
1. Check for fault LEDs and check the MP logs for errors.
2. Check that a conductive item has not been dropped or left inside the SEU chassis.
3. Check the connections on all boards.
4. Check the system backplane for bent pins.
5. Minimize configuration to isolate a potential bad device.

**SEU LED Indicators**

The SEU has LEDs that indicate system health. This section defines those LEDs.

**Front Panel LEDs**

There are five (5) LEDs located on the front panel.

**Figure 4-1 Front Panel with LED Indicators**

**Table 4-1 Front Panel LEDs**

<table>
<thead>
<tr>
<th>LED</th>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>Off</td>
<td>48 V Off</td>
</tr>
<tr>
<td></td>
<td>Green (solid)</td>
<td>48 V Good (LED functions even if MP is not installed and not active)</td>
</tr>
<tr>
<td></td>
<td>Green (flashing)</td>
<td>Server cabinet is powering Off OS shutdown is in progress</td>
</tr>
<tr>
<td></td>
<td>Amber (flashing)</td>
<td>Non-redundant power condition exists. Check for:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• I/O Backplane VRMs fault</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• BPS fault</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Missing or faulty power cord</td>
</tr>
<tr>
<td></td>
<td>Red (flashing)</td>
<td>Insufficient power available. Check for:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• BPS missing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• PCI power module missing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Backplane VRMs missing</td>
</tr>
<tr>
<td>MP Status</td>
<td>Off</td>
<td>No MPs are installed or at least one is installed but not active</td>
</tr>
<tr>
<td></td>
<td>Green (solid)</td>
<td>At least one MP is installed and active</td>
</tr>
<tr>
<td></td>
<td>Amber (flashing)</td>
<td>Cabinet fan slow or failed Master slave failover</td>
</tr>
<tr>
<td></td>
<td>Amber (solid)</td>
<td>MP is booting (Occurs immediately after AC power On) FPGA detects no MPs present or functioning</td>
</tr>
<tr>
<td></td>
<td>Red (flashing)</td>
<td>Cabinet overtemp condition exists</td>
</tr>
<tr>
<td></td>
<td>Red (solid)</td>
<td>Cabinet shutdown for thermal reasons</td>
</tr>
</tbody>
</table>
### Table 4-1 Front Panel LEDs (continued)

<table>
<thead>
<tr>
<th>LED</th>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/O Chassis 0–Cell 2 and I/O Chassis 1–Cell 3 (Cell “n” = 2, 3)</td>
<td>Off</td>
<td>Cell power Off</td>
</tr>
<tr>
<td></td>
<td>Green (solid)</td>
<td>Cell power On, I/O backplane powered On</td>
</tr>
</tbody>
</table>
|     | Amber (flashing) | Cell I/O fault warning. Check for:  
  • LPM not ready  
  • Loss of power redundancy |
|     | Amber (solid) | Cell “n” I/O link not connected  
  I/O link connected but Cell “n” not present |
|     | Red (solid) | Cell “n” I/O fault. Check for:  
  • I/O bay powered Off due to power fault |
| Locate | Off | Timeout or user requests locator Off |
|       | Blue (flashing) | User requests locator On and specifies (1–72) hour Off timeout  
  (Default timeout is 24 hours) |

### Bulk Power Supply LEDs

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

**Figure 4-2 BPS LED Location**

![BPS LED Location](image)

### Table 4-2 BPS LED Indicators

<table>
<thead>
<tr>
<th>LED Indication</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blink Green</td>
<td>BPS in standby state and no faults or warnings</td>
</tr>
<tr>
<td>Green</td>
<td>BPS in run state (48V output enabled) and no faults or warnings</td>
</tr>
<tr>
<td>Blink Yellow</td>
<td>BPS in standby or run state and warnings present but no faults</td>
</tr>
<tr>
<td>Yellow</td>
<td>BPS in standby state and recoverable faults present but no non-recoverable faults</td>
</tr>
<tr>
<td>Blink RED</td>
<td>BPS state may be unknown, non-recoverable faults present</td>
</tr>
<tr>
<td>Red</td>
<td>BPS failure</td>
</tr>
<tr>
<td>Off</td>
<td>BPS fault or failure, no power cords installed or no power to chassis</td>
</tr>
</tbody>
</table>
PCI-X Power Supply LEDs

There are three LEDs on the PCI-X power supply. The green power LED reports overall power status for the PCI power supply. The multi-colored fault LED reports faults and warnings.

**Figure 4-3 PCI-X Power Supply LED Locations**

![Image of PCI-X Power Supply LED Locations]

**Table 4-3 PCI-X Power Supply LEDs**

<table>
<thead>
<tr>
<th>LED</th>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power¹</td>
<td>On Green</td>
<td>All output voltages generated by the power supply are within limits.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Power to entire system has been removed.</td>
</tr>
<tr>
<td>Fault²</td>
<td>Off</td>
<td>Normal operation.</td>
</tr>
<tr>
<td></td>
<td>Flash Red</td>
<td>Power supply has shut down because of an over temperature condition, a failure to regulate the power within expected limits, or a current-limit condition.</td>
</tr>
</tbody>
</table>

System and I/O Fan LEDs

There is a single three-color LED located on the front OLR fan, the rear OLR fan and the PCI I/O fan.
Table 4-4 contains the LED states for the front, rear, and PCI I/O fans.

### Table 4-4 Front, Rear and I/O Fan LED States

<table>
<thead>
<tr>
<th>LED</th>
<th>Driven By</th>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fan Status</td>
<td>Fan</td>
<td>Solid Green</td>
<td>Normal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flash Yellow</td>
<td>Predictive failure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flash Red</td>
<td>Failed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>No Power</td>
</tr>
</tbody>
</table>

**PCI OL* Card Divider LEDs**

The PCI OL* card LEDs are located on each of the 16 PCI slot dividers in the PCI-X card cage assembly area. The green power LED indicates whether power is supplied to the card slot. The yellow attention LED states are defined in Table 4-5 in combination with whether power is being supplied to the card or not.
Figure 4-5 PCI OL* LED Locations

Slot Attention (Yellow)
Slot Power (Green)
Card Divider

Table 4-5 OL* LED States

<table>
<thead>
<tr>
<th>State</th>
<th>Power (Green)</th>
<th>Attention (Yellow)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal operation, slot power on</td>
<td>On</td>
<td>Off</td>
</tr>
<tr>
<td>Slot selected, slot power on</td>
<td>On</td>
<td>Flashing</td>
</tr>
<tr>
<td>Slot needs attention, slot power on</td>
<td>On</td>
<td>On</td>
</tr>
<tr>
<td>Slot available, slot power off</td>
<td>Off</td>
<td>Off</td>
</tr>
<tr>
<td>Ready for OL*, slot power off</td>
<td>Off</td>
<td>Flashing</td>
</tr>
<tr>
<td>Fault detected, slot power off</td>
<td>Off</td>
<td>On</td>
</tr>
<tr>
<td>Slot powering down or up</td>
<td>Flashing</td>
<td>Off</td>
</tr>
</tbody>
</table>

Core I/O LEDs

The core I/O LEDs in Table 4-6 are located on the bulkhead of the installed core I/O PCA. There is a DIP switch on the core I/O card that is used to select which MP firmware set (indicated by the MP SEL LED) is selected for loading. The DIP switch is only visible when the core I/O card is removed from the system and is located in the center of the PCA.
**IMPORTANT:** The MP LAN, local and remote console ports are never functional for a core I/O card installed in the SEU.

The system LAN and UPS ports are not functional until the operating system is configured and running.

