technical reference guide

hp workstation zx2000

Document Part Number: 5969-3154

April 2003

This manual contains an overview of system specifications, instructions for removing and replacing system components, information on configuring your system using the included tools and interfaces, and detailed troubleshooting information.

WARNING: Text set off in this manner indicates that failure to follow directions could result in bodily harm or loss of life.

CAUTION: Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of information.

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important safety warnings

WARNING: *Avoid Electrical Shocks.* To avoid electrical shock, do not open the power supplies. There are no user-serviceable parts inside.

To avoid electrical shock and harm to your eyes by laser light, do not open the DVD 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 DVD for power requirements and wavelength. This product is a class I laser product.

WARNING: *Removing and Replacing the Cover.* For your safety, never remove the system side cover without first disconnecting the power cord from the power outlet and removing any connection to a telecommunications network. If a Power Protection Device is fitted to your system, you must shut down your computer using its on/off switch, then remove the power cord before removing the system's side cover. Remove the Power Protection Device cables before any servicing operation. Always replace the side cover before switching the system on again.

WARNING: *Battery Safety Information.* 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 system 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 system, 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.

WARNING: *Avoid Burn Injuries.* Some parts inside the computer will be hot. Wait approximately three to five minutes for them to cool down before touching them.

CAUTION: *Avoid Static Electricity.* Static electricity can damage electronic components. Turn OFF all equipment before installing an accessory card. Don't let your clothes touch any accessory card. To equalize the static electricity when replacing an accessory card, rest the accessory card bag on top of the system unit while you are removing the card from the bag. Handle the card as little as possible and with care.

CAUTION: *Information on Ergonomic Issues.* It is strongly recommended that you read the ergonomics information, available in the "Working In Comfort" section of this manual, before using your system. You can access more extensive ergonomics information at: **www.hp.com/ergo**

NOTE: Recycling Your System. HP has a strong commitment toward the environment. Your HP system has been designed to respect the environment as much as possible. HP can also take back your old system for recycling when it reaches the end of its useful life. HP has a product take-back program in several countries. The collected equipment is sent to an HP recycling facilities in Europe or the U.S.A. As many parts as possible are reused. The remainder is recycled. Special care is taken for batteries and other potential toxic substances, these are reduced into non-harmful components through special chemical processes. If you require more details about the HP product take-back program, contact your local dealer or your nearest HP Sales Office.

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3 System Configuration

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product information

This chapter provides an overview of the hp workstation zx2000, including:

- System features
- Physical characteristics
- Power specifications
- Environmental specifications
- Front panel features
- Rear panel connectors

system features

Feature	Description
Processor	Intel® Itanium® 2 • 900 MHz • 1.5 MB cache on chip
Firmware	8 MB flash EEPROM • Configured using Extensible Firmware Interface (EFI)
Operating system	Models include one of the following: • HP-UX • Linux® • Microsoft® Windows® XP 64-Bit Edition Version 2003
Main memory	Capacity: • 512 MB min. (2 x 256 MB) • 8 GB max. (4 x 2 GB) Type: PC2100 ECC registered DDR266 SDRAM Sockets: Four DIMM sockets Bus Bandwidth: 4.25 GB/sec For memory loading order and detailed memory installation instructions, see “Loading Order” on page 2-12.
Hard drive(s)	Models include one or two of the following: • *Ultra ATA-100 IDE*: 40 GB, 80 GB or 120 GB • *Ultra 160 SCSI*: 36 GB, 73 GB or 146 GB

Feature	Description
Optical drive(s)	Models include one of the following IDE drives: • 48X CD-RW • 16X DVD-ROM
SCSI controller (optional)	Models may include one Ultra 160 SCSI adapter
IDE controller	Ultra ATA-100 capable controller supporting a total of two IDE buses and four IDE devices: • Two internal hard drives • Two front-access optical drives
Graphics controllers	Models available with a range of AGP graphics cards (Appendix A).
Accessory card sockets	Six sockets total: • One AGP Pro 50 1.5V-only 4× 32-bit socket • Three full-length and one half-length 3.3V 64-bit 66 MHz PCI-X sockets • One full-length 3.3V 64-bit 133 MHz PCI-X socket.
I/O connectors	• 10/100/1000 LAN connector • Four USB 2.0 480 Mb/s connectors: • Two front-access • Two rear-access • Two 9-pin serial ports: • UART 16550 buffered • RS-232-C
Input devices	USB keyboard and mouse: • HP 104/105 key keyboard, available in 13 localized layouts • HP three-button mouse, standard or scroll-wheel
IEEE-1394 FireWire (optional)	Models may include IEEE-1394 interface cards: • IEEE-1394A, OHCI • Three ports (two rear, one internal)
Audio	Integrated audio features: • 16-bit stereo • Internal CD audio connector • Full duplex • Three rear-connect audio jacks: • Microphone • Line in • Line out

physical characteristics

Characteristic	hp workstation zx2000
Weight[1]	
Tower system	Minimum: 21.98 kg (48.45 lb.) Maximum: 24.80 kg (54.68 lb.)
Rack system	Minimum: 17.77 kg (39.18 lb.) Maximum: 20.60 kg (45.41 lb.)
Dimensions	
Tower system	Height: 502.6 mm (19.79 in.) Depth: 512.4 mm (20.17 in.) Width: 268.0 mm (10.55 in.)
Rack system	Height: 175.3 mm (6.90 in.) Depth: 510.9 mm (20.11 in.) Width: 482.5 mm (18.99 in.)
Footprint, tower system	0.09 m2 (0.98 sq. ft.)
Space requirement, rack system	4 units

1. Excludes keyboard, mouse and display.

power specifications

Available power (output) is the maximum DC power that the power supply can supply to the system.

Maximum input power is what the power supply requires from the AC line to deliver that maximum DC output (given worst case efficiency and max loading).

Maximum input current is the worst case/highest current given the lowest input voltage and the maximum input power.

Parameter	Total Rating	PCI Sockets	AGP Sockets
Input voltage (wide-range)	100-127VAC 200-240VAC	5 sockets available at 15W/socket Total of 75W	1 socket available at 50W/socket
Max input current	6.4A at 100VAC 3.2A at 200VAC		
Input frequency	50 – 60 Hz		
Max input power required	643W		
Max available output power	450W		
Max current at +12V	14A		
Max current at +12V-CPU	16A		
Max current at +3.3V	34A		
Max current at +5V	20A		
Max current at –12V	0.55A		
Max current at +5Vsb	2A		

The power supply has Active Power Factor Correction (APFC) that meets EN61000-3-2 over the range of 88-255 VAC rms.

power consumption and cooling

The power consumptions listed in the following table are valid for a standard configuration as shipped (4 GB of memory, 450W power supply, two hard disk drives, and one graphics card).

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

Additional Component		
Processor	130W	443.6 Btu/h
IDE hard disk drive with I/O access	23W	78.4 Btu/h
IDE hard disk without I/O access (idle)	16W	54.5 Btu/h
PCI card	10W to 25W	34.12 Btu/h to 85.30 Btu/h
AGP card	50W (maximum)	170.6 Btu/h

environmental specifications

Environmental Specifications (System Processing Unit with Hard Disk)	
Operating temperature	+5° C to +35° C (+41° F to +95° F)
Storage temperature	-40° C to +70 C (-40° F to +158° F)
Over-temperature shutdown	+40° C (+104° F)
Operating humidity	15% to 85% relative (non-condensing)
Storage humidity	8% to 85% relative (non-condensing)
Operating altitude	0-3000 m (0-10,000 ft.)
Storage altitude (long-term)	0-4600 m (0-15,000 ft.)

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.

front panel

The hp workstation zx2000 front panel has the following features:

- Two front-access **USB connectors**.
- Two front-access **optical drive bays**.
- **Power Button** turns the system power on or off.
- **Power LED** is green when the power is on or the power button is pushed in. If the power is on and the button is pushed in, the light will stay on even after the system is powered down. When the button is released, the green light turns off.
- **Activity LED** indicates whether the system is accessing any of the hard drives or optical drives (IDE or SCSI). If the LED is:
  - **off**, the system is off, or the system is not accessing internal drives
  - **blinking green**, the system is accessing an internal drive

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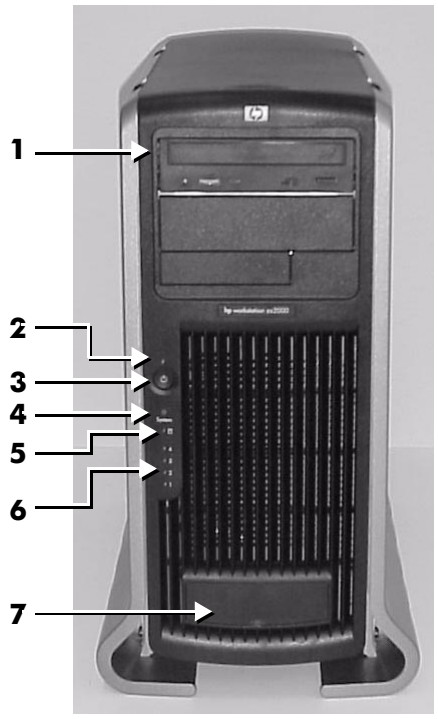
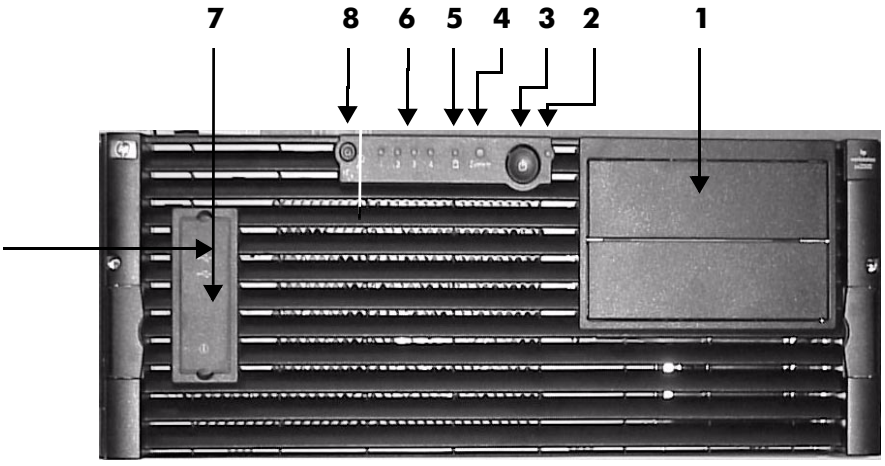
NOTE: The Activity LED automatically communicates with IDE hard drives or optical drives. To communicate with SCSI drives, a SCSI LED activity cable must connect the SCSI card and the system board. *The Activity LED is active only on systems purchased after March 2003.*

- **System** and **Diagnostic LEDs** provide information about system errors.
- **Locator Button and LED** (rack-mount configuration only) identifies the rack position of the workstation.



Front Panel, Tower Configuration

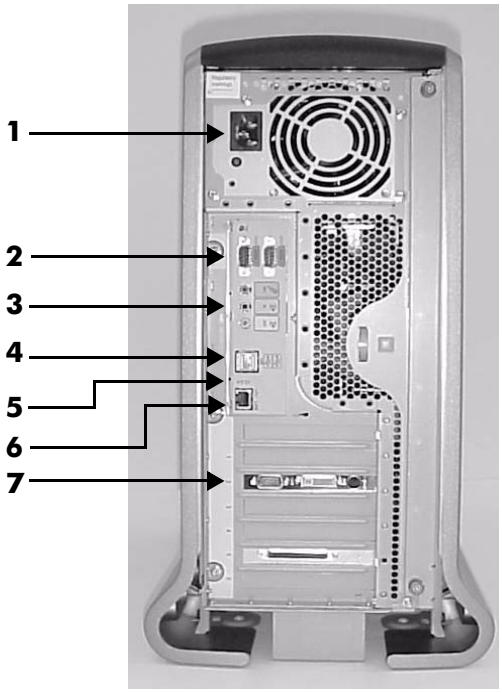


Front Panel, Rack Configuration

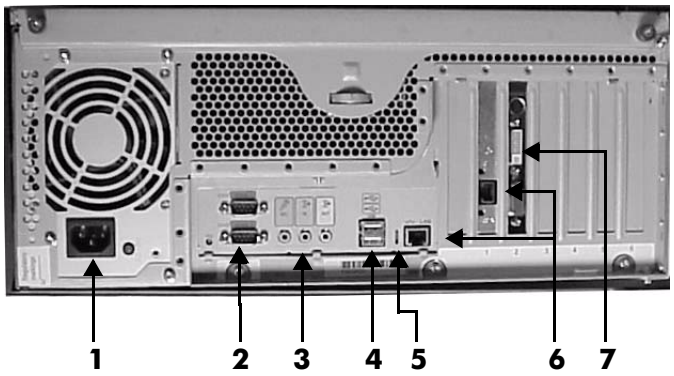
1 Optical drive bays	**5** Activity LED
2 Power LED	**6** Diagnostic LEDs 1-4
3 Power button	**7** Front-access USB connectors (behind door)
4 System LED	**8** Locator LED and button (rack-mounted system only)

rear panel

The connectors are shaped to go in one way only. Refer to the label on the back of the workstation.



Rear Panel Connectors, Tower Configuration



Rear Panel Connectors, Rack-mounted Configuration

1 Power	**5** LAN LEDs
2 Serial ports	**6** Built-in LAN and optional 2nd LAN ports
3 Audio (headphone, microphone)	**7** Monitor port(s) on graphics card
4 USB	

2

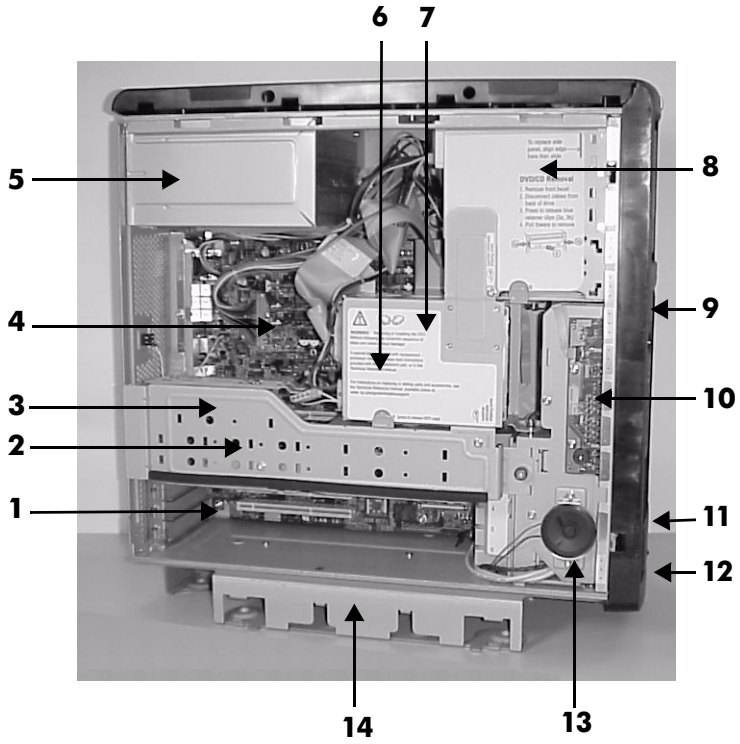
installing or replacing parts and accessories

overview

This chapter contains the following sections:

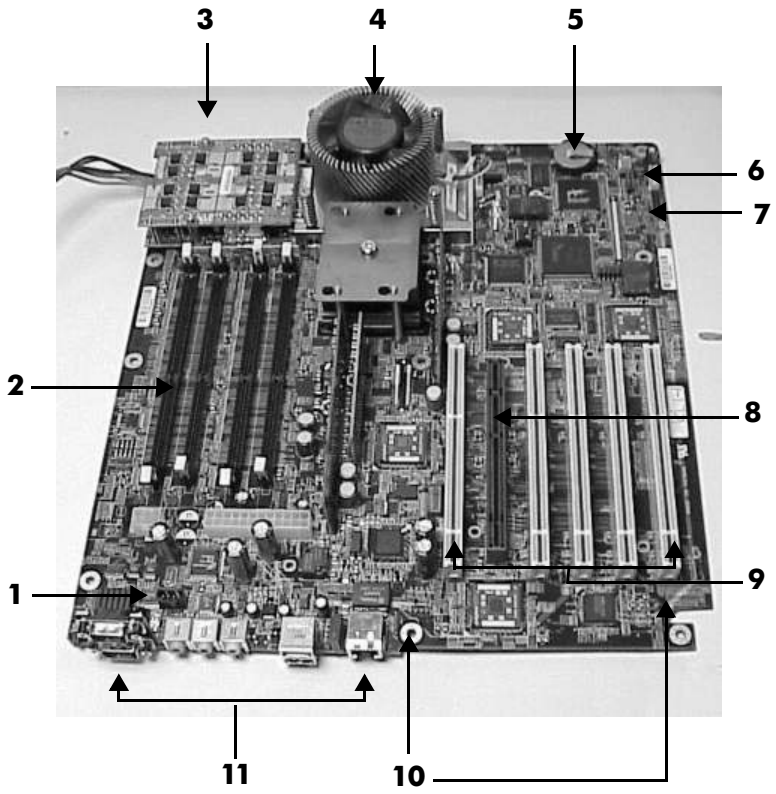
- "Internal components" on page 2-2 shows photos of the internal components and system board. These will help you locate components.
- "Removal and replacement prerequisites" on page 2-4 provides information you **must** know before you remove components.
- "Removing and replacing covers" on page 2-5 and "Removing and replacing the front bezel" on page 2-10 explain two tasks you perform for many remove/replace procedures.
- The remaining sections explain how to remove and replace components:
  - Memory modules, page 2-11
  - Accessory and graphics cards, page 2-13
  - Optical drives (CD or DVD), page 2-17
  - Hard drives, page 2-20
  - Power supply, page 2-23
  - System fans, page 2-24
  - Airflow guide, page 2-26
  - LED status panel, page 2-27
  - Processor assembly and power module, page 2-28
  - System board, page 2-33
  - System battery, page 2-36

internal components



zx2000 Main Components

1	PCI sockets	**8**	Optical drive(s)
2	AGP video card (behind arm)	**9**	System fans (behind front bezel)
3	AGP retainer arm	**10**	LED status panel
4	Memory DIMMs	**11**	Serial number label (behind door)
5	Power supply	**12**	Front-access USB ports (behind door)
6	Processor/fan assembly (behind hard-drive cage)	**13**	Internal speaker
7	Hard-drive cage	**14**	Pedestal (tower system)



zx2000 System Board

1	CD Audio connector	**7**	Internal speaker connector
2	Memory DIMM sockets (4)	**8**	AGP-Pro 50 socket
3	CPU Power Module	**9**	PCI sockets (5)
4	CPU Assembly	**10**	SCSI LED activity connectors
5	Battery	**11**	Rear panel connectors
6	USB front cable connector		

For additional information on the system board, see Appendix B.

removal and replacement prerequisites

Before you remove or replace parts, you must:

- Read the power and EMI warning and note below. (Your safety is important!)
- Gather your tools.
- Follow electrostatic discharge (ESD) precautions.

read the power and EMI warning and note

WARNING: For 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 Electromagnetic Interference (EMI) compliance, verify that all covers are replaced and that all screws are properly seated.

gather your tools

You need:

- Flat blade screwdriver
- T-15 Torx driver
- Special processor tool (provided with replacement CPU)
- Static-free mat
- Static strap

follow 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 covers

To upgrade, remove or replace system components, you must first remove the covers from the system chassis. This section explains how to remove and replace the covers for both tower and rackmount configurations.

WARNING: Never remove the system cover(s) without first turning the system off and unplugging the power cord from the outlet or Power Protection Device. Always replace the cover(s) before turning the workstation on.

removing the plastic and metal covers

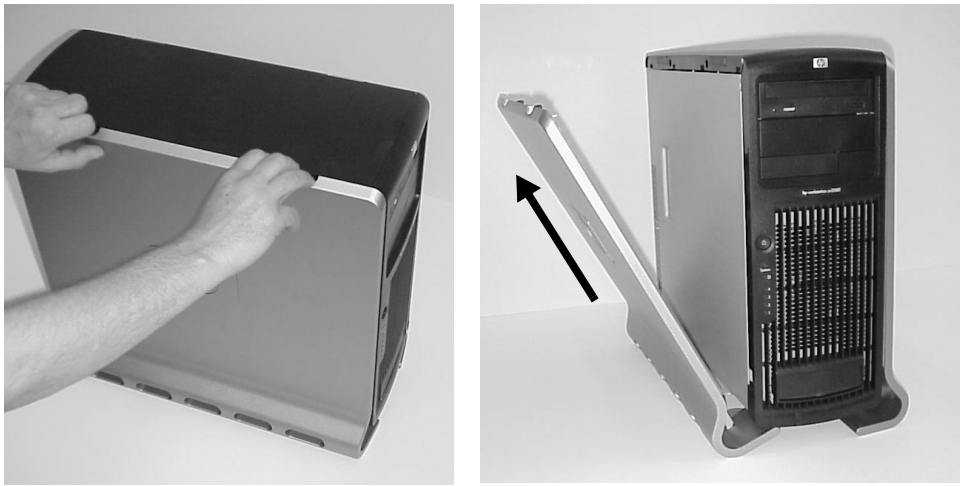
1. Turn off the system and disconnect the power cable and all other cables from the back of the system.
2. Access the metal cover.

