

# **Operation And Maintenance Guide**

**HP Workstation zx6000**  
**HP Server rx2600**



**Manufacturing Part Number : n.a.**  
**Edition E0902**

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The manual printing date and part number indicate its current edition. The printing date will change when a new edition is printed. Minor changes may be made at reprint without changing the printing date. The manual part number will change when extensive changes are made.

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

First Edition: September 2002

Printing Division:

Hewlett-Packard Co.  
Technical Computer Division  
3404 E. Harmony Rd.  
Fort Collins, CO 80525

Printed in the U.S.A.

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## Preface

### Important Warnings

#### Avoid Electrical Shocks

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**WARNING**

To avoid electrical shock, do not open the power supply. There are no user-serviceable parts inside.

To avoid electrical shock and harm to your eyes by laser light, do not open the laser module. The laser module should be serviced by service personnel only. Do not attempt to make any adjustment to the laser unit. Refer to the label on the CD-ROM for power requirements and wavelength. This product is a class I laser product.

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#### Electrical

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**WARNING**

For your safety always connect the equipment to a grounded wall outlet. Always use a power cord with a properly grounded plug, such as the one provided with the equipment, or one in compliance with your national safety standards. This equipment can be disconnected from the power by removing the power cord from the power outlet. This means the equipment must be located close to an easily accessible power outlet.

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#### Multimedia Models

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**WARNING**

If your system is a multimedia model, or if you have installed a sound card in your system, always turn the volume down before connecting the headphones or speakers. This prevents discomfort from unexpected noise or static. Listening to loud sounds for prolonged periods of time may permanently damage your hearing. Before putting on headphones, place them around your neck and turn the volume down. When you put on the headphones, slowly increase the volume until you find a comfortable listening level. When you can hear comfortably and clearly, without distortion, leave the volume in that position.

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#### Removing And Replacing The Cover

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**WARNING**

You can remove system covers to remove or replace hot-swappable devices, such as hard disk drives, optical drives and fans. However, when removing components other than hot-swappable devices, never remove the system cover without first disconnecting the power cord from the power outlet and removing any connection to a telecommunications network. Always replace the cover before switching the system on again.

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**CAUTION**

Both the zx6000 and rx2600 systems depend on the system cover for proper cooling of internal components. Operating the system with the system cover removed, can cause the system to quickly overheat.

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## **Safety Information**

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**WARNING**

**There is a danger of explosion if the battery is incorrectly installed. For your safety, never attempt to recharge, disassemble, or burn an old battery. Replace the battery with the same or equivalent type, as recommended by the manufacturer.**

**The battery in this PC is a lithium battery that does not contain any heavy metals. However, to protect the environment, do not dispose of batteries in household waste. Return used batteries either to the shop from which you bought them, to the dealer from whom you purchased your PC, or to HP so that they can either be recycled or disposed of in the correct way. Returned batteries will be accepted free of charge.**

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## **Static Electricity**

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**CAUTION**

Static electricity can damage electronic components. Turn OFF all equipment when removing or adding components. Don't let your clothes touch the accessory. To equalize the static electricity, rest the accessory bag on top of the system while you are removing the accessory from the bag. Handle the accessory as little as possible and with care.

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## **Potential Metallic Particulate Contamination**

Metallic particulates can be especially harmful around electronic equipment. This type of contamination may enter the data center environment from a variety of sources, including, but not limited to, raised floor tiles, worn air conditioning parts, heating ducts, rotor brushes in vacuum cleaners or printer component wear. Because metallic particulates conduct electricity, they have an increased potential for creating short circuits in electronic equipment. This problem is exaggerated by the increasingly dense circuitry of electronic equipment.

Over time, very fine whiskers of pure metal can form on electroplated zinc, cadmium, or tin surfaces. If these whiskers are disturbed, they may break off and become airborne, possibly causing failures or operational interruptions. For over 50 years, the electronics industry has been aware of the relatively rare, but possible, threat posed by metallic particulate contamination. During recent years, a growing concern has developed in computer rooms where these conductive contaminants are formed on the bottom of some raised floor tiles.

Although this problem is relatively rare, it may be an issue within your computer room. Since metallic contamination can cause permanent or intermittent failures on your electronic equipment, Hewlett-Packard strongly recommends that your site be evaluated for metallic particulate contamination before installation of electronic equipment.

## System Documentation Roadmap

<b>If you want to...</b>	<b>Go to this source...</b>	<b>And refer to...</b>
Set up your computer	Installation Guide (provided with the system)	Chapter 1 “setting up your system”
Learn how to use your operating system	Your computer	Operating System Online Help
Learn how to upgrade your computer by installing accessories	This Operation and Maintenance Guide	Chapter 2 “installing or replacing parts and accessories”
Find out about the different support options available	<a href="http://www.hp.com/go/workstationsupport">www.hp.com/go/workstationsupport</a>	The support options section
Find out how to troubleshoot your System	This Operation and Maintenance Guide	Chapter 4 “Troubleshooting”





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# **1** **Product Information**

This chapter provides detailed system specifications for your system:

- Introduces the system's internal and external features
- Lists the system's specifications and characteristic data
- Provides a summary of the available documentation

## System Description

The following table provides an overview of the system.

Feature	Description
<i>Processor(s)</i>	Systems can be operated with one or two Intel® Itanium® 2 processors
<i>Cache Memory (integrated in processor package)</i>	<ul style="list-style-type: none"> <li>• Level 0: 16KB</li> <li>• Level 1: 256KB</li> <li>• Level 2: 3MB (1.5MB with 900MHz processor)</li> </ul>
<i>Internal Processor Clock Speed Options</i>	900MHz or 1GHz
<i>Chipset</i>	HP scalable processor chipset ZX1, including a Processor Dependent Hardware interface, AGP/PCI-X host controller and Memory Controller
<i>System Firmware</i>	8MB Flash EEPROM
<i>Operating System</i>	HP-UX Operating Systems
<i>Main Memory</i>	<p>Twelve DIMM sockets that support 256MB, 512MB and 1GB DDR SDRAM memory modules.</p> <p>The order in which you install the memory modules is important. For information on the installing memory, see the section “removing and replacing memory” in Chapter 2 of this document. You can install a minimum of 512MB of memory and a maximum of 12GB.</p>
<i>Mass Storage</i>	<p>Four shelves, supporting:</p> <ul style="list-style-type: none"> <li>• One front-access, slimline optical drive.</li> <li>• Three 3 1/2-inch hard disk drives (1-inch height)</li> </ul>
<i>SCSI Controller</i>	66MHz, 64bit PCI based two channel Ultra 160 SCSI host controller.
<i>IDE Controller</i>	Includes an integrated Ultra ATA-100 capable controller that supports one optional slimline optical drive.
<i>Graphics Controllers for zx6000 not built in</i>	ATI Radeon 7000 and ATI FireGL4 are supported by the HP-UX operating system. ATI Radeon 7000, nVIDIA Quadro2 EX and nVIDIA Quadro4 900XGL are supported by the Linux operating system.

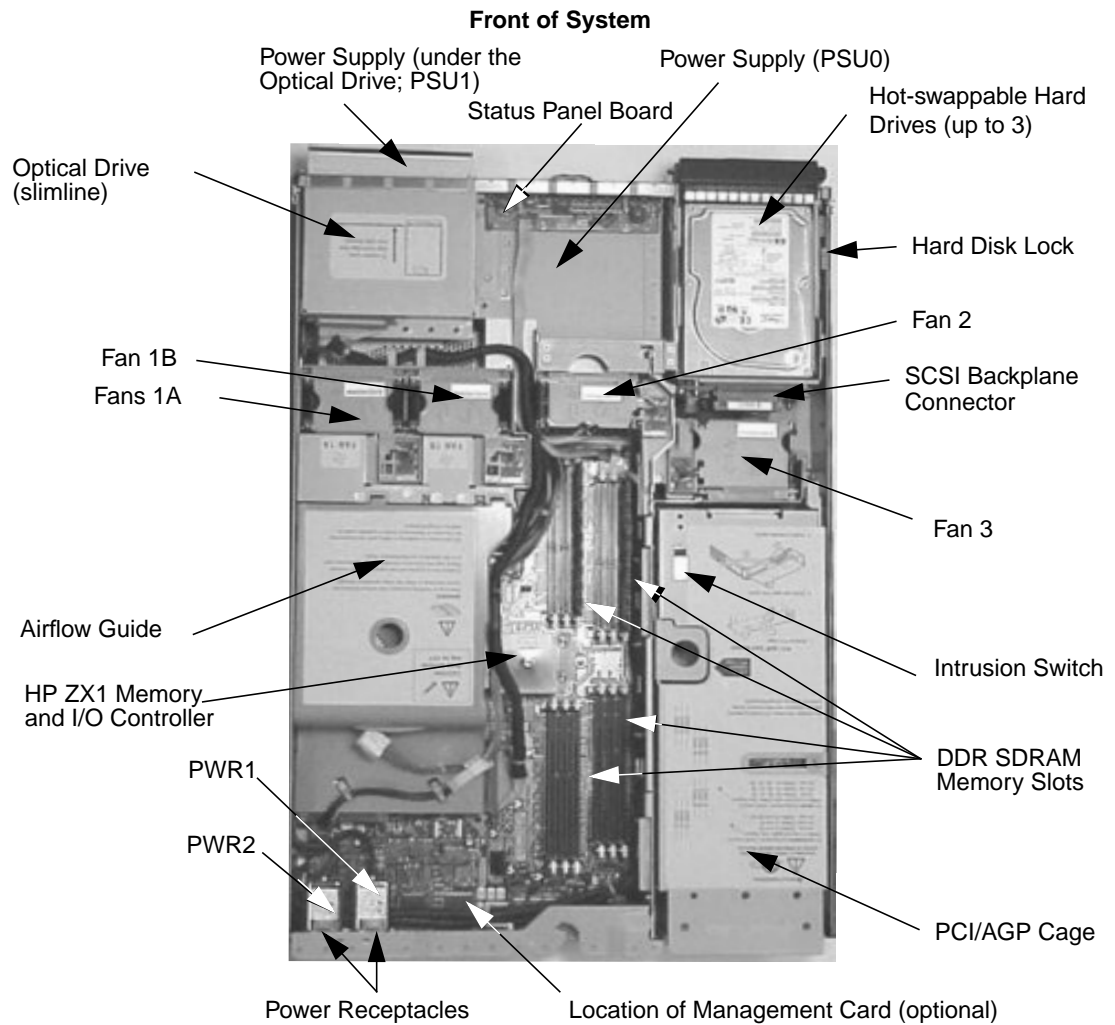
Feature	Description
<p><i>Accessory Card Slots</i> (see the Note in the section "I/O Cards" in Appendix A)</p>	<p>One AGP Pro 50W slot that supports 1.5V cards. Note that this card slot could support cards that use <math>\leq 70W</math> of energy.</p> <p>Three 64-bit 133MHz Peripheral Component Interconnect (PCI-X) slots, supporting all bridges and multifunction PCI-X devices. All three PCI-X slots comply with PCI-X Specification. Note that the PCI-X slots are rated at 15W and 3.3V and they can support Universal cards.</p> <p>(Alternatively, the system may have four PCI-X slots with no AGP slot.)</p>
<p><i>Optical Drive</i></p>	<p>Models include either a slimline 12<math>\times</math>8<math>\times</math> DVD-ROM/CD-RW combo drive, slimline 8<math>\times</math> DVD-ROM drive.</p>
<p><i>System Connectors located on the system board</i></p>	<ul style="list-style-type: none"> <li>• One ATA-100 capable IDE connector</li> <li>• Main power supply connector(s)</li> <li>• Main chassis fan connectors</li> <li>• Processor fan connectors</li> <li>• Status panel connector</li> <li>• Three PCI X connectors and one AGP card connector for zx6000 systems, and four PCI X connectors for rx2600 systems.</li> <li>• One connector for the PCI/AGP backplane</li> <li>• Management card (optional)</li> <li>• Two internal SCSI connectors</li> <li>• One SCSI backplane connector</li> </ul>
<p><i>Management Card (for the rx2600 and optional for the rack-mounted zx6000)</i></p>	<ul style="list-style-type: none"> <li>• 25-pin Serial connector (with console/remote/UPS extensions — requires breakout cable)</li> <li>• 15-pin VGA connector</li> <li>• 10/100 Management LAN</li> </ul>
<p><i>Rear Connectors (labeled)</i></p>	<ul style="list-style-type: none"> <li>• Four USB connectors that are all high speed 480Mb/sec capable as well as full speed 12Mb/sec and low speed 1.5Mb/sec. HP-UX supports HP's USB keyboard and mouse.</li> <li>• 9-pin serial (two, buffered) <ul style="list-style-type: none"> <li>— Standard: Two UART 16550 buffered serial ports A and B (both RS-232-C).</li> <li>— Serial Port A may be used as console.</li> </ul> </li> <li>• 10/100 Management LAN and 10/100/1000 LAN</li> <li>• External LVD/SE 68-pin SCSI</li> </ul>
<p><i>Buttons</i></p>	<p>Front panel:</p> <ul style="list-style-type: none"> <li>• Locator Button and LED</li> <li>• Power Button</li> </ul> <p>Backplane:</p> <ul style="list-style-type: none"> <li>• Locator Button and LED</li> <li>• Transfer of Control (TOC) Button</li> <li>• Management Processor Button</li> </ul>

<b>Feature</b>	<b>Description</b>
<i>Non-volatile Memory</i>	Battery backed 512KB SRAM
<i>Local Area Network (LAN)</i>	LAN connections: <ul style="list-style-type: none"><li>• 10/100BT, supports Wake-On-LAN</li><li>• 10/100/1000BT</li></ul>
<i>System Lock</i>	This lock is located on the back of the system and it prevents removal of the system cover, therefore protecting the system from unwanted removal of its components.

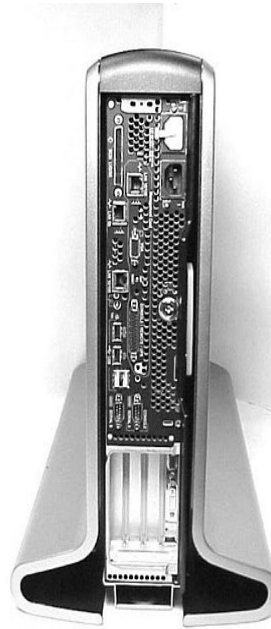
## Packaging

Figure 1-1, Figure 1-2 and Figure 1-3 show the inside and rear views of the system.

**Figure 1-1 Internal Physical Layout**

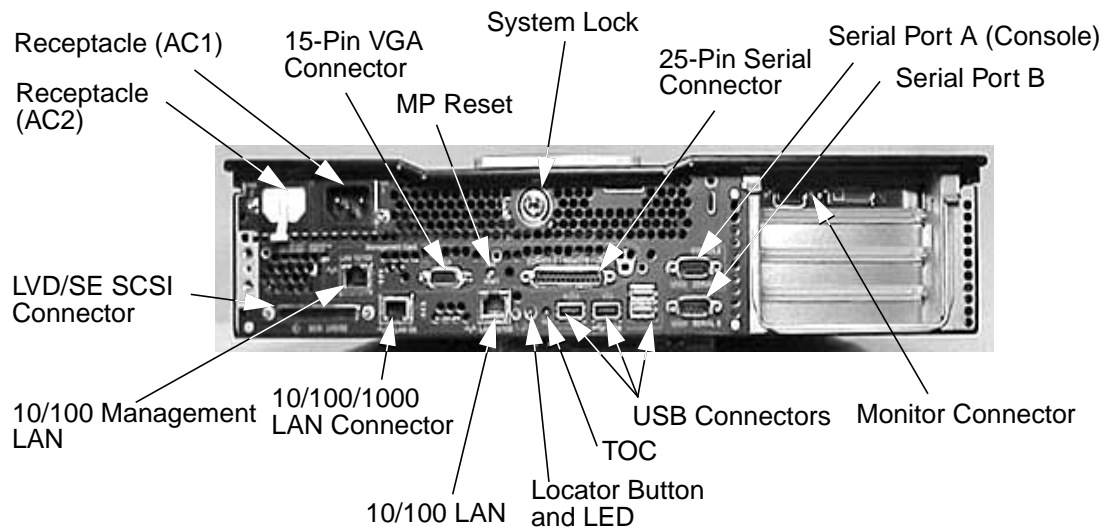


**Figure 1-2 Rear Panel Connectors on Tower System (with Optional Management Card for zx6000s only)**



See Figure 1-3 below for descriptions of connectors.

**Figure 1-3 Rear Panel Connectors on Rack-mounted System (with Optional Management Card for zx6000s only)**



## Consideration for External SCSI Devices

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**NOTE**

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Do not connect a SCSI terminator to the SCSI connector on the back of the system because the connector is automatically terminated.

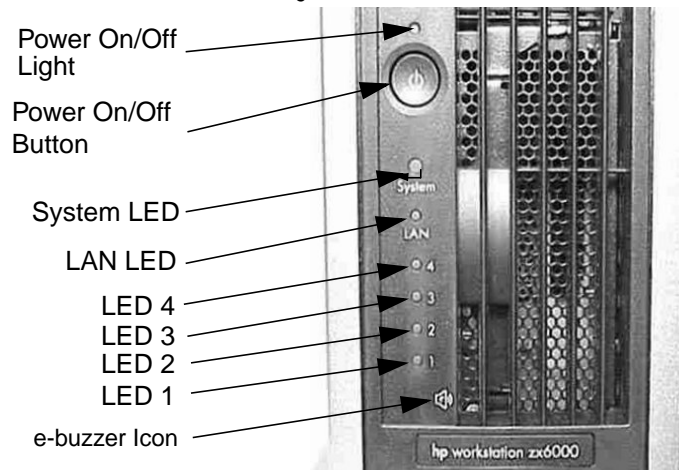
If you have an external SCSI device connected to your system and it is the last device connected externally to the system, you will need to connect a SCSI terminator to that device.

## Front Panel

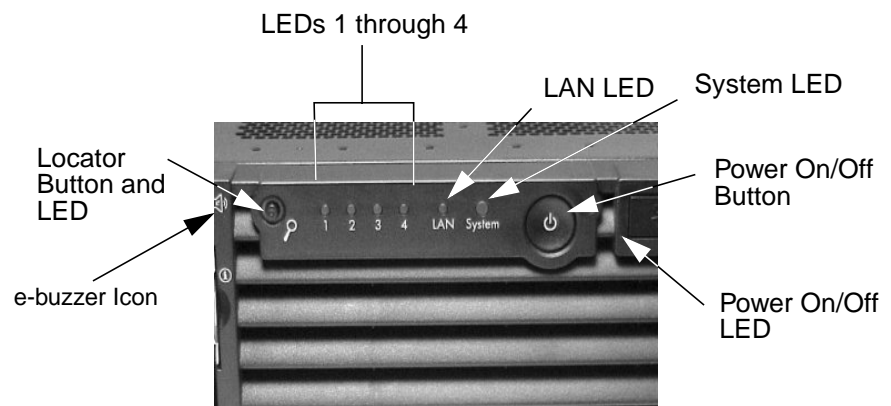
The workstation's front panel has the following features:

- The On/Off LED is green when the power is on.
- The system LED is green when the system is running, orange when there is a system warning and red when there is a system fault.
- The LAN LED blinks when there is activity on the LAN. When the system is turned off, the LAN LED is off.
- There are four diagnostic LEDs to help you troubleshoot your system. See the section “Using the System’s LEDs and e-buzzer to Troubleshoot” in Chapter 4 of this document.
- The locator button and LED can be found only on the rx2600. The purpose of this button and LED is to help you locate the system you are working on in a rack of systems. When the button is pressed in the LED light is blue on the back and front of the system. This LED can be activated remotely.

**Figure 1-4 Front Panel for the Desk-side System**



**Figure 1-5 Front Panel for the Rack-mounted System**





## Specifications and Characteristics

### Physical Characteristics

System Processing Unit	
Weight: (Standard configuration as shipped, excluding keyboard and display)	Desk-side Min.: 22.4 kilograms (49.4 pounds) Desk-side Max.: 25.5 kilograms (56.3 pounds) Rack-mount Min.: 17.5 kilograms (38.6 pounds) Rack-mount Max.: 22.2 kilograms (49.0 pounds)
Dimensions Desk-side:  Dimensions Rack-mount:	67.5cm max. (D) × 29.5cm (W) × 49.4cm (H) (26.6 inches × 11.6 inches × 19.5 inches) 67.9cm max. (D) × 48.3cm (W) × 8.6cm (H) (26.8 inches × 19.0 inches × 3.4 inches)
Footprint (Desk-side system)	0.2 square meters (2.1 square feet)

### Electrical Specifications

**NOTE**

In this document, available power and measured input power are different. The difference is measured input power is the most the system will draw for the supported configuration. A supported configuration for this workstation is: two 1GHz processors, three 36GB SCSI hard disk drives, one FireGL 4 graphics card, one LVD SCSI card, twelve 512MB or 1GB DDR SDRAMs and one 8× DVD slimline drive. Available power is the maximum power that the power supply is capable of delivering. As a guideline, cooling and power specifications should be designed around the measured input value.

Parameter	Total Rating <sup>a</sup>		Peak (15 secs.)	Maximum per PCI-X Slots 64-bit, 133MHz	Maximum for AGP Slot Standard Connector
Input voltage	100-127 VAC	200-250 VAC	Off	Off	Off
Input current (max)	7.2 A	3.6 A	Off	Off	Off
Input frequency	50 to 60 Hz		Off	Off	Off
Measured input power	560 W		Off	Off	Off
Available power (output)	600 W		Off	85W total for PCI slots and AGP slot	
Max current at +12 V	49 A		Off	0.5 A	4.8 A
Max current at -12 V	0.35 A		Off	0.1 A	N/A
Max current at +3.3V	34 A		Off	4.6 A	12.1 A
Max current at +5V	18 A		31 A	3 A	2 A
Max current at +3.3V stdby	3.5 A		Off	Off	

a. The Total Ratings are for a system configuration with two 1GHz processors, 12 DDR SDRAM (512MB each), three 36GHz hard disk drives, one FireGL 4 graphics card and one LVD SCSI card.

If an overload triggers the power supply's overload protection, the system is immediately powered off. To reset the power supply unit:

1. Disconnect the power cord.
2. Determine what caused the overload by contacting an HP Support Representative.
3. Reconnect the power cord, and reboot the workstation.

If an overload occurs twice, then there is an undetected short circuit somewhere.

When you use the front panel's power button to turn off the workstation, power consumption falls below the low power consumption (refer to the table on page 23), but doesn't reach zero. To reach zero power consumption in "off" mode, either unplug the workstation or use a power block with a switch.

## Power Consumption and Cooling

The power consumptions listed in the following table are valid for a standard configuration as shipped (two processors, 6GBs of memory, 600W power supply, three hard disk drives, one graphics card, one LVD SCSI card).

All information in this section is based on primary power consumptions.

Additional Component	130W	—	443.6Btu/h
• Processor	23W	—	78.4Btu/h
• SCSI hard disk drive with I/O access	16W	—	54.5Btu/h
• SCSI hard disk without I/O access (idle)	10W to 25W	—	34.12Btu/h to 85.30Btu/h
• PCI card	70W	—	238.4Btu/h
• AGP card			

## Environmental Specifications

Environmental Specifications (System Processing Unit with Hard Disk)	
Operating Temperature	+10 °C to +35 °C (+50 °F to +95 °F).
Storage Temperature	-40 °C to +70°C (-40 °F to +158 °F).
Over-Temperature Shutdown	+50°C (+122°F)
Operating Humidity	15% to 80% (relative). <sup>a</sup>
Storage Humidity	8% to 85% (relative). <sup>a</sup>
Acoustic noise emission (ISO 7779) Entry configuration: <sup>b</sup> Idle Disk Active Performance configuration: <sup>c</sup> Idle Disk Active	Sound power level <sup>d</sup>  LwA =4.0 BA LwA =4.3 BA  LwA =4.3 BA LwA =4.6 BA
Operating Altitude	10,000ft (3048m) max
Storage Altitude	15,000ft (4600m) max

- a. Noncondensing conditions.
- b. One IDE hard disk drive and an AGP graphics card with passive heatsink.
- c. One SCSI hard disk drive and an AGP graphics card with active heatsink.
- d. Typical for the maximum configuration at room temperature.

Operating temperature and humidity ranges may vary depending on the installed mass storage devices. High humidity levels can cause improper disk operation. Low humidity levels can aggravate static electricity problems and cause excessive wear of the disk surface.

## Hot-Swappable/Pluggable Devices

The zx6000 and rx2600 have hard disk drives that are hot-pluggable and power supplies that are hot-swappable. This section explains how to swap these devices while the system is running.

Topics covered in this section are:

- Hot-Swapping a Fan
- Hot-Swapping a Power Supply
- Hot-Plugging a Hard Disk Drive

### Hot-Swapping a Fan

System fans can be swapped out of a system while it is running. You can remove a bad system fan and replace it using the procedures described in the section “Removing and Replacing the System Fans” in Chapter 2 of this document.

### Hot-Swapping a Power Supply

The hot-swapping capability for power supplies is important for those systems that need to be always on and that have two supplies installed in them. What this means to you is, if one of your power supplies stops working or is having voltage problems, the remaining supply can support the system until the failed unit can be replaced. You can then remove the bad supply and replace it using the procedures described in the section “Removing and Replacing a Power Supply” in Chapter 2 of this document.

### Hot-Plugging a Hard Disk Drive

The zx6000 and rx2600 systems can support up to three hot-pluggable, Low-Voltage Differential (LVD) hard disk drives. These hard disk drives are 3.5-inch form factor, 10K and 15K RPM devices that connect to Ultra2 Wide LVD (Low Voltage Differential) SCSI interfaces on the disk bay backplane.

The three hard disk drive models currently supported are:

- 36 GB LVD 10K RPM disk drive (Product Number A7835A)
- 73 GB LVD 10K RPM disk drive (Product Number A7837A)

The physical aspect of inserting and removing a disk drive is discussed in the document that comes with the drive. However, the operating system must be prepared for the insertion or removal of a disk, or unexpected and harmful effects may occur.

There is a significant difference between the terms “hot-pluggable” and “hot-swappable”. Hot swapping happens at the device level; that is, a hot-swappable device manages insertion/removal on its own without assistance from operating system commands. The disk drive(s) in the zx6000 and rx2600 are not hot-swappable; they are merely hot-pluggable. Thus, a manual software procedure must be done in order to safely remove or insert disk drives while the system is running.

The hot-plug process allows you to replace a defective disk drive in a high-availability system while it is running.

**HP-UX's Hot-Plug Process**

---

**NOTE** The ability to hot plug the hard disk drive(s) on an HP-UX operating system requires MirrorDisk/UX (Product Number B2491BA on HP-UX TCOE 11i V1.6).

---

In the context of replacing a failed disk drive, the system administrator must determine which disk has failed. Depending on how the system was set up, the identity of the failed drive may or may not be obvious. This determination may be done in either of two ways:

- Tracking the error message written by the LVM (Logical Volume Manager) to the system console and/or a log file. For information on LVM commands, see the man pages for `vgchange`, `lvreduce`, `vgfgrestore`, `lvlnboot`, `lvextend`, `lvsync`, etc.
- If installed, run the diagnostic utility Support Tool Manager (`xsttm`) to determine disk malfunction.

The removal of a defective disk drive from an active file system is supported through LVM commands if hot-pluggable disks have been configured into the HP-UX file system with LVM. To provide high availability, without impact to users, the disks must also be configured as mirrored disks. Disk-mirroring is accomplished through use of the MirrorDisk/UX software (HP part number B2491BA); for information on classes, see <http://www.hgp.com/education/courses/h628s.html>.

No graphical user interface is currently offered through the System Administrator Manager (SAM) for doing the required LVM commands because manipulation of the LVM requires specialized knowledge that only experienced system administrators are expected to have (see below for details).

*Hot-Plug Example*

The following example describes a particular system problem where the solution is to replace a hot-plug disk module.

Volume group `/dev/vg00` contains the two disks, with the logical volume configuration as shown:

**Table 1-1 Example Configuration**

Volume Description	Volume Description
Logical Volume 1	Logical Volume 3
Logical Volume 2	Logical Volume 4
Logical Volume 3	Logical Volume 5

hardware address	10/0/12/0.0	10/0/13/0.0
device file (/dev/dsk/)	c2t6d0	c2t5d0

The system problem for this example is that the disk at hardware address 10/0/13/0.0 has a head crash, and as a result, is unusable. The steps described in the Hot-Plug Procedure section below outline a method that can be used to recover from this state.

1. All of the replaced disk's in-use extents must belong to mirrored logical volumes which were created with the "strict" option (-s); see the documentation for MirrorDisk/UX.
2. You must have an up-to-date configuration backup file. This is done automatically each time an LVM command changes LVM configuration.

The default backup file's path is:

```
/etc/lvmconf/<base_vg_name>.conf
```

For example,

```
/etc/lvmconf/vg00.conf
```

3. The replacement disk must be the same product ID as the replaced one.

---

**NOTE**

HP often uses different manufacturers for disks having the same product number. The hot-plug manual procedure will not update the disk driver's internal information to that of the replaced disk.

The replacement disk will have the same capacity and block size as the defective disk because they have the same product number. The only field that could be incorrect is the string specifying the vendor's name. This will not affect the behavior of the LVM. If it is desired to update the manufacturer's name, the disk's volume group must be deactivated and reactivated. See the HP-UX System Administration Tasks manual for details.

#### *Hot-Plug Procedure*

These are the steps required to properly hot-plug a disk drive:

#### **Step 1**

- Check if the LVM found the physical volume to be defective when the volume group was activated.
- The command "vgchange -a y" would have printed the following message on the console:

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

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

- If the status of the "vgchange -v vg02" is unknown, you may check if this occurred by doing a vgdisplay<VG name> command. For example:

```
vgdisplay /dev/vg00
```

- If the disk was defective at `vgchange` time, the following messages will be printed one or more times:

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

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

- If you see these messages, the disk was defective at the time the volume group was activated.

Otherwise, your disk became defective after the `vgchange` and you must continue with step 2 of this procedure.

### Step 2

- Reduce any logical volumes that have mirror copies on the faulty disk so that they no longer mirror onto that disk (note the `-A n` option). This will take a several minutes.

```
lvreduce -m 0 -A n <LV name> /dev/dsk/<hard drive>  
(for 1-way mirroring)
```

For example:

```
lvreduce -m 0 -A n /dev/vg00/stand /dev/dsk/c2t5d0  
lvreduce -m 0 -A n /dev/vg00/swap /dev/dsk/c2t5d0  
lvreduce -m 0 -A n /dev/vg00/ /dev/dsk/c2t5d0
```

The number of logical volumes that this step needs is variable. For instance, on a mirror of a root disk you should have at least three logical volumes: `/swap` (is `lv012`), and `/` (is `lv013`). Note that if your root mirror disk dies, you need to do the following:

- Follow the procedure in the section “Initial System Loader (ISL) Environment” in the chapter “Boot Console Handler” in this document. At the **Main Menu** prompt boot from the good disk.
- Type `y` at the `Interact with ISL` prompt and press **Enter**.
- Type this command at the ISL prompt and press **Enter**: `hpux -lq`

The `-lq` option stands for loss of quorum. Once this procedure has been completed the system will boot.

### Step 3

- Replace the faulty disk.
- Do an `ioscan` on the replaced disk to insure that it is accessible and also as a double check that it is a proper replacement.

For example:

```
ioscan /dev/dsk/c2t5d0
```



#### Step 4

- Restore the LVM configuration/headers onto the replaced disk from your backup of the LVM configuration:

```
vgcfgrestore -n <volume group name> /dev/rdisk/cxtxdx
```

where x is the logical unit number of the disk that has been replaced.

For example:

```
vgcfgrestore -n /dev/vg00 /dev/rdisk/c2t5d0
```

#### Step 5

- Attach the new disk to the active volume group with the `vgchange` command.

```
vgchange -a y /dev/vg00
```

#### Step 6

- If the disk is not a mirror of a root disk, then skip this step.
- Run the `mkboot` command. For example:

```
mkboot /dev/rdisk/c2t5d0
```

- Run `lvlnboot -R` to relink the replaced disk into the Boot Data Reserved Area of all the Physical volumes in the Volume group.

```
lvlnboot -R
```

#### Step 7

- Run the `lvsync` command to synchronize the physical extents of each logical volume specified by logical volume path. Synchronization occurs only on physical extents that are stale mirrors of the original logical extent.

```
lvsync /dev/<volume group name>/<LV name>
```

For example:

```
lvsync /dev/vg00/stand  
lvsync /dev/vg00/swap  
lvsync /dev/vg00/
```

At this stage, your system should be fully functioning. Use the `xstm` command to verify.

## Documentation

The following table lists the documentation available for the workstation. Only selected publications are in hard-copy format. Most are available as PDF files from the HP Web site.

Title	Available at HP Web site (see below)	Hard-copy?
<i>Installation Guide</i>	PDF file	A7857-90000
<i>Operation and Maintenance Guide (this document)</i>	PDF file (web based)	No

### Access HP World Wide Web Site

The above documents as well as additional online support documentation, firmware upgrades, and drivers are available from HP's Web site at

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

After accessing the site, go to the topic "Support Resources" and select "manuals."

### Where to Find the Information

The table below summarizes information provided in the workstation documentation set.

	Installation Guide	Operation and Maintenance Guide (this document)
<b>Introducing the Workstation</b>		
<i>Product features</i>	Minimal	Key features. Exploded view. Parts list.
<i>Product model numbers</i>		
<i>Environmental</i>	Setting up the system. Working in Comfort.	Complete listing.
<i>Safety warnings</i>	Safety.	Electrical, multimedia, safety, unpacking, removing, and replacing cover.
<i>Finding on-line information</i>	HP Web sites.	HP Web sites.
<i>Technical information</i>	Basic details.	Advanced.
<i>Formal documents</i>	Certificate of Conformity. Software License Agreement.	
<b>Using the Workstation</b>		
<i>Connecting devices and turning on</i>	Rear panel connectors, starting and stopping.	
<i>EFI</i>		Basic details.
<i>Fields and their options within Setup</i>	Basic details. Viewing Setup screen, using passwords	Complete list.

	Installation Guide	Operation and Maintenance Guide (this document)
<b>Upgrading the Workstation</b>		
<i>Opening the PC</i>		Full description.
<i>Supported accessories</i>		Full description
<i>Installing accessories</i>		Processor(s), memory, accessory boards, mass storage devices., fans, power supply, system board, battery
<i>Configuring devices</i>		Installing devices.
<i>System board</i>		Installing and removing, connectors and switch settings. Chip-set details.
<b>Repairing the Workstation</b>		
<i>Troubleshooting</i>	Basic.	Advanced. Hardware diagnoses and suggested solutions.
<i>Diagnostic utility</i>		HP STM, Monitor diagnostics and ODE.
<i>Replacing Parts</i>		Description of all customer-replaceable parts.
<i>Contacting Support</i>		Go to the web site listed in this chapter in the section "Access HP World Wide Web Site" and under the topic "Support Resources" select "call hp or find service centers."



---

## **2**

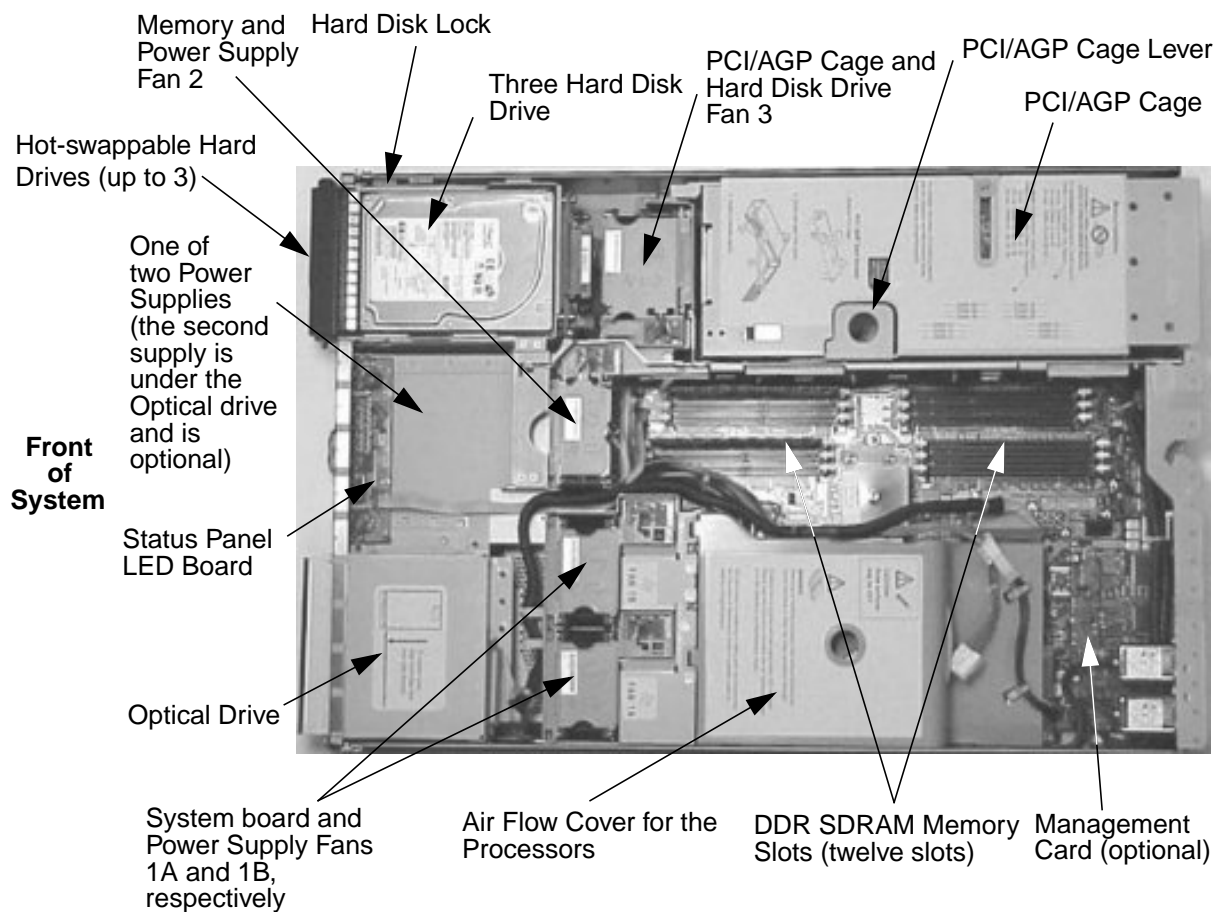
# **Installing or Replacing Parts and Accessories**

This chapter provides information about installing accessories and replacing hardware parts in your system.

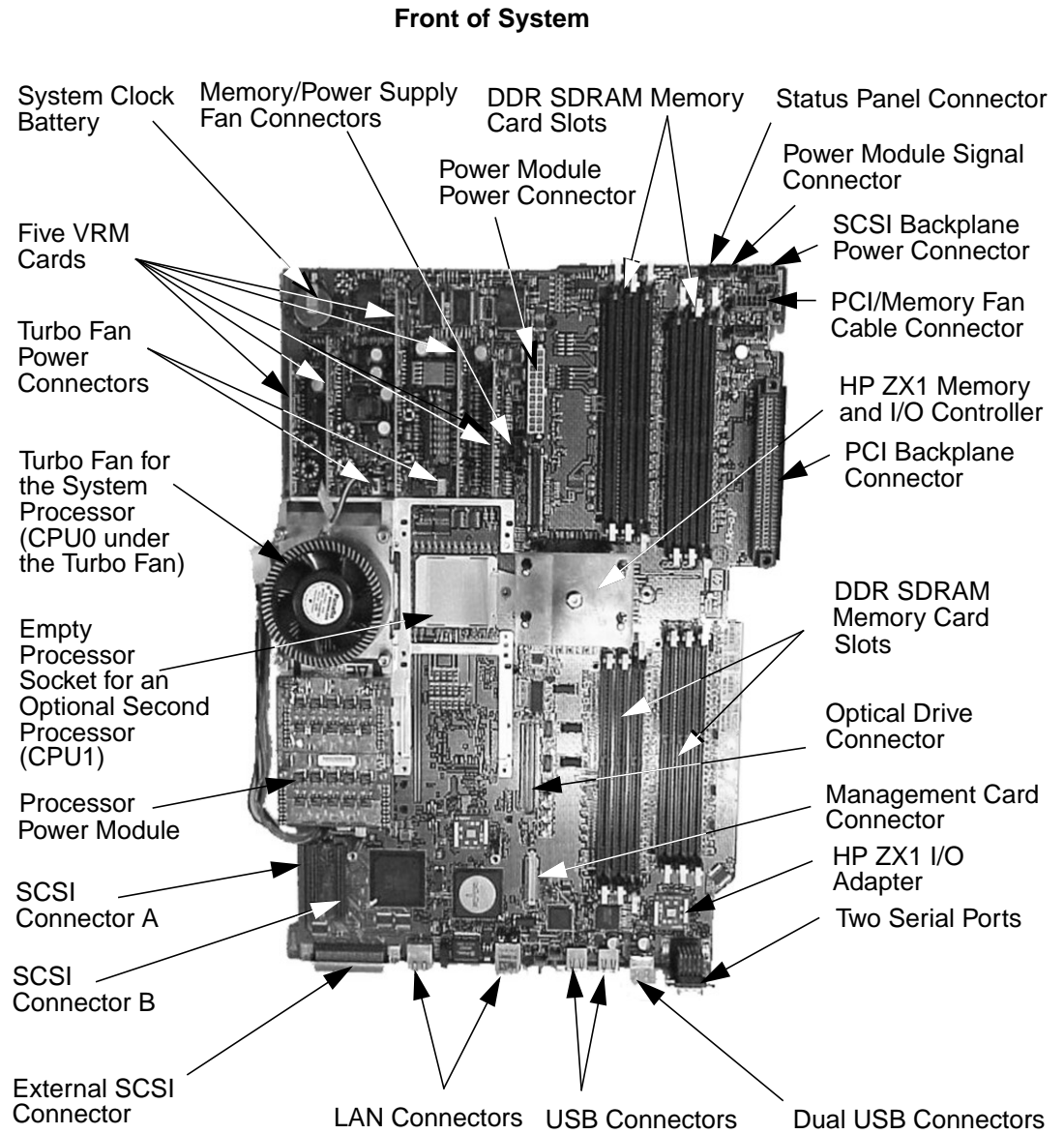
## Overview

This section provides a view of the internal components of the system and the system board.

**Figure 2-1 Internal Components of the System**



**Figure 2-2 System Board Connectors and Slots**



## Pre-Removal/Replacement Information

This section provides information that is prerequisite to parts removal and replacement. The topics covered are:

- Power and EMI Warning and Note
- Tools Required
- Electrostatic Discharge (ESD) Precautions

### Power and EMI Warning and Note

Your safety is important when working on our systems so please take the time to read the following warning. There are also certain regulations that need to be followed when operating this system, so please read the subsequent note.

---

**WARNING**

**For most of the installation and removal procedures in this chapter, you must power off the workstation and unplug the workstation power cord from the AC power outlet.**

---

**NOTE**

To maintain FCC/EMI (Electromagnetic Interference — EMI) compliance, verify that all covers are replaced and that all screws are properly seated.

---

### Tools Required

Use the following tools to remove or replace system components (for example, hard disk drives, optical drives, processors, etc.):

- Light-duty flat blade screwdriver with 6-inch (152mm) blade
- T-15 Torx driver
- Special processor tool (Part Number A7231-04046; shipped with processor upgrade)
- ESD equipment (see the subsequent section “Electrostatic Discharge (ESD) Precautions” in the subsequent section)

### Electrostatic Discharge (ESD) Precautions

To prevent damage to this system, observe all of the following ESD precautions while performing the system parts removal/replacement procedures:

- Work on a static-free mat.
- Wear a static strap to ensure that any accumulated electrostatic charge is discharged from your body to ground.
- Create a common ground for the equipment you are working on by connecting the static-free mat, static strap and peripheral units to that piece of equipment.
- Keep uninstalled printed circuit boards in their protective antistatic bags.
- Handle printed circuit boards by their edges, once you have removed them from their protective antistatic bags.



---

## Removing and Replacing the Tower System's Plastic Panels and Metal Side Cover

This section covers the removal and replacement of the tower's plastic panels and metal side cover. To learn how to remove/replace the plastic front panel and metal top cover for a rack system, read the section "Removing and Replacing the Rack System's Metal Top Cover and Front Panel" found in this chapter.

### Removing the Tower System's Left-side and Front Panels and Metal Side Cover

If you need to upgrade or just remove/replace internal system components, you will need to remove the system's left-side panel and its metal side cover. If you need to remove a hot-swappable power supply from the system, you will only need to remove the front panel.

Here is the procedure for removing the tower's left-side and front panels and metal side cover.

1. Turn the system's power off and disconnect the system's power cable(s).
2. Use the indentations located on the top edge of the left-side panel and pull outward to un-snap and rotate it away from system. See Figure 2-3. After an approximate 45 degree rotation, lift the left-side panel upwards and off of the two lower retaining tabs.

**Figure 2-3** Removing the Left-side Panel

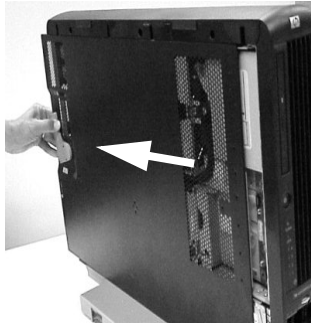


Removing and Replacing the Tower System's Plastic Panels and Metal Side Cover

3. Rotate the blue release handle toward the back of the system and slide the metal side cover in the direction of the arrow. See Figure 2-4. This gives you access to the system's internal components. Note that the system can be serviced in either the vertical or horizontal orientation (see Figure 2-4 b and c). Proceed to step 4 if you need to remove the system's front panel.

**Figure 2-4 Removing the Metal Side Cover**

a. Remove Metal Side Cover



b. Access in Vertical Orientation



c. Access in Horizontal Orientation



---

**CAUTION**

Both the zx6000 and rx2600 systems depend on the metal side cover for proper cooling of internal components. Operating the system with the side cover removed can cause the system to quickly overheat.

---

4. Use the indentation on the top edge of the plastic front panel and pull outward to un-snap and rotate it away from the system. See Figure 2-5. After an approximate 45 degree rotation, lift the plastic front panel upwards and off of the two lower retaining tabs.

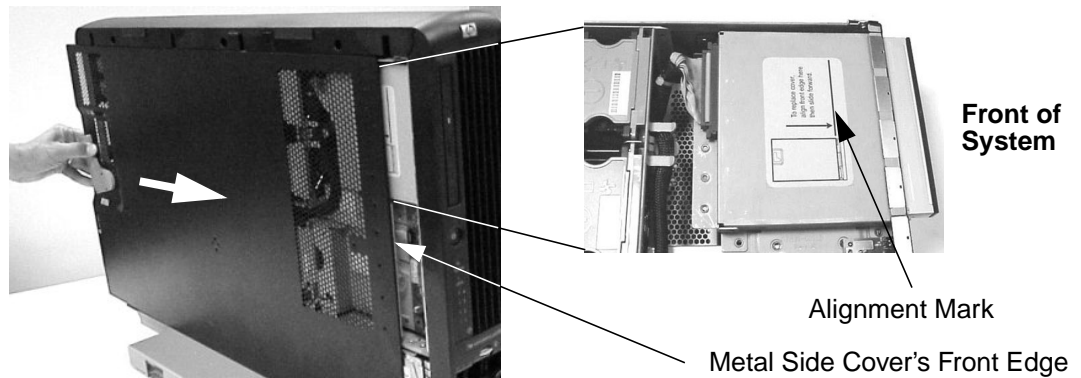
**Figure 2-5 Removing the Front Panel**



## Replacing the Tower System's Left-side and Front Panels and Metal Side Cover

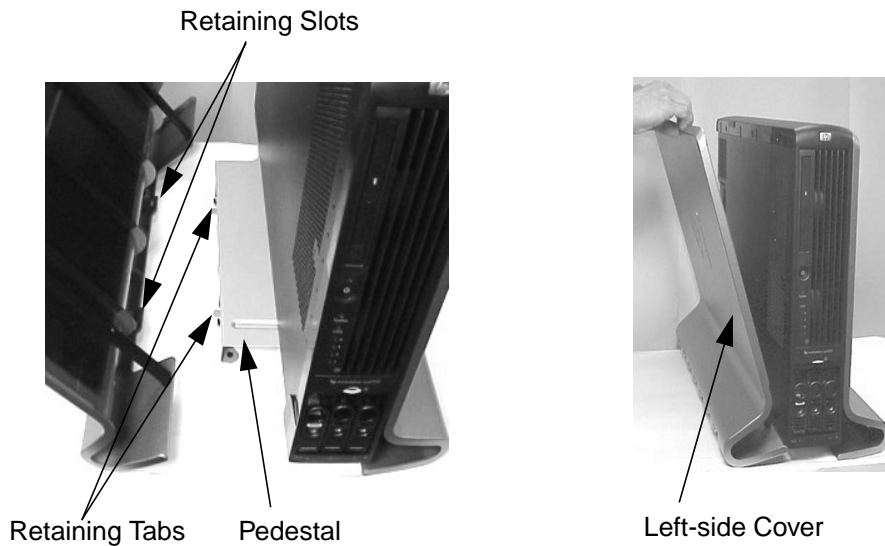
1. Align the metal side cover's front edge with the alignment mark on the optical drive's bay area and slide the cover in the direction of the arrow until the cover's blue release lever latches in place. See Figure 2-6.