---

**Figure 4-6 Core I/O Card Bulkhead LEDs**

![Core I/O Card Bulkhead LEDs](image)

**Table 4-6 Core I/O LEDs**

<table>
<thead>
<tr>
<th>LED (as silk-screened on the bulkhead)</th>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCSI TRM</td>
<td>On Green</td>
<td>SCSI termpower is on</td>
</tr>
<tr>
<td>SCSI LVD</td>
<td>On Green</td>
<td>SCSI LVD mode (on = LVD, off = SE)</td>
</tr>
<tr>
<td>ATTN</td>
<td>On Yellow</td>
<td>PCI attention</td>
</tr>
<tr>
<td>PWR</td>
<td>On Green</td>
<td>I/O power on</td>
</tr>
<tr>
<td>SYS LAN 10 BT</td>
<td>On Green</td>
<td>SYS LAN in 10 BT mode</td>
</tr>
<tr>
<td>SYS LAN 100 BT</td>
<td>On Green</td>
<td>SYS LAN in 100 BT mode</td>
</tr>
<tr>
<td>SYS LAN 1Gb</td>
<td>On Green</td>
<td>SYS LAN in 1Gb mode</td>
</tr>
<tr>
<td>SYS LAN ACT</td>
<td>On Green</td>
<td>Indicates SYS LAN activity</td>
</tr>
<tr>
<td>SYS LAN LINK</td>
<td>On Green</td>
<td>SYS LAN link is ok</td>
</tr>
<tr>
<td>Locate</td>
<td>On Blue</td>
<td>Locater LED</td>
</tr>
<tr>
<td>Reset</td>
<td>On Red</td>
<td>Indicates that the MP is being reset</td>
</tr>
<tr>
<td>MP LAN 10 BT</td>
<td>On Green</td>
<td>MP LAN in 10 BT mode</td>
</tr>
<tr>
<td>MP LAN 100 BT</td>
<td>On Green</td>
<td>MP LAN in 100 BT mode</td>
</tr>
<tr>
<td>MP LAN ACT</td>
<td>On Green</td>
<td>Indicates MP LAN activity</td>
</tr>
<tr>
<td>MP LAN LINK</td>
<td>On Green</td>
<td>MP LAN link is OK</td>
</tr>
<tr>
<td>Active</td>
<td>On Green</td>
<td>This core I/O is managing the system</td>
</tr>
<tr>
<td>MP Power</td>
<td>On Green</td>
<td>Indicates standby power is on</td>
</tr>
</tbody>
</table>

---

**Disk Drive LEDs**

There are two tri-color LED on each disk drive.
Table 4-7 Disk Drive LEDs

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

Interlock Switches

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

- **Side Covers** - If either side cover is removed while the system is powered on, the system fans on the front and rear will increase in speed to ensure adequate cooling. An event code will be generated to indicate a side cover was removed.

- **Top Cover** - If the top cover is removed while the system power is on, the PCI-X assembly I/O fan speed will not change. An event code is generated to indicate the top cover was removed.

MP Code FRU Reporting

The Management Processor (MP) interface defines the locations for the field replaceable unit (FRU). These locations are denoted in the following figures to aid in physically locating the FRU when the diagnostics point to a specific FRU that has failed or may be failing in the near future.
The secondary core I/O card inserted in the upper slot is identified as core I/O 3 and the primary core I/O card inserted in the lower slot is identified as core I/O 2.

The SEU will work without the top (secondary) core I/O card installed but it will not operate without the bottom (primary) core I/O card installed.

Troubleshooting Aids

Troubleshooting

The basic steps in troubleshooting are:

• Identify the failure
• Troubleshoot using tools to categorize the failure
• Troubleshoot with specific procedures to pinpoint bad field replaceable unit (FRU).
• Remove the FRU, replace and then verify that the failure had been eliminated
• Restore the system

The steps below will allow quick assessment and solution of most system failures.

1. Determine what the symptom is. The following is a list of symptom examples:
   • Attention LED Blinking
   • System Alert present on Console
   • System will not power up
   • System will not boot
   • EMS Event Message received
   • MCA occurred

2. Narrow down from the observed problem to the specific troubleshooting procedures and isolate the failure to a specific part of the machine so that more detailed troubleshooting can be done to find the specific fix.

Example 4-1 Attention Light Is Blinking

If the attention light is blinking, look for more information as follows:

• Observe the console for a system Alert
• Analyze alert using IPMI decoder
• Analyze last IPMI error logged by the MP using IPMI decoder

At this point, the CE should have a good idea which area of the machine needs to be focused on. For example, if the symptom was “System won’t power up,” the initial troubleshooting procedures may have led to a problem with the DC power supplies (48 V) not coming up after the power switch was turned on.

3. Troubleshoot further to identify in more detail the exact cause of the problem.
4. Determine the FRU or FRUs that will fix the problem.

NOTE: If multiple FRUs are identified as part of the solution, a fix cannot be guaranteed unless all identified FRUs are replaced.

Contractual commitments may dictate multiple FRU replacements.

There may be specific recovery procedures that need to be done to finish the repair. For example, if the MP is replaced, customer specific information such as user profiles, network ID’s and passwords will need to be restored.

A basic “getting started” flow might look like figure 1-1.
Troubleshooting Aids

There are many troubleshooting "aids" available to help the investigator locate a failed FRU:

Maintenance Processor

The most useful is the Error Log indications as read using the maintenance processor (MP). Also, the MP `ps` command and others enables the user to interrogate the server quickly.

ODE Diagnostics

The Offline Diagnostic Environment (ODE) is useful for troubleshooting a system that is running without an operating system or cannot be tested using the online tools. This offline environment is also useful for some types of testing in which it is not desirable to have to boot the system first. The CE has the choice between a pure command line interface or a menu-driven interface.- Support Tools Manager (STM/EIT) is useful for: > Testing the system while it is online (OS is running). > Exercising the system to uncover the cause of intermittent problems. > Testing interface cards and peripheral devices. > Looking at system logs to get detail about suspected problems. > Obtaining hardware-related information, using Information tools. > Other functionality, such as downloading firmware to devices.
Using Logs and Files to Troubleshoot

Several key files provide much of the information required to fully troubleshoot a failed system. This section list the files, indicate where they are located, and provide some information on how to use them.

Management Processor Error Logs

There are three error logs accessed from the MP:

- System Event Log
- Forward Progress Log
- Live Events

To invoke these logs, enter **s1** from the MP main menu.
Management Processor Outputs

Three MP outputs can be used to determine vital status of the system:

- **sysrev** — Displays system revision
- **ps** — Displays power status
- **cp** — Displays cell partition information
Server Expansion Unit Firmware Revision

Verify that sx2000 Server Expansion Unit (SEU) firmware and programmable hardware versions match the PA-RISC HP 9000 rp8440 Server versions during initial installation.

A single process is used at the factory for shipping the sx2000 SEU. The process uses an HP Integrity server for factory integrated and non-integrated SEU’s. Therefore, the SEU will always contain an IPF firmware recipe when it ships from the factory to a customer.

The SEU can be attached to an HP 9000 rp8440 server or an HP Integrity rx8640 server. Each server uses different firmware. Each of these servers require matched SEU firmware and programmable hardware versions. The SEU versions must match the associated server versions.

During installation at a customer site, ensure the SEU contains a matching PA-RISC firmware revision when connecting to an HP 9000 PA-RISC server.

As documented in the HP Service Guide, Server Expansion Unit for the HP Integrity rx8640 and User Service Guide, Server Expansion Unit for the HP Integrity rx8640, perform the sysrev command from the MP Command Menu. Verify the firmware and programmable hardware revisions on the SEU are the same revisions as those on the HP 9000 PA-RISC server.

The SEU versions are listed in the section of the sysrev output titled IO Cabinet FPGA and Firmware revision report.