   Rackmount system: Release the glide-rail retainers and slide the system outward as far as you can so that you have access to the system cover.

   Tower system: remove the plastic cover. With the front panel of the tower case facing right:

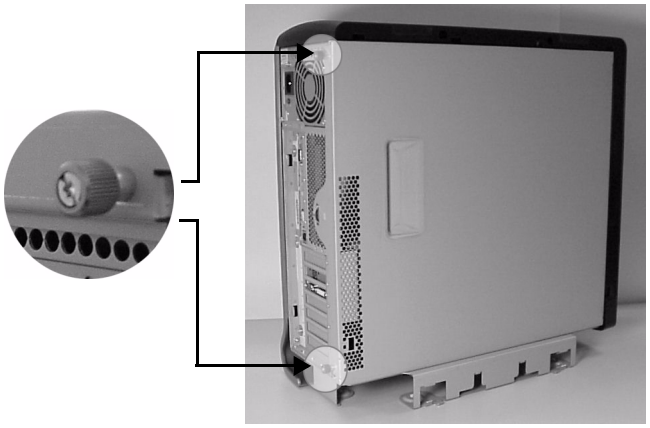
   a. Grasp both indentations at the top of the side panel and pull outward.

   b. Lift the plastic cover off of the system chassis.



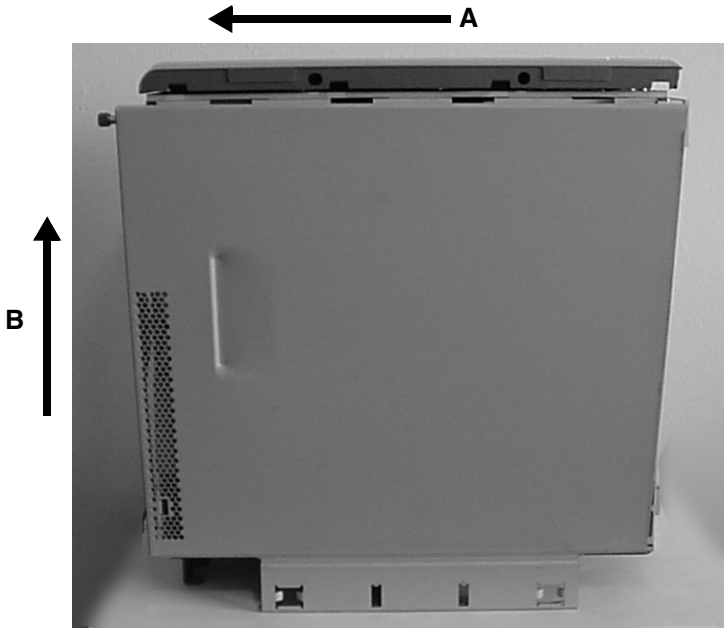
Removing the Plastic Cover (Tower System Only)

3. Loosen the two blue screws on the cover near the back panel of the chassis.



Unscrewing the Metal Side Cover

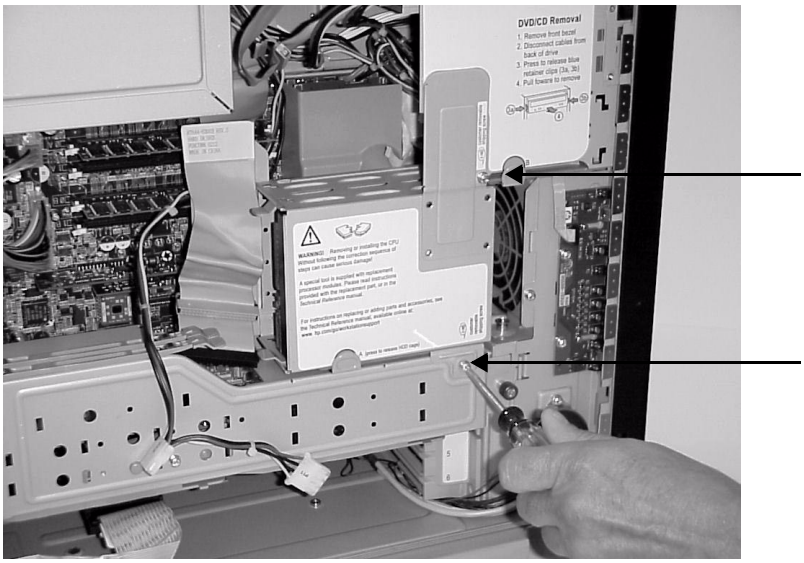
4. Slide the cover about 60 mm (1.5 in.) toward the back of the chassis, then lift it off.



Removing the Metal Side Cover

removing the shipping screws

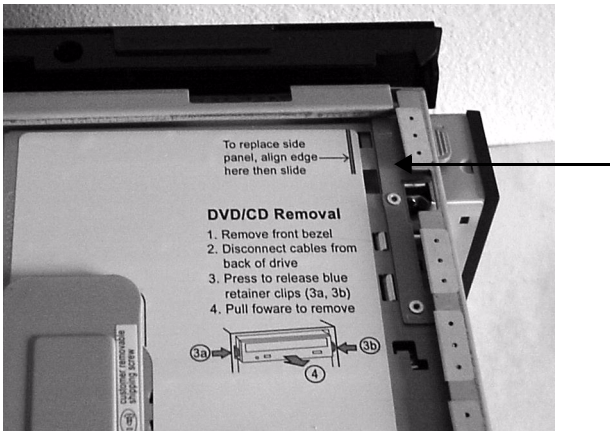
The first time you open the case to work on the system, remove the screws that hold the hard drive cage and AGP retainer arm in place for shipping. Replacing these screws is not necessary.



Shipping Screws

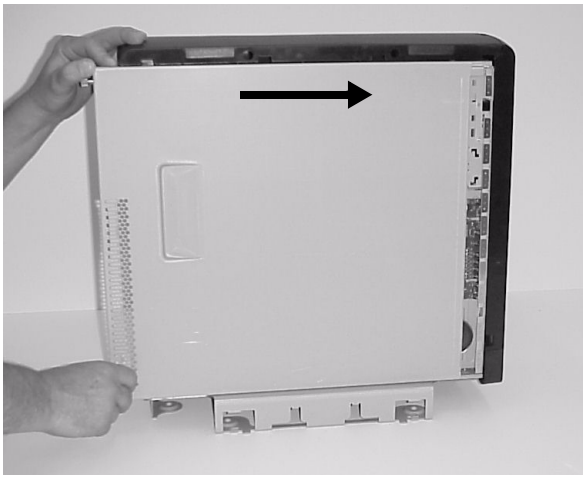
replacing the covers

1. Align the right edge of the metal cover with the blue line on the system chassis.



Align the Metal Cover

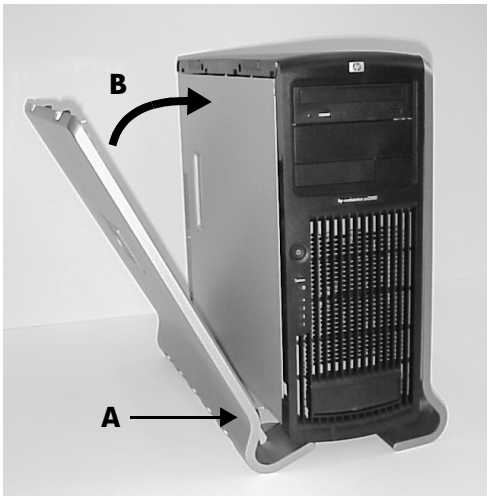
2. Place the metal cover on the chassis and slide it toward the system front panel.



Replace the Metal Cover

3. Tighten the two blue screws on the cover near the rear panel of the chassis.
4. *Rackmount system:* Slide the system inward until the glide-rail retainers latch.

5. *Tower system:* Replace the plastic cover.
   a. Align the cover mounting holes with the matching tabs on the system chassis.
   b. Close the cover until it snaps onto the system chassis.



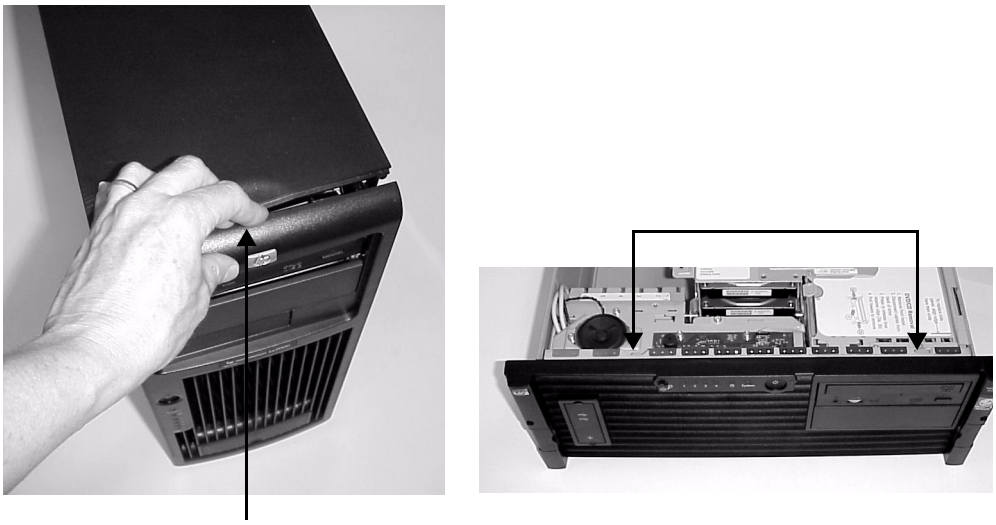
Replacing the Plastic Cover (tower system only)

removing and replacing the front bezel

You must remove the front bezel from the chassis to upgrade, remove or replace an optical drive.

removing the front bezel

1. To remove the front bezel:
   - ❏ *Tower system:* Firmly grasp the finger grip at the top of the bezel and pull forward until the bezel snaps open.
   - ❏ *Rack-mounted system:* Remove the metal cover, then depress the blue release tabs inside the chassis and rotate the bezel away from the chassis.

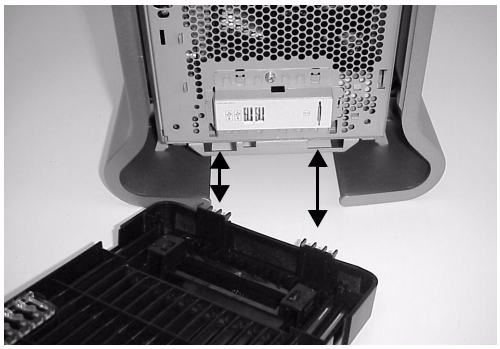


Removing the Front Bezel

2. Lift the bezel off of the chassis.

replacing the front bezel

1. Insert the bezel latches into the matching slots on the system chassis.



Replacing the Front Bezel

2. Close the bezel and push toward the front of the system until it snaps into place.
3. *Rack-mounted system only*: Replace the metal cover.

removing and replacing internal components

memory modules

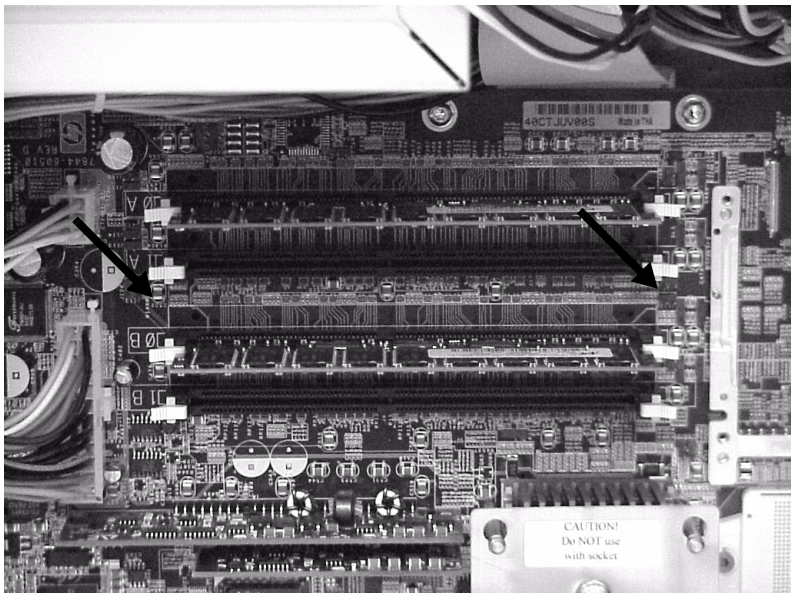
The hp workstation zx2000 has four memory sockets for memory modules. These modules can be 256 MB, 512 MB, 1 GB or 2 GB. DIMMs must be installed in ordered pairs of equal size. You can install between 512 MB and 8 GB of memory in the system. For a list of approved memory modules, see Appendix C.

removing memory modules

1. Turn off the system, disconnect all cables, and remove the system covers.

WARNING: To ensure that memory modules are not damaged during removal or installation, power off the workstation and unplug the power cord from the AC power outlet. Wait until the LED on the back of the power supply turns off before removing memory.

2. Press down on the memory module retainer clips and lift the module by its edges out of its memory socket.



Memory Module Retainer Clips

3. If the removed memory is functional, store it in a static-free container for future use.
4. Replace the system covers, reconnect all cables, and turn on the system.
5. Execute the EFI shell `info mem` command to verify the new memory configuration. For more information on EFI, see Chapter 3

installing memory modules

1. Turn off the system, disconnect all cables, and remove the system covers.

WARNING: To ensure that memory modules are not damaged during removal or installation, power off the workstation and unplug the power cord from the AC power outlet. Wait until the LED on the back of the power supply turns off before removing or installing memory.

2. Holding the memory module by its left and right edges, insert the module into the socket.
   - ❏ DDR SDRAM must be loaded as matched pairs. For example, if you place a memory module of 1 GB in DIMM 0A, you must insert a 1 GB module in DIMM 0B. Matched pairs should be loaded in sockets 0A and 0B first, and then in sockets 1A and 1B.
   - ❏ To verify that DIMMs are matched pairs, make sure the HP part numbers are identical.
   - ❏ It is not necessary for DIMMs in the two pairs to match. For example, you may install a pair of 256 MB DIMMs in sockets 0A and 0B and a pair of 1 GB DIMMs in sockets 1A and 1B.

Location of power supply (reference point)

Loading Order	Memory DIMM Sockets
1st	DIMM 0A
2nd	DIMM 1A
1st	DIMM 0B
2nd	DIMM 1B

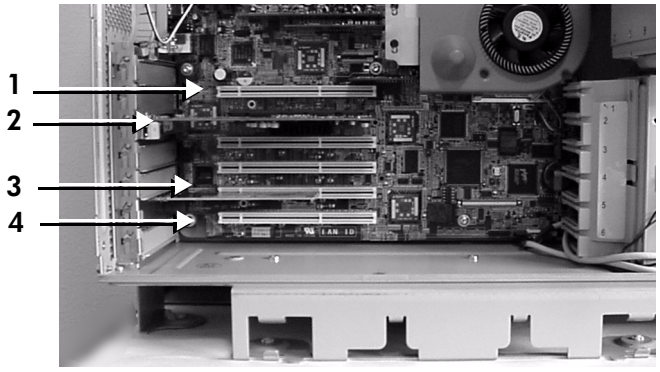
NOTE: The memory modules are keyed and can only be inserted in one direction. When the module is correctly seated, the retainer clips will return to their fully upright position. Snap the clips firmly into place to ensure that the DIMMs are seated properly.

3. Replace the system covers, reconnect all cables, and turn on the system.
4. Execute the EFI shell `info mem` command to verify the new memory configuration. For more information on EFI, see Chapter 3.

accessory and graphics cards

The zx2000 has the following accessory card sockets:

- One half-length 64-bit 66 MHz PCI-X socket
- One AGP-Pro 50 4X video card socket
- Three full-length 64-bit 66 MHz PCI-X sockets
- One full-length 64-bit 133 MHz PCI-X socket



PCI and AGP Sockets

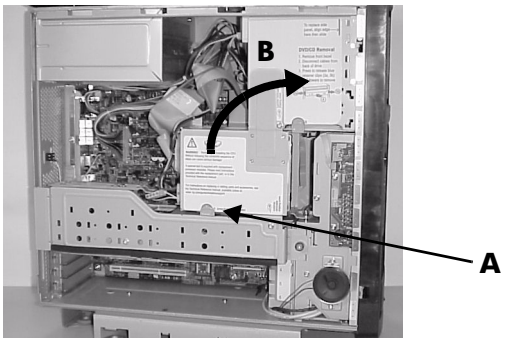
1	Half-length PCI socket
2	AGP-Pro 50 socket
3	66 MHz full-length PCI sockets (3)
4	133 MHz full-length PCI sockets

This section explains how to:

- access the sockets, and
- remove and replace AGP video and PCI accessory cards.

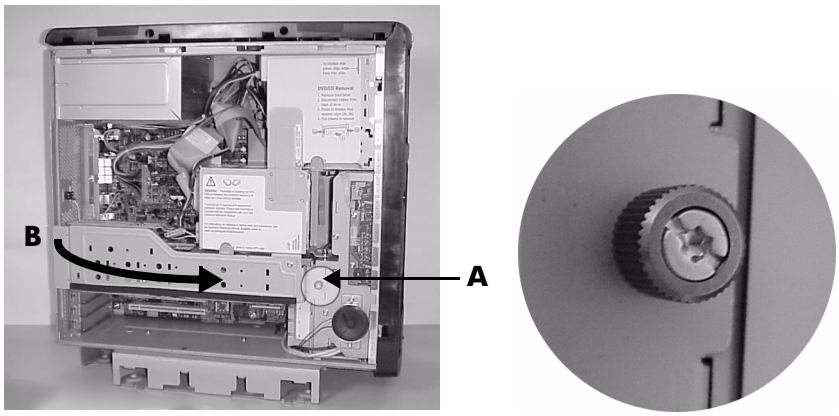
removing an accessory or video card

1. Turn off the system, disconnect all cables, and remove the system covers.
2. Disconnect the hard drive power connection and IDE or SCSI cable.
3. Raise the hard drive cage:
   a. Depress the blue latch on the hard drive cage.
   b. Lift up the hard drive cage until it snaps into the upright position.



Lifting the Hard Drive Cage

4. Remove the AGP retainer arm:
   a. Unscrew the blue AGP retainer arm screw.
   b. Lift the arm, sliding it slightly toward the front of the system to release the latches from the slots in the chassis.

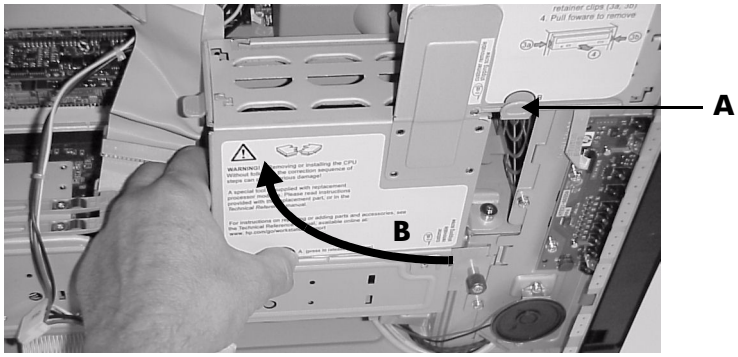


Removing the AGP Retainer Arm

5. Pull the blue lever on the end of the retainer clip at the rear of the system and lift it out.

Removing the PCI Retainer Clip

6. Grasp the bulkhead end of the card and its opposite edge and lift the card out of its connector.
7. Insert a bulkhead blank, then replace the PCI retainer clip.
8. Replace the AGP retainer arm, making sure that the latches on the arm are inserted securely into the slots on the rear edge of the system chassis and the retainer clip is securely holding the AGP card in place. Lower the arm into place and tighten the blue screw.
9. Close the hard drive cage:
   a. Depress the blue latch holding the hard drive cage in the upright position.
   b. Lower the cage until it snaps into place.



Releasing and Lowering the Hard Drive Cage

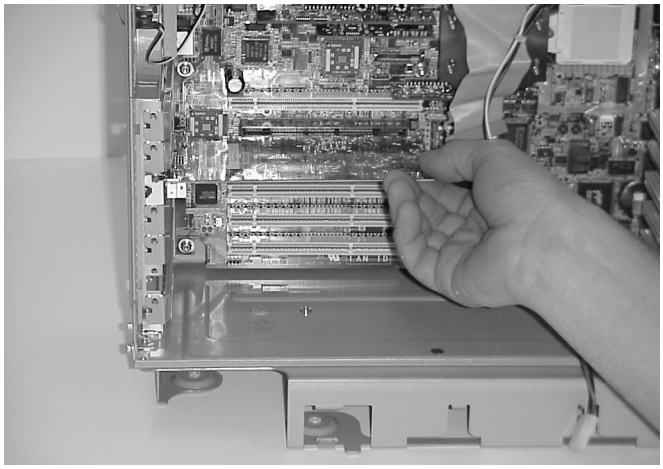
10. Reattach the hard drive power connection and IDE or SCSI cable.
11. Replace the system covers and cables, and restart the workstation.

installing or replacing an accessory or video card

NOTE: For specifications on your video card, visit the manufacturer's web site or refer to the graphics documentation included in the acccessory kit.