**Figure 2-6** Aligning the Metal Side Cover's Front Edge with the Alignment Mark



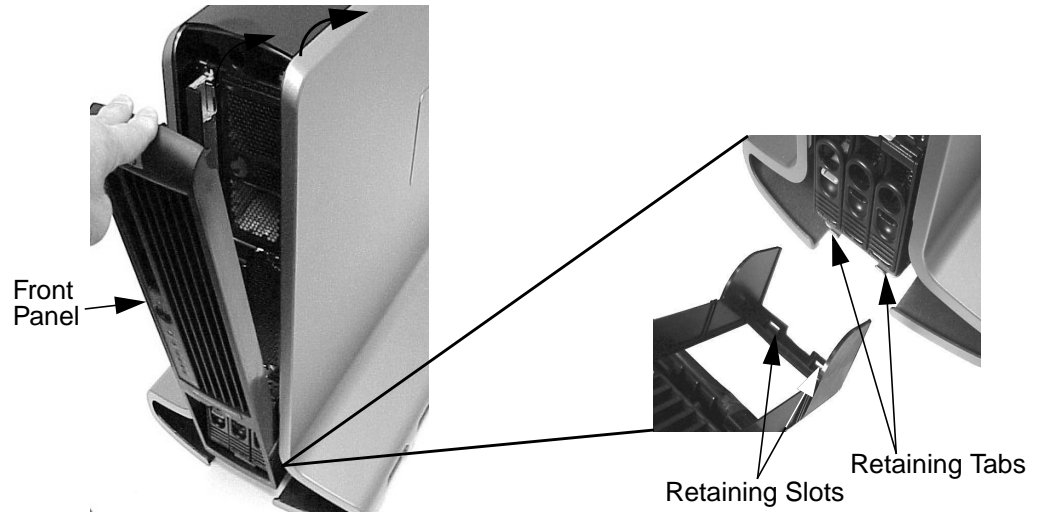
2. Position the left-side panel at approximately 45 degrees and align the panel's retaining slots with the pedestal retaining tabs. See Figure 2-7. Slide the panel toward the system until it stops against the pedestal. Rotate the panel inward until it snaps in place. You can do the same thing with the plastic right-side panel to replace it. Proceed to step 3 if you need to replace the system's front panel; otherwise, go to step 4.

**Figure 2-7** Replacing the Left-side Panel



3. Position the front panel at approximately 45 degrees and place its lower retaining slots on the pedestal's retaining tabs. Rotate the front panel inward (see Figure 2-8) until it snaps in place.

**Figure 2-8 Replacing the Front Panel**



4. Reconnect the power cable(s) and turn it on.

---

## Removing and Replacing the Rack System's Metal Top Cover and Front Panel

This section covers the removal and replacement of the rack system's metal top cover and front panel. To learn how to remove/replace the plastic front panel and metal side cover for a tower system, read the section "Removing and Replacing the Tower System's Plastic Panels and Metal Side Cover" found in this chapter.

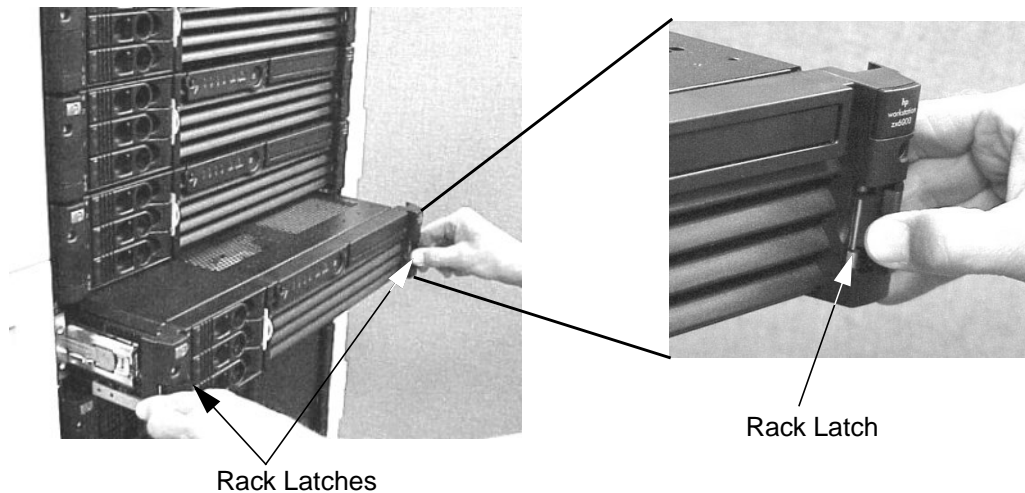
### Removing the System's Metal Top Cover and Front Panel

If you need to upgrade or just remove/replace internal system components, you will need to remove the system's metal top cover. If you need to remove a hot-swappable power supply from the system, you will only need to remove the front panel.

Here is the procedure for removing the rack system's metal top cover and front panel.

1. Turn the system's power off and disconnect the system's power cable(s).
2. Release the front panel's rack latches by rotating them outward and slide the system out of the rack until the guide-rail release clips are visible. See Figure 2-9. For rack-mounting instructions, see the Midweight Slide Kit HP 5064-9670 "Installation Guide" that came with your rack enclosure.

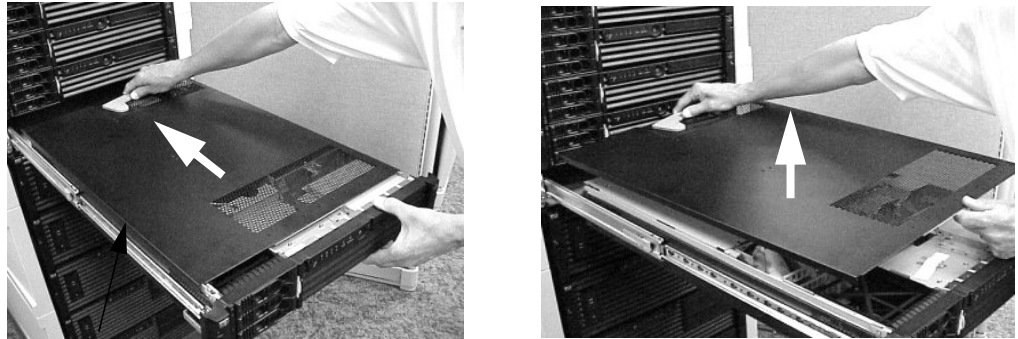
**Figure 2-9** Releasing the System from the Rack



Removing and Replacing the Rack System's Metal Top Cover and Front Panel

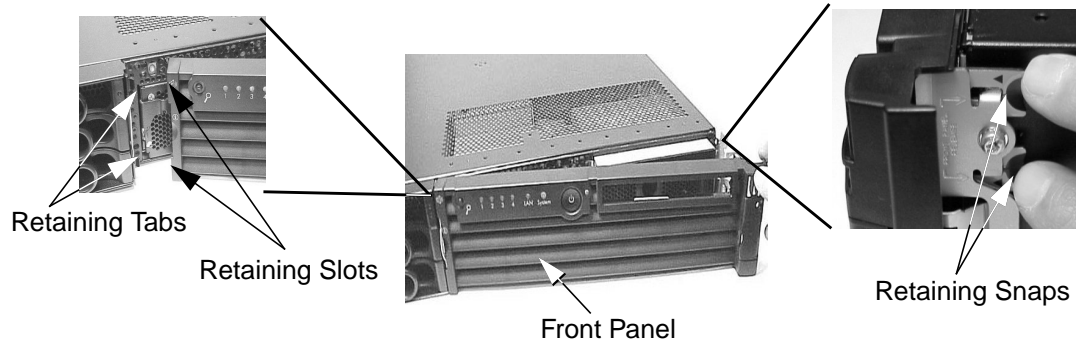
3. Rotate the metal top cover's blue release lever toward the back of the system and slide the cover toward the back of the system. Next, lift the cover off the system chassis. See Figure 2-10. If you need to remove a system power supply or optical drive, you must complete step 4 of this procedure.

**Figure 2-10 Removing the Metal Top Cover**



4. Press in on the retaining snaps located on the right-side of the front panel. Rotate the front panel outward to an angle of approximately 45 degrees and pull the panel off of its retaining tabs. See Figure 2-11.

**Figure 2-11 Removing the Front Panel**

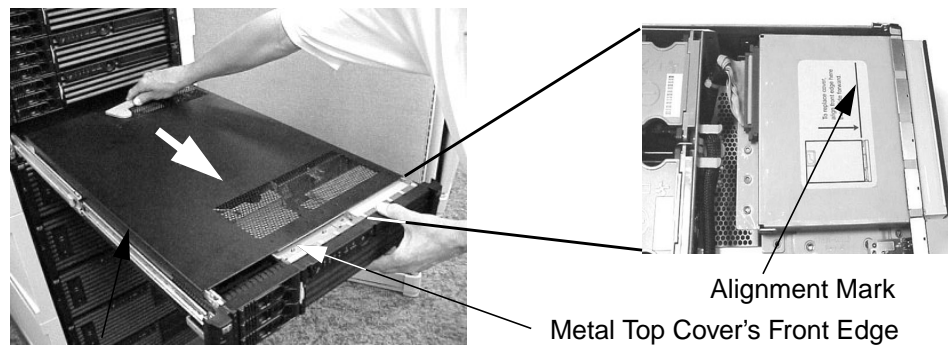




## Replacing the System's Metal Top Cover and Front Panel

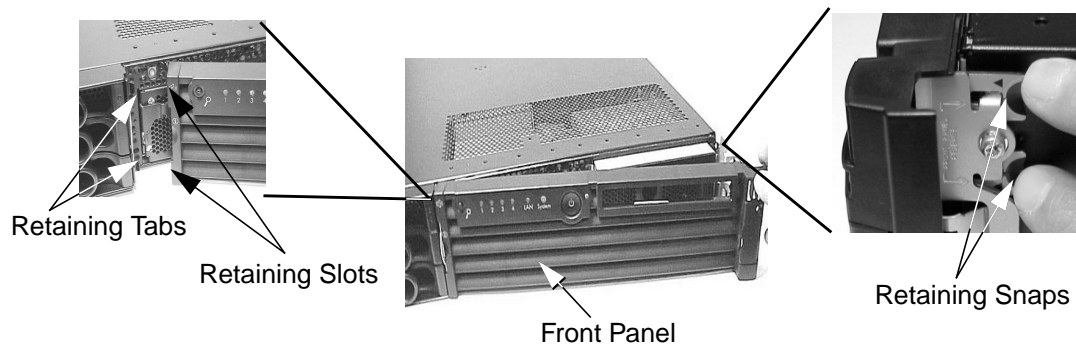
1. Secure any wires or cables in your system so they will not get cut or interfere with the replacement of the top cover on the system's chassis.
2. Align the metal top cover's front edge with the alignment mark on the system's optical drive bay area. Next, grasp the cover's blue release lever and slide the cover toward the front of the system. When the release lever snaps in place, the cover is secure on the system. See Figure 2-12. If you removed the system's front panel, you will need to replace it by completing step 3 before sliding the system back into the rack; otherwise, skip to step 4.

**Figure 2-12** Replacing the Metal Top Cover



3. Complete this step if you need to replace the front panel; otherwise skip to step 4. Position the right-side front panel at approximately 45 degrees to the front of the system and the front panel retaining slots onto the chassis retaining tabs. Rotate the front panel inward until it snaps in place. See Figure 2-13.

**Figure 2-13** Replacing the Front Panel



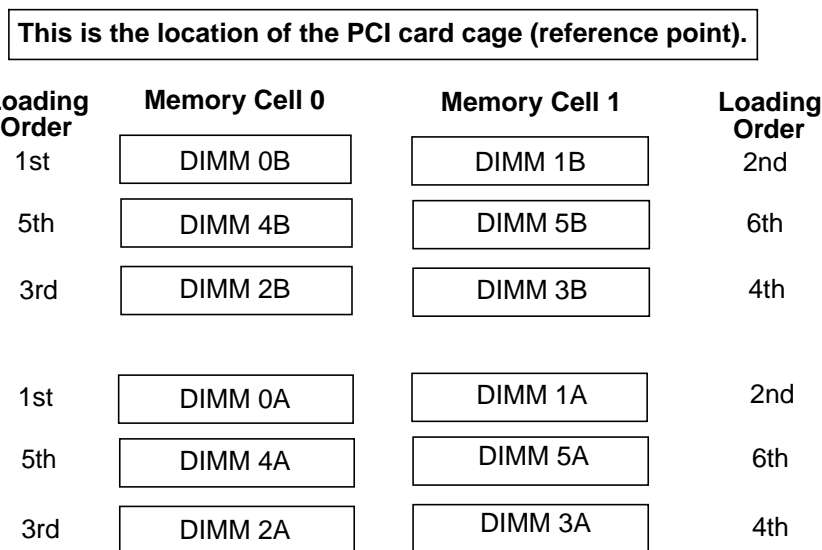
4. Slide the system into the rack and reconnect the power cable(s) and turn on the system.

## Removing and Replacing Memory

You system has 12 memory slots for installing DDR SDRAM memory modules. These memory modules can either be 256MB, 512MB or 1GB, and they have to be arranged as ordered pairs of equal size. For example, if you place a memory module of size 1GB in slot 0A then you must insert a 1GB memory module in slot 0B. You can install a maximum of 12GB of memory in your workstation and a minimum of 512MB.

The memory loading sequence is shown in Figure 2-14. Note that memory in the rx2600 must be loaded in matched quads. This means that you have to load two matched memory cards per cell. For example, you would use the loading order provided in Figure 2-14, and place DIMMs in slots 0A and 0B of memory cell 0 and in slots 1A and 1B in memory cell 1.

**Figure 2-14** Memory Loading Order



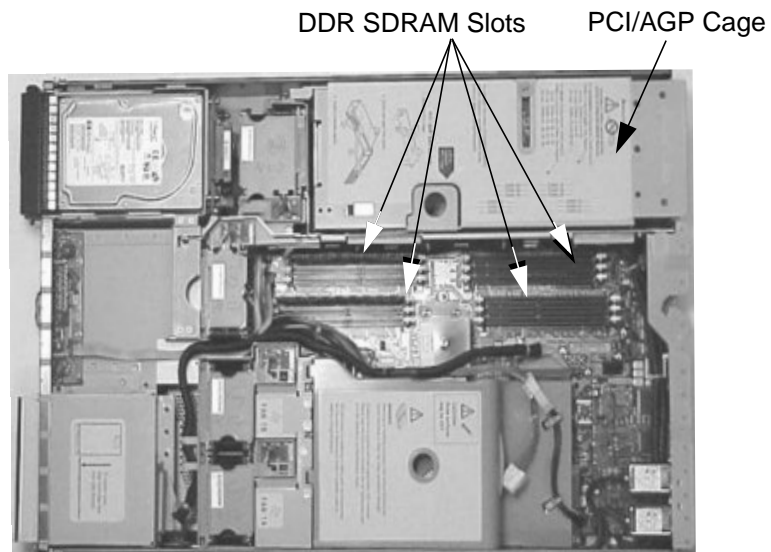
The memory loading instructions for the system are:

1. DDR SDRAM must be loaded as matched pairs. To determine if the DIMMs are matched pairs, look at the HP part number on the DIMMs. If the HP part numbers match, then the DIMMs can be paired together for loading in the system.
2. It is acceptable to mix module sizes in the system as long as DIMMs within each pair share the same HP part number. For example, it is acceptable to load a pair of 256MB DIMMs in slots 0A and 0B, and a pair of 1GB DIMMs in slots 1A and 1B. It is also acceptable to continue with the previous example and load 512MB DIMMs in slots 2A, 2B, 3A, and 3B.



3. You must load the first DDR SDRAM matched pair in **Memory Cell 0** and in the slots labeled **DIMM 0A** and **DIMM 0B**. Load the second matched pair in **Memory Cell 1** and in the slots labeled **DIMM 1A** and **DIMM 1B**. Continue loading successive matched pairs using the sequence described in Figure 2-14. To achieve optimal system performance, always load memory in the sequence described in Figure 2-14. To ensure “chip spare functionality,” memory must be loaded in quads (two pairs). Refer to the section “Chip Spare Functionality” in the Appendix B for more information.

**Figure 2-15 Location of Memory on the System Board**



To remove and replace a memory module, follow this procedure:

1. Turn off the system and disconnect all power cables as well as any LAN or telecommunications cables.

---

**CAUTION**

---

Turning off the system prevents damage to the memory card when removing or replacing it.

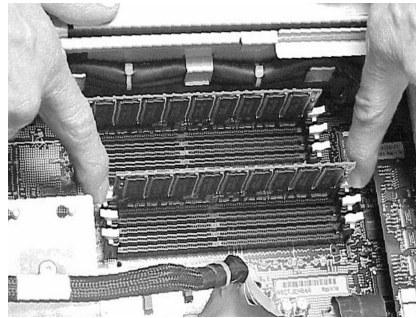
2. Remove the system's plastic panels and metal side/top cover (refer to page 37 or page 41 for instructions).

3. Press down on the memory module's retaining clips and lift the module by its left and right edges out of its memory slot. See Figure 2-16. Always store the removed memory modules in a static-free container for future use.

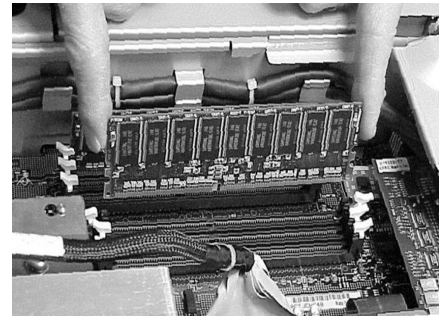
To replace or install a memory module, reverse this procedure. Note that the memory module is keyed and can only be inserted in one direction. When the memory module is correctly seated, you will feel the memory module's retaining clips lock in place.

**Figure 2-16 Removing a Memory Module**

1: Press down on the retaining clips



2: Lift card out of memory slot



4. Replace the system's plastic panels and metal side/top cover (refer to page 39 or page 43). Reconnect all of the power and telecommunications cables.
5. Execute the `info mem` command at the Extensible Firmware Interface (EFI) shell prompt to verify your memory configuration. For more information on EFI, see chapter 3 of this document.

## Removing or Replacing an Accessory Card

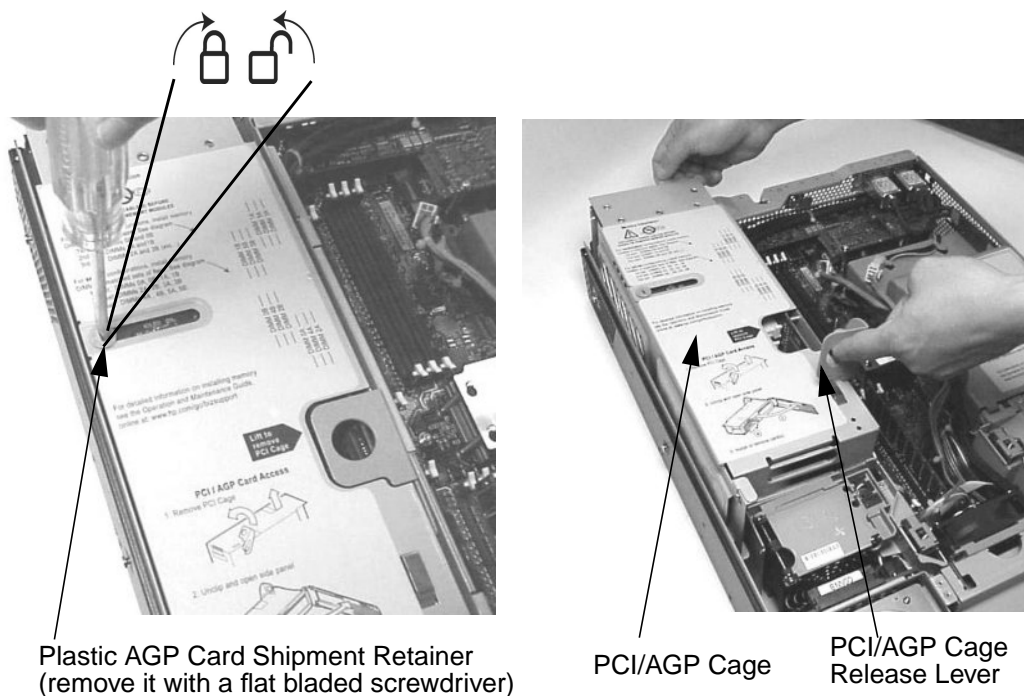
If you have a zx6000, your system has three 64-bit, 133MHz PCI-X card slots and one AGP Pro 4×, 1.5V slot located in a PCI/AGP cage that connects to the system board. If you have a rx2600, your system has four 64-bit, 133MHz PCI-X card slots. This section explains how to access the PCI/AGP cage and remove cards from it and replace cards in it.

### Removing an Accessory Card

To remove an accessory card, complete the following steps:

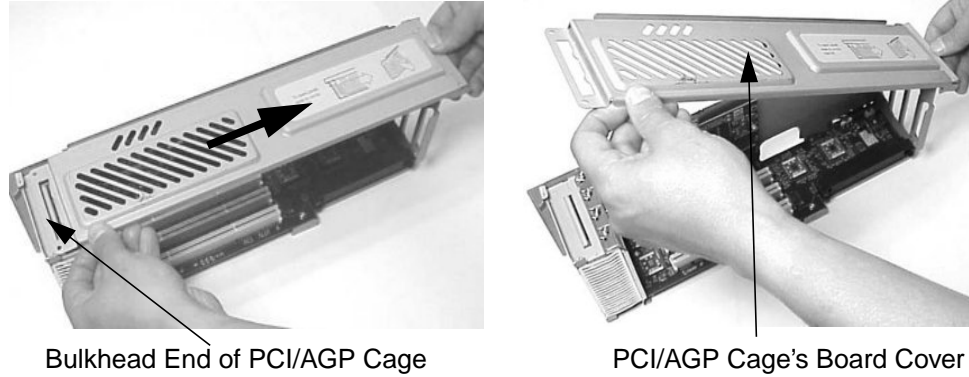
1. Turn off the display and system. Disconnect all power cables and any LAN or telecommunications cables.
2. Remove the system's plastic panels and metal side/top cover (refer to page 37 or page 41 for instructions).
3. Lift up on the PCI/AGP cage release lever and the back edge of the PCI/AGP cage and lift the PCI/AGP cage out of the system. See Figure 2-17. If the accessory card you are removing is in the AGP card slot, you may need to remove the AGP card's shipment retainer. See Figure 2-17. To do this, turn the shipment retainer counterclockwise and remove it. Note that this plastic retainer will wear out if used too often, therefore, you may need to contact your local HP sales representative for a replacement part.

**Figure 2-17 Removing the PCI/AGP Cage from the System**



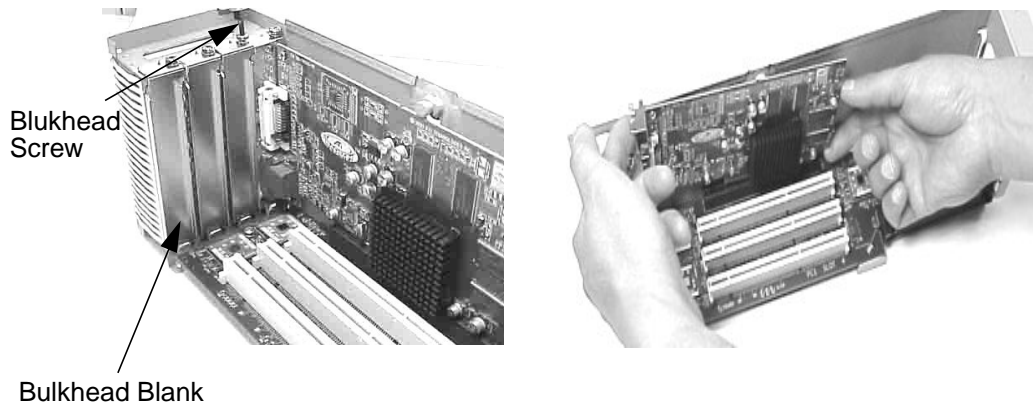
4. Grasp the PCI/AGP cage's cover and slide it away from the bulkhead end of the PCI/AGP cage. Lift the cover off the PCI/AGP cage. See Figure 2-18.

**Figure 2-18 Removing the PCI/AGP Cage's Board Cover**



5. Unscrew the bulkhead screw that holds the accessory card in place. Grasp the bulkhead end of the card and its opposite edge and lift the card out of its connector. See Figure 2-19.

**Figure 2-19 Removing the Accessory Card**

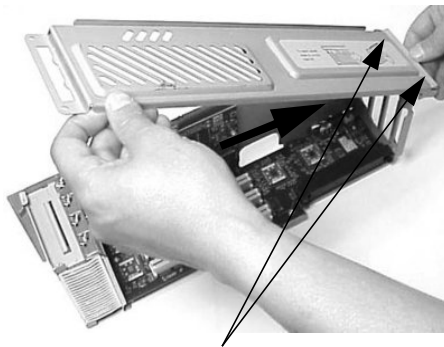


## Replacing an Accessory Card

To replace/install an accessory card, complete the following steps:

1. Turn off the display and system. Disconnect all power cables and any LAN or telecommunications cables.
2. Remove the system's plastic panels and metal side/top cover (refer to page 37 or page 41 for instructions).
3. Lift up on the PCI/AGP cage release lever and the back edge of the PCI/AGP cage. See Figure 2-17. Next, lift the PCI/AGP cage out of the system. See Figure 2-17.
4. Grasp the PCI/AGP cage's cover and slide it away from the bulkhead end of the PCI/AGP cage. See Figure 2-18.
5. Remove any bulkhead blank (if present) that is in the slot where you will insert the accessory card. Grasp the bulkhead end of the card and its opposite edge and insert the card into its connector. See Figure 2-19. Secure the card in its card slot by screwing in the bulkhead screw that was used to hold the bulkhead blank in place. See Figure 2-19.
6. Slide the retaining tabs on the fan end of the PCI/AGP cage's cover into their retaining slots and press the cover down on the accessory board(s). Next, slide the bulkhead end of the PCI/AGP cage's retaining tab into the cover's retaining slot. See Figure 2-20.

**Figure 2-20 Replacing the PCI/AGP Cage's Board Cover**



Fan End's Retaining Tabs and Slots



Bulkhead End's Retaining Tab and Slot

7. Place the PCI/AGP cage back in the system. See Figure 2-17. Note that the PCI/AGP cage release lever must remain up until you get the PCI/AGP cage aligned in the system. You can then press it down to lock it in place. If you have an accessory card in the AGP card slot, you will need to secure it with the plastic shipment retainer.
8. Replace the system's plastic panels and metal side/top cover (refer to page 39 or page 43). Reconnect all of the power and telecommunications cables.
9. Turn the system on and verify that the accessory card has been properly installed. To do this, execute the `info io` command at the Extensible Firmware Interface (EFI) shell. For more information on EFI, see chapter 3 of this document.



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## Removing and Replacing an Audio Card

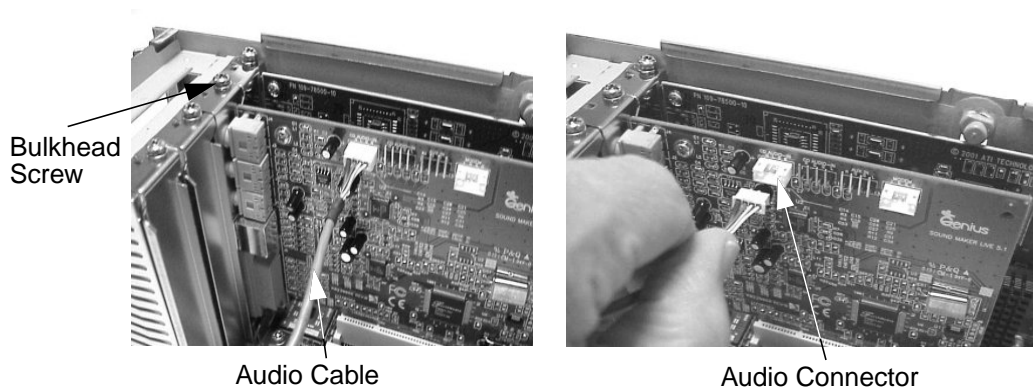
This section explains how to remove and replace an audio card from the PCI/AGP cage.

### Removing an Audio Card

To remove an audio card, complete the following steps:

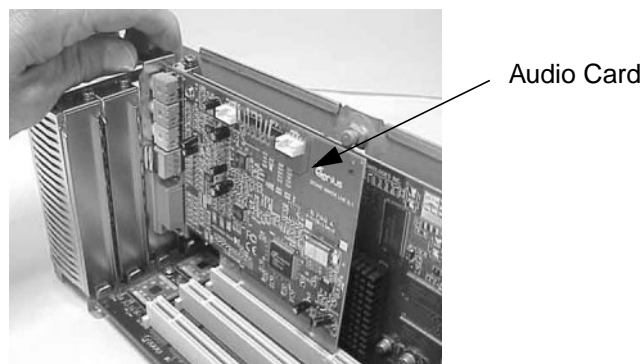
1. Turn off the display and system. Disconnect all power cables and any LAN or telecommunications cables.
2. Follow steps two through four of the section “Removing an Accessory Card” in this chapter (refer to page 47 for instructions).
3. Unscrew the bulkhead screw that holds the audio card in place and unplug the audio cable. See Figure 2-21.

**Figure 2-21** Removing the Audio Card’s Cable



4. Grasp the bulkhead end of the card and lift the card out of its connector. See Figure 2-22.

**Figure 2-22** Removing an Audio Card

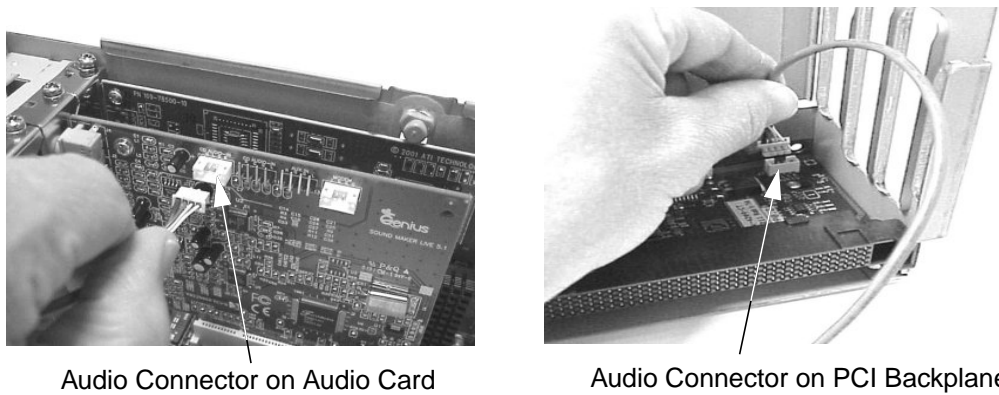


## Replacing an Audio Card

To replace an audio card, complete the following steps:

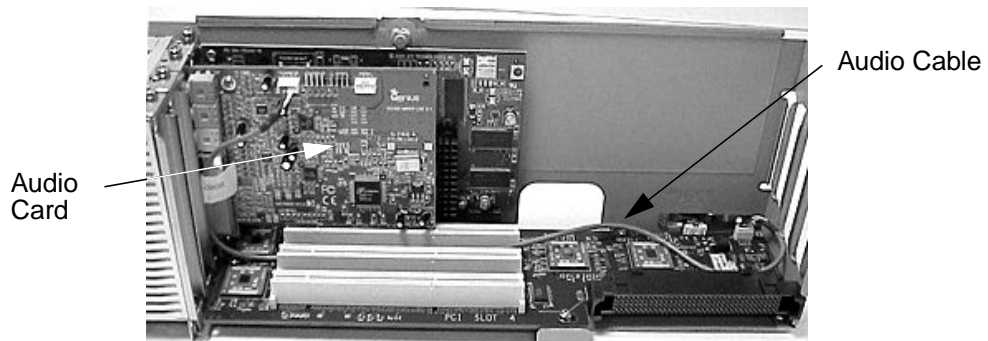
1. Turn off the display and system. Disconnect all power cables and any LAN or telecommunications cables.
2. Follow steps two through four of the section “Removing an Accessory Card” in this chapter (refer to page 47 for instructions).
3. Insert the audio card into a PCI card slot. See Figure 2-22.
4. Connect one end of the audio cable to the audio card and the other end to the audio connector on the PCI backplane card. See Figure 2-23.

**Figure 2-23 Replacing the Audio Card’s Cable**



5. Ensure that the audio cable is properly installed by connecting headphones to the audio OUT jack on the audio card and playing audio media in the optical device.

**Figure 2-24 Installed Audio Card and Cable**



6. Complete steps six through nine of the section “Replacing an Accessory Card” in this chapter. See page 49.

## Removing and Replacing the PCI Backplane

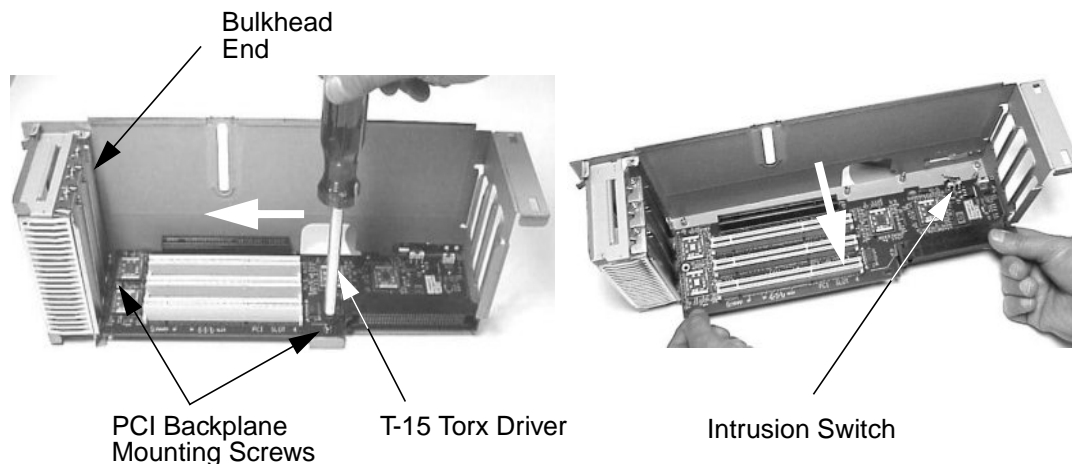
This section explains how to remove and replace the PCI backplane.

### Removing the PCI Backplane

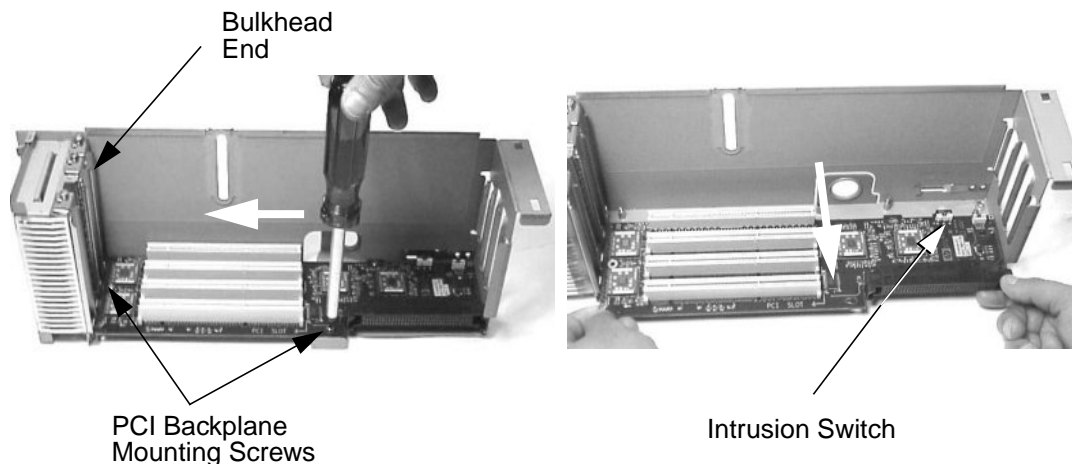
To remove the PCI backplane follow these steps:

1. Remove any accessory cards by completing steps one through five in the section “Removing an Accessory Card” found in this chapter. See page 47.
2. Unscrew the PCI backplane’s mounting screws and slide the backplane board toward the bulkhead end of the PCI/AGP cage. This unlocks the PCI backplane from its standoffs. Next, slightly lift the PCI backplane over the top of the standoffs and slide it out of the PCI/AGP cage. Please be careful not to damage the system’s intrusion switch. See Figure 2-25.

**Figure 2-25 Removing the PCI Backplane (for the zx6000)**



**Figure 2-26 Removing the PCI Backplane (for the rx2600)**



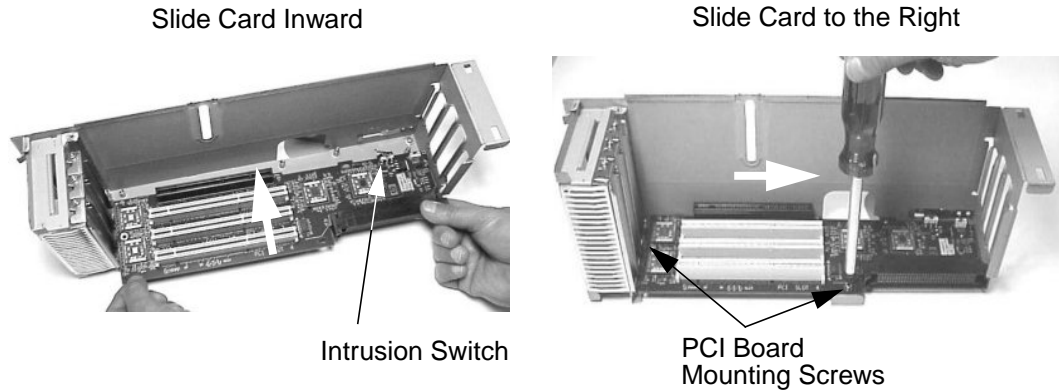


## Replacing the PCI Board

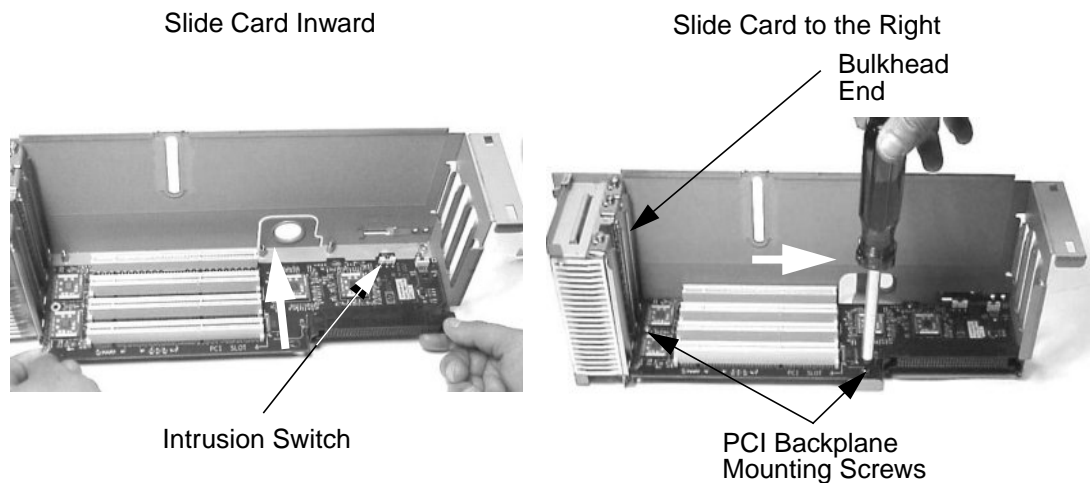
To replace the PCI board follow these steps:

1. Place the PCI board in the PCI/AGP cage by aligning the cage's standoffs with the holes on the PCI board. When sliding the board onto the standoffs, slide it in the direction of the white arrows. See Figure 2-27 and Figure 2-28. Next, secure the PCI board by screwing in its mounting screws. See Figure 2-27 and Figure 2-28.

**Figure 2-27 Replacing the PCI Board (for the zx6000)**



**Figure 2-28 Replacing the PCI Backplane (for the rx2600)**



2. Complete steps five through nine in the section “Replacing an Accessory Card” found in this chapter. See page 49.

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## Removing and Replacing an Optical Drive

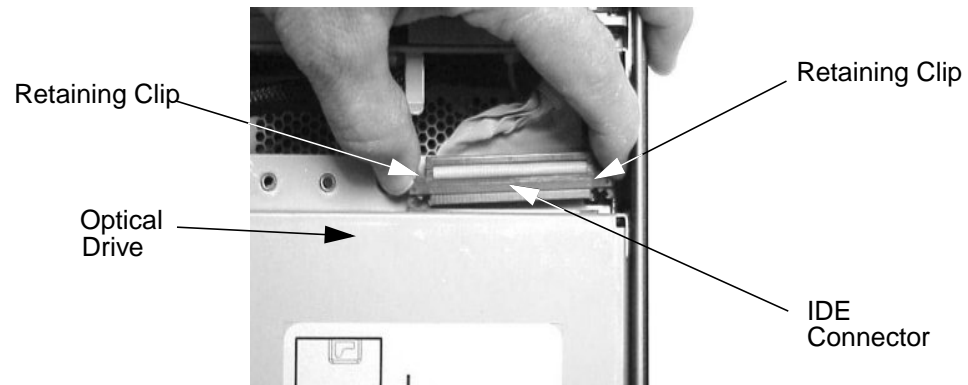
This section explains how to remove and replace an optical drive, such as a CD-RW or DVD drive, in/from your system.

### Removing an Optical Drive

To remove an optical drive from your system, follow these steps:

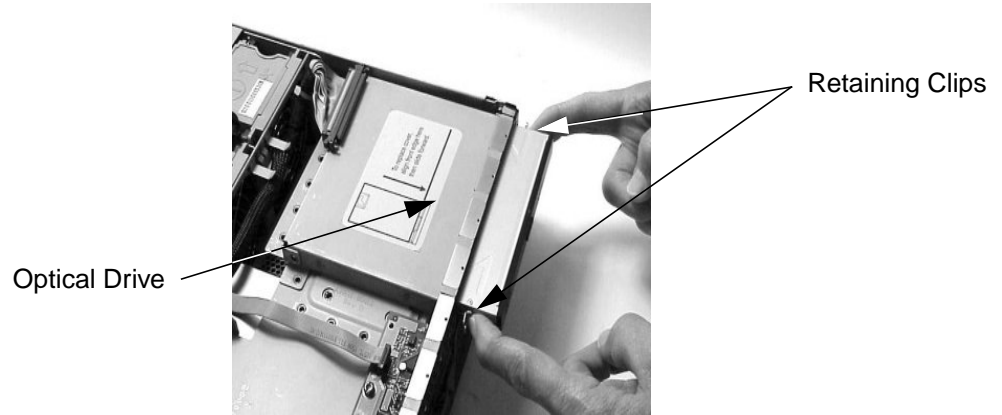
1. Turn off the display and system. Disconnect all power cables and any LAN or telecommunications cables.
2. Remove the system's plastic panels and metal side/top cover (refer to page 37 or page 41 for instructions).
3. Disconnect the IDE cable from the back of the optical drive. See Figure 2-29. Note that the retaining clips on the connector cable need to be pulled back to release the cable from the optical drive's connector.

**Figure 2-29** Disconnecting the Optical Drive's IDE Cable



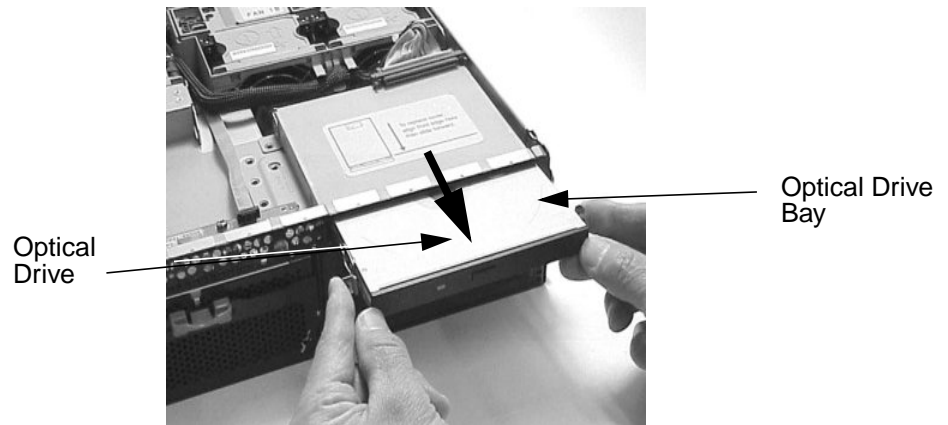
4. Release the small retaining clips on both sides of the optical drive by pressing in on them. See Figure 2-30.

**Figure 2-30 Releasing the Optical Drive's Retaining Clips**



5. Slide the optical drive out of the optical drive bay. See Figure 2-31.

**Figure 2-31 Removing the Optical Drive from the Optical Drive Bay**

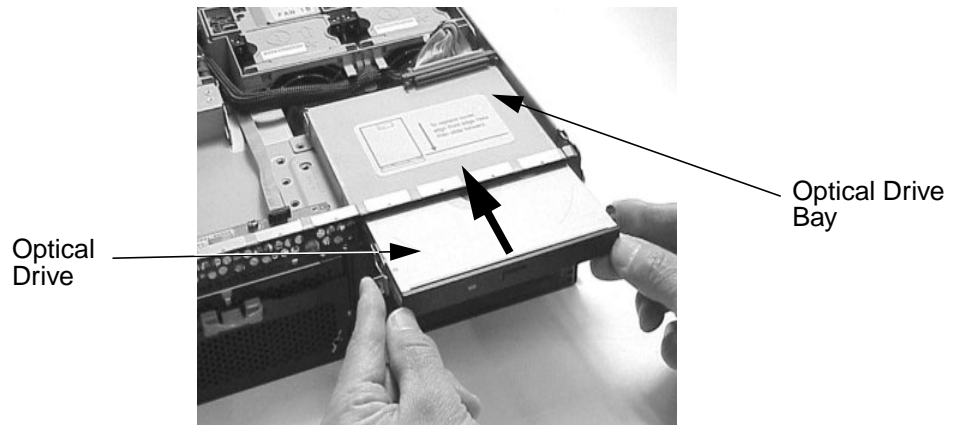


## Replacing an Optical Drive

To replace an optical drive in your system, follow these steps:

1. Turn off the display and system. Disconnect all power cables and any LAN or telecommunications cables.
2. Remove the system's plastic panels and metal side/top cover (refer to page 37 or page 41 for instructions).
3. Slide the optical drive into the optical drive bay until it stops sliding. See Figure 2-32.

