® hp invent

service and technical reference guide
hp workstation xw4100

Document Part Number: 326428-001
Spares Part Number: 337256-001

Second Edition

october 2003

This guide provides important information that is useful for maintaining and servicing your workstation. It provides software and hardware installation and troubleshooting information as well.

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.

service and technical reference guide
hp workstation xw4100
Second Edition (october 2003)

Document Part Number: 326428-001
Spares Part Number: 337256-001

contents

1 product overview

2 installing or restoring the operating system

3 system management

4   removal and replacement procedures

5 system diagnostics and troubleshooting

A Ultra ATA drive guidelines and features

B   SCSI Devices

C   SATA Devices

D   system board and riser board reference designators

E   connector pin assignments

F   power cord set requirements

G   routine care

H   additional password security and resetting CMOS

I quick troubleshooting flowcharts

index

1

product overview

This chapter presents an overview of the hardware components of the hp workstation xw4100. For a more detailed overview of all the hardware components and spare part numbers refer to the *hp workstation xw4100 Illustrated Parts Map*.

1.1   product features

1.1.1   front panel components

The following illustration shows a typical hp workstation xw4100. Drive configurations may vary depending on the configuration that was purchased.
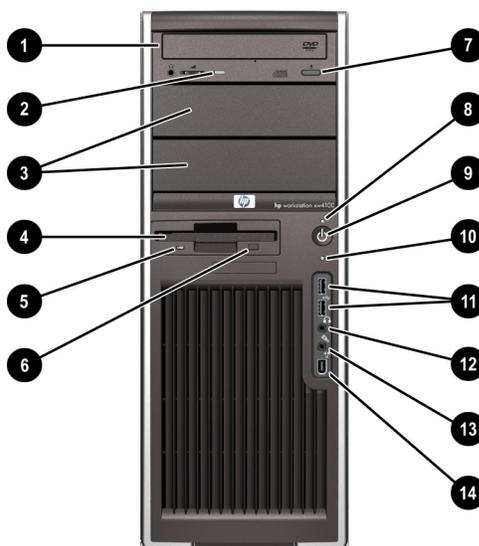
front panel components

❶	Optical Drive* (optional)	❻	Diskette Eject Button	⓫	USB (Universal Serial Bus) Ports
❷	Optical Drive Activity Lights	❼	Optical Drive Eject Button	⓬	Headphone Connector
❸	5.25 inch drive bays	❽	Power On Light	⓭	Microphone Connector
❹	Diskette Drive (optional)	❾	Power Button	⓮	IEEE-1394 Connector**
❺	Diskette Drive Activity Light	❿	Hard Drive Activity Light		

*An optical drive is a CD-ROM, CD-R/RW, DVD-ROM, DVD+R/RW, or CD-RW/DVD combo drive.

**IEEE-1394 is an optional feature. If the workstation was purchased without this option, then this connector will be covered.

1.1.2 rear panel components
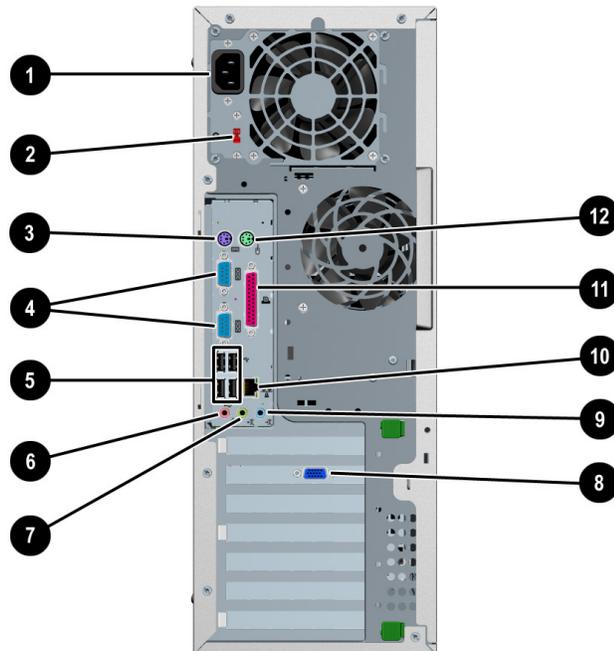
rear panel components

❶	Power Cord Connector	❼	Audio Line-Out Connector (lime)
❷	Voltage Select Switch	❽	Graphics Adapter (optional)
❸	PS/2 Keyboard Connector (purple)	❾	Audio Line-In Connector (light blue)
❹	Serial Connector (teal)	❿	RJ-45 Network Connector
❺	Universal Serial Bus (USB)	⓫	Parallel Connector (burgundy)
❻	Microphone Connector (pink)	⓬	PS/2 Mouse Connector (green)

NOTE: The rear panel connectors are labeled with industry-standard icons to assist you in connecting your peripheral devices. Also, industry-standard colors are used in identifying the connectors.

1.1.3 system board components

The following illustration shows the system board connectors and sockets on the hp workstation xw4100.
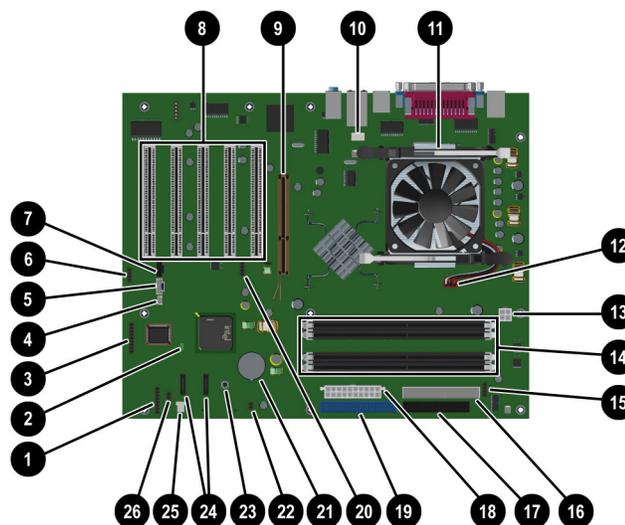
system board components

❶	Control panel connector	⓮	DIMM sockets (4)
❷	Jumper switches	⓯	MultiBay connector
❸	Security (TPM module) connector	⓰	Secondary IDE connector*
❹	Speaker connector	⓱	Diskette drive connector
❺	Auxiliary audio input connector	⓲	Main power connector
❻	Front audio connector	⓳	Primary IDE connector**
❼	CD audio input connector	⓴	Front USB connector
❽	PCI sockets (5)	㉑	Battery
❾	AGP socket	㉒	Hood lock connector
❿	Chassis fan connector	㉓	CMOS reset button
⓫	Processor socket/heatsink	㉔	Serial ATA connectors(2)***
⓬	Processor heatsink fan connector	㉕	Hood sensor connector
⓭	12V auxiliary power connector	㉖	SCSI LED connector

*The Secondary IDE connector is generally used for optical drives.

**The Primary IDE connector is generally used for hard drives.

1.1.4 serial number and COA label location

Each workstation has two unique serial number labels and a certificate of authentication (COA) label. The serial number labels ❶ are located on the top (in a minitower configuration) of the unit and on the rear panel. Keep this number available when contacting customer service for assistance. The COA label ❷ is located on the top panel (in a minitower configuration).
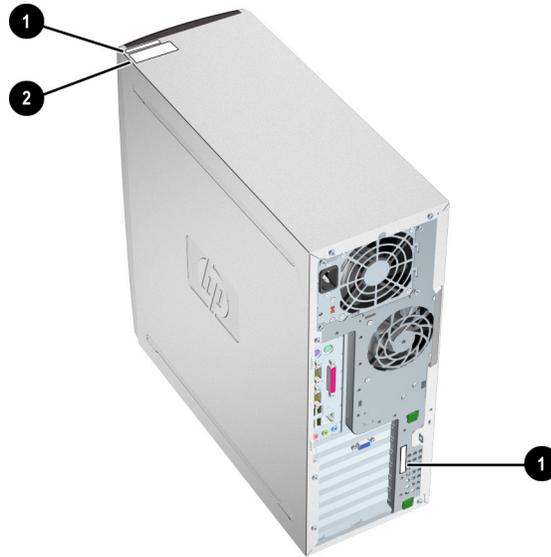
serial number and COA label locations

1.2   product specifications

The following table shows the general specifications of the hp workstation xw4100.

weight	16 kg/35 lb	
tower dimensions (H x W x D)	45.0 x 16.8 x 45.6 cm/17.7 x 6.6 x 17.9 in	
power supply	**input current**	3.6 A @ 115 VAC 1.8 A @ 230 VAC
	line frequency	50 to 60 Hz
	maximum rated power	412 W input, 280 W output
	maximum BTU Load	1.47K BTU/HR
temperature	**operating** **non-operating**	10 to 35 C/5 to 95 F -30 to 60 C/-22 to 140 F
humidity	**operating** **non-operating**	15% to 80% 10% to 90%
maximum altitude (non-pressurized)	**operating** **non-operating**	3,048 m/10,000 ft 4,572 m/15,000 ft

1.2.1 graphics and AGP slot power specifications

Your workstation contains five PCI slots that support a total maximum power of 40 W. Each PCI slot supports a maximum of 25 W. The workstation also contains a single AGP slot that supports a total maximum power of 25W. The total maximum power output that can be supported on all slots (PCI and AGP) is 65W.

NOTE: For hardware specifications of other system components, such as graphics cards or optical drives, visit the Web site of the specific manufacturer.

1.3 Energy Star®

The Energy Star program is a government-backed initiative to promote energy efficiency by identifying ways to reduce energy consumption at home or in the office. Select HP workstations participate in the Energy Star program.

NOTE: Energy Star is not supported on Linux-based workstations.

For those workstations that support Energy Star and have it enabled, the power management features will be set as follows:

■ Monitor—goes into sleep mode after 15 minutes of inactivity.

■ System—goes into Standby mode after 15 minutes of inactivity.

■ Hard Drive—goes into power savings mode after the system goes into Standby mode.

NOTE: Should you have to restore the operating system, Energy Star settings (if applicable) will need to be reset after the restore.

To verify the factory default power settings for your product, go to the Control Panel and double-click on Power Options.

1.3.1 LED color definitions

An LED light exists on the front panel of your workstation. The following table describes what each color signifies.

LED Color	System Status
Green	System is on.
Yellow or Orange	System is in Standby.
No light	System is in Hibernate, or it is off.

1.3.2 Energy Star compliance

HP products purchased with the Energy Star configuration are compliant with the U.S. Environmental Protection Agency (EPA) Energy Star Computers Program. The EPA Energy Star configuration does not imply endorsement by the EPA. As an Energy Star Partner, HP has determined that products with the Energy Star configuration meet the Energy Star guidelines for energy efficiency.

The Energy Star Computers Program was created by the EPA to promote energy efficiency and reduce air pollution through more energy-efficient equipment in homes, offices, and factories. HP products achieve this by reducing the power consumption when not being used.