To install or replace an accessory or video card:

1. Remove the existing card or bulkhead blank that is in the socket you want to use.
2. Grasp the bulkhead end of the card and its opposite edge and insert the card into its connector.



Insert the New Card

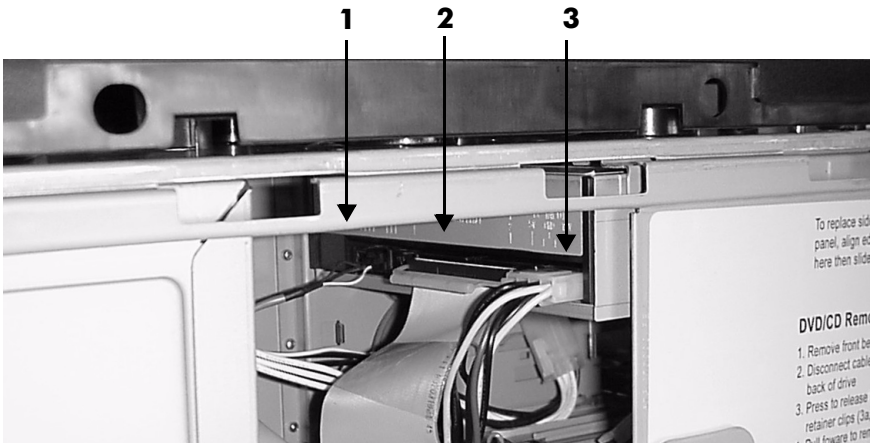
3. Replace the PCI retainer clip. First insert the tab at the lower end, then press down until the blank snaps into place.
4. Replace the AGP retainer arm and lower the hard drive cage.
5. Replace the covers and reconnect all cables.
6. Turn the system on, then execute the EFI firmware shell `info io` command to verify that the accessory card has been properly installed. For more information on EFI, see Chapter 3.

optical drives (CD or DVD)

removing an optical drive

1. Turn off the system, disconnect all cables, and remove the system covers and front bezel.
2. Disconnect the power, IDE and audio cables from the back of the optical drive.

NOTE: The audio cable has a small release clip on the side of the connector. Squeeze in on the connector and pull gently to remove it from the drive.



Disconnecting the Cables

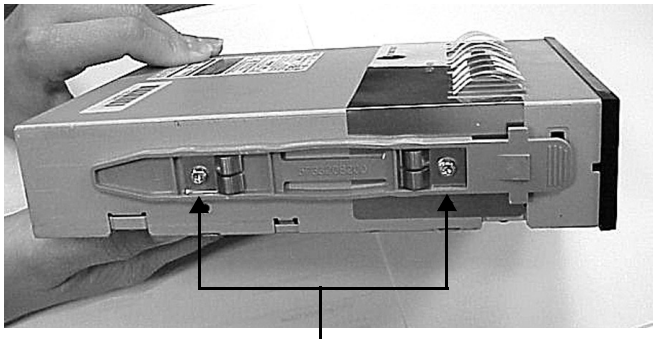
1	Audio
2	IDE
3	Power

3. Release the small blue retainer clips on both sides of the optical drive by pressing in on them.

Releasing the Optical Drive Retainer Clips

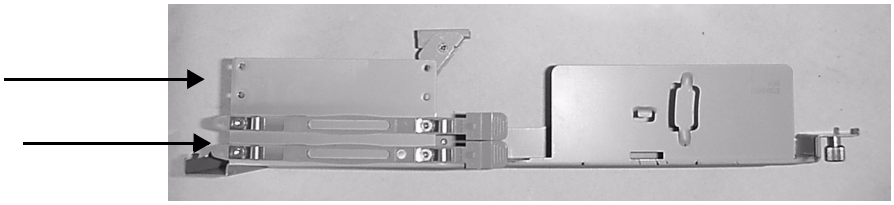
4. Slide the optical drive forward and pull it out of the drive bay.

5. Remove the rails from the drive by unscrewing the two screws on each rail.



Removing the Optical-drive Rail Screws

6. To save these rails for future use, attach them to the inside of the AGP retainer arm.



Rail Storage on AGP Retainer Arm

7. If you are not replacing the optical drive with a new drive, install a blank in the drive bay opening.

replacing an optical drive

1. Turn off the system, disconnect all cables, and remove the system covers and front bezel.
2. Attach the rail labeled “L” to the left side of the optical drive and the rail labeled “R” to the right side. Make sure the EMI gasket is installed on the top of the drive as shown:

EMI Gasket

3. Slide the optical drive into the drive bay until it stops.
4. Ensure that the retainer 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 retainer clips and pull. If you can pull gently on the optical drive without it sliding out of its bay, the optical drive is securely in place.

5. Connect the IDE, power, and audio cables on the back of the optical drive.

NOTE: The system has two IDE cables — one is marked "Hard Drives," the other is marked "Optical Devices." Make sure you connect them properly. The black connector on each cable is for the master device; the gray connector is for the slave device. Make sure the jumper on the optical drive is set to cable select (CSEL), not to master (M) or slave (S). See the documentation provided with your drive for help locating the jumper.

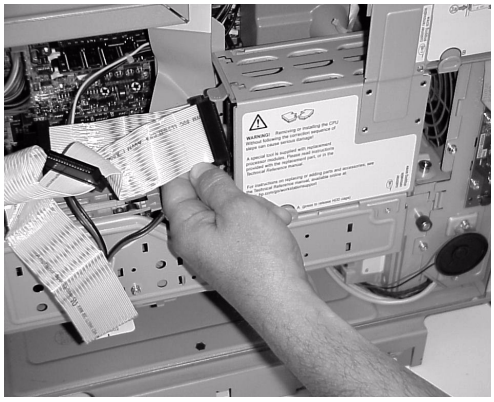
6. Replace the covers and reconnect all cables.
7. Turn the system on, then execute the EFI shell `info io` command to verify that the optical drive has been properly installed. For more information on EFI, see Chapter 3.

hard drives

removing a hard drive

1. Turn off the system, disconnect all cables, and remove the system covers.
2. Disconnect the hard drive power connection and IDE or SCSI cable.

1

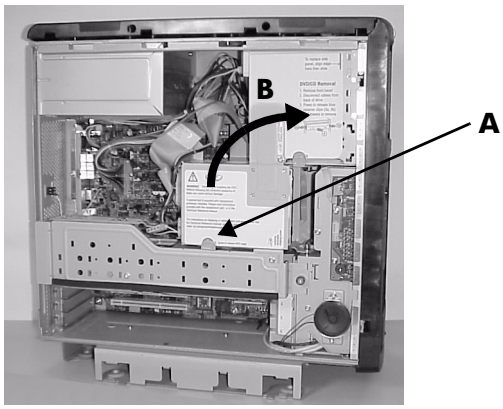


2

Disconnect the Drive Cables

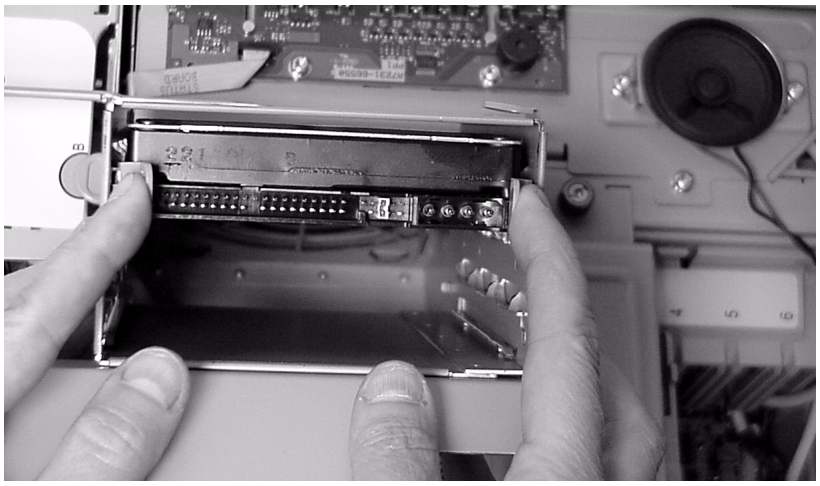
1	Power cable
2	IDE or SCSI cable

3. Raise the hard drive cage:
   a. Depress the blue latch.
   b. Lift up the hard drive cage until it snaps into the upright position.



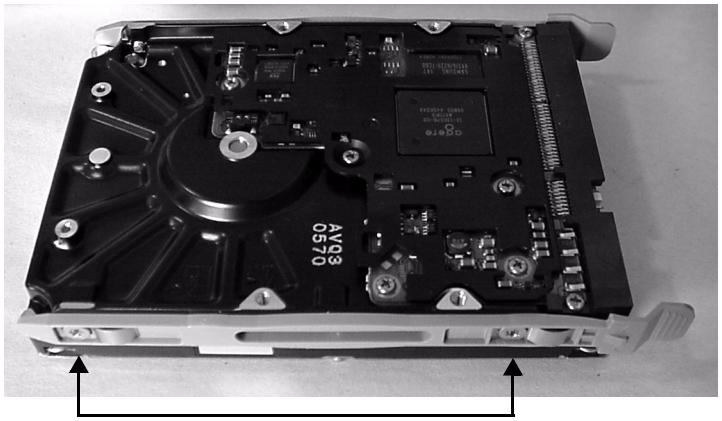
Lifting the Hard Drive Cage

4. Place your fingers on the colored release clips, located on the sides of the drive, and squeeze inward. Then, pull outward to remove the drive from the system.



Removing the Hard Drive

5. Remove the rails from the hard drive by unscrewing the two screws on each rail.



Removing the Hard Drive Rail Screws

6. To save these rails for future use, attach them to the inside of the AGP retainer arm.

replacing a hard drive

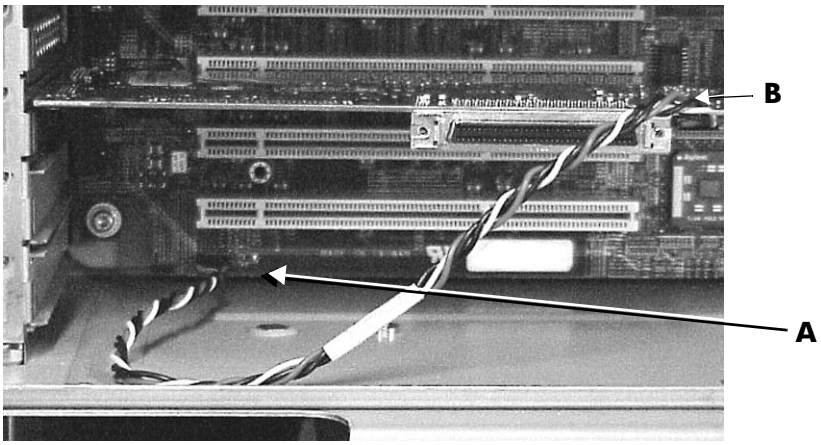
1. Attach rails to the hard drive (page 2-21).

NOTE: Extra hard drive rails are attached to the inside of the AGP retainer arm (page 2-18).

2. Push inward on the drive until it no longer slides inward.
3. If you removed the AGP retainer arm to access stored rails, replace it, making sure that the latches on the arm are inserted securely into the sockets on the rear edge of the system chassis and the retainer clip is securely holding the AGP card in place. Lower the arm into place and tighten the blue screw using your fingers.
4. Depress the blue latch holding the hard drive cage in the upright position, and lower the cage until it snaps into place.
5. Reattach the hard drive power connection and IDE or SCSI cable.

NOTE: The system has two IDE cables — one is marked "Hard Drives," the other is marked "Optical Devices." Make sure you connect them properly. The black connector on each cable is for the master device; the gray connector is for the slave device. Make sure the jumper on the hard drive is set to cable select (CSEL), not to master (M) or slave (S). See the documentation provided with your drive for help locating the jumper.

6. *SCSI Drives only:* Connect the SCSI Activity LED cable provided with the SCSI card to the system board (A) and SCSI card (B).



Connect the SCSI LED Cable

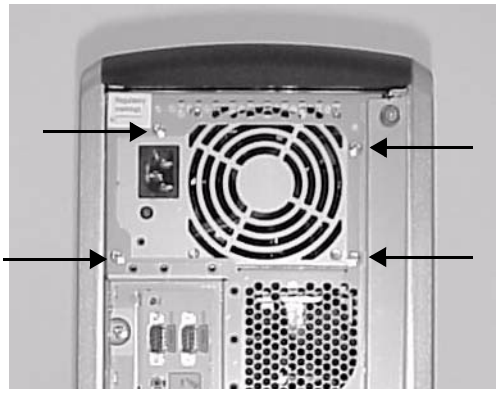
NOTE: The SCSI Activity LED is only active on systems purchased after March 2003.

7. Replace the system covers and cables.
8. Turn the system on, then execute the EFI shell `info io` command to verify that the optical drive has been properly installed. For more information on EFI, see Chapter 3.

power supply

removing the power supply

1. Turn off the system, disconnect all cables, and remove the system covers.
2. Unplug the power supply power connectors from all components in the system including the hard drive, optical drive, CPU and motherboard (large and small connectors).
3. Unscrew the four screws attaching the power supply to the back of the system chassis.



Unscrew the Power Supply

4. Pull the power supply forward and lift it out of the chassis.

Removing the Power Supply

replacing the power supply

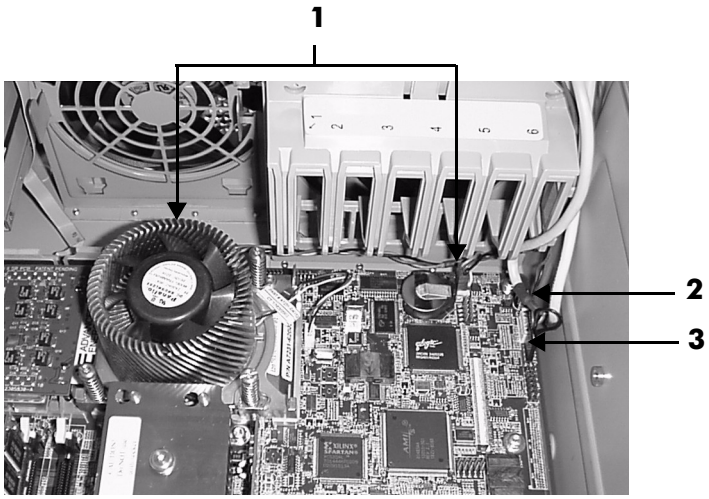
1. Insert the new power supply into the system chassis.
2. Attach the four screws to the rear panel of the system.
3. Plug the power supply power connectors into all components in the system including the hard drive, optical drive, CPU and motherboard (large and small connectors).

system fans

Two cooling fans are mounted in a single removable module behind the system front bezel.

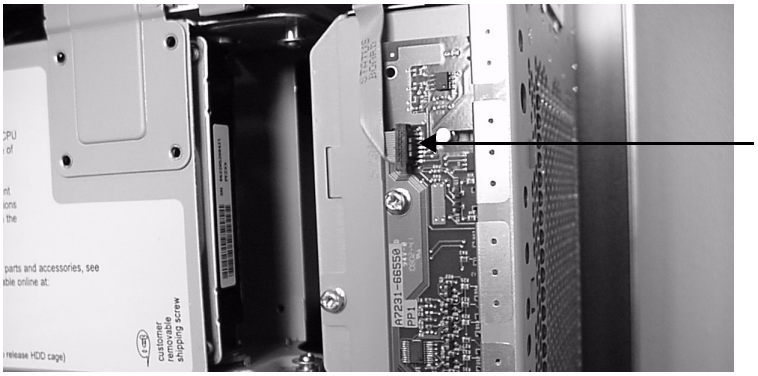
removing the system fans

1. Turn off the system, disconnect the power cable, and remove the system covers.
2. Remove the covers from the system, lift the hard drive cage, and remove the AGP retainer arm.
3. Disconnect the two system fan power cables, as well as the speaker, front-access USB connectors and the LED status panel.



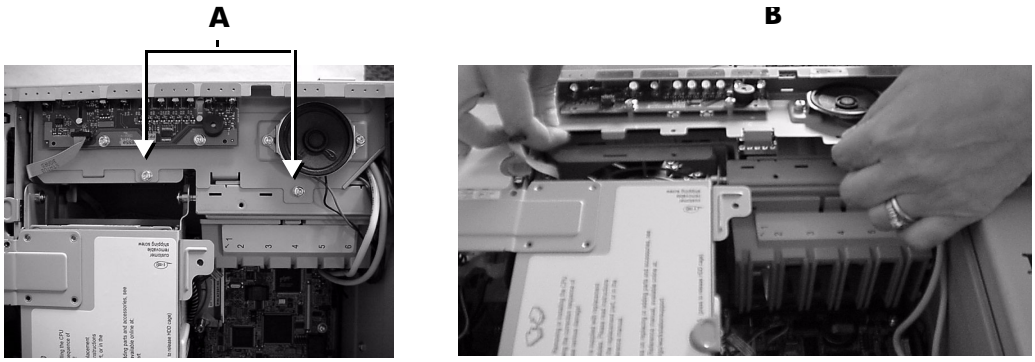
Disconnecting the Fans and Cables

1	Two fan connectors (one behind CPU assembly)
2	Speaker connector
3	USB connector



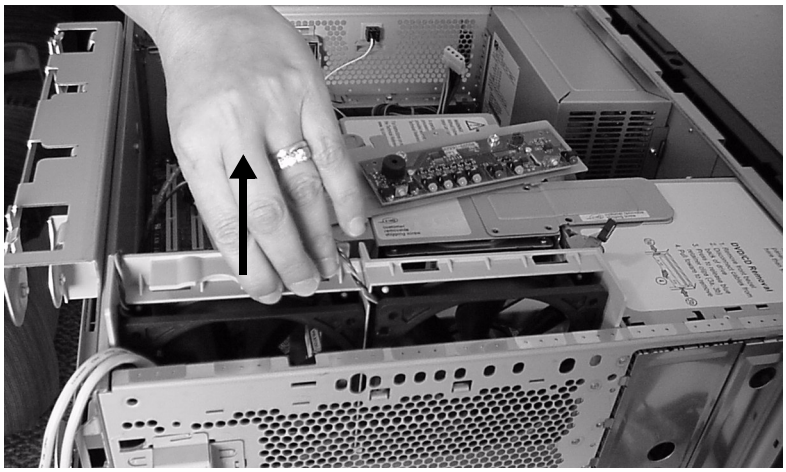
Disconnecting the LED Status Panel Cable

4. Unscrew the fan cover (A), lift it off of the fan enclosure (B), and move it to the side.



Removing the System Fan Cover

5. Grasp the fan enclosure firmly and pull it out of the system chassis.



Removing the System Fans

replacing the system fans

1. Grasp the replacement fan module firmly and insert it into its fan slot.
2. Re-attach the LED status panel and all cables, replace the system covers, and turn on the system.
3. Verify that the fans have been properly installed by verifying that none of the Diagnostic LEDs on the front of the system are lit.

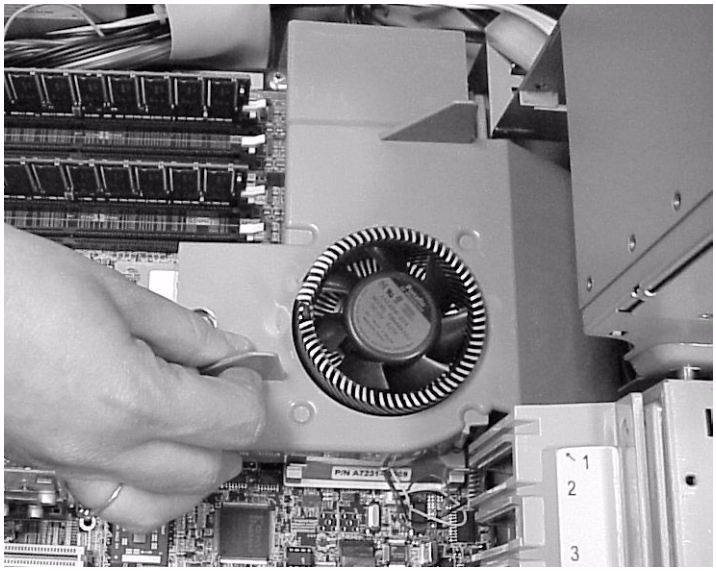
airflow guide

The airflow guide on your system ensures that the proper volume of air for cooling the voltage regulator modules (VRMs), processor, and processor power module flows over these components.

You may need to replace the airflow guide if it becomes damaged to the point that airflow across the processor is restricted. You may need to remove the airflow guide to gain access to components under it.

removing the airflow guide

1. Turn off the system and **disconnect all power**.
2. Disconnect all cables, and remove the system covers.
3. Raise the hard drive cage and remove the AGP retainer arm.
4. Lift the airflow guide out of the system chassis.