**Figure 2-32 Replacing the Optical Drive in the Optical Drive Bay**



4. Ensure that the retaining clips on both sides of the optical drive have snapped in place. To do this, grasp both sides of the drive without pressing in on the retaining clips and pull outward. If you can pull outward on the optical drive without it sliding out of its bay, the optical drive is securely in place.
5. Connect the IDE cable on the back of the optical drive. See Figure 2-29.
6. Replace the system's plastic panels and metal side/top cover (refer to page 39 or page 43). Reconnect all of the power and telecommunications cables.
7. Turn the system on and verify that the optical drive has been properly installed. To do this, execute the `info io` command at the Extensible Firmware Interface (EFI) shell. For details on the `info io` command, read the chapter "System Configuration" in this document.

## Removing and Replacing a Hard Disk Drive

This section explains how to remove and replace hard disk drives in/from your tower or rack-mounted system. Please keep in mind that this system's hard disk drives are hot-swappable, therefore, you do not need to turn off the system to remove or replace them.

### Removing a Hard Disk Drive

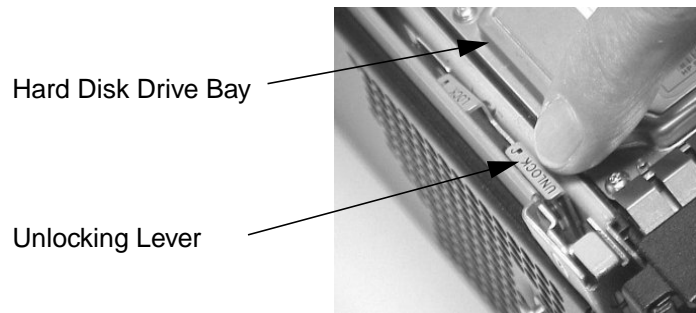
To remove a hard disk drive from a tower or rack system, follow these steps:

1. Unlock the hard disk drives if you have locked them. To do this, you need to remove the system's plastic panels and metal side/top cover (refer to page 37 or page 41 for instructions). Next, press down on the **Unlock** lever. See Figure 2-33.

#### CAUTION

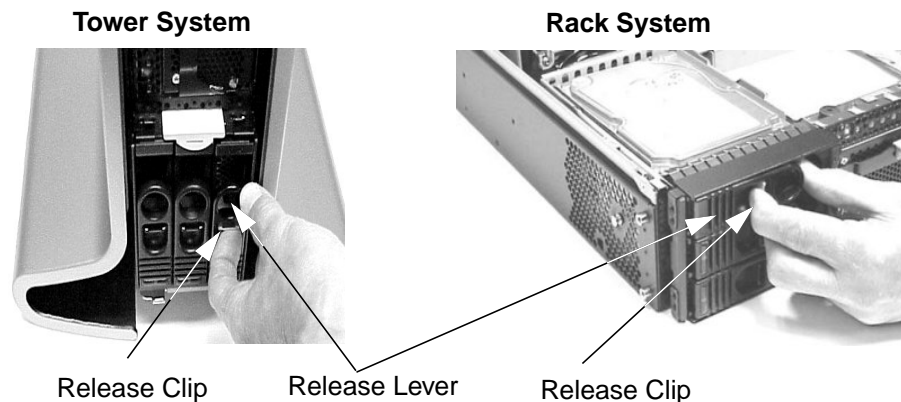
If you try to remove a hard disk drive without unlocking it from the system, you will damage the hard disk drive's bay area.

**Figure 2-33** Unlocking the Hard Disk Drives



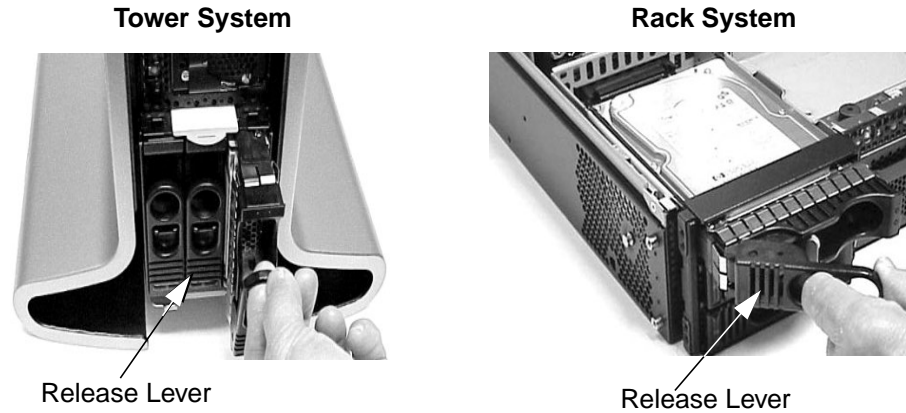
2. Place your finger on the colored release clip, which is located on your hard drive's release lever, and squeeze it inward. See Figure 2-34. Note that the release clips on the blank hard disk drive mounting brackets cannot be squeezed inward.

**Figure 2-34** Squeezing Inward on the Hard Disk Drive's Release Clip



3. Pull outward on the release lever. See Figure 2-35. This will remove the hard disk drive from the system.

**Figure 2-35 Removing the Hard Disk Drive from the System**



## Replacing a Hard Disk Drive

To replace a hard disk drive in a tower or rack system, follow these steps:

1. Insert the hard disk drive into an empty hard disk drive bay slot and push inward on the release lever until the hard disk drive no longer slides inward. See Figure 2-35. Please note that you must leave the release lever in the open position, as shown, when you push the hard disk drive into the system.
2. Secure the hard disk drive by pushing in on the hard disk drive's release lever. This makes sure the hard disk drive's connector is seated properly in the hard disk drive backplane connector. See Figure 2-34.

## Removing and Replacing a Power Supply

This section explains how to remove and replace a power supply. This system has two power supply bay areas for systems that require redundant supplies.

Please note that the power supplies are hot-swappable, which means they can be removed and replaced without turning off the system. This assumes that you have two power supplies installed in your system and that one of them is still working when you remove the defective supply.

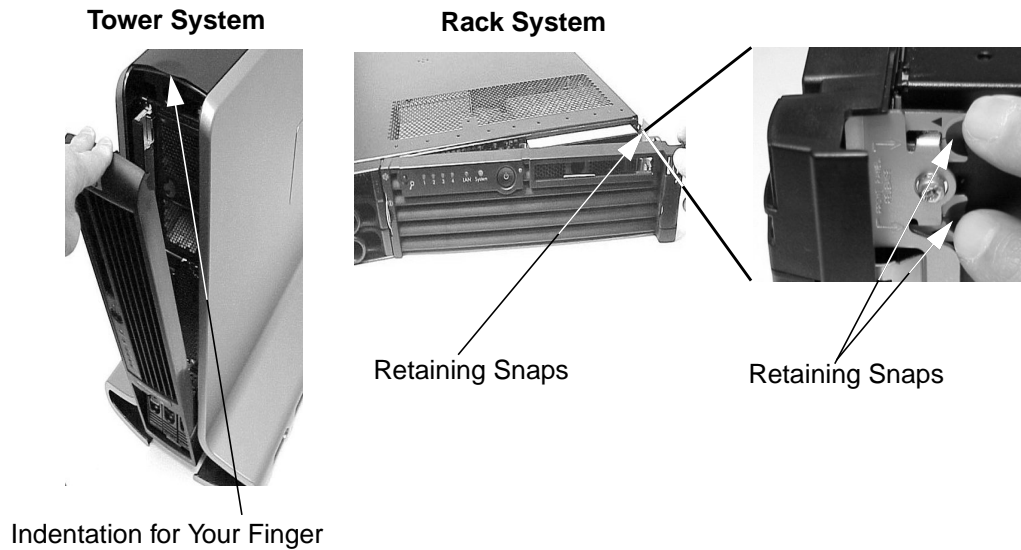
To determine which power supply failed, you would go the table “Power Supply FAULTS” in the section “Using the System’s LEDs and e-buzzer to Troubleshoot” found in the chapter “Troubleshooting” in this document.

### Removing a Power Supply

To remove your power supply, follow these steps:

1. Remove the front panel from the system’s chassis. To remove the tower system’s front panel, place a finger in the indentation at the top of the system’s front panel and pull outward. See Figure 2-36. To remove the rack system’s front panel, press in on the two retaining snaps on the back side of the front panel and pull outward on the front panel. See Figure 2-36.

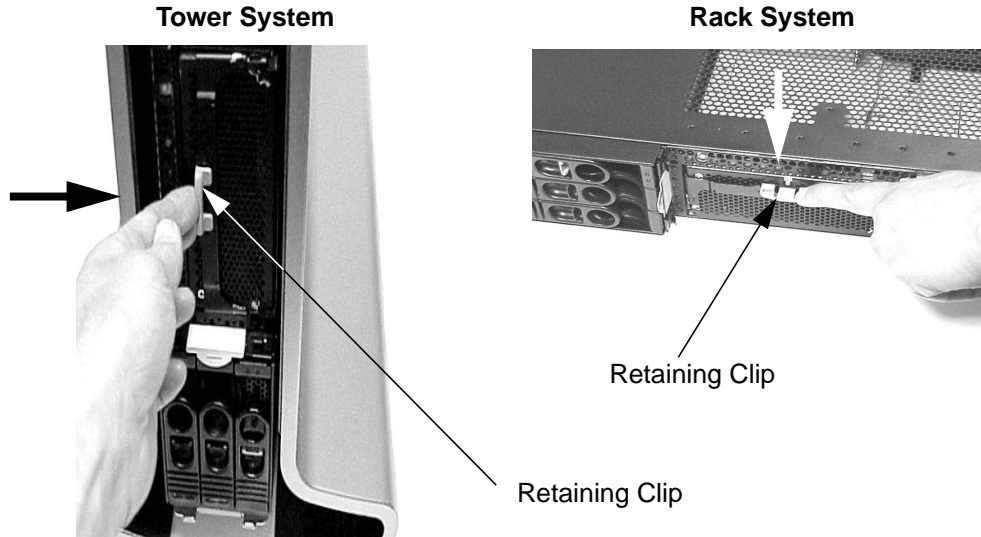
**Figure 2-36** Removing the System’s Front Bezel





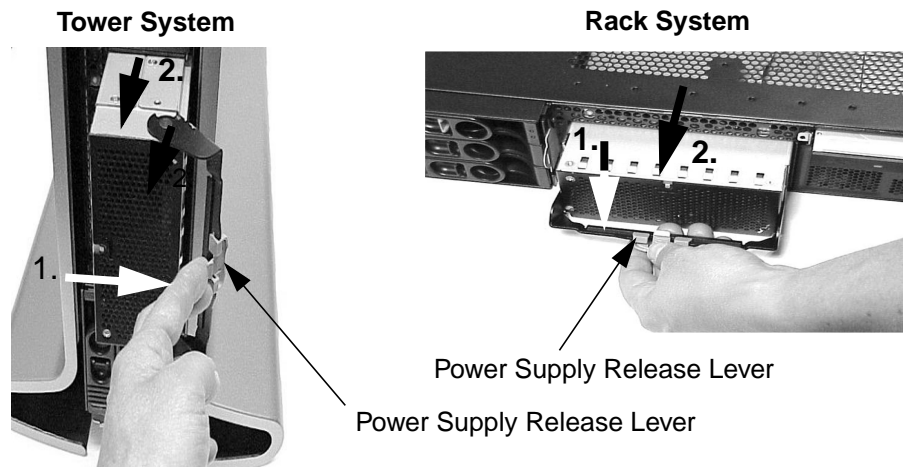
2. Press in the direction of the arrow on the power supply's retaining clip. This releases the power supply's release lever. See Figure 2-37.

**Figure 2-37 Releasing the Power Supply's Retaining Clip**



3. Pull down on the power supply's release lever and slide the power supply out of the system. See Figure 2-38.

**Figure 2-38 Removing the Power Supply from the System**



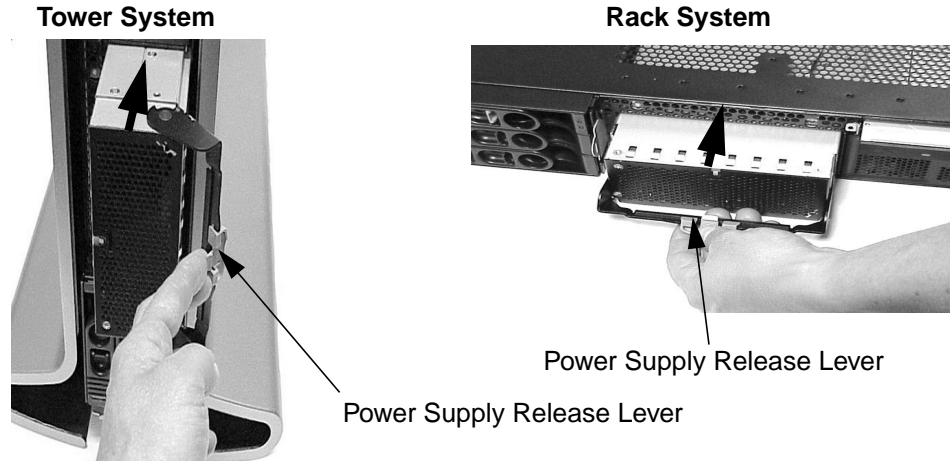


## Replacing a Power Supply

To replace your power supply, follow these steps:

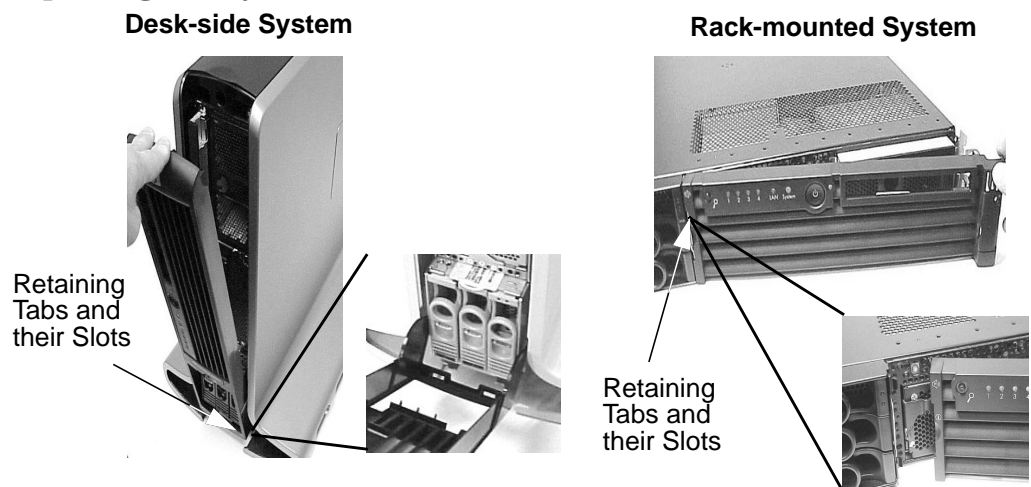
1. Complete steps one through three of the section “Removing a Power Supply” on page 59. If you have already done this, skip to step two.
2. Use the power supply’s release lever to slide it into the system. See Figure 2-39. Note that the release lever must be open to allow the power supply to be slid into place.

**Figure 2-39 Slide the Power Supply into the System**



3. Push in on the power supply’s release lever to lock its retaining clip in place. See Figure 2-37.
4. Replace the tower system’s front panel, insert the retaining tabs on the system’s chassis into the retaining slots on the front panel and swing the bezel toward the system’s chassis until it snaps in place. See Figure 2-40. To replace the rack system’s front panel, insert the retaining tabs of the system’s chassis into their corresponding slots on the front panel. Swing the front panel in toward the system’s chassis until it snaps in place. See Figure 2-40.

**Figure 2-40 Replacing the System’s Front Panel**



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## Removing and Replacing the System Fans

This section explains how to remove and replace the system fans. There are four fans (not including the processor's turbo fan or fans) that keep the system cool when it is running. See Figure 2-41. Please note that the system fan modules are hot-swappable, which means you can replace a fan module while the system is running.

If one of the system's fan modules fails, refer to the section "Troubleshooting with the Systems LEDs and e-buzzer" in the chapter "Troubleshooting" in this document.

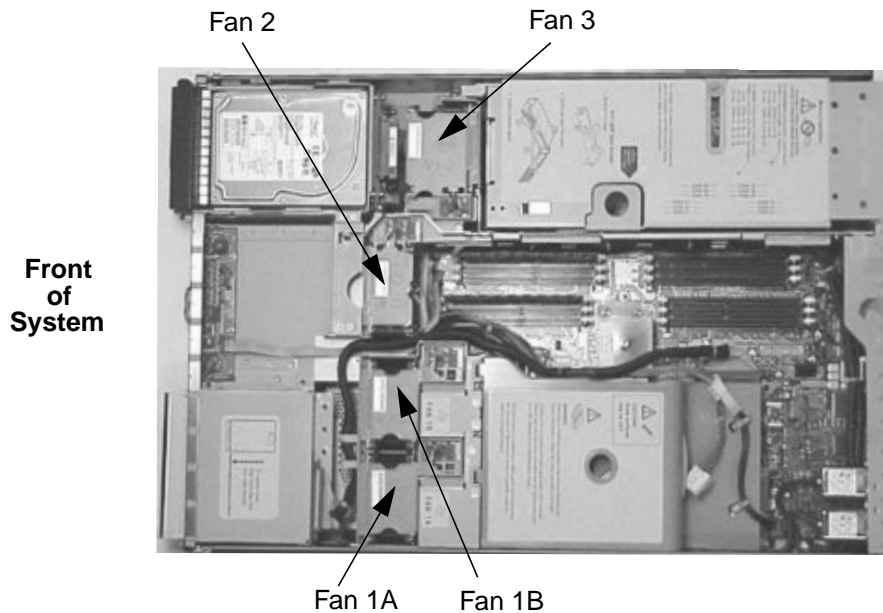
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### CAUTION

When the system is running, the system's metal cover must be replaced within four minutes to prevent overheating of the system components.

Please note the fans shown in the removal procedure of this section are the fans used for the rx2600 rack and tower systems and for the zx6000 rack system. Figure 2-43 shows how to remove fans 1A, 1B and 2 for a zx6000 tower system. The removal of fan 3 for all systems is the same.

**Figure 2-41**      **View of Four System Fans**

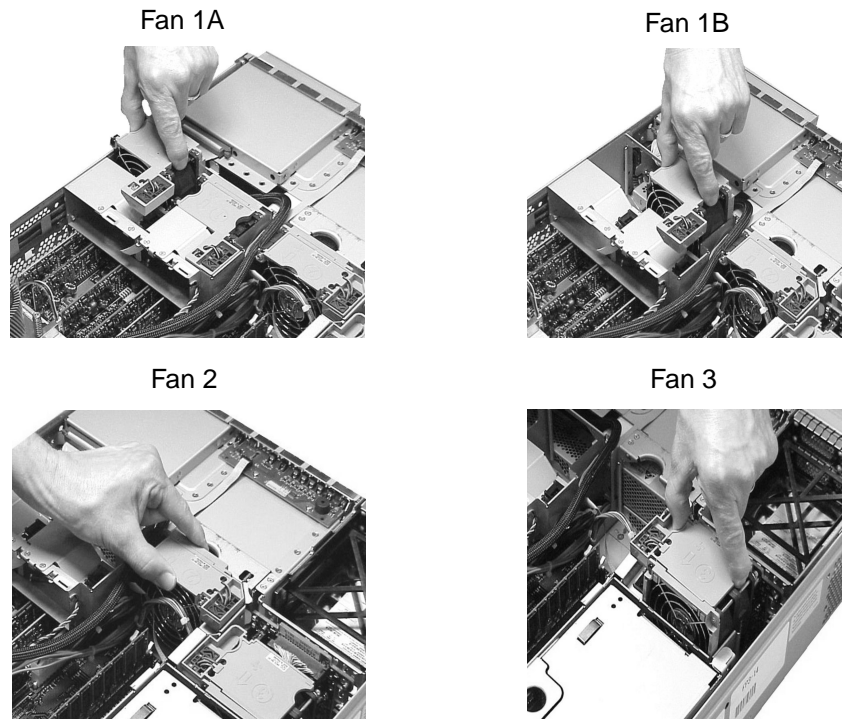


## Removing a System Fan

To remove a system fan, follow these steps:

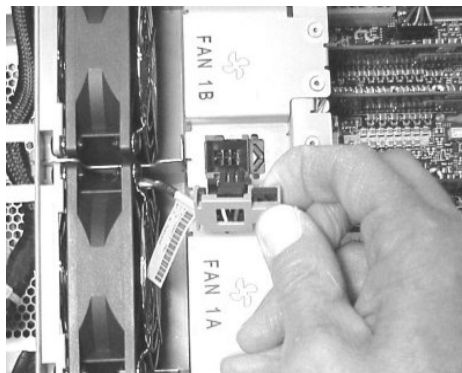
1. Remove the system's plastic panels and metal side/top cover (refer to page 37 or page 41 for instructions).
2. Grasp the fan module that needs to be replaced with your index finger and thumb and lift it out of its fan slot. Note that each of the fan modules has indentations for grasping them with your index finger and thumb. See Figure 2-42.

**Figure 2-42** Removing a System Fan

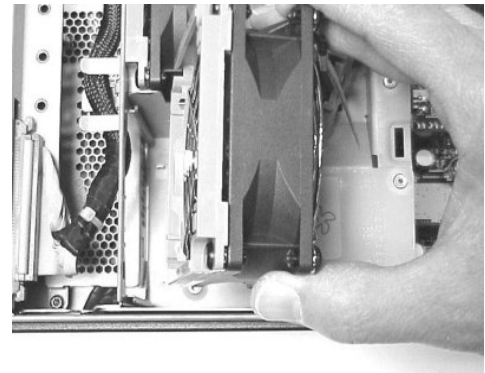


**Figure 2-43** Removing Fans 1A, 1B or 2 from a zx6000 Tower System

Unplugging the fans power connector



Removing the fan from the system



3. Replace the fan. See the subsequent section “Replacing a System Fan.”

## Replacing a System Fan

To replace a system fan, follow these steps:

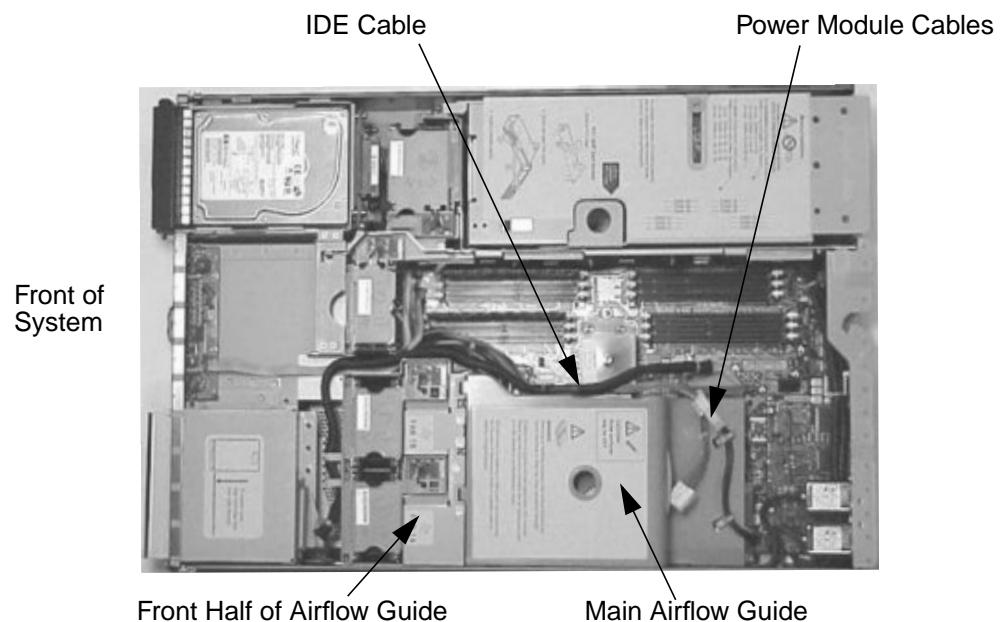
1. Grasp the replacement fan module with your index finger and thumb and insert it into its fan slot. See Figure 2-42 and Figure 2-43.
2. Replace the system's metal cover within four minutes to prevent damage to the system components (refer to page 39 or page 43 for instructions).
3. Verify that the fan has been properly installed. To do this, observe the LED signals on the front of the system for the appropriate fan information. LED information can be found in the section "Troubleshooting with the Systems LEDs and e-buzzer" in the chapter on troubleshooting.

## Removing and Replacing the Airflow Guide

This section explains how to remove and replace the system airflow guide. The airflow guide on your system ensures that the proper volume of air for cooling the voltage regulator modules (VRMs), processor(s), and processor power module(s) flows over these components. See Figure 2-44. Note that air flows through the system from front to back.

The airflow guide may need to be replaced if it accidentally becomes damaged to the point that airflow across the processor(s) is restricted. The airflow guide may need to be removed to gain access to components under it.

**Figure 2-44** View of Airflow Guide



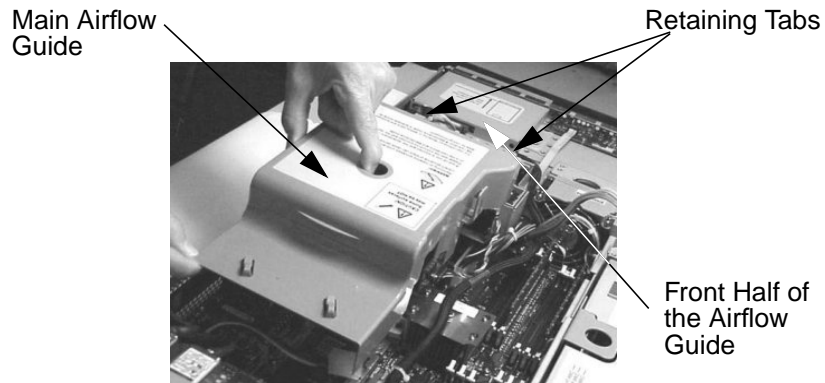
### Removing the Airflow Guide

To remove the airflow guide, follow these steps:

1. Turn off the system. Disconnect all power cables and any LAN or telecommunications cables.
2. Remove the system's plastic panels and metal side/top cover (refer to page 37 for instructions). Also, remove the IDE cable and power module cables from the main airflow guide (see Figure 2-44).

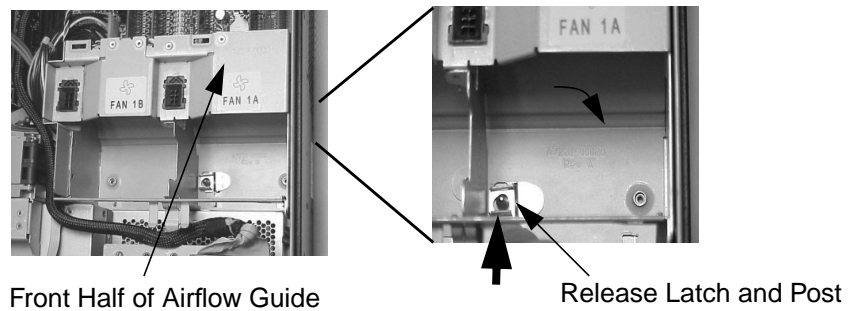
3. Place one finger in the opening on top of the main airflow guide, and using the other hand grasp the back end of the airflow guide. Next, lift the main airflow guide out of the system. See Figure 2-45. Note that the front part of the main airflow guide has two retaining tabs on it that are inserted into two slots on the front half of the airflow guide. When you lift up on the main airflow guide the tabs release themselves from the two slots.

**Figure 2-45 Removing the Main Airflow Guide**



4. Remove system fans 1A and 1B (refer to page 63 for instructions). Next, press inward on the blue clip on the release latch. See the large arrow in the right half of Figure 2-46.

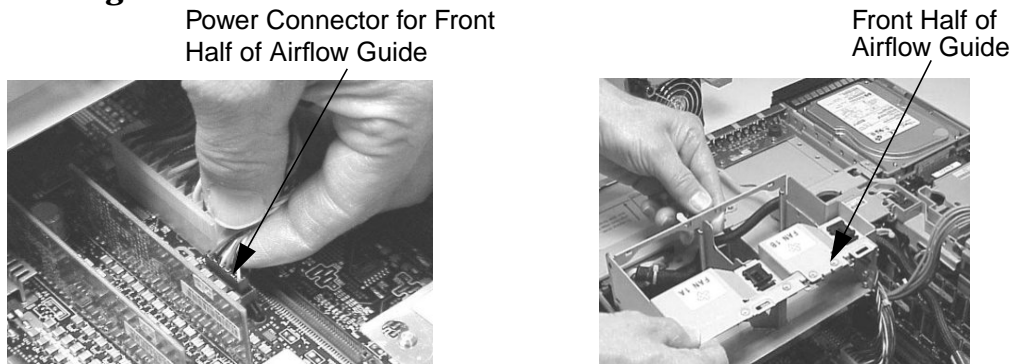
**Figure 2-46 Disconnecting the Airflow Guide's Release Lever**





5. Disconnect the power cable that is connected to the front half of the airflow guide from the system board and lift the front half of the airflow guide out of the system. See Figure 2-47.

**Figure 2-47 Removing the Front Half of the Airflow Guide**

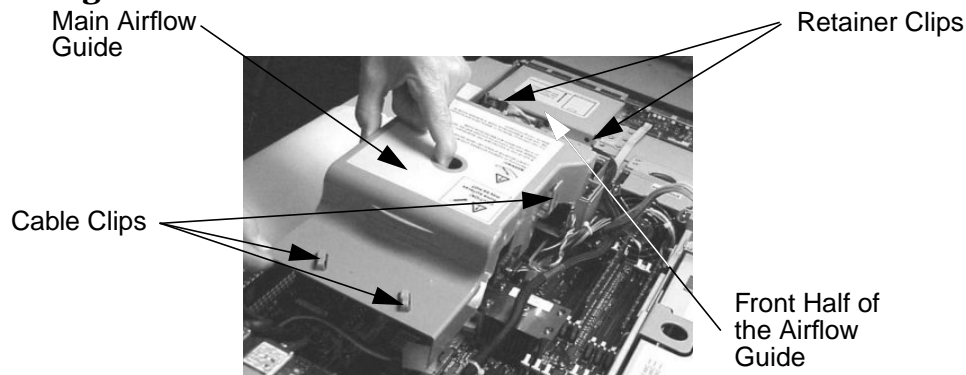


## Replacing the Airflow Guide

To replace the system's airflow guide, follow these steps:

1. Turn off the system if it is not already turned off. Disconnect all power cables and any LAN or telecommunications cables.
2. Remove the system's plastic panels and metal side/top cover if it has not been already removed (refer to page 37 or page 41 for instructions).
3. Align the release latch of the front half of the airflow guide over the release latch post and snap it in place. Next, connect the front half of the airflow guide's power connector to its connector on the system board. See Figure 2-46. Replace system fans 1A and 1B (refer to page 63 for instructions).
4. Place one finger in the opening on top of the main airflow guide, and grasp the back end of the airflow guide with your hand. Next, insert the main airflow guide into the system. See Figure 2-48. Connect the power module's cable and place the cable in its cable clips. Insert the two airflow guide retaining tabs into the two slots on the front half of the airflow guide.

**Figure 2-48 Replacing the Main Airflow Guide**



5. Replace the system's plastic panels and metal side/top cover (refer to page 39 or page 43). Reconnect all of the power and telecommunications cables.

## Removing and Replacing the Management Card

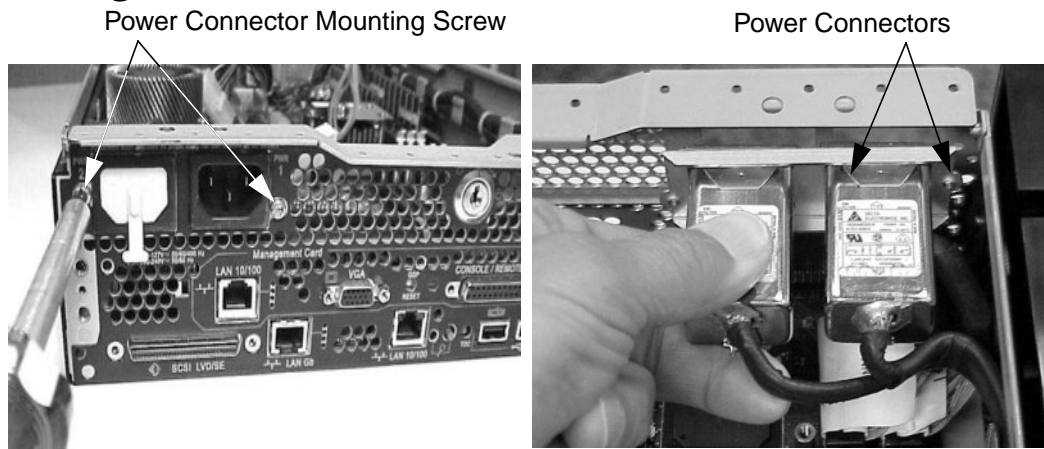
This section explains how to remove and replace the optional Management Card. This card adds these connectors to your system: 10/100 Management LAN connector, 15-pin VGA connector and 25-pin Serial connector.

### Removing the Management Card

To remove the Management Card, follow these steps:

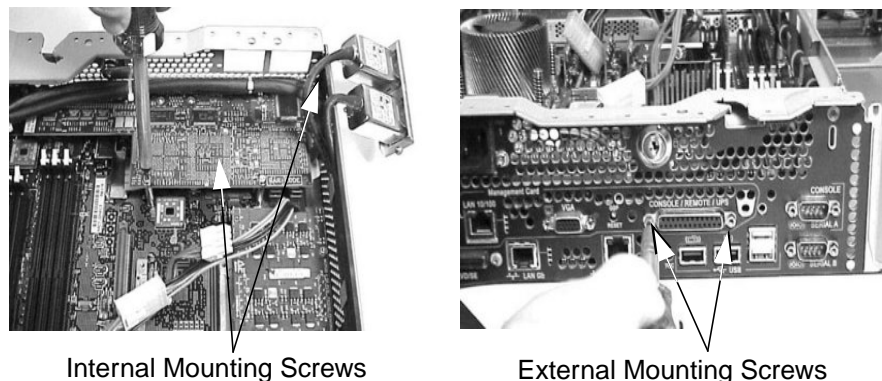
1. Turn off the display and system. Disconnect all power cables and any LAN or telecommunications cables.
2. Remove the system's plastic panels and metal side/top cover (refer to page 37 or page 41 for instructions).
3. Unscrew the two power connector mounting screws and remove the power connectors from the back of the system. See Figure 2-49.

**Figure 2-49** Removing the Power Connectors



4. Unscrew the two mounting screws that connect the Management Card to the internal chassis post. Next, unscrew the two external mounting screws that are located on both sides of the 25-pin Serial connector as shown below. See Figure 2-50.

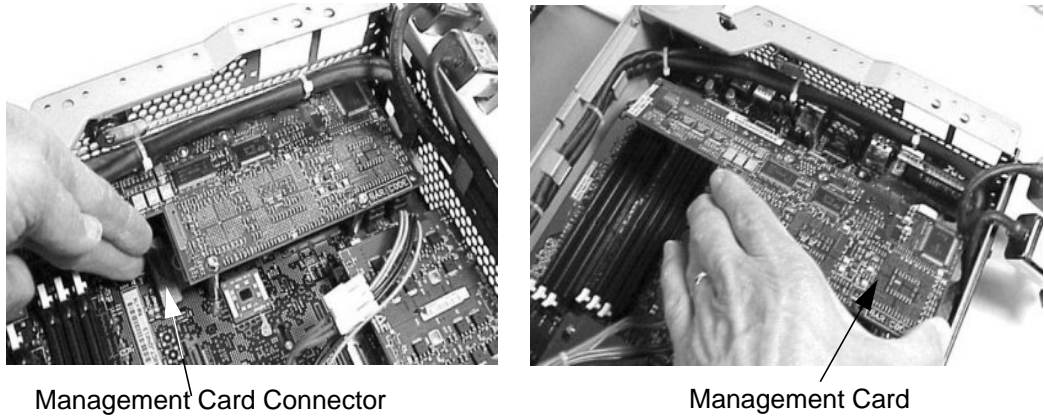
**Figure 2-50** Unscrew the Management Card Mounting Screws





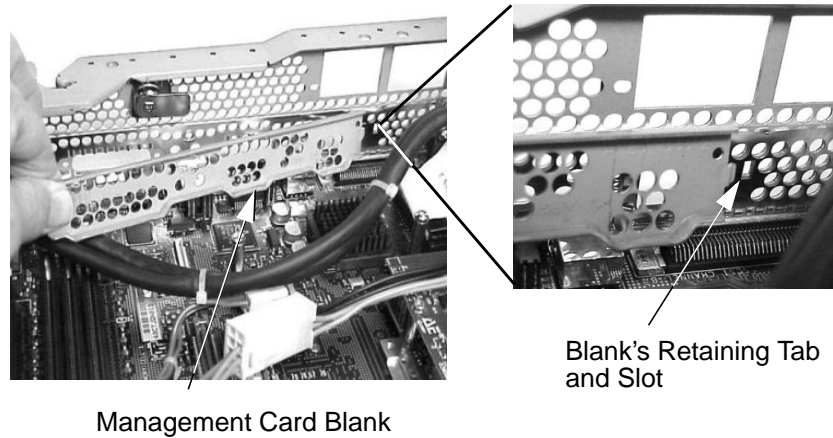
5. Disconnect the Management card connector and remove the Management Card from the system by grasping it by its edges. See Figure 2-51.

**Figure 2-51** Disconnecting the Management Card Connector and Removing the Card



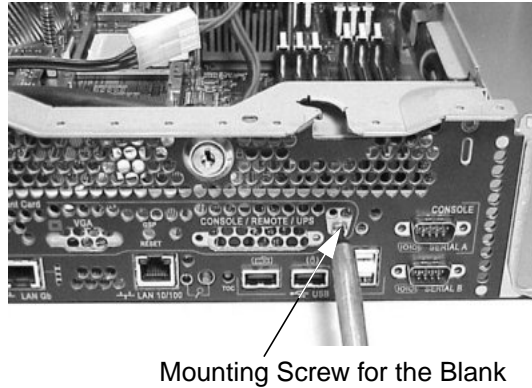
6. Replace the Management Card blank, if available, on the system's chassis. This blank is used to fill the holes left by the 10/100 Management LAN, 15-pin VGA and 25-pin Serial connectors, and it is not necessary for the system to function. To install the blank, insert the blank's retaining tab into its slot on the system's chassis. See Figure 2-52.

**Figure 2-52** Replacing the Management Card's Blank



7. Push the Management card's blank against the inside of the chassis and screw in the blank's mounting screw on the external connector side of the system's chassis. See Figure 2-53.

**Figure 2-53** Completing the Installation of the Management Card's Blank



8. Replace the system's plastic panels and metal side/top cover (refer to page 39 or page 43). Reconnect all of the power and telecommunications cables.

## Replacing/Installing the Management Card

To replace the Management card, follow these steps:

1. Turn off the system. Disconnect all power cables and any LAN or telecommunications cables.
2. Remove the system's plastic panels and metal side/top cover (refer to page 37 or page 41 for instructions).
3. Unscrew the mounting screw for the Management card's blank, which is located on the external connector side of the system's chassis. See Figure 2-53.
4. Remove the Management card blank's retaining tab out of its slot on the system chassis and remove the blank from the system. See Figure 2-52.
5. Replace the Management card in the system by grasping its edges and placing it on the two Management card posts. You will need to push the card's 10/100 Management LAN, 15-pin VGA and 25-pin Serial connectors through their openings on the back of the system. Next, connect the Management card's cable to its connector on the system board. See Figure 2-51.
6. Screw in the two mounting screws that connect the Management card to the internal chassis post. Next, screw in the two external mounting screws that are located on both sides of the 25-pin Serial connector as shown below. See Figure 2-50.
7. Replace the two power connectors. See Figure 2-49.
8. Replace the system's plastic panels and metal side/top cover (refer to page 39 or page 43). Reconnect all of the power and telecommunications cables.

## Removing and Replacing the LED Status Panel

This section explains how to remove and replace the LED status panel. This card contains a set of LEDs and a buzzer that provide status and troubleshooting information.

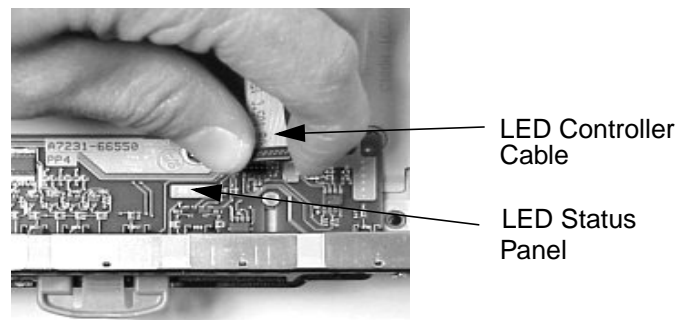
For information on the status panel LEDs, see the section “Troubleshooting with the Systems LEDs and e-buzzer” in the chapter “Troubleshooting” in this document.

### Removing the LED Status Panel

To remove the LED status card, follow these steps:

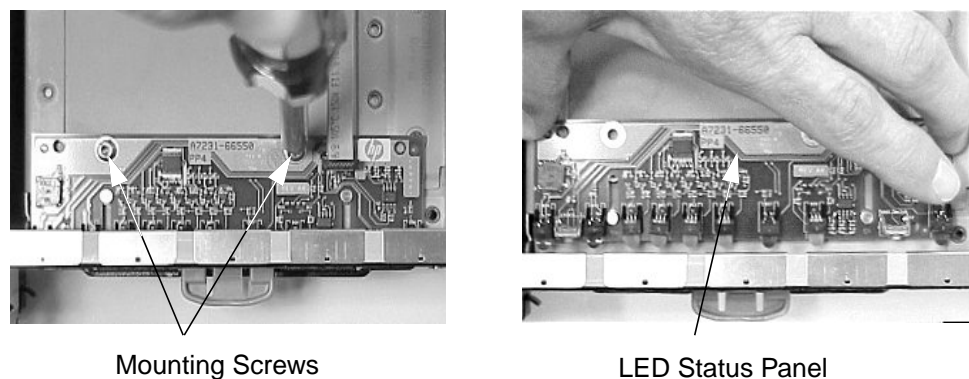
1. Turn off the display and system. Disconnect all power cables.
2. Remove the system’s plastic panels and metal side/top cover (refer to page 37 or page 41 for instructions).
3. Disconnect the LED status panel’s controller cable. See Figure 2-54.

**Figure 2-54** Disconnect the LED Status Card’s Controller Cable



4. Unscrew the two LED status panel mounting screws and remove the panel. See Figure 2-55.

**Figure 2-55** Remove the LED Status Card



## Replacing the LED Status Panel

To replace the LED status panel, follow these steps:

1. Turn off the display and system if you have not already done this and disconnect all power cables.
2. Remove the system's plastic panels and metal side/top cover if this has not been done (refer to page 37 or page 41 for instructions).
3. Replace the LED status panel in the system and screw in the two LED status panel mounting screws. See Figure 2-55.
4. Connect the LED status panel's controller cable. See Figure 2-54.
5. Replace the system's plastic panels and metal side/top cover (refer to page 39 or page 43 for instructions) and reconnect all power cables. Turn on the system and verify that the system and power LEDs light up.
6. Copy a valid UUID to the new status panel. To do this, answer yes to the question that is given by pressing the **Y** key.

```
EFI version 1.10 [14.57]
Build flags: EFI64 Running on Intel(R) Itanium Processor
EFI 1.10 IA-64 FOUNDATION XPEAK 1.22 [Tue May 14 16:37:12 2002] - HP
Secondary UUID is undefined
Do you want to copy the valid UUID to the new board?
(y/[n])
```

The display will show a message similar to this:

```
EFI version 1.10 [14.57]
Build flags: EFI64 Running on Intel(R) Itanium Processor
EFI 1.10 IA-64 FOUNDATION XPEAK 1.22 [Tue May 14 16:37:12 2002] - HP
Secondary UUID is undefined
Do you want to copy the valid UUID to the new board?
(y/[n]) 2 0 0x0002F2 0x0000000000000000 UUID was set to valid value
```

This message indicates that you have successfully assigned the system board's UUID to the status panel.

---

## Removing and Replacing a Processor

This section explains how to remove and replace a processor power module and processor. If there are two processors on your system board, the procedure for removing them is the same; therefore, this section only explains how to remove a single processor.

---

### CAUTION

You must follow the correct sequence of steps provided in this section to avoid any serious damage to the system.

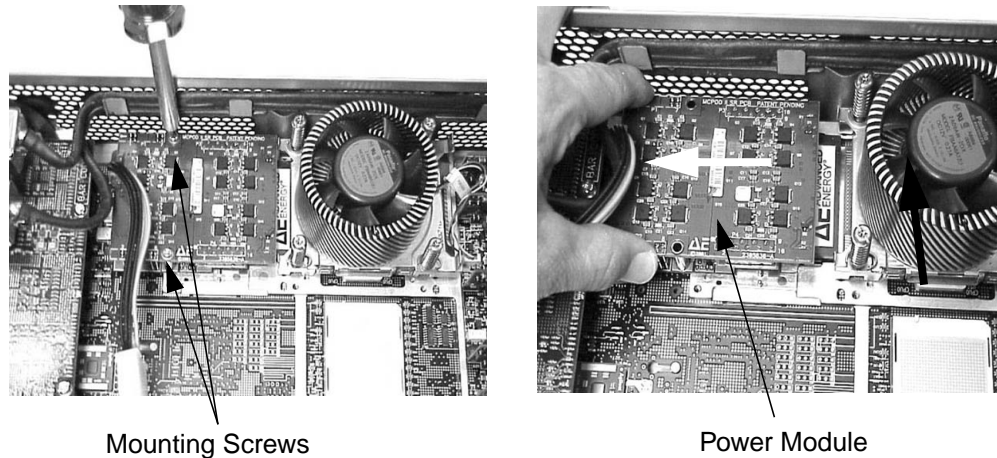
---

### Removing a Processor

To remove a processor, follow these steps:

1. Turn off the display and system. Disconnect all power cables and any LAN or telecommunications cables.
2. Remove the system's plastic panels and metal side/top cover (refer to page 37 or page 41 for instructions).
3. Remove the airflow guide and cables (refer to page 65 for instructions).
4. Unscrew the power module's mounting screws and disconnect the module from its processor by sliding it toward the back of the system chassis. See Figure 2-56.

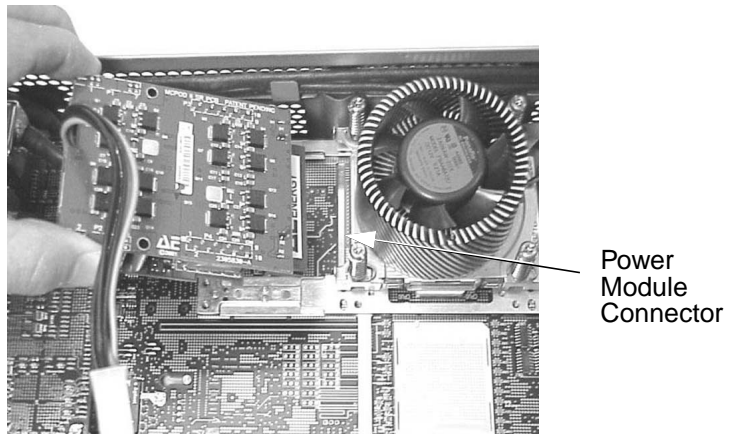
**Figure 2-56** Disconnect the Power Module from its Processor





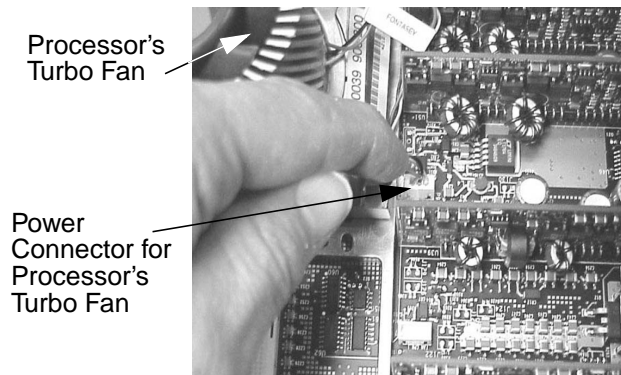
5. Remove the power module from the system. See Figure 2-57.