See the following example from an HP 9000 rp8440 server with SEU:

MP:CM> sysrev

Cabinet firmware revision report

PROGRAMMABLE HARDWARE:

<table>
<thead>
<tr>
<th>System Backplane</th>
<th>GPM</th>
<th>EMMUX</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>001.002.000</td>
<td>001.000.000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IO Backplane</th>
<th>IO_LPM-0</th>
<th>IO_LPM-1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>001.003.000</td>
<td>001.003.000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Core IO</th>
<th>CIO-0</th>
<th>CIO-1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>001.002.000</td>
<td>001.002.000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cell 0</th>
<th>CELL_LPM</th>
<th>CELL_JTAG</th>
<th>CELL_PDH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>001.002.000</td>
<td>001.002.000</td>
<td>001.005.001</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cell 1</th>
<th>CELL_LPM</th>
<th>CELL_JTAG</th>
<th>CELL_PDH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>001.002.000</td>
<td>001.002.000</td>
<td>001.005.001</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cell 2</th>
<th>CELL_LPM</th>
<th>CELL_JTAG</th>
<th>CELL_PDH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>001.002.000</td>
<td>001.002.000</td>
<td>001.005.001</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cell 3</th>
<th>CELL_LPM</th>
<th>CELL_JTAG</th>
<th>CELL_PDH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>001.002.000</td>
<td>001.002.000</td>
<td>001.005.001</td>
</tr>
</tbody>
</table>

FIRMWARE:

Core IO

<table>
<thead>
<tr>
<th>MP-0</th>
<th>ED-0</th>
<th>MP-1</th>
<th>ED-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.002.005.012</td>
<td>002.007.000</td>
<td>B.002.005.012</td>
<td>002.007.000</td>
</tr>
</tbody>
</table>

Cell 0

<table>
<thead>
<tr>
<th>PDHC</th>
<th>PDHC_FW</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.023.003.038</td>
<td>043.006.000</td>
</tr>
</tbody>
</table>

Cell 1

<table>
<thead>
<tr>
<th>PDHC</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.023.003.038</td>
</tr>
</tbody>
</table>

Troubleshooting
PDHC          :  B.023.003.037
PDC_FW        :    043.006.000 - Active
PDC_FW        :    043.005.000
Cell 2
PDHC          :  B.023.003.038 - Active
PDHC          :  B.023.003.037
PDC_FW        :    043.006.000 - Active
PDC_FW        :    043.005.000
Cell 3
PDHC          :  B.023.003.038 - Active
PDHC          :  B.023.003.037
PDC_FW        :    043.006.000 - Active
PDC_FW        :    043.005.000

IO Cabinet FPGA and Firmware revision report

PROGRAMMABLE HARDWARE:

<table>
<thead>
<tr>
<th>System Backplane</th>
<th>GPM</th>
<th>EMMUX</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>001.002.000</td>
<td>001.000.000</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>IO Backplane</th>
<th>IO_LPM-0</th>
<th>IO_LPM-1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>001.003.000</td>
<td>001.003.000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Core IO</th>
<th>CIO-0</th>
<th>CIO-1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>001.002.000</td>
<td>001.002.000</td>
</tr>
</tbody>
</table>

FIRMWARE:
Core IO
MP-0          :  B.002.005.012
ED-0          :    002.007.000
MP-1          :  B.002.005.012
ED-1          :    002.007.000

If the SEU firmware requires an update, refer to the applicable rp8440/rp7440 and SEU firmware release notes for download and update instructions.

Note that the SEU contains the following firmware and programmable hardware entities which must be verified during installation:

PROGRAMMABLE HARDWARE:
System Backplane: GPM
System Backplane: EMMUX
IO Backplane: IO_LPM
Core IO: CIO

FIRMWARE:
Core IO: MP
Core IO: ED

Power Status

To invoke the system revision output, from the MP main menu enter cm. Then from the command mode menu, enter ps.

Figure 4-12 shows the initial power status output. It lists the active devices in the system. To obtain the status of an entire cabinet or portion thereof, enter the corresponding letter for the menu choices shown in the figure. Example 4-2 shows full status output for cabinet 0.
Figure 4-12 Initial Power Status Window

MP:CM> pc

Display detailed status of the selected MP bus device.

The following MP bus devices were found:

```
<table>
<thead>
<tr>
<th>Cab</th>
<th>MP</th>
<th>Bkpln</th>
<th>Cells</th>
<th>Chassis</th>
<th>Supplies</th>
</tr>
</thead>
<tbody>
<tr>
<td>#</td>
<td>IM</td>
<td>0</td>
<td>10</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

```

You may display detailed power and hardware status for the following items:

T - Cabinet
S - System Backplane
G - MP (Core I/O)
P - IO Chassis
C - Cell

Select Device: t

Enter cabinet number (0 or 8): 0
Example 4-2 Full Status Output

You may display detailed power and hardware status for the following items:

- Cabinet
- System Backplane
- MP Crate I/O
- 10 Chassis
- Cell

Select Device: t

Enter cabinet number (8 or 8): 8

Status for rsc4048 cabinet: FAILURE DETECTED
MANUFACTURING MODE ENABLED

Master/Slave failover is Disabled
Power switch is on
Right Door is open
top Door is open
Left Door is closed

Total Power Available 4600 W
Total Power Needed 3972 W
Power Redundancy: redundant
Power Viability: NOT VIABLE

<table>
<thead>
<tr>
<th>Power Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Eps</td>
</tr>
<tr>
<td>Regulated</td>
</tr>
<tr>
<td>Enabled</td>
</tr>
<tr>
<td>Power OK</td>
</tr>
<tr>
<td>Warning/Fault</td>
</tr>
<tr>
<td>Attention LED</td>
</tr>
</tbody>
</table>

AC Line Status:
Line HH Present
Line HH NOT PRESENT
Line RL Present
Line RL NOT PRESENT

Front Fan Speed: normal
Back Fan speed: high
I/O Bay Fan Speed: high
Temperature state: normal
Main Fan Redundancy: redundant
I/O Fan Redundancy: INSUFFICIENT

!!!!!! OVERTEMP SHUTDOWN DISABLED !!!!!!!

<table>
<thead>
<tr>
<th>BPE</th>
<th>PCL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fans</td>
<td>Fans</td>
</tr>
<tr>
<td>0 1 2 3 4 5</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>Regulated</td>
<td>x</td>
</tr>
<tr>
<td>ailing</td>
<td></td>
</tr>
<tr>
<td>Failed</td>
<td></td>
</tr>
<tr>
<td>Standby/Main Fans</td>
<td></td>
</tr>
<tr>
<td>1 1 1 1 1 1 1 1 2</td>
<td></td>
</tr>
<tr>
<td>0 1 2 3 4 5 6 7 8 9</td>
<td></td>
</tr>
<tr>
<td>Regulated</td>
<td>x</td>
</tr>
<tr>
<td>ailing</td>
<td></td>
</tr>
<tr>
<td>Failed</td>
<td></td>
</tr>
<tr>
<td>Cell Fans</td>
<td></td>
</tr>
<tr>
<td>0 1 2 3 4 5 C</td>
<td></td>
</tr>
<tr>
<td>Cell B</td>
<td></td>
</tr>
<tr>
<td>Regulated</td>
<td></td>
</tr>
<tr>
<td>ailing</td>
<td></td>
</tr>
<tr>
<td>Failed</td>
<td></td>
</tr>
<tr>
<td>Cell 1</td>
<td></td>
</tr>
<tr>
<td>Regulated</td>
<td></td>
</tr>
<tr>
<td>ailing</td>
<td></td>
</tr>
<tr>
<td>Failed</td>
<td></td>
</tr>
<tr>
<td>Cell 2</td>
<td></td>
</tr>
<tr>
<td>Regulated</td>
<td></td>
</tr>
<tr>
<td>ailing</td>
<td></td>
</tr>
<tr>
<td>Failed</td>
<td></td>
</tr>
</tbody>
</table>

Troubleshooting Aids 87

Cell Partition

Use the cp command to display a table of cells assigned to partitions, arranged by cabinets. The cp command generates display output only; no configuration is possible with this command. To invoke this output, enter cm from the MP Main Menu, and then enter cp. Example 4-3 shows example output of the cell partition command.
Configuration Problems

Configuration problems are often related to an improper configuration. This section provides a brief summary of nPartition configuration methods and tools. Refer to the HP System Partitions Guide for detailed information on this topic.