The power management feature is compatible with operating systems and environments that support APM1.2. This means that users in those environments will not be disconnected from the network during the low-power operating state.

The Power Management feature, when used in conjunction with an external Energy Star compliant monitor, will support the power-down features of the monitor. The Power Management feature allows an external monitor to go into low-power mode when the energy save timeout occurs.

⚠ **CAUTION:** Using the Energy Save Monitor feature with non–Energy Star compliant monitors may cause video distortion when the Energy Save timeout occurs.

1.4 Hyper-Threading Technology

Hyper-Threading Technology is a high performance technology, developed by Intel®, that allows a single processor to execute multiple threads of instructions simultaneously. Hyper-Threading Technology enables the processor to utilize its execution resources more efficiently, delivering performance increases and improving user productivity. Not all systems benefit from the Hyper-Threading Technology.

To see if Hyper-Threading Technology can benefit you, test your system by turning the feature on. Computer Setup (F10) can be used to turn this feature on. To do this, run F10 Setup during boot up and select Advanced > Device Options > Hyper-Threading, and enable the Hyper-Threading Technology.

NOTE: If your workstation does not support Hyper-Threading Technology, the Hyper-Threading menu item will not be available on the Computer Setup menu.

NOTE: The Hyper-Threading Technology is recommended for use with Windows XP systems. This technology is detected by the system and is turned on in the operating system after it is enabled in the system BIOS.

NOTE: Hyper-Threading is not recommended for use with Windows 2000-based workstations.

NOTE: With the release of Red Hat Enterprise Linux WS 3.0, Hyper-Threading Technology will be compatible with Linux-based systems. An SMP kernel must be installed on your system before this technology can be enabled.

For more information about the Hyper-Threading Technology, you can visit the Intel® Web site at www.intel.com.

1.5 finding additional information

The following resources are also available:

■ *Documentation Library* CD—This CD ships with your workstation and has the following documentation:

❏ *Getting Started Guide* (available in print and PDF on the CD)
Helps you set up hardware and factory-provided software; also includes basic troubleshooting information should you encounter any problems during initial startup.

❏ *Safety and Comfort Guide* (available in PDF on the CD)
Provides safety and ergonomic information to assist the user in setting up a safe and comfortable workstation environment.

❏ *Safety and Regulatory Information Guide* (available in PDF on the CD)
Provides safety and regulatory information that ensures compliance with U.S., Canadian, and various international regulations.

■ The following links can also be accessed for additional information:

❏ For information about this and other HP products:
www.hp.com

❏ For information about the Microsoft Windows operating system:
www.microsoft.com

❏ For information about the Linux operating system:
www.redhat.com

■ *hp workstation xw4100 Illustrated Parts Map*—This document provides an overview of all spares for the workstation as well as some basic system information.

■ *Quick Reference Guide* (QRG)—This document provides general hardware information and is offered through a subscription service. To order this document, call 1-800-952-7689 (1-800-567-1616 in Canada) and ask for part number 184960-001.

■ Additional product information is available from the HP Web site at:
www.hp.com/go/workstationsupport.

2

installing or restoring the operating system

Depending on the workstation model, Microsoft™ Windows® 2000 Professional, Windows XP Professional, or Red Hat® Linux® is preinstalled and will be configured automatically the first time the workstation is turned on.

⚠ **CAUTION:** Do not add optional hardware devices to your workstation until the operating system is successfully installed. Doing so may cause errors and may prevent the operating system from installing properly.

⚠ **CAUTION:** Once the automatic installation has begun, DO NOT TURN OFF THE WORKSTATION UNTIL THE PROCESS IS COMPLETE. Turning off the workstation during the installation process might damage the software that runs the workstation.

2.1 installing the operating system and software

The following section discusses the operating system and HP software installation procedures.

2.1.1 Microsoft Windows 2000 Professional

The first time the workstation is turned on, Microsoft Windows and HP software is automatically installed. This takes approximately 10 minutes, depending on the system hardware configuration. At the beginning of the installation process, you are prompted to select the appropriate language for the operating system. Read and follow the instructions that appear on the screen to complete the installation. During this process, do not turn off your workstation unless you are directed to do so.

For complete operating system installation and configuration instructions, refer to the operating system documentation that was provided with the workstation. Additional information is available in the online help after you install the operating system.

installing or upgrading device drivers

To install hardware devices such as a printer, a display adapter, or network adapter after the operating system installation is completed, the operating system needs access to the appropriate software drivers for the devices. These drivers are available on the Support Software CD that shipped with your system.

The I386 directory and its subdirectories provide the HP-specific integration of the operating system for the workstation model and include device drivers supported by Windows 2000.

When prompted for the I386 directory on the operating system CD, replace the path specification with C:\I386 or use the browse button of the dialog box to search for the I386 folder. For Windows 2000, no further steps are required.

NOTE: The service pack for Windows 2000 Professional has been integrated into the program.

creating an emergency repair diskette

1. Click Start > Programs > Accessories > Backup.

2. Select the menu option Tools, then select Create an Emergency Disk.

3. Follow the instructions that appear on the screen.

using the emergency repair diskette

1. Insert the diskette into the diskette drive and restart the workstation (you may boot the workstation to the Windows 2000 CD on some workstations).

2. Press **Enter** to start the repair process, then choose to repair the system.

3. Select the Emergency Repair Process.

4. Follow the instructions that appear on the screen.

2.1.2 Microsoft Windows XP Professional

The first time you turn on your workstation, you will be prompted to select a language for the operating system. After selecting the language, read and follow the instructions on the screen to complete the installation of the operating system. This takes approximately 10 minutes, depending on the system hardware configuration. During the process, do not turn off your workstation unless you are directed to do so.

installing or upgrading device drivers

To install hardware devices such as a printer, a display adapter, or network adapter after the operating system installation is completed, the operating system needs access to the appropriate software drivers for the devices. Device drivers are usually provided on a CD supplied with the peripheral device.

Some existing peripheral devices may not have been shipped with drivers developed for Windows XP. To locate the most current device drivers, go to www.hp.com.

creating a restore diskette

To create a restore diskette for Windows XP, go to Start > Programs > Accessories > System Tools > System Restore, and follow the instructions on the screen.

2.1.3 Red Hat Linux

The first time the workstation is booted, the Linux Setup Tool utility displays. This program allows you to enter your password, network, graphics, time, and keyboard settings for your workstation.

⚠ **CAUTION:** Once the automatic installation has begun, DO NOT TURN OFF THE WORKSTATION UNTIL THE PROCESS IS COMPLETE. Turning off the workstation during the installation process may damage the software that runs the workstation or prevent its proper installation.

NOTE: When you enable the YPBind feature in the Network tab of the Linux Setup Tool, you may get a blank screen for about 15-30 seconds after you have selected and saved all of your settings and have exited the utility. This is normal. The boot process continues its execution after the screen returns.

NOTE: In the Time/Time Zone tab of the Linux Setup Tool utility, the Time Zone Region must be selected first and then the City, before clicking the Save/Exit button.

upgrading device drivers

Should you ever have to upgrade a Linux device driver, visit the HP Web site at: http://www.hp.com/go/workstationsupport.

You can also visit Red Hat's Web site at www.redhat.com to check the availability of additional device drivers.

2.1.4 hp software

The following HP software will also be installed the first time the workstation is turned on:

- Computer Setup (F10) Utilities and diagnostic features
- HP Support Software including device drivers
- Configuration Record
- HP Intelligent Manageability (available for download from http://www.hp.com/go/workstationsupport)
- Enhanced HP Insight Personal Edition (Diagnostics for Windows) (not supported for Linux)
- DMI Support
- Power Management Setup with energy saver features (not supported for Linux)
- Security Management tools
- Software Support Management tools

Certain drivers and utilities are available only in selected languages. You can obtain the latest version of these files, in English and selected other languages, in one of three ways:

■ *Support Software* CD

■ HP Web site at www.hp.com

■ *Restore Plus!* CD, which is supplied with Windows-based workstations

■ *hp workstations Red Hat Linux with hp additions* CD, which is supplied with Linux-based workstations

NOTE: Additional HP software may be required in certain situations.

2.2 restoring the operating system

The following sections discuss the procedures for restoring the operating system and applications software.

2.2.1 Microsoft Windows 2000 Professional and Windows XP Professional

Restore the original operating system and factory-installed software by using the *Restore Plus!* CD and the OS CD that came with the workstation. Carefully read and follow the instructions provided with the *Restore Plus!* CD.

2.2.2 Red Hat Linux

Should a recovery of the OS or software be required, insert the *hp workstations Red Hat Linux with hp additions* (Binary Disk 1/3) CD and follow the prompts on the screen to successfully complete the recovery process.

2.3 protecting the software

To protect software from loss or damage, you should keep a backup copy of all system software, applications, and related files stored on the hard drive. See the operating system or backup utility documentation for instructions on making backup copies of data files.

2.4 ordering backup software

All software that shipped with the workstation, including the *Restore Plus!* CD, can be ordered from HP as a single set, or you can order the various software packages separately.

NOTE: Before calling HP to order the software, be sure to have the serial number of the workstation available. This number is necessary for all diskette orders. See the "serial number and COA label location" section in Chapter 1, for the location of the serial number on the workstation.

3

system management

This section discusses the various tools and utilities that allow for the system management of the hp workstation xw4100.

3.1 Computer Setup (F10)

The Computer Setup (F10) utilities that allow you to:

■ Change factory default settings and to set or change the system configuration, which may be necessary when you add or remove hardware.

■ Determine if all of the devices installed on the workstation are recognized by the system and functioning properly.

■ Determine information about the operating environment of the workstation.

■ Solve system configuration errors detected but not automatically fixed during the Power-On Self-Test (POST).

■ Establish and manage passwords and other security features.

■ Establish and manage energy-saving timeouts (not supported for Linux platforms).

■ Modify or restore factory default settings.

■ Set the system date and time.

■ Set, view, change, or verify the system configuration including settings for processor, graphics, memory, audio, storage, communications, and input devices.

■ Modify the boot order of bootable devices such as hard drives, diskette drives, optical drives, or LS-120 drives.

■ Configure the boot priority of IDE (ATA) and SCSI hard drive controllers.

■ Enable Quick Boot which is faster than Full Boot but does not run all of the diagnostic tests run during a Full Boot. You can set your system to:

   ❑ always Quick Boot (default);
   ❑ periodically Full Boot (from every 1 to 30 days); or
   ❑ always Full Boot.

■ Enable or disable Network Server Mode, which allows the workstation to boot the operating system when the power-on password is enabled with or without a keyboard or mouse attached. When attached to the system, the keyboard and mouse remain locked until the power-on password is entered.

■ Select POST Messages Enabled or Disabled to change the display status of Power-On Self-Test (POST) messages. POST Messages Disabled suppresses most POST messages, such as memory count, product name, and other non-error text messages. If a POST error occurs, the error is displayed regardless of the mode selected. To manually switch to POST Messages Enabled during POST, press any key (except **F1** through **F12**).

■ Establish an Ownership Tag, the text of which is displayed each time the system is turned on or restarted.