**Figure 2-57 Remove the Power Module from the System**



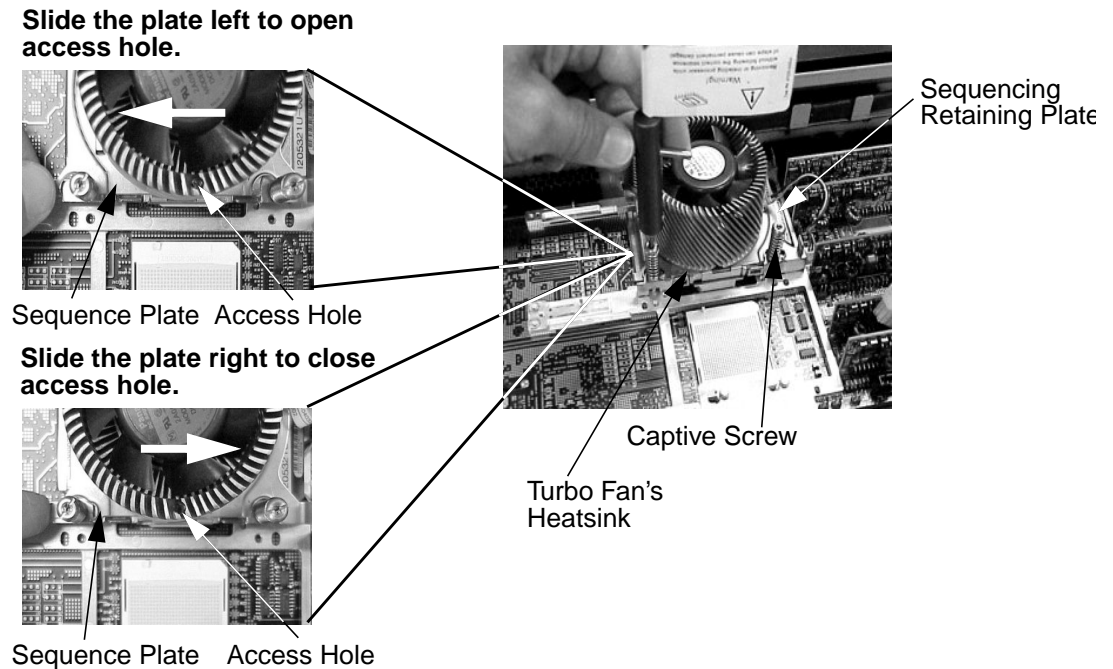
6. Disconnect the power cable for the processor's turbo fan. See Figure 2-58.

**Figure 2-58 Disconnect the Power Cable for the Processor's Turbo Fan**



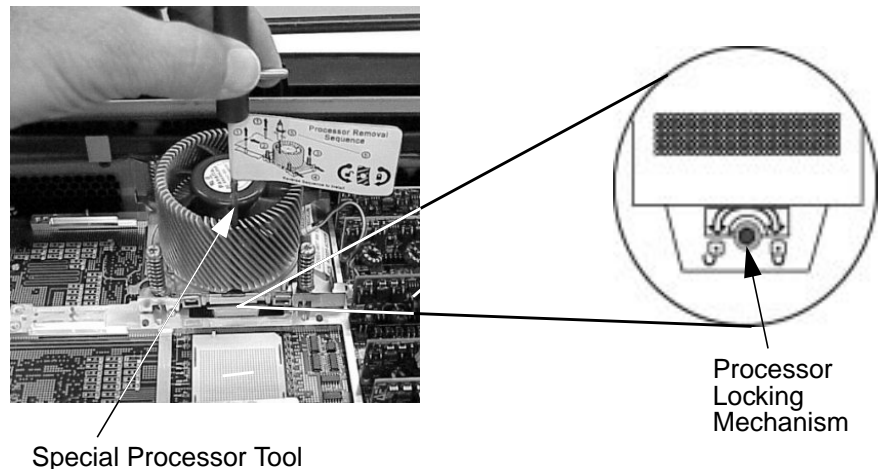
7. Unscrew the four heatsink captive screws using the special processor tool that was shipped with your replacement processor. See Figure 2-59. Performing this task allows you to slide the sequencing retaining plate toward the back of the system. Sliding the sequencing retainer plate toward the back of the system opens up the hole in the edge of the turbo fan's heatsink for insertion of the special processor tool into the processor locking mechanism. See Figure 2-59.

**Figure 2-59 Unscrew the Turbo Fan's Heatsink Captive Screws**



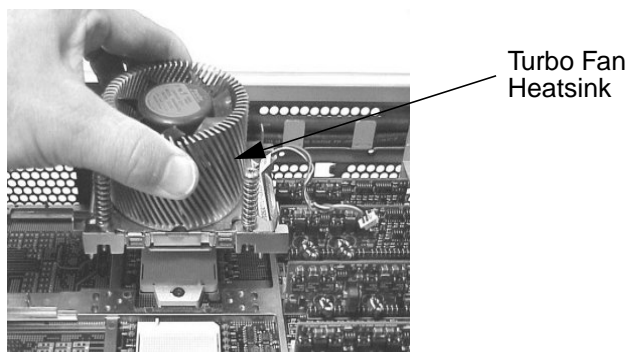
8. Unlock the processor locking mechanism using the special processor tool shipped with your replacement processor assembly. To do this, you need to insert the tool into the hole that runs down through the edge of the turbo fan's heatsink and rotate the special processor tool 180 degrees counterclockwise. See Figure 2-60.

**Figure 2-60 Unlock the Processor Locking mechanism**



9. Remove the turbo fan heatsink and processor from the system. See Figure 2-61.

**Figure 2-61 Remove the Turbo Fan Heatsink and the Processor**

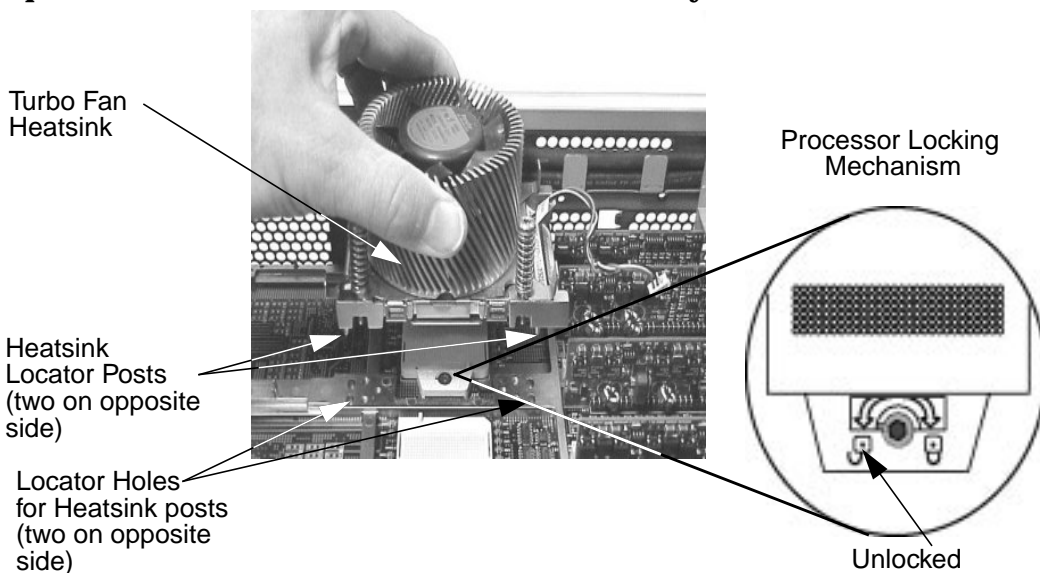


### Replacing/Installing a Processor

To replace a processor or add a second processor, follow the steps provided in this section. *Note that you must have a processor in slot CPU0 before installing one in slot CPU1.*

1. Complete steps one through nine of the section “removing a processor” in this chapter if you have not already done them. Otherwise, skip to step two.
2. Ensure that the processor’s locking mechanism is rotated into the unlocked position. See Figure 2-62.
3. Check to ensure that none of the processor pins are bent. Next, use the four locator posts on the heatsink and the turbo fan’s power cable to properly align the fan and processor assembly on the system board. The four locator posts will fit in locator holes on the system board’s processor mount. The turbo fan’s power cable must be positioned so that it is located on the side of the heatsink that faces the front of the system. See Figure 2-62.

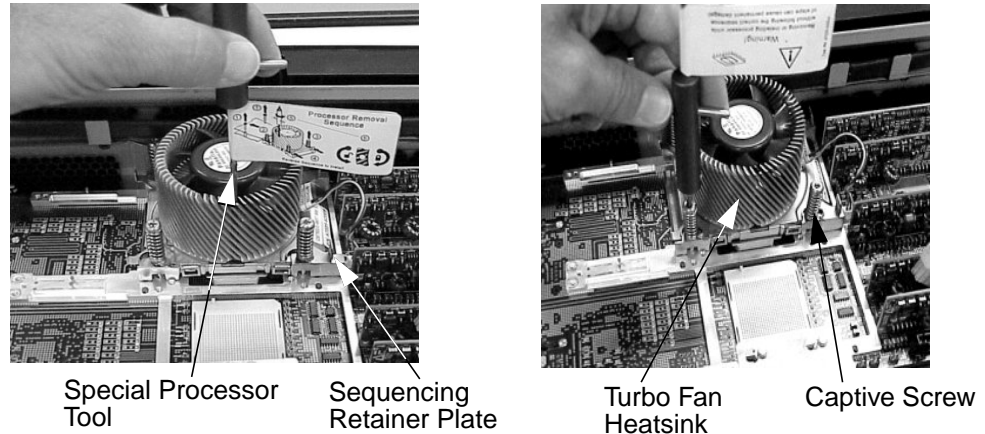
**Figure 2-62 Replace the Turbo Fan and Processor Assembly**





4. Use the special processor tool shipped with your replacement processor assembly to lock the processor in place on the system board. To do this, insert the special processor tool into the hole that runs down the side of the heatsink and rotate it clockwise 180 degrees. Then, slide the sequencing retainer plate toward the front of the system. Next, screw in the four heatsink captive screws. See Figure 2-63.

**Figure 2-63** Screw in the Heatsink and Processor Screws



5. Connect the power cable for the processor's turbo fan to its connector on the system board. See Figure 2-58.
6. Slide the power module on the system board's metal mounting bracket so that the power module's connector connects with its connector on the processor. The two mounting screw holes on the power module must align themselves with their screw holes on the system board's metal mounting bracket. Screw in the power module's mounting screws. See Figure 2-56.
7. Replace the airflow guide and connect the power module's power cable (refer to steps three through six of the instruction on page 67).
8. Verify that the processor works by turning the system on and executing the `info cpu` command at the Extensible Firmware Interface's prompt. For details on the `info cpu` command, read the chapter "System Configuration" in this document.

## Removing and Replacing the System Board

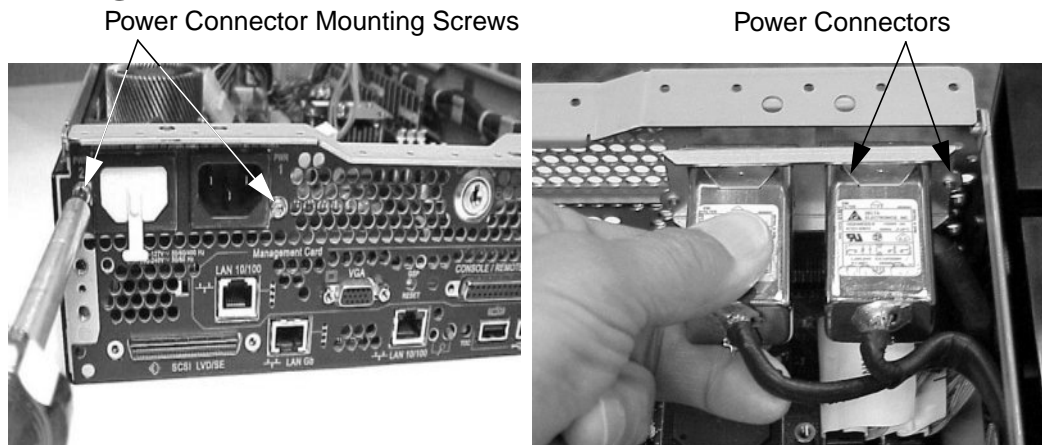
This section explains how to remove and replace the system board.

### Removing the System Board

To remove the system board, follow these steps:

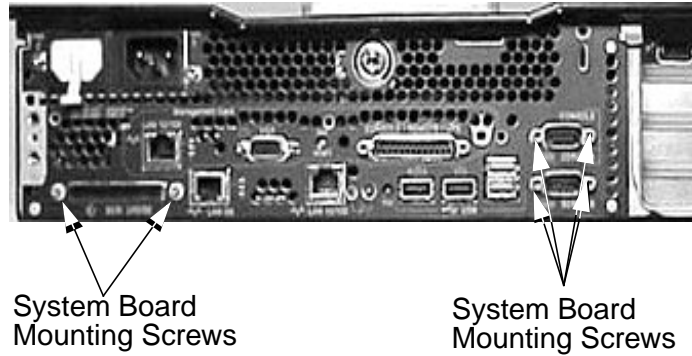
1. Turn off the display and system. Disconnect all power cables and any LAN or telecommunications cables.
2. Remove the system's plastic panels and metal side/top cover (refer to page 37 and page 41 for instructions).
3. Follow these steps:
  - a. Complete step three of the removal instructions found in the section "Removing and Replacing Memory" on page 44.
  - b. Complete step three of the section "Removing an Accessory Card" on page 47.
  - c. Complete step three of the section "Removing a System Fan" on page 63.
  - d. Complete steps three through five of the section "Removing the Airflow Guide" on page 65.
  - e. Complete steps three through five of the section "Removing the Management Card" on page 68. You can skip this step if your system does not have a Management card.
4. Complete this step if your system does not have a Management card installed, and you need to remove the power connectors; otherwise, skip to step 5. Unscrew the two power connector mounting screws on the back of the system, and reach inside the system to remove the power connectors from their slot. See Figure 2-64. The power connectors will still be connected to their cables. You will just be moving them out of the way so you can remove the system board.

**Figure 2-64** Removing the Power Connectors



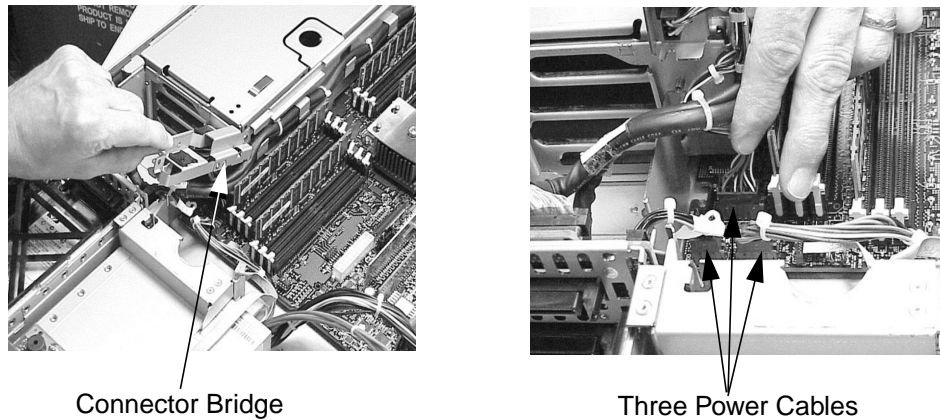
5. Unscrew the six backplane system board mounting screws that connect the system board to the rear of the system chassis. See Figure 2-65.

**Figure 2-65 Unscrewing the Six System Board Mounting Screws**



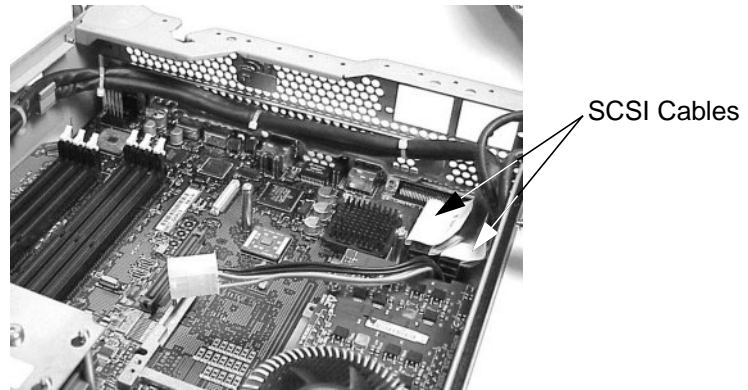
6. Disconnect all cables that are connected to the system board. Note that there are three cables located near the systems PCI/AGP cage that need to be removed. These cables can be accessed only by lifting up the connector bridge for the PCI/AGP cage's fan. See Figure 2-66. To help with re-assembly, make note of which cables were connected to which connector.

**Figure 2-66 Disconnect the Three Cables under the Connector Bridge**



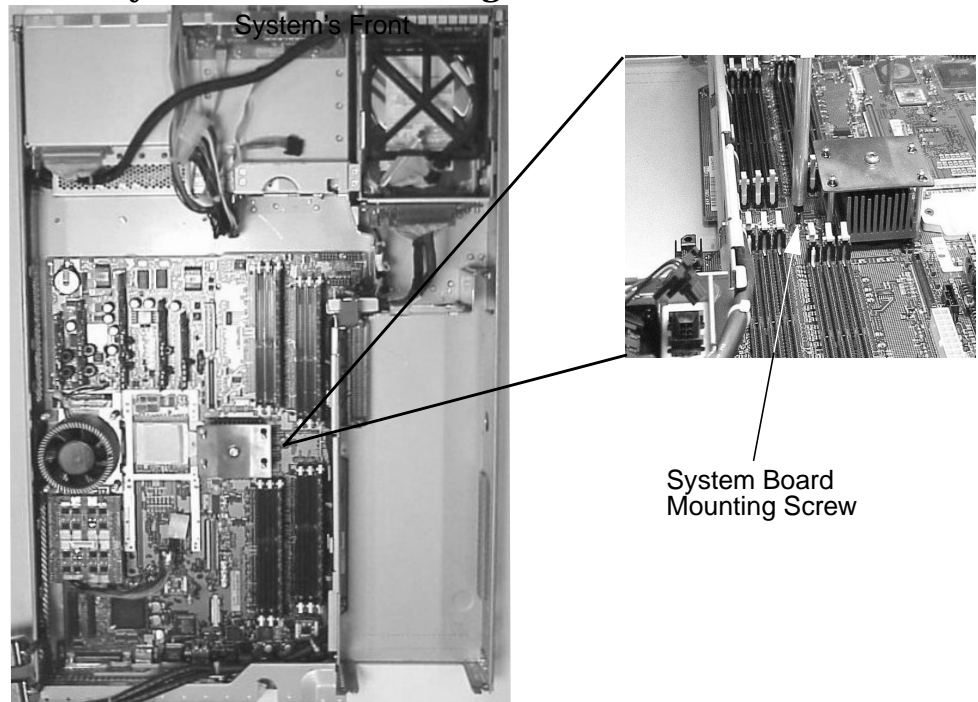
7. Disconnect the SCSI cables from the system board. See Figure 2-67.

**Figure 2-67 Disconnecting the SCSI Cables from the System Board**



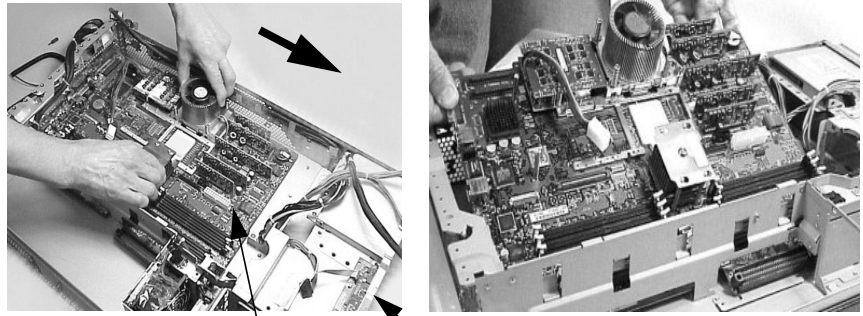
8. Unscrew the system board's mounting screw. See Figure 2-68. Note that you will see a screw symbol adjacent to the mounting screw.

**Figure 2-68 Unscrew the System Board's Mounting Screw**



9. Grasp the memory controller chip's heatsink and the processor's heatsink and slide the system board toward the front of the system. This releases the system board from its chassis standoffs. Next, lift up the processor side of the system board and slide it free of the PCI/AGP cage bay area. See Figure 2-69.

**Figure 2-69 Remove the System Board from the System**



System Board

Front of System

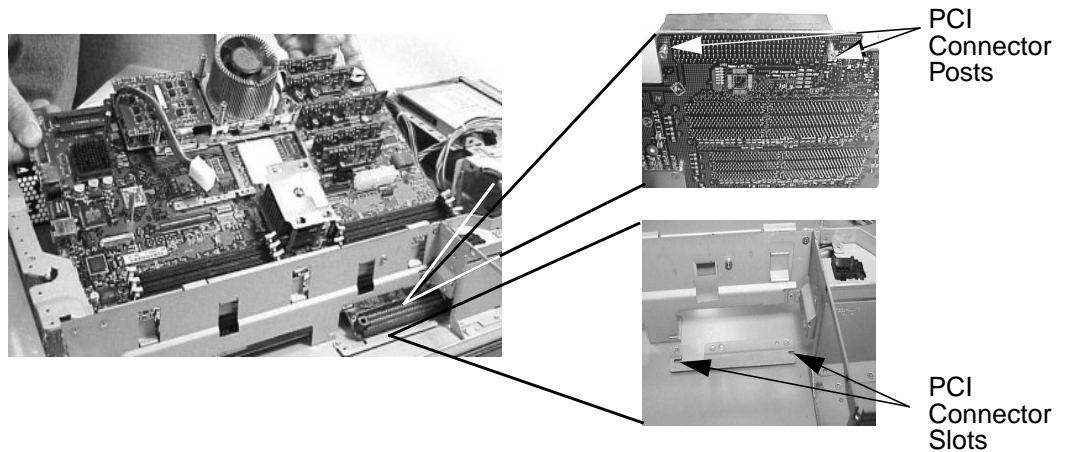


## Replacing the System Board

To replace the system board, follow these steps:

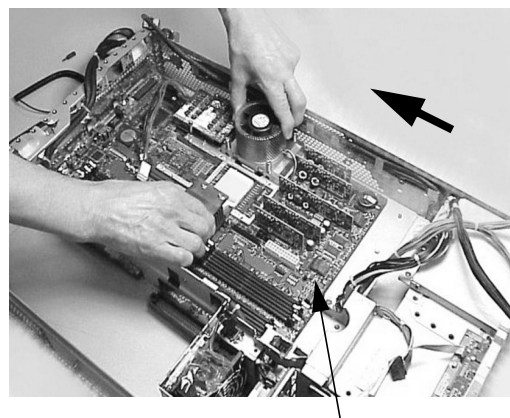
1. Complete all of the steps in the section “Removing the System Board” on page 78. If you have already completed the steps in the section “Removing the System Board,” then skip to step two.
2. Grasp the new system board by its edges and carefully place it in the system. Angle the system board as shown in Figure 2-70 to allow the PCI connector to slide into the PCI/AGP cage bay area. Remember that the system board keyholes must be aligned with their corresponding standoffs on the system’s chassis. Also, the PCI connector posts on the system board must slide into their slots on the system chassis. See Figure 2-70.

**Figure 2-70** Replace the System Board in the System



3. Slide the system board back toward the rear of the system. This locks the system board in place on its standoffs. See Figure 2-71.

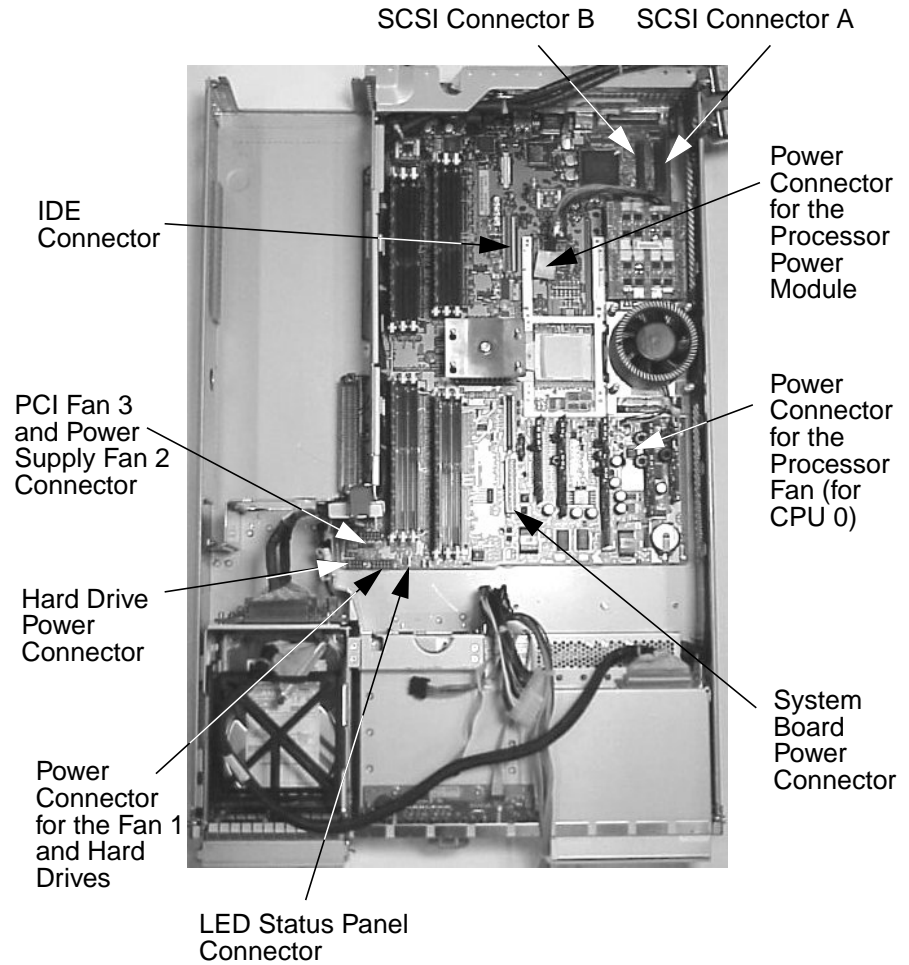
**Figure 2-71** Locking the System Board in Place



System Board

4. Screw in the system board's mounting screw. See Figure 2-68. To help you locate where the system board's mounting screw should be placed, there is a screw symbol adjacent to the mounting screw hole.
5. Connect all cables to their appropriate connectors on the system board. See Figure 2-72.

**Figure 2-72 Connect the System Board Cables to their Connectors**



6. Screw in the six rear backplane system board mounting screws. See Figure 2-65.
7. Complete this step if you system does not have a Management Card. Replace the power connectors in their slots on the back of the system and screw in the power connector mounting screws. See Figure 2-64.
8. Follow these steps:
  - a. Complete steps five and seven of the section “Replacing/Installing the Management Card” on page 70. You can skip this step if your system does not have a Management card.
  - b. Complete steps three through five of the section “Replacing the Airflow Guide” on page 67. Note that you will need to route the processor’s power module cable through the cable clips on the airflow guide.
  - c. Complete step three of the section “Replacing a System Fan” on page 64.
  - d. Complete step seven of the section “Replacing an Accessory Card” on page 49.
  - e. Complete the reverse of step three of the removal instructions found in the section “Removing and Replacing Memory” on page 44.
9. Replace the system’s plastic panels and metal side/top cover (refer to page 39 or page 43). Reconnect all of the power and telecommunications cables.
10. Verify that the processor works by turning the system on and executing the `info cpu` command at the Extensible Firmware Interface’s prompt. For details on the `info cpu` command, read the chapter “System Configuration” in this document.



---

## Removing and Replacing the System Batteries

The section explains how to remove and replace the system batteries. Note that there are two batteries in the system if you have a Management card installed, otherwise, there is one battery in the system.

### Removing the System Board Battery

To remove the system board battery, follow these steps:

1. Turn off the display and system. Disconnect all power cables and any LAN or telecommunications cables.
2. Remove the system's plastic panels and metal side/top cover (refer to page 37 or page 41 for instructions).
3. Complete steps three through five of the section "Removing the Airflow Guide" on page 65.
4. Lift up on the battery with a finger and push on the back of it with a small flat-head screwdriver. This will remove the battery from its holder. See Figure 2-73.

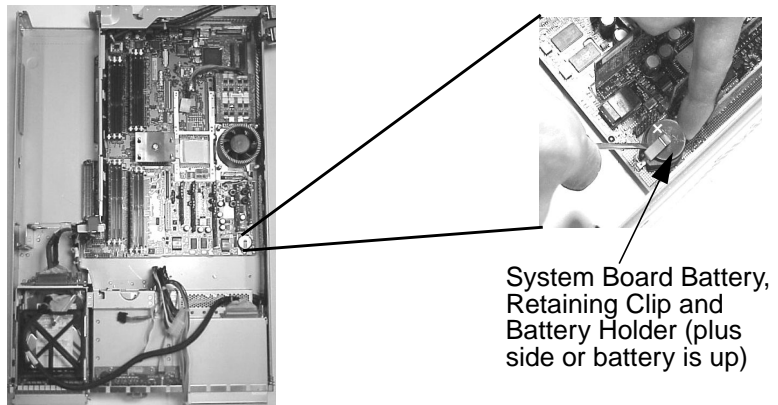
---

#### CAUTION

You should lift the battery just high enough to clear its holder because too much stress on the battery holder's retaining clip could break it.

---

**Figure 2-73** Remove the System Board's Battery



## Replacing the System Board's Battery

To replace the system board's battery, follow these steps:

1. Lift up on the battery holder's retaining clip with a small flat-head screwdriver and slide the battery into its holder with your finger. The positive (+) side of the battery should face up. See Figure 2-73.

---

**CAUTION**

---

You should lift the battery holder's retaining clip just high enough to slide the battery into the battery holder because too much stress on the battery holder's retaining clip could break it.

2. Complete steps three through five of the section "Replacing the Airflow Guide" on page 67.
3. Replace the system's plastic panels and metal side/top cover (refer to page 39 or page 43). Reconnect all of the power and telecommunications cables.
4. Turn on the system and if you have installed the battery correctly the diagnostic LED's should indicate no problems, unless your system has problems that are not related to the battery. The date and time of the system will both need to be reset. To do this set the date and then the time using the `date` and `time` commands at the EFI prompt. The date needs to be set first or the system may not allow you to change the time. For details on how to use the `date` and `time` commands see the chapter "System Configuration" in this document.

## Removing the Management Card's Battery

To remove the Management card's battery, follow these steps:

1. Complete steps one through four of the section "Removing the Management Card" on page 68.
2. Lift up on the battery with a finger and push on the back of it with a small flat-head screwdriver. This will remove the battery from its holder. See Figure 2-74.

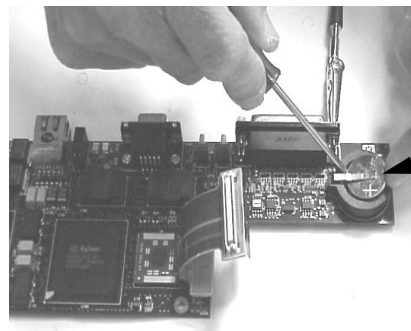
---

**CAUTION**

---

You should lift the battery just high enough to clear its holder because too much stress on the battery holder's retaining clip could break it.

**Figure 2-74 Remove the Management Card's Battery**



Battery, Battery Holder and Retaining Clip (plus, "+," side of battery is up)

## Replacing the Management Card's Battery

To replace the Management card's battery, follow these steps:

1. Lift up on the battery holder's retaining clip with a small flat-head screwdriver and slide the battery into its holder with your finger. See Figure 2-74. The positive side of the battery should face up.

---

**CAUTION**

---

You should lift the battery holder's retaining clip just high enough to slide the battery into the battery holder because too much stress on the battery holder's retaining clip could break it.

2. Complete steps five and six of the section "Replacing/Installing the Management Card" on page 70.
3. Replace the system's plastic panels and metal side/top cover (refer to page 39 or page 43). Reconnect all of the power and telecommunications cables.

## Removing and Replacing the Power Supply Interface Module

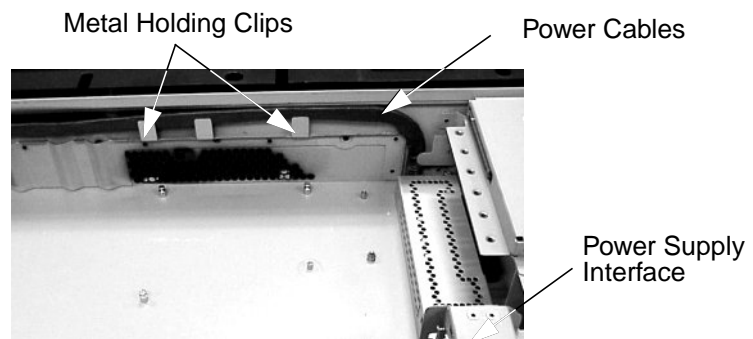
The section explains how to remove and replace the power supply interface (PSI) module. A maximum of two redundant supplies can plug into this power supply interface module.

### Removing the Power Supply Interface

To remove the power supply interface module, follow these steps:

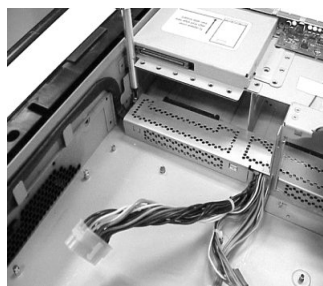
1. Turn off the display and system. Disconnect all power cables and any LAN or telecommunications cables.
2. Remove the system's plastic panels and metal side/top cover (refer to page 37 or page 41 for instructions).
3. Complete steps three through eight of the section "Removing the System Board" on page 78.
4. Lift the power cables out of their metal holding clips. See Figure 2-75.

**Figure 2-75** Removing the Power Cables from their Holding Clips

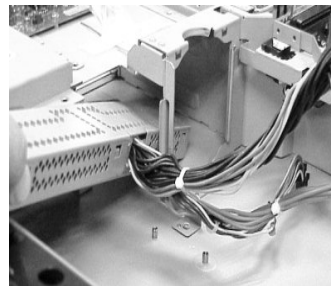


5. Unscrew the power supply interface module's mounting screw and remove the PSI module from the system. See Figure 2-76.

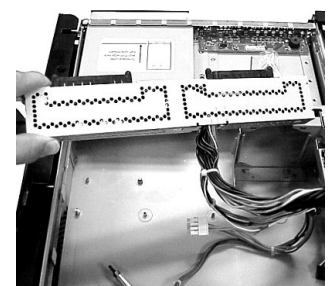
**Figure 2-76** Removing the Power Supply Interface Module



Remove Mounting Screw



Slide PSI out of Chassis



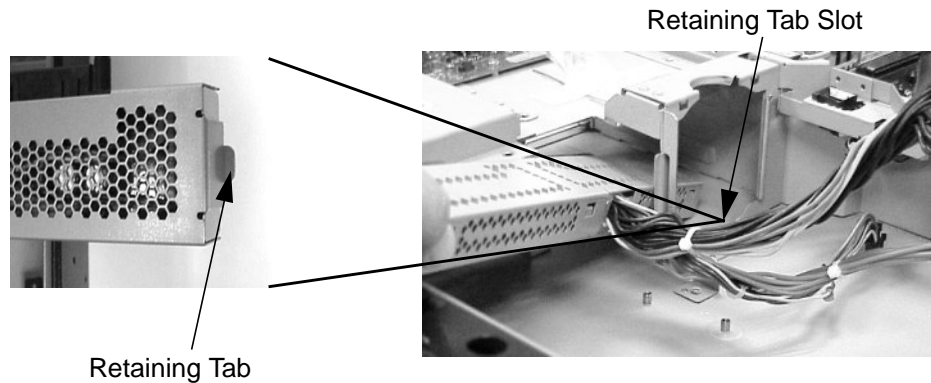
PSI Removed from System

## Replacing the Power Supply Interface Module

To replace the power supply interface module, follow these steps:

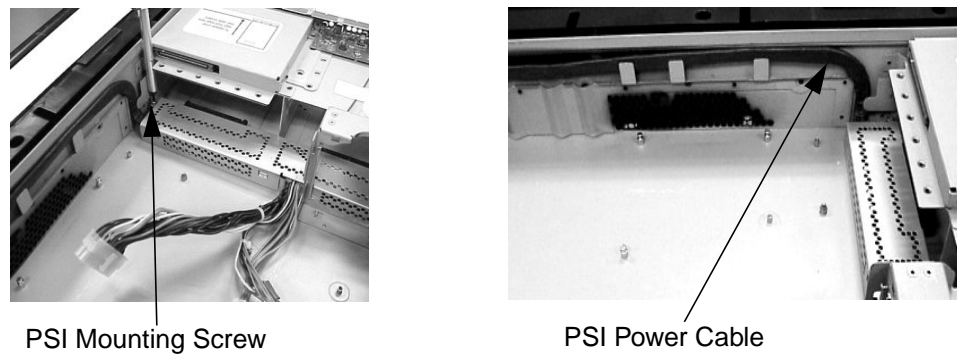
1. Insert or place the power supply interface module into the system's chassis. To do this you will need to slide the power supply interface module's retaining tab into its retaining slot located on the hard disk drive bay area wall. See Figure 2-77.

**Figure 2-77 Replacing the Power Supply Interface Module**



2. Screw in the power supply interface module's mounting screw and secure the power cables behind their holding clips. See Figure 2-78.

**Figure 2-78 Securing the Power Supply Interface Module and Its Cables**



3. Complete steps two through nine of the section "Replacing the System Board" on page 82.

---

## Removing and Replacing the Hard Drive Backplane

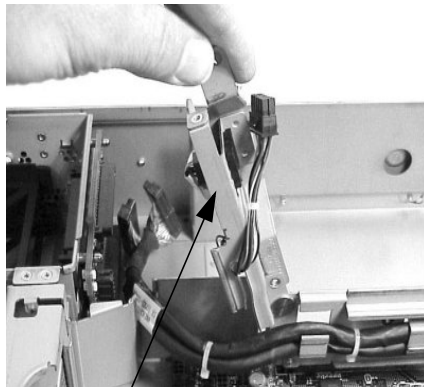
The section explains how to remove and replace the hard drive backplane. The hard drive backplane provides connectors for three hard disk drives.

### Removing the Hard Drive Backplane

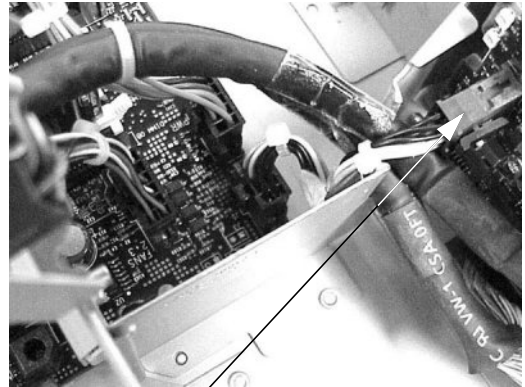
To remove the hard drive backplane, follow these steps:

1. Turn off the display and system. Disconnect all power cables and any LAN or telecommunications cables.
2. Remove the system's plastic panels and metal side/top cover (refer to page 37 or page 41 for instructions).
3. Complete step three of the section "Removing an Accessory Card" on page 47.
4. Lift up on the fan power bridge and disconnect the backplane power cable. See Figure 2-79.

**Figure 2-79** Disconnect the Fan and Backplane Power Cables



Fan Power Bridge

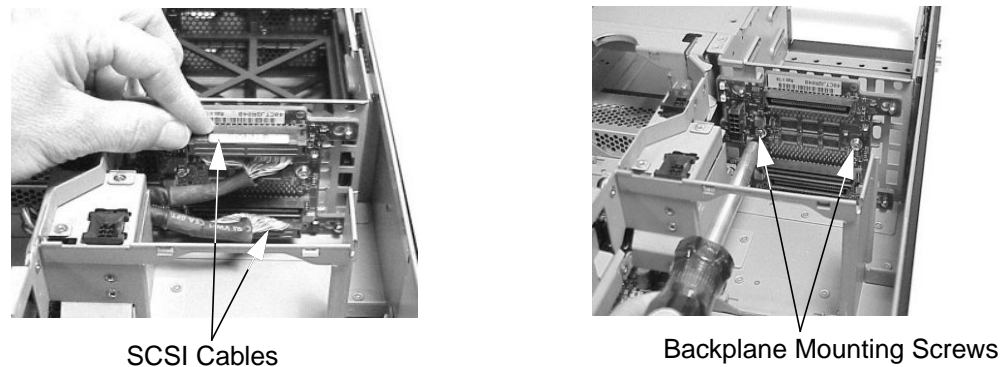


Backplane Power Cable



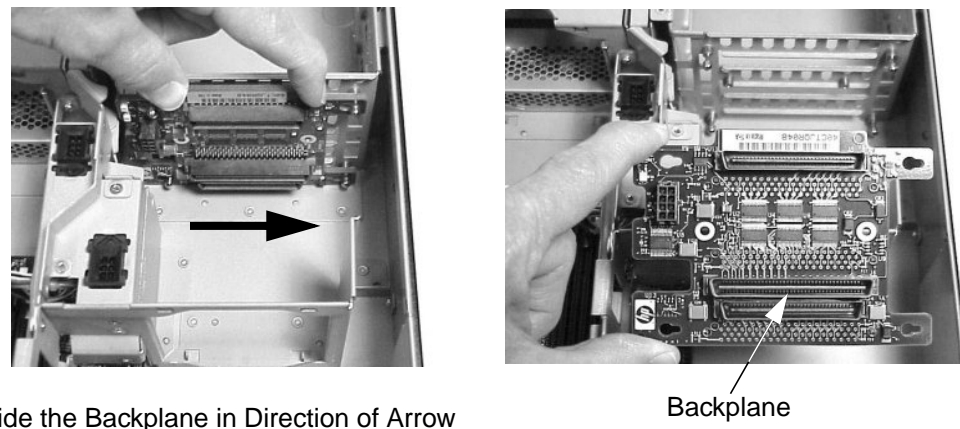
5. Disconnect the SCSI cables and unscrew the backplane mounting screws. See Figure 2-80.

**Figure 2-80 Unscrewing the Backplane's Mounting Screws**



6. Remove the hard drive backplane by sliding it in the direction of the arrow and pulling it outward from its standoff posts. See Figure 2-81.

**Figure 2-81 Remove the Hard Drive Backplane**



## Replacing the Hard Drive Backplane

To replace the hard drive backplane, follow these steps:

1. Insert the hard drive backplane onto its four chassis standoffs and slide it to the left as you face it. This locks the hard drive backplane in place. See Figure 2-81.
2. Screw in the two backplane mounting screws and connect the two SCSI cables. See Figure 2-80.
3. Connect the backplane power cable and lower the fan power bridge until it snaps in place. See Figure 2-79.
4. Complete step seven of the section “Replacing an Accessory Card” on page 49.
5. Replace the system's plastic panels and metal side/top cover (refer to page 39 or page 43). Reconnect all of the power and telecommunications cables and turn on the display and system.





---

## **3 System Configuration**

This chapter covers the Extensible Firmware Interface (EFI), Management Processor (MP) and Baseboard Management Controller.

## Extensible Firmware Interface (EFI)

The section introduces you to the Extensible Firmware Interface (EFI) and it explains how to use it for configuring your system. Here are the topics covered:

- EFI Overview
- Accessing the EFI Shell
- EFI Editor Commands
- EFI Configuration Menus
- Updating Your Firmware
- Classes of EFI Commands
- Creating EFI Shell Scripts

### EFI Overview

The file system supported by the Extensible Firmware Interface is based on the File Allocation Table (FAT) file system. EFI encompasses the use of FAT-32 for a system partition. The system partition is required on a bootable disk for the IA-64 platform.

For a hard disk, the system partition is a contiguous grouping of sectors on the disk, where the starting sector and size are defined by the EFI partition table, which resides on the second logical block of the hard disk, and/or by the Master Boot Record (MBR), which resides on the first sector of the hard disk.

The system partition can contain directories, data files, and EFI images. The EFI system firmware may search the \EFI directory of the EFI system partition, EFI volume, to find possible EFI images that can be loaded. The HP-UX bootloader is one example of an EFI image.

The EFI commands used by the EFI shell are given in the section “Classes of EFI Commands” in this chapter. This section gives a brief description of the commands. You can obtain a detailed description of the commands online by typing `help` and the command name at the EFI shell prompt. For example, to get a detail description of the `date` command, you would type the following at the shell prompt and press **Enter**:

```
Shell> help date
```

## Accessing the EFI Shell Prompt

To gain access to the EFI Shell on zx6000 systems, you need to turn on the system and observe the screen. When you see the EFI Boot Manager menu, select the EFI Shell item and you can begin using the EFI shell.

```
EFI Boot Manager ver 1.10 [14.57]
```

```
Please select a boot option
```

```
EFI Shell [Built-in]  
Boot option maintenance menu  
Security/Password Menu
```

```
Use up and down arrows to change option(s). Use Enter to select an  
option
```

To gain access to the EFI Shell on rx2600 systems, follow the procedure provided in this section. Please remember to leave the system off until you have the system console set up and ready to use.

1. Connect a serial cable from your external laptop to the system you are configuring. You will open up a terminal window on this external computer to use as the system console. A system console is used for monitoring the system and executing system commands.
2. Turn on the external computer and establish a terminal window on its display. This terminal window will serve as the system console. In this window you will monitor system messages and execute EFI commands. Note you need to configure your vt100+ terminal emulation software with these settings:
  - Baud rate: 9600
  - Bits: 8
  - Parity: None
  - Stop Bits: 1 (one)
  - Flow Control: Xon/Xoff
3. Turn on the system you are trying to configure.
4. Select the “EFI Shell [Built-in]” boot option from the Boot Manager menu.

```
EFI Boot Manager ver 1.10 [14.57]
```

```
Please select a boot option
```

```
EFI Shell [Built-in]  
Boot option maintenance menu  
Security/Password Menu
```

```
Use up and down arrows to change option(s). Use Enter to select an  
option
```

5. Observe that the “Shell>” prompt is present. This is the prompt from which you will execute all of your EFI shell commands.

## EFI Editor Commands

This section provides a list of the EFI editor commands. If your keyboard's function keys do not work in the EFI shell, you can use the escape sequences provide in Table 3-1.