HP nPartition-capable servers enable you to configure a single server complex as one large system or as multiple smaller systems. Each nPartition defines a subset of the server hardware resources to function as an independent system environment. An nPartition includes the following features:

- One or more cells (containing processors and memory) that are assigned to the nPartition, and all I/O chassis connected to those cells.
- Processors, memory, and I/O in an nPartition for exclusive use by software running in the nPartition.
- A dedicated system boot interface.
- Each nPartition boots and reboots independently.
- Hardware and software isolation, so that hardware or software faults in one nPartition do not affect other nPartitions within the same server complex.

You can reconfigure nPartition definitions for a server without physically modifying the server hardware configuration by using the HP software-based nPartition management tools.

Basic partition creation guidelines:
- Build the largest partition first.
- Keep memory amounts on each cell in a partition as equal as possible.
- For optimum performance, add cells to partitions in multiples of two (1, 2, 4, and so on).

Power Subsystem Failures

Use the following power-on sequence summary to aid in locating power failures:

1. AC power cord is plugged in.
2. HKP power is applied, utilities initialized and complex configuration checking performed.
3. Power switch is on and cabinet is supplied with 48 V power.
4. Main system backplane comes up first and supplies clocks to cells and I/O backplanes.
5. I/O backplanes are powered on (0-1).
6. Cell boards are powered on (0-3).
7. Cells are queried for valid complex profiles and wait for SM_GOOD to be set by PDC. Cells must be powered on with 48 V in addition to HKP. When one valid cell is located, a timer starts and any cell boards not ready when the time limit expires will not be initialized.
8. Early CPU_INIT and Cell_Monarch_Selection
9. Cell_Initialization
10. PD_Rendezvous and Core_Cell_Selection
11. PD_Initialization
12. IPL_Launch
Bulk Power Supplies

The power subsystem is comprised of two bulk power supplies (BPS) and the power distribution Unit (PDU). When properly loaded the BPS provide N+1 redundancy. The BPS and the PDU are in the bottom of the server chassis.

Each BPS has a power good LED on the front of the supply. Additionally, the system monitors and reports the current power condition to the server. Use the ps command to view the current power status.

The following types of faults can occur:

- Faults in the BPSs, several in parallel
- AC input faults
- Housekeeping power faults
- 48 V bus faults

Table 4-8 lists power subsystem symptoms and actions to take to correct the problem.

**Table 4-8 Power Troubleshooting**

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common power failure indications:</td>
<td>Power problems may be generally isolated to the input source, the BPS or the DC distribution paths. Visual inspections for LED indications and the use of the &quot;ps&quot; command should pinpoint the failing FRU. When troubleshooting power, LED indications, the MP &quot;ps&quot; command, and the Error Log are your most useful tools.</td>
</tr>
<tr>
<td>System will not power up</td>
<td></td>
</tr>
<tr>
<td>Power supply fault LED may be lighted</td>
<td></td>
</tr>
<tr>
<td>Front panel LED not lighted</td>
<td></td>
</tr>
<tr>
<td>No LED lights &quot;on&quot; anywhere</td>
<td></td>
</tr>
<tr>
<td>Error log indicates a power error</td>
<td></td>
</tr>
<tr>
<td>- read the log with the MP.</td>
<td></td>
</tr>
<tr>
<td>48V Fault reported</td>
<td>Check chassis codes for fault reporting time stamp. If more than one failure occurs within a short period of time, there exists a significant probability that the root cause is outside the power subsystem and the BPS failure is an artifact of the root cause. Probable cause and or symptoms to look for outside the power subsystem are, blocked airflow for the failed BPS’s, ambient conditions beyond limits and AC input beyond limits.</td>
</tr>
<tr>
<td>3.3V Fault reported</td>
<td></td>
</tr>
<tr>
<td>12V Fault reported</td>
<td></td>
</tr>
<tr>
<td>Fan Fault and/or OverTemp 0 or 1 Fault reported</td>
<td></td>
</tr>
<tr>
<td>PM will NOT turn on 48V</td>
<td>PM will NOT turn on 48V under the following conditions: N- main fans present - N- I/O fans present - N- Bulk Power Supplies detected state - PM POST fails - Power Switch OFF - Ambient inlet temp reading is OverTempHigh (Over 40C) - Invalid BPS ID detected</td>
</tr>
<tr>
<td>PM is shutting down 48V to the cabinet</td>
<td>PM will shut down 48V to the cabinet under the following conditions: Ambient OverTempHigh (Over 40C) - N- Fans Present and Working - N- I/O Fans Present and Working in a CPU cabinet - Service Processor 48V_Off command or PM reset - Power Switch OFF</td>
</tr>
</tbody>
</table>

**IO Chassis Power**

Power for the PCI-X I/O chassis (48 V and 3.3 V housekeeping and 12 V housekeeping) is provided by the PCI-X power supplies located at the front of the server. These two DC-to-DC converters provide N+1 redundancy for the PCI-X I/O chassis.

Each power supply has LED indicators that provide a visible indication of the status of the converters (Power Good, Fault, ready for OLR).

Table 4-9 lists the actions to take when you encounter problems with the PCI-X DC-to-DC power supply.
Table 4-9 PCI-X Power Converter Troubleshooting

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common power failure indications: Power Good LED not on. Power Fault LED is on.</td>
<td>A green LED will be illuminated to indicate that all DC output rails are operating within specification. The Power Good LED indicates the status of the PWR_OK signals.</td>
</tr>
</tbody>
</table>

Backplane Power

Power to the system backplane is provided through the power distribution module located in the bottom of the server chassis. Power is routed to the system backplane from the distribution module through wires and cables connected to the backplane at various locations.

The system backplane also contains VRM’s to condition and control power delivered to the cell boards inserted into the server.

Figure 4-13 Backplane Power

Table 4-10 System Backplane Troubleshooting

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common power failure indications: Power “good” LED may not be lighted. Error log indicates a power error - read the log using the MP.</td>
<td>Visual inspections for LED indications on the system backplane and the use of the “ps” command should pinpoint the failing FRU. The entire system backplane assembly is a FRU.</td>
</tr>
</tbody>
</table>

Cooling Subsystem Failures

The rx8640 Server has the following cooling features.

9 front intake fans
12 rear exhaust fans
6 PCI-X cooling fans
Up to 6 power supply fans. Each power supply has its own fan.
There are points for temperature monitoring: 1. Inlet air. 2. BPS - overtemperature
### Table 4-11 Cooling Troubleshooting

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common cooling failure indications: - System will not power up - Green fan LED may not be lighted - Error log indicates a failed fan</td>
<td>When troubleshooting cooling, LED indications, the MP &quot;ps&quot; command, and the Error Log are your most useful tools. Cooling problems are most often isolated to a failed fan or a high ambient room temperature. Visual inspections for LED indications and the use of the &quot;ps&quot; command should pinpoint the failing FRU. Also inspect the server for blocked input air accesses.</td>
</tr>
</tbody>
</table>

### Backplane (fabric) Failures

Backplane problems are one of the more difficult problems to troubleshoot. The crossbar complexity makes it difficult to narrow the scope of a failure to a specific FRU. Failure possibilities may include a cell, a connector, a failing XBC, or a failing I/O response. Only familiarity with the backplane’s XBC port (logical-physical) crossbar technology and your ability to decode fabric errors will allow troubleshooting success with backplane (fabric) errors. If you are unfamiliar with the crossbar technology, it strongly suggested that you contact WTEC for assistance. Reading the Error Log, and using the MCA Analyzer are your most valuable tools.