■ Enter the Asset Tag or property identification number assigned by your company to this workstation.

■ Enable power-on password prompting during system restarts (warm boots) as well as during power-on.

■ Secure the integrated I/O functionality, including the serial, USB, or parallel ports, audio, or embedded NIC, so that they cannot be used until they are unsecured.

■ Enable or disable Master Boot Record (MBR) Security.

■ Enable or disable removable media boot ability.

■ Enable or disable removable media write ability (when supported by hardware).

■ Solve system configuration errors detected but not automatically fixed during the Power-On Self-Test (POST).

■ Replicate your system setup by saving system configuration information on diskette and restoring it on one or more workstations.

■ Execute self-tests on a specified IDE (ATA) hard drive (when supported by the drive).

NOTE: All features identified in this chapter may not be available on all HP products.

3.1.1 using Computer Setup (F10)

Computer Setup can be accessed only by turning on the workstation or restarting the system. To access the Computer Setup Utilities menu, complete the following steps:

1. Turn on or restart the workstation. If you are in Windows, click Start > Shut Down > Restart the Computer.

2. Press the **F10** key as soon as the monitor light turns green.

NOTE: If you do not press the **F10** key at the appropriate time, you must turn the workstation off, then on again, and press the **F10** key again to access the utility.

3. Select your language from the list and press the **Enter** key. A choice of four headings appears in the Computer Setup Utilities menu: File, Storage, Security, and Advanced.

4. Use the arrow (left and right) keys to select the appropriate heading. Use the arrow (up and down) keys to select the option you want, then press **Enter.**

5. To apply and save changes, select File > Save Changes and Exit.

   ❏ If you have made changes that you do not want applied, select Ignore Changes and Exit.

   ❏ To reset to factory settings, select Set Defaults and Exit. This option will restore the original factory system defaults.

⚠ **CAUTION:** Do NOT turn the workstation power OFF while the ROM is saving your Computer Setup F10 changes because the CMOS could become corrupted. It is safe to turn off all power to the workstation after you exit the F10 Setup screen.

3.1.2 Computer Setup menu

heading	option	description
File	System Information	Lists product name, processor type/speed/stepping, cache size (L1/L2), system ROM family and version, installed memory size, chassis serial number, integrated MAC for enabled or embedded NIC (if applicable), and asset tracking number.
	About	Displays copyright information.
	Set Time and Date	Allows you to set system time and date.
	Save to Diskette	Saves system configuration, including CMOS, to a formatted blank 1.44-MB diskette in file CPQsetup.txt. Save/Restore for DiskOnKey is supported.
	Restore from Diskette	Restores system configuration from a diskette. Save/Restore for DiskOnKey is supported.
	Set Defaults and Exit	Restores factory default settings which includes clearing any established passwords.
	Ignore Changes and Exit	Exits Computer Setup without applying or saving any changes.
	Save Changes and Exit	Saves changes to system configuration and exits Computer Setup.
Storage	Device Configuration	Lists all installed non-SCSI storage devices. **NOTE:** SCSI storage drives will not be listed in Computer Setup (F10). When a device is selected, detailed information and options are displayed. The following options may be presented: **Diskette Type** *(for legacy diskette drives only)* Identifies the highest capacity media type accepted by the diskette drive. Options are 3.5" 1.44 MB, 5.25" 1.2 MB, and Not Installed. **Drive Emulation** *(IDE devices only)* Allows you to select a drive emulation type for a storage device. (For example, a Zip drive can be made bootable by selecting disk emulation.)

Drive Type	Emulation Options
ATAPI Zip drive	None (treated as Other).
	Diskette (treated as diskette drive).
	Disk (treated as hard drive).
IDE Hard disk	None (treated as Other). Disk (treated as hard drive).
Legacy diskette	No emulation options available.
IDE CD-ROM	No emulation options available.
ATAPI LS-120	No emulation options available.

heading	option	description
Storage *(continued)*	Device Configuration *(continued)*	**Transfer Mode** *(IDE devices only)* Specifies the active data transfer mode. Options (subject to device capabilities) are PIO 0, Max PIO, Enhanced DMA, Ultra DMA 0, and Max UDMA.
		Translation Mode *(IDE disks only)* Lets you select the translation mode to be used for the device. This enables the BIOS to access disks partitioned and formatted on other systems and may be necessary for users of older versions of Unix (e.g., SCO Unix version 3.2). Options are Bit-Shift, LBA Assisted, User, and None. ⚠ Ordinarily, the translation mode selected automatically by the BIOS should not be changed. If the selected translation mode is not compatible with the translation mode that was active when the disk was partitioned and formatted, the data on the disk will be inaccessible.
		Translation Parameters *(IDE disks only)* Allows you to specify the parameters (logical cylinders, heads, and sectors per track) used by the BIOS to translate disk I/O requests (from the operating system or an application) into terms the hard drive can accept. Logical cylinders may not exceed 1024. The number of heads may not exceed 256. The number of sectors per track may not exceed 63. These fields are only visible and changeable when the drive translation mode is set to User.
		Multisector Transfers *(IDE disks only)* Specifies how many sectors are transferred per multi-sector PIO operation. Options (subject to device capabilities) are Disabled, 8, and 16.
	Options	**Removable Media Boot** Enables/disables ability to boot the system from removable media. **Removable Media Write** Enables/disables ability to write data to removable media. **NOTE:** This feature applies only to legacy diskette, (IDE/ATA) LS-120 Superdisk, (IDE/ATA) LS-240 Superdisk, and (IDE/ATA) PD-optical drives. **NOTE:** After saving changes to Removable Media Boot, the workstation will restart. Manually, turn the workstation off, then on.
		Primary IDE Controller Allows you to enable or disable the primary IDE/ATA controller.
		Secondary IDE Controller Allows you to enable or disable the secondary IDE/ATA controller.
		BIOS IDE DMA Allows you to enable or disable the BIOS use of DMA for IDE data transfers.
Storage *(continued)*	Options *(continued)*	**SATA Configuration** Allows you to select how the SATA controller will be configured (adds as Separate Controller or Replace Primary IDE Controller).

heading	option	description
		Diskette MBR Validation
		Allows you to enable or disable strict validation of the diskette Master Boot Record (MBR).
		NOTE: If you use a bootable diskette image that you know to be valid, and it does not boot with Diskette MBR Validation enabled, you may need to disable this option in order to use the diskette.
	IDE DPS Self-Test	Allows you to execute self-tests on IDE hard drives capable of performing the Drive Protection System (DPS) self-tests.
		NOTE: This selection will only appear when at least one drive capable of performing the IDE DPS self-tests is attached to the system.
	Controller Order (this feature is supported on select models only.)	Allows you to specify the order of the attached hard drive controllers. The first hard drive controller in the order will have priority in the boot sequence and will be recognized as drive C (if any devices are attached).
		NOTE: The selection will not appear if all hard drives are attached to the embedded IDE controllers.
	SCSI Narrow Termination (supported on select models only.)	Allows you to configure SCSI termination on the external SCSI connector for narrow SCSI drives. The feature should only be enabled if using a narrow SCSI drive to terminate the external SCSI channel.
	Boot Order	Allows you to specify the order in which attached peripheral devices (such as a diskette drive, hard drive, optical drive, or network interface card) are checked for bootable operating system image. Each device on the list may be individually excluded from or included for consideration as a bootable operating system source.
		NOTE: MS-DOS drive lettering assignments may not apply after a non-MS-DOS operating system has started.
		Shortcut to Temporarily Override Boot Order
		To boot **one time** from a device other than the default device specified in Boot Order, restart the workstation and press **F9** when the F10=Setup message appears on the screen. After POST is completed, a list of bootable devices is displayed. Use the arrow keys to select the preferred bootable device and press **Enter.** The workstation then boots from the selected non-default device for this one time.
Security	Setup Password	Allows you to set and enables setup (administrator) password.
		NOTE: If the setup password is set, it is required to change Computer Setup options, flash the ROM, and make changes to certain plug and play settings under Windows.
	Power-On Password	Allows you to set and enable power-on password.
Security *(continued)*	Password Options (This selection will appear only if a power-on password is set.)	Allows you to specify whether the password is required for warm boot (**CTRL+ALT+DEL**).

heading	option	description
	Hood cover sensor	Allows you to enable/disable solenoid hood cover lock.
		NOTE: *Notify User* alerts the user that the sensor has detected that the cover has been removed. *Setup Password* requires that the setup password be entered to boot the workstation if the sensor detects that the cover has been removed.
		This feature is supported on select models only.
	DriveLock	Allows you to assign or modify a master or user password for certain hard drives. When enabled, the user is prompted to provide one of the DriveLock passwords during POST. If neither is successfully entered, the hard drive will remain inaccessible until one of the passwords is successfully provided during a subsequent cold-boot sequence.
		This selection will only appear when at least one drive that supports the DriveLock feature is attached to the system.
	Master Boot Record Security*	Allows you to enable or disable Master Boot Record (MBR) Security.
		When enabled, the BIOS rejects all requests to write to the MBR on the current bootable disk. Each time the workstation is powered on or rebooted, the BIOS compares the MBR of the bootable disk to the previously saved MBR. If changes are detected, you are given the option of saving the MBR on the current bootable disk, restoring the previously-saved MBR, or disabling MBR security. You must know the setup password if one is set.
		NOTE: Disable MBR Security before intentionally changing the formatting or partitioning of the current bootable disk. Several disk utilities (such as FDISK and FORMAT) attempt to update the MBR.
		If MBR Security is enabled and disk accesses are being serviced by the BIOS, write requests to the MBR are rejected, causing the utilities to report errors.
		If MBR Security is enabled and disk accesses are being serviced by the operating system, any MBR change will be detected by the BIOS during the next reboot, and an MBR Security warning message will be displayed.
	Save Master Boot Record*	Saves a backup copy of the Master Boot Record of the current bootable disk.
		NOTE: Only appears if MBR Security is enabled.
*Option supported on select models.		

heading	option	description
Security *(continued)*	Restore Master Boot Record*	Restores the backup Master Boot Record to the current bootable disk.
		NOTE: Only appears if all of the following conditions are true: MBR Security is enabled. A backup copy of the MBR has been previously saved. The current bootable disk is the same disk from which the backup copy of the MBR was saved.
		Restoring a previously saved MBR after a disk utility or operating system has modified the MBR may cause the data on the disk to become inaccessible. Only restore a previously saved MBR if you are confident that the current bootable disk's MBR has been corrupted or infected with a virus.
	Device Security*	Enables/disables serial ports A and B, parallel port, front USB ports, all USB ports, system audio, network controllers (some models), and SCSI controllers (some models).
	Network Service Boot	Enables/disables the workstation's ability to boot from an operating system installed on a network server. (Feature available on NIC models only; the network controller must reside on the PCI bus or be embedded on the system board.)
	System IDs	Allows you to set: • Asset tag (18-byte identifier) and ownership Tag (80-byte identifier displayed during POST). • Chassis serial number or Universal Unique Identifier (UUID) number. The UUID can only be updated if the current chassis serial number is invalid. (These ID numbers are normally set in the factory and are used to uniquely identify the system.) • Keyboard locale setting (for example, English or German) for System ID entry.