**Table 3-1**            **EFI Editor Commands**

Command	Function Key	Escape Sequence
Open File	F1	Esc O
Save File	F2	Esc S
Exit	F3	Esc Q
Cut	F4	Esc D
Paste	F5	Esc P
Goto	F6	Esc G
Search	F7	Esc F
Replace	F8	Esc R
File Type	F9	Esc T

## EFI Configuration Menus

This section provides listings of the Extensible Firmware Interface (EFI) menus that you will use to configure your system. Topics covered are the:

- EFI Shell
- Boot Option Maintenance Menu
- Security/Password Menu

When you turn on your system and it begins to boot up, your system will stop at the following screen. The **EFI Shell [Built-in]** boot option will be highlighted. You need to select one of the options to begin your configuration process.

```
EFI Boot Manager ver 1.10 [14.57]
```

```
Please select a boot option
```

```
EFI Shell [Built-in]
Boot option maintenance menu
Security/Password Menu
```

```
Use up and down arrows to change option(s). Use Enter to select an
option
```

## EFI Shell Option

If you select the “EFI Shell” option, you will see information similar to this on your display:

```
EFI Shell version 1.10 [14.57]

Device mapping table

fs0 : Acpi(HWP0002,100)/Pci(1|0)/Scsi(Pun0,Lun0)/HD(Part1,Sig00112233)
blk0 : Acpi(HWP0002,0)/Pci(2|0)/Ata(Primary,Master)
blk1 : Acpi(HWP0002,100)/Pci(1|0)/Scsi(Pun0,Lun0)
blk2 : Acpi(HWP0002,100)/Pci(1|0)/Scsi(Pun0,Lun0)/HD(Part1,Sig00112233)
```

At the “Shell>” prompt, you can choose to enter EFI shell commands or create EFI shell scripts. You may also wish to boot the operating system by typing the appropriate operating system name `hpux` for HP-UX and pressing **Enter**.

## Boot Option Maintenance Menu

This section covers the **Boot option maintenance menu**. This menu allows you to select console output and input devices as well as various boot options.

Here is the **Boot option maintenance menu** that provides a large list of selections you can make to configure your system. When you select one of these menu items, you will be provided with another menu from which to select your choice of options. Subsequent sections show these menus.

```
EFI Boot Maintenance Manager ver 1.10 [14.57]

Main Menu. Select an Operation

Boot from a File
Add a Boot Option
Delete Boot Option(s)
Change Boot Order

Manage BootNext setting
Set Auto Boot TimeOut

Select Active Console Output Devices
Select Active Console Input Devices
Select Active Standard Error Devices

Cold Reset
Exit

Timeout-->[7] sec SystemGuid-->[G0]
SerialNumber-->[(null)]
```

### Boot from a File

The menu item **Boot from a File** provides the following selections:

```
EFI Boot Maintenance Manager ver 1.10 [14.57]
Boot From a File. Select a Volume

  IA64_EFI [Acpi(HWP0002,100)/Pci(1|0)/Scsi(Pun0,Lun0)/HD(Part1,Si
  Removable Media Boot [Acpi(HWP0002,0)/Pci(2|0)/Ata(Primary,Master Load
  File [EFI Shell [Built-in]]
  Load File [Acpi(HWP0002,0)/Pci(3|0)/Mac(00306E1E4EAF)]
  Exit
```

### Add a Boot Option

The menu item **Add a Boot Option** provides the following selections:

```
EFI Boot Maintenance Manager ver 1.10 [14.57]
Add a Boot Option. Select a Volume

  IA64_EFI [Acpi(HWP0002,100)/Pci(1|0)/Scsi(Pun0,Lun0)/HD(Part1,Si
  Removable Media Boot [Acpi(HWP0002,0)/Pci(2|0)/Ata(Primary,Master Load
  File [EFI Shell [Built-in]]
  Load File [Acpi(HWP0002,0)/Pci(3|0)/Mac(00306E1E4EAF)]
  Exit
```

### Delete Boot Option(s)

The menu item **Delete Boot Option(s)** provides the following selections:

```
EFI Boot Maintenance Manager ver 1.10 [14.57]
Delete Boot Option(s). Select an Option

  EFI Shell [Built-in]
  Delete All Boot Options
  Save Settings to NVRAM
  Help
  Exit

  VenHw(D65A6B8C-71E5-4DF0-A909-F0D2992B5AA9)
  Boot0000
```

If you want to delete a single item from the options list that appears above the `EFI Shell` menu item, press the **D** key.

## Change Boot Order

The menu item **Change Boot Order** provides the following selections:

```
EFI Boot Maintenance Manager ver 1.10 [14.54]
Change boot order. Select an Operation

EFI Shell [Built-in]
Save Settings to NVRAM
Help
Exit
```

If you need to move up and down within the options provided above the `EFI Shell` menu item, press the **U** key to move up and the **D** key to move down.

## Manage BootNext Setting

The menu item **Manage BootNext Setting** provides the following selections:

```
EFI Boot Maintenance Manager ver 1.10 [14.54]
Manage BootNext setting. Select an Operation

EFI Shell [Built-in]
Reset BootNext Setting
Save Settings to NVRAM
Help
Exit
```

Note that the **BootNext Setting** only effects `NextBoot`.

## Set Auto Boot TimeOut

The menu item **Set Auto Boot TimeOut** provides the following selections:

```
EFI Boot Maintenance Manager ver 1.10 [14.57]
Set Auto Boot Timeout. Select an Option

Set Timeout Value
Delete/Disable Timeout
Help
Exit
```

## Select Active Console Output Devices

The menu item **Select Active Console Output Devices** provides the following selections:

```
EFI Boot Maintenance Manager ver 1.10 [14.57]
Select the Console Output Device(s)

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

Active Output Device. Active Standard Error Device.
```

The menu items listed with an asterisk beside them are active consoles.

## Select Active Console Input Devices

The menu item **Select Active Console Input Devices** provides the following selections:

```
EFI Boot Maintenance Manager ver 1.10 [14.57]
Select the Console Input Device(s)

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

Active Input Device. Active Output Device. Active Standard Error
Device.
```

The menu items listed with an asterisk beside them are active devices.



## Select Active Standard Error Devices

The menu item **Select Active Standard Error Devices** provides the following selections:

```
EFI Boot Maintenance Manager ver 1.10 [14.57]
Select the Standard Error Device

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

Active Output Device. Active Standard Error Device.
```

The menu items listed with an asterisk beside them are active devices.

## Security/Password Menu

This section covers the **Security/Password Menu**. This menu allows you to change the administrator and user passwords. When you select one of these menu items, you will be provided with another menu from which to select your choice of options. Subsequent sections show these menus.

```
EFI Security/Password Menu
Security Menu. Select an Operation

    Set Administrator Password
    Set User Password
Exit
```

## Set Administrator Password

The menu item **Set Administrator Password** provides the following selections:

```
EFI Security/Password Menu
Administrator Password. Select an Option

    Set Administrator Password
    Enable/Disable Password
    Help
Exit
```

## Set User Password

The menu item **Set User Password** provides the following selections:

```
EFI Security/Password Menu
```

```
User Password. Select an Option
```

```
Set User Password
```

```
Enable/Disable Password
```

```
Help
```

```
Exit
```

## Updating Your Firmware

To update your system firmware and BMC firmware, follow these steps:

1. Obtain your system's product number and product name.
2. Get access to a web browser on your system and enter the following URL in the address entry box:

`http://thenew.hp.com/country/us/eng/support.html`

3. Use the product number or name obtained in step 1 to search for the firmware for your system. You will next follow the instructions given to download your firmware.

## Classes of EFI Commands

When you execute the `help` command at the EFI shell prompt a list of classes of commands will appear. The list is as follows:

<code>boot</code>	Booting options and disk-related commands
<code>configuration</code>	Changing and retrieving system information
<code>device</code>	Getting device, driver and handle information
<code>memory</code>	Memory related commands
<code>shell</code>	Basic shell navigation and customization
<code>scripts</code>	EFI shell script commands

The subsequent sections provide a list of the commands included in these classes. To obtain a detailed description of each command in these classes, you need to type `help` followed by the name of the command.

### Boot Class

This section provides a list of the `boot` class commands.

<code>autoboot</code>	View or set autoboot timeout variable
<code>bcfg</code>	Displays/modifies the driver/boot configuration
<code>dblkl</code>	Displays the contents of blocks from a block device
<code>boottest</code>	Set/View BootTest bits
<code>mount</code>	Mounts a file system on a block device
<code>reset</code>	Resets the system
<code>vol</code>	Displays volume information of the file system

### Configuration Class

This section provides a list of the `configuration` class commands.

<code>cpuconfig</code>	Deconfigure or reconfigure cpus
<code>date</code>	Displays the current date or sets the date in the system. The date format is: mm/dd/yyyy.

err	Displays or changes the error level
errdump	View/Clear logs
info	Display hardware information
monarch	View or set the monarch processor
palproc	Make a PAL call
salproc	Make a SAL call
time	Displays the current time or sets the time of the system. The time format is: hh:mm:ss.
ver	Displays the version information

### Device Class

This section provides a list of the device class commands.

baud	Set Serial port com settings
connect	Binds an EFI driver to a device and starts the driver
devices	Displays the list of devices being managed by EFI drivers
devtree	Displays the tree of devices that follow the EFI Driver Model
disconnect	Disconnects one or more drivers from a device
dh	Displays the handles in the EFI environment
driver	Lists and installs ROM-based drivers
drivers	Displays the list of drivers that follow the EFI Driver Model
drvcfg	Invokes the Driver Configuration Protocol
drvdiag	Invokes the Driver Diagnostics Protocol
guid	Displays all the GUIDs in the EFI environment
lanaddress	Display core I/O MAC address
load	Loads and optionally connects EFI drivers
loadpcirom	Loads a PCI Option ROM
map	Displays or defines mappings
openinfo	Displays the protocols on a handle and the agents
pci	Displays PCI devices or PCI function configuration space
reconnect	Reconnects one or more drivers from a device
unload	Unloads a protocol image

### Memory Class

This section provides a list of the `memory` class commands.

<code>default</code>	Sets, Resets, or Clears default NVM values
<code>dmpstore</code>	Displays all NVRAM variables
<code>dmem</code>	Displays the contents of memory
<code>memmap</code>	Displays the memory map
<code>mm</code>	Displays or modifies MEM/IO/PCI
<code>pdt</code>	View or set pdt

### Shell Class

This section provides a list of the `shell` class commands.

<code>alias</code>	Displays, creates, or deletes aliases in the EFI shell
<code>attrib</code>	Displays or changes the attributes of files or directories
<code>cd</code>	Displays or changes the current directory
<code>cls</code>	Clears the standard output with an optional background color
<code>comp</code>	Compares the contents of two files
<code>cp</code>	Copies one or more files/directories to another location
<code>edit</code>	Edits an ASCII or UNICODE file in full screen
<code>eficompress</code>	Compress a file
<code>efidecompress</code>	Uncompress a file
<code>exit</code>	Exits the EFI Shell
<code>help</code>	Displays help menus, command list, or verbose help of a command
<code>hexedit</code>	Edits with hex mode in full screen
<code>ls</code>	Displays a list of files and subdirectories in a directory
<code>mkdir</code>	Creates one or more directories
<code>mode</code>	Displays or changes the mode of the console output device
<code>mv</code>	Moves one or more files/directories to destination
<code>rm</code>	Deletes one or more files or directories
<code>set</code>	Displays, creates, changes or deletes EFI environment variables
<code>setsize</code>	Sets the size of the file
<code>touch</code>	Updates time with current time
<code>type</code>	Displays the contents of a file
<code>xchar</code>	Turn on/off extended character features

### Scripts Class

This section provides a list of the `scripts` class commands.

<code>echo</code>	Displays messages or turns command echoing on or off
-------------------	--

<code>for/endifor</code>	Executes commands for each item in a set of items
<code>goto</code>	Makes batch file execution jump to another location
<code>if/endif</code>	Executes commands in specified conditions
<code>pause</code>	Prints a message and suspends for keyboard input
<code>stall</code>	Stalls the processor for some microseconds

## Creating EFI Scripts

The Extended Firmware Interface (EFI) scripting language allows you to place a set of EFI commands in a shell script and execute them. Once you have created this shell script, you can use it as often as needed. You can even modify the script to make it perform different tasks. A file with the name `startup.nsh` is automatically executed when you enter the EFI shell environment. You can edit this `startup.nsh` file to perform EFI tasks that you want execute automatically. Note that all EFI shell scripts end with a “.nsh” suffix.

This section is not intended to tell you every thing there is to know about writing EFI shell scripts. Here is what this section does provide:

- Writing an EFI shell script.
- EFI shell script commands and control structures.

### Writing an EFI Shell Script

This section explains how to write an EFI shell script using the shell's editor. To create a simple shell script, follow these steps:

1. Select the drive on which you are going create the script. For example type the following at the shell prompt and press **Enter**:

```
Shell> fs0:
```

2. Enter the shell's editor. To do this, type the following at the shell prompt and press **Enter**:

```
fs0:\> edit <filename.nsh>
```

where `filename.nsh` is the name of your shell script file.

3. Turn `echo` off by executing this command and pressing **Enter**:

```
fs0:\> echo -off
```

4. Enter the following text in your file using the `edit` editor:

```
echo This is a test file.
```

Save this file as `mytest.nsh` and exit the editor.

5. Execute the shell script by typing the file name at the shell prompt and pressing **Enter**.

## Shell Script Commands and Control Structures

The EFI shell scripting language only has four commands and two control structures. This section provides a description of these commands and control structure as well as some simple examples.

Here is a list of the shell script commands:

- echo
- goto
- pause
- stall

Here is a list of the shell script control constructs:

- for/endfor
- if/endif

**echo Command** The echo command displays a message, or turns command echoing on or off in batch files.

### Syntax

```
echo [-on | -off]  
echo [message]d
```

-on	Displays when reading command lines from batch files.
-off	Does not display when reading batch command lines.
-message	Displays a message string.

### Notes:

- echo -off means not to display command lines when reading from batch files.
- echo without a parameter shows the current echo setting.

### Examples:

- To display a message string of 'Hello World,' execute this command at the shell prompt:

```
fs0:\> echo Hello World
```

result:

```
Hello World
```

- To turn command echoing off, execute this command at the shell prompt:

```
fs0:\> echo -off
```

- To display the current echo setting, execute this command at the shell prompt:

```
fs0:\> echo
```

result:

```
Echo is off
```

- To turn command echoing on, execute this command at the shell prompt:

```
fs0:\> echo -on
```

**goto Command** The `goto` command makes a batch file execution jump to another location.

### Syntax

```
goto label
```

label                    Specifies a location in a batch file.

### Notes:

- This command is only available in batch script files.
- This command causes execution of the code to occur at the next line after the `label`.
- This command will not allow you to jump into a FOR loop from outside the loop.

### Examples:

- To skip the code between the `goto` statements and its label within a shell script, you would execute a command similar to this:

```
goto Done
<statements>...
:Done
```

**pause Command** The `pause` command prints a message and suspends script execution for keyboard input.

### Syntax

```
pause
```

### Notes:

- The `pause` command is only available in batch script files.
- The message displayed when `pause` is executed is:  
"Enter 'q' to quit, any other key to continue."



### Examples:

- To use the `pause` command, create the following script using the edit editor:

```
#
# Example script for the 'pause' command
#
echo script pause.nsh begins
date
time
pause
echo script pause.nsh ends
```

Here are the results from executing `pause.nsh` with `echo` on:

```
+pause.nsh> echo script pause.nsh begins
script pause.nsh begins
+pause.nsh> date
03/05/02
+pause.nsh> time
04:29:19
+pause.nsh> pause
Enter 'q' to quit, any other key to continue:
+pause.nsh> echo script pause.nsh ends
script pause.nsh ends
```

**stall Command** The `stall` command stalls the processor for the number of microseconds specified with the command.

### Syntax

```
stall microseconds
```

`microseconds`    Number of microseconds that the shell script will remain stalled.

### Notes:

- The `stall` command in an emulation window environment will cause the system to sleep for the number of microseconds given.
- The `stall` command in other environments will wait for the specified number of microseconds given.
- The value of microseconds is given in decimal format.

### Examples:

- To stall a shell script's execution for one second, create and execute the follow shell script:

```
#
# Example script for the stall command
#
echo script stall.nsh begins
stall 1000000
echo The script has ended.
echo script stall.nsh ends
```

Here are the results from executing `stall.nsh` with `echo` on:

```
+pause.nsh> echo script stall.nsh begins
script stall.nsh begins
+pause.nsh> stall 1000000
Stall for 1000000 uS
+pause.nsh> echo script stall.nsh ends
script stall.nsh ends
```

**if...then/endif Control Structure** The `if...then/endif` control construct allows you to conditionally execute one or more commands. The `else` portion of this control construct provides a command or a set of commands to execute if the tested condition is not true.

### Syntax

```
if [not] exist file then
    command [arguments]
[else
    command [arguments]]
endif

if [not] str1 == str2 then
    command [arguments]
    [command [arguments]]
[else
    command [arguments]
    [command [arguments]]
    ...]
endif
```

<code>not</code>	This keyword makes a condition that was false true and that was true false.
<code>exist file</code>	Test to see if the file exists. If the file exists, then the condition is true.
<code>str1 == str2</code>	Test to see if <code>str1</code> is equal to <code>str2</code> . If the strings are equal, then the condition is true.
<code>command</code>	This command is one of the EFI commands that may or may not be executed in this control construct.

arguments      The command in many cases has an argument or set of arguments that enhance the capabilities of the command.

**Notes:**

- This control construct is only available in batch script files.
- If the condition is true, the commands are executed and the control construct is exited. Otherwise, if there is an else contract, the commands within this construct are executed and the if...then/endif control structure is exited.

**Examples:**

- To test whether a file exists before you execute it, you would create a control structure similar to this:

```
if exist fs0:\myscript.nsh then
    myscript.nsh myarg1 myarg2
else
    echo The file does not exist.
endif
```

- To test whether two string values are equal before executing a set of commands, you would create a control structure similar to this:

```
if %str1% == %str2% then
    myscript1.nsh
    myscript2.nsh
else
    echo The two stings are not equal.
endif
```

**for/forend Control Structure** The for/forend control structure executes one or more commands for each item in a set of items. While the condition is true for this control structure the for loop will continue to loop.

**Syntax**

```
for %indexvar in set
    command [arguments]
    [command [arguments]]
endfor
```

%indexvar	This is the index value for the for loop.
set	A set can be a file or batch of files (for example, myfile.txt or *.nsh).
command	This command is one of the EFI commands that may or may not be executed in this control construct.
arguments	The command in many cases has an argument or set of arguments that enhance the capabilities of the command.

**Notes:**

- This control structure is available only in batch script files.
- The `for` control structure must have an ending `endfor`.

**Examples:**

- To loop through a file with string values in it, you would use a control structure similar to this:

```
for %string in myfile.txt
    type %string
endfor
```

- To loop through a batch of files with strings in them, you would use a control structure similar to this:

```
for %string in *.txt
    type %string
endfor
```

---

## Management Card

The Management card contains a processor and I/O hardware that act as an autonomous embedded device for controlling the system console, reset and power management functions. The card connectors located on the back of the system provide SIO (Remote, Console and UPS), VGA and one LAN connections.

Two major functions of the Management card are remote and local manageability. The Management card contains the management processor (MP), which monitors system status and can control various aspects of the system operation, such as power, resets, software/firmware upgrades and cooling. The Management card's manageability hardware, when installed, operates on standby power. This means that it operates independently of the on-off state of the rest of the system.

### Overview of Management Card Components

The management processor uses the following external memory: 8 MB DRAM, 8MB Flash and 512 KB of NVRAM. A power monitor and watchdog timer reset the processor if standby power is out of specification or the processor is inactive for a set amount of time. The processor also uses a 25MHz clock.

The I/O and Memory Controller chip is connected to the Management card's I/O bus interface by rope number seven of the system bus. The Management card consists of the following components:

- I/O Bus Interface
- VGA Controller with 16 Mb of DDR SDRAM for a video buffer
- Management Processor with:
  - Three RS-232 Serial Ports
  - Four I2C Ports
  - 10/100BT LAN
  - 16-bit GPIO Interface
- Management Processor DRAM, Flash Memory and Battery backed NVSRAM
- I2C battery backed Real Time Clock
- I2C Field Replaceable Unit EEPROM
- I2C 8K Serial EEPROM
- System Reset Logic

### Management Card I/O Functionality

This section provides a brief description of the Management card's I/O components.

#### System Serial Ports

There are three RS-232 ports that can be accessed through one three connector cable (A6144-63001; Dongle) when this cable is connected to the DB25 connector located on the backplane of the system. This cable provides for three DB9 connectors for terminal device connections.

### **VGA Controller**

The 2D VGA graphics controller console port is provided on a DB15F connector. Also, Serial Flash memory with VGA BIOS and a 16MB video buffer (DDR SDRAM) is included with the VGA controller.

### **PCI Interface**

The PCI interface connects the PCI bus with the Management processor. This interface emulates three 16550-style UARTs and part of the Management processor. Note that this interface is equivalent to the HP developed DIVA ASIC.

### **I2C Bus**

The I2C bus of the Management processor provides communication with the system's Baseboard Management Controller.

### **Console/Modem Serial Ports**

The Management card serial ports can be configured to redirect system console and session communications to the Management card's RS-232 lines (local port) and a modem (remote port).

### **Service LAN**

Network access is provided by a 10/100BT LAN connection on a RJ-45 connector and its associated LED's, which are located on the Management card. An I2C 8K serial EEPROM supports MAC address storage.

### **Disabling the X Server**

If the X Server attempts to start up and no mouse is present it will detect this and terminate. In the normal case the Common Desktop Environment (CDE) will notice that X Windows has terminated and attempt to start X Windows again. This will continue until either X Windows starts successfully or the system's configuration is modified using one of these procedures:

- CDE is disabled
- CDE is configured to run without starting X Windows
- X Windows is configured to run without a mouse
- A mouse is added to the system.

Here are the four procedures mentioned above and the steps required to accomplish them.

#### **Procedure One:**

Disable CDE by executing these steps:

1. Stop CDE by executing this command at the shell prompt as root:

```
#init 2
```

2. Disable CDE from running by executing this command at the shell prompt as root:

```
#!/usr/dt/bin/dtconfig -d
```

3. Start all services, except CDE, that were stopped as a result of going to run level 2 by bringing the system back to run level 3. To do this, execute the following command at the shell prompt as root:

```
#init 3
```

Since CDE is no enabled, it will not attempt to start X Windows.

#### **Procedure Two:**

Configure CDE to run without starting the X Server by executing these steps:

1. Stop CDE by executing this command at the shell prompt as root:

```
#init 2
```

2. Edit the “/etc/dt/config/Xservers” file as root and comment out the line near the in of the file that contains “/usr/bin/X11/X.” To comment out this line, add the “#” character at the beginning of the line.
3. Start all services that were stopped as a result of going to run level 2 by bringing the system back to run level 3. To do this, execute the following command at the shell prompt as root:

```
#init 3
```

This will allow CDE to run without trying to continuously start an X Server.

#### **Procedure Three:**

Configure X Windows to run without a mouse by executing these steps:

1. Stop CDE by executing this command at the shell prompt as root:

```
#init 2
```

2. Edit the “/etc/X11/XF86Config” file as root and change the line in the “InputDevice” section that reads:

```
Option "Device" "/dev/hid/mouse_000"
```

to read:

```
Option "Device" "NULL"
```

3. Start all services that were stopped as a result of going to run level 2 by bringing the system back to run level 3. To do this, execute the following command at the shell prompt as root:

```
#init 3
```

This will allow the X Server to start up correctly without a mouse attached to the system.

#### **Procedure Four:**

Add a mouse to the system and reboot.

## Management Processor (MP)

This section explains how to configure your system using the Management Processor. The topics covered are:

- MP Overview
- Using MP
- MP Commands
- Management Card

This section assumes that you have the Management Card installed in your system. To determine if the card is installed, look at the back panel of your system and you will see a 25-pin Serial Port if the Management Card is installed.

### MP Overview

The Management Processor (MP) is an independent support processor for the system console. MP provides services that facilitate the management of the host system. Its major features are:

**Table 3-2 MP Features and their Descriptions**

Feature	Description										
Always on capability	The MP is alive as long as the power cord is plugged in.										
User/password access control	The users supported are both operators and administrator.										
Multiple access methods	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Console</td> <td>Use terminal of laptop computer for direct connect</td> </tr> <tr> <td>Remote Port</td> <td>Use dedicated modem RS-232 port</td> </tr> <tr> <td>UPS</td> <td>Use uninterruptible power source</td> </tr> <tr> <td>LAN</td> <td>Use telnet or web to access MP LAN</td> </tr> <tr> <td>VGA</td> <td>Use console display for HP-UX</td> </tr> </table>	Console	Use terminal of laptop computer for direct connect	Remote Port	Use dedicated modem RS-232 port	UPS	Use uninterruptible power source	LAN	Use telnet or web to access MP LAN	VGA	Use console display for HP-UX
Console	Use terminal of laptop computer for direct connect										
Remote Port	Use dedicated modem RS-232 port										
UPS	Use uninterruptible power source										
LAN	Use telnet or web to access MP LAN										
VGA	Use console display for HP-UX										
Mirrored console	The system console output stream is reflected to all of the connected console users. Any user can provide input provided the right console is selected and the serial console is deselected.										
Display and/or logging of	The system console, system event logs (chassis codes), Virtual Front Panel (VFP) and system power and configuration status provide information for the user.										
An independent, non-mirrored session	This is available from console and remote ports for MP connection (CSP), or OS login (SE).										



**Table 3-2 MP Features and their Descriptions (Continued)**

Feature	Description
Additional features	The additional features are: power control, system reset, and Transfer of Control (TOC).

## Using MP

This section explains how to enter the MP command mode on your system console. There are two methods you can use to accomplish this task. Method one requires the use of your Management Card's serial console port. Before you can do Method Two, you need to make the necessary LAN settings on the Management Card. To accomplish this task, complete Method One and then in the MP command mode make the required LAN settings. Method two also requires the use of the LAN port on your system's Management Card.

Here are the topics covered in this section:

- Method One: Entering the MP Command Mode through the Serial Console
- Setting Up a LAN Connection to the Management Card
- Method Two: Entering the MP Command Mode through the LAN

### Method One: Entering the MP Command Mode through the Serial Console

To get to the MP command mode, you need to follow these steps:

1. Set up a Windows based system to run a vt100+ terminal emulation program with these serial port settings: 9600 baud, 8 bits, no parity, one stop bit and no flow control.
2. Connect the 25-pin end of an M cable to the Management Card's 25-pin serial port connector, which is located on the back panel of the system. Next,
3. Connect the console connector on the M cable to your Windows based system's serial port.
4. Connect an AC line cord to your system and plug it into an AC outlet.
5. Observe that the green Standby Power LED on the Management Card blinks continuously indicating that the system's standby power is on. The Standby Power LED is located to the right of the Management Card's LAN port and LAN LEDs, which are locate on the system's back panel.
6. Watch the Management Card boot the MP command mode prompt. You will see the following information displayed on the screen:

```
HP Management Processor
Firmware Revision kdEv1026 Oct 26 2001,10:28:32
(c) Copyright Hewlett-Packard Company 1999-2001. All Rights Reserved
```

Type Ctrl-B to activate the MP Command Interface

7. Press **Ctrl-B**, and respond to the login prompt by pressing **Enter**. Respond to the password prompt by pressing **Enter**. The follow information is displayed:

```
Hewlett-Packard Management Processor
(c) Copyright Hewlett-Packard Company 1999-2001. All Rights Reserved
```

```
System Name: fstl3a
```

```
*****
```

```
MP ACCESS IS NOT SECURE
```

```
No MP users are currently configured and remote access is enabled.
```

```
Set up a user with a password (see SO command)
```

```
OR
```

```
Disable all types of remote access (see EL and ER commands)
```

```
*****
```

```
MP Host Name: fstl3a
```

```
MP>
```

8. Enter "he" at the MP prompt. This will give you access to information regarding MP's commands and help topics. The following menu is displayed:

```
==== MP Help =====
```

```
MP Help System
```

```
Enter a command at the help prompt:
```

```
Overview : Launch the help overview
```

```
List : Show the list of MP commands
```

```
<COMMAND> : Enter the command name for help on individual  
command
```

```
TOPics : Show all MP Help topics and commands
```

```
HElp : Display this screen
```

```
Q : Quit help
```

```
====
```

```
MP HELP: <selection>
```

Where <selection> is one of the items from the menu.

## Setting Up a LAN Connection to the Management Card

Once you have established a LAN connection to your Management Card, you can remotely control your system. As you will see in the section on “MP commands,” there are many system tasks you can perform without being physical positioned next to the system. Note that the steps provided in this section must be completed before you can perform the steps given in the section “Method Two: Entering the MP Command Mode through the LAN.”

Here are the steps for setting up a LAN connection to the Management Card in your system:

1. Enter the MP command mode by completing the steps provided in the section “Method One: Entering the MP Command Mode through the Serial Console.”
2. Type the LAN configuration command at the MP prompt and press **Enter**:

```
MP> lc
```

Information similar to the following is displayed:

```
LC
```

```
This command allows you to modify the LAN configuration.
```

```
Current configuration:
```

```
IP Address           : 127.0.0.0
MP Host Name         : myhost
Subnet Mask          : 200.0.0.0
Gateway              : 127.0.1.0
Web Console Port Number : 2023
```

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

3. Configure the LAN for your system. To do this, type “y” and press **Enter** in response to the following prompt:

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

```
Current IP Address: 127.0.0.0
```

```
Do you want to modify it? (Y/[N])
```

4. Change the current IP address to the IP address appropriate for your local network. To do this, type “y” and press **Enter** in response to the following prompt:

```
Do you want to modify it? (Y/[N]) y
```

```
Y
```

```
Enter new IP Address:
```

5. Enter the new IP address. To do this, type “<IP\_Address>” and press **Enter** in response to the follow prompt:

```
Enter new IP Address: <IP_Address>
<IP_Address>
New IP Address: <IP_Address>
Confirm? (Y/[N])
```

6. Confirm that the new IP address is correct. To do this, type “y” and press **Enter** in response to the following prompt:

```
Confirm? (Y/[N]) y
Y
-> IP Address will be updated.
```

```
Current MP Host Name: myhost
Do you want to modify it? (Y/[N])
```

7. Change the current MP Host Name for your system. To do this, type “y” and press **Enter** in response to the following prompt:

```
Do you want to modify it? (Y/[N]) y
Y
```

```
Current MP Host Name: myhost
Do you want to modify it? (Y/[N])
```

8. Enter the MP Host Name. To do this, type “<new\_host\_name>” and press **Enter** in response to the following prompt:

```
Enter new MP Host Name: <new_host_name>
<new_host_name>
New MP Host Name: <new_host_name>
Confirm? (Y/[N])
```

9. Confirm that the new MP Host Name is correct. To do this, type “y” and press **Enter** in response to the following prompt:

```
Confirm? (Y/[N]) y
Y
-> MP Host Name will be updated.
```

```
Current Subnet Mask: 200.0.0.0
Do you want to modify it? (Y/[N])
```

10. Change the current Subnet Mask for your system. To do this, type “y” and press **Enter** in response to the following prompt:

```
Do you want to modify it? (Y/[N]) y
Y
Enter new Subnet Mask:
```

11. Enter the Subnet Mask. To do this, type “<new\_subnet\_mask>” and press **Enter** in response to the following prompt:

```
Enter new MP Host Name: <new_subnet_mask>
<new_subnet_mask>
New MP Host Name: <new_subnet_mask>
Confirm? (Y/[N])
```

12. Confirm that the new Subnet Mask is correct. To do this, type “y” and press **Enter** in response to the following prompt:

```
Confirm? (Y/[N]) y
Y
-> Subnet Mask will be updated.

Current Gateway: 127.0.1.0
Do you want to modify it? (Y/[N]) (Default will be IP Address)
```

13. Change the current Gateway for your system. To do this, type “y” and press **Enter** in response to the following prompt:

```
Do you want to modify it? (Y/[N]) (Default will be IP Address) y
Y
Enter new Gateway:
```

14. Enter the Gateway. To do this, type “<new\_gateway>” and press **Enter** in response to the following prompt:

```
Enter new MP Host Name: <new_gateway>
<new_gateway>
New MP Host Name: <new_gateway>
Confirm? (Y/[N])
```

15. Confirm that the new Gateway is correct. To do this, type “y” and press **Enter** in response to the following prompt:

```
Confirm? (Y/[N]) y
Y
-> Gateway will be updated.

Current Web Console Port Number: 2023
Modifying Web Port number will cause all present Web
connections to be dropped.
Do you want to modify it? (Y/[N])
```

16. Change the current Web Console Port Number for your system. To do this, type “y” and press **Enter** in response to the following prompt:

```
Do you want to modify it? (Y/[N]) y
Y
Valid Web Port numbers: 23, 2000-2400
Enter new Web Console Port Number:
```

17. Enter the Web Console Port Number. To do this, provide the “<web\_console\_port\_number>” and press **Enter** in response to the following prompt:

```
Enter new Web Console Port Number: <web_console_port_number>
<web_console_port_number>
New Web Console Port Number: will be: <web_console_port_number>
Confirm? (Y/[N])
```

18. Confirm that the new Web Console Port Number is correct. To do this, type “y” and press **Enter** in response to the following prompt:

```
Confirm? (Y/[N]) y
Y
-> Web Console Port Number: will be updated.
```

```
Current configuration:
MAC Address           : 0x00306e22a4b1
Auto Negotiate        : Enabled
Full Duplex           : Enabled
100BaseT              : Enabled
```

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

19. Answer the following prompt that asks if you want to modify the LAN hardware configuration by typing “n” and pressing **Enter**:

---

**CAUTION**

---

If you answer “y,” you should never turn off “Undo Negotiate.” It will lock the system.

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

```
-> Settings have been updated.
-> Reset the MP for LAN configuration to take effect.
-> Use the R option of the XD command to reset the MP.
```

```
MP Host Name: <new_host_name>
MP>
```

20. Ensure that the LAN configurations take effect. To do this, type “xd” at the MP prompt and press **Enter**. The following information is displayed:

```
MP> xd
xd
Non destructive tests:
1. Parameters checksum
2. I2C access (get Power Monitor status)
3. LAN access (PING)
4. Modem selftests
5. Secondary I2C access (get System status)
```

```
Type R to reset the MP or [Q] to quit the diagnostic menu.
```

```
-> Choice:
```

21. Reset the MP. To do this, type “r” and press **Enter** in response to the following prompt:

```
Type R to reset the MP or [Q] to quit the diagnostic menu.
```

```
-> Choice: r
```

```
r
```

```
The MP is now being reset...
```

The following information will be displayed when the MP is reset:

```
HP Management Processor  
Firmware Revision kdEv0131 Jan 31 2002,14:43:43  
(c) Copyright Hewlett-Packard Company 1999-2001. All Rights Reserved.
```

```
Type Ctrl-B to activate the MP Command Interface.
```

22. Close your Windows based terminal emulation program, and you will be ready to telnet to this system from another remote system.

### **Method Two: Entering the MP Command Mode through the LAN**

To get to the MP command mode, you need to follow these steps:

1. Complete the steps in the section “Setting Up a LAN Connection to the Management Card.”
2. Logon to the system with the *<new\_host\_name>* you created in the section “Setting Up a LAN Connection to the Management Card.” To do this, create a terminal window on your remote system’s display and at the shell prompt type:

```
C:\> telnet <new_host_name>
```

3. Watch the Management Card boot the MP command mode prompt. You will see the following information displayed on the screen:

```
HP Management Processor  
Firmware Revision kdEv1026 Oct 26 2001,10:28:32  
(c) Copyright Hewlett-Packard Company 1999-2001. All Rights Reserved
```

```
Type Ctrl-B to activate the MP Command Interface
```

4. Press **Ctrl-B**, and respond to the login prompt by pressing **Enter**. Respond to the password prompt by pressing **Enter**. The follow information is displayed:

```
Hewlett-Packard Management Processor
(c) Copyright Hewlett-Packard Company 1999-2001. All Rights Reserved
```

```
System Name: <new_host_name>
```

```
*****
```

```
MP ACCESS IS NOT SECURE
```

```
No MP users are currently configured and remote access is enabled.
```

```
Set up a user with a password (see SO command)
```

```
OR
```

```
Disable all types of remote access (see EL and ER commands)
```

```
*****
```

```
MP Host Name: <new_host_name>
```

```
MP>
```

5. Enter "he" at the MP prompt. This will give you access to information regarding MP's commands and help topics. The following menu is displayed:

```
==== MP Help =====
```

```
MP Help System
```

```
Enter a command at the help prompt:
```

```
Overview : Launch the help overview
```

```
List : Show the list of MP commands
```

```
<COMMAND> : Enter the command name for help on individual  
command
```

```
TOPics : Show all MP Help topics and commands
```

```
HElp : Display this screen
```

```
Q : Quit help
```

```
====
```

```
MP HELP: <selection>
```

Where <selection> is one of the items from the menu.



## MP Commands

The MP commands allow you to configure your server or workstation either from a local console or remote console. Please keep in mind that these commands work only with the Management Card.

There are five categories of MP commands:

- Status commands
- Server control commands
- General MP configuration commands
- MP port configuration commands
- Connections commands

The subsequent sections are the categories of MP commands that are available for your use. The commands listed under each of these categories are described in more detail online. To get details for any of these commands type the command name at the MP help prompt and press **Enter**.

Here are the steps required for getting help on any of the MP commands:

1. Enter the MP command mode as described in the section “Method One: Entering the MP Command Mode through the Serial Console” or “Method Two: Entering the MP Command Mode through the LAN.”
2. Execute the MP help command. To do this, type “he” at the MP prompt and press **Enter**.

```
MP> he
```

3. Enter the command name at the MP help prompt and press **Enter**.

### Status Commands

This set of commands provides status on the server and the MP. See Table 3-15.

**Table 3-3 Status Commands**

Command	Description
CL	Console history
DF	Display Field Replaceable Unit ID
LS	LAN status
MS	Status of the modem
PS	Power management module status
SL	Status Logs
SR	Display all firmware revisions
SS	System's processor status
VFP	Virtual front panel display

### Server Control Commands

This set of commands can be used to alter the state of the server. See Table 3-4.

**Table 3-4 Server Control Commands**

Command	Description
MR	Modem reset
PC	Remote power control
RS	System reset from RST signal
TC	Transfer of control; system reset through INIT signal

### General MP Configuration Commands

This set of commands allows you to perform some general configurations, such as, configuring automatic system restart, setting the default configuration, etc. See Table 3-5.

**Table 3-5 General MP Configuration Commands**

Command	Description
AC	Alert display configuration
BP	Reset BMC password
CE	Log a chassis code in the GSP chassis code history buffer
CG	Generate RSA key pair of Self Signed Certificate
CT	Configure tracing into GSP firmware
DC	Default configuration
EX	Exit from the MP command mode
HE	Prints a Help menu
IT	Modify MP inactivity timeout
LOC	Locator LED
OT	Disable over temperature control
PR	Power Restore Policy Configuration
RB	BMC reset through Toggle GPIO pin
SDM	Set display mode (hex or text)
SO	Security options and access control
VT	View trace buffer
XD	MP diagnostics and reset
XU	Upgrade the MP firmware
ZCTGNAYOR	Clear GSP NVM at your own risk

**Table 3-5 General MP Configuration Commands (Continued)**

Command	Description
ZDTPMT	Dump the GSP internal postmortem trace

**MP Port Configuration Commands**

This set of commands allows you to configure LAN/WEB, remote/modem, and local ports. See Table 3-6.

---

**CAUTION**

If you are not connecting anything to a port, hardware flow control should be off.

**Table 3-6 MP Port Configuration Commands**

Command	Description
CA	Configure serial port parameters
EL	Enable LAN access options: telnet and web permissions
ER	Enable remote; modem access configurations
LC	Configure the LAN
PG	Configure paging

**Connections Commands**

This set of commands provides a means for examining and making connections or changing mode. See Table 3-7.

**Table 3-7 Connections Commands**

Command	Description
CO	Return to the redirected console mode
CSP	Connect to another service processor
DI	Disconnect remote or LAN connection
SE	Activate a system session on locator remote port
TE	Send message to other user
WHO	Display a list of connected users

### Manufacturing Mode Commands

This set of commands provides a means for entering and quitting the manufacturing mode. See Table 3-8.

**Table 3-8 Manufacturing Mode Commands**

<b>Command</b>	<b>Description</b>
GSPMFG	Enter the manufacturing mode
GSPQMM	Quit the manufacturing mode
MFG	Enter the manufacturing mode
QMM	Quit the manufacturing mode

## Baseboard Management Controller (BMC)

The baseboard management controller supports the industry-standard Intelligent Platform Management Interface (IPMI) specification. This specification describes the management features that have been built into the system board. These features include: diagnostics, both local and remote, console support, configuration management, hardware management and troubleshooting.

This section explains the BMC command-line interface including:

- Using the BMC Command Line Interface (CLI)
- BMC Command Overview

### Using the BMC Command Line Interface (CLI)

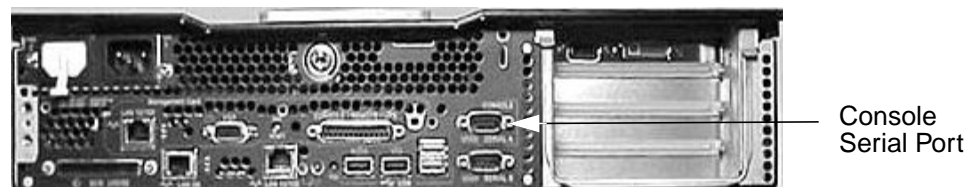
To access the zx6000 system's BMC CLI, you must first log in to the workstation using a serial connection and terminal.

#### Logging in to the BMC CLI

To log in to the zx6000 system's BMC command line interface, use a serial connection and terminal. Please keep in mind that the terminal can be terminal emulation software running on a laptop computer. Here is the procedure for logging in to the BMC command line interface:

1. With the workstation turned off, connect a null-modem cable to Serial Port A on the back panel of the system and to a laptop or other Windows system with a serial port and terminal emulation software.

**Figure 3-1 Serial Port A (Console)**



2. Configure the terminal emulation software with these settings:

- Baud rate: 9600
- Bits: 8
- Parity: None
- Stop Bits: 1 (one)
- Flow Control: Xon/Xoff

3. Turn on the zx6000 system. The system console will display in the terminal emulation software window.

4. Access the BMC CLI in you terminal emulation program, type:

```
Esc (
```

That is, press **Esc**, then **Shift-9** (on a Qwerty keyboard). This will activate the BMC CLI, even if the system power is off.

5. Press **Enter** and BMC will respond with the CLI prompt:

```
cli>
```

To return to the system console, press **Esc** then **Shift-Q**.

When you enter a command, you can use the **Backspace** key to correct mistakes and press **Enter** to execute commands.

### Executing BMC Commands

BMC commands are typed at the CLI command prompt, in a manner similar to HP-UX commands.

- Type the command and any required parameters after the `cli>` prompt.
- Use the **Backspace** key to correct mistakes.
- Press **Enter** to execute the command.

The subsequent section “BMC Commands” explains a few of the commands that are available for use.

### Logging Out of the BMC CLI

When you are finished using the BMC CLI:

- Log out by executing `Q[uit]` (that is, type `Q`, then press **Enter**).
- Return to the system console by pressing **Esc Q** (that is, press **Esc**, then **Shift-Q**).

### BMC Commands

The BMC commands allow you to configure your system from a local console.

There are two categories of BMC commands:

- Standard commands
- Intelligent Platform Management Interface (IPMI) commands

This section provides a brief overview of the available commands. For detailed information on all of the BMC commands, see the Intel® web site:

```
www.intel.com/design/servers/ipmi
```

### Standard Commands

Standard BMC commands allow you to control the BMC interface, view logs, get help and change your password.

To execute standard BMC commands:

1. Type the first letter or letters of the command, as indicated in the subsequent table, followed by any required options. For example, to execute the Change Password command, type **C** and press **Enter**.
2. Enter additional information if prompted, such as a new password and press **Enter**.

Command Syntax	Options	Mode	Description
C[hangePassword] <current passwordstring>	prompts user for new passowrd	User	Allows user to change their own password
P[ower] <power setting>	0=off 1=on	User	Forces system power on or off, does not shut down using OS procedures
SDRR[ead]	N/A	User	Read SDR repository
SELR[ead]	N/A	User	Displays system event log
FPLR[ead]	N/A	User	Read FPL
H[elp]	N/A	User	Displays list of BMC commands
Q[uit]	N/A	User	Logs out user, does not close BMC session

### IPMI Commands

IPMI commands allow you to communicate with and configure various components of the system. IPMI commands are only available to users with administrative level access.

All IPMI commands require a sequence of ASCII codes used as parameters. Each command may include some or all of the following parameters:

- Network Function and Lun (NetFnLun) — The NetFnLun parameter that identifies the functional class of the message.
- Command — The messages specified in this document contain a one-byte command field. Commands are unique within a given Network Function. Command values can range from 00h through FDh. Code FEh is reserved for future extension of the specification, and code FFh is reserved for message interface level error reporting on potential future interfaces.
- Data — The Data field carries the additional parameters for a request or a response, if any.

The IPMI commands can be entered in long or short forms. The associated response from the BMC will match the form of the command.

For example:

- Short format or `ipmi` command:

— Syntax:

```
ipmi NetFnLun Cmd Data1 Data2 ... DataN
```

— Sample command and system response:

```
cli> ipmi 18 04  
00 55 00  
cli>
```

- Long format or `i` command:

— Syntax:

```
i 0 NetFnLun 0 0 0 Cmd Data1 Data2 ... DataN 0
```

— Sample command and system response:

```
cli> i 0 18 0 0 0 04 0  
0 1C E4 00 00 04 00 55-00 A7  
cli>
```



---

# 4 Troubleshooting

This chapter provides information about isolating a failing component, known as a Field Replaceable Unit (FRU), in the system. Here are the topics covered

- Introduction to Troubleshooting
- Flowcharts for Troubleshooting
- Running Support Tools Manager
- Running Event Monitoring Service
- Running TopTools (for Linux® on an rx2600 only)
- Running HP's e-DiagTools
- Using the System's LEDs and e-buzzer to Troubleshoot
- Troubleshooting Monitor Problems

## Introduction to Troubleshooting

To troubleshoot your system, you must be familiar with the HP-UX operating system and be able to start and stop processes. You should also be familiar with the Offline Diagnostics Environment and the Support Tools Manager for HP-UX systems.

First note any event messages, and use the diagnostics tool that is appropriate for your system to determine what failed. Note that event messages can be found in Appendix C of this document. If a test fails, the diagnostics message will give you an indication of the Field Replaceable Unit (FRU) to replace.