Airflow Guide

replacing the airflow guide

1. Insert the airflow guide so the CPU assembly fits into the opening in the guide.
2. Lower the hard drive cage, making sure it lowers fully and fits firmly against the airflow guide and replace the AGP retainer arm.
3. Replace the system covers and reconnect all cables.

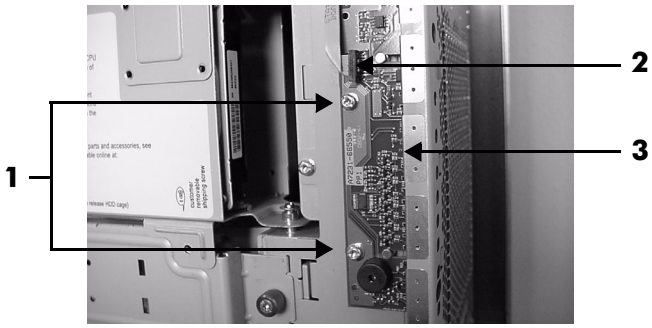
LED status panel

The LED status panel contains a set of LEDs and buzzer that provide status and troubleshooting information.

CAUTION: Some system settings are saved to the LED status panel. If you are replacing **both** the LED status panel and the system board, they must be replaced one at a time to avoid loss of system settings. First replace one component, then turn on the system and boot to the EFI prompt. After confirming that the first component has been replaced successfully, shut down the system and replace the second component.

removing the LED status panel

1. Turn off the system, disconnect all cables, and remove the system covers.
2. Disconnect the LED status panel controller cable.
3. Unscrew the two LED status panel mounting screws and remove the panel.



Disconnecting the LED Status Panel

1	Mounting screws
2	LED controller cable
3	LED status panel

replacing the LED status panel

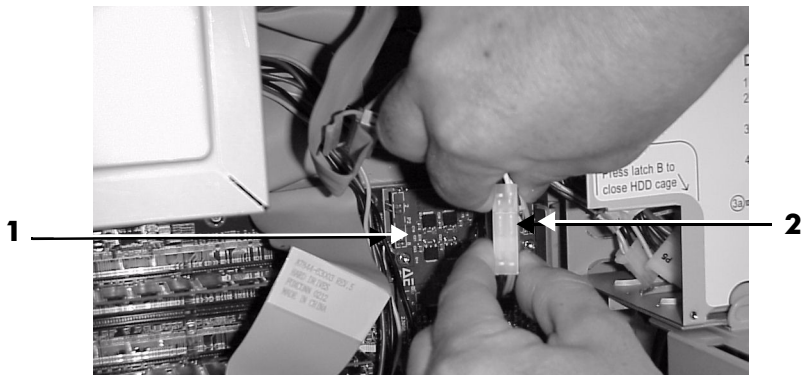
1. Replace the LED status panel in the system and screw in the two LED status panel mounting screws.
2. Connect the LED status panel controller cable.
3. Replace the system covers and reconnect all power cables. Turn on the system and verify that the system and power LEDs light up.

processor assembly and power module

CAUTION: You must follow these steps **exactly and in the correct sequence** to avoid serious damage to the system.

removing a processor

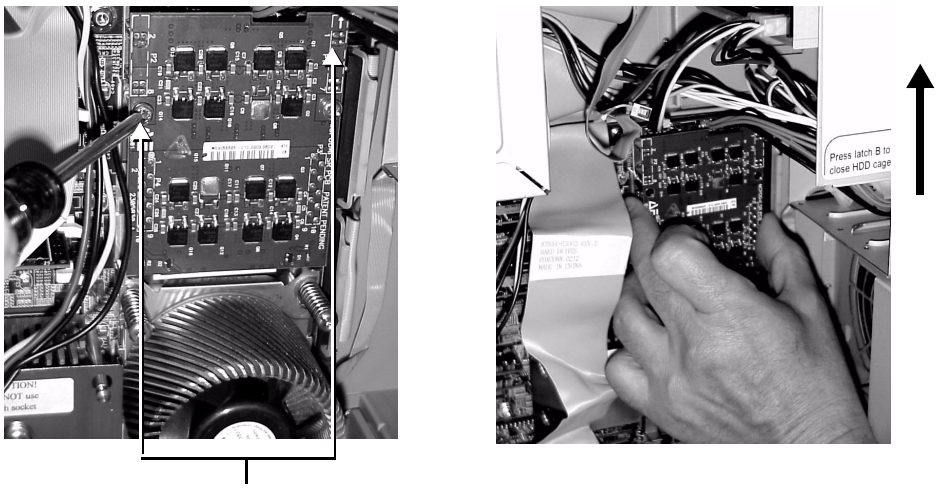
1. Turn off the system, disconnect all power cables, and remove the system covers.
2. Raise the hard drive cage and remove the AGP retainer arm and airflow guide.
3. Disconnect the power module power cable.



Disconnect the Power Module Power Cable

1	Power module
2	Power module cable

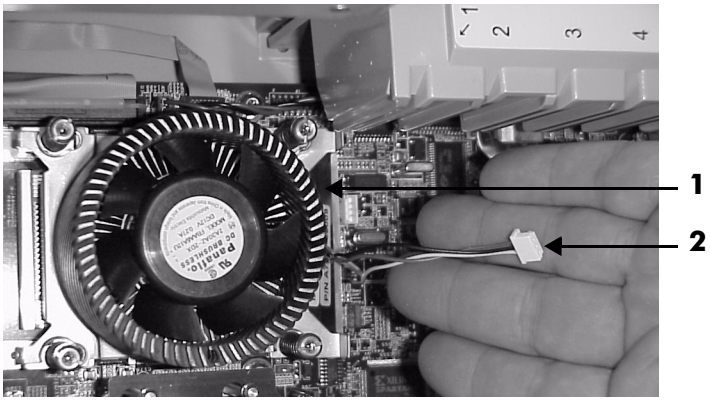
4. Unscrew the power module mounting screws, then disconnect the module from its processor by sliding it toward the back of the system chassis.



Unscrewing and Removing the Power Module

5. Remove the power module from the system.

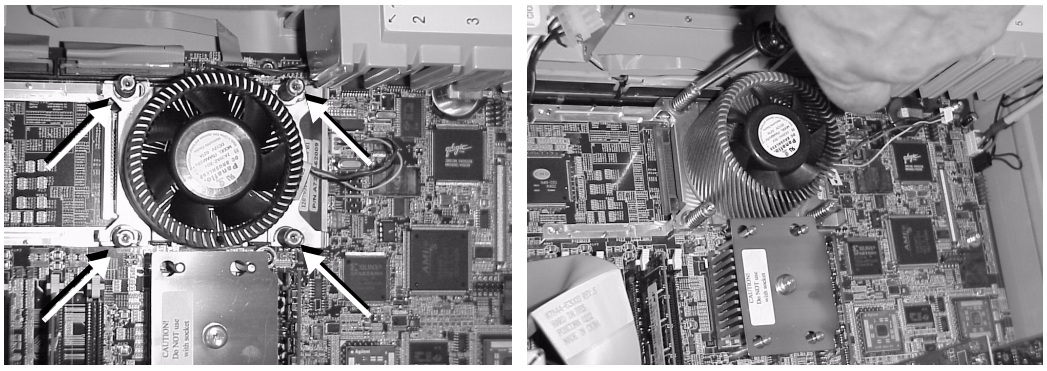
6. Disconnect the small power cable for the processor turbo fan.



Disconnect the Power Cable for the Processor Turbo Fan

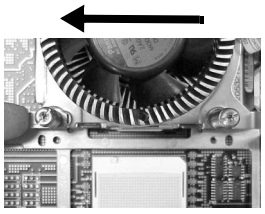
1	Turbo fan heatsink
2	Power connector for processor turbo fan

7. Use the special processor tool provided with the replacement processor to unscrew the four captive heatsink screws.



Unscrew the Four Turbo Fan Captive Heatsink Screws

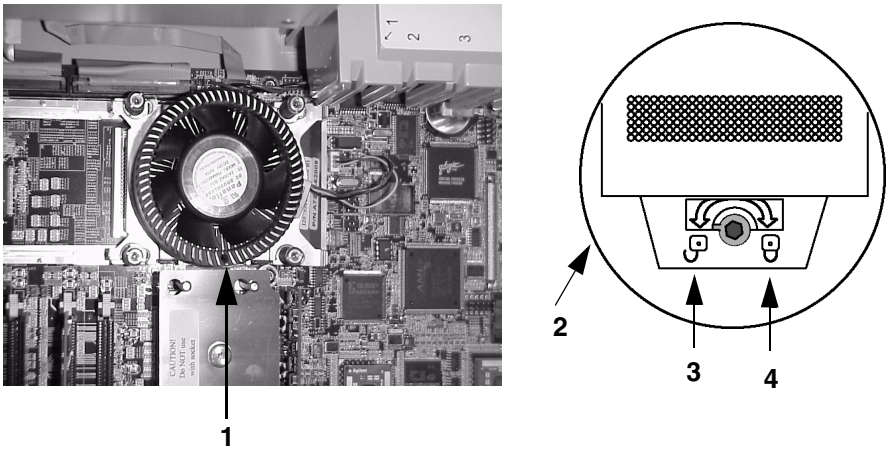
8. Slide the sequencing plate to the open position: towards the top (tower) or right side (rackmount) of the system. This opens up the hole in the edge of the turbo fan's heatsink for insertion of the special processor tool into the processor locking mechanism.



Slide the Sequencing Plate This Way to Remove

9. Unlock the processor locking mechanism using the special processor tool shipped with your replacement processor assembly. To do this, you need to rotate the mechanism 180 degrees counter-clockwise.

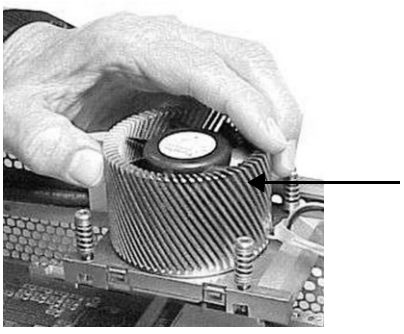
NOTE: There is a hole that runs down through the edge of the turbo fan's heatsink, which allows you access to the processor's locking mechanism using the hex-key end of the special processor tool.



Unlock the Processor Locking mechanism

1	Insert special processor tool here
2	The special processor tool rotates this lock underneath the heat sink
3	**Unlocked**
4	Locked

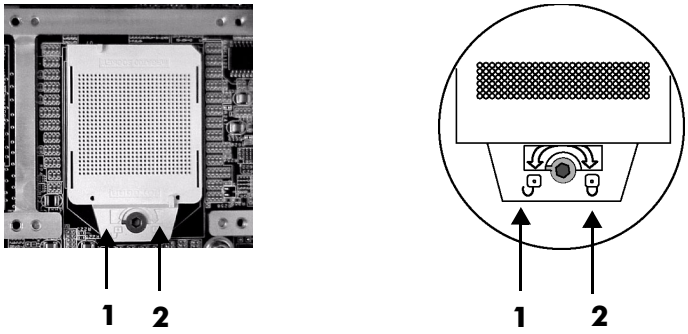
10. Lift the turbo fan heatsink and processor out of the system.



Remove the Turbo Fan Heatsink and Processor Assembly

replacing a processor

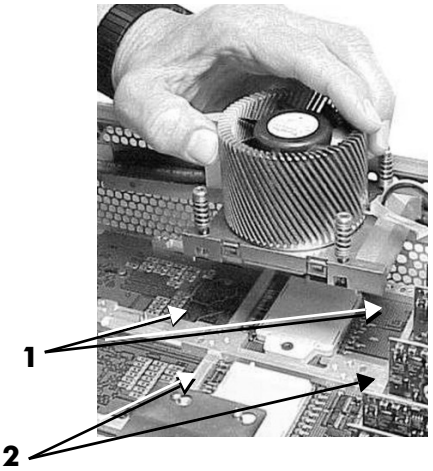
1. Remove the existing processor (page 2-28).
2. Make sure the processor locking mechanism is rotated into the unlock position.



Processor Locking Mechanism

1	**Unlocked**
2	Locked

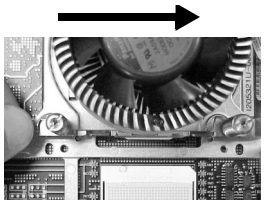
3. Use the four locator posts on the heatsink and the turbo fan power cable to properly align the fan and processor assembly on the system board:
   - ❏ The four locator posts fit in locator holes on the system board's processor mount.
   - ❏ The turbo fan's power cable must be positioned so that it is located on the side of the heatsink that faces the bottom (tower) or left side (rackmount) of the system.



Aligning the Turbo Fan and Processor Assembly

1	Locator posts
2	Locator holes

4. Use the special processor wrench shipped with your replacement processor assembly to lock the processor in place on the system board:
   a. Insert the special processor tool into the hole that runs down the side of the heatsink and rotate it clockwise 180 degrees. Remove the tool.
   b. Slide the sequencing plate to the closed position.



Slide The Sequencing Plate This way to Install

   c. Screw in the four captive heatsink screws.
5. Connect the small power cable for the processor turbo fan to its connector on the system board.
6. Place the power module in the system.
7. Slide the power module on the system board's metal mounting bracket so that the power module's connector connects with the processor's connector. 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.
8. Connect the power module power cable.
9. Replace the airflow guide. Replace the AGP retainer arm and lower the hard drive cage.
10. Replace the system covers and reattach all cables.
11. Verify that the processor works by turning the system.

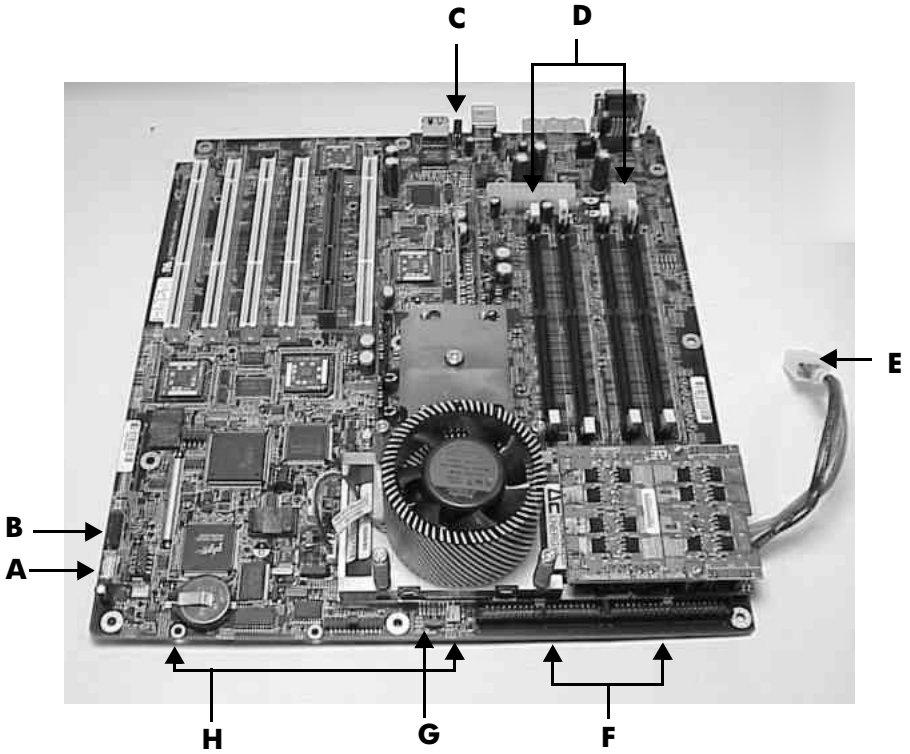
system board

CAUTION: Some system settings are saved to the LED status panel. If you are replacing **both** the LED status panel and the system board, they must be replaced one at a time to avoid loss of system settings. First replace one component, then turn on the system and boot to the EFI prompt. After confirming that the first component has been replaced successfully, shut down the system and replace the second component.

removing the system board

1. Turn off the system, disconnect all cables, and remove the system covers.
2. Raise the hard drive cage and remove the AGP retainer arm.
3. Disconnect the system board connectors.

NOTE: Disconnect the IDE cables from the hard disks and optical drives. Leave them attached to the system board.



System Board Connectors

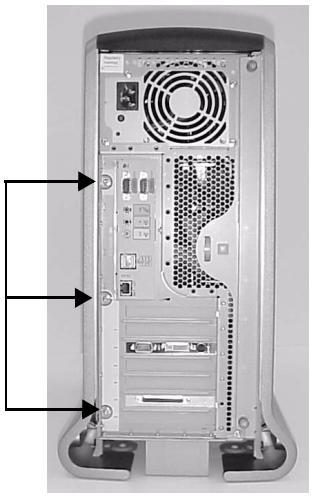
A	Front-access USB connectors	**E**	CPU power
B	Speaker	**F**	IDE connectors
C	Chassis intrusion switch	**G**	LED status panel connector
D	System board power connectors	**H**	System fan connectors (2)

4. Remove the following cables and components. Do *not* remove the CPU.

NOTE: To help with re-assembly, make note of which cables were connected to which connector.

- ❏ DIMMs
- ❏ Accessory and video cards
- ❏ Fan, LED status panel and front-access USB connections
- ❏ Airflow guide
- ❏ Power connections and power supply

5. Unscrew the three backplane system board mounting screws that connect the system board to the rear of the system chassis.



Unscrewing the System Board Mounting Screws

6. Grasp the chipset heatsink and the processor heatsink and slide the system board toward the front of the system.
7. Lift up the rear edge of the system board and lift it out of the chassis.

replacing the system board

1. Complete all of the steps in the section “Removing the System Board” on page 2-33.
2. Grasp the new system board by its edges and carefully place it in the system. Remember that the system board keyholes must be aligned with their corresponding standoffs on the system’s chassis. Once the system board is in the system aligned with the keyhole standoffs, slide it back toward the rear of the system. This locks the system board in place.

Aligning the System Board

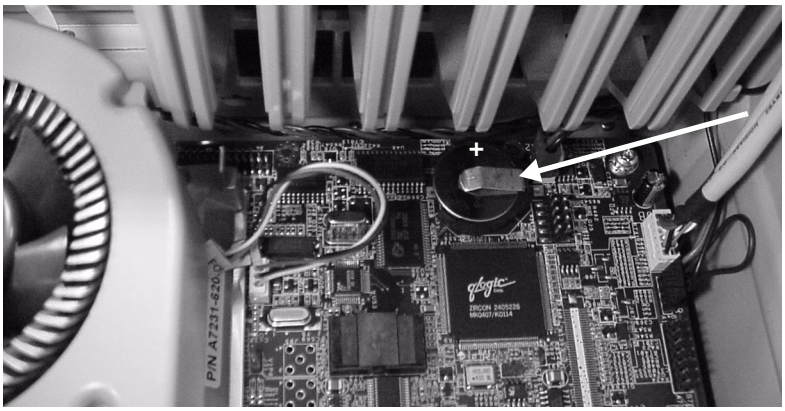
3. Screw in the three rear backplane system board mounting screws.
4. Connect the system board cables.
5. Replace all cables and components on the system board:
   - ❏ Memory DIMMs
   - ❏ IDE devices — hard drives and optical drives
   - ❏ Accessory and graphics cards
   - ❏ Fan, LED and front-access USB connections
   - ❏ Airflow guide
   - ❏ Power connections and power supply
6. Replace the AGP retainer arm, lower the hard drive cage. Replace the system covers and reconnect the cables.
7. Verify that the processor works by turning the system.

system battery

removing the system board battery

1. Turn off the system, disconnect all cables, and remove the system covers.
2. Raise the hard drive cage. Remove the AGP retainer arm and any PCI or AGP cards that are blocking access to the battery.
3. Lift up on the battery and push on the back of it with a small flat-head screwdriver. This will remove the battery from its holder.

CAUTION: Lift the battery just high enough to clear its holder. Too much stress on the retainer clip can break it.



The System Board Battery Retainer Clip

replacing the system board battery

1. Lift up on the battery holder's retainer 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.

CAUTION: Lift the battery holder retainer clip just high enough to slide the battery into the battery holder. Too much stress on the retainer clip can break it.

2. Replace any accessory cards you removed. Replace the AGP retainer arm and lower the hard drive cage.
3. Replace the system covers and reconnect all cables.
4. Verify that the battery has been installed correctly by turning on the system and executing the `time` command at the EFI prompt.

   You may need to reset the system time and date using the EFI `time` and `date` commands. Once you have set the time, turn the system off, unplug the power cord, and wait for a minute before turning it back on. Execute the `time` and `date` commands again. If the time and date are now correct, you have installed the battery correctly.

   For details on using EFI commands, see Chapter 3.

3

system configuration

This chapter covers the tools available for configuring the hp workstation zx2000 system:

- Extensible Firmware Interface (EFI), page 3-1
- Baseboard Management Controller (BMC), page 3-23
- Firmware upgrades, page 3-31

extensible firmware interface (EFI)

The Extensible Firmware Interface (EFI) is an interface between the operating systems and the workstation firmware.