*Option supported on select models.

heading	option	description
Advanced**	Power-On Options	Allows you to set:
		• POST mode (QuickBoot, FullBoot, or FullBoot every 1-30 days).
		• POST messages (enable/disable).
		• Safe POST* (enable/disable). Enabling this feature allows the ROM to monitor add-in cards during boot. If an add-in card does not work or initialize correctly, then on the next boot all cards will be skipped during POST.
		• **F9** prompt (enable/disable). Enabling this feature will display the text F9=Boot Menu during POST. Disabling this feature prevents the text from being displayed but pressing **F9** will still access the Shortcut Boot (Order) Menu screen. See Storage > Boot Order for more information.
		• **F10** prompt (enable/disable). Enabling this feature will display the text F10=Setup during POST. Disabling this feature prevents the text from being displayed but pressing **F10** will still access the Setup screen.
		• **F12** prompt (enable/disable). Enabling this feature will display the text F12=Network Service Boot during POST. Disabling this feature prevents the text from being displayed but pressing **F12** will still force the system to attempt booting from the network.
		• Option ROM* prompt (enable/disable). Enabling this feature will cause the system to display a message before loading options ROMs.
		• Remote wakeup boot source (remote server/local hard drive).
		• After Power Loss (off/on): After power loss, if you connect your workstation to an electric power strip and would like to turn on power to the workstation using the switch on the power strip, set this option to ON. **NOTE:** If you turn off power to your workstation using the switch on a power strip, you will not be able to use the suspend/sleep feature or the Remote Management features.
		• POST Delay (in seconds) (enable/disable). Enabling this feature will add a user-specified delay to the POST process. This delay is sometimes needed for hard disks on some PCI cards that spin up very slowly; so slowly that they are not ready to boot by the time POST is finished. The POST delay also gives you more time to select **F10** to enter Computer Setup (F10).

*Available on select models.

**These options should be used by advanced users only.

heading	option	description
Advanced** *(continued)*	Power-On Options *(continued)*	Allows you to set: *(continued)* • I/O APIC Mode (enable/disable). Enabling this feature will allow Microsoft Windows Operating system to run optimally. This feature must be disabled for certain non-Microsoft Operating Systems to work properly. • ACPI/USB Buffers @ Top of Memory (enable/disable). Enabling this feature places USB memory buffers at the top of memory. The advantage of remapping is that it allows space in the DOS Compatibility Hole range, below 1MB, to be made available for additional PCI plug-in cards that need option ROM space.
	Onboard Devices	Allows you to set resources for or disable onboard system devices (serial port, parallel port, or diskette controller).
	PCI Devices	Lists currently installed PCI devices and their IRQ settings. Allows you to reconfigure IRQ settings for these devices or to disable them entirely. These settings have no effect under an APIC-based operating system.
	Bus Options*	Allows you to enable or disable: • PCI bus mastering, which allows a PCI device to take control of the PCI bus. • PCI VGA palette snooping, which sets the VGA palette snooping bit in PCI configuration space; only needed when more than one graphics controller is installed. • PCI SERR# generation. • ECC support allows hardware-based error correction for ECC-capable memories.

*Available on select models.

**These options should be used by advanced users only.

heading	option	description
Advanced** *(continued)*	Device options	Allows you to set: • Printer mode (bi-directional, EPP+ECP, output only). • Num Lock state at power-on (off/on). • PME (power management event) wakeup events (enable/disable). • Processor cache (enable/disable). • Hyper-Threading* (enable/disable). • ACPI S3* support (enable/disable). S3 is an ACPI (advanced configuration and power interface) sleep state that some add-in hardware options may not support. **NOTE:** ACPI S3 selections are supported on select models only. If the ACPI S3 support option is not presented, the other ACPI S3 options (ACPI S3 Video REPOST, ACPI S3 Hard disk Reset, and ACPI S3 PS2 Mouse Wakeup) will not be available. • ACPI S3 Video REPOST* (enable/disable). This feature reruns the video option ROM on a boot from the S3 state. • ACPI S3 Hard Disk Reset* (enable/disable). Resets the hard disk on a boot from the S3 sleep state. • ACPI S3 PS2 Mouse Wakeup* (enable/disable). Allows the mouse to wake the system from the S3 sleep state. • AGP Aperture size*. Allows you to specify the amount of system memory reserved for use by your graphics controller. • Monitor Tracking (enable/disable). Allows ROM to save monitor asset information. • Unique Sleep State Blink Patterns*. Allows you to choose an LED blink pattern that uniquely identifies each sleep state. • Frame Buffer Size*. Allows you to specify amount of system memory dedicated to the embedded graphics frame buffer. The AUTO setting attempts to optimize the frame buffer size depending on the amount of total system memory.

*Available on select models.

**These options should be used by advanced users only.

heading	option	description
Advanced** *(continued)*	Device options *(continued)*	Allows you to set: *(continued)* • PCI Slot x Option ROM Download. Allows you to enable/disable the downloading of the PCI slot option ROM. "x" can be a value of 1, 2, 3, 4, or 5. • NIC PXE (enable/disable). The BIOS contains an embedded NIC option ROM to allow the unit to boot through the network to a PXE server. This is typically used to download a corporate image to a hard drive. The NIC option ROM takes up memory space below 1MB commonly referred to as DOS Compatibility Hole (DCH) space. This space is limited. The F10 option allows you to disable the downloading of the embedded NIC option ROM, giving more DCH space for other PCI cards which may need option ROM space. The default setting for the NIC option ROM is "enabled."
	PCI VGA Configuration	Displayed only if there are multiple PCI video adapters in the system. Allows you to specify which VGA controller will be the "boot" or primary VGA controller.

*Available on select models.

**These options should be used by advanced users only.

3.2 desktop management

HP Intelligent Manageability (available for download from http://www.hp.com/go/workstationsupport) provides standards-based solutions for managing and controlling workstations in a networked environment. This section summarizes the capabilities and features of the four key components of desktop management:

■ initial configuration and deployment

■ software updating and management

■ asset tracking and security

■ fault notification and recovery

NOTE: Support for specific features described in this guide may vary by model or software version.

3.2.1 initial configuration and deployment

HP workstations come with a preinstalled system software image. After a very brief software "unbundling" process, the workstation is ready to be used.

You may prefer to replace the preinstalled software image with a customized set of system and application software. There are several methods for deploying a customized software image. They include:

■ Installing additional software applications after unbundling the preinstalled software image.

■ Using software deployment tools, such as Microsoft MS Batch or NT Distribution Share (NTDS), or Altiris eXpress to replace the preinstalled software with a customized software image.

■ Using a disk cloning process to copy the contents from one hard drive to another.

The best deployment method depends on your information technology environment and processes. The PC Deployment section of the Solutions and Services Web site (http://h18000.www1.hp.com/solutions/pcsolutions/) provides information to help you select the best deployment method. You'll also find guides and utilities to integrate Microsoft or PXE-based deployment tools.

The *Restore* or the *Restore Plus!* CD, ROM-based setup, and ACPI-ready hardware provide further assistance with recovery of system software, configuration management and troubleshooting, and power management.

3.2.2 Remote System Installation

Remote System Installation lets you start and set up your system using the software and configuration information located on a network server. This feature is usually used as a system setup and configuration tool, and can be used for the following tasks:

■ Deploying a software image on one or more new PCs.

■ Formatting a hard drive.

■ Installing application software or drivers.

■ Updating the operating system, application software, or drivers.

To initiate Remote System Installation, press **F12** when the F12=Network Service Boot message appears in the lower-right corner of the HP logo screen. Follow the instructions on the screen to continue the process.

3.2.3 software updating and management

HP provides several tools for managing and updating software on desktops and workstations—Altiris eXpress, Altiris PC Transplant Pro, PC Transplant, Insight Manager™ LC, System Software Manager, and Remote Management Setup Utilities. Using Insight Manager LC, you can also monitor a workgroup of PCs from a central console and remotely update the system software, security settings, flash ROM, or hardware device drivers, for each of the managed PCs individually.

Altiris eXpress

Altiris eXpress allows the system administrator to create and quickly deploy a customized, corporate-standard software image across one or more networked client PCs with an interface as simple to use as Windows Explorer. Altiris eXpress supports Intel's Wired for Management and Preboot Execution Environment (PXE). Using Altiris eXpress and the Remote System Installation features of the workstation, there is no need for the system administrator to visit each new PC individually to deploy the software image.

Altiris eXpress is able to install a disk image containing the operating system, application software, and the Altiris eXpress client, without requiring the use of a separate boot diskette. With Altiris eXpress, the network administrator can:

■ Create a new image or edit an existing image, or clone a PC on the network which may have the ideal image.

■ Create any number of customized disk images for a variety of workgroups.

■ Edit image files, modifying them without having to start from scratch. This is possible because Altiris eXpress stores files in its native format: NTFS, FAT16, or FAT32.

■ Establish a "New PC Event," a script that will run automatically when a new PC is added to the network. The script can, for instance, format the PC hard drive, flash the ROM BIOS, and install a full, standard software image.

■ Schedule an event to run on a group of workstations.

Altiris eXpress also includes easy-to-use software distribution capabilities. You can use Altiris eXpress to update operating systems and application software from a central console. When used in conjunction with System Software Manager, Altiris eXpress can also update ROM BIOS and device driver software.

For more information, refer to the HP Web site at www.hp.com.

PC Transplant Pro and PC Transplant

PC Transplant is designed to assist you in personalizing your new HP workstation. It can be downloaded free from the HP web site. It lets you preserve the "personality" or the customized settings, such as Start menu entries, drive and printer mappings, software application options, and so on of an existing PC. It will then transfer those unique settings to a workstation.

For more information, refer to the HP Web site at www.hp.com.

hp Insight Manager LC

HP Insight Manager LC is a web-based tool for managing workgroups of PCs. It provides a unified "browser-based roaming console," not only for HP clients but any standard DMI 2.0-based PC on the network. It can automatically discover, view system information, and receive alerts from any DMI 2.0 PC on a specified domain or workgroup.

For more information, refer to the HP Web site at www.hp.com.

System Software Manager

System Software Manager (SSM) is a utility that lets you update system-level software on multiple systems simultaneously. When executed on a PC client system, SSM detects both hardware and software versions, then updates the appropriate software from a central repository, also known as a file store. Support software that works with SSM is flagged with the PC Lifecycle Management icon on the HP web site. To download the utility or to obtain more information on SSM, visit the HP Web site at www.hp.com.

Remote Management Setup Utilities

The Remote Management Setup Utilities, when integrated with Management Solutions Partners products supplement the capabilities of Solutions Partners products for distributing new applications, device drivers, and other system software. The HP web site includes updated ROM images and device drivers which can be distributed to client PCs using these software tools.