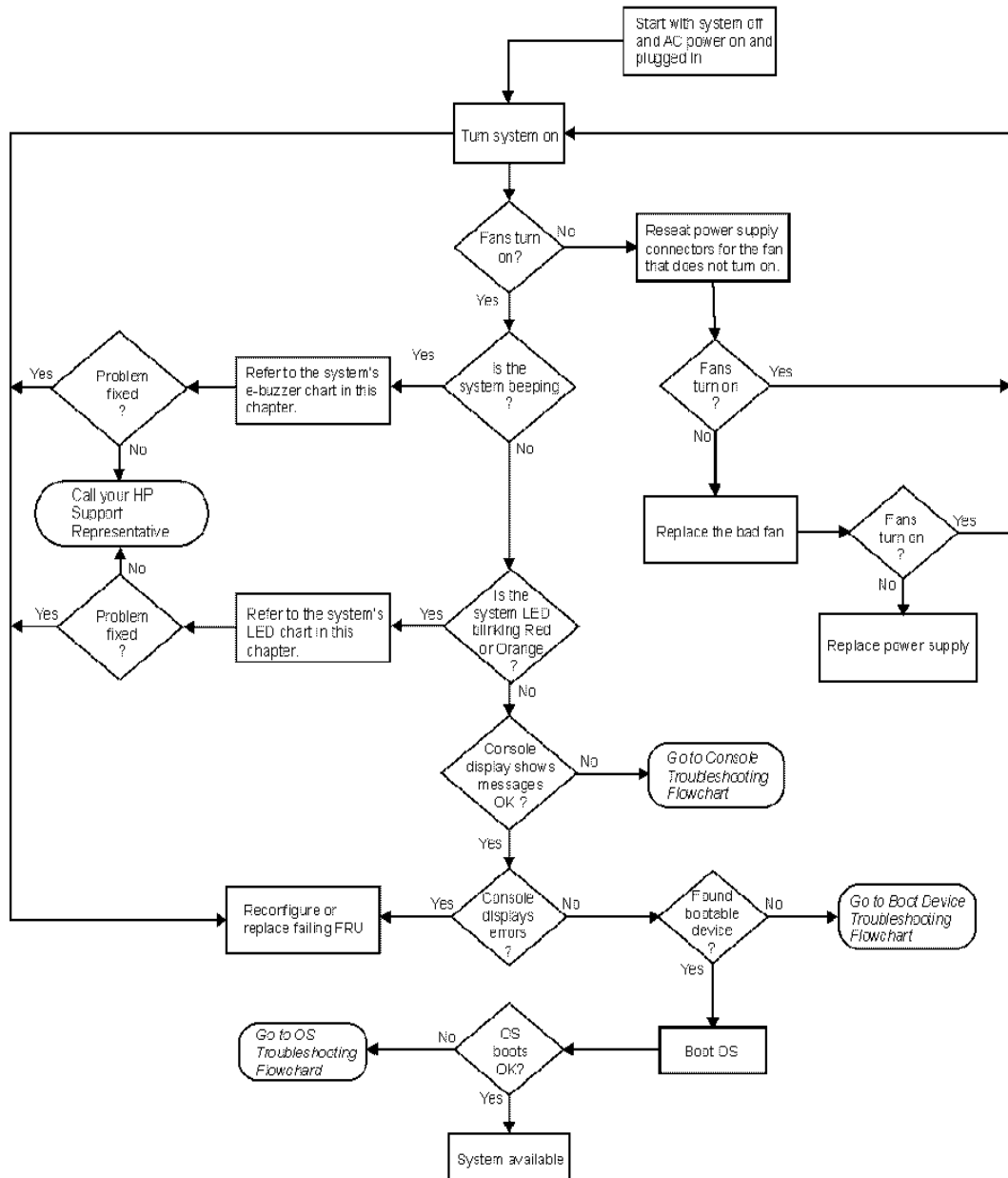
For a complete description of the HP-UX diagnostics tools, go to this URL:

<http://docs.hp.com//hpux/diag/>

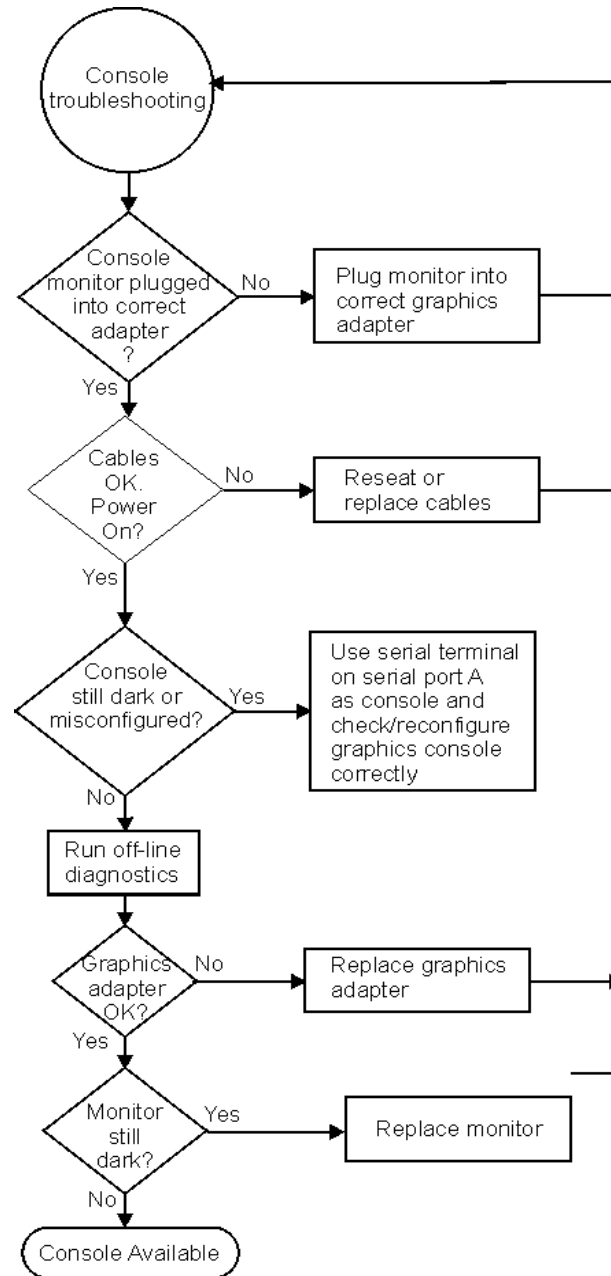
## **Flowcharts for Troubleshooting**

The following four figures contain troubleshooting flowcharts you can follow to isolate a failing Field Replaceable Unit (FRU). Figure 3-1 on the next page contains the main troubleshooting flowchart. Figures 3-2 through 3-4 on the following pages contain the flowcharts for console, bootable device, and Operating System troubleshooting, respectively.

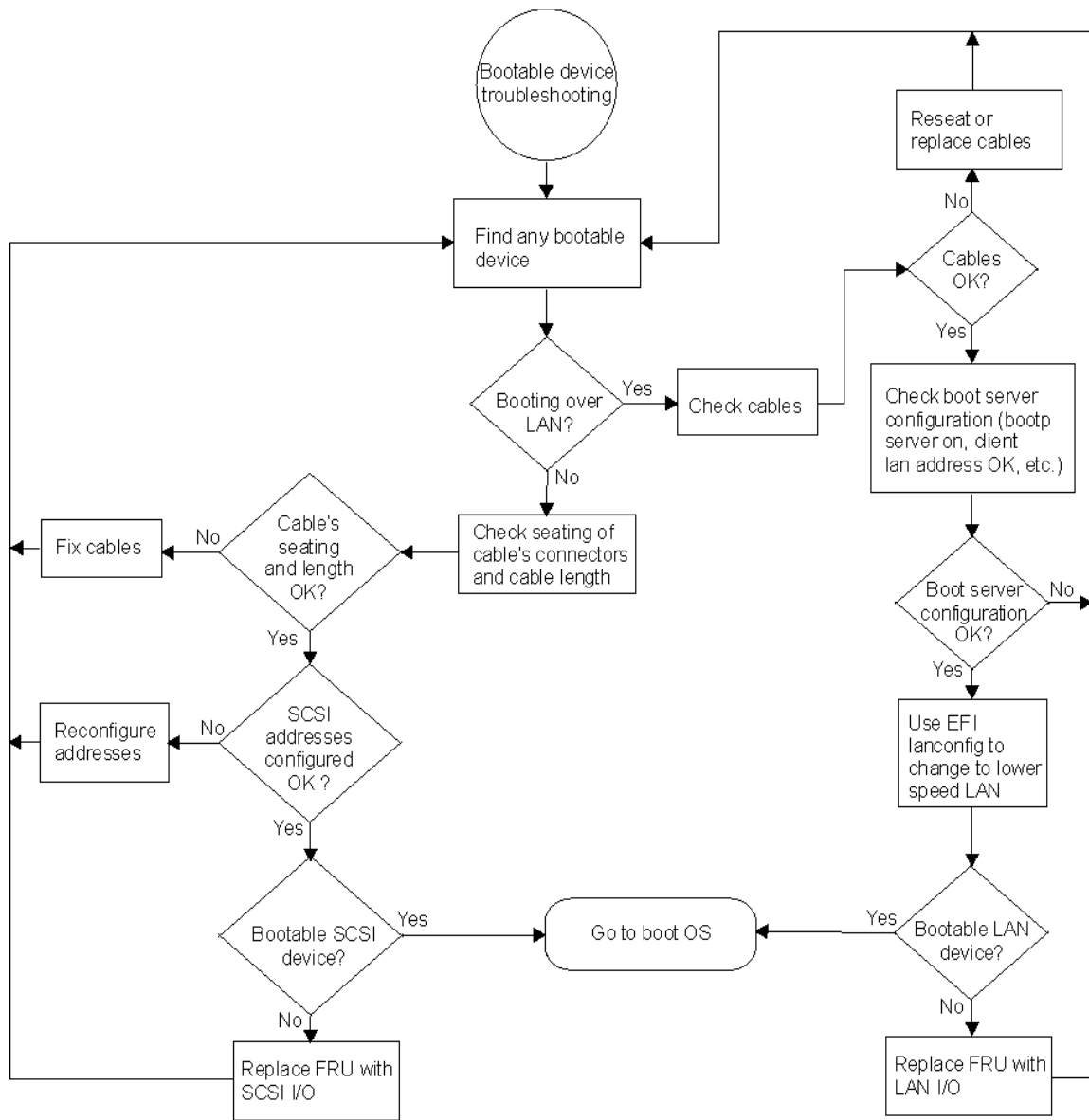
**Figure 4-1 Main Flowchart for Troubleshooting**



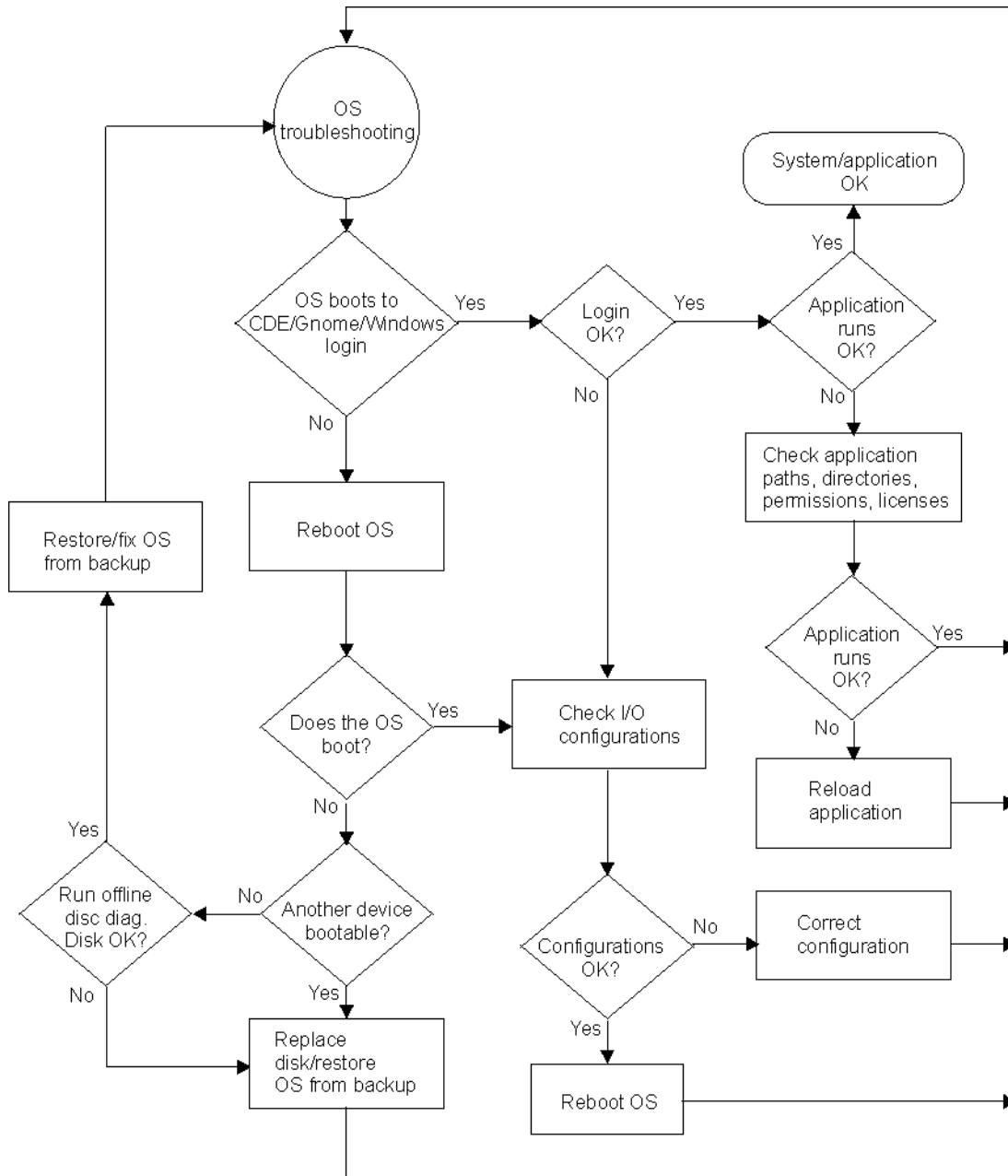
**Figure 4-2 Console Troubleshooting Flowchart**



**Figure 4-3 Bootable Device Troubleshooting Flowchart**



**Figure 4-4 Operating System (OS) Troubleshooting Flowchart**



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## Running Support Tools Manager (HP-UX only)

HP-UX uses an online diagnostics product called the Support Tools Manager (STM) that allows system operation verification.

Three interfaces are available with the Support Tools Manager: a command line interface (accessed through the `cstm` command), a menu-driven interface (accessed through the `mstm` command), and the graphical user interface (accessed through the `xstm` command).

For more information on these user interfaces, see the online man pages by entering the following at a command line prompt:

```
man cstm [Enter]
```

```
man mstm [Enter]
```

```
man xstm [Enter]
```

For information on the enhanced online diagnostics, see the “Support Tools for HP Computers” documents located at this URL:

```
http://docs.hp.com//hpux/diag/
```

To access the Support Tools Manager, perform the following steps:

1. In a terminal window, type the following at the `fs0:\>` prompt to invoke the command line interface:

```
fs0:\> cstm [Enter]
```

2. The following message appears:

```
Support Tool Manager      Version A.01.00
Type 'help' for a list of available commands.
CSTM>
```

3. To verify the system operation, type the following at the `CSTM>` prompt:

```
CSTM> verify all [Enter]
```

Messages similar to the following appear:

```
Verification has started on device (CPU).
Verification has started on device (FPU).
```

```
CSTM> Verification of (FPU) has completed.
```

```
CSTM> Verification of (CPU) has completed.
```

4. Press `[Enter]` to return to the `CSTM>` prompt after all test results are reported.

5. To exit the Support Tools Manager, enter the following:

```
CSTM> exit [Enter]
```



---

## Running Event Monitoring Service

The Event Monitoring Service performs hardware monitoring. Hardware monitoring is the process of watching a hardware resource (such as a disk) for the occurrence of any unusual activity, called an event. When an event occurs, it is reported using a variety of notification methods (such as e-mail). Event detection and notification are all handled automatically with minimal involvement on your part.

The Event Monitoring Service is designed to provide a high level of protection against system hardware failure with minimal impact on system performance. By using hardware monitoring, you can virtually eliminate undetected hardware failures that could interrupt system operation or cause data loss.

The following are the steps involved in installing and configuring hardware monitoring. For a detailed explanation, see the *EMS Hardware Monitors User's Guide* located at this URL:

<http://docs.hp.com//hpux/diag/>

Here are the steps for installing and configuring the hardware monitor:

1. Install the Support Tools from the most current copy of Support Plus Media you can find. You can also download this package over the Web. To learn how to download this package over the web, see the *EMS Hardware Monitors User's Guide*. Note that this step is only necessary for HP-UX 10.20 or 11.x. With HP-UX 11i, the Support Tools are automatically installed when the OS is installed.
2. Examine the list of supported products to see if any of your devices have special requirements in order to be monitored. For example, if monitoring FC-AL hubs, edit the file:

```
/var/stm/config/tools/monitor/dm_fc_hub
```

3. Enable hardware event monitoring. This step is only necessary if you have a release of the Diagnostic/IPR Media earlier than June 1999.
4. Determine whether default monitoring requests are adequate.
5. Add or modify monitoring requests as necessary.
6. Verify monitor operation, if desired (recommended but optional).

Once the EMS hardware monitor is installed, you need to get it running. To get the hardware monitor running, start the Hardware Monitoring Request Manager and enable monitoring. This is done by executing the following command at the shell prompt:

```
/etc/opt/resmon/lbin/monconfig
```

The opening screen looks similar to this:

```
=====
=====          Event Monitoring Service          =====
=====          Monitoring Request Manager        =====
=====
                                                    INDICATES
EVENT MONITORING IS CURRENTLY ENABLED      <== MONITORING
                                                    STATUS
=====
=====  Monitoring Request Manager Main Menu  =====
=====
Select:
(S)how current monitoring requests configured via monconfig
(C)heck detailed monitoring status
(L)ist descriptions of available monitor
(A)dd a monitoring request                  <== MAIN MENU
(D)elete a monitoring request                SELECTION
(M)odify an existing monitoring request      OPTION
(E)nable Monitoring
(K)ill (disable) monitoring
(H)elp
(Q)uit
Enter selection: [s]
```

## Running TopTools (for Linux® on an rx2600 only)

TopTools is the diagnostics tool that you will use for on-line diagnostics of systems running the Linux® operating system on an rx2600 system.

TopTools is a collection of applications and agents designed to provide device management of Hewlett-Packard computing products. At the center of the TopTools solution is a device management tool (also referred to as the Device Manager) that is designed to help you identify and diagnose network and system problems quickly using a friendly and intuitive web-based interface.

You can install the TopTools server from the TopTools CD ROM (run `CD:\setup.exe`) or from the TopTools web site. The web site URL is:

`http://www.hp.com/toptools`

Go to the download page and follow the directions provided. The TopTools installation wizard (`setup.exe`) is an extensive program designed to make the TopTools installation process friendly and successful.

To open a TopTools console immediately following installation, log into the TopTools server console as a local administrator, a domain administrator or as the TopTools user (for whichever account you specified during the installation process). Double-click the TopTools shortcut placed on the system.

Self-paced training for TopTools is available on the TopTools web site at:

`ftp://ftp.hp.com/pub/toptools/Training/start.html`

## Running HP's e-DiagTools

This section includes information on e-DiagTools hardware diagnostics for the zx6000 and rx2600 systems.

More detailed troubleshooting information can be found at this URL:

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

### HP e-DiagTools Hardware Diagnostics

Your system came with a CD containing HP e-DiagTools hardware diagnostic utilities. These tools may be used to diagnose hardware-related problems on your HP system.

---

#### NOTE

Run e-DiagTools before contacting HP for Warranty service. This is to obtain information that will be requested by a Support Agent.

With this utility you can:

- Check the hardware configuration and verify that it is functioning correctly.
- Test individual hardware components.
- Diagnose hardware-related problems.
- Obtain a complete hardware configuration.
- Provide precise information to an HP support agent so they can solve problems quickly and effectively.

#### Starting HP e-DiagTools

1. Make sure your system model matches the CD-ROM (the CD-ROM is locked to a specific system model).
2. Insert the HP Drivers and Diagnostics CD in the CD-ROM drive.
3. Restart the system.
4. Select the CD-ROM boot option from the EFI startup menu.

---

#### NOTE

If you are unable to boot from your CD-ROM drive, restart your system and check the boot options from the Boot Options Maintenance Menu to ensure that your system is configured to boot from the CD-ROM.

5. Press **F2** [**Continue**] at the e-DiagTools introductory screen to access the Main Menu.

## Running HP e-Diagtools and Producing a Support Ticket

To produce a complete record of your system's configuration and test results, you will need to create a Support Ticket. This is a simple text file that contains essential information and is designed to assist your local or HP Support Agent.

To produce a Support Ticket, from the e-DiagTools Main Menu:

1. Select **2 - Run e-Diagtools** to run the diagnostics on your system if you have not already done so.
2. Select **4 - Support Ticket** to create the ticket.
  - To save the Support Ticket, press **4**.
  - To view the Support Ticket, click the button at the bottom of the screen.
  - To exit the Support Ticket tool, press **3**.

For more information about the e-DiagTools utility, refer to the *zx2000 Technical Reference Guide*, available on the HP web site at:

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

## Using the System's LEDs and e-buzzer to Troubleshoot

This section explains how you can use the system's LEDs and e-buzzer to troubleshoot system problems.

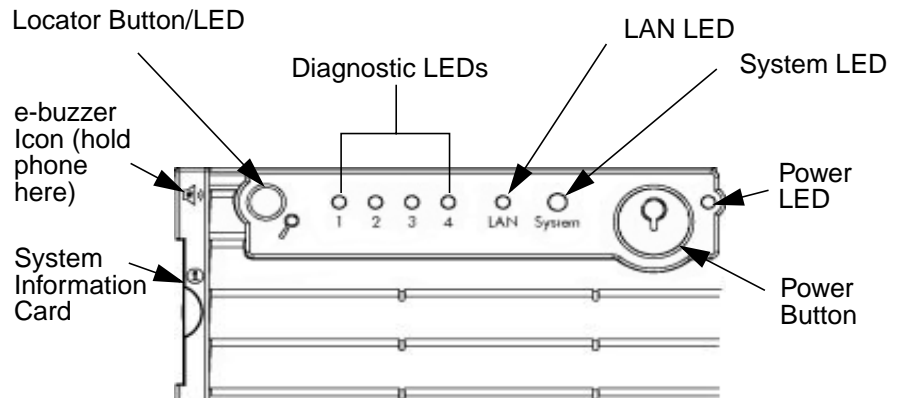
### Troubleshooting with the System's LEDs

There is a set of four LEDs located on the tower and rack-mount systems front bezel that are used for diagnosing the health of the system. These LEDs warn of any impending failures and allow you to take preventive action. For example, you may want to make a system backup or replace a system component before it quits functioning. The remaining four LEDs are the power, system, LAN, and locator LEDs. This section explains how the system's LEDs can be used for troubleshooting system problems and locating the system you want to work on within a rack of systems.

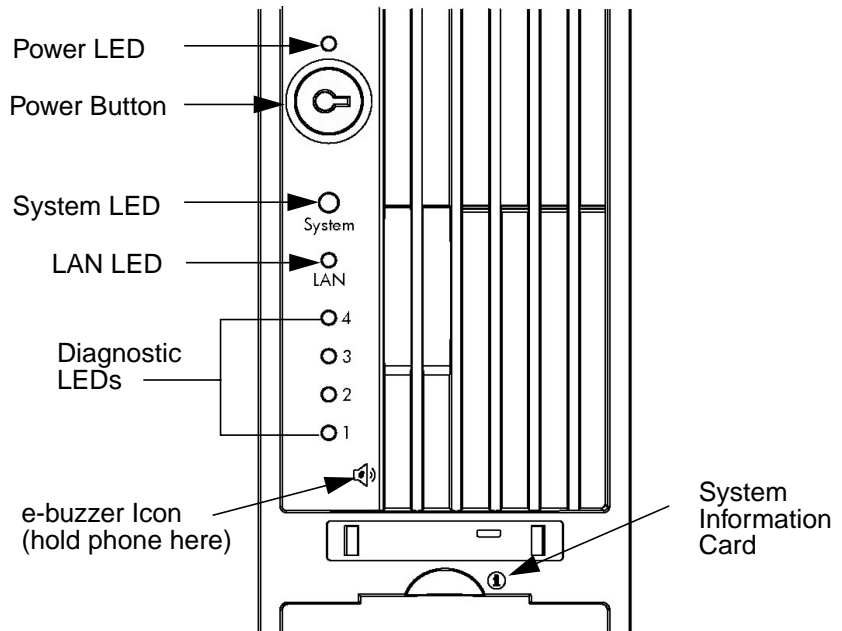
Here is a list of the types of LEDs covered in this section:

- Power and System LEDs
- LAN LED
- Locator LED and Button
- Diagnostic LEDs

**Figure 4-5** Rack-mounted System's LEDs and Buttons



**Figure 4-6 Desk-side System's LEDs and Buttons**



**Power and System LEDs**

The power and system LEDs indicate the state of the system. Here is a table of these states:

**Table 4-1**

Power LED	System LED	State
Off	Off	Off
On (green)	Solid green	Running
On (green)	Off	Booting
On (green)	Blinking orange (1/sec.)	Attention (see section "Diagnostic LEDs")
On (green)	Blinking red (2/sec.)	Fault (see section "Diagnostic LEDs")

**LAN LED**

The LAN LED provides an indication as to whether the system is communicating over the LAN. If the LED is not green the system is off, and therefore, the system is not communicating over the LAN. If the LAN LED is on, there is LAN traffic. If the LAN LED is blinking green, the system is communicating over the LAN.

**Locator LED and Button (Rack-mounted Systems only)**

The locator LED provides a means for locating the system on which you intend to work. For example, you find out that system number 5 in your rack of systems has a LAN cable that needs to be replaced. This will require that you walk all the way around to the back of your rack of systems to replace the cable. Once you get behind the rack of systems, you need to locate the system that needs the cable replaced. The locator LED makes this an easy task. When the locator button is pressed in, the locator LED begins to flash blue at a frequency of one blink per second both on the front of the system and the back, thus making it easy to locate the system on which you need to work.

The locator LED can also be activated or deactivated by use of the locator button on the back panel of the system or by use of a Management Processor (MP) command. See Chapter 3.

**Diagnostic LEDs**

There are four diagnostic LEDs located on the front bezel of your system. These LEDs are labeled one through four. This section provides a table with a list of faults associated with the various possible LED lighting sequences. These faults are placed in categories that are appropriate to the system problem they indicate (for example, memory faults, system board faults, etc.). Note that the red LEDs can be used to identify the fault category of the LED error message. For example, if LED one is the only red LED, the error message is for a memory fault. If LEDs one and two are red, the error message is for a processor fault.

The column for the e-buzzer code in the following tables associates that code with a LED error message; however, in some cases there is no e-buzzer code associate with a LED error message. For more information on e-buzzer codes see the section “Troubleshooting with the System’s e-buzzer” in this chapter (see page 156).

To use the LED Fault and Warning tables for troubleshooting a system problem, you need to remember to use the correct table for a fault and a warning. You use the Fault tables to diagnose a problem when the system light is blinking red, and you use the Warning tables to diagnose a problem when the system light is blinking orange.

**Memory FAULT (System LED is Blinking RED ●)**

LED 1	LED 2	LED 3	LED 4	Fault and Solution	e-buzzer code
Red	Any <sup>a</sup>	Any <sup>a</sup>	Any <sup>a</sup>	<b>Memory FAULT</b>	3
Red	Green	Off	Off	Mismatched memory pairs; use the memory sequence diagram on the system's PCI/AGP cage	3
Red	Green	Green	Off	No memory installed; Install memory	3
Red	Green	Green	Green	Bad memory: one or more DIMMs are bad, or not seated properly; reseal the DIMM card or replace it	3

a. This LED can display any color other than red (for example, green or off).



**Memory WARNING (System LED is Blinking ORANGE ●)**

LED 1	LED 2	LED 3	LED 4	Warning and Suggestion
Red	Any <sup>a</sup>	Any <sup>a</sup>	Any <sup>a</sup>	<b>Memory WARNING</b>
Red	Green	Off	Off	Mismatched memory pairs; depending on your need to keep your system from failing you may want to use the memory sequence diagram on the system's PCI/AGP cage to prevent and problems from occurring.
Red	Off	Green	Green	Memory thermal load order; depending on your need to keep your system from failing you may want to use the memory sequence diagram on the system's PCI/AGP cage to prevent and problems from occurring.
Red	Green	Green	Green	Bad SPD information (cannot detect type); one or more DIMMs are bad, or not seated properly; reseat the DIMM card or replace it

a. This LED can display any color other than red (for example, green or off).

**Firmware FAULT (System LED is Blinking RED ●)**

LED 1	LED 2	LED 3	LED 4	Fault and Solution	e-buzzer code
Off	Red	Off	Off	System firmware hang; replace the system board	6

**System Board FAULTS (System LED is Blinking RED ●)**

LED 1	LED 2	LED 3	LED 4	Fault and Solution	e-buzzer code
Any <sup>a</sup>	Any <sup>a</sup>	Red	Any <sup>a</sup>	<b>System Board FAULT</b>	7
Green	Off	Red	Off	VRM undervoltage; contact your local HP Support Engineer	7
Off	Green	Red	Off	VRM overvoltage; contact your local HP Support Engineer	7

a. This LED can display any color other than red (for example, green or off).

**System Board WARNING (System LED is Blinking ORANGE ●)**

LED 1	LED 2	LED 3	LED 4	Warning and Suggestion
Green	Green	Red	Off	System board battery voltage is low; replace the system battery

**Fan FAULTS for zx6000 (System LED is Blinking RED ● )**

LED 1	LED 2	LED 3	LED 4	Fault and Solution	e-buzzer code
Any <sup>a</sup>	Any <sup>a</sup>	Any <sup>a</sup>	Red	<b>Cooling Unit FAULT</b>	N/A
Green	Off	Off	Red	This fault is for the group of fans, which consists of the turbo fans for both processors, fan 1A, fan 1B and fan 2. If any of the turbo fans are not functioning you will need to replace the processor unit. See the section "Removing and Replacing a Processor" in Chapter 2 of this document. If either fan 1A, 1B or 2 is bad, replace the bad fan. See the section "Removing and Replacing the System Fans" in Chapter 2 of this document.	N/A
Off	Off	Green	Red	This fault is for fan 3. If this fan is not functioning, replace the fan. See the section "Removing and Replacing the System Fans" in Chapter 2 of this document.	N/A

a. This LED can display any color other than red (for example, green or off).

**Fan FAULTS for rx2600 (System LED is Blinking RED ● )**

LED 1	LED 2	LED 3	LED 4	Fault and Solution	e-buzzer code
Any <sup>a</sup>	Any <sup>a</sup>	Any <sup>a</sup>	Red	<b>Cooling Unit FAULT</b>	N/A
Green	Off	Off	Red	This fault is for the group of fans, which consists of the turbo fans for both processors, fan 1A and fan 1B. If any of the turbo fans are not functioning you will need to replace the processor unit. See the section "Removing and Replacing a Processor" in Chapter 2 of this document. If either fan 1A or 1B is bad, replace the bad fan. See the section "Removing and Replacing the System Fans" in Chapter 2 of this document.	N/A
Off	Green	Off	Red	This fault is for fan 2. If this fan is not functioning, replace the fan. See the section "Removing and Replacing the System Fans" in Chapter 2 of this document.	N/A
Off	Off	Green	Red	This fault is for fan 3. If this fan is not functioning, replace the fan. See the section "Removing and Replacing the System Fans" in Chapter 2 of this document.	N/A

a. This LED can display any color other than red (for example, green or off).

**Fan WARNINGS (System LED is Blinking ORANGE ●)**

LED 1	LED 2	LED 3	LED 4	Warning and Suggestion
Any <sup>a</sup>	Any <sup>a</sup>	Any <sup>a</sup>	Red	<b>Fan WARNING</b>
Green	Off	Off	Red	Fan 1A; depending on your need to keep your system from failing you may want to replace the fan
Off	Green	Off	Red	Fan 1B; depending on your need to keep your system from failing you may want to replace the fan
Off	Off	Green	Red	Turbo fan CPU0; depending on your need to keep your system from failing you may want to replace the fan
Green	Green	Off	Red	Turbo fan CPU1; depending on your need to keep your system from failing you may want to replace the fan
Off	Green	Green	Red	Fan 2; depending on your need to keep your system from failing you may want to replace the fan
Green	Green	Green	Red	Fan 3; depending on your need to keep your system from failing you may want to replace the fan

a. This LED can display any color other than red (for example, green or off).

**Processor FAULTS (System LED is Blinking RED ●)**

LED 1	LED 2	LED 3	LED 4	Fault and Solution	e-buzzer code
Red	Red	Any <sup>a</sup>	Any <sup>a</sup>	<b>Processor FAULT</b>	1
Red	Red	Green	Off	CPU 0 temperature exceeds limit; check the processors turbo fan or fan 1A and 1B	1
Red	Red	Off	Green	CPU 1 temperature exceeds limit; check the processors turbo fan or fan 1A and 1B	1
Red	Red	Green	Green	No CPU detected in system; install a new processor or replace the old one	1

a. This LED can display any color other than red (for example, green or off).

**Processor WARNINGS (System LED is Blinking ORANGE ●)**

LED 1	LED 2	LED 3	LED 4	Warning and Suggestion
Red	Red	Any <sup>a</sup>	Any <sup>a</sup>	<b>Processor WARNING</b>
Red	Red	Green	Off	CPU 0 temperature exceeds limit; determine if the processor's turbo fan or fans 1A and 1B are working
Red	Red	Off	Green	CPU 1 temperature exceeds limit; determine if the processor's turbo fan or fans 1A and 1B are working

a. This LED can display any color other than red (for example, green or off).

**Baseboard Management Controller FAULTS (System LED is Blinking RED ●)**

LED 1	LED 2	LED 3	LED 4	Fault and Solution	e-buzzer code
Red	Any <sup>a</sup>	Red	Any <sup>a</sup>	<b>Baseboard Management Controller FAULT</b>	7
Red	Green	Red	Off	BMC firmware is damaged; replace the system board; see Chapter 2	7
Red	Green	Red	Green	System board field replaceable unit inventory device is inaccessible; replace the system board; see Chapter 2	7

a. This LED can display any color other than red (for example, green or off).

**Power Supply FAULTS (System LED is Blinking RED ●)**

LED 1	LED 2	LED 3	LED 4	Fault and Solution	e-buzzer code
Any <sup>a</sup>	Red	Any <sup>a</sup>	Red	<b>Power Supply FAULT</b>	2
Off	Red	Off	Red	VRM or power module is not functioning; see Chapter 2	2
Green	Red	Off	Red	Power Supply Unit 1 fault; replace the power supply; see Chapter 2	2
Off	Red	Green	Red	Power Supply Unit 2 fault; replace the power supply; see Chapter 2	2
Green	Red	Green	Red	12V out of range (power supply interface fault); replace the power supply; see Chapter 2	2

a. This LED can display any color other than red (for example, green or off).

**Power Supply WARNINGS (System LED is Blinking ORANGE ●)**

LED 1	LED 2	LED 3	LED 4	Warning and Suggestion
Any <sup>a</sup>	Red	Any <sup>a</sup>	Red	<b>Power Supply WARNING</b>
Green	Red	Off	Red	Power Supply Unit 1 warning; depending on your need to keep your system from failing you may want to replace the power supply; see Chapter 2
Off	Red	Green	Red	Power Supply Unit 2 warning; depending on your need to keep your system from failing you may want to replace the power supply; see Chapter 2

a. This LED can display any color other than red (for example, green or off).

**Video WARNING (System LED is Blinking ORANGE ●)**

LED 1	LED 2	LED 3	LED 4	Warning and Suggestion
Off	Red	Red	Off	No video adapter present; install a video adapter; see the installation instructions shipped with the video adapter

**Temperature FAULT (System LED is Blinking RED ●)**

LED 1	LED 2	LED 3	LED 4	Fault and Solution	e-buzzer code
Red	Green	Green	Red	External air temperature too high; make sure no items are blocking the system's airflow and locate your system in an air conditioned room	N/A

**Temperature WARNING (System Light is Blinking ORANGE ●)**

LED 1	LED 2	LED 3	LED 4	Warning and Suggestion
Red	Green	Green	Red	External air temperature becoming too high; make sure no items are blocking the system's airflow and locate your system in an air conditioned room

**Unknown FAULT (System LED is Blinking RED ●)**

LED 1	LED 2	LED 3	LED 4	Fault and Solution	e-buzzer code
Red	Red	Red	Red	Contact your local HP Service Representative	N/A

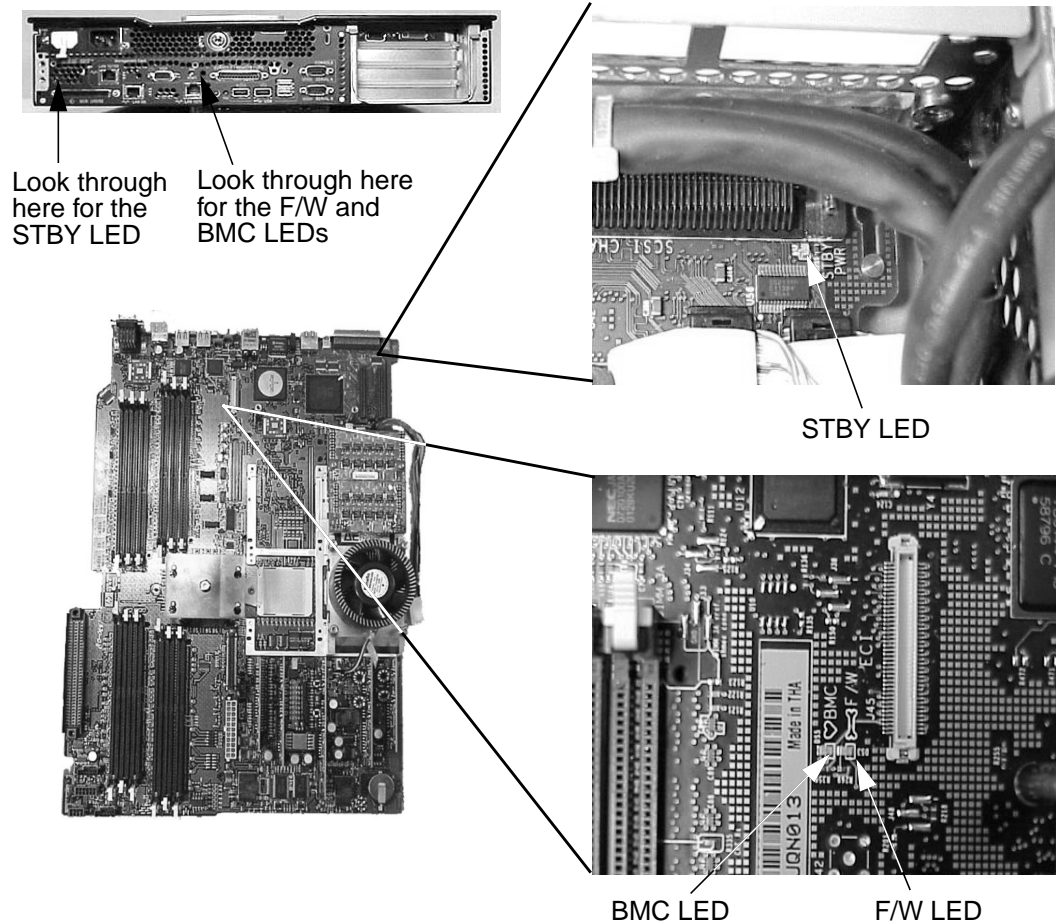
**Unknown WARNING (System Light is Blinking ORANGE ●)**

LED 1	LED 2	LED 3	LED 4	Warning and Suggestion
Red	Red	Red	Red	Contact your local HP Service Representative

### System Board Diagnostic LEDs

There are three additional LEDs that can help when troubleshooting the system. These LEDs are located on the system board close to the back of the system and can be viewed through the small cooling holes in the system backplane.

**Figure 4-7 Location of the STBY LED, F/W LED and BMC LED**



**Table 4-2 Description of the System Board LEDs**

LED's Name	Description
STBY	This standby LED comes on as soon as the system's power cord is plugged in. If this light is off when you plug it in, reseal the power supply, and if this does not work, replace the power supply. See Chapter 2 for instructions.
F/W	A few seconds after the system button is pressed in the system firmware code fetch LED comes on indicating that the firmware has started the boot process. If this LED does not come on, you may have to replace the system board.
BMC	A few seconds after the system is plugged in this LED starts blinking, which means that the Baseboard Management Controller is alive. If this LED is not blinking and the STBY (standby) LED is on, you may have to replace the system board.

### LAN LEDs for the System Board and Management Card

There are two towers of LEDs located on the backplane of the system. The tower of LEDs on the system board's Gb LAN connector come standard with the zx6000 and rx2600 systems. The second tower of LAN LEDs is located on the Management card. Please keep in mind that the Management card is optional for the zx6000 systems and a standard part of the rx2600 systems.

**Table 4-3 LAN LEDs for the Gb LAN on the System Board**

LED Name	Description
1000BT (blinking green when on)	The 1000MHz with Ethernet protocol and twisted-pair wiring is enabled.
100BT (blinking green when on)	The 100MHz with Ethernet protocol and twisted-pair wiring is enabled.
10BT (blinking green when on)	The 10MHz with Ethernet protocol and twisted-pair wiring is enabled.
Activity (blinking green when on)	There is LAN activity taking place.

**Table 4-4 LAN LEDs for the 10/100BT LAN on the Management Card**

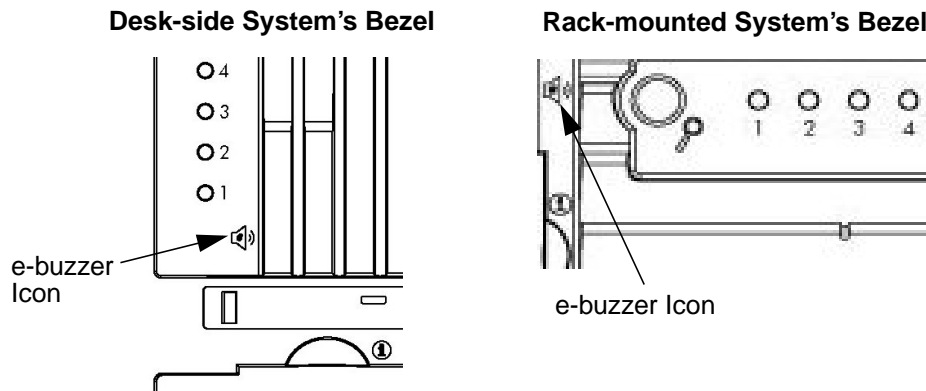
LED Name	Description
SP2 (yellow when on)	This LED when on indicates that the Management processor is self-testing or booting.
10BT (blinking green when on)	The 10MHz with Ethernet protocol and twisted-pair wiring is enabled.
100BT (blinking green when on)	The 100MHz with Ethernet protocol and twisted-pair wiring is enabled.
STBY (green when on)	The 3.3V standby power is on.

## Troubleshooting with the System's e-buzzer

When your system starts up, the system firmware performs pre-boot diagnostics to test your hardware configuration for any problems. If a problem is detected during pre-boot, the pre-boot diagnostics will emit an audio signal through the workstation's internal speaker.

The pre-boot diagnostics emits an audio sequence with two kinds of sounds. The first is an unusual series of tones that indicate an anomaly has been detected. This series of sounds also contains an electronic signal that can be sent through a telephone line to an authorized help desk or HP Support, if necessary. This signal cannot be interpreted by the human ear. However, it can be decoded by help desk equipment to extract the workstation model, serial number and details about any faults. To send this signal to HP Support, you need to hold your telephone next to the e-buzzer icon on the system's front bezel. See Figure 4-8.

**Figure 4-8 e-buzzer Label for Desk-side and Rack-mounted Systems**





The second type of sound is a series of long beeps that indicate a particular error. If you hear a series of beeps, you should count them as this will help you detect the cause of the problem. Here is the meaning of the number of beeps you hear.

**Table 4-5 Description of Beep Codes**

Number of Beeps	FRU to Replace	Meaning
1	Processor	Processor absent, not correctly connected or ZIF socket not closed; see the associated e-buzzer codes in the section "Diagnostic LEDs" in this chapter
2	Power Supply	Power supply is in protected mode; replace the power supply; see Chapter 2
3	Memory	No memory, bad memory modules or incompatible memory module; see the associated e-buzzer codes in the section "Diagnostic LEDs" in this chapter
4	Video Card	Graphics card problem; see the associated e-buzzer codes in the section "Diagnostic LEDs" in this chapter
5	PCI Card	PCI card problem; replace the PCI card; see Chapter 2
6	Firmware	Corrupted firmware. You need to activate crisis recovery procedure; see the associated e-buzzer codes in the section "Diagnostic LEDs" in this chapter
7	System Board	Defective system board; see the associated e-buzzer codes in the section "Diagnostic LEDs" in this chapter

**If You Miss the Beep Code**

If you miss the beep code, send the signal again by pressing the power supply button for 3 seconds and releasing it. The sound will begin after you release the button.

## Troubleshooting Monitor Problems

In the event that your console does not display or stops displaying to your graphics device, use the following procedure to set the console for displaying to an external terminal.

Here are the steps to follow:

1. Turn the system power off.
2. Disconnect the computer keyboard connector from the system's rear panel.
3. Connect a serial terminal to the Serial A connector (the top serial connector) on the system's rear panel. Configure the terminal for: 9600 baud, 1 Stop Bits, No Parity, 8 Bits and Xon/Xoff.
4. Power on the system. The system will now display the console to the terminal connected to the Serial A port. Note that you can use a 9-pin to 9-pin serial cable (HP F1044-80002) null-modem to connect a serial terminal or terminal emulator on a Personal Workstation or Laptop computer.
5. Set the monitor type and path using the Extensible Firmware Interface (EFI). For information on doing this see the chapter "System Configuration" in this document.

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# **A** **System Accessories**

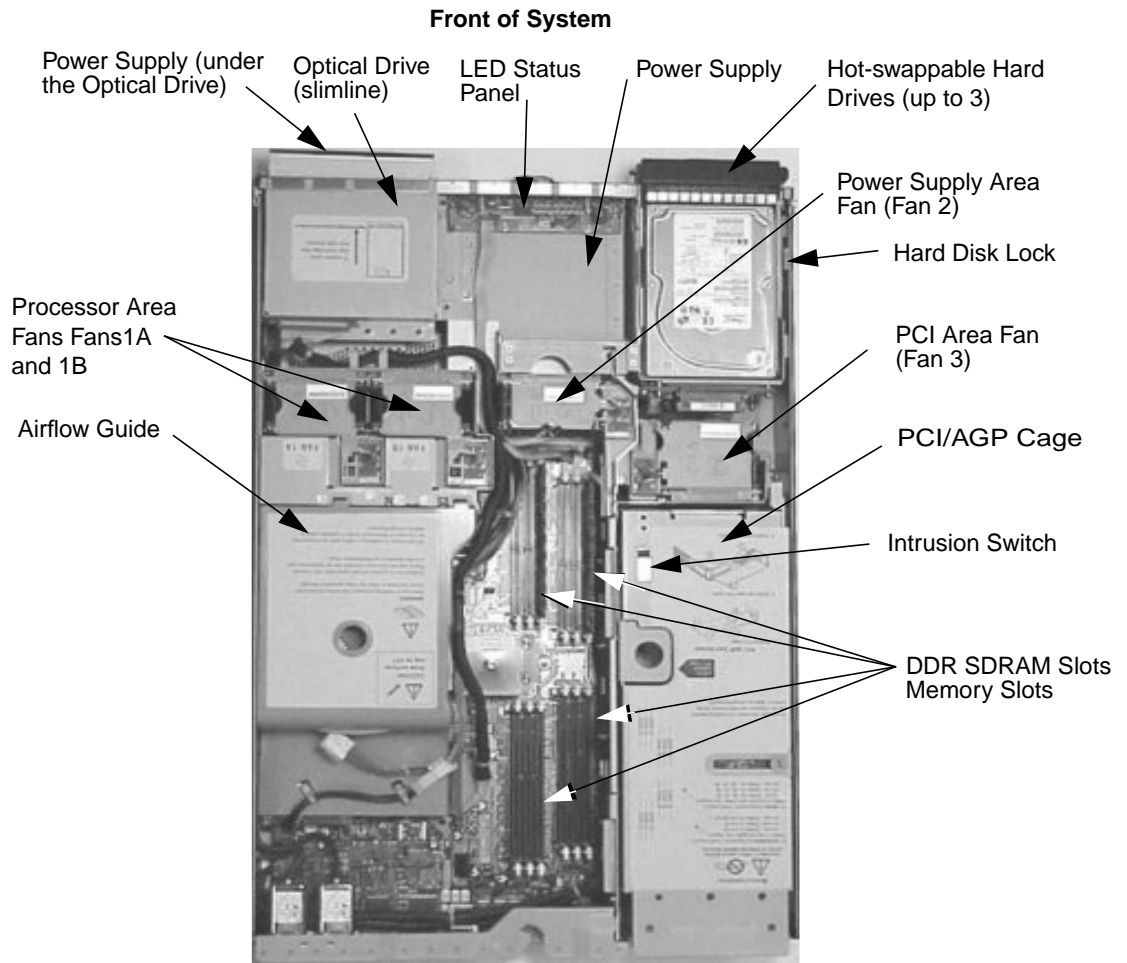
This appendix contains hardware components. Here are the topics covered:

- Component overview
- Graphics cards
- I/O cards
- Mass storage devices

## Component Overview

This section provides a view of the hardware components that make up your system. For a detailed description of your system's components and their part numbers, see Appendix C.