The new sx2000 backplane supports up to 4 Cells, interconnected via the crossbar links. A sustained total bandwidth of 25.5 GBytes/s is provided to each Cell. Each Cell connects to XBC ASICs that enables communicating with other Cells in the server.

The only fatal errors on XBCs are link errors detected in the sx2000 Link Block (ALB). When the ALB cannot recover from a link error, it logs the error, completes the remainder of the packet with poisoned micropackets, and brings the link down. If the error occurs in the header, ALB will try to correct 1-bit errors. Double-bit errors in the header are uncorrectable and hence fatal. When a link is powered-down, the XBC will invalidate the route table, and empty all inport FIFOs of pending transactions. Transactions destined to the powered-down link from other ports will be accepted and inter credits will be returned; these transactions will be marked invalid.

### Table 4-12 Backplane Troubleshooting

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backplane failure indications: - BPB green LED may not be lighted.- Error log indicates an error - read the log with the MP.</td>
<td>Search the error logs for fatal (link) errors. Try visual inspections for LED (power)/ (attention) indications. Use the &quot;ps&quot; command to verify cell status. Apparent backplane problems may actually be a failing Cell, XBC, REO cables or IO FRU. Use logs and/or diagnostics to better pinpoint the failing FRU…avoid changing several FRUs.</td>
</tr>
</tbody>
</table>

### Utility Subsystem Failures

The Utility subsystem is primarily composed of the Maintenance Processor (MP). Your best troubleshooting tools are visual interpretation of LED indications and the use of the Error Log - if it is accessible. If the MP fails, the following functions are lost:

- The ability to process and store log entries.
- Console functions to every partition.
- OL* functions.
- Virtual front panel and system alert notification.
- The ability to connect to the MP for maintenance.
- The ability to run diagnostics (ODE and scan).
Table 4-13 Utility Troubleshooting

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common power failure indications: Cannot log into MP: MP not responding.</td>
<td>When troubleshooting utilities, LED indications, and the Error Log are your most useful tools. Utility problems are often isolated to an access, power, or firmware problem. Verify the username &amp; password are correct. Verify the MP port is not disabled. Verify via Utility LEDs that the MP has heartbeat... if there is no heartbeat, but power is present, reset the MP by reseating PCA does not affect the operating system. Verify cable and access configurations are correct.</td>
</tr>
</tbody>
</table>

A system alert at the console indicates a utility subsystem problem. There is an error in the chassis log and the Attention LED is flashing. Interpret the activity & error logs on the MP. Verify LED settings on utility PCAs. Interpret the chassis logs.

I/O Subsystem Failures

Troubleshooting I/O faults starts with knowing what firmware (F/W) or software (S/W) was running at the time of the fault and interpreting the fault's error information in the Error Log.

If an EMS event message was generated, the problem/cause/action statement gives you a good starting point in troubleshooting the problem. If HP-UX messages indicate some sort of problem, examine the I/O error logs. Use the log tool as the starting point for troubleshooting these problems.

I/O faults gather error information from different FRUs. For example:
- HPMC or MCA F/W saves all logged fatal and uncorrectable error info from CC, SBA, LBA, and HBA CSRs.
- HP-UX & EMS S/W generates event messages from H/W correctable faults from memory DIMMs, CPU caches, and HBA functions and their external devices. ISL & ODE S/W provides console messages with generic error information about CPU, MEM, I/O, and device FRU function failures and loop / halt until the partition is hard reset.
- BCH or EFI F/W also provides console messages about failed CPU, MEM, and console operations, while early self-test F/W relies on LEDs and chassis codes to convey error information about failed cell and chassis FRUs.

Table 4-14 I/O Problems

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP-UX or EMS messages indicate I/O problems.</td>
<td>If an EMS event message was generated, the problem/cause/action statement gives you a good starting point in troubleshooting the problem. If HP-UX messages indicate some sort of problem, examine the I/O error logs. Use the log tool as the starting point for troubleshooting these problems. Examine the console logs for HP-UX messages indicating problems with the I/O system. Look for EMS event messages indicating I/O system problems. Examine the I/O error logs. Use the MP’s “io” &amp; “ps” commands to figure out which cell is connected to each individual I/O card cage.</td>
</tr>
</tbody>
</table>

Booting Failures

Booting problems are one of the most difficult problems to troubleshoot because of the many, many types of failures that can prevent the server from booting. Your initial troubleshooting approach should be based upon the server environment found when you begin. For instance, if you have just added a new cell, updated microcode, or taken some other invasive process recently…then reviewing those actions more closely are a logical first step.

If the server was running normally and was forced into an unsuccessful reboot by a power failure - then verification of server power and a review of the Error Log would be in order. Additionally, recent customer activities may suggest a possible troubleshooting path to pursue.
### Table 4-15 Booting Problems

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>On an HP Integrity server, HP-UX B.11.23 begins booting but is interrupted with a panic when launching the HP-UX kernel (/stand/vmunix).</td>
<td>The nPartition ACPI configuration might not be properly set for booting HP-UX. In order to boot the HP-UX operating system an nPartition must have its acpiconfig value set to default. At the EFI Shell interface, enter the acpiconfig command with no arguments to list the current ACPI configuration for an nPartition. If the acpiconfig value is set to windows, then HP-UX cannot boot; in this situation you must reconfigure acpiconfig. To set the ACPI configuration for HP-UX: at the EFI Shell interface enter the acpiconfig default command, and then enter the reset command for the nPartition to reboot with the proper (default) configuration for HP-UX. Use the help acpiconfig command for more details.</td>
</tr>
<tr>
<td>Not all cells boot to join (rendezvous) an nPartition.</td>
<td>Some cells may have the use-on-next-boot value set to &quot;n&quot; (do not use), or the cells may have been powered off, or the cells may have booted too late to participate in partition rendezvous, or the cells have failed self-tests and cannot be used, or the cells are incompatible. Check the cell use-on-next-boot values and change them to &quot;y&quot; as needed then reboot for reconfig (HP-UX shutdown -R, or Windows shutdown /r). Check cell power (frupower -d -C) and power on any cells as needed, then reboot for reconfig. Check the cell processor and firmware revisions using (parstatus -V -c# where # is the cell number). As the cells assigned to the nPartition reboot, observe the boot progress from the Virtual Front Panel (VFP) for the nPartition and note any problems the cells have proceeding from one boot state to the next; as needed review chassis logs or event logs using the service processor Show Chassis Logs or Show Event Logs (SL) menu.</td>
</tr>
<tr>
<td>An nPartition takes a long time to boot (over ten minutes)</td>
<td>One or more cells assigned to the nPartition that have a &quot;y&quot; use-on-next-boot value has not booted to participate in partition rendezvous, thus causing the rest of the cells assigned to the nPartition to wait for ten minutes for the cell to report. For example, the cell might not be installed, might be powered off, or might have been powered on or reset too late to rendezvous with the other cells. You can avoid the delay by performing any of the following actions, as needed. Perform a reboot for reconfig following any changes you make: - Set the cell use-on-next-boot value to &quot;n&quot; (do not use). - Power on the cell. - Un-assign (remove) the cell from the nPartition.</td>
</tr>
<tr>
<td>An nPartition does not boot to its system boot environment (BCH or EFI) and instead all cells remain at a boot-is-blocked (BIB) state.</td>
<td>The nPartition has been reset to the shutdown for reconfig state, or no valid core cell is available to the nPartition. If the nPartition was reset to the shutdown for reconfig state, use the BO command from the service processor Command menu to boot the nPartition past boot-is-blocked (to enable it to boot to its system boot environment). If no valid core cell was available to the nPartition when it booted, check the power for all core cell choices (a cell might be powered off) and power it on if needed. Also review the chassis logs for the nPartition to search for any core cell problems and failures.</td>
</tr>
</tbody>
</table>

### Firmware Problems

Firmware problems are often the result of an improper “mix” or “recipe” of firmware revisions. To avoid improper mixes of firmware, always follow the installation instructions contained in the firmware update package. Firmware updates are available from the following web site: [http://h20000.www2.hp.com/bizsupport/TechSupport/Home.jsp](http://h20000.www2.hp.com/bizsupport/TechSupport/Home.jsp).