For more information, refer to the online *Remote Management Administrators Guide.* The *Remote Management Administrators Guide* is included with the Remote Management Setup Utilities, which are available on the HP Web site at www.hp.com. The following sections provide information on using these utilities to accomplish various remote management functions including ROM flash, changing security settings, and wakeup/shutdown.

remote ROM flash

Your workstation comes with a reprogrammable flash ROM (read only memory). By establishing a setup password in Computer Setup, you can protect the ROM from being unintentionally updated or overwritten. This is important to ensure the operating integrity of the workstation. Should you need or want to upgrade your ROM, you may:

■ Order an upgraded ROMPaq diskette from HP.

■ Download the latest ROMPaq images from the HP Web site (www.hp.com).

△ **CAUTION:** For maximum ROM protection, be sure to establish a setup password. The setup password prevents unauthorized ROM upgrades. HP Insight Manager LC allows the system administrator to set the setup password on one or more PCs simultaneously. For more information, visit the HP Web site at www.hp.com.

using Remote ROM flash

Remote ROM Flash allows the system administrator to safely upgrade the ROM on remote HP workstations directly from the centralized network management console. Enabling the system administrator to perform this task remotely on multiple workstations results in a consistent deployment of and greater control over ROM images over the network.

All ROMPaq ROM images from HP are digitally signed to ensure authenticity and minimize potential corruption. Your system ROM may include a Boot Block that is protected during the flash process and allows the workstation to be restarted, in the unlikely event of an unsuccessful ROM flash.

NOTE: Your workstation must be powered on, or turned on through Remote Wakeup, to take advantage of Remote ROM Flash. Use of Remote ROM Flash also requires an established setup password.

For more information on enabling Remote ROM Flash, refer to the online *Remote Management Administrators Guide.* The *Remote Management Administrators Guide* is included with the Remote Management Setup Utilities, and is available on the HP Web site at www.hp.com.

FailSafe Boot Block ROM

The FailSafe Boot Block ROM allows for system recovery in the unlikely event of a ROM flash failure, for example, if a power failure were to occur during a ROM upgrade. The Boot Block is a flash-protected section of the ROM that checks for a valid system ROM flash when power to the system is turned on.

■ If the system ROM is valid, the system starts normally.

■ If the system ROM fails the validation check, the FailSafe Boot Block ROM provides enough support to start the system from a ROMPaq diskette, which will program the system ROM with a valid image.

When the Boot Block detects an invalid system ROM, the system sounds a series of beeps (one long and three short) and flashes the three keyboard lights (on and off two times). A Boot Block recovery mode message is displayed on the screen.

To recover the system after it enters Boot Block recovery mode, complete the following steps:

1. Remove any diskettes from the diskette drive and turn off the power.

2. Insert a ROMPaq diskette into the diskette drive.

3. Turn on power to the system.

4. If no ROMPaq diskette is found, you will be prompted to insert one and restart the workstation.

5. If a setup password has been established, the Caps Lock light will turn on and you will be prompted to enter the password.

6. Enter the setup password.

7. If the system successfully starts from the diskette and successfully reprograms the ROM, then the three keyboard lights will turn on. A "rising tone" series of beeps also signals successful completion.

The following table lists the various keyboard light combinations used by the Boot Block ROM, as well as the meaning and action associated with each combination.

keyboard light combinations used by Boot Block ROM

failsafe boot block mode	keyboard LED color	keyboard LED activity	state/message
Num Lock	Green	On	ROMPaq diskette not present, is bad, or drive not ready.*
Caps Lock	Green	On	Enter password.*
Num, Caps, Scroll Lock	Green	Turn on and off 2 times (accompanied by 1 long and 3 short beeps)	ROM flash failed.*
Num, Caps, Scroll Lock	Green	On	Boot Block ROM Flash successful. Turn power off, then on to reboot.

NOTE: Diagnostic lights do not flash on USB keyboards.

*Insert valid ROMPaq diskette in drive A. Turn power switch off, then on to reflash ROM. If ROM flash is successful, all three keyboard LEDs will light up, and you will hear a rising tone series of beeps. Remove diskette and turn power off, then on to restart the workstation.

3.2.4 remote security management

Remote Security Management allows the system administrator to safely set or modify security features on remote workstations directly from the centralized network management console. Enabling the system administrator to perform these tasks remotely, on multiple workstations, results in consistent deployment of and greater control over client workstation security parameters over the network.

NOTE: Your workstation must be powered on, or turned on through Remote Wakeup, to take advantage of Remote Security Management. Use of Remote Security Management also requires an established setup password.

For more information about the Remote Management Setup software and enabling Remote Security Management, refer to the online *Remote Management Administrators Guide.* The *Remote Management Administrators Guide* is included with the Remote Management Setup Utilities, and is available on the HP Web site at www.hp.com.

remote wakeup and remote shutdown

If your workstation has a network card installed, it may support the Remote Wakeup and Remote Shutdown functions. These functions allow a system administrator to power on and power off a client workstation from a remote location supported by PC LAN management tools.

NOTE: Third-party software tools are required to remotely distribute software.

Remote Wakeup allows the network interface controller to continue functioning when power to the workstation has been turned off, but the power cord is still connected to an electrical outlet.

NOTE: The workstation continues to consume a small amount of electricity even after you turn it off. Only when you disconnect the power cord from the electrical outlet does the workstation stop consuming electricity.

To enable Remote Wakeup and Remote Shutdown, complete the following steps:

1. Double-click the *Network Icon,* located in the Control Panel.

2. Double-click the appropriate network controller.

3. Click the Advanced Properties tab.

4. Select Remote Wakeup.

5. Change the value to ON.

6. Click OK to save and apply changes, then click OK to exit the Network dialog.

For more information on using Remote Wakeup and Remote Shutdown, refer to the online *Remote Management Administrators Guide.* The *Remote Management Administrators Guide* is included with the Remote Management Setup Utilities, and is available on the HP Web site at www.hp.com.

NIC Alert

The NIC Alert function enables desktop PCs to send an immediate alert to the network administrator when there is a hardware or operating system failure, or evidence of tampering. An alert will be sent even if the system is powered off or the operating system has not yet started.

replicating your setup

This procedure gives an administrator the ability to easily copy one setup configuration to other workstations of the same model. This allows for faster, more consistent configuration of multiple workstations. To replicate your setup:

1. Access the Computer Setup Utilities menu.

2. Click File > Save to Diskette. Follow the instructions on the screen.

NOTE: This requires an internal diskette drive or a portable, external diskette drive.

3. To replicate the configuration, click File > Restore from Diskette, and follow the instructions on the screen.

Altiris eXpress and PC Transplant make it easy to replicate the configuration and custom settings of one PC and copy it to one or more PCs. For more information, visit the HP Web site at www.hp.com.

dual-state power button

With Advanced Configuration and Power Interface (ACPI) enabled for Windows, the power button can function either as an on/off switch or as a suspend button. The suspend feature does not completely turn off power, but instead causes the workstation to enter a low-power standby. This allows you to quickly power down without closing applications and to quickly return to the same operational state without any data loss.

To change the power button's configuration, complete the following steps:

1. Access the Computer Setup menu.

2. Select Power > Energy Saver. Select Minimal or Advanced to turn on the Energy Saver Options menu.

3. Select Power > Energy Saver Options. Set the power button configuration to either On/Off or Suspend/Wakeup, as desired.

4. See the "Computer Setup (F10)" section of this guide for more detailed information about the features of Computer Setup.

5. Select File > Save Changes and Exit.

After configuring the power button to function as a suspend button, press the power button to put the system in a very low power state (suspend). Press the button again to quickly bring the system out of suspend to full power status. To completely turn off all power to the system, press and hold the power button for four seconds.

NOTE: If you have selected the "Blink LED during Energy Save" option in Computer Setup, the power-on light will blink green once every two seconds while the workstation is in suspend. See to the "Computer Setup menu" section earlier in this chapter for more information on using Computer Setup.

power management

Power Management is a feature that saves energy by shutting down certain components of the workstation when they are not in use, saving energy without having to shut down the workstation. Timeouts (the period of inactivity allowed before shutting down these components) can be enabled, customized, or disabled using the Control Panel program (Power Options). More advanced customization of the power management settings is available through Computer Setup.

NOTE: The power saver and power management features are not supported on Linux-based workstations.

1. Access the Computer Setup menu.

2. Select Power > Energy Saver. Select Advanced to turn on the Timeouts menu.

3. Select Power > Timeouts. Enable, customize, or disable timeouts.

4. See to the "Computer Setup menu" section earlier in this chapter for additional information about the features of Computer Setup.

5. Select File > Save Changes and Exit.

Use Display Properties to establish, modify, or disable Power Management settings for the monitor. To access Display Properties, right-click on the Windows Desktop, then choose Properties.

World Wide Web site

When making the transition to new or revised operating systems, it is important to implement the support software designed for that operating system. If you plan to run a version of Microsoft Windows that is different from the version included with your workstation, you must install corresponding device drivers and utilities to ensure that all features are supported and functioning properly.

HP has made the task of locating, accessing, evaluating, and installing the latest support software easier. You can download the software from the HP Web site at www.hp.com.

The Web site contains the latest device drivers, utilities, and flashable ROM images needed to run the latest Microsoft Windows operating system on your HP workstation.

Desktop Management Interface (DMI)

The Desktop Management Task Force (DMTF) is an industry body with the goal of standardizing systems manageability. DMTF established the Desktop Management Interface (DMI) framework to standardize access to PC configuration data. HP delivers hardware and software instrumentation that supports the DMI standard.

For more information on configuring the DMI software, refer to the online *Intelligent Manageability Guide.*

Wired for Management

Intel's Wired for Management initiative is focused on reducing the support and administration cost of Intel architecture-based systems without compromising flexibility and performance. The Wired for Management guidelines provide a baseline set of building blocks that are utilized in Intelligent Manageability to provide standardized management of desktop inventories, remote system configuration, off-hours maintenance, and next generation power management. Additional capabilities have been incorporated into Intelligent Manageability to provide an extensive solution for managing networked computing environments.

Wired for Management technologies include:

■ Desktop Management Interface (DMI) 2.0

■ Remote System Installation

■ Remote Wakeup and Remote Shutdown

■ ACPI-Ready Hardware

■ SMBIOS

■ Pre-boot Execution (PXE) support

■ Boot Integrity Services (BIS)

3.2.5 asset tracking and security

The asset control features incorporated into the workstation provide key asset tracking data that can be managed using HP Insight Manager products and Management Solutions Partners products. Seamless, automatic integration between AssetControl features and these products enables you to choose the management tool that is best suited to your environment and to leverage your investment in existing tools.

HP workstations are manufactured with the hardware and firmware required to fully support the DMI 2.0 standard.

HP also offers several solutions for controlling access to valuable components and information. Security features such as the hood cover sensor and the solenoid hood cover lock, available as an option, help to prevent unauthorized access to the internal components of the workstation. By disabling parallel, serial, or USB ports, or by disabling removable media boot capability, you can protect valuable data assets. Memory Change and hood cover sensor alerts can be automatically forwarded to HP Insight Manager products to deliver proactive notification of tampering with a workstation's internal components.