The following topics introduce you to the EFI and explain how to use it to configure your system:

- Accessing and navigating the EFI shell, page 3-2
- Using the Boot Option Maintenance menu, page 3-11
- Using the Security/Password menu, page 3-21

accessing and navigating the EFI shell

When you turn on your system and it begins to start up, your system pauses at the **boot option** screen:

```
EFI Boot Manager ver x.xx [xx.xx]

  Please select a boot option

       [your OS will be listed here]
       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
```

NOTE: You have 7 seconds to change the boot option before the system boots to the default OS.

Use the up or down arrow keys to highlight an option, then press **Enter**.

- The **EFI Shell [Built-in]** is a command line interface that allows you to operate the EFI commands or create and run automated scripts.
- **Boot Option Maintenance Menu** allows you to select the order of the devices from which you want the firmware to attempt to boot the OS. You can also configure the system to boot from a configuration file.
- **Security/Password Menu** lets you add, change and delete system administrator and user passwords.

remote access

You can also access the EFI remotely.

1. With the workstation turned off, connect a 9-pin to 9-pin serial cable to *Serial Port A* on the rear panel of the workstation, and to your remote device.
2. Configure the terminal emulation software with these settings:
   - ❏ Baud rate: 9600
   - ❏ Bits: 8
   - ❏ Parity: None
   - ❏ Stop Bits: 1 (one)
   - ❏ Flow Control: XON/XOFF

NOTE: The default terminal emulation type is VT100+. The default baud rate is 9600. These settings can be changed from the EFI **Boot Options Maintenance Menu**.

3. Using the terminal emulation software, connect to the workstation with a *direct connection*.
4. Turn on the workstation and follow the steps below to access the EFI.

using the EFI shell

To access the EFI shell:

1. When the EFI boot option screen displays, use the arrow keys to highlight **EFI Shell**, then press **Enter**.

NOTE: You have 7 seconds to change the boot option before the system boots to the default OS.

---

2. A list of *file systems* (drives and partitions), and *block devices* on hard drives is displayed. For example:

```
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)
```

3. The EFI shell first searches for an optional script file named `startup.nsh`.
   - ❏ If this file is found, it is executed automatically.
   - ❏ If the script does not automatically start an OS or other application, the shell then waits for commands to be entered at the command prompt.
4. You can now enter commands.

   To run an individual command:

   a. Type the command at the shell prompt. For example, to clear the display on the monitor enter the **cls** command:

   ```
   Shell:> cls
   ```

   b. Press **Enter** to execute the command.

   - ◆ Some commands require additional arguments to further define their action. For example, to display information about the system memory, you must type the command name (**info**), plus the desired category of information to display (**mem**):

   ```
   fs0:\> info mem
   ```

   - ◆ When you enter individual commands at the command prompt, the shell performs variable substitution, then expands wild cards before the command is executed.
   - ◆ To switch to a different file system, execute the following, where *fsx* is the selected file system, as listed on the screen (see step 2). For example:

   ```
   Shell> fs0:
   ```

   You see this prompt:

   ```
   fs0:\> _
   ```

   - ◆ You can also run EFI applications (files ending with **.efi**). To list applications in the current file system, run the **ls** command. For example:

   ```
   fs0:> ls
   ```

   You see a list of applications on the `fs0` file system.

command syntax

The EFI shell uses a programming language to control the execution of individual commands. Some characters have special meanings in the EFI shell. This section includes instructions for running EFI shell commands and a list of the available commands.

To run an individual command:

1. Type the command at the shell prompt.

   For example, to clear the display on the monitor:

   ```
   fs0:\> cls
   ```

2. Press **Enter** to execute the command.

Arguments

Some commands require additional *arguments* to further define their action. For example, to display information about the system memory, you must type the command name, plus the desired category of information to display:

```
fs0:\> info mem
```

Rules

Follow these rules or the commands will not run correctly.

# Denotes a *comment*. All text after this symbol is ignored.

> Denotes an *output redirect*. Output of EFI shell commands can be saved to files instead of being displayed on the monitor or in the terminal emulation program. The shell redirects standard output to a single file and standard error to a single file. Redirecting both standard output and standard error to the same file is allowed. Redirecting to more than one file on the same command is not supported.

The output redirect options, include:

- **>** redirect output to a unicode file
- **>a** redirect output to an ASCII file
- **>>** append output to a unicode file
- **>>a** append output to an ASCII file

The syntax for redirecting script output is:

Command > **output_file_pathname**

% Denotes an *environment variable*. Environment variables can be set and viewed through the use of the set command (see **set** command in this chapter). To access the value of an environment variable as an argument to a shell command, delimit the name of the variable with the **%** character before and after the variable name; for example, **%myvariable%**.

***** Denotes a *wildcard* character. Matches zero or more characters in a file name.

? Denotes a *wildcard* character. Matches exactly one character of a file name.

[	Denotes a *wildcard* character. Defines a set of characters; the pattern matches any single character in the set. Characters in the set are not separated. Ranges of characters can be specified by specifying the first character in a range, then the **-** character, then the last character in the range. For example: **[a-zA-Z]**
^	Denotes a *literal argument*. When a command contains a defined alias the shell replaces the alias with its definition (see **alias** command in this chapter). If the argument is prefixed with the **^** character, however, the argument is treated as a literal argument and alias processing is not performed.
“ ”	Quotation marks in the EFI shell are used for argument grouping. A quoted string is treated as a single argument to a command, and any whitespace characters included in the quoted string are just part of that single argument. Quoting an environment variable does not have any effect on the de-referencing of that variable. Double quotation marks (**“ ”**) denote strings. Single quotation marks are not treated specially by the shell in any way. Empty strings are treated as valid command line arguments.
space	Used to format batch scripts to separate command names, parameters and so forth.
newline	Used to format batch scripts. Each line represents a new command.

command descriptions

The following sections provide brief descriptions of the EFI commands. For more information, use the EFI shell's help system. To access a:

- List of EFI command classes, execute `help` at the EFI shell prompt.
- Detailed description of a command, execute `help` and the command name or other options at the EFI shell prompt. For example:
  - `fs0:\> help date` displays help for the `date` command
  - `fs0:\> help -a` displays all commands in alphabetical order
  - `fs0:\> help -a-b` displays all commands in alphabetical order with page breaks
  - `fs0:\> help class` displays all commands in the specified command class (see below)

Command Classes

EFI commands are organized into different classes based on their functions. The classes include:

`boot`	Boot options and disk-related commands
`configuration`	Change and retrieve system information
`device`	Get device, driver and handle information
`memory`	Memory related commands
`shell`	Basic shell navigation and customization
`scripts`	EFI shell script commands

Boot Commands

The *boot class* commands let you set boot and disk options.

`autoboot`	View or set autoboot timeout variable
`bcfg`	Display/modify the driver/boot configuration
`dblk`	Display the contents of blocks from a block device
`boottest`	Set/view BootTest bits
`mount`	Mount a file system on a block device
`reset`	Reset the system
`vol`	Display volume information of the file system

Configuration Commands

The *configuration class* commands let you change and retrieve system information.

`cpuconfig`	Deconfigure or reconfigure CPUs
`date`	Display the current date or sets the date in the system; format is **mm/dd/yyyy**
`err`	Display or change the error level
`errdump`	View/clear logs
`info`	Display hardware information

`monarch`	View or set the monarch processor
`palproc`	Make a PAL procedure call
`salproc`	Make a SAL procedure call
`time`	Display the current time or set the time of the system; format is **hh:mm:ss**
`ver`	Display the version information

Device Commands

The *device class* commands provide device, driver and handle information.

`baud`	Set serial port settings
`connect`	Bind an EFI driver to a device and start the driver
`devices`	Display the list of devices being managed by EFI drivers
`devtree`	Display the tree of devices that follow the EFI Driver Model
`disconnect`	Disconnect one or more drivers from a device
`dh`	Display the handles in the EFI environment
`driver`	List and install ROM-based drivers
`drivers`	Display the list of drivers that follow the EFI Driver Model
`drvcfg`	Invoke the Driver Configuration Protocol
`drvdiag`	Invoke the Driver Diagnostics Protocol
`guid`	Display all the GUIDs in the EFI environment
`lanaddress`	Display core I/O MAC address
`load`	Load and optionally connect EFI drivers
`loadpcirom`	Load a PCI Option ROM
`map`	Display or define mappings
`openinfo`	Display the protocols on a handle and the agents
`pci`	Display PCI devices or PCI function configuration space
`reconnect`	Reconnect one or more drivers from a device
`unload`	Unload a protocol image

Memory Commands

The *memory class* commands let you manage your memory.

`default`	Reset all NVM values to system defaults
`dmpstore`	Display all NVRAM variables
`dmem`	Display the contents of memory
`memmap`	Display the memory map
`mm`	Display or modify memory, memory-mapped IO and PCI settings
`pdt`	View or clear the Page Deallocation Table (PDT)

Shell Commands

The *shell class* commands let you navigate and customize your shell.

`alias`	Display, create, or deletes aliases in the EFI shell
`attrib`	Display or change the attributes of files or directories
`cd`	Display or change the current directory
`cls`	Clear the standard output with an optional background color
`comp`	Compare the contents of two files
`cp`	Copy one or more files/directories to another location
`edit`	Edit an ASCII or UNICODE file in full screen
`eficompress`	Compress a file
`efidecompress`	Uncompress a file
`exit`	Exit the EFI shell
`help`	Display help menus, command list, or verbose help of a command
`hexedit`	Edit with hex mode in full screen
`ls`	Display a list of files and subdirectories in a directory
`mkdir`	Create one or more directories
`mode`	Display or change the mode of the console output device
`mv`	Move one or more files/directories to destination
`rm`	Delete one or more files or directories
`set`	Display, create, change or delete EFI environment variables
`setsize`	Set the size of the file
`touch`	Update the specified file with the current time
`type`	Display the contents of a file
`xchar`	Turn on/off extended character features

Scripts Commands

The *scripts class* commands let you use shell scripts.

`echo`	Display messages or turn command echoing on or off
`for/endfor`	Execute commands for each item in a set of items
`goto`	Make batch file execution jump to another location
`if/endif`	Execute commands in specified conditions
`pause`	Print a message and suspends for keyboard input
`stall`	Stalls, or pauses, the processor for the specified time in microseconds

EFI scripts

The EFI scripting language allows you to create executable shell scripts. You can place a set of EFI commands in the shell script, then execute the script as often as needed. You also can modify the script to make it perform different tasks. Script files can be either unicode or ASCII format.

Note that commands executed from a batch script are not saved by the shell for DOSkey history (up-arrow command recall).

The optional script `startup.nsh` is automatically executed when you enter the EFI shell environment. All EFI shell scripts have the "`.nsh`" suffix.

This section provides a brief explanation of how to create, edit and run an EFI shell script.

To create or edit a shell script:

1. At the EFI shell prompt, run the shell's editor. Execute:

   `fs0:\> edit` *file.nsh*

   where *file.nsh* represents the name of the new shell script you are creating or the existing script you want to edit.

2. Type or edit the commands to be executed when the script is run. For example:

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

3. When you are finished writing the script: press **F2** to save the file, then press **F3** to exit the editor.

The EFI editor is controlled by function key commands. A menu of available commands is shown at the bottom of the screen. If you are accessing the editor through a terminal emulator and the function keys do not work, use the escape sequences listed here.

Command	Function Key	Escape Sequence
Open file	F1	Esc 0
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

To run a shell script:

1. Type the name of the command at the EFI shell prompt. For example:

   ```
   fs0:\> mytest.nsh
   ```

2. Press **Enter**.

positional arguments

Up to nine positional arguments are supported for batch scripts. Positional argument substitution is performed before the execution of each line in the script file. Positional arguments are denoted by **%n**, where n is a digit between 0 and 9. By convention, **%0** is the name of the script file currently being executed.

In batch scripts, argument substitution is performed first, then variable substitution. Thus, for a variable containing **%2**, the variable will be replaced with the literal string **%2**, not the second argument on the command line. If no real argument is found to substitute for a positional argument, then the positional argument is ignored.

For example, this sample script replaces the two literal arguments **arg1** and **arg2** with the positional arguments **%1** and **%2**:

```
echo -off
set arg1 %1
set arg2 %2
echo "I found a %arg1%"
echo "I also found a %arg2%"
```

To run the command, type the command name followed by the arguments at the shell prompt:

```
fs0:\efi\tools> example cat dog

example> echo -off
I found a cat
I also found a dog
```

nesting

Script file execution can be nested; that is, script files may be executed from within other script files. Recursion is allowed.

output redirection

Output redirection is fully supported. Output redirection on a command in a script file causes the output for that command to be redirected. Output redirection on the invocation of a batch script causes the output for all commands in the batch script to be redirected to the file, with the output of each command appended to the end of the file.

By default, both the input and output for all commands executed from a batch script are echoed to the console. Display of commands read from a batch file can be suppressed via the echo -off command (see echo). If output for a command is redirected to a file, then that output is not displayed on the console.

error handling in scripts

By default, if an error is encountered during the execution of a command in a batch script, the script will continue to execute. The **lasterror** shell variable allows batch scripts to test the results of the most recently executed command using the if command. This variable is not an environment variable, but is a special variable maintained by the shell for the lifetime of that instance of the shell.

comments in script files

Comments can be embedded in batch scripts. The **#** character on a line denotes that all characters on the same line and to the right of the **#** are to be ignored by the shell. Comments are not echoed to the console.

using the boot option maintenance menu

This menu allows you to select console output and input devices as well as various boot options. It contains the following items:

- **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**

These items are described in the following sections.

In all menus, to:

- display the help available for the command, select **Help**
- return to the main Boot Options Maintenance menu, select **Exit**
- select an item, use the arrow keys to highlight the item, then press **Enter**
- save your changes, select **Save Settings to NVRAM**

NOTE: The options shown below are examples, each system will have different options available based on the system configuration and installed hardware components

paths

All devices in the zx2000 are represented by *paths* in the EFI shell. To identify the correct socket or disk drive, use the following tables.

Accessory Card Sockets

Socket	Path
1 PCI	Acpi(HWP0002,400)/pci(1|0)
2 AGP	Acpi(HWP0003,0)/pci(0|0)
3 PCI	Acpi(HWP0002,400)/pci(2|0)
4 PCI	Acpi(HWP0002,400)/pci(3|0)
5 PCI	Acpi(HWP0002,400)/pci(4|0)
6 PCI	Acpi(HWP0002,600)/pci(1|0)

Systems with IDE Drives

Drive	Path
IDE hard drive	Acpi(HWP0002,500)/Pci(2|0)/Ata(Primary,Master)
IDE hard drive	Acpi(HWP0002,500)/Pci(2|0)/Ata(Primary,Slave)
Removable media boot	Acpi(HWP0002,500)/Pci(2|0)/Ata(Secondary,Master)
Removable media boot	Acpi(HWP0002,500)/Pci(2|0)/Ata(Secondary,Slave)

Systems with SCSI Drives

Drive	Path
SCSI hard drive	Acpi(HWP0002,400)/Pci(3|0)/Scsi(Pun0,Lun0)
SCSI hard drive	Acpi(HWP0002,400)/Pci(3|0)/Scsi(Pun1,Lun0)
Removable media boot	Acpi(HWP0002,500)/Pci(2|0)/Ata(Secondary,Master)

boot from a file

Use this option to manually run a specific application or driver.

NOTE: This option boots the selected application or driver one time only. When you exit the application, you will return to this menu.

This option displays the file systems that are on your server or workstation and lets you browse these file systems for applications or drivers that are executable. Executable files end with the `.efi` extension. You can also select remote boot (LAN) options that have been configured on your network.

For example:

```
Boot From a File. Select a Volume
   NO VOLUME LABEL [Acpi(HWP0002,500)/Pci(2|0)/Ata(Primary,Master)/
   CD_FORMAT [Acpi(HWP0002,500)/Pci(2|0)/Ata(Secondary,Master)/CDRO
   Removable Media Boot [Acpi(HWP0002,500)/Pci(2|0)/Ata(Secondary,M
   Load File [EFI Shell [Built-in]]
   Load File [Acpi(HWP0002,500)/Pci(3|0)/Mac(00306E385AFB)]
   Exit
```

In this example:

- **NO VOLUME LABEL** is an IDE hard drive. When you format a hard drive, the EFI tools provide an option to LABEL the disk. In this example, the volume was not labelled.
- **CD_FORMAT** is the label created for the disk currently inside the DVD-ROM drive.
- **Removable Media Boot** allows you to boot from a removable media drive (CD/DVD drive). This option does not support booting from a specific file on a specific removable media disc.
- The two **Load Files** are the EFI Shell and the LAN.

add a boot option

Use this option to add items to the EFI boot menu.

This option displays the file systems that are on your workstation and lets you browse these file systems for applications or drivers that are executable. Executable files end with the `.efi` extension. You can also select remote boot (LAN) options that have been configured on your network. The option you have selected will be added to the EFI boot menu.

When adding a boot option that already exists in the Boot Manager list of boot option, you can choose whether to create a new option or modify the existing one:

- If you choose to modify an existing option, you may change the boot option name and/or add boot option arguments to the existing option.
- Creating a new boot option for an already existing option allows multiple instances of the same boot option to exist.

For example:

```
Add a Boot Option. Select a Volume
NO VOLUME LABEL [Acpi(HWP0002,500)/Pci(2|0)/Ata(Primary,Master)/
   Removable Media Boot [Acpi(HWP0002,500)/Pci(2|0)/Ata(Secondary,M
   Load File [EFI Shell [Built-in]]
   Load File [Acpi(HWP0002,500)/Pci(3|0)/Mac(00306E385AFB)]
   Exit
```

In this example:

- Most of the items are the same options in **Boot From a File**.
- **NO VOLUME LABEL** is the IDE hard drive. You can search through the IDE disk for bootable applications to add to the Boot Manager list of Boot options.
- **Removable Media Boot** will treat the Removable Media (generally a CD) as a bootable device.
- **Load File EFI Shell** adds a new instance to the EFI Shell, Load File with the MAC address is for adding a network boot option.

delete boot option(s)

Use this option to remove boot option from the EFI boot menu.

NOTE: This does *not* delete any files, applications or drivers from your system.

This option displays a list of boot options that are configured on your workstation. The names will match the options on the main Boot Manager menu (above).

- To delete an item from the list, use the arrow keys to highlight the item and press **Enter**.
- To remove all of the entries from the EFI boot menu, select **Delete All Boot Options**. This setting may be used as a security device on systems that are accessed remotely.

change boot order

Use this option to change the order of boot options. The order in which options are listed in the EFI boot menu also reflects the order in which the system attempts to boot. If the first boot option fails, the system will try booting the second, then the third, and so forth, until a boot option succeeds or until all options have failed.

For example, if you normally boot using a configuration on your LAN but would like to boot from a local hard drive if the LAN is unavailable, move the LAN boot option to the top of the list, followed by the hard drive boot option.

The Menu lists boot options that currently exist in the main Boot Manager menu. You can change the priority of the items by moving them up or down in the list:

- Press **U** to move an option up.
- Press **D** to move an option down.
- Save changes to modify the order in the Boot Manager menu, which modifies the order that the Boot Manager will attempt to boot the options.
- The items at the bottom of the screen (shown in bold in these examples) are descriptions of the selected option.