### Environmental Problems

Five key environmental problems that the troubleshooter should always remain aware of are:

- Equipment clearances
- Computer room air temperature
- Computer room humidity
Table 4-16 Server Operational Physical Environment

<table>
<thead>
<tr>
<th>Operating Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
</tr>
<tr>
<td>20°C to 30°C</td>
</tr>
<tr>
<td>20°C to 25°C recommended</td>
</tr>
<tr>
<td>Maximum Rate of Temperature Change</td>
</tr>
<tr>
<td>20°C/hr</td>
</tr>
<tr>
<td>Operating Relative Humidity</td>
</tr>
<tr>
<td>15% to 80% @ 30°C Non-condensing</td>
</tr>
<tr>
<td>40% to 55% Recommended</td>
</tr>
</tbody>
</table>

The customer should be kept aware of the consequences of blocked airflows, heat, humidity, and unstable power on the Superdome server. See Chapter 2 for details on proper site environment preparations.
This chapter provides a detailed description of the Support Expansion Unit (SEU) FRU removal and replacement procedures.

The sections contained in this chapter are:

- “Electrostatic Discharge”
- “Shutting Down nPartitions and Powering Off Hardware Components”
- “Removing and Replacing a DDS-4 or DVD Drive”
- “Removing and Replacing a Disk Drive”
- “Removing and Replacing a Standby/Main Fan (Front) Assembly”
- “Removing and Replacing a Standby/Main Fan (Rear) Assembly”
- “Removing and Replacing a Bulk Power Supply (BPS)”
- “Removing and Replacing a PCI Power Supply (Brick)”

Electrostatic Discharge

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

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

Take these precautions:

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

Shutting Down nPartitions and Powering Off Hardware Components

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

This section gives details on how to ensure that an nPartition is properly shut down, and it also describes how to power off (and power on) hardware components.

Shutting Down an nPartition

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

1. Advise the customer that the system (one or more nPartitions) must be shut down for repairs. Ensure that the customer has a current backup, and inform the customer of the anticipated downtime.
2. Log in to the service processor (MP) of the host server.
3. Use the Virtual Front Panel (VFP) to view the current state of the nPartition that you will shut down.

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

Enter Control-b (^B) to exit the VFP display.

- If an nPartition has booted HP-UX, or if it is in the process of launching HP-UX, you must shut down HP-UX on the nPartition.
  
  When HP-UX is running on an nPar, its VFP displays “HP-UX heartbeat” with a blinking asterisk (*) to indicate its interactivity.

  In this case, proceed with the next step.

- If the nPartition is at its Boot Console Handler (BCH) interface, then HP-UX has already been shut down.

- If the nPartition is booting, then you should wait for it to reach the BCH interface and, if necessary, interrupt auto-boot when you see the “Attempting to boot” and “To discontinue, press any key within 10 seconds” messages.

If the nPartition is at the BCH menu interface, then HP-UX is shut down. Otherwise, proceed with the next step to shut down HP-UX.

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

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

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

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

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

To reboot the nPartition after it is halted, use the MP Command menu, RS command, to restart the nPartition. (This enables the nPartition to reset and boot to the BCH interface; if auto-boot is configured it also boots HP-UX.)

---

### Powering Off Hardware Components

This procedure is for powering off and powering on components that are to be removed and replaced.

1. Log in to the host server service processor (MP).

2. If the component you will power off is assigned to an nPartition, then use the Virtual Front Panel (VFP) to view the current boot state of the nPartition.

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

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

   Refer to the procedure, “Shutting Down an nPartition”, for details on determining the nPartition boot state and shutting down HP-UX.

3. Access the MP Command menu.

   From the MP Main menu type CM to access the Command menu.
4. Use the MP Command menu **PS** command to check details about the hardware component you plan to power off.

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

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

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

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

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

```
NOTE: Ensure that all power cords are labeled to indicate which receptacle each cord plugs into. Because of power redundancy capabilities, it is important that each power cord plugs into its proper receptacle.

Also, ensure that the cabinet power has been turned off before disconnecting any power cords.
```

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

8. If needed, reconnect all power cords to the receptacles where they belong.

9. Use the MP Command menu **PE** command to power on the hardware component that you powered off.

10. Use the MP Command menu **PS** command to confirm the status of the newly replaced component.

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

Removing and Replacing a DDS-4 or DVD Drive

The DDS-4 or DVD drive is located in the front of the chassis. The system power to this component must be removed before attempting to remove or replace it.

```
NOTE: When installing or replacing a DDS-4 component, ensure that only DDS-4 components with a replacement part number of C5686-67204, or an exchange part number of C5686-69204, are used.

Refer to the, “Shutting Down nPartitions and Powering Off Hardware Components” section, for more information.
```
CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could result in damage to the SEU.

Figure 5-1 DDS-4 or DVD Drive Location

Removing a DDS-4 or DVD Drive

Figure 5-2 DDS-4 or DVD Drive Detail
The figure shown above displays two DVD components. Either or both items may be replaced by a DDS-4 component.

1. To remove the DDS-4 or DVD drive, push the front locking tab toward the DDS-4 or DVD drive, then pull the tab out to slide the DDS-4 or DVD drive out of the chassis.

   **NOTE:** DDS-4 or DVD drive components include removable rails attached to both sides. If the component is to be replaced, ensure that the replacement component includes the plastic rails. If the rails are not included, extract the pin that holds each rail, remove the rail, and install both rails on the replacement component. There are two sets of holes on each side of the DDS-4 or DVD drive component. Ensure that the rails are mounted so that the pins fit into the **bottom** set of holes. One of the rails has a locking tab attached. Ensure that the rail with the locking tab is mounted on the left side of the DDS-4 or DVD drive component, as shown in Figure 5-2, above.

2. Disconnect the power and SCSI cables from the rear of the DDS-4 or DVD drive.
3. Pull the DDS-4 or DVD drive from the chassis and set aside.

   **NOTE:** If the system has only one DDS-4 or DVD drive installed, a tray will be located beneath the DDS-4 or DVD drive as shown in the preceding figure. Follow the same removal procedure to extract the tray, pushing the bottom front locking tab toward the tray then pulling out on the tab to remove it from the chassis.

### Replacing a DDS-4 or DVD drive

   **NOTE:** If you are replacing a DDS-4 or DVD drive component in the lower tray, the upper DDS-4 or DVD drive component must be removed to have access to the lower DDS-4 or DVD drive cables.

1. Visually inspect the replacement part for proper number and revision.
2. For the DDS-4 drive, verify that the jumpers are set correctly.