There are three ways to manage security settings on your HP workstations:

■ Locally, using the Setup Utilities. See the "Computer Setup menu" section earlier in this chapter for additional information and instructions on using the Computer Setup Utilities.

■ Remotely, using the Remote Security Management software. This software enables the secure, consistent deployment and control of security settings from a central point on the network using a third-party PC LAN management application such as Microsoft SMS.

■ Remotely, using HP Insight Manager LC, a tool for managing PC workgroups.

The following table and sections refer to managing security features of your workstation locally through the Setup Utilities. Refer to the Remote Management Setup Utilities for more information on using the Remote Security Management software. These utilities are available on the HP web site at www.hp.com.

security features overview

feature	purpose	how it is established
Removable Media Boot Control	Prevents booting from the removable media drives.	From the Setup Utilities menu.
Serial, Parallel, USB, or Infrared Interface Control	Prevents transfer of data through the integrated serial, parallel, USB (universal serial bus), or infrared interface.	From the Setup Utilities menu.
Power-On Password	Prevents use of the workstation until the password is entered. This can apply to both initial system startup and restarts.	From the Setup Utilities menu.
Setup Password	Prevents reconfiguration of the workstation (use of the Setup Utilities) until the password is entered.	From the Setup Utilities menu.
Network Server Mode	Provides unique security features for workstations being used as servers.	From the Setup Utilities menu.
DriveLock	Prevents unauthorized access to the data on specific hard drives.	From the Setup Utilities menu.
Hood Cover Sensor (optional feature)	Indicates that hood cover has been removed. Can be set to require the setup password to restart the workstation, after the cover has been removed.	From the Setup Utilities menu.
Solenoid Hood Cover Lock (optional feature)	This is a software controlled lock the prevents the unauthorized removal of the hood cover.	From the Setup Utilities menu.
Master Boot Record Security	May prevent unintentional or malicious changes to the Master Boot Record of the current bootable disk, and provides a means of recovering the "last known good" MBR.	From the Setup Utilities menu.
Memory Change Alerts	Detects when memory modules have been added, moved, or removed; notifies user and system administrator.	For information on enabling Memory Change Alerts, refer to the online *Intelligent Manageability Guide.*
Ownership Tag	Displays ownership information, as defined by the system administrator, during system startup (protected by setup password).	From the Setup Utilities menu.

security features overview *(Continued)*

feature	purpose	how it is established
Kensington Cable Lock Provision	Inhibits access to the interior of the workstation to prevent unwanted configuration changes or component removal. Can also be used to secure the workstation to a fixed object to prevent theft.	Install a Kensington cable lock to secure the workstation to a fixed object.
Padlock loop	Prevents hood cover from being removed. This loop can also be used to secure the unit to a fixed object.	Install a padlock.

NOTE: For more information about Computer Setup, see the "Computer Setup menu" section earlier in this chapter.

password security

The power-on password prevents unauthorized use of the workstation by requiring entry of a password to access applications or data each time the workstation is turned on or restarted. The setup password specifically prevents unauthorized access to Computer Setup, and can also be used as an override to the power-on password. That is, when prompted for the power-on password, entering the setup password instead will allow access to the workstation.

A network-wide setup password can be established to enable the system administrator to log in to all network systems to perform maintenance without having to know the power-on password, even if one has been established.

establishing a setup password using Computer Setup

Establishing a setup password through Computer Setup prevents reconfiguration of the workstation (use of the Computer Setup utility) until the password is entered.

1. Turn on or restart the workstation. If you are in Windows, click Start > Shut Down > Restart the workstation.

2. When the `F10=Setup` message appears in the lower-right corner of the screen, press the **F10** key. Press **Enter** to bypass the title screen, if necessary.

NOTE: If you do not press the **F10** key while the message is displayed, you must restart the workstation to access the utility.

---

3. Select Security, then select Setup Password and follow the instructions on the screen.

4. Before exiting, click File > Save Changes and Exit.

establishing a power-on password using Computer Setup

Establishing a power-on password through Computer Setup prevents access to the workstation when power is turned on, unless the password is entered. When a power-on password is set, Computer Setup presents Password Options under the Security menu. The password options include Network Server Mode and Password Prompt on Warm Boot.

When Network Server Mode is disabled, the password must be entered each time the workstation is turned on when the key icon appears on the monitor. When Password Prompt on Warm Boot is enabled, the password must also be entered each time the workstation is rebooted. When Network Server Mode is enabled, the password prompt is not presented during POST, but any attached PS/2 keyboard will remain locked until the user enters the power-on password.

1. Turn on or restart the workstation. If you are in Windows, click Start > Shut Down > Restart the Computer.

2. When the `F10=Setup` message appears in the lower-right corner of the screen, press the **F10** key. Press **Enter** to bypass the title screen, if necessary.

NOTE: If you do not press the **F10** key while the message is displayed, you must restart the workstation to access the utility.

3. Select Security, then Power-On Password and follow the instructions on the screen.

4. Before exiting, click File > Save Changes and Exit.

entering a power-on password

To enter a power-on password, complete the following steps:

1. Turn on or restart the workstation. If you are in Windows, click Start > Shut Down > Restart the Computer.

2. When the key icon appears on the monitor, type your current password, then press **Enter.**

NOTE: Type carefully; for security reasons, the characters you type do not appear on the screen.

If you enter the password incorrectly, a broken key icon appears. Try again. After three unsuccessful tries, you must turn off the workstation, then turn it on again before you can continue.

entering a setup password

If a setup password has been established on the workstation, you will be prompted to enter it each time you run Computer Setup.

1. Turn on or restart the workstation. If you are in Windows, click Start > Shut Down > Restart the Computer.

2. When the `F10=Setup` message appears in the lower-right corner of the screen, press the **F10** key.

NOTE: If you do not press the **F10** key while the message is displayed, you must restart the workstation to access the utility.

3. When the key icon appears on the monitor, type the setup password, then press the **Enter** key.

NOTE: Type carefully; for security reasons, the characters you type do not appear on the screen.

If you enter the password incorrectly, a broken key icon appears. Try again. After three unsuccessful tries, you must turn off the workstation, then turn it on again before you can continue.

changing a power-on or setup password

1. Turn on or restart the workstation. If you are in Windows, click Start > Shut Down > Restart the Computer. To change the setup password, run Computer Setup.

2. When the key icon appears, type your current password, a slash (/) or alternate delimiter character, your new password, another slash (/) or alternate delimiter character, and your new password again as shown:

```
current password/new password/new password
```

NOTE: Type carefully; for security reasons, the characters you type do not appear on the screen.

---

3. Press the **Enter** key.

The new password takes effect the next time you turn on the workstation.

NOTE: See the "national keyboard delimiter characters" section in this chapter for information about the alternate delimiter characters.

The power-on password and setup password may also be changed using the Security options in Computer Setup.

---

deleting a power-on or setup password

1. Turn on or restart the workstation. Use the appropriate operating system shutdown process. To delete the setup password, run Computer Setup.

2. When the key icon appears, type your current password followed by a slash (/) or alternate delimiter character as shown:

```
current password/
```

3. Press the **Enter** key.

NOTE: See the "national keyboard delimiter characters" section for information about the alternate delimiter characters. The power-on password and setup password may also be changed using the Security options in Computer Setup.

---

national keyboard delimiter characters

Each keyboard is designed to meet country-specific requirements. The syntax and keys that you use for changing or deleting your password depend on the keyboard that came with your workstation.

national keyboard delimiter characters

Arabic	/	Greek	-	Russian	/
Belgian	=	Hebrew	.	Slovakian	-
BHCSY*	-	Hungarian	-	Spanish	-
Brazilian	/	Italian	-	Swedish/Finnish	/
Chinese	/	Japanese	/	Swiss	-
Czech	-	Korean	/	Taiwanese	/
Danish	-	Latin American	-	Thai	/
French	!	Norwegian	-	Turkish	.
French Canadian	é	Polish	-	U.K. English	/
German	-	Portuguese	-	U.S. English	/

*For Bosnia-Herzegovina, Croatia, Slovenia, and Yugoslavia

clearing passwords

If you forget your password, you cannot access the workstation. See Appendix G, "additional password security and resetting CMOS" for instructions on clearing passwords.

network server mode

Network Server Mode provides unique security features for workstations being used as servers. It is only available when a power-on password has been set in Computer Setup. When the Network Server Mode is enabled, the power-on password is not required to boot the hard drive, and a keyboard is not required to be attached to the system. If a PS/2 keyboard is present, it will be locked until the user enters the power-on password. If a USB keyboard is present, it will remain usable by default. To prevent USB keyboard access after the operating system has loaded, a user must hide the USB Port under the Device Security option of Computer Setup's Security menu. When used in conjunction with the Computer Setup After Power Loss power-on option, Network Server Mode permits the "server" to automatically reboot after a power interruption without user intervention. While Network Server Mode is enabled, the power-on password must be entered to boot the removable media (e.g. diskettes) or removable devices (e.g. USB flash devices).

DriveLock

DriveLock is a security feature that prevents unauthorized access to the data on specific hard drives. DriveLock has been implemented as an extension to Computer Setup. It is only available on certain systems and only when DriveLock-capable hard drives are detected.

DriveLock employs a two-password security scheme. One password is intended to be set and used by a system administrator while the other is typically set and used by the end-user. There is no "back-door" that can be used to unlock the drive if both passwords are forgotten. Therefore, DriveLock is most safely used when the data contained on the hard drive is replicated on a corporate information system or is regularly backed-up.

⚠ **CAUTION:** In the event that both DriveLock passwords are lost, the hard drive is rendered unusable.

using DriveLock

The DriveLock option appears under the Security menu in Computer Setup. The user is presented with options to set the master password or to enable DriveLock. A user password must be provided in order to enable DriveLock. Since the initial configuration of DriveLock is typically performed by a system administrator, a master password should be set first. HP encourages system administrators to set a master password whether they plan to enable DriveLock or keep it disabled. This will give the administrator the ability to modify DriveLock settings if the drive is locked in the future. Once the master password is set, the system administrator may enable DriveLock or choose to keep it disabled.

If a locked hard drive is present, POST will require a password to unlock the device. If a power-on password is set and it matches the user password of the device, POST will not prompt the user to re-enter the password. Otherwise, the user will be prompted to enter a DriveLock password. Either the master or the user password may be used. Users will have two attempts to enter a correct password. If neither attempt succeeds, POST will continue but the data on the drive will remain inaccessible.

DriveLock applications and recommendations

The most practical use of the DriveLock security feature is in a corporate environment where a system administrator provides users with multibay hard drives for use in some desktop computers. The system administrator would be responsible for configuring the multibay hard drive which would involve, among other things, setting the DriveLock master password. In the event that the user forgets the user password or the equipment is passed on to another employee, the master password can always be used to reset the user password and regain access to the hard drive.