For example:

```
Change boot order. Select an Operation
   EFI Shell [Built-in]
   Current OS
   Save Settings to NVRAM
   Help
   Exit

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

manage bootnext setting

Use this option to run the selected boot option immediately upon entering the main Boot Manager menu. This option is useful for booting an option that only needs to be booted once, without changing any other setting in the main Boot Manager menu. This is a one-time operation and does not change the permanent system boot settings.

This option displays the file systems that are on your workstation and lets you browse these file systems for applications or drivers that are executable. Executable files end with the `.efi` extension. You can also select remote boot (LAN) options that have been configured on your network.

To restore the default boot next setting, select **Reset BootNext Setting**.

For example:

```
Manage BootNext setting. Select an Operation
EFI Shell [Built-in]
Current OS
Reset BootNext Setting
Save Settings to NVRAM
Help
Exit
```

set auto boot timeout

Use this option to set the amount of time the system will pause before attempting to launch the first item in the Boot Options list.

For example:

```
Set Auto Boot Timeout. Select an Option
   Set Timeout Value
   Delete/Disable Timeout
   Help
   Exit
```

Interrupting the timeout during the countdown stops the Boot Manager from loading any boot options automatically. If there is no countdown then boot options must be selected manually.

- To set the auto boot timeout value, in seconds, select **Set Timeout Value** and enter the desired value.
- To disable the timeout function, select **Delete/Disable Timeout**.

NOTE: When this option is selected, the system will not automatically boot. The system will stop at the EFI boot menu and wait for user input.

---

select active console output devices

Use this option to define the devices that will display output from the system console. This list normally includes the VGA monitor and a serial port for directing output to a terminal emulation package.

NOTE: If you are installing a modem in your system, make sure you disable the modem serial port from the Active Console Input **and** Active Console Output device lists.

NOTE: Some Operating Systems support multiple consoles, such as a simultaneous serial and VGA output. This is not supported for HP-UX. See your OS documentation to determine how many consoles are supported with your system.

For example:

```
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(HWP0003,0)/Pci(0|0)
   Save Settings to NVRAM
   Exit
```

* indicates a currently selected device.

This menu is identical to **Console Error Devices**. The zx2000 does not support different configurations for Output and Error console. For correct operation:

- When changes are made to either Output or Error console menus, the identical change must be made in both menus.
- When changing serial devices, changes must be made to Output, Input, and Error menus for proper operation.

To select:	Choose:
Serial A/Serial 1	Acpi(PNP0501,0)/*Uart(9600 N81)/VenMsg(Vt100+)*
AGP Graphics Port	Acpi(HWP0003,0)/Pci(0|0)

- Each option is identified with an EFI Device path. Not all options will be available, depending on the configuration of the system and the options purchased. Device paths may differ slightly on different product models.
- On both serial device examples, UART 9600 indicates the current baud rate of the serial device. This can be changed with the EFI **baud** command. VenMsg Vt100+ is the current emulation type. Several different terminal emulation protocols are supported (see list above).
- Only one terminal emulation type (PcANSI, Vt100, etc.) can be selected for each serial console, but multiple serial consoles can be selected at a time.

select active console input devices

Use this option to define the devices that will be used to provide input to the system console.

This option displays the console devices on your workstation. This may include a standard keyboard or a serial port for receiving output from a terminal emulation package. Several different terminal emulation protocols are supported.

- When changing serial devices, changes must be made to Output, Input, and Error menus for proper operation.

NOTE: If you are installing a modem in your system, make sure you disable the modem's serial port from the Active Console Input **and** Active Console Output device lists.

For example:

```
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(HWP0002,0)/Pci(1|0)
 Save Settings to NVRAM
 Exit
```

* indicates a currently selected device.

- Each option is identified with an EFI Device path. Not all options will be available, depending on the configuration of the system and the options purchased. Device paths may differ slightly on different product models.
- On both serial device examples, UART 9600 indicates the current baud rate of the serial device. This can be changed with the EFI **baud** command. VenMsg Vt100+ is the current emulation type. Several different terminal emulation protocols are supported (see list above).
- Only one terminal emulation type (PcAnsi, Vt100, etc.) can be selected for each serial console, but multiple serial consoles can be selected at a time.

To select:	Choose:
Serial A/Serial 1	Acpi(PNP0501,0)/*Uart(9600 N81)/VenMsg(Vt100+)*
USB Keyboard	Acpi(HWP0002,0)/Pci(1|0)

select active standard error devices

Use this option to define the devices that will display error messages from the system console.

This menu is identical to **Console Output Devices**. The zx2000 does not support different configurations for Output and Error console. For correct operation:

- When changes are made to either Output or Error console menus, the identical change must be made in both menus.
- When changing serial devices, changes must be made to Output, Input, and Error menus for proper operation.

using the security/password menu

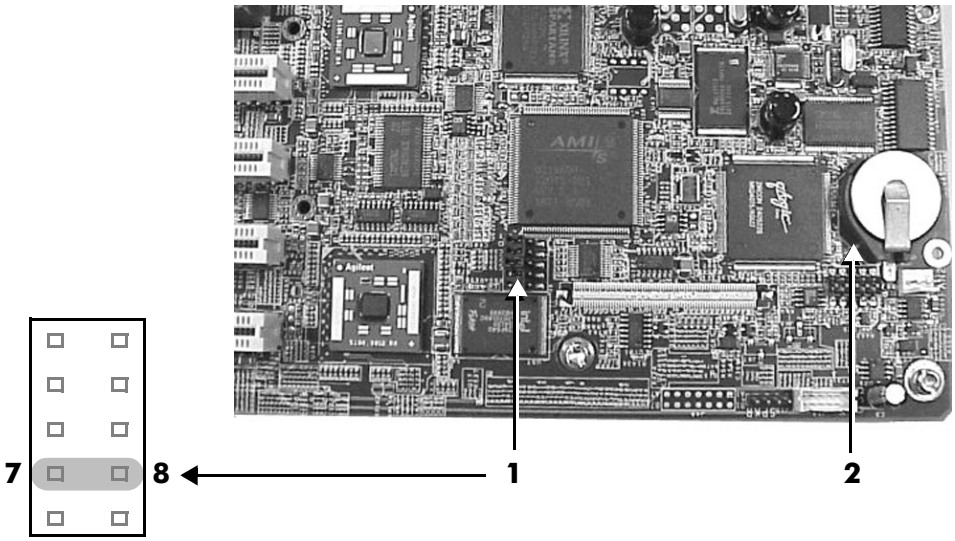
To change the administrator and user passwords:

1. Select **Security/Password Menu**.
2. Select either:
   - ❑ **Set Administrator Password**
   - ❑ **Set User Password**
3. Select:
   - ❑ **Set Administrator Password** or **Set User Password** to set a new password
   - ❑ **Enable/disable Password** to specify whether a password is required
   - ❑ **Help** for assistance
4. When you are finished, select **Exit**.

If you forget your passwords, they can be reset using a jumper on the system board.

To reset the system passwords:

1. Power down the system and unplug the AC power cord.
2. Place a jumper between pins 7 and 8 on J47 on the system board.



Password Reset Jumper and BMC Heartbeat LED

1	J47
2	BMC heartbeat LED (between BMC and battery)

3. Plug in the AC power cord and wait for the BMC heartbeat LED to start blinking green. This should take about 5 seconds from the time you plug in the power cord.
4. Unplug the AC power cord again and remove the jumper.
5. Plug in the power cord and boot the system.

   The passwords have been cleared. Follow the instructions above to set new system passwords.

NOTE: Store the system in a secure location and keep the system case locked at all times to protect against unauthorized access.

Attach the Lock to the Latch on the Case

baseboard management controller (BMC)

This section explains the BMC command-line interface. Topics include:

- Using the BMC command line interface (CLI), page 3-23
- BMC commands, page 3-24

using the BMC command line interface (CLI)

To log in to the BMC command line interface, use a serial connection and terminal emulation software:

1. With the workstation turned off, connect a null-modem cable to *Serial Port 1* on the rear panel of the workstation (see page 17), and to your remote device.
2. Configure the terminal emulation software with these settings:
   - ❏ Baud rate: 9600
   - ❏ Bits: 8
   - ❏ Parity: None
   - ❏ Stop Bits: 1 (one)
   - ❏ Flow Control: XON/XOFF

NOTE: The default terminal emulation type is VT100+. Terminal emulation for the BMC cannot be changed. The default baud rate is 9600. This setting can be changed using the EFI **baud** command.

---

3. Using the terminal emulation, connect to the workstation with a *direct connection*.
4. To access the BMC command line interface, press **Esc (**

   For example, on a U.S. QWERTY keyboard, press **Esc**, then press **Shift** and **9** at the same time.
5. If prompted, enter the user or admin password at the login prompt:

   ```
   login>
   ```

   If no password is defined, you are not prompted for one.

NOTE: If AC power is connected to the system, this command activates the BMC command line interface even if the workstation power is off.

---

6. The BMC prompt displays. If you entered the admin password, you have full access. If you entered the user password, you have restricted access.

   ```
   Admin Session Initiated
      cli>
   ```

   or

   ```
   User Session Initiated
      cli>
   ```

logging out of the BMC command line interface

When you are finished using the BMC CLI:

1. If you have a system password set, execute the following to log out of the BMC without returning to the system console:

   Q

   The BMC login prompt displays:

   ```
   login>
   ```

2. To log out of the BMC and return to the system console, press **Esc Q** (press **Esc**, then press **Shift** and **Q** at the same time).

BMC commands

overview

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 (local and remote), console support, configuration management, hardware management, and troubleshooting.

There are two categories of BMC commands:

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

This section provides a brief overview of the available commands. For detailed information, see the Intel web site: **http://www.intel.com/design/servers/ipmi**

Executing BMC Commands

To execute BMC commands at the command prompt:

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

simple commands

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

To execute simple BMC commands:

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

```
cli> c
Type the new password> ****
Retype the new password> ****
New password confirmed.
cli>
```

Command syntax	Options	Mode	Description
C	Prompts user for new password	User	Lets you change the password.
FPL	N/A	User	Reads the forward progress log. This log is encoded and can be used by HP support representatives. For additional information see "SEL and FPL log entries" on page D-4.
H	N/A	User	Displays a list of BMC commands.
INFO	N/A	User	Displays the BMC firmware revision.
LOC [0, 1]	0=off 1=on	User	Turns the system locator LED on or off (rack mount systems only).
P [0, 1]	0=off 1=on	User	Forces system power on or off; does not shut down using OS procedures. If you do not enter a parameter, displays the current power state.
Q	N/A	User	Logs out user; does not close BMC session. Only applies if passwords are set.
RS	N/A	User	Resets the system.
SD	N/A	User	Displays the SDR repository. This data is encoded and can be used by HP support representatives.
SE	N/A	User	Displays system event log (SEL). This log is encoded and can be used by HP support representatives. For additional information see "SEL and FPL log entries" on page D-4.

IPMI commands

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

CAUTION: If IPMI commands are sent incorrectly to certain registers, the system board may be damaged and need to be replaced.

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

- *Network Function and Lun (NetFnLun).* The NetFn parameter identifies the message category. The LUN value is always 0.
- *Command.* The messages specified in this document contain a one-byte command field. Commands within each category are unique. Command values can range from 00h through FDh. FEh is reserved for future extension of the specification, and 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 matches 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 20 18 c8 f0 04 04 08
    F0 1C F4 20 04 04 00 55 00 83
    cli>
    ```

Long format IPMI commands (“I”) use an ASCII transcription of the IPMI data format.

NOTE: All non-command bytes can be replaced with 0.

Long Format IPMI Command Data Structures

Bits		Byte
7-2	**1-0**	
rsSa = 0x20		0x20
NetFn = 0x07	rsLUN = 0x00	0x18
Checksum = 0xC8		0xC8
rqSWID = 0xF0		0xF0
rqSeq = 0x01	rqLUN = 0x00	0x04
Cmd = 0x04		0x04
Checksum = 0x08		0x08

Long Format IPMI Response Data Structure

Bits		Byte
7-2	**1-0**	
rqSWID = 0xF0		0xF0
NetFn = 0x07	rsLUN = 0x00	0x1C
Checksum = 0xF4		0xF4
rsSA = 0x20		0x20
rqSeq = 0x01	rsLUN = 0x00	0x04
Cmd = 0x04		0x04
Data byte 1 = 0x00 (completion code)		0x00
Data byte 2 = 0x55 (result = no error)		0x55
Data byte 3 = 0x00 (details)		0x00
Checksum = 0x83		0x83

The BMC supports the version 1.0 IPMI categories and commands listed in the following tables. For detailed information on the IPMI specification and commands, see the Intel web site:

http://www.intel.com/design/servers/ipmi

Command Categories

NetFn	NetFn << 2	Description
00, 01	00, 04	Chassis
04, 05	10, 14	Sensor/Event (S/E)
06, 07	18, 1C	Application
0A, 0B	28, 2C	Storage
32, 33	C8, CC	HP Custom (proprietary)

Chassis Commands

Command	Description
01h	Get chassis status
02h	Chassis control
0Fh	Get Power-on Hours (POH) counter
06h	Set Power Restore Policy

Sensor/Event Commands

Command	Description
01h	Get event receiver
02h	Platform event (a.k.a. "Event Message")
28h	Set sensor event enable
29h	Get sensor event enable
2Ah	Re-arm sensor events
2Dh	Get sensor reading

Application Commands

Command	Description
IPM Device "Global" Commands	
01h	Get device ID
02h	Cold reset
03h	Warm reset
04h	Get self test results
Broadcast Commands	
01h	Broadcast 'Get Device ID'
System Interface Commands	
2Eh	Set BMC global enables
2Fh	Get BMC global enables
30h	Clear message flags
31h	Get message flags
32h	Enable message channel receive
33h	Get message
34h	Send message
35h	Read event message buffer
36h	Get BT interface capabilities

Command	Description
BMC Watchdog Timer Commands	
22h	Reset watchdog timer
24h	Set watchdog timer
25h	Get watchdog timer

Storage Commands

Command	Description
SEL Commands	
40h	Get SEL info
41h	Get SEL allocation info
42h	Reserve SEL
43h	Get SEL entry
44h	Add SEL entry
47h	Clear SEL
48h	Get SEL time
49h	Set SEL time
SDR Repository Commands	
20h	Get SDR repository info
21h	Get SDR repository allocation info
22h	Reserve SDR repository
23h	Get SDR
28h	Get SDR repository time
29h	Set SDR repository time
FRU Inventory Device Commands	
10h	Get FRU inventory area info
11h	Read FRU inventory data
12h	Write FRU inventory data

firmware upgrades

To update the system and BMC firmware:

1. Download the firmware update from **http://www.hp.com/go/bizsupport**.

   Follow the menu prompts to navigate to the support page:

   - Select **download drivers/ software**.
   - Enter the product name in the search field (**hp workstation zx2000**).
   - Select the search result.
   - Choose the firmware release you need to download.
   - Click the **i** information icon for instructions on how to download, unpack, and install the firmware upgrade:

2. Download, unpack and install the firmware upgrade.
3. Execute the **info fw** EFI command to confirm that the upgrade was successful.

4

troubleshooting

This chapter contains the following sections, which describe how to identify and solve common problems you may encounter when using your hp workstation zx2000:

troubleshooting overview

The hp workstation zx2000 includes several tools to help you troubleshoot potential problems. Many problems have simple solutions, so try the tools and suggestions covered in this section before contacting HP support. The following sections provide additional information about:

- The system e-buzzer
- The LEDs
- Monitor troubleshooting

identifying and diagnosing hardware problems

Should a hardware failure occur, the zx2000 LEDs, e-buzzer, and logs will help you identify the problem:

- **System beeps and e-buzzer.** The Workstation zx2000 has an e-buzzer that beeps in specific patterns to identify errors when the system boots. The e-buzzer can also send encoded data over the phone to help support representatives identify more complex problems.
- **LEDs.** The lights on the front bezel of the workstation change color and blink in different patterns to help identify specific hardware problems.
- The **System Event Log (SEL)** and **Forward Progress Log (FPL)** provide additional detailed information about errors identified by the e-buzzer and LEDs. (See “SEL and FPL log entries” on page 4.)

If the LEDs, e-buzzer, and logs do not provide enough information for you to identify the problem you are experiencing, HP also provides **software diagnostic tools**.

system e-buzzer

If a problem is detected at any time when the system is booting or running, the e-buzzer emits audible beeps and an encoded error message.

- The audible beeps consist of a modem-like sound repeated 3 times, followed by 0-7 beeps of a single frequency at 1-second durations, each separated by 1 second. The e-buzzer emits a different number of beeps for each type of error. More detailed information is provided by the LEDs.
- The electronic signal can be sent through a telephone line to an authorized help desk or HP Support. This signal 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, hold your telephone next to the LED 1 on the system front bezel when the system is booting.

The e-buzzer does **not** report all problems, only the problems listed below. If the e-buzzer indicates an error, check the SEL (page D-4) for a more detailed explanations of the failure.

Number of Beeps	Component	Description
1	Processor	Processor absent or not correctly connected. Reseat or replace processor.
2	Power Supply	Power supply failure. Replace power supply.
3	Memory	No memory, bad memory modules or incompatible memory module. Check memory module loading order. Reseat or replace memory modules.
4	Graphics Card	Graphics card problem. Reseat or replace the graphics card.
5	PCI Card	PCI card problem. Reseat or replace the PCI card.
6	Critical System Failure	Two minutes has elapsed after the BMC starts system power and no BOOT_START event is logged in the SEL. Possible problems include: • Clock is bad • System board problem • CPU connection to the board bad • CPU power pod failure • CPU failure • Corrupt Firmware (bad code, or improper update) Contact support.
7	System Board	Defective system board. Contact support.

NOTE: See Chapter 2 for detailed instructions on removing and replacing system components.

The e-Buzzer may also be activated by several other events:

- If the system firmware detects an error during system operation, the BMC will trigger the e-Buzzer to sound.
- If you miss the beep code count during the initial transmission sequence, trigger the sequence again by pressing and holding the system power button for 3-5 seconds and *release it as soon as the sound begins.*

The power button on the front panel operates differently depending on how long the button is pressed and whether or not the system was on or off when the button was pressed.

- When the system power is off:
  - 1-3 seconds. System power turns on. The e-buzzer beeps if an error is encountered.
  - 3-5 seconds. The e-buzzer repeats the last stored error.
- When the system power is on and the system is at the EFI:
  - 1-3 seconds. System power turns off immediately.
  - 3-5 seconds. The e-buzzer repeats the last stored error.
  - 5 seconds or longer. System power turns off immediately.
- When the system power is on and the OS is running:
  - 1-3 seconds. System power turns off via ACPI signal to OS (soft power-down).
  - 3-5 seconds. The e-buzzer repeats the last stored error.
  - 5 seconds or longer. System power turns off immediately (hard power-down).

LEDs

Several LEDs are on the front bezel of the workstation. See the following sections for a detailed description of these functions.

power and system LEDs

The power and system LEDs indicate the overall state of the system:

Power LED	System LED	State
Off	Off	Off or on Standby
On (green)	Solid green	Running normally
On (green)	Blinking green (1/sec.)	Booting
On (green)	Blinking orange (1/sec.)	Attention (See "<$elemtext7)
On (green)	Blinking red (2/sec.)	Fault (See "<$elemtext7)

activity LED

The Activity LED indicates the state of disk and drive activity on the system.

Activity LED	State
Off	Off or no current disk/drive activity
Blinking (green)	Disk/drive is being accessed

NOTE: The Activity LED is only active on systems purchased after March 2003.

NOTE: The Activity LED automatically communicates with IDE HDD or optical drives. To communicate with SCSI drives, a SCSI LED activity cable must connect the SCSI card and the system board.

LAN LEDs (back panel)

The four LAN LEDs on the back panel of the system indicate LAN activity.

LAN LED	Location	Color	State
1. Gbit	*Tower:* Right	Off	No 1000 mb/s link
	Rack-mounted: Top	Green	Indicates link at 1000mb/s LAN port
2. 100mb	*Tower:* 2nd from right	Off	No 100 mb/s link
	Rack-mounted: 2nd from top	Green	Indicates link at 100mb/s LAN port
3. Link	*Tower:* 2nd from left	Off	No LAN connection
	Rack-mounted: 2nd from bottom	Green	Link connectivity on LAN port
4. Activity	*Tower:* Left	Off	No LAN activity
	Rack-mounted: Bottom	Green	Flashing or solid green LED indicates activity on LAN port

locator LED and button (rack-mounted systems only)

If you have several similar systems on a rack, you may find it difficult to identify a specific computer requiring maintenance. The locator LED is designed to help identify the workstation in a rack.

The locator LED can be activated and deactivated by pressing the locator button on the front bezel of the system. The LED can also be accessed remotely using the BMC interface. See “<$elemtext23.

diagnostic LEDs

The four diagnostic LEDs on the front bezel of the system are used for diagnosing the health of the system. These LEDs warn of impending hardware failures and allow you to take preventive action, such as making a system backup or replacing a component before it fails. These diagnostic LEDs are labeled 1, 2, 3 and 4.

The location of red LEDs can be used to identify the category of the fault or warning. For example, if LED one is red, there is a problem with memory. However, if LEDs one and two are both red, there is a problem with the system processor.

If the diagnostic LEDs indicates an error, check the SEL (page D-4) for a more detailed explanations of the failure.

The following symbols are used in the LED tables.

- The *System LED* indicates the severity of the error:

Blinking orange indicates a WARNING.

Blinking red indicates a FAULT.

- The *Diagnostic LEDs* provide details about the specific error that has occurred:

Solid red indicates the failing part or sub-system.

Off or solid green diagnostic LEDs provide additional details about the failure.

The faults and warnings fall into several general categories.

LED1	LED2	LED3	LED4	Category	e-buzzer Beeps
RED				Memory	3
	RED			Firmware	6
		RED		System Board	7
			RED	Fan	None
RED	RED			Processor	1
RED		RED		BMC	7
RED			RED	Temperature	None
	RED		RED	Power Supply	2
RED	RED	RED	RED	Unknown	None

Warnings

The following tables provide additional information about each specific **warning** associated with the various possible LED lighting sequences **when the system LED is orange**.

System LED	LED1	LED2	LED3	LED4	Problem	Solution
Unknown Warnings						
					Unknown warning.	View the SEL for additional information (page D-4). For further assistance, contact your HP Support Engineer.
Memory Warnings						
					Mismatched memory pairs.	Use the memory sequence diagram in “Installing Memory Modules” on page 2-11.
					Memory thermal load order.	Use the memory sequence diagram in “Installing Memory Modules” on page 2-11.
					Bad SPD information (can't detect type).	View the SEL for additional information (page D-4). For further assistance, contact your HP Support Engineer.
System Board Warnings						
					Battery voltage low.	Replace the system board battery.
Fan Warnings						
					Fan 2 (bottom) is not functioning properly	Replace the fan that is not functioning. If the processor fan has failed, you must replace the CPU.
					Fan 1 (top) is not functioning properly	

System LED	LED1	LED2	LED3	LED4	Problem	Solution
Processor Warnings						
					Processor temperature exceeds limit.	If the processor fan has failed, you must replace the CPU.
Temperature Warnings						
					External air temperature too high.	Make sure nothing is blocking the system's airflow and locate your system in an air-conditioned room.
Video Warnings						
					No video adapter present.	Install a video adapter. See the installation instructions shipped with the video adapter.
Power Supply Errors						
					Power supply fault.	Replace the power supply.

Faults

The following tables provide additional information about each specific **fault** associated with the various possible LED lighting sequences **when the system LED is red**.

System LED	LED1	LED2	LED3	LED4	Problem	Solution
Unknown Faults						
					Unknown fault.	View the SEL for additional information (page D-4). For further assistance, contact your HP Support Engineer.
Memory Faults						
					Mismatched memory pairs.	Use the memory sequence diagram in "Installing Memory Modules" on page 2-11.
					Uncorrectable memory error.	Replace memory.
					No memory installed.	Install memory.
					Bad memory. One or more DIMMs are bad or not seated properly.	Reseat the DIMMs. If the error persists, replace them.
Firmware Faults						
					System firmware hang.	View the SEL for additional information (page D-4). For further assistance, contact your HP Support Engineer.
System Board Faults						
					VRM overvoltage.	View the SEL for additional information (page D-4). For further assistance, contact your HP Support Engineer.

System LED	LED1	LED2	LED3	LED4	Problem	Solution
Fan Faults						
					Fan 2 (bottom) is not functioning properly.	Replace the fan that is not functioning. If the processor fan has failed, you must replace the CPU.
					Fan 1 (top) is not functioning properly.	
Processor Faults						
					Processor temperature exceeds limit.	If the processor fan has failed, you must replace the CPU.
					No processor detected.	Replace the CPU.
BMC Faults						
					BMC firmware is damaged.	Reflash the system firmware.
					Motherboard FRU inventory device inaccessible.	Replace the system board.
Temperature Faults						
					External air temperature too high.	Make sure nothing is blocking the system's airflow and locate your system in an air-conditioned room.

System LED	LED1	LED2	LED3	LED4	Problem	Solution
Power Supply Errors						
					VRM or power pod fault.	View the SEL for additional information (page D-4). For further assistance, contact your HP Support Engineer.
					Power Supply fault.	Replace the power supply.
					12V out of range.	

monitor troubleshooting

It is normal for the display to remain blank for a minute or longer during system boot-up.

To access the offline diagnostic tools when your monitor is not working, direct the system output to a console device for troubleshooting:

1. With the workstation turned off, connect a 9-pin to 9-pin serial cable (HP F1044-80002) to *Serial Port 1* on the rear panel of the workstation, and to a laptop or other device with terminal emulation software.
2. Configure the terminal emulation software with these settings:
   - ❏ Terminal emulation: VT100+
   - ❏ Wrap lines: Off (unchecked)
   - ❏ Baud rate: 9600
   - ❏ Bits: 8
   - ❏ Parity: None
   - ❏ Stop Bits: 1 (one)
   - ❏ Flow Control: XON/XOFF

NOTE: The default terminal emulation type is VT100+. The default baud rate is 9600. These setting can be changed from the EFI **Boot Options Maintenance Menu**.

3. Using the terminal emulation software, connect to the workstation with a *direct connection*.
4. Turn on the workstation and follow the instructions in Running Diagnostic Software Tools, page 4-15.

running diagnostic software tools

This section includes information on the following diagnostic tools for the Workstation zx2000:

- HP e-DiagTools hardware diagnostics, page 4-15
- Additional diagnostics tools for HP-UX, page 4-18

Before you run the HP diagnostic software, note any e-buzzer and LED error messages. They give you an indication of the Field Replaceable Unit (FRU) to replace.

hp e-diagtools hardware diagnostics

Your system came with an *HP IPF Offline Diagnostics and Utilities* CD with HP e-DiagTools Hardware Diagnostics. These tools may be used to diagnose hardware-related problems on your HP system.

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.

HP e-DiagTools provides a user-friendly interface to the *Offline Diagnostics Environment (ODE)*, that enables you to troubleshoot a system that is running without an OS or cannot be tested using the online tools. ODE can also be run separately using a command line interface, which allows the user to select specific tests and/or utilities to execute on a specific hardware module.

starting hp e-diagtools

1. Insert the *HP IPF Offline Diagnostics and Utilities* CD in the CD or DVD drive.
2. Restart the system.
3. Select the CD/DVD boot option from the EFI startup menu.

NOTE: If you are unable to boot from your CD/DVD 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/DVD drive.

---

4. If you are not familiar with e-DiagTools, review the documentation. From the main menu:
   a. Select **View Release Notes and Documentation Menu** to view a list of available documentation.
   b. Select **View e-DiagTools Info** to open the overview document.
5. If you are already familiar with e-DiagTools, select **Run e-DiagTools for IPF** from the main menu.

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 **Welcome to e-DiagTools** Menu:

1. Start e-DiagTools and select **Run e-DiagTools for IPF** from the main menu.
2. Select **2 - Run e-DiagTools Basic System Test (BST)** to run the basic diagnostics on your system if you have not already done so.

   e-DiagTools scans your system. The Configuration Description will display on the screen when the configuration detection phase is complete
3. Select **2 - Continue Test** to run the rest of the basic diagnostics test.
4. After the test is complete:
   - ❏ To view the Support Ticket, press **4**. (Use the arrow keys to scroll.) Have the support ticket the screen when you contact customer support.
   - ❏ To exit the Support Ticket tool, press **3**.

offline diagnostics environment (ODE)

The Offline Diagnostics Environment is an offline support tools platform that enables users to troubleshoot a system that cannot be tested using online tools. These may be accessed through the HP e-DiagTools Hardware Diagnostics menus or as separate applications. The offline environment is also useful for some types of testing in which it is not desirable to have to boot the system first.

Tools Provided

The ODE includes a variety of diagnostics tools. Depending on your system and configuration, these may include some or all of the following tools, as well as additional tools specific to your system:

- MAPPER is an offline system configuration mapping utility. It identifies and displays a list of system components including hardware modules and peripheral devices.
- CPUDIAG is a CPU diagnostics tool.
- MEMDIAG is a memory diagnostics tool.
- PERFVER is a utility for testing peripherals attached to the boot path.

To access a detailed list of tools provided on your system, from the ODE Main Menu:

1. Select **View Release Notes and Documentation Menu**
2. Browse the documentation and release notes.

running ODE from the offline Diagnostics and Utilities CD

ODE uses a command line interface, which allows the user to select specific tests and/or utilities to execute on a specific hardware module.

To run ODE from the *HP IPF Offline Diagnostics and Utilities* CD:

1. Insert the CD into the CD/DVD drive and reset system power, the system should come up to the boot manager.
2. If the boot manager is already configured, and the CD/DVD drive is configured as one of the boot devices, you move the cursor to the line which shows the CD/DVD drive, and press **Enter**. The CD then will boot to the Launch Menu.
3. Select **Run the Off-line Diagnostic Environment (ODE)** from the launch menu.

NOTE: If you are unable to boot from your CD/DVD 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/DVD drive.

For further information, see **http://docs.hp.com/hpux/diag** under the section titled "Offline Diagnostics." This site includes links to a FAQ, conceptual overview, and a quick reference guide to ODE. Also see the section titled "Diagnostics (Support Tools) General," especially the *SupportPlus: Diagnostic User's Guide*, Chapter 3. "Using the SupportPlus Media to Run Offline Diagnostics" is a useful chapter for more information on what ODE is, and how to run it.

References to the SupportPlus Media in the SupportPlus User's Guide, Chapter 3, should be ignored: they do not apply to zx2000 systems. However, the conceptual and procedural information still applies to IPF systems. Any discrepancies have been noted and explained in the *SupportPlus User's Guide*, and elsewhere, as appropriate.

additional diagnostics tools for HP-UX

HP provides several additional tools to help you identify possible problems with your system running HP-UX. These include:

- *Support Tools Manager*. 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).
- *Event Monitoring*. 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.

For a complete description of the HP-UX diagnostics tools, go to **docs.hp.com/hpux/diag/**

support tools manager (STM)

HP-UX uses an online diagnostics product called the Support Tools Manager (STM) that allows system operation verification. STM supports users from novice to expert levels. It runs on a simple three-step paradigm (select devices/run test/examine results). STM also supports remote management.

To run STM on an HP-UX system:

1. Check to see if STM is installed on your system. Execute:

   ```
   /usr/sbin/cstm
   ```

   The message "`--Information-- Support Tools Manager`" should appear on your screen, indicating that STM is installed on your system. If this does not appear, you need to install STM. For instructions, see: **docs.hp.com/hpux/diag/**

2. Start STM with the desired user interface.

   The HP Support Tool Manager can be accessed through any of the three user interfaces. Choose the interface appropriate for your needs, preferences, and resources. All functionality exists in all three interfaces.

   - **Graphical User Interface (xstm)** runs on X Window graphics terminals or workstations and provides graphical access to your system devices and STMs tools. To start **xstm**, enter:

     ```
     /usr/sbin/xstm
     ```

     or

     ```
     /usr/sbin/stm/ui/bin/stm -x
     ```

NOTE: Be sure the DISPLAY variable for X Windows is set.
For example: `export DISPLAY=`*`my_workstation.mydomain`*`.com:0.0`

- **Menu User Interface (mstm)** runs on non-graphics HP terminals and provides menu-driven access to your system devices and STM's tools. To start mstm, enter:

  ```
  /usr/sbin/mstm
  ```

  or

  ```
  /usr/sbin/stm/ui/bin/stm -m
  ```

- **Command Line User Interface (cstm)** runs on non-graphics terminals and allows the user to create and run scripts to simplify the system management process. To start cstm, enter:

  ```
  /usr/sbin/cstm
  ```

  or

  ```
  /usr/sbin/stm/ui/bin/stm -c
  ```

For more information on using STM, access the online help system:

- xstm: Use the **Help** menu at the far right of the menu bar
- mstm: Press the **Help** function key

event monitoring

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* at: **docs.hp.com/hpux/diag/**

To install and configure 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 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. Determine whether default monitoring requests are adequate.
4. Add or modify monitoring requests as necessary.
5. Verify monitor operation, if desired (recommended but optional).

Once the EMS hardware monitor is installed, you need to get it running. To do this, 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]
```

A

system accessories

This appendix contains information about the graphics cards and mass storage devices supported on the hp workstation zx2000:

- For photographs of internal system components, see Chapter 2.
- For a complete list of system components and part numbers, see Appendix C.
- For additional information on supported accessories and components, visit **http://www.hp.com/go/bizsupport**.

graphics cards

supported graphics cards

Depending on the OS on your system, you may have one of the following graphics cards. For a complete and current list of supported cards, see **http://www.hp.com/go/bizsupport**.

Type of Card	HP-UX	Linux	Windows
High End 3D	ATI FireGL 4	nVIDIA Quadro4 900XGL nVIDIA Quadro4 980XGL	nVIDIA Quadro4 900XGL nVIDIA Quadro4 980XGL ATI FireGL X1
Entry 3D		nVIDIA Quadro2 EX	
Professional 2D	ATI Radeon 7000	ATI Radeon 7000	ATI Radeon 7000

- For more detailed information about your graphics card, see the manufacturer's web site:
  - ATI: **www.ati.com**
  - NVIDIA: **www.NVIDIA.com**

selecting a monitor

The tables in the following sections list the features, display resolutions and frequencies for the graphics cards supported by your system.

Use the supported resolutions and frequencies to select the appropriate monitor for your graphics card. Frequencies of 75-85Hz and higher (depending on monitor size) provide ergonomic flicker-free viewing on analog CRT monitors. Displays using DVI never flicker; the refresh rate changes the speed at which the image is updated. Anything over 48 frames/sec. is considered "smooth motion."

If the monitor you select is DDC-2B or DDC-2B+ compliant, the graphics card automatically limits itself to the 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. If the display mode you desire is supported by your video card and monitor, but not part of VESA or is not programmed into the monitor's DDC-ROM, you may override the defaults.

On the tables that follow:

- Only common resolutions are listed. Other intermediate resolutions are possible.
- High frequencies may not be available at all color depths.

CAUTION: To prevent possible damage to your monitor, make sure you select a monitor that supports the resolutions and frequencies you want to use.

Supported Resolutions and Frequencies

ATI FireGL 4

Analog Monitor with DB-15 Connector

Display Resolution	Vertical Frequency (Hz)
1024×768	60, 75, 85, 100
1280×1024	60, 75, 85, 100
1600×1200	60, 75, 85, 100
1920×1200	60, 75, 85, 100

Digital Monitor with DVI Connector

Display Resolution	Vertical Frequency (Hz)
1024×768	60, 75
1280×1024	60, 75
1600×1200	60

ATI FireGL X1

NOTE: Support for two analog or digital monitors. You can set resolutions and refresh rates independently for two connected displays.

Analog or Digital Monitor with DB-15 Connector

Display Resolution	Vertical Frequency (Hz)
800×600	60, 75, 85, 100
1024×768	60, 75, 85, 100
1280×1024	60, 75, 85, 100
1600×1200	60, 75, 85
1920×1200	60, 75

Digital Monitor with DVI Connector

Display Resolution	Vertical Frequency (Hz)
800×600	60, 75
1024×768	60, 75
1280×1024	60, 75
1600×1200	60

ATI RADEON 7000

Analog Monitor with DB-15 Connector

NOTE: Can operate with two analog monitors using included converter dongle.

Display Resolution	Vertical Frequency (Hz)
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
1280×1024	60, 70, 75, 85, 90, 100, 125, 130, 140
1600×1200	60, 66, 70, 72, 75, 76, 85, 90, 100
1920×1200	60, 72, 75, 76, 80, 85
2048×1536	60, 66

Digital Monitor with DVI Connector

Display Resolution	Vertical Frequency (Hz)
640×480	60, 75
800×600	60, 75
1024×768	60, 75
1280×1024	60, 75
1600×1200	60

NVIDIA Quadro4 900XGL

Analog Monitor with DB-15 Connector

NOTE: Includes two built-in digital video ports with analog converter cables.

Display Resolution	Vertical Frequency (Hz)
640×480	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240
800×600	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240
1024×768	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240
1280×1024	60, 70, 72, 75, 85, 100, 120, 140, 144, 150
1600×1200	60, 70, 72, 75, 85, 100, 120
1920×1200	60, 70, 72, 75, 85, 100
2048×1536	60, 70, 72, 75

Digital Monitor with DVI Connector

Display Resolution	Vertical Frequency (Hz)
640×480	60
800×600	60
1024×768	60
1280×1024	60
1600×1200	60

NVIDIA Quadro4 980XGL

Analog Monitor with DB-15 Connector

Display Resolution	Vertical Frequency (Hz)
640×480	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240
800×600	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240
1024×768	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240
1280×1024	60, 70, 72, 75, 85, 100, 120, 140, 144, 150
1600×1200	60, 70, 72, 75, 85, 100, 120
1920×1200	60, 70, 72, 75, 85, 100
2048×1536	60, 70, 72, 75

Digital Monitor with DVI Connector

Display Resolution	Vertical Frequency (Hz)
640×480	60
800×600	60
1024×768	60
1280×1024	60
1600×1200	60

NVIDIA Quadro2 EX

Analog Monitor with DB-15 Connector

Display Resolution	Vertical Frequency (Hz)
640×480	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240
800×600	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240
1024×768	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240
1280×1024	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170
1600×1200	60, 70, 72, 75, 85, 100, 120
1920×1200	60, 70, 72, 75, 85, 100
2048×1536	60, 70, 72, 75

mass storage devices

You can find HP product numbers and replacement part numbers for mass storage devices in Appendix C.

You can find information about available accessories at:

www.hp.com/pcaccessories

hard disk drives

The tables below list the 3.5-inch (1-inch high) hard disk drives (subject to change) that may be supplied with the workstation on internal shelves (type and quantity depends on model). SCSI drives also require a SCSI adapter card and cable (see parts list in Appendix C).

NOTE: NOTE: The Activity LED automatically communicates with IDE drives. To communicate with SCSI drives, a SCSI LED activity cable must connect the SCSI card and the system board. The Activity LED is only active on systems purchased after March 2003.

Supported IDE Drives

	40 GB	80 GB	120 GB
Interface	Ultra ATA/100	Ultra ATA/100	Ultra ATA/100
Average seek time (read)	10 ms	<9.1 ms	<9.1 ms
Track-to-track seek time (read)	0.8 ms	0.8 ms	0.8 ms
Full stroke seek time (read)	<18	<17	<17
Rotational Speed	7,200 rpm	7,200 rpm	7,200 rpm
Buffer size	2 MB	8 MB	8 MB

Supported SCSI Drives

	36.4 GB	73.4 GB	146 GB
Interface	Ultra 160 SCSI	Ultra 160 SCSI	Ultra160 SCSI
Average seek time (read)	4.9 ms	3.8 ms	4.9 ms
Track-to-track seek time (read)	0.55 ms	0.4 ms	0.55 ms
Full stroke seek time (read)	9.2 ms	6.7 ms	9.2 ms
Rotational Speed	10 krpm	15 krpm	10 krpm
Buffer size	8 MB	8 MB	8 MB

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.

Not all hardware features are supported by all operating systems.

	Description
Write/Read Speed	Write (CD-R) 2× to 48× Write (CD-R/W) 4×, 10×, 12x, 24x Read 48× (maximum)
Data Capacity	650 MB or up to 74 minutes of audio per disc 700 MB or up to 80 minutes of audio per extended disk 547 MB in CD-UDF data format
Access Time	< 100 ms
Loading Type	Motorized tray
Data Buffer Capacity	2 MB
Acoustic Noise	42 db max.
Reliability MTBF	125,000 POH at 10% duty cycle in room temp.

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 66.

	Description
Data Capacity:	
DVD-ROM	Up to 8.5 GB/side
DVD-RAM	4.7 GB/side
DVD-R	4.7 GB/side
CD	650 MB
Read Speed	16× (maximum) DVD 40× (maximum) CD-ROM 6× (maximum) DVD+R 2.5× (maximum) DVD+RW
Loading Type	Motorized tray
Access Time	125 ms (DVD) 100 ms (CD-ROM)
Data Buffer Capacity	256 MB
Acoustic Noise	<42 dB
Reliability MTBF	125,000 POH

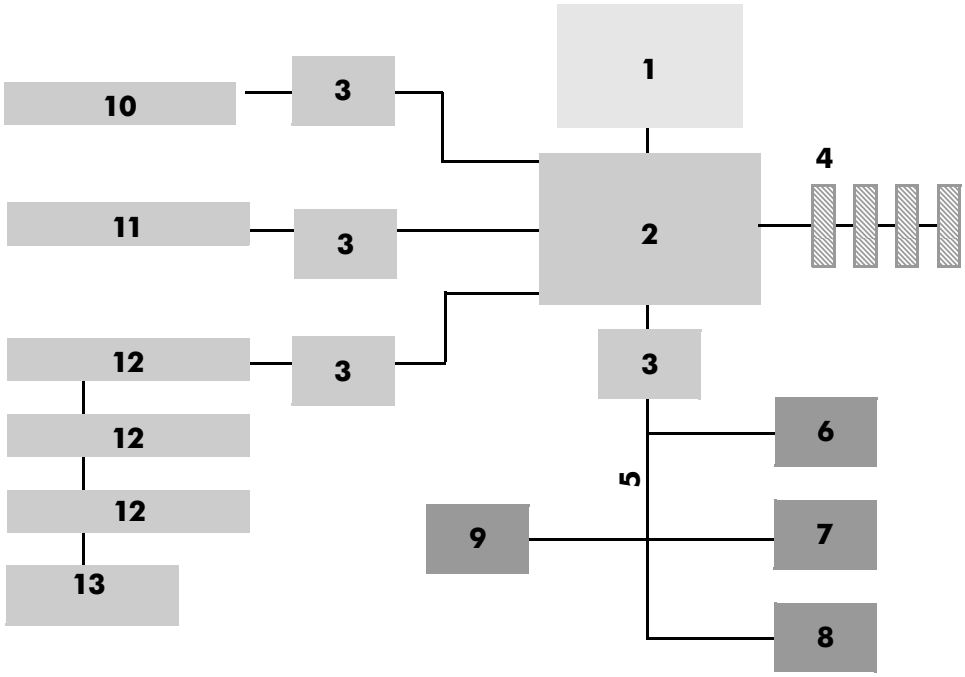
B

system board

This appendix provides an overview of the system board and descriptions of key components (chips) on the board.