   - **Eject Disable**
   - **Eject Enable**
   - **Termination ON**
   - **OFF**
   - **Factory Default**
   - **SCSI ID**

3. Connect the cables to the rear of the DDS-4 drive.
NOTE: DDS-4 or DVD drive components include removable rails attached to both sides. If the component is to be replaced, ensure that the replacement component includes the plastic rails. If the rails are not included, extract the pin that holds each rail, remove the rail, and install both rails on the replacement component. There are two sets of holes on each side of the DDS-4 or DVD drive component. Ensure that the rails are mounted so that the pins fit into the bottom set of holes. One of the rails has a locking tab attached. Ensure that the rail with the locking tab is mounted on the left side of the DDS-4 or DVD drive component, as shown in Figure 5-2, above.

4. Slide the drive in the chassis. Fold the cables out of the way.
5. The drive easily slides into the chassis; however, a slow firm pressure is needed for proper seating.
6. The front locking tab will latch to secure the disk drive in the chassis.

Removing and Replacing a Disk Drive

The disk drives are located in the front of the chassis. Unless mirroring is used, the nPartition must be shut down to remove or replace the drive that serves as the boot disk. Refer to “Shutting Down nPartitions and Powering Off Hardware Components” for more information. The remainder of the internal disk drives are hot-pluggable.

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

Figure 5-3 Disk Drive Location
Removing a Disk Drive

Figure 5-4 Removing the Disk Drive

1. Disengage the front locking latch on the disk drive by pushing the release tab to the right and the latch lever to the left.

Figure 5-5 Disk Drive Detail

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

Replacing a Disk Drive

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

1. Visually inspect the replacement part for proper number and revision.
2. Before installing the disk drive, type the following command:
   
   #diskinfo -v /dev/rdsk/cxtxdx
3. Then type the following:
   
   ```
   #ioscan -f
   ```
   
   The response message after running this command is:
   
   ```
   NO_HW
   ```

4. Ensure that the front locking latch is open, then position the disk drive in the chassis.
5. Slide the disk drive into the chassis; apply slow firm pressure to properly seat the connection.
6. Press the front locking latch to secure the disk drive in the chassis.
7. Spin up the disk by entering one of the following commands:
   
   ```
   #diskinfo -v /dev/rdsk/cxtxdx
   ```
   
   Where cxtxdx = the device file of the disk removed.
   
   ```
   #ioscan -f
   ```

### Removing and Replacing a PCI Power Supply (Brick)

The PCI power supply is located in the front of the chassis (Figure 5-6). The power subsystem has N+1 redundancy when both power supplies are installed. It is not necessary to power down the PCI domain to replace a failed PCI power supply.

⚠️ **CAUTION:** Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could result in damage to the SEU.

#### Preliminary Procedures

Complete these procedures before removing the PCI power supply.

1. Identify the failed power supply.
2. Connect to ground with a wrist strap.
3. Visually inspect the replacement part for proper number and revision.
4. Remove the front bezel.

**Figure 5-6 PCI Power Supply Location**
### Table 5-1 PCI Power Supply LED Indications

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

### Removing a PCI Power Supply (Brick)

1. Securely grasp the handle on the front of the power supply.
2. Firmly depress the securing thumb latch.
3. Slide the module from the chassis. Refer to Figure 5-7.

**Figure 5-7 PCI Power Supply Detail**

![PCI Power Supply Detail](image)

### Replacing the PCI Power Supply

1. Slide the power supply in the chassis until the thumb latch clicks into the locked position.
2. The module easily slides into the chassis; apply a slow, firm pressure to properly seat the connection.
3. Verify the status of the power supply LEDs. Green LED should be ON and the fault LED should be OFF.
Removing and Replacing a Standby/Main Fan (Front) Assembly

The Front Standby/Main Fan Assembly is located in the front of the chassis. The fan assembly is a hot-swap component.

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

Figure 5-8 Front Standby/Main Fan Assembly Locations

![Diagram of the Front Standby/Main Fan Assembly](image)

Table 5-2 Front Standby/Main Fan Assembly LED Indications

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

Removing a Front Standby/Main Fan Assembly

1. Remove the bezel.
2. Loosen the two blue-colored captive screws (lower left and upper right sides).

⚠️ NOTE: The blue captive screws are slotted so that a straight slot screwdriver can be used, if necessary.

3. Carefully pull on the fan to detach it from the nine-pin connector.
4. Pull the fan away from the chassis.

Replacing a Front Standby/Main Fan Assembly

1. Visually inspect the replacement part for proper number and revision.
2. Position the fan assembly on the chassis fan guide pins.
3. Carefully seat the fan into the nine-pin connector.
4. Tighten the two blue-colored captive screws (lower left and upper right sides).
5. Replace the bezel.

**NOTE:** The fan LED will show that the fan is operational (green).

### Removing and Replacing a Standby/Main Fan (Rear) Assembly

The Rear Standby/Main fan Assembly is located in the rear of the chassis. The fan assembly is a hot swap component.

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

#### Figure 5-9 Rear Standby/Main Fan Assembly Locations

![](image)

**Fans**

### Removing and Replacing the Rear Standby/Main fan Assembly

The rear standby/main fan assembly is located in the rear of the chassis.

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

### Removing the Rear Standby/Main Fan Assembly

1. Identify the failed fan assembly. The table below defines the fan LED states.

#### Table 5-3 Standby/Main Fan Assembly LED Indications

<table>
<thead>
<tr>
<th>LED State</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>On Green</td>
<td>Fan is at speed and in sync or not at speed less than 12 seconds</td>
</tr>
<tr>
<td>Flash Yellow</td>
<td>Fan is not keeping up with speed/sync pulse for greater than 12 seconds</td>
</tr>
<tr>
<td>Red</td>
<td>Fan failed or stalled, has run slow, or fast for greater than 12 seconds</td>
</tr>
<tr>
<td>Off</td>
<td>Fan is not present, or no power is applied to fan, or the fan has failed</td>
</tr>
</tbody>
</table>
2. Loosen the two blue screws securing the fan to the chassis.
3. Pull the fan from the chassis.

Replacing the Rear Standby/Main Fan Assembly
1. Visually inspect the replacement part for proper number and revision.
2. Position the fan assembly in the chassis.
3. Push the fan into the connector.
4. Tighten the two thumb screws to secure the fan to the chassis.
5. The LED should be GREEN. See the previous table for a listing of LED definitions.

Removing and Replacing a Bulk Power Supply (BPS)
The bulk power supply is located in the front of the chassis. The BPS is a hot swap-component.

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

Preliminary Procedures
1. Identify the failed power supply.
2. Connect to ground with a wrist strap.
3. Visually inspect the replacement part for proper number and revision.

Figure 5-10 BPS Location
IMPORTANT: When a BPS is pulled from the SEU and then immediately re-inserted, the SEU may report an overcurrent condition and shut down.

Removing a BPS

Figure 5-11 BPS Detail

1. Remove the bezel.

**NOTE:** Bulk Power Supplies are interchangeable. To install the right-hand BPS in the left-side housing, turn the BPS 180 degrees. Ensure that the locking lever is on the inside of the component and slide the BPS into the housing until the locking lever seats.

2. Grasp the handle and, with your thumb, squeeze the extraction lever towards the handle til it clicks.

**CAUTION:** The BPS is heavier than it appears. Be prepared to support the component with your free hand to keep it from dropping suddenly and swinging back when it clears the housing. Failure to heed this precaution can result in personal injury and/or damage to the component.

3. Pull the BPS out of the chassis and set it aside.
Replacing a BPS

1. Verify that the locking lever is on the inside of the component, then insert the BPS into the empty slot and slide it all the way in.