**Figure A-1** System Components



## Graphics Cards

Your zx6000 system supports the HP-UX and Linux operating systems. See Table A-1 for a list of the graphics cards you can install in your system.

If you install a graphics card but choose not to run the X Server there are several procedures you could use to prevent the X Server from being started automatically. Refer to the section “Management Card” in Chapter 3 for a detailed description on how to do this.

**Table A-1 Graphics Cards Available for Your System**

Type of Card	HP-UX	Linux
High End 3D	ATI FireGL 4	nVIDIA Quadro4 900XGL
Entry 3D		nVIDIA Quadro2 EX
Professional 2D	ATI Radeon 7000	ATI Radeon 7000

Here is the URL you can go to for more detailed information about your graphics card:

ATI Radeon 7000, FireGL 4 and FireGL 8800 — for more information, see:

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

nVIDIA Quadro4 900XGL and Quadro2 EX — for more information, see:

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

### ATI FireGL 4 Graphics Card

The ATI FireGL 4 graphics card’s main features include:

- Maximum system 2D/3D graphics performance
- Dual digital monitor support
- Ability to sustain two screens
- 128MB of DDR.

**Figure A-2 ATI FireGL 4 Graphics Card**



### **ATI Radeon 7000 Graphics Card**

The ATI Radeon 7000 graphics card's main features include:

- Double data rate memory, delivers enhanced 2D performance
- Adaptive per pixel de-interlacing process that reduces feathering or blurring artifacts

**Figure A-3**      **ATI Radeon 7000 Graphics Card**



## **nVIDIA Quadro4 900XGL Graphics Card (Linux and Windows)**

The nVIDIA Quadro4 900XGL graphics card's main features include:

- Hardware anti-aliased line engine
- Hardware overlay planes
- Two-sided lighting
- Full screen anti-aliasing
- Second-generation occlusion culling
- LMA II
- Display size is 2048×1536
- nfiniteFX II engine.

**Figure A-4**      **nVIDIA Quadro4 900XGL Graphics Card**

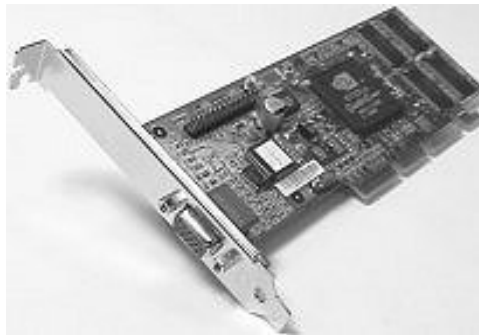


## **nVIDIA Quadro2 EX (Linux and Windows)**

The nVIDIA Quadro2 EX graphics card's main features include:

- AGP 4x with fast writes
- Low profile form factor card
- nv11 GPU at 175MHz
- 32MB SDRAM frame buffer at 166MHz
- Single VGA (DB-15) analog connector
- 350MHz RAMDAC with maximum resolution of 1920×1440 at 85Hz

**Figure A-5**      **nVIDIA Quadro2 EX Graphics Card**



### **3D features**

- Second-generation transform and lighting engines
- Dedicated graphics-specific GPU frees your Workstation's main processor for other tasks and provides faster transform and lighting processing
- nVIDIA shading rasterizer provides natural visual properties such as cloud, smoke, water, textiles, and plastic to images
- 32MB unified frame buffer allows the use of high-resolution 32bpp textures
- 32-bit Z/Stencil buffer eliminates polygon-popping problems in high-polygon 3D imaging



## Select a Monitor for your Graphics Card

The tables in this section provide a list of display resolutions and frequencies for the graphics cards supported by your system. Using these resolutions and frequencies you will be able to select the appropriate monitor for your graphics card. Note that frequencies of 85Hz and higher provide ergonomic flicker-free viewing.

If the monitor you select is DDC-2B or DDC-2B+ compliant, the graphics card will automatically limit itself to those resolutions and frequencies supported by that monitor. In this case, you do not need to use the tables in this section to select your monitor.

### CAUTION

To prevent possible damage to your monitor, make certain you select a monitor that supports the resolutions and frequencies you wish to use.

**Table A-2 Resolutions and Frequencies for the nVIDIA Quadro2 EX (Analog Monitors and DB-15 Connector; Linux)**

Graphics Card	Display Resolution <sup>a</sup>	Vertical Frequency (Hz) <sup>b</sup>
nVIDIA Quadro2 EX	640×480 800×600 1024×768 1280×1024 1600×1200 1920×1200 2048×1536	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240 60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240 60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240 60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170 60, 70, 72, 75, 85, 100, 120 60, 70, 72, 75, 85, 100 60, 70, 72, 75

a. Only common resolutions are listed. Other intermediate resolutions are possible.

b. The maximum frequency may not be available at all color depths.

**Table A-3 Resolutions and Frequencies for the nVIDIA Quadro4 900 XGL (Analog Monitors with DB-15 Connector; Linux)**

Graphics Card	Display Resolution <sup>a</sup>	Vertical Frequency (Hz) <sup>b</sup>
nVIDIA Quadro4 900XGL	640×480 800×600 1024×768 1152×864 1280×960 1280×1024 1600×900 1600×1200 1920×1080 1920×1200 2048×1536	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240 60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240 60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240 60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200 60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170 60, 70, 72, 75, 85, 100, 120, 140, 144, 150 60, 70, 72, 75, 85, 100, 120, 140, 144, 150 60, 70, 72, 75, 85, 100, 120 60, 70, 72, 75, 85, 100 60, 70, 72, 75, 85, 100 60, 70, 72, 75

a. Only common resolutions are listed. Other intermediate resolutions are possible.

b. The maximum frequency may not be available at all color depths.

**Table A-4 Resolutions and Frequencies for the nVIDIA Quadro4 900 XGL (Digital Monitors with DVI Connector; Linux)**

Graphics Card	Display Resolution <sup>a</sup>	Vertical Frequency (Hz)
nVIDIA Quadro4 900XGL	640×480	60
	800×600	60
	1024×768	60
	1152×864	60
	1280×960	60
	1280×1024	60
	1600×900	60
	1600×1200	60

a. Only common resolutions are listed. Other intermediate resolutions are possible.

**Table A-5 Resolutions and Frequencies for the ATI Radeon 7000 (Analog Monitor with DB-15 Connector; HP-UX and Linux)**

Graphics Card	Display Resolution <sup>b</sup>	Vertical Frequency (Hz) <sup>c</sup>
ATI Radeon 7000	640×480	60, 72, 75, 85, 90, 100, 120, 160, 200
	800×600	60, 70, 72, 75, 85, 90, 100, 120, 160, 200
	1024×768	60, 70, 72, 75, 85, 90, 100, 120, 140, 150, 160, 200
	1152×864	60, 70, 75, 80, 85, 90, 100, 120, 150, 160
	1280×1024	60, 70, 75, 85, 90, 100, 125, 130, 140
	1600×1200	60, 66, 70, 72, 75, 76, 85, 90, 100
	1792×1344	60, 75, 80, 85
	1920×1080	60, 70, 75, 80, 85, 90
	1920×1200	60, 72, 75, 76, 80, 85
	2048×1536	60, 66

a. Only common resolutions are listed. Other intermediate resolutions are possible.

b. Not all resolutions and frequencies are supported on all operating systems.

c. The maximum frequency may not be available at all color depths.

**Table A-6 Resolutions and Frequencies for the ATI Radeon 7000 (Digital Monitor with DVI Connector; HP-UX and Linux)**

Graphics Card	Display Resolution <sup>b</sup>	Vertical Frequency (Hz) <sup>c</sup>
ATI Radeon 7000	640×480	60, 75
	800×600	60, 75
	1024×768	60, 75
	1152×864	60, 75
	1280×960	60, 75
	1280×1024	60, 75
	1600×1000	60
	1600×1024	60
	1600×1200	60

- a. Only common resolutions are listed. Other intermediate resolutions are possible.  
b. Not all resolutions and frequencies are supported on all operating systems.  
c. The maximum frequency may not be available at all color depths.

**Table A-7 Resolutions and Frequencies for the ATI FireGL 4 (Analog Monitor with DB-15 Connector; HP-UX)**

Graphics Card	Display Resolution <sup>b</sup>	Vertical Frequency (Hz) <sup>c</sup>
ATI FireGL 4	1024×768	75, 85
	1280×1024	60, 75, 85
	1600×1024	75, 85
	1600×1200	75, 85
	1920×1080	75, 85
	1920×1200	75, 85

- a. Only common resolutions are listed. Other intermediate resolutions are possible.  
b. Not all resolutions and frequencies are supported on all operating systems.  
c. The maximum frequency may not be available at all color depths.

**Table A-8 Resolutions and Frequencies for the ATI FireGL 4 (Digital Monitor with DVI Connector; HP-UX)**

Graphics Card	Display Resolution <sup>b</sup>	Vertical Frequency (Hz) <sup>c</sup>
ATI FireGL 4	1024×768	75
	1280×1024	75
	1600×1024	75
	1600×1200	75

- a. Only common resolutions are listed. Other intermediate resolutions are possible.  
b. Not all resolutions and frequencies are supported on all operating systems.  
c. The maximum frequency may not be available at all color depths.

---

## I/O Cards

This section covers the I/O cards that are supported by the two operating systems. Table A-9 provides a matrix of the I/O cards that are supported by the three operating systems. For details on each of the I/O cards mentioned in Table A-9, read the subsequent section associated with the I/O card in which you are interested.

---

### NOTE

Hewlett-Packard has done extensive testing of PCI, PCI-X and AGP cards to ensure proper operation with this system. A full list of HP supported cards is available at

[http://www.hp.com/support/itanium\\_tpl](http://www.hp.com/support/itanium_tpl)

If you are considering using a non-supported card, please review the errata notices at:

[http://www.hp.com/support/itanium\\_ipf](http://www.hp.com/support/itanium_ipf)

These will inform you of any issues HP is aware of and help ensure that your system remains trouble free.

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**Table A-9**

**I/O Card Support Matrix**

I/O Card Names	HP-UX	Linux
10/100BT Ethernet	B5509BA	A5230A
Ultra 160 SCSI Single Port	A6828A	A7059A
GbE-TX (Copper)	A6825A	A7061A
Firewire	N/A	A8084A
Audio	A7784A	A7784A

## Ultra 160 SCSI Single Port Card

This card can connect to Low-Voltage Differential (LVD) SCSI devices (for example, Ultra 160/m) and Single-Ended (SE) SCSI devices (for example, Ultra SCSI, Fast SCSI, SCSI-1). Examples of SE devices include DAT drives, scanners, and older hard disk drives.

Here some features of the Ultra 160 SCSI card:

- Supports 64-bit, 66 MHz, bus master with zero wait states.
- Includes an on board flash ROM that allows bootability, configuration and field upgrades.

**Figure A-6** Ultra 160 Single Port SCSI Card



## 10/100BT Ethernet Card

The 10/100 BT Ethernet (A5230A and B5509BA) card has these features:

- Uses standard-based networking, such as, Intel® SingleDriver™ Technology and supports all major operating systems.
- Includes industry-leading performance, such as, 802.1 Intel® Priority Packet, 802.1Q VLANs, 802.3x Flow Control and Adaptive Technology.

**Figure A-7** 10/100BT Ethernet (A5230A) Card

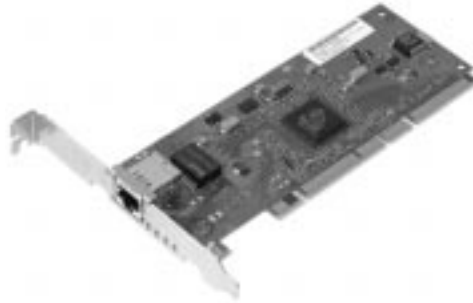


### **GbE-TX (Copper) Card**

The GbE-TX (Copper) card has these features:

- Provides high-performance networking to ISA systems, and lets users make the most of their systems.
- Complies with the IEEE 802.3 10BASE-T and 100BASE-TX standards.
- Provides auto-negotiation.
- Ensures compatibility with the operating systems.

**Figure A-8 GbE-TX (Copper) Card**



### **IEEE-1394 (Firewire) Card**

This new IEEE standard allows you to connect your workstation to digital peripheral devices, such as set-top boxes, camcorders, DVCRs, DTV, DVDs/CD-ROMs, printers, scanners, hard disk drives and cameras. You no longer have to deal with the conversion of digital signals to analog signals and then back again, thus losing the quality of your signal. Using the high speed IEEE-1394 card your signal can remain digital and be used directly by the devices previously mentioned. Figure A-9 shows an example of an IEEE-1394 card.

**Figure A-9 IEEE-1394 (Firewire) Card**



The Firewire card is capable of standard speeds of 100, 200 and 400 Megabits per second. This makes the Firewire card ideal for high-bandwidth multimedia applications, such as digital A/V equipment.

## Audio Card

The audio card provides these features:

- System beep.
- Stereo CD audio play from internal CD-ROM, CD-RW or DVD-ROM drive.
- API support, providing play from programmatic, file and streaming sources, as well as Line In and Mic port record.

**Figure A-10**      **Audio Card**



## Mass Storage Devices

You can find HP product numbers and replacement part numbers for mass storage devices in Appendix C of this document.

You can find information about available accessories at:

[www.hp.com/pcaccessories](http://www.hp.com/pcaccessories)

## Hard Disk Drives

Table 5-1 lists the 3.5-inch (1-inch high) hard disk drives (which are subject to change) that may be supplied with the workstation (type and quantity depends on model) on internal shelves, connected to the SCSI controller.

**Table A-10**      **SCSI Hard Disk Drives**

	SCSI (10 krpm)	SCSI (10 krpm)
Capacity	36.4GB	73.4GB
Interface	Ultra 160 SCSI	Ultra160 SCSI
Average seek time (read)	5.4ms	5.3ms
Track-to-Track Seek Time (read)	0.7ms	0.6ms
Full Stroke Seek Time (read)	10.2ms	9.6ms
Buffer size	—	—



## CD-RW drive

The CD-RW features include:

- CD-ROM data disk (Mode 1 and Mode 2)
- Photo-CD Multisession
- Video CD
- CD-DA
- CD-I FMW
- CD-ROM XA Mode 2 (Form 1 & 2)
- Enhanced CD (CD-Plus, CD-Extra, Pre-gap, Mixed)
- MPC III compliant
- Interface type: E-IDE/ATAPI, supports Ultra DMA 33
- DVD-ROM

Readable disks:

- CD/CD-ROM (12cm, 8cm)
- CD-R
- CD-RW
- DVD-ROM
- DVD-R
- DVD-RW
- DVD+RW

Writable disks:

- CD-R
- CD-RW

	Description
Write/Read Speed	Write (CD-R) 2× to 8× Write (CD-R/W) 2× CD-ROM Read 24× (maximum) DVD Read 8× (read only) DVD-RAM 4× (read only) DVD+RW 4× (read only)
Data capacity	650MB or up to 74 minutes of audio per disc 700MB or up to 80 minutes of audio per extended disk 547MB in CD-UDF data format
Data transfer rate (max.)	600 KB/sec, 3600KB/sec (CD), 10,800KB (DVD)
Access Time	< 100ms
Loading Type	Manual tray
Mounting Type	Horizontal or Vertical
Data Buffer Capacity	2 MB
Rotation Method	- Constant Angular Velocity (CAV) - Constant Linear Velocity
Reliability	MTBF 60,000 POH

## DVD-ROM drive

The DVD-ROM drive features include:

- Supported CD-ROM formats:
  - CD-ROM Mode 1 and 2 data disk
  - Photo-CD Multisession
  - CD Audio disk
  - Mixed mode CD-ROM disk (data and audio)
  - CD-ROM XA, CD-I, CD-Extra, CD-R, CD-RW
- Supported DVD-ROM formats:
  - DVD-ROM
  - DVD-R (4.7GB/3.9GB)
  - DVD-RAM (4.7GB/2.6GB)
  - DVD-RW
  - DVD+RW
- Interface: E-IDE/ATAPI, Support Ultra DMA 33.

	Description
Data Capacity: Capacity DVD-ROM	Up to 8.5 GB/side
Capacity DVD-RAM	4.7 GB/side
Capacity DVD-R	4.7 GB/side
Capacity CD	650 MB
Data Transfer Rate	8× (maximum) DVD 24× (maximum) CD-ROM 4× (maximum) DVD-RAM 4× (maximum) DVD+RW
Loading Type	Manual tray
Access Time	120ms (DVD) 90ms (CD-ROM) 210ms (DVD-RAM)
Data Buffer Capacity	256 KB
Acoustic Noise	45 dB
Reliability	MTBF 60,000 POH

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## **B** **System Board**

This chapter provides an overview of the system board, and it gives a description of key components on the system board and some of their features. Here are the topics covered:

- System Board Overview
- System Board Components
- Chip Spare Functionality

## System Board Overview

This section provides a view of the system board and its block diagram. The subsequent sections provide a brief description of the main chips that are on the system board and shown in the system board's block diagram.

**Figure B-1** System Board

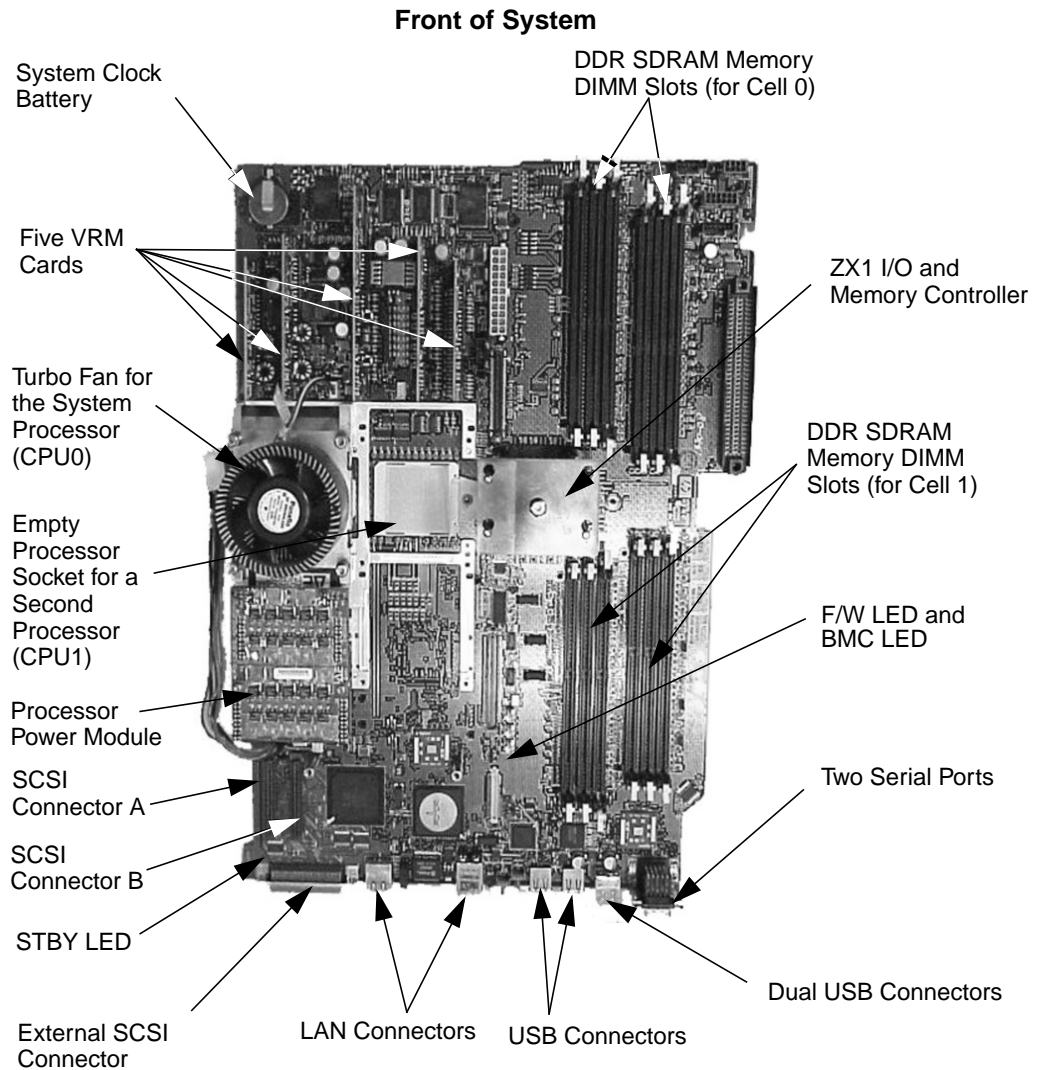
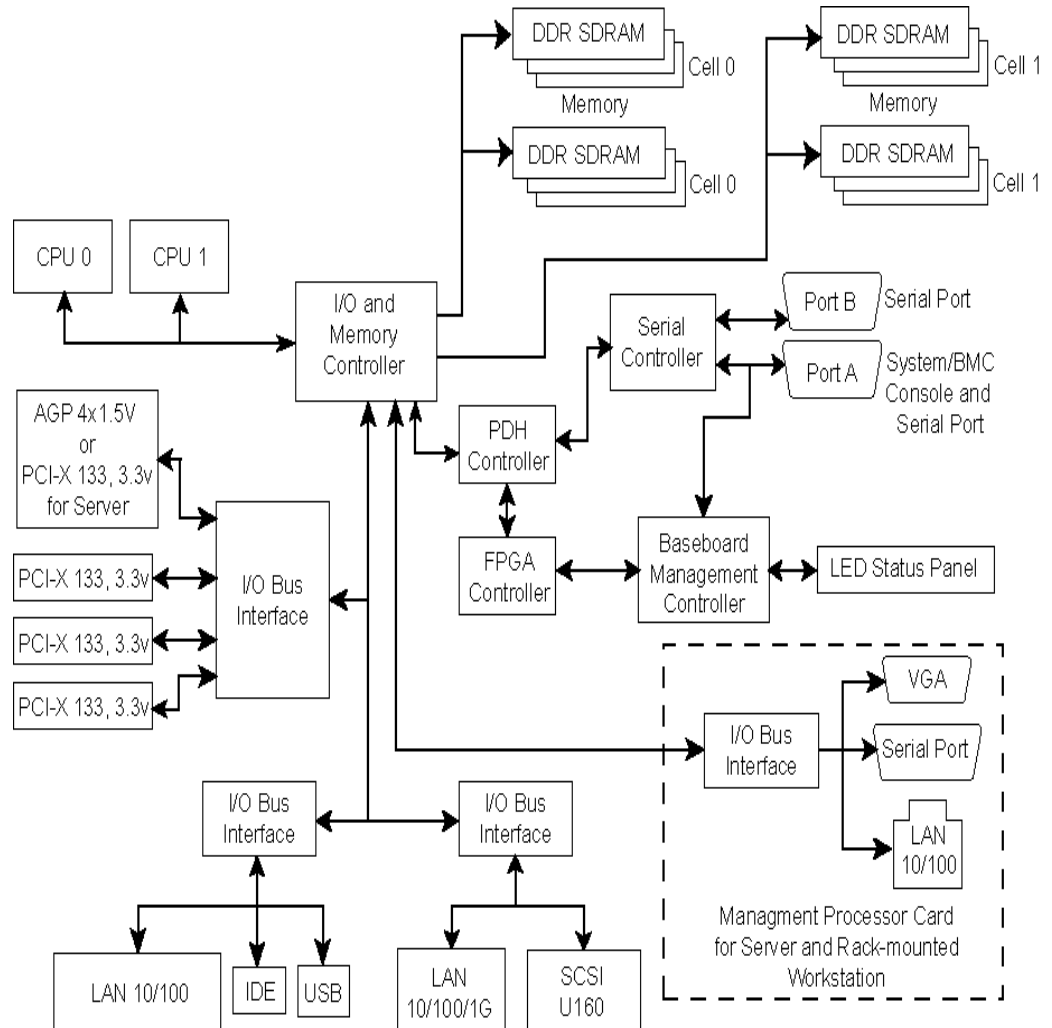


Figure B-2 provides a block diagram of the system boards main chips.

**Figure B-2** **Block Diagram of the System Board**



## System Board Components

This section covers the main components (chips) that make up the system board.

### Overview of System Board Components

Here is a list of those components.

- Processor
- I/O and Memory Controller
- I/O Bus Interface
- Processor Dependent Hardware Controller
- Dual Serial Controller
- Field Processor Gate Array Controller
- Baseboard Management Controller
- SCSI Controller
- IDE Interface
- 10/100BT Standard/Management LAN

Before you start reading about the system components listed above, you should be familiar with the term *ropes*.

Here is a brief description of *ropes* as related to the system board's architecture. Ropes are associated with the I/O and memory controller chip and are used as buses for I/O devices and expandability. The I/O devices have:

- One rope that provides the PCI 66MHz/64bit bus for the core 1GB LAN and U320 SCSI
- One rope that provides the PCI 33MHz/32-bit bus for the I/O connections, such as USB, IDE and 100MB LAN.

For the ropes that provide expandability, there is/are:

- One rope that connects to the Management Processor card.
- Five ropes that are connected to the PCI-AGP riser.

The PCI and AGP risers use single ropes for three PCI-X 133 slots and one double for either the AGP 4× slot or an additional PCI-X 133 slot. The slots behind a single rope are limited to the 533MB/second maximum bandwidth.

## Intel® Itanium® 2 Processor

The Intel® Itanium® 2 processor provides the following features:

- 8-stage pipeline, general purpose ALU, two integer units, one floating-point unit
- L0 cache split instruction and data L0 caches:
  - Instruction cache: 16k, 4-way associative, data cache: 16k, 4-way associative
  - 64-byte line size
  - 57.6 GB/sec read bandwidth at 900 MHz (28.8 GB/sec for floating-point double precision)
- L2 cache unified instruction and data L1 cache:
  - 3 MB, 12-way associative (1.5MB with 900MHz processor)
  - 128-byte line size
  - Virtual/Physical addressing 64-bit virtual address
  - 50-bit physical address

Note that you may install up to two processors in your system.

### Processor Bus

The Intel® Itanium® 2 processor bus (Front Side Bus, FSB) in this product is qualified to run at 200 MHz. Data on the FSB is transferred at a double data rate, which allows a peak FSB bandwidth of 6.4 GB/sec.

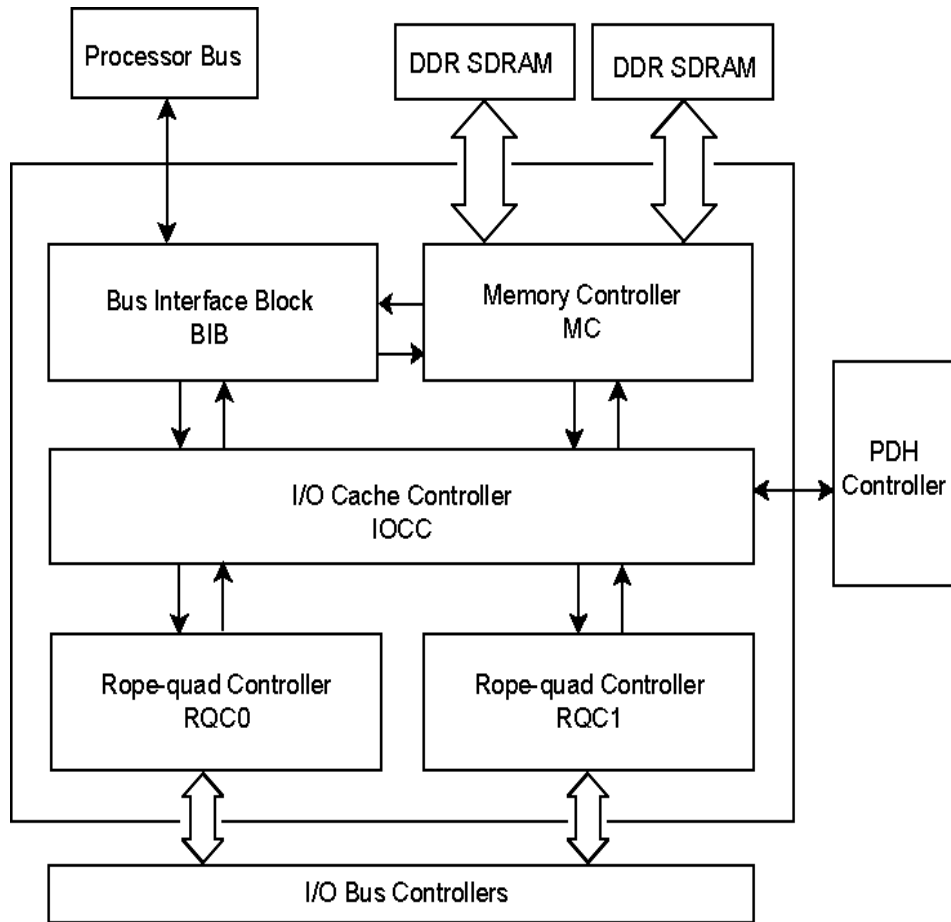
### ZX1 I/O and Memory Controller

The ZX1 I/O and memory controller chip provides eight I/O ropes that support PCI, PCI-X and/or AGP via this chip. This controller chip supports a direct data path between I/O and main memory without crossing the processor bus. The peak I/O bandwidth is 4GB/second.

The ZX1 I/O and memory controller chip provides two memory cells, each consisting of 144-bit data buses. The DDR bus is transferred at a double data rate, which provides a peak bandwidth of 8GB/sec at an extremely low latency (approximately 70nS for an idle system, open page access).

This controller supports rope expander chips that sits on one or more of the ZX1 I/O and memory controller's ropes, which are in a double-wide configuration. The ZX1 I/O and memory controller chip controls two sets of four ropes that can be configured as either single-wide, double-wide or quad-wide. The bandwidth that is supplied by the host rope is shared by the four guest ropes.

**Figure B-3 ZX1 I/O and Memory Controller**





The ZX1 I/O and memory controller is partitioned into five major components:

**Table B-1 Five Major Components of the ZX1 I/O and Memory Controller**

Bus Interface Bloc (BIB)	This block provides the interface between the processor's bus and the memory controller (MC) and the I/O cache controller (IOCC) blocks of this chip.
Memory Controller (MC)	This block provides the interface between the main memory and the bus interface block. This controller provides the lowest idle system latency.
I/O Cache Controller (IOCC)	This block is responsible for taking Direct Memory Access request generated for the Rope-Quad Controller and issuing them either to the process bus or directly to the memory controller.
Rope-quad Controller (RQC)	This block provides an interface between the IOCC and up to four I/O ropes. The ropes it controls can be bundled as single-wide, double-wide or quad-wide bundles. The rope-quad controller provides the "pre-rope" functionality such as error detection, prefetching, flushing and side-band address decoding.
Clocking	The clock for the BIB and the majority of the I/O blocks are derived from the main processor bus clock. This is referred to as the "bclk" or the bus clock domain. Each of the I/O rope interfaces have two independent clock domains, one for outgoing data and one for incoming data. The source for the outgoing clock domain is programmatically selected from one of two clock sources. The expected rope frequencies are 266MHz, 200MHz, 133MHz and 100MHz. The two clocks are internally fabricated by multiplying two separate external clock sources by eight or sixteen to derive the desired frequencies. The source for the incoming I/O clock domain is the incoming "istrb" signal for that rope. The "istrb" signal is allowed to be asynchronous relative to the outgoing clock signal (ostrb).

## **I/O Bus Interface**

The I/O bus interface provides these features:

- Provides industry standard AGP 1× and 2× support for legacy graphics, or AGP 4× support for future high performance graphics.
- Provides features to enable use in HP-UX systems. It can also support PA RISC/HP-UX systems by including virtual index.
- Provides a 64-bit data width.
- Uses 3.3V PCI only, and it does not support 5V PCI.
- Optimizes for DMA performance.
- Supports AGP fast writes (only to addresses less than 4GB).
- Uses peer-to-peer (P2P) subset that is required by the AGP specification (write-only, PCI cycles).
- Supports up to six PCI slots and 10 wire interrupts.

## **Processor Dependent Hardware Controller**

The processor dependent hardware controller (PDH) provides these features:

- Simple seven-bit, point-to-point bus interface
- 16-bit PDH bus with reserved address space for:
  - Flash memory
  - Non-volatile memory
  - Scratch RAM
  - Real Time Clock
  - UARTs
  - External Registers
  - Firmware read/writable registers
  - Two general purpose 32-bit registers
  - Semaphore registers
  - Monarch selection registers
  - Test and Reset register
- Reset and INIT generation

## Dual Serial Controller

The dual serial controller is an EXAR ST16C2550 compatible dual universal asynchronous receiver and transmitter (DUART). This chip provides enhanced UART functions with 16-byte FIFO's, a modem control interface and data rates up to 115.2kbps. There are registers located on this chip that provide onboard error indications and operation status. There is also an internal loopback capability that allows onboard diagnostics.

Here are the features provided by this dual serial controller chip:

- Data rates of 115.2kbps with an external clock of 1.8432MHz (fully 16550A compatible).
- A 16-byte transmit FIFO to reduce the bandwidth requirement of the external CPU
- A 16-byte receive FIFO with error flags to reduce the bandwidth requirement of the external CPU
- UART control that provides independent transmit and receive
- A Receive FIFO with four selectable interrupt trigger levels
- Modem control signals (-CTS, -RTS, -DSR, -DTR, -RI, -CD, and software controllable line break)
- Programmable character lengths (5, 6, 7, 8) with Even, Odd or No Parity
- A status report register

## Field Programmable Gate Array

The field programmable gate array (FPGA) provides ACPI and LPC support for HP's Intel® Itanium® 2 platforms based on HP chipsets. This controller is connected to the PDH bus and provides these features:

- ACPI 2.0 interface
- LPC bus interface to support BMC
- Decoding logic for PDH devices

## Baseboard Management Controller

The baseboard management controller supports the industry-standard Intelligent Platform Management Interface (IPMI) specification. This specification describes the management features that have been built into the system board. These features include: diagnostics, both local and remote, console support, configuration management, hardware management and troubleshooting.

The baseboard management controller provides the following:

- Compliance with Intelligent Platform Management Interface 1.0
- Tachometer inputs for fan speed monitoring
- Pulse width modulator outputs for fan speed control
- Push-button inputs for front panel buttons and switches
- One serial port, multiplexed with the system console port
- Remote access and intelligent chassis management bus (ICMB) support
- Three I2C master/slave ports (one the ports is used for IPMB)
- Low pin count (LPC) bus provides access to three keyboard controller style (KCS) and one-block transfer (BT) interface
- 32-bit ARM7 RISC processor
- 160-pin low profile flat pack (LQFP) package
- Firmware is provided for the following interfaces:
  - Intelligent platform management interface (IPMI)
  - Intelligent platform management bus (IPMB)

## SCSI Controller

The SCSI controller is an LSI Logic 53C1030 chip. This chip is fully compliant with the SCSI Peripheral Interface-4 Specification (SPI-4). The 53C1030 adheres to the PCI-X addendum to the PCI Local Specification and is hard-wired to PCI ID 1 which corresponds to bit 17 of the PCI AD bus.

## IDE Interface

The IDE interface provides the support for an internal CD R/W or a DVD reader through an internal IDE connector and cable. This interface supports the master capability.

The IDE controller (PCI649) supports the ATAPI zero (0) to five (5) modes (from 16 to 100MB/s). The usable speed on this system is limited to 16MHz (ATA-33 mode, 33MB/s) because the slimline CD/DVD devices do not support the ATA-66 and 100 modes.

The primary IDE channel is the only channel that is implemented. The IDE cable provides only one drive connector, of the Master type, for the optical storage peripheral. This cable is sliced into ten segments each consisting of eight wires. Note that no more than three signal wires exist per octet with a ground or power cable always on the outside, so that signal wires are always located between ground and power cables. Signal assignments through the IDE cables wires have been assigned to reduce potential crosstalk and optimize signal integrity.

## 10/100BT Standard/Management LAN

The 10/100 LAN port provides: some It mainly provides The 10/100 LAN port also provides:

- Basic remote manageability features on the core system.
- A management LAN interface for operating system level manageability applications such as Tiptools.

The LAN controller is an Intel® 82550 chip.

Power-On-LAN is an additional feature that the LAN controller provides. Power-On-LAN allows you the ability to power up a system remotely through the LAN by sending special LAN packets to the system to be powered on.

## Chip Spare Functionality

Chip spare enables an entire DDR SDRAM chip on a DIMM to be bypassed/replaced in the event that a multi-bit error is detected on the DDR SDRAM. In order to use the chip spare functionality on your system, only DIMMs built with ×4 DDR SDRAM parts can be used, and these DIMMs must be loaded in quads (two DIMMs per memory cell, loaded in the same location in each memory cell and according to the following sequence).

This is the location of the PCI card cage (reference point).

Loading Order	Memory Cell 0	Memory Cell 1	Loading Order
1st	DIMM 0B	DIMM 1B	2nd
5th	DIMM 4B	DIMM 5B	6th
3rd	DIMM 2B	DIMM 3B	4th
1st	DIMM 0A	DIMM 1A	2nd
5th	DIMM 4A	DIMM 5A	6th
3rd	DIMM 2A	DIMM 3A	4th

Using the DIMM loading order shown above, chip spare can be achieved if four identical DIMMs are loaded in the slots labeled “1st” and “2nd” found in each memory cell. If more DIMMs are added to the example case, four identical DIMMs (identical to each other, but can be different from the original quad that was loaded) must be loaded in the slots labeled “3rd” and “4th” and finally four identical DIMMs (identical to each other, but can be different from the original quad that was loaded) must be loaded in the slots labeled “5th” and “6th.”

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## **C** **Service Information**

This appendix contains an overview of system accessories, an exploded view of the workstation components and a components parts list.

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## HP zx6000 and rx2600 Accessories

This section provides a list of supported accessories for the workstation.

### zx6000 Supported Accessories

**Table C-1 Supported Processor**

Intel® Itanium® 2, 900MHz	A7845A OD1
Intel® Itanium® 2, 1.0GHz	A7848A OD1

**Table C-2 Memory Upgrades**

512MB PC2100 DDR-SDRAM	A7840A OD1
1.0GB PC2100 DDR-SDRAM	A7841A OD1
2.0GB PC2100 DDR-SDRAM	A7842A OD1

**Table C-3 Mass Storage — Hard Disk Drives**

36GB Ultra160 SCSI HotPlug Disk	A7835A OD1
36GB Ultra320 SCSI HotPlug Disk	A7836A OD1
73GB Ultra160 SCSI HotPlug Disk	A7837A OD1

**Table C-4 Optical Drives**

DVD+ROM 8× slimline	A7850A OD1
CD-RW 12×/8× slimline	A7851A OD1

**Table C-5 Graphics Cards**

ATI FireGL 4	A7226A OD1
ATI FireGL 8800	A8050A OD1
ATI Radeon 7000	A8049A OD1
nVida Quadro4 900XGL	A8064A OD1
nVida Quadro2 EX	A7806A OD1

**Table C-6 I/O Cards**

Ultra 160 SCSI Single Port	A6828A OD1
Ultra 160 SCSI Dual Port	A6829A OD1
IEEE 1394 OHCI/ Firewire Card	A8048A OD1
10/100 BT Ethernet	P3492A OD1
10/100 BT Ethernet	A5230A OD1



**Table C-6 I/O Cards (Continued)**

GbE-TX (Copper)	A6825A OD1
GbE-SX (Fibre)	A6847A OD1
2Gb Fibre Channel Single Port	P5455A OD1
2Gb Fibre Channel Double Port	A6795A OD1
100 BT Four Port	A5506B OD1
HVD SCSI Dual Port	A5159A OD1
Audio Card	A7784A OD1

**rx2600 Supported Accessories**

**Table C-7 Supported Processor**

Intel® Itanium® 2, 900MHz	A6957A OD1
Intel® Itanium® 2, 1.0GHz	A6958A OD1

**Table C-8 Memory Upgrades**

1.0GB PC2100 DDR-SDRAM	A6833A OD1
2.0GB PC2100 DDR-SDRAM	A6746A OD1
4.0GB PC2100 DDR-SDRAM	A6834A OD1

**Table C-9 Mass Storage — Hard Disk Drives**

36GB Ultra160 SCSI HotPlug Disk	A6980A OD1
36GB Ultra320 SCSI HotPlug Disk	A6981A OD1
73GB Ultra160 SCSI HotPlug Disk	A6982A OD1

**Table C-10 Optical Drives**

DVD+ROM 8× slimline	A6985A OD1
CD-RW 12×/8× slimline	A6986A OD1

**Table C-11 I/O Cards**

Ultra 160 SCSI Dual Port	A6829A OD1
2 Port X.25/Frame Relay/SDLC Interface Card	J3525A OD1
10/100 BT Ethernet	P3492A OD1
10/100 BT Ethernet	B5509BA OD1
GbE-TX (Copper)	A6825A OD1
GbE-SX (Fibre)	A6847A OD1
100 BT Four Port	A5506B OD1

**Table C-11 I/O Cards (Continued)**

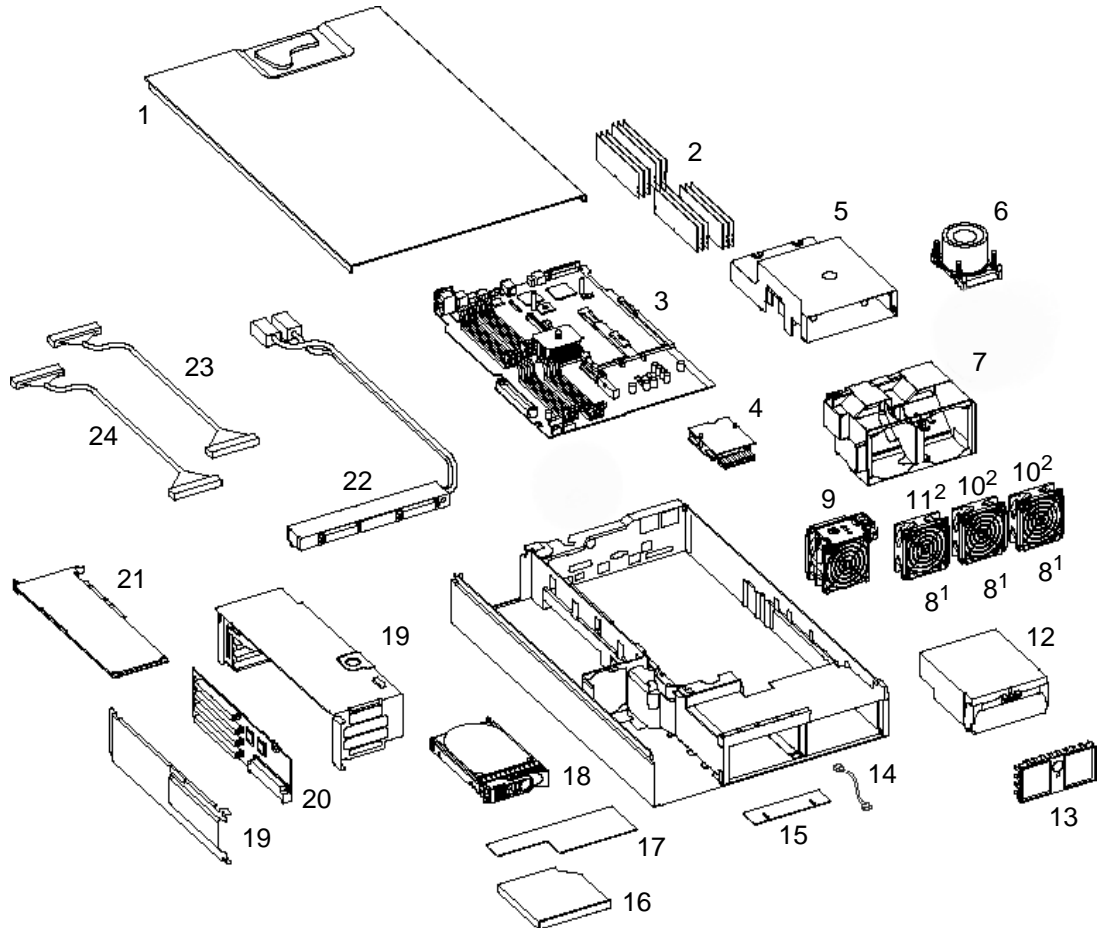
HVD SCSI Dual Port	A5159A OD1
Audio Card	A7784A OD1

## Exploded View and Part Numbers

The subsequent sections provide an exploded view of the zx6000 and rx2600 parts and a list of their part numbers.

### zx6000 Exploded View and Parts List

**Figure C-1** Exploded View of the zx6000 Parts



1. These fans are to be used only with the zx6000 tower system.
2. These fans are to be used only with the zx6000 rack-mounted system.