HP recommends that corporate system administrators who choose to enable DriveLock also establish a corporate policy for setting and maintaining master passwords. This should be done to prevent a situation where an employee intentionally or unintentionally sets both DriveLock passwords before leaving the company. In such a scenario, the hard drive would be rendered unusable and require replacement. Likewise, by not setting a master password, system administrators may find themselves locked out of a hard drive and unable to perform routine checks for unauthorized software, other asset control functions and support.

For users with less stringent security requirements, HP does not recommend enabling DriveLock. Users in this category include personal users or users who do not maintain sensitive data on their hard drives as a common practice. For these users, the potential loss of a hard drive resulting from forgetting both passwords is much greater than the value of the data DriveLock has been designed to protect. Access to Computer Setup and DriveLock can be restricted through the Setup password. By specifying a Setup password and not giving it to end users, system administrators are able to restrict users from enabling DriveLock.

hood cover sensor

The hood cover sensor is an optional feature that is a combination of hardware and software technology that can alert you when the workstation hood cover has been removed. This option is available as a kit that includes the solenoid hood cover lock (see the following section). There are three levels of protection, as described in the following table.

hood cover sensor protection levels

level	setting	description
Level 0	hood cover = Disabled	hood cover sensor is disabled (default).
Level 1	hood cover = Notify User	When the workstation is restarted, the screen displays a message indicating that the workstation hood cover has been removed.
Level 2	Setup Password = enabled and hood cover = notify user	When the workstation is restarted, the screen displays a message indicating that the workstation hood cover has been removed. You must enter the setup password to continue.

setting the hood cover sensor protection level

To set the hood cover sensor protection level, complete the following steps:

1. Turn on or restart the workstation.

2. When the `F10=Setup` message appears in the lower-right corner of the screen, press the **F10** key. Press **Enter** to bypass the title screen, if necessary.

NOTE: If you do not press the **F10** key while the message is displayed, you must restart the workstation to access the utility.

3. Select Security, then hood cover, and follow the instructions on the screen.

4. Before exiting, click File > Save Changes and Exit.

solenoid hood cover lock

The solenoid hood cover lock is available as an option on hp workstation xw4100 models (this options comes as a kit that includes the hood cover sensor). When installed, the solenoid hood cover lock can prevent unauthorized access to the internal components.

$\triangle$ **CAUTION:** For maximum cover lock security, be sure to establish a setup password. The setup password prevents unauthorized access to the Computer Setup utility.

locking the solenoid hood cover lock

To activate and lock the solenoid hood cover lock, complete the following steps:

1. Turn on or restart the workstation.

2. When the `F10=Setup` message appears in the lower-right corner of the screen, press the **F10** key. Press **Enter** to bypass the title screen, if necessary.

NOTE: If you do not press the **F10** key while the message is displayed, you must restart the workstation to access the utility.

3. Select Security, then select hood cover and the Locked option.

4. Before exiting, click File > Save Changes and Exit.

unlocking the solenoid hood cover lock

1. Turn on or restart the workstation.

2. When the `F10=Setup` message appears in the lower-right corner of the screen, press the **F10** key. Press **Enter** to bypass the title screen, if necessary.

NOTE: If you do not press the **F10** key while the message is displayed, you must restart the workstation to access the utility.

3. Select Security > hood cover > Unlocked.

4. Before exiting, click File > Save Changes and Exit.

using the hood cover FailSafe key

If you enable the solenoid hood cover lock and cannot enter your password to disable the lock, you will need a hood cover FailSafe Key to open the workstation hood cover. You will need the key in any of the following circumstances:

■ Power outage

■ Startup failure

■ PC component failure (such as processor or power supply)

■ Forgotten password

△ **CAUTION:** The hood cover FailSafe Key is a specialized tool available from HP. Be prepared; order this key before you need one.

To obtain the FailSafe Key, do any one of the following:

■ Contact your authorized HP reseller or service provider.

■ Refer to the HP Web site (www.hp.com) for ordering information.

■ Call the appropriate number listed in the warranty.

Master Boot Record security

The Master Boot Record (MBR) contains information needed to successfully boot from a disk and to access the data stored on the disk. Master Boot Record Security may prevent unintentional or malicious changes to the MBR, such as those caused by some computer viruses or by the incorrect use of certain disk utilities. It also allows you to recover the "last known good" MBR, should changes to the MBR be detected when the system is restarted.

To enable MBR Security, complete the following steps:

1. Turn on or restart the workstation. If you are in Windows, click Start > Shut Down > Restart the Computer.

2. When the `F10=Setup` message appears in the lower-right corner of the screen, press the **F10** key. Press **Enter** to bypass the title screen, if necessary.

NOTE: If you do not press the **F10** key while the message is displayed, you must restart the workstation to access the utility.

3. Select Security > Master Boot Record Security > Enabled.

4. Select Security > Save Master Boot Record.

5. Before exiting, click File > Save Changes and Exit.

When MBR Security is enabled, the BIOS prevents any changes being made to the MBR of the current bootable disk while in MS-DOS or Windows Safe Mode.

NOTE: Most operating systems control access to the MBR of the current bootable disk; the BIOS cannot prevent changes that may occur while the operating system is running.

Each time the workstation is turned on or restarted, the BIOS compares the MBR of the current bootable disk to the previously saved MBR. If changes are detected and if the current bootable disk is the same disk from which the MBR was previously saved, the following message is displayed:

`1999 - Master Boot Record has changed.`

Press any key to enter Setup to configure MBR Security.

Upon entering Computer Setup, you must

■ Save the MBR of the current bootable disk;

■ Restore the previously saved MBR; or

■ Disable the MBR Security feature.

You must know the setup password, if one exists. If changes are detected and if the current bootable disk is not the same disk from which the MBR was previously saved, the following message is displayed:

`2000 - Master Boot Record Hard Drive has changed.`

Press any key to enter Setup to configure MBR Security.

Upon entering Computer Setup, you must

■ Save the MBR of the current bootable disk; or

■ Disable the MBR Security feature.

You must know the setup password, if one exists.

In the unlikely event that the previously saved MBR has been corrupted, the following message is displayed:

`1998 - Master Boot Record has been lost.`

Press any key to enter Setup to configure MBR Security.

Upon entering Computer Setup, you must

■ Save the MBR of the current bootable disk; or

■ Disable the MBR Security feature.

You must know the setup password, if one exists.

Before you partition or format the current bootable disk, ensure that MBR Security is disabled before you change partitioning or formatting of the current bootable disk. Some disk utilities, such as FDISK and FORMAT, attempt to update the MBR. If MBR Security is enabled when you change partitioning or formatting of the disk, you may receive error messages from the disk utility or a warning from MBR Security the next time the workstation is turned on or restarted. To disable MBR Security, complete the following steps:

1. Turn on or restart the workstation. If you are in Windows, click Start > Shut Down > Restart the Computer.

2. When the `F10=Setup` message appears in the lower-right corner of the screen, press the **F10** key. Press **Enter** to bypass the title screen, if necessary.

NOTE: If you do not press the **F10** key while the message is displayed, you must restart the workstation to access the utility.

3. Select Security > Master Boot Record Security > Disabled.

4. Before exiting, click File > Save Changes and Exit.

Kensington cable lock provision

The rear panel of the chassis can accommodate a Kensington cable lock accessory that allows the workstation to be physically secured to a work area.

For illustrated instructions, see the "cable lock (optional)" section in Chapter 4.

3.2.6 fault notification and recovery

Fault Notification and Recovery features combine innovative hardware and software technology to prevent the loss of critical data and minimize unplanned downtime.

When a fault occurs, the workstation displays a Local Alert message containing a description of the fault and any recommended actions. You can then view current system health by using the Management Agent. If the workstation is connected to a network managed by a HP Insight Manager product or other management products from HP Management Solutions Partners, the workstation also sends a fault notice to the network management application.

Drive Protection System

The Drive Protection System (DPS) is a diagnostic tool built into the hard drives installed in select HP workstations. DPS is designed to help diagnose problems that might result in unwarranted hard drive replacement.

Each installed hard drive is tested using DPS, and a permanent record of key information is written onto the drive. Each time DPS is run, test results are written to the hard drive. Your service provider can use this information to help diagnose conditions that caused you to run the DPS software. Refer to the *Troubleshooting Guide* for instructions on using DPS.

Ultra ATA Integrity Monitoring

Ultra ATA Integrity Monitoring monitors the integrity of data as it is transferred between an Ultra ATA hard drive and the system's core logic. If the workstation detects an abnormal number of transmission errors, the workstation displays a Local Alert message with recommended actions.

ECC fault prediction and prefailure warranty

When the workstation encounters an excessive number of error checking and correcting (ECC) memory errors, the workstation displays a Local Alert message. This message contains detailed information about the errant memory module, allowing you to take action before you experience non-correctable memory errors. The Prefailure Warranty for ECC memory modules allows you to replace these modules, free of charge, before the modules actually fail. ECC memory modules are optional on selected HP systems.

NOTE: To use this feature, you must replace the standard DIMMs with HP ECC DIMMs.

surge-tolerant power supply

An integrated surge-tolerant power supply provides greater reliability when the workstation is hit with an unpredictable power surge. This power supply is rated to withstand a power surge of up to 2000V (Line to PE or Neutral to PE) and 1000V (Line to Line) without any data loss or system downtime.

thermal sensor

The thermal sensor is a hardware and software feature that tracks the internal temperature of the workstation. The thermal sensor monitors the processor temperature and if the temperature gets too hot, the processor clock automatically begins to throttle. If the temperature does not go down, then the system eventually shuts down.

3.3 Configuration Record

The Configuration Record utility is a windows-based information-gathering tool that gathers critical hardware and software information from various workstation subsystems. The information includes such things as the ROM, asset tag, processor, physical drives, PCI devices, memory, graphics, operating system version number, operating system parameters, and the operating system startup files to give a complete view of the workstation. Configuration Record provides a means for automatically identifying and comparing configuration changes, and has the ability to maintain a configuration history. The information can be saved as a history of multiple sessions.

This utility allows the resolution of problems without taking the workstation offline and assists in maximizing the workstation availability. The information obtained by the utility is useful in troubleshooting system problems, and streamlines the service process by enabling quick and easy identification of system configurations.

The utility displays it findings in a *Now.log* file. If the original *Base.log* file is present in the *cpqdiags* directory, the *Base.log* file is displayed next to the *Now.log* file in a split window with the differences between the two highlighted in the color red.

3.3.1 installing Configuration Record

The Configuration Record is part of Diagnostics for Windows and is automatically installed at the same time as Diagnostics for Windows.

3.3.2 running Configuration Record

To run this program:

1. Click Start > HP Information Center > Configuration Record.

   Alternately, you can access Diagnostics for Windows via the control panel.

NOTE: The Configuration Record utility has two view options: Show Changed Items Only and Show All. The default view is Show Changed Items Only, therefore all the text is displayed in the color red since it shows only the differences. Switching to Show All displays the complete, comprehensive view of the system.

2. The default view is Show Changed Items Only. To view all the information gathered by Configuration Record, click View at the top of the window and select Show All, or click the Show All Items icon.