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

2. You will know that the BPS has seated by the clicking sound made by the locking lever.

   **NOTE:** The BPS LED should show that the BPS is operational and there is no fault. The BPS LED should be GREEN.
The CRU list contains replacement part numbers for the SEU. Where applicable, exchange part numbers are included. For a more updated list of part numbers, go to the HP Part Surfer web site at: http://www.partsurfer.hp.com.

## Replaceable Parts

### Table A-1 SEU Customer Replaceable Unit (CRU) List

<table>
<thead>
<tr>
<th>CRU Description</th>
<th>Replacement Part Number</th>
<th>Exchange Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PCA BOARDS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOA (USB/VGA/RMP)</td>
<td>AD307-67001</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>POWER</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC Bulk Power Supply</td>
<td>0957-2183</td>
<td>N/A</td>
</tr>
<tr>
<td>PCI-X Power Module</td>
<td>0950-4637</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>FANS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front Smart Fan Assembly</td>
<td>A6093-67017</td>
<td>N/A</td>
</tr>
<tr>
<td>Rear Smart Fan Assembly</td>
<td>A6093-67018</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>CABLES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power Cord C19/Unterminated 4.5m, International—Europe</td>
<td>8120-6895</td>
<td>N/A</td>
</tr>
<tr>
<td>240 V N. American UPS 4.5 M C19/L</td>
<td>8120-8494</td>
<td>N/A</td>
</tr>
<tr>
<td>Power Cord C19/IEC-309 4.5m, International</td>
<td>8120-6897</td>
<td>N/A</td>
</tr>
<tr>
<td>Power Cord C19/GB-1002 4.5m, China</td>
<td>8121-0070</td>
<td>N/A</td>
</tr>
<tr>
<td>C19/20, blk, 2.5 m - Jumper</td>
<td>8121-0802</td>
<td>N/A</td>
</tr>
<tr>
<td>C19/C20, blk, 4.5 m - Jumper</td>
<td>8121-0806</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>OTHER COMPONENTS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DVD Filler Tray</td>
<td>A6912-00014</td>
<td></td>
</tr>
<tr>
<td>Snap Bezel Attach</td>
<td>C2786-40002</td>
<td>N/A</td>
</tr>
<tr>
<td>Bezel Assembly, Graphite color</td>
<td>A6434-04036</td>
<td>N/A</td>
</tr>
<tr>
<td>Name Plate, IOX</td>
<td>AB301-3401A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>MASS STORAGE DRIVES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36 GB ultra 320 15K RPM SCSI Disk Drive</td>
<td>AB420-2101A</td>
<td>AB420-69001</td>
</tr>
<tr>
<td>73 GB ultra 320 15K RPM SCSI Disk Drive</td>
<td>AB421-2101A</td>
<td>AB421-69001</td>
</tr>
<tr>
<td>146 GB ultra 320 10K RPM SCSI Disk Drive</td>
<td>AB422-2101A</td>
<td>AB422-69001</td>
</tr>
<tr>
<td>300 GB ultra 320 10K RPM SCSI Disk Drive</td>
<td>AB423-2101A</td>
<td>AB423-69001</td>
</tr>
<tr>
<td>Removable Media DVD + RW drive</td>
<td>AB351-67002</td>
<td>N/A</td>
</tr>
<tr>
<td>Removable DAT 72 GB (DDS4)</td>
<td>DW009-67201</td>
<td>DW009-69201</td>
</tr>
<tr>
<td><strong>KITS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kit, Removable Media</td>
<td>A6752-67011</td>
<td>N/A</td>
</tr>
</tbody>
</table>
## B MP Commands

This appendix contains a list of the Server Management Commands.

### Server Management Commands

Table B-1 lists the server management commands.

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

Table B-2 lists the server status commands.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CP</td>
<td>Display partition cell assignments</td>
</tr>
<tr>
<td>HE</td>
<td>Display the list of available commands</td>
</tr>
<tr>
<td>LS</td>
<td>Display LAN connected console status</td>
</tr>
<tr>
<td>MS</td>
<td>Display modem status</td>
</tr>
<tr>
<td>PS</td>
<td>Display detailed power and hardware configuration status</td>
</tr>
</tbody>
</table>

Table B-3 lists the server system and access config commands.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA</td>
<td>Configure Asynchronous and Modem parameters</td>
</tr>
<tr>
<td>CC</td>
<td>Initiate a Complex Configuration</td>
</tr>
<tr>
<td>CG</td>
<td>Generate ssl key pair and self signed certificate</td>
</tr>
<tr>
<td>CP</td>
<td>Display partition cell assignments</td>
</tr>
<tr>
<td>DATE</td>
<td>Set the time and date</td>
</tr>
<tr>
<td>DC</td>
<td>Reset parameters to default configuration</td>
</tr>
<tr>
<td>Command</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>DE</td>
<td>Display entity status</td>
</tr>
<tr>
<td>DI</td>
<td>Disconnect Remote or LAN console</td>
</tr>
<tr>
<td>DFW</td>
<td>Duplicate firmware</td>
</tr>
<tr>
<td>DU</td>
<td>Display devices on bus</td>
</tr>
<tr>
<td>FW</td>
<td>Firmware update utility</td>
</tr>
<tr>
<td>ID</td>
<td>Change certain stable complex configuration profile fields</td>
</tr>
<tr>
<td>IF</td>
<td>Display network interface information</td>
</tr>
<tr>
<td>IT</td>
<td>Modify command interface inactivity time-out</td>
</tr>
<tr>
<td>LC</td>
<td>Configure LAN connections</td>
</tr>
<tr>
<td>LS</td>
<td>Display LAN connected console status</td>
</tr>
<tr>
<td>PD</td>
<td>Modify default Partition for this login session</td>
</tr>
<tr>
<td>PWRGRD</td>
<td>Allows user to configure the power grid</td>
</tr>
<tr>
<td>PARPERM</td>
<td>Enable/Disable interpartition security</td>
</tr>
<tr>
<td>RL</td>
<td>Re-key complex profile lock</td>
</tr>
<tr>
<td>RU</td>
<td>Reset MP bus device</td>
</tr>
<tr>
<td>SA</td>
<td>Display and set MP remote access</td>
</tr>
<tr>
<td>SO</td>
<td>Configure security options and access control</td>
</tr>
<tr>
<td>XD</td>
<td>MP Diagnostic and reboot</td>
</tr>
</tbody>
</table>
This appendix contains blank floor plan grids and equipment templates. Combine the necessary number of floor plan grid sheets to create a scaled version of the computer room floor plan. Figure C-1 illustrates the overall dimensions required for the servers.

**Figure C-1 Server Space Requirements**

---

**Equipment Footprint Templates**

Equipment footprint templates are drawn to the same scale as the floor plan grid (1/4 inch = 1 foot). These templates show basic equipment dimensions and space requirements for servicing. Refer to Figure C-2 (page 114).

The service areas shown on the template drawings are lightly shaded.

Use the equipment templates with the floor plan grid to define the location of the equipment that will be installed in your computer room.

**NOTE:** Photocopying typically changes the scale of drawings copied. If you copy any templates, then you must also copy all templates and floor plan grids.

**Computer Room Layout Plan**

Use the following procedure to create a computer room layout plan:

1. Remove several copies of the floor plan grid (Figure C-3).
2. Cut and join them together (as necessary) to create a scale model floor plan of your computer room.
3. Remove a copy of each applicable equipment footprint template (Figure C-2).
4. Cut out each template selected in step 3; then place it on the floor plan grid created in step 2.
5. Position pieces until you obtain the desired layout, then fasten the pieces to the grid. Mark locations of computer room doors, air-conditioning floor vents, utility outlets, and so on.

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

Figure C-2 Server Cabinet Template
Figure C-3 Planning Grid

Scale: 1/4 inch = 1 foot
Figure C-4 Planning Grid

Scale: 1/4 inch = 1 foot
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