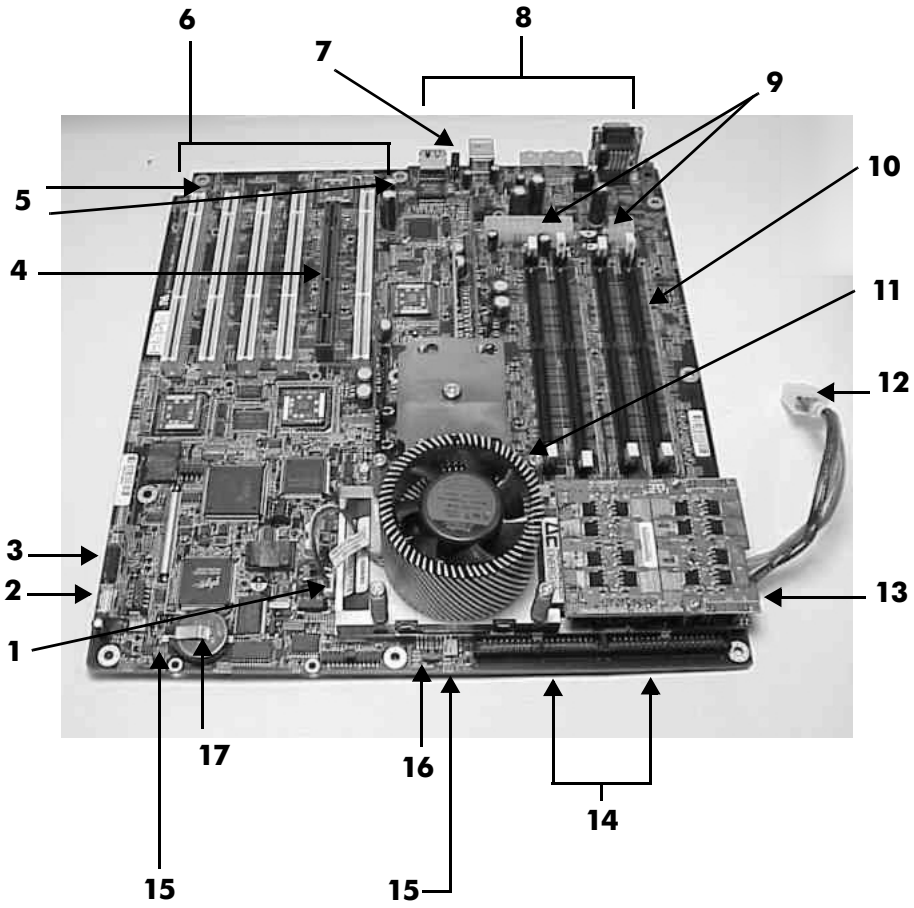
system board overview

This section provides a block diagram of the system board and photos of the main components and connectors on the board.



Block Diagram of Board

1	Intel Itanium 2 Processor	**8**	Audio: Line-in, Line-out, Microphone
2	zx1 Memory and I/O Controller	**9**	Gb LAN
3	zx1 I/O Adapter	**10**	AGP-Pro 50
4	DIMMs	**11**	PCI-X 133 64-bit
5	PCI 33 32-bit bus	**12**	PCI-X 66 64-bit
6	USB 2.0: 2 rear ports, 2 front ports	**13**	PCI-X 66 64-bit half-length
7	IDE: 2 internal drives, 2 5.25-in drives		



System Board Connectors and Sockets

1	CPU fan	**11**	CPU assembly
2	USB	**12**	CPU power cable
3	Speaker	**13**	CPU power module
4	AGP-Pro 50 socket	**14**	IDE connectors
5	SCSI LED connectors	**15**	System fan connectors (2)
6	PCI sockets (5)	**16**	LED status panel connector
7	Reset switch	**17**	Battery
8	Rear panel connectors		
9	System board power connectors		
10	Memory DIMM sockets (4)		

system board components

The following sections describes the main components of the zx2000 system board.

- Intel® Itanium® 2 Processor
- ZX1 I/O and Memory Controller
- I/O Bus Interface
- Processor Dependent Hardware Controller
- Dual Serial Controller
- Field Programmable Gate Array Controller
- Baseboard Management Controller (BMC)
- IDE Interface
- 10/100/1000 BT LAN

Intel® Itanium® 2 processor

The Intel® Itanium® 2 processor provides the following features:

- Eight-stage pipeline, six general-purpose ALUs, two integer units, one shift unit, four floating-point units
- Split L1 cache:
  - 16 KB, 4-way set associative data cache
  - 16 KB, 4-way set associative instruction cache
  - 64 byte line size
- Unified L2 cache:
  - 256 KB, 8-way set associative
  - 128 byte line size
- Unified L3 cache:
  - 1.5 MB, 6-way set associative (900 MHz)
  - 128 byte line size

processor bus

The Intel® Itanium® processor bus (Front Side Bus, FSB) runs at 200 MHz. Data on the FSB runs at a double data rate, which allows a peak FSB bandwidth of 6.4 GB/sec.

ZX1 I/O and memory controller

The zx2000 workstation supports the following features of the ZX1 I/O and memory controller chip:

- Provides six I/O ropes, or communications paths, that support PCI, PCI-X and AGP connections
- Supports a direct data path between I/O and main memory without crossing the processor bus
- Peak I/O bandwidth is 2.8 GB/second
- Peak memory bandwidth of 4.25 GB/sec with DDR bus transferred at a double data rate
- One memory cell, consisting of a 144-bit data bus

I/O bus interface

The I/O bus interface provides these features:

- Provides one of the following:
  - AGP-4x bus
  - 133 MHz PCI-X bus
  - 66 MHz PCI-X bus
  - 33 MHz PCI bus
- 64-bit data width (non-AGP)
- Optimized for DMA performance
- Supports AGP fast writes (only to addresses less than 4 GB)
- Supports 3.3V or Universal keyed PCI cards. 5V keyed PCI cards are not supported.
- Uses peer-to-peer (P2P) subset that is required by the AGP specification (write-only, PCI cycles)
- Supports up to five PCI sockets and one AGP socket

processor dependent hardware controller

The processor dependent hardware controller (PDH) provides these features:

- 16-bit PDH bus with reserved address space for:
  - Flash memory
  - Non-volatile memory
  - Scratch RAM
  - Real Time Clock
  - LBD UART
  - 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 a dual universal asynchronous receiver and transmitter (DUART). This chip provides enhanced UART functions with 16-byte FIFOs, a modem control interface and data rates up to 4 Mbps. Registers on this chip provide onboard error indications and operation status. An internal loopback capability provides onboard diagnostics.

Features include:

- Data rates up to 115.2 kbps
- 16550A fully compatible controller
- A 16-byte transmit FIFO to reduce the bandwidth requirement of the external CPU
- A 16-byte receive FIFO with four selectable interrupt trigger levels and error flags to reduce the bandwidth requirement of the external CPU
- UART control that provides independent transmit and receive
- 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 controller

The field programmable gate array controller (FPGA) provides ACPI and LPC support for HP Intel® Itanium® 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 (BMC)

The BMC supports the industry-standard Intelligent Platform Management Interface (IPMI) specification. Features built into the zx2000 system board include: diagnostics, both local and remote, console support, configuration management, hardware management and troubleshooting.

The BMC provides the following:

- Compliance with IPMI 1.0 specification
- 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 I^2C 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)

IDE interface

The IDE interface provides support for internal hard disk drives and optical drives (CD-RW or DVD) using an internal IDE connector and cable. This interface supports the cable select capability.

NOTE: IDE hard disks and optical drives should have the jumper set to CSEL (cable select).

The IDE controller (PCI649) supports the ATAPI zero (0) to five (5) modes (from 16 to 100 MB/s).

10/100/1000 bt LAN

The LAN controller is an Intel® 82540 chip.

The zx2000 supports the LAN controller's Power-On-LAN feature. This allows you to power up the system remotely through the LAN by sending special LAN packets to the system.

NOTE: HP-UX versions lower than 11.23 require PCI LAN adapter card.

C

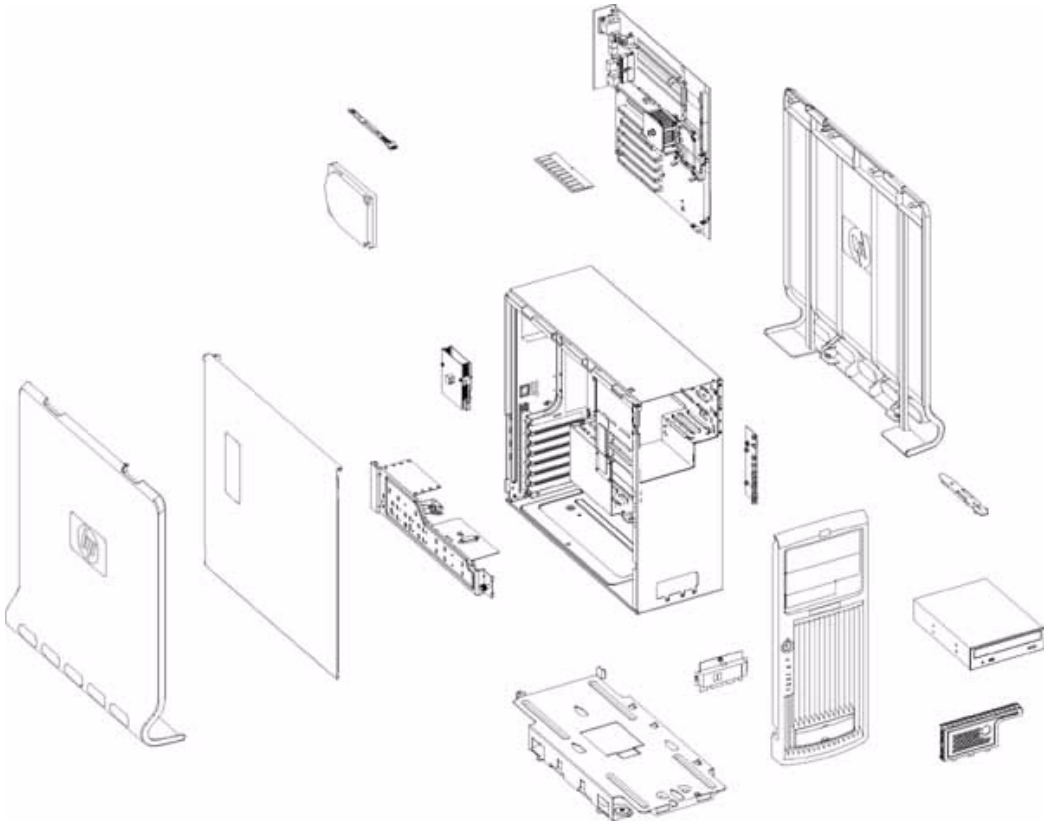
part numbers

This appendix contains an overview of system accessories, an exploded view of the workstation components, and a components parts list. For more recent information on supported accessories and components, visit:

http://www.hp.com/go/bizsupport

exploded view

The following section lists the options and part numbers for the components and accessories of the hp workstation zx2000.



Main Components

Item	Description	Replacement	Exchange
System Components			
	System board	A7844-67510	A7844-69510
	Status panel and speaker assembly	A7844-04003	N/A
Processor			
	Intel Itanium 2 900 MHz 1.5 MB Cache	A7844-62030	A7844-69030
	Processor tool	A7231-04046	
Power Components			
	Power supply (450W)	0950-4378	N/A
	Assembly - McPod II (Power Pod)	0950-4294	N/A
Mass Storage			
	IDE HDD, 40 GB, 7.2 K, UDMA-100	294932-001	N/A
	IDE HDD, 80 GB, 7.2 K, UDMA-100	294934-001	N/A
	IDE HDD, 120 GB, 7.2 K, UDMA-100	294935-001	N/A
	SCSI HDD, 36 GB, 10K Ultra 160	A6060-64001	A6060-69001
	SCSI HDD, 36 GB, 10K Ultra 160	A6060-67005	A6060-69005
	SCISI HDD, 36 GB, 10K, Ultra 320	A7107-67001	A7107-69001
	SCSI HDD, 36 GB, 15K, Ultra 160	A7213-64001	A7213-69001
	SCSI HDD, 36 GB, 15K, Ultra 320	A7213-67002	A7213-69002
	SCSI HDD, 73 GB 10K, Ultra 160	A7214-64001	A7214-69001
	SCSI HDD, 73 GB 10K, Ultra 320	A7214-67002	A7214-69002
	SCSI HDD, 73 GB 15K, Ultra 320	A7077-67001	A7077-69001
	SCSI HDD, 146 GB 10K, Ultra 320	A9649-67001	A9649-69001
	DVD-ROM, 16x, carbon bezel	290992-M30	N/A
	CD-RW, 48X24X, carbon bezel	314756-MD0	N/A

Item	Description	Replacement	Exchange
Memory			
	256 MB PC2100 Registered DDR-SDRAM	1818-8716	A8086-69001
	512 MB PC2100 Registered DDR-SDRAM	1818-8717	A8087-69001
	1 GB PC2100 Registered DDR-SDRAM	1818-8711	A8088-69001
	2 GB PC2100 Registered DDR-SDRAM	A7843-67001	A7843-69001
Graphics Cards			
	ATI RADEON 7000 32 MB, Dual Monitor	A8049-60520	A8049-69520
	NVIDIA Quadro2-EX	A7806-60510	A7806-69510
	ATI, Fire GL4 AGP, 128 MB	A7226-60520	A7226-69520
	ATI, Fire GLX1, AGP	313287-001	312523-001
	NVIDIA, Quadro4 900XGL	A8064-60510	A8064-60510
	NVIDIA, Quadro4 980XGL	308961-001	313285-001
I/0 Cards			
	100BaseT PCI LAN Adapter and L	B5509-66001	N/A
	SCSI adapter, Single Chnl, Ultra160 (PCI)	A6828-60001	A6828-69001
	Fibre Channel adapter, 2 GB, Single (PCI)	A6795-62001	A6795-69001
	LAN adapter, 1000 TX Gigabit	A6825-60001	N/A
	SCSI adapter, Dual port HVD/FW, PCI Bus	A5159-60001	A5159-69001
	SCSI adapter, U160 Dual port (PCI)	A6829-60001	N/A
	LAN Adapter, 10/100 IPSec 3DES	P3492-63000	N/A
	PCI LAN Adapter, 4 Port 100 Base-TX	A5506-69102	N/A
	LAN Adapter, 1000 SX Gigabit	A6847-67101	N/A
	Firewire Adapter, IEEE-1394A, 3 port	5185-8203	N/A

Item	Description	Replacement	Exchange
Cables			
	Audio cable	5182-1857	N/A
	SCSI cable	A7844-63010	N/A
	SCSI LED cable (ships with A6828A and A7059A)	A7844-63011	N/A
	LED status panel cable	A7844-63008	N/A
	IDE CD cable	A7844-63001	N/A
	IDE HDD cable	A7844-63003	N/A

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event, error and warning messages

This appendix contains event, error and warning information for the zx2000 system, including:

- EFI Error and Warning Messages
- IPMI Event Messages
- Sensor Data Record Repository (SDRR)

EFI error and warning messages

EFI error and warning messages are displayed on the console as part of the boot process. They can also be retrieved via the `info warnings` EFI command.

Error Number	Error/Warning Message	Solution
2	Insufficient resources to assign to one or more I/O devices	—
3	Failed I/O socket(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	Call support center.
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	—

Error Number	Error/Warning Message	Solution
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	Reflash firmware.
27	PAL_B warning. Not compatible with CPU	Update firmware.
28	Memory errors detected and PDT is disabled	Reseat DIMMs. If error persists, replace bad DIMM(s).
30	Memory required reinterleave to get a good page 0	—
33	One or more memory ranks are mismatched and deallocated	Load DIMMs in correct loading order (page 2-12).
34	Memory deallocated because of a loading error	Load DIMMs in correct loading order (page 2-12).
35	Memory is not loaded recommended loading order	Load DIMMs in correct loading order (page 2-12).
36	The PDT is full	Clear with **pdt clear** command in EFI shell.
37	At least one (1) CPU has bad fixed core ratio	—
38	All CPUs were slated for compatibility deconfig	—
42	All CPUs are over clocked	—
43	CPU is over clocked	—
44	Monarch changed to lowest stepping CPU	Only seen once after monarch is set to lowest stepping.
48	SAL NVM cleared	Information only, no action required.
49	EFI NVM cleared	Information only, no action required.

Error Number	Error/Warning Message	Solution
50	EFI NVM failed	—
51	CPU deconfigured by SAL_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 **sysset** command.
56	Error reading CPU SMBUS information ROM	—
57	Error accessing FRU information	—
58	Checksum error accessing FRU information	—
59	FRU information version error	—

SEL and FPL log entries

This section is a quick reference for the IPMI events recorded in the SEL and FPL files. These logs are available via the BMC CLI.

- All entries from the SEL are forwarded to the FPL. The FPL is a circular log so the newest entries replace the oldest. The FPL contains forward progress messages from the BMC, System firmware, EFI, and the OS.
- The SEL will not accept new entries once it is full and contains only those events considered of major importance to system operation.
- Both contain type 02 and E0 messages.
- A triplet is formed from the **SensorType**, **EventType**, and the lower nibble of the **Data1** fields of Type 02 events. MP firmware displays the triplet in the *Keyword* field.

accessing the logs with BMC CLI commands

The **fpl** command displays the *forward progress log*. For example:

```
1          2         3 4    5       6                       7
0000000E - Pwr Spply 1 Ctrl Enabled 44-08:09:01 2003-02-28 16:41:46
0000000F 2 CPU0 Boot start 00063  DT 06 0000000000000000
00000010 2 CPU0 Boot start 00063 Time 2003-02-28 16:41:46
00000011 0 CPU0 00020             DT 00 0000000000000000
00000012 0 CPU0 0000E             DT 06 0000000000010000
00000013 1 CPU0 CPU monarch 0000C DT 06 0000000000000000
00000014 1 CPU0 CPU present 00261 DT 06 0000000000000000
00000015 0 CPU0 00008             DT 00 0000000000000000
00000016 0 CPU0 0024B             DT 00 0000000000000000
00000017 0 CPU0 00006             DT 03 0000000000000000
00000018 0 CPU0 00044             DT 06 02000000002C0400
00000019 - BMC LPC reset 00-12:70:02 2003-02-28 16:41:47
```

The **sel** command displays the *system event log*. For example:

```
1      2         3  4    5       6                      7
00E0 - Pwr Spply 1  Ctrl Enabled 44-08:09:01 2003-02-28 16:41:46
00F0 2 CPU0 Boot start 00063     DT 06 0000000000000000
0100 2 CPU0 Boot start 00063 Time 2003-02-28 16:41:46
0110 - BMC LPC   reset 00-12:70:02 2003-02-28 16:41:47
```

Each column in the log contains a different data field:

1. Record ID.
2. Severity for E0 messages.
3. Generator id or sensor reporting the event.
4. Text description of events.
5. Sensor number-Sensor Type:Event Type:Data1 fields for type 02 msgs (triplet) event id for E0 msgs.
6. Data2 and Data3 for type 02 msgs (if applicable) or Data type for E0 messages.
7. Timestamp or extended data specific to the event

system specific events

OEM sensortype 12, eventtype 71

Missing Components are determined at the time of a power-on request, cause a failure in the request, and cause the event to be logged.

Data2	Data3	Missing Component
0x0C-0F		Power pod 0-3
0x20-23		CPU 0-3
0x1E	0x01	Cooling unit 1
0x1E	0x01	Cooling unit 3
0x1E	0x03	Cooling unit 3

Chassis Control Event Codes

For BMC rev 1.41+, an SEL event will be logged for each ChassisControl event, whether it's generated by an IPMI request, or a sensor event.

The EventData fields are:

- Data1: 0xA3 (indicating OEM data in Data2 and Data3, and OEM offset 3)
- Data2:
  - [7] 0 = Request generated by a Sensor Event
  - 1 = IPMI request
  - [6-4] Reserved
  - [3-0] ChassisControl command
- Data3: Sensor Number or IPMI Request Origin

Chassis Control Commands

Command	Description
0x00	Hard power down
0x01	Power up
0x03	Hard reset
0x04	NMI/TOC/INIT
0x0D	Soft shutdown and restart
0x0E	Soft shutdown

Sensor Numbers

Sensor Number	Description
0x04	Power button
0x0E	Wake on LAN
0x11-13	Cooling units
0x40-41	Power supplies
0xCD-D3, 0xD5-D6	Voltage sensors
0xD8	Ambient temp
0xD9-DA	CPU temps
0xFA	ACPI

IPMI Origins

Number	Source
0x01	BT
0x03	CLI
0x07	IPMB
0x08	I2C1
0x09	I2C2
0x0F	KCS0
0x10	KCS1
0x11	KCS2
0x1F	System power thread (Used by Power Restore Policy)

For example:

```
Data2  Data3
80     03     ipmi req from the CLI thd for CHASSIS_CONTROL_POWER_DOWN ("p 0")
81     03     ipmi req from the CLI thd for CHASSIS_CONTROL_POWER_UP ("p 1")
80     01     ipmi req from via BT for CHASSIS_CONTROL_POWER_DOWN
83     03     ipmi/RS req from the CLI thd for CHASSIS_CONTROL_HARD_RESET
00     FA     CHASSIS_CONTROL_POWER_DOWN req from the ACPI sensor (S5)
00     D9     CHASSIS_CONTROL_POWER_DOWN req from CPU0 temp sensor
01     0E     CHASSIS_CONTROL_POWER_UP req from WakeOnLan sensor
```

events without sensors

The BMC logs these events with a "sensor number" of 0. There is no matching SDR entry.

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			

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