**Table C-12 HP zx6000 Parts List**

Item	Description	Replacement Part Number	Exchange Part Number
<b>System Components</b>			
3	zx6000 System Board	A7231-66010	A7231-69010
20	AGP Board	A7231-66540	N/A
22	Power Supply Interface Module	A7231-04018	N/A
N/A	SCSI Backplane	A7231-66520	A7231-69520
15	Status Panel	A7231-66550	N/A
<b>Processor</b>			
6	Intel® Itanium® 2, 900 MHz	A7231-62009	A7231-69009
6	Intel® Itanium® 2, 1.0 GHz	A7231-62013	A7231-69013
N/A	Processor Tool	A7231-04046	N/A
<b>Hard Disk Drive</b>			
18	36GB Ultra 160 SCSI Drive 10.0K rpm	A7835-64001	A7835-69001
18	36GB Ultra 160 SCSI Drive 15.0K rpm	A7836-64001	A7836-69001
18	73GB Ultra 160 SCSI Drive 10.0K rpm	A7837-64001	A7837-69001
<b>Memory</b>			
2	256MB PC2100 DDR-SDRAM	A6833-60001	A6833-69001
2	512MB PC2100 DDR-SDRAM	A6746-60001	A6746-69001
2	1.0GB PC2100 DDR-SDRAM	A6834-60001	A6834-69001
<b>Power Supply</b>			
12	600W Power Supply-AC	0950-4119	A6874-69001
4	Processor Power Module	0950-4294	N/A
<b>Graphics Cards</b>			
21	ATI FireGL 4	A7226-60520	A7226-69520
21	ATI FireGL 4 DVI-I to DB15 Cable	A6046-63001	N/A
21	ATI Radeon 7000	A8049-60510	A8049-69510
21	nVIDIA Quatro2 EX	A7806-60510	A7806-69510
21	nVIDIA Quatro4 900XGL	A8064-60510	A8064-69510
<b>I/O Cards</b>			
21	10/100BT Ethernet (P3492A)	P3492-63000	N/A

**Table C-12 HP zx6000 Parts List (Continued)**

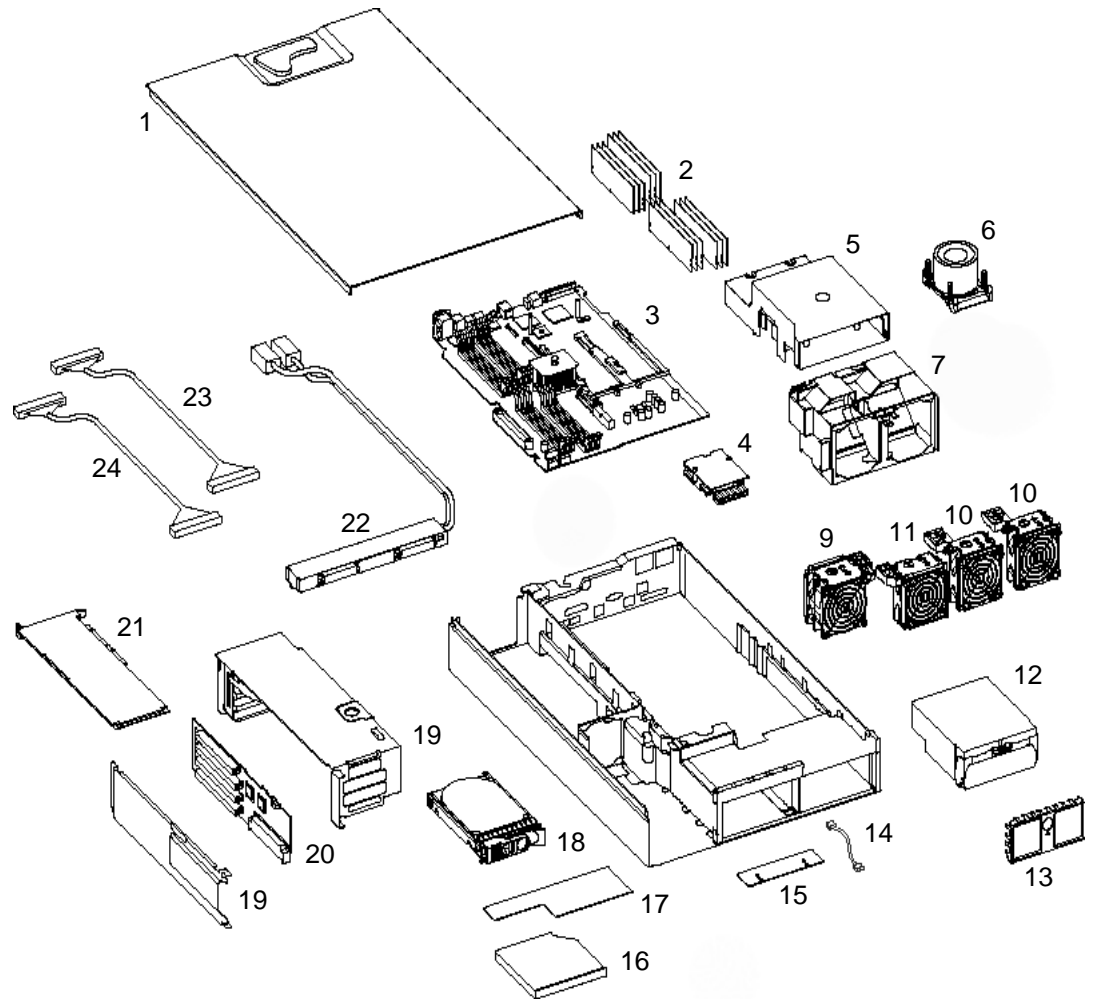
<b>Item</b>	<b>Description</b>	<b>Replacement Part Number</b>	<b>Exchange Part Number</b>
21	100BT Ethernet	B5509-66001	N/A
21	Ultra160 SCSI Dual Port	A6829-60001	N/A
21	GbE-TX (Copper)	A6825-67001	N/A
21	GbE-SX (Fibre)	A6847-60001	N/A
21	100BTX Four Port	A5506-60102	A5506-68101
21	HVD SCSI Dual Port	A5159-60001	N/A
21	Firewire	5185-8203	N/A
21	Audio Card	A7784-60501	N/A
17	Management Card	A7231-66580	A7231-69580
<b>Fans</b>			
10	Super 80mm fan (zx6000 rack)	A7231-04014	N/A
11	Thin 80mm fan (zx6000 rack)	A7231-04015	N/A
9	Dual fan (zx6000 tower and rack)	A7231-04033	N/A
8	Standard 80mm fan (zx6000 tower)	A7231-04017	N/A
<b>Cables</b>			
N/A	IDE Cable	A7231-63002	N/A
23	SCSI Cable A	A7231-63017	N/A
24	SCSI Cable B	A7231-63018	N/A
14	Status Panel Cable	A7231-63003	N/A
N/A	Audio Cable	8121-4373	N/A
N/A	Disk Power Cable	A7231-63004	N/A
N/A	Single Channel Ultra 160 SCSI Adapter	A6828-60001	N/A
N/A	80mm Fan Cable	A7231-63006	N/A
N/A	Super 80mm Fan Cable	A7231-63005	N/A
N/A	DVI-I to DB15, Converter Dongle	A6064-63001	N/A
<b>Plastic Covers/Metal Latches and Chassis</b>			
N/A	Right-side Rack Latch	A7231-04023	N/A
N/A	Right-side Rack Bezel (carbon)	A7231-04038	N/A
N/A	Left-side Rack Bezel (carbon) and Latch	A7231-04039	N/A
N/A	Optical Drive Blank (carbon)	A7231-40027	N/A
N/A	Hard Disk Drive Blank (carbon)	A6198-60003	N/A

**Table C-12 HP zx6000 Parts List (Continued)**

<b>Item</b>	<b>Description</b>	<b>Replacement Part Number</b>	<b>Exchange Part Number</b>
1	System Cover	A7231-04003	N/A
N/A	Rack Nameplate	A7231-40032	N/A
5	Main Airflow Guide (plastic)	A7231-04034	N/A
7	Front Half of the Airflow Guide (metal)	A7231-04004	N/A
19	PCI/AGP Cage	A7231-04006	N/A
<b>Tower and Rack Kit for the zx6000</b>			
N/A	Tower Pedestal	A7231-04028	N/A
N/A	Tower Pedestal Covers	A7231-04041	N/A
N/A	Tower Front Panel	A7231-40040	N/A
N/A	Tower Top Cover	A7231-40036	N/A
N/A	Tower Nameplate	A7231-40039	N/A
N/A	Rack Standard Slide, Middle Weight	5064-9670	N/A
N/A	Rack Cable Management Arm	5065-5963	N/A
<b>Optical Devices</b>			
16	DVD-ROM Drive, Slimline (carbon)	A7231-64005	A7231-69005
16	CD-RW/DVD-ROM Drive, Slimline (carbon)	A7851-64001	A7851-69001

## rx2600 Exploded View and Parts List

Figure C-2 Exploded View of the rx2600 Parts



**Table C-13 HP rx2600 Parts List**

Item	Description	Replacement Part Number	Exchange Part Number
<b>System Components</b>			
3	rx2600 System Board	A7231-66510	A7231-69510
20	PCI Board	A7231-66530	N/A
22	Power Supply Interface Module	A7231-04018	N/A
N/A	SCSI Backplane	A7231-66520	A7231-69520
15	Status Panel	A7231-66550	N/A
<b>Processor</b>			
6	Intel® Itanium® 2, 900 MHz	A7231-62009	A7231-69009
6	Intel® Itanium® 2, 1.0 GHz	A7231-62013	A7231-69013
N/A	Processor Tool	A7231-04046	N/A
<b>Hard Disk Drive</b>			
18	36GB Ultra 160 SCSI Drive 10.0K rpm	A6980-64001	A6980-69001
18	36GB Ultra 160 SCSI Drive 15.0K rpm	A6981-64001	A6981-69001
18	73GB Ultra 160 SCSI Drive 10.0K rpm	A6982-64001	A6982-69001
<b>Memory</b>			
2	256MB PC2100 DDR-SDRAM	A6833-60001	A6833-69001
2	512MB PC2100 DDR-SDRAM	A6746-60001	A6746-69001
2	1.0GB PC2100 DDR-SDRAM	A6834-60001	A6834-69001
<b>Power Supply</b>			
12	600W Power Supply-AC	0950-4119	A6874-69001
4	Processor Power Module	0950-4294	N/A
<b>I/O Cards</b>			
21	10/100BT Ethernet (P3492A)	P3492-63000	N/A
21	10/100BT Ethernet (A5230A)	B5509-66001	N/A
21	Ultra160 SCSI Dual Port	A6829-60001	N/A
21	GbE-TX (Copper)	A6825-67001	N/A
21	GbE-SX (Fibre)	A6847-60001	N/A
21	100BTX Four Port	A5506-60102	A5506-69101
21	HVD SCSI Dual Port	A5159-60001	N/A
17	Management Card	A7231-66580	A7231-69580



**Table C-13 HP rx2600 Parts List (Continued)**

<b>Item</b>	<b>Description</b>	<b>Replacement Part Number</b>	<b>Exchange Part Number</b>
<b>Fans</b>			
10	Super 80mm fan (rx2600 tower and rack)	A7231-04014	N/A
11	Thin 80mm fan (rx2600 tower and rack)	A7231-04015	N/A
9	Dual fan (rx2600 tower and rack)	A7231-04033	N/A
<b>Cables</b>			
N/A	IDE Cable	A7231-63002	N/A
23	SCSI Cable A	A7231-63017	N/A
24	SCSI Cable B	A7231-63018	N/A
14	Status Panel Cable	A7231-63003	N/A
N/A	Audio Cable	8121-4373	N/A
N/A	Disk Power Cable	A7231-63004	N/A
N/A	Single Channel Ultra 160 SCSI Adapter	A6828-60001	N/A
N/A	80mm Fan Cable	A7231-63006	N/A
N/A	Super 80mm Fan Cable	A7231-63005	N/A
N/A	DVI-I to DB15, Converter Dongle	A6064-63001	N/A
<b>Plastic Covers/Metal Latches and Chassis</b>			
N/A	Right-side Rack Latch	A7231-04023	N/A
N/A	Right-side Rack Bezel (grey)	A7231-04025	N/A
N/A	Left-side Rack Bezel (grey) and Latch	A7231-04030	N/A
N/A	Optical Drive Blank (grey)	A7231-40026	N/A
N/A	Hard Disk Drive Blank (grey)	A6198-60002	N/A
1	System Cover	A7231-04003	N/A
N/A	Management Cover Plate	A7231-00072	N/A
5	Main Airflow Guide (plastic)	A7231-04034	N/A
7	Front Half of the Airflow Guide (metal)	A7231-04004	N/A
19	PCI/AGP Cage	A7231-04006	N/A
N/A	Rack Nameplate	A7231-40003	N/A
N/A	Tower Nameplate	A7231-40025	N/A
<b>Tower and Rack Kit for the zx6000</b>			
N/A	Tower Pedestal	A7231-04028	N/A
N/A	Tower Covers	A7231-04036	N/A

**Table C-13 HP rx2600 Parts List (Continued)**

<b>Item</b>	<b>Description</b>	<b>Replacement Part Number</b>	<b>Exchange Part Number</b>
N/A	Tower Front Panel	A7231-40026	N/A
N/A	Tower Top Cover	A7231-40021	N/A
N/A	Rack Standard Slide, Middle Weight	5064-9670	N/A
N/A	Rack Cable Management Arm	5065-5963	N/A
<b>Optical Devices</b>			
16	DVD-ROM Drive, Slimline (grey)	A7231-64005	A7231-69005
16	CD-RW/DVD-ROM Drive, Slimline (grey)	A7851-64001	A7851-69001

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## **D** **Event, Error and Warning Messages**

This appendix contains event, error and warning information for the zx6000 and rx2600 systems. Here are the topics covered:

- EFI Error and Warning Messages
- IPMI Event Messages
- Sensor Data Record Repository (SDRR)

## EFI Error and Warning Messages

This section provides the EFI error and warning messages for your system. includes the error number, error or warning message and a solution if available.

**Table D-1**      **EFI Error and Warning Messages**

Error Number	Error/Warning Message	Solution
0	Error initializing LDB	—
2	Insufficient resources to assign to one or more I/O devices	—
3	Failed I/O slot(s) deconfiguration	—
4	Unexpected hardware I/O configuration	—
7	No BMC installed in platform	Ensure the BMC ROM is installed; update BMC firmware
8	BMC cannot be accessed	Check BMC logs for errors
9	One or more BMC ports failed	—
10	BMC system event log is full	Clear SEL
11	Platform Scr is bad	—
12	Set time to BMC SEL failed	—
13	SEL get info failed	—
14	Initial BMC SEL event failed	—
15	Update of BMC buffered data failed	—
16	All ACPI BMC ports bad	—
17	Read error on BMC token	—
18	BMC token transmit checksum error	—
19	Error writing BMC token on download	—
20	NVM token access error	—
21	BMC token write error during NVM write through	—
22	Error reading BMC token on upload to NVM	—
23	Error reading BMC first boot token	—
24	Primary fit failed	Reflash firmware
25	Secondary fit failed	Reflash firmware
26	PAL_A warning. One copy of PAL is bad	—

**Table D-1 EFI Error and Warning Messages (Continued)**

<b>Error Number</b>	<b>Error/Warning Message</b>	<b>Solution</b>
27	PAL_B warning. Not compatible with at least one CPU	—
28	Memory errors detected and PDT is disabled	—
30	Memory required reinterleave to get a good page 0	—
31	One or more ranks have chip spare disabled	—
33	One or more memory ranks are mismatched and deallocated	—
34	Memory deallocated because of a loading error	—
35	Memory is not loaded recommended loading order	—
36	The PDT is full	Clear with <code>pdt clear</code> command in EFI shell
37	At least one (1) CPU has bad fixed core ratio	—
38	All CPUs were slated for compatibility deconfig	—
39	Incompatible CPUs detected	—
40	CPUs installed with mixed cache sizes	<b>This will always cause a stopboot.</b>
41	CPUs installed with mixed steppings	—
42	All CPUs are over clocked	—
43	At least one (1) CPU is over clocked	—
44	Monarch changed to lowest stepping CPU	Only seen once after monarch is set to wrong stepping
45	At least one (1) CPU is a prototype device...remove	—
46	CPUs loaded in wrong order	—
48	SAL NVM cleared	—
49	EFI NVM cleared	—
50	EFI NVM failed	—
51	CPU deconfigured by SAL_B	—

**Table D-1      EFI Error and Warning Messages (Continued)**

<b>Error Number</b>	<b>Error/Warning Message</b>	<b>Solution</b>
52	A ROM revision is inconsistent with FIT or REVBLOCK	One or more firmware components (fw, bmc, mp) is out of date
53	Error building SMBIOS	Call Support Center
54	Failure constructing the EFI Memory Data Table (MDT)	Call Support Center
55	UUID error	Update with <code>sysset</code> command
56	Error reading CPU SMBUS information ROM	—
57	Error accessing FRU information	—
58	Checksum error accessing FRU information	—
59	FRU information version error	—
60	DC- CPU error condition	—
61	DC- IO error condition	—
62	DC- Memory error condition	—

## IPMI Event Messages

This section is a quick reference for IPMI events. Topic covered are:

- BMC fpl Format
- MP Log Output Format
- Type 2 and Type E0 Records
- Generator IDs
- Sensor Types
- Event Types

### BMC fpl Format

The fpl command shows the forward progress log.

Here is an example of a FPL format followed by a description of the columns of information:

```

0000BAA4 02 00000029 - C1:00 12:6F:41 8F FF
0000BAA5 E0          5 00    0020B 04 0000000000000006
0000BAA6 02 00000029
0000BAA7 E0          1 00    00318 06 0000000000000030

```

- Column One: is a 32-bit Record ID.
- Column Two: is Record Type of either 02 or E0.
- Column Three: is a timestamp in `time_t` format. It is blank if there is no timestamp.
- Column Four: is the E0 severity information. It is a "-" for a type 2 event.
- Column Five: is an Generator ID. It is one byte for a type-E0 event (00-03 are CPU IDs). It is two bytes for a type-2 event. In this example, C1:00 indicates an event generated by system firmware. BMC-generated events are in the form of 20:XX, where XX is the Sensor ID.
- Column Six: is event data. For a type-E0 event, it is the event ID, a 20-bit number. For a type-2 event, it is the event triplet, three bytes (XX:YY:ZZ) representing the Sensor Type (XX), the Event Type Code (YY), and the Data1 byte (ZZ). The low nibble of ZZ is the event offset, the high nibble describes whether Data2 and/or Data3 contain valid information.
- Column Seven: is the event-specific data.

## MP Log Output Format

The MP displays raw log data in hexadecimal format on the last line of each entry. Here is an example of that data:

```
203E179D3E020010 FF0F807115250300
```

The previous data record can be separate into bytes seven through zero and bytes fifteen through eight.

**Here are bytes seven through zero (read from left to right):**

20	3E179D3E	02	0010
Generator ID	Timestamp (time_t)	Record Type	Record ID

**Here are bytes fifteen through eight (read from left to right):**

FF	0F	80	71	15	25	03	00
Data3	Data2	Data1	event dir   type	Sensor Num	Sensor Type	EvMRev (03)	Generator ID (00)



## Type 2 and Type E0 Records

Offset	Type 2 Record	Type E0 Record
0-1	Record ID	Record ID
2	Record Type (02)	Record Type (E0)
3	Timestamp	Reporting Entity ID
4	Timestamp	Event ID, bits 7 through 0
5	Timestamp	Event ID, bits 15 through 8
6	Timestamp	Bits 7: Timestamp flag Bit 1-0: Event ID, bits 17-16
7	Generator ID	Bits 7-5: Alert Level Bits 4-0: Data Type
8	Generator ID (00)	Data 0
9	EvM Rev (03)	Data 1
10	Sensor Type	Data 2
11	Sensor Number	Data 3
12	Event Dir   Event Type Bit 7: 0=assertion, 1=deassertion Bit 6-0: Event Type Code	Data 4
13	Event Data 1 Bits 7-4: varies according to sensor class Bits 3-0: offset from event/reading code	Data 5
14	Event Data 2	Data 6
15	Event Data 3	Data 7

## Generator IDs

ID (Hex)	Description
20	BMC
C1	System Firmware
Odd Number	Software

## Sensor Types

Type (Hex)	Description
1	Temperature
2	Voltage
4	Fan

Type (Hex)	Description
5	Physical Security (Chassis Intrusion)
6	Platform Security (Password)
7	Processor
8	Power Supply
9	Power Unit
0A	Cooling Device
0C	Memory
0F	POST Error
12	System Event
13	Critical Interrupt
14	Button
1B	Cable
1D	System Boot Initiated
22	ACPI Power State

### Event Types

Type (Hex)	Description
1	Threshold
2	Discrete - idle/active/busy
3	Discrete - asserted/deasserted
6	Discrete - performance
7	Discrete - severity transition
8	Discrete - absent/present
9	Discrete - disabled/enabled
0B	Discrete - redundancy
6F	Sensor-specific
70	HP-defined
71	HP-defined

## Sensor Data Record Repository (SDRR)

The SDR Repository holds descriptions for all the sensors managed by the BMC. The subsequent section contains sensor and event lists.

### Sensor and Event Lists

#### Chassis Intrusion SDR (Sensor 0x01)

Field Name	Value	Notes
SDR Type	0x02	Compact sensor record
Entity ID	0x17	23, system chassis
Entity Instance	0x01	
Sensor Initialization	0x03	Sensor events+scanning enabled at BMC reset
Sensor Capabilities	0x40	Ignore sensor = no Auto-rearm = no Hysteresis = none Thresholds = none Event Message Control support = global disable only
Sensor Type	0x05	Physical security
Event/Reading Type Code	0x6F	Sensor-specific
Assertion Event Mask	0x0001	Supported events: 0x00: general chassis intrusion
Deassertion Event Mask	0x0001	
Discrete Reading Mask	0x0001	
String	"Chassis Intrus"	

This sensor "latches" intrusion events for the system. When an intrusion event occurs, this sensor sets the corresponding reading bit to 1. System firmware must manually re-arm the sensor to reset its reading value, which generates an event. Until the sensor has been re-armed, all readings will return the set intrusion bit.

Events:

Triplet	Event
05:6F:00	Chassis Intrusion
05:EF:00	Chassis intrusion Reset

**Chassis Open SDR (Sensor 0x02)**

Field Name	Value	Notes
SDR Type	0x02	Compact sensor record
Entity ID	0x17	23, system chassis
Entity Instance	0x01	
Sensor Initialization	0x03	Sensor events+scanning enabled at BMC reset
Sensor Capabilities	0x40	Ignore sensor = no Auto-rearm = yes Hysteresis = none Thresholds = none Event Message Control support = per state
Sensor Type	0x05	Physical security
Event/Reading Type Code	0x03	Discrete – asserted/deasserted
Assertion Event Mask	0x0002	0x01: state asserted
Deassertion Event Mask	0x0002	
Discrete Reading Mask	0x0003	
String	“Chassis Open”	

This sensor tracks the current state of the chassis. All transition events are logge

Triplet	Event
05:03:01	Chassis Opened
05:83:01	Chassis Closed

**Platform Security SDR (Sensor 0x03)**

Field Name	Value	Notes
SDR Type	0x02	Compact sensor record
Entity ID	0x00	Unspecified
Entity Instance	0x00	Unspecified
Sensor Capabilities	0x42	Ignore sensor = no Auto-rearm = yes Hysteresis = none Thresholds = none Event Message Control support = global disable only
Sensor Type	0x06	Platform security
Event/Reading Type Code	0x6F	Sensor-specific
Assertion Event Mask	0x0020	0x05: out-of-band access password violation
Deassertion Event Mask	0x0000	
Discrete Reading Mask	0x0000	
String	"Security"	

This sensor is used by the BMC to log all system violation attempts. It does not support current readings.

The following events are defined:

Triplet	Event	data2	data3
06:6F:25	CLI login violation	xx	1
06:6F:25	Open session violation	xx	2
06:6F:25	Verify password violation	xx	3
06:6F:25	Set manufacturing mode violation	xx	4

**Power Button SDR (Sensor 0x04)**

Field Name	Value	Notes
SDR Type	0x02	Compact sensor record
Entity ID	0x00	Unspecified
Entity Instance	0x00	Unspecified
Sensor Initialization	0x03	Sensor events+scanning enabled at BMC reset
Sensor Capabilities	0x40	Ignore sensor = no Auto-rearm = yes Hysteresis = none Thresholds = none Event Message Control support = per state
Sensor Type	0x14	Button
Event/Reading Type Code	0x6F	Sensor-Specific
Assertion Event Mask	0x0001	0x00: power button pressed
Deassertion Event Mask	0x0000	
Discrete Reading Mask	0x0001	
String	"Power Button"	

This sensor is used to log power button usage.

Event Data 3 is used to indicate special power button actions (1=normal, 2=e-buzzer, 3=override).

**Jumper SDRs (Sensors 0x07-0x0B)**

Field Name	Value	Notes
SDR Type	0x02	Compact sensor record
Entity ID	0x00	Unspecified
Entity Instance	0x00	Unspecified
Sensor Capabilities	0x40	Ignore sensor = no Auto-rearm = yes Hysteresis = none Thresholds = none Event Message Control support = global disable only
Sensor Type	0xD0	Button
Event/Reading Type Code	0x03	Discrete – asserted/deasserted
Assertion Event Mask	0x0002	0x01: state asserted
Deassertion Event Mask	0x0000	
Discrete Reading Mask	0x0003	
String	“Clr Config Jmpr” “Safe Mode Jmpr” “Clr Passwd Jmpr” “Jmpr 4” “Jmpr 5”	

These sensors track jumper positions.

Events:

Triplet	Event
D0:03:01	Jumper set

**Watchdog SDR (Sensor 0x0C)**

Field Name	Value	Notes
SDR Type	0x02	Compact sensor record
Entity ID	0x00	Unspecified
Entity Instance	0x00	Unspecified
Sensor Initialization	0x03	Sensor events+scanning enabled at BMC reset
Sensor Capabilities	0x42	Ignore sensor = no Auto-rearm = yes Hysteresis = none Thresholds = none Event Message Control support = global disable only
Sensor Type	0x23	Watchdog 2
Event/Reading Type Code	0x6F	Sensor-specific
Assertion Event Mask	0x010F	0x00: timer expired, status only (no action) 0x01: hard reset 0x02: power down 0x03: power cycle 0x08: timer interrupt (details in event data2)
Deassertion Event Mask	0x0000	
Discrete Reading Mask	0x0000	
String	"Watchdog Timer"	

This sensor is used by the BMC to log watchdog-triggered events. Readings are not supported.

Triplet	Event
23:6F:00	Watchdog Timer Expired – no action
23:6F:01	Watchdog Timer Expired – Hard Reset
23:6F:02	Watchdog Timer Expired – Power Down
23:6F:03	Watchdog Timer Expired – Power-Cycle
23:6F:08	Watchdog Timer Expired – Timer Interrupt



**Wake-on-LAN SDRs (Sensors 0x0E-0x0F)**

Field Name	Value	Notes
SDR Type	0x02	Compact sensor record
Entity ID	0x07	System board
Entity Instance	0x01	
Sensor Initialization	0x00	Sensor events+scanning disabled at BMC reset
Sensor Capabilities	0x40	Ignore sensor = no Auto-rearm = yes Hysteresis = none Thresholds = none Event Message Control support = per state
Sensor Type	0x27	LAN
Event/Reading Type Code	0x03	Discrete – asserted/deasserted
Assertion Event Mask	0x0002	0x01: state asserted
Deassertion Event Mask	0x0000	
Discrete Reading Mask	0x0003	
Strings	“Wake-on-LAN 100”	Long’s Peak Sensor 0x0E
	“Wake-on-LAN 1Gb”	Long’s Peak Sensor 0x0F
	“Wake-on-LAN 1Gb”	Wilson Peak Sensor 0x0E (Intel LOM)
	“PCI PME”	Wilson Peak Sensor 0x0F

These sensors are used to log wake-on-LAN events. Readings are not supported.

Events:

Triplet	Event
27:03:01	Wake-on-LAN asserted

**Cooling Unit Status SDRs (Sensors 0x11-0x14)**

Field Name	Value	Notes
SDR Type	0x02	Compact sensor record
Entity ID	0x1E	Cooling unit
Entity Instance	0x01-0x03	
Sensor Initialization	0x00	Sensor events+scanning disabled at BMC reset
Sensor Capabilities	0x40	Ignore sensor = no Auto-rearm = yes Hysteresis = none Thresholds = none Event Message Control support = entire sensor only (01)
Sensor Type	0x0A	Cooling device
Event/Reading Type Code	0x07	Discrete – severity
Assertion Event Mask	0x0007	0x00: transition to OK 0x01: transition to non-critical from OK 0x02: transition to critical from less severe
Deassertion Event Mask	0x0000	
Discrete Reading Mask	0x0007	
String	“Cooling 1 (Sys)” “Cooling 2 (Mem)” “Cooling 3 (I/O)”	

This sensor reports the state of the redundant cooling units.

Events:

Triplet	Event
0A:07:00	Cooling unit OK
0A:07:01	Cooling unit warning
0A:07:02	Cooling unit fault requiring system shutdown

**Missing Device (Sensor 0x15)**

Field Name	Value	Notes
SDR Type	0x02	Compact sensor record
Entity ID	0x00	Undefined
Entity Instance	0x00	Undefined
Sensor Initialization	0x00	Sensor events+scanning disabled at BMC reset
Sensor Capabilities	0x42	Ignore sensor = no Auto-rearm = yes Hysteresis = none Thresholds = none Event Message Control support = global disable only
Sensor Type	0x25	Entity Presence
Event/Reading Type Code	0x71	OEM
Assertion Event Mask	0x0003	0x00: Missing FRU 0x01: Missing Entity
Deassertion Event Mask	0x0000	
Discrete Reading Mask	0x0000	
String	"Missing Device"	

The BMC uses this sensor definition to log missing devices when attempting to perform a system power-on. There is no actual sensor – no readings are supported, and only the power-on code logs events with this sensor number.

This sensor logs the following events:

Triplet	Event	data2	data3
25:71:80	Missing FRU	FRU ID	Unspecified
25:71:A1	Missing Entity	Entity ID	Entity Instance ID

**Power Supply Status SDRs (Sensors 0x40-0x42)**

Field Name	Value	Notes
SDR Type	0x02	Compact sensor record
Entity ID	0x0A	Power supply
Entity Instance	0x01-0x02 (LPK) 0x01-0x03 (Ev.)	
Sensor Initialization	0x03	Sensor events+scanning enabled at BMC reset
Sensor Capabilities	0xC0	Ignore sensor = yes Auto-rearm = yes Hysteresis = none Thresholds = none Event Message Control support = per event
Sensor Type	0x08	Power Supply
Event/Reading Type Code	0x6F	Sensor-specific
Assertion Event Mask	0x000B (LPK) 0x0003 (Ev.)	0x00: presence detected 0x01: power supply failure detected 0x03: power supply A/C lost
Deassertion Event Mask	0x000B (LPK) 0x0003 (Ev)	
Discrete Reading Mask	0x000B (LPK) 0x0003 (Ev)	
String	“Power Supply x”	x = 0, 1, or 2 (nothing on WPK, LPW)

This sensor tracks the status of the power supplies. It supports deassertions and readings (see below for the list of supported events). The BMC reports whether it has enabled/disabled the supplies using sensors 0x43-0x45.

The Everest power supplies do not report “A/C lost” as a separate event, but as a generic “failure detected” event.

Triplet	Event
08:6F:0	Power supply inserted
08:6F:1	Power supply failure detected
08:6F:3	Power supply A/C lost
08:EF:0	Power supply removed
08:EF:1	Power supply failure ended
08:Ef:3	Power supply A/C restored

**Power Supply Control SDRs (Sensor: 0x44-0x45)**

Field Name	Value	Notes
SDR Type	0x02	Compact sensor record
Entity ID	0x0A	Power supply
Entity Instance	0x01-0x03 (Ev) 0x01-0x02 (LPK), 0x01 (WPK)	
Sensor Initialization	0x03	Sensor events+scanning enabled at BMC reset
Sensor Capabilities	0xC0	Ignore sensor = yes Auto-rearm = yes Hysteresis = none Thresholds = none Event Message Control support = per state
Sensor Type	0x08	Power Supply
Event/Reading Type Code	0x09	Discrete – enabled/disabled
Assertion Event Mask	0x0003	0x00: device disabled 0x01: device enabled
Deassertion Event Mask	0x0000	
Discrete Reading Mask	0x0003	
String	“Pwr Spply x Ctrl” “Power Control”	x = 1 or 2

This sensor tracks the state programmed by the BMC to the power supplies, using the PSU<sub>x</sub>\_ON signals.

Events:

Triplet	Event
08:09:00	Power supply turned off
08:09:01	Power supply turned on

**Power Unit Redundancy SDR (Sensor 0x4F)**

Field Name	Value	Notes
SDR Type	0x02	Compact sensor record
Entity ID	0x13	Power Unit
Entity Instance	0x01	
Sensor Initialization	0x03	Sensor events+scanning enabled at BMC reset
Sensor Capabilities	0x42	Ignore sensor = no Auto-rearm = yes Hysteresis = none Thresholds = none Event Message Control support = global disable only
Sensor Type	0x09	Power Unit
Event/Reading Type Code	0x0B	Redundancy
Assertion Event Mask	0x0003	0x00: Redundancy Regained 0x01: Redundancy Lost
Deassertion Event Mask	0x0000	
Discrete Reading Mask	0x0003	
String	“Power Redundancy”	

This sensor tracks the redundancy of the power unit. If one redundant supply goes down, a “redundancy lost” event is logged. There is no “redundancy degraded” state, since one of the two power supplies is needed to operate.

Events:

Triplet	Event
09:0B:00	Power redundancy regained
09:0B:01	Power redundancy lost

**PGOOD Voltage SDRs**

Field Name	Value	Notes
SDR Type	0x02	Compact sensor record
Entity ID	var.	
Entity Instance	var.	
Sensor Initialization	var.	

Field Name	Value	Notes
Sensor Capabilities	0x40	Ignore sensor = no Auto-rearm = yes Hysteresis = none Thresholds = none Event Message Control support = per event
Sensor Type	0x02	Voltage
Event/Reading Type Code	0x07	Discrete - severity
Assertion Event Mask	0x0008	0x03: transition to non-recoverable from less severe
Deassertion Event Mask	0x0000	
Discrete Reading Mask	0x0008	
String	""	

These sensors are used to log failing PGOOD signals. When one of these signals fails, the BMC logs a transition event and initiates an emergency power-off.

DC sensors:

Number	Entity ID	Entity Instance	Sensor Init	Sensor Cap	String
0xCD	0x0A	0x01	0x00	0xC0	12V Pwr Supply 1
0xCE	0x0A	0x02	0x00	0xC0	12V Pwr Supply 2
0xCF	0x15	0x01	0x00	0x40	12V Rail 0
0xD0	0x15	0x01	0x00	0x40	12V Rail 1
0xD1	0x15	0x01	0x00	0x40	12V Rail 2
0xD2	0x15	0x01	0x00	0x40	12V Rail 3
0xD3	0x15	0x01	0x00	0x40	12V Rail 4
0xD5	0x07	0x01	0x00	0x40	Over-Voltage
0xD6	0x07	0x01	0x00	0x40	Power Good

Events:

Triplet	Event
02:07:03	Voltage reached critical level

**AC sensors (0xCB-0xCC)**

Field Name	Value	Notes
SDR Type	0x02	Compact sensor record
Entity ID	0x0A	
Entity Instance	1-2	
Sensor Initialization	0x03	
Sensor Capabilities	0x40	Ignore sensor = no Auto-rearm = yes Hysteresis = none Thresholds = none Event Message Control support = per event
Sensor Type	0x02	Voltage
Event/Reading Type Code	0x08	Discrete – present/absent
Assertion Event Mask	0x0003	0x00: device absent 0x01: device present
Deassertion Event Mask	0x0000	
Discrete Reading Mask	0x0003	
String	“AC Pwr Supply x”	x=1-2

Events:

Triplet	Event
02:08:00	AC power removed
02:08:01	AC power present



**Battery Voltage SDR (Sensor 0xD4)**

Field Name	Value	Notes
SDR Type	0x02	Compact sensor record
Entity ID	0x0A	
Entity Instance	0x03 (LPK) 0x04 (Ev)	
Sensor Initialization	0x03	Sensor events+scanning enabled at BMC reset
Sensor Capabilities	0x40	Ignore sensor = no Auto-rearm = yes Hysteresis = none Thresholds = none Event Message Control support = per state
Sensor Type	0x02	Voltage
Event/Reading Type Code	0x06	Discrete – performance
Assertion Event Mask	0x0003	0x00: performance met 0x01: performance lags
Deassertion Event Mask	0x0000	
Discrete Reading Mask	0x0003	
String	“Battery Voltage”	

Events:

Triplet	Event
02:06:00	Battery voltage OK
02:06:01	Battery voltage low

**Ambient Temperature SDR (Sensor 0xD8)**

Field Name	Value	Notes
SDR Type	0x01	Full sensor record
Entity ID	0x17	System chassis
Entity Instance	0x01	
Sensor Initialization	0x00	Sensor events+scanning disabled at BMC reset
Sensor Capabilities	0x55	Ignore sensor = no (0) Auto-rearm = yes (1) Hysteresis = readable (01) Thresholds = readable (01) Event Message Control support = entire sensor only (01)
Sensor Type	0x01	Temperature
Event/Reading Type Code	0x01	Threshold
Lower Threshold Reading Mask	0x0FC0	b6-b11: assertion events on all upper thresholds
Upper Threshold Reading Mask	0x4000	b14: upper non-recoverable threshold comparison is returned no deassertion events
Settable/Readable Threshold Mask	0x0020	b5: upper non-recoverable threshold is readable
Positive-going threshold hysteresis	3 C	
String	"Ambient Temp"	

This sensor returns the current ambient temperature, and logs all upper threshold events. Note that the actual sensor is an LM75.

Triplet	Event	data2	data3
01:01:52	Temperature too low (critical)	Reading	Threshold
01:01:54	Temperature too low (non-recov)	Reading	Threshold
01:01:56	Temperature (OK from non-crit)	Reading	Threshold
01:01:57	Overtemperature (non-critical)	Reading	Threshold
01:01:58	Temperature (OK from critical)	Reading	Threshold
01:01:59	Overtemperature (critical)	Reading	Threshold
01:01:5A	Temperature (OK from non-recov)	Reading	Threshold
01:01:5B	Overtemperature (non-recov)	Reading	Threshold

**Processor Temperature SDRs (Sensor 0xD9-0xDA)**

Field Name	Value	Notes
SDR Type	0x01	Full sensor record
Entity ID	0x03	Processor
Entity Instance	0x01-0x02	
Sensor Initialization	0x03	Sensor events+scanning enabled at BMC reset
Sensor Capabilities	0xD6	Ignore sensor = yes (1) Auto-rearm = yes (1) Hysteresis = readable (01) Thresholds = readable (01) Event Message Control support = global disable only (10)
Sensor Type	0x01	Temperature
Event/Reading Type Code	0x01	Threshold
Lower Threshold Reading Mask	0x0FC0	b6-b11: assertion events on all upper thresholds
Upper Threshold Reading Mask	0x4000	b14: upper non-recoverable threshold comparison is returned no deassertion events
Settable/Readable Threshold Mask	0x0020	b5: upper non-recoverable threshold is readable
Positive-going threshold hysteresis	3 C	
String	"Processor x Temp"	x=0-1

These sensors return processor temperatures, and log all upper threshold events.

Triplet	Event	data2	data3
01:01:56	Temperature (OK from non-crit)	Reading	Threshold
01:01:57	Overtemperature (non-critical)	Reading	Threshold
01:01:58	Temperature (OK from critical)	Reading	Threshold
01:01:59	Overtemperature (critical)	Reading	Threshold
01:01:5A	Temperature (OK from non-recov)	Reading	Threshold
01:01:5B	Overtemperature (non-recov)	Reading	Threshold

**Fan Tach SDRs (Sensors 0xE0-0xE7)**

Field Name	Value	Notes
SDR Type	0x01	Full sensor record
Entity ID	0x1D	Fan
Entity Instance	0x01-0x08	
Sensor Initialization	0x00	Sensor events+scanning disabled at BMC reset
Sensor Capabilities	0x43	Ignore sensor = no Auto-rearm = yes Hysteresis = none Thresholds = none Event Message Control support = entire device only
Sensor Type	0x04	Fan
Event/Reading Type Code	0x01	Threshold
Assertion Event Mask	0x0000	
Deassertion Event Mask	0x0000	
Discrete Reading Mask	0x0000	
String	"Fan 1R (Power)" "Fan 1L (Power)" Fan CPU0 (R) Fan CPU1 (L) Fan 2F (Memory) Fan 2B (Memory) Fan 3F (Disk) Fan 3B (Disk)	Wilson Peak: "Fan 1 (Top)" "Fan 2 (Bottom)" "Processor Fan" Everest: "Fan 0 (System-F)" "Fan 1 (System-B)" "Fan 2 (I/O)" "Fan 3 (I/O)" "Fan 4 (I/O)" "Fan 5 (I/O)"

These sensors report current fan speeds. They do not generate events – the “fan health” sensors do.

**Fan Health SDRs (Sensors 0xE8-0xEF)**

Field Name	Value	Notes
SDR Type	0x02	Compact sensor record
Entity ID	0x1D	Fan
Entity Instance	0x01-0x08	
Sensor Initialization	0x00	Sensor events+scanning disabled at BMC reset
Sensor Capabilities	0x41	Ignore sensor = no (0) Auto-rearm = yes (1) Hysteresis = none (00) Thresholds = none (00) Event Message Control support = entire sensor only (01)
Sensor Type	0x04	Fan
Event/Reading Type Code	0x06	Discrete – performance
Assertion Event Mask	0x0003	0x00: performance met 0x01: performance lags
Deassertion Event Mask	0x0000	
Discrete Reading Mask	0x0003	
String	“Fan xx Health”	xx = fan position

These sensors report the health of the individual fans when they are part of a cooling unit. Even when the chassis is opened, a “performance lags” event would be generated if the fan speed is out of range. This indicates a fan replacement in progress. There would be no matching event from the cooling unit itself.

Events:

Triplet	Event
04:06:00	Fan speed OK
04:06:01	Fan speed too slow

**SCSI Disk Presence SDR (Sensors 0xF1-0xF3)**

Field Name	Value	Notes
SDR Type	0x02	Compact sensor record
Entity ID	0x04	Disk
Entity Instance	0x01-0x03	
Sensor Initialization	0x00	Sensor events+scanning disabled at BMC reset
Sensor Capabilities	0x42	Ignore sensor = no Auto-rearm = yes Hysteresis = none Thresholds = none Event Message Control support = global disable only
Sensor Type	0x0D	Drive slot/bay
Event/Reading Type Code	0x08	Discrete – presence
Assertion Event Mask	0x0003	0x00: device absent 0x01: device present
Deassertion Event Mask	0x0000	
Discrete Reading Mask	0x0003	
String	“SCSI Disk x”	x=1-3

These sensors track insertion/removal of disks in the three SCSI bays. An assertion event is logged each time a disk is added/removed. Readings indicate whether a disk is currently present. When the system is off, these sensors return incorrect readings.

Events:

Triplet	Event
0D:08:00	SCSI disk absent
0D:08:01	SCSI disk present

**SCSI Cable Presence SDR (Sensors 0xF4-0xF6)**

Field Name	Value	Notes
SDR Type	0x02	Compact sensor record
Entity ID	0x1F	Cable
Entity Instance	0x01-0x03	
Sensor Initialization	0x00	Sensor events+scanning disabled at BMC reset
Sensor Capabilities	0x42	Ignore sensor = no Auto-rearm = yes Hysteresis = none Thresholds = none Event Message Control support = global disable only
Sensor Type	0x1B	Cable
Event/Reading Type Code	0x08	Discrete – presence
Assertion Event Mask	0x0000, 0x0003 (0xF6)	0x00: device absent 0x01: device present
Deassertion Event Mask	0x0000	
Discrete Reading Mask	0x0003	
String	“SCSI Cable x”	x= ChA, ChB, ExtCh

These sensors track cable presence on each of the three SCSI channels. An assertion event is logged each time the external cable is added/removed (no events are generated for the internal cables). Readings indicate whether a cable is currently present.

The actual detection is done through an 8575 expander on the SCSI backplane, which is powered by V5P0, not standby voltage therefore, when power is off, these sensors must return no reading at all (i.e. completion code 0xCE).

Events (sensor 0xF6 only):

Triplet	Event
1B:08:00	External SCSI cable removed
1B:08:01	External SCSI cable connected

**ACPI Power State SDR (Sensor 0xFA)**

Field Name	Value	Notes
SDR Type	0x02	Compact sensor record
Entity ID	0x00	Unspecified
Entity Instance	0x00	Unspecified
Sensor Initialization	0x03	Sensor events+scanning enabled at BMC reset
Sensor Capabilities	0x42	Ignore sensor = no Auto-rearm = yes Hysteresis = none Thresholds = none Event Message Control support = global disable only
Sensor Type	0x22	System ACPI Power State
Event/Reading Type Code	0x6F	Sensor-specific
Assertion Event Mask	0x0421	0x00: S0/G0 "working" 0x05: S5/G2 "soft-off" 0x0A: S5 entered by override
Deassertion Event Mask	0x0000	
Discrete Reading Mask	0x0421	
String	"ACPI Power"	

This sensor tracks the current ACPI power state (see [ACPI 2.0] for definitions). An assertion event is logged on each ACPI transition.

Events:

Triplet	Event
22:6F:00	ACPI state S0 "working"
22:6F:05	ACPI state S5 "soft-off"
22:6F:0A	ACPI state S5 "soft-off override"



**TOC SDR (Sensor 0xFB)**

Field Name	Value	Notes
SDR Type	0x02	Compact sensor record
Entity ID	0x00	Unspecified
Entity Instance	0x00	Unspecified
Sensor Initialization	0x00	Sensor events+scanning disabled at BMC reset
Sensor Capabilities	0x00	Ignore sensor = no Auto-rearm = no Hysteresis = none Thresholds = none Event Message Control support = per state
Sensor Type	0x13	Critical Interrupt
Event/Reading Type Code	0x6F	Sensor-specific
Assertion Event Mask	0x0001	0x00: Diagnostic interrupt
Deassertion Event Mask	0x0000	
Discrete Reading Mask	0x0001	
String	"TOC Interrupt"	

This sensor is used to log TOC events. The reading indicates a diagnostic interrupt (bit 0), until the system is reset.

Event Data 3 is used to indicate the TOC source (1=button, 2=IPMI command, 3=watchdog).

Triplet	Event	data2	data3
13:6F:20	TOC interrupt	xx	source

**Timestamp SDRs (Sensors 0xFC-0xFD)**

Field Name	Value	Notes
SDR Type	0x02	Compact sensor record
Entity ID	0x00	Unspecified
Entity Instance	0x00	Unspecified
Sensor Initialization	0x03	Sensor events+scanning enabled at BMC reset
Sensor Capabilities	0x40	
Sensor Type	0xC0	OEM
Event/Reading Type Code	0x03	Discrete – assertion/deassertion
Assertion Event Mask	0x0002	01 = assertion
Deassertion Event Mask	0x0000	
Discrete Reading Mask	0x0002	
String	“SEL Time Set”	

This sensor logs an event when an external agent asks to update the SEL clock.

Events:

Triplet	Event
C0:03:01	Time set

**BMC Internal Watchdog (Sensor 0xFE)**

Field Name	Value	Notes
SDR Type	0x02	Compact sensor record
Entity ID	0x00	Unspecified
Entity Instance	0x00	Unspecified
Sensor Capabilities	0x40	
Sensor Type	0xC1	OEM
Event/Reading Type Code	0x03	Discrete – assertion/deassertion
Assertion Event Mask	0x0000	
Deassertion Event Mask	0x0000	
Discrete Reading Mask	0x0000	
String	“Intrnl Watchdog”	

This sensor logs BMC internal resets due to internal watchdog expiration (i.e. BMC hangs).

Events:

Triplet	Event
C1:03:01	BMC self-reset

### Events without Sensors

The BMC logs these events with a “sensor number” of 0; there is no matching SDR.

Triplet	Event	data2	data3	Notes
10:70:64	SEL almost full	1F	%full	The BMC logs this when the SEL is 75% full
12:70:80	BMC entering special mode	Mode	–	Mode is a bit-map: Bit 0: Shmoo Bit 1: MfgTest Bit 2: Shutdown override Bit 3: Fixed fan speed Bit 4: Mfg Bits 7-5: unused, set to 0
12:70:A1	BMC firmware initializing	Major FW rev	Minor FW rev	
1D:70:00	BMC Cold Reset			
1D:70:01	BMC Warm Reset			
1D:70:02	BMC Cold Reset after SDRR update			

### FRU Device Locator Records

These records are used to indicate that some entities should be detected by looking at their FRU devices. If the FRU inventory device is present, then the entity is present too. The “device string” in the locator record is also useful to distinguish between entities.

Note: the “Device Type Modifier” byte is used to indicate the FRU data format, as per [IPMI 1.5] ([IPMI 1.0] says that this byte should be set to 0x00 for a logical FRU device).

FRU Format	Device Type Modifier
IPMI	0x00
DIMM Memory ID	0x01
FRU Inventory	0x02
System processor cartridge FRU/PIROM (Processor Information ROM)	0x03

### I/O Backplane

Field Name	Value	Notes
FRU Device ID	0x05	
Device Type	0x10	Logical FRU device
Device Type Modifier	0x00	IPMI
FRU Entity ID	0x10 (16)	System expansion board
FRU Entity Instance	0x01	
Device ID String Type/Length	0xD0	16 x ASCII
Device String	"I/O Backplane"	

### Lithium Card / Management Card

Field Name	Value	Notes
FRU Device ID	0x06	
Device Type	0x10	Logical FRU device
Device Type Modifier	0x00	IPMI
FRU Entity ID	0x06	System management module
FRU Entity Instance	0x01	
Device ID String Type/Length	0xD0	16 x ASCII
Device String	Ev: "GSP Board" LPK:"Mgt Card"	

### Disk Backplane

Field Name	Value	Notes
FRU Device ID	0x08	
Device Type	0x10	Logical FRU device
Device Type Modifier	0x00	IPMI
FRU Entity ID	0x0F (15)	Disk Backplane
FRU Entity Instance	0x01	
Device ID String Type/Length	0xD0	16 x ASCII
Device String	"Disk Media Bay"	

**Processors**

There are two processor locator records on your system.

Field Name	Value	Notes
FRU Device ID	0x20-0x23	
Device Type	0x10	Logical FRU device
Device Type Modifier	0x03	PIROM
FRU Entity ID	0x03	Processor
FRU Entity Instance	0x01-0x04	
Device ID String Type/Length	0xD0	16 x ASCII
Device String	"Processor x"	x=0-3

**DIMMs**

There are twelve DIMM locator records on your system.

Field Name	Value	Notes
FRU Device ID	0x80-0xBF	See Error! Reference source not found.
Device Type	0x10	Logical FRU device
Device Type Modifier	0x01	DIMM ID
FRU Entity ID	0x20 (32)	Memory device
FRU Entity Instance	1-48	See Error! Reference source not found.
Device ID String Type/Length	0xC6	6 x ASCII
Device String	"DIMMxy" (LPK) "DIMMxy - Ext z" (Ev.)	See Error! Reference source not found. for x, y, z