3. To save the information in the left or right window, select File > Save Window File and then select Left Window File or Right Window File.

NOTE: Saving the configuration of the workstation periodically allows the user to keep a history of the configuration. This history may be useful to you in the future if the system ever encounters a problem that needs debugging.

4. To exit Configuration Record, click File, then click Exit.

4

removal and replacement procedures

4.1   service considerations

The following sections discuss service considerations that should be reviewed and practiced prior to removing and replacing any system components.

⚠ **WARNING:** When lifting or moving the workstation, the front bezel should not be used as a handle or lifting point. Lifting the workstation from the front bezel or lifting it incorrectly could cause the unit to fall and cause harm to the user and/or damage to the workstation. To properly and safely lift the workstation, lift it from the bottom of the unit from either the desktop or minitower configuration.

4.1.1   warnings and safety precautions

Before accessing the components of the workstation, view the following precautions. Also, review the *Safety and Regulatory Guide* that came with your workstation for more information.

avoid electrical shocks

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

⚠ **WARNING:** To avoid electrical shock or harm to your eyes by laser light on systems with an optional optical drive, do not open the laser module. The laser module should be serviced by service personnel only. Do not attempt to make any adjustment to the laser unit. Refer to the label on the CD-ROM for power requirements and wavelength.

electrical

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

multimedia models

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

removing and replacing the hood cover

⚠ **WARNING:** For your safety, never remove the system hood cover without first disconnecting the power cord from the power outlet and removing any connection to a telecommunications network. Always replace the cover before switching the workstation on again.

safety information

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

The battery in this workstation 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 workstation, 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.

If you have a modem:

Do not attempt to connect this product to the phone line during a lightning storm. Never install telephone jacks in wet locations unless the telephone line has been disconnected at the network interface. Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface. Use caution when installing or modifying telephone lines. Avoid using a telephone (other than a cordless type) during an lightning storm. There may be a risk from lightning.

Do not use the telephone to report a gas leak in the vicinity of the leak.

Never touch or remove the communications board without first removing the connection to the telephone network.

static electricity

⚠ **CAUTION:** Static electricity can damage electronic components. Turn OFF all equipment. Do not let your clothes touch the accessory. To equalize the static electricity, rest the accessory bag on top of the system while you are removing the accessory from the bag. Handle the accessory as little as possible and with care.

Review the following sections for additional information about electrostatic discharge.

4.1.2 electrostatic discharge information

A sudden discharge of static electricity from your finger or other conductor can destroy static-sensitive devices or microcircuitry. Often the spark is neither felt nor heard, but damage occurs. An electronic device exposed to electrostatic discharge (ESD) may not appear to be affected at all and can work perfectly throughout a normal cycle. The device may function normally for a while, but it has been degraded in the internal layers, reducing its life expectancy.

Networks built into many integrated circuits provide some protection, but in many cases, the discharge contains enough power to alter device parameters or melt silicon junctions.

generating static

The following table shows that:

■ Different activities generate different amounts of static electricity.

■ Static electricity increases as humidity decreases.

	relative humidity		
event	**55%**	**40%**	**10%**
Walking across carpet	7,500 V	15,000 V	35,000 V
Walking across vinyl floor	3,000 V	5,000 V	12,000 V
Motions of bench worker	400 V	800 V	6,000 V
Removing bubble pack from PCB	7,000 V	20,000 V	26,500 V
Packing PCBs in foam-lined box	5,000 V	11,000 V	21,000 V

> **NOTE:** 700 volts can degrade a product.

preventing electrostatic damage to equipment

Many electronic components are sensitive to ESD. Circuitry design and structure determine the degree of sensitivity. The following packaging and grounding precautions are necessary to prevent damage to electric components and accessories.

■ To avoid hand contact, transport products in static-safe containers such as tubes, bags, or boxes.

■ Protect all electrostatic parts and assemblies with conductive or approved containers or packaging.

■ Keep electrostatic sensitive parts in their containers until they arrive at static-free stations.

■ Place items on a grounded surface before removing them from their container.

■ When handling or touching a sensitive component or assembly, ground yourself by touching the chassis.

■ Avoid contact with pins, leads, or circuitry.

■ Place reusable electrostatic-sensitive parts from assemblies in protective packaging or conductive foam.

personal grounding methods and equipment

Use the following equipment to prevent static electricity damage to equipment:

■ Wrist straps are flexible straps with a maximum of one-megohm ± 10% resistance in the ground cords. To provide proper ground, a strap must be worn snug against bare skin. The ground cord must be connected and fit snugly into the banana plug connector on the grounding mat or workstation.

■ Heel straps, Toe straps, and Boot straps can be used at standing workstations and are compatible with most types of shoes or boots. On conductive floors or dissipative floor mats, use them on both feet with a maximum of one-megohm ± 10% resistance between the operator and ground.

static shielding protection levels

method	voltage
Antistatic plastic	1,500
Carbon-loaded plastic	7,500
Metallized laminate	15,000

grounding the work area

To prevent static damage at the work area, use the following precautions:

■ Cover the work surface with approved static-dissipative material. Provide a wrist strap connected to the work surface and properly grounded tools and equipment.

■ Use static-dissipative mats, foot straps, or air ionizers to give added protection.

■ Handle electrostatic sensitive components, parts, and assemblies by the case or PCB laminate. Handle them only at static-free work areas.

■ Turn off power and input signals before inserting and removing connectors or test equipment.

■ Use fixtures made of static-safe materials when fixtures must directly contact dissipative surfaces.

■ Keep work area free of nonconductive materials such as ordinary plastic assembly aids and Styrofoam.

■ Use field service tools, such as cutters, screwdrivers, and vacuums, that are conductive.

recommended materials and equipment

Materials and equipment that are recommended for use in preventing static electricity include:

■ Antistatic tape

■ Antistatic smocks, aprons, or sleeve protectors

■ Conductive bins and other assembly or soldering aids

■ Conductive foam

■ Conductive tabletop workstations with ground cord of one-megohm +/- 10% resistance

■ Static-dissipative table or floor mats with hard tie to ground

■ Field service kits

■ Static awareness labels

■   Wrist straps and footwear straps providing one-megohm +/- 10% resistance

■   Material handling packages

■   Conductive plastic bags

■   Conductive plastic tubes

■   Conductive tote boxes

■   Opaque shielding bags

■   Transparent metallized shielding bags

■   Transparent shielding tubes

4.1.3 tools and software requirements

To service the workstation, you may need the following:

■   Torx T-15 screwdriver or Flat-bladed screwdriver (may be used in place of the Torx screwdriver)

■   Phillips screwdriver (to remove system fan, if necessary)

■   Diagnostics software

■   Tamper-resistant T-15 wrench (FailSafe key) or Tamper-resistant bits (required if you get locked out by the solenoid hood cover lock)

4.1.4 screws

The screws used in the workstation are not interchangeable. They may have standard or metric threads and may be of different lengths. If an incorrect screw is used during the reassembly process, it can damage the unit. HP strongly recommends that all screws removed during disassembly be kept with the part that was removed, then returned to their proper locations.

NOTE: Metric screws have a black finish. American National (unified) screws have a silver finish.

NOTE: As each subassembly is removed from the workstation, it should be placed away from the work area to prevent damage.

Additional drive guide screws are provided on the system chassis. There are eight Metric (located on chassis near the 5.25 inch optical drive bays). These screws can be used to mount additional optical drives or an optional diskette drive. There are four American National screws (located on the chassis near the hard drive). These can be used to mount additional hard drives.

NOTE: The Metric (black) and American National (silver) screws are not interchangeable.

4.1.5 special handling of components

The following components require special handling when servicing the workstation.

WARNING: When lifting or moving the workstation, the front bezel should not be used as a handle or lifting point. Lifting the workstation from the front bezel or lifting it incorrectly could cause the unit to fall and cause harm to the user and/or damage to the workstation. To properly and safely lift the workstation, lift it from the bottom of the unit from either the desktop or minitower configuration.

power supply fan

The power supply fan is a variable-speed fan based on the temperature in the power supply.

CAUTION: The cooling fan is off **only** when the workstation is turned off or the power cable has been disconnected.

The cooling fan is always on when the workstation is either in the "On," "Standby," or "Suspend" modes.

You must disconnect the power cord from the power source before opening the workstation to prevent system board or component damage.

cables and connectors

Cables must be handled with care to avoid damage. Apply only the tension required to seat or unseat the cables during insertion or removal from the connector. Handle cables by the connector whenever possible. In all cases, avoid bending or twisting the cables, and ensure that the cables are routed in such a way that they cannot be caught or snagged by parts being removed or replaced.

CAUTION: When servicing this workstation, ensure that cables are placed in their proper location during the reassembly process. Improper cable placement can damage the workstation.

hard drives

Handle hard drives as delicate, precision components, avoiding all physical shock and vibration. This applies to failed drives as well as replacement spares.

■ If a drive must be mailed, place the drive in a bubble-pack mailer or other suitable protective packaging and label the package "Fragile: Handle With Care."

■ Do not remove hard drives from the shipping package for storage. Keep hard drives in their protective packaging until they are actually mounted in the workstation.

■ Avoid dropping drives from any height onto any surface.

■ If you are inserting or removing a hard drive, turn off the workstation. Do not remove a hard drive while the workstation is on or in standby mode.

■ Before handling a drive, ensure that you are discharged of static electricity. While handling a drive, avoid touching the connector. For more information about preventing electrostatic damage, see the "electrostatic discharge information" section in this chapter.

■ Do not use excessive force when inserting a drive.

■ Avoid exposing a hard drive to liquids, temperature extremes, or products that have magnetic fields such as monitors or speakers.

lithium coin cell battery

The battery that comes with the workstation provides power to the real-time clock and has a minimum lifetime of about three years.

See the " battery" section in this chapter for instructions on the removal and replacement procedures.

⚠ **WARNING:** This workstation contains a lithium battery. There is a risk of fire and chemical burn if the battery is handled improperly. Do not disassemble, crush, puncture, short external contacts, dispose in water or fire, or expose it to temperatures higher than 140° F (60° C).

⚠ **CAUTION:** Batteries, battery packs, and accumulators should not be disposed of together with the general household waste.

4.2 pre-disassembly procedures

The following steps should be taken prior to servicing the workstation:

1. Remove/disengage any security devices that prohibit opening the workstation. If an optional solenoid hood cover lock is installed, disable it in the software prior to turning off the workstation.

2. Close any open software applications.

3. Exit the operating system.

4. Remove any diskette or compact disc from the workstation.

5. Turn off the workstation and any peripheral devices that are connected to it.

⚠ **CAUTION:** Turn off the workstation before disconnecting any cables.

⚠ **CAUTION:** The cooling fan is off **only** when the workstation is turned off or the power cable has been disconnected. The cooling fan is always on when the workstation is in the "On," "Standby," or "Suspend" modes. You must disconnect the power cord from the power source before opening the workstation to prevent system board or component damage.

6. Disconnect the power cord from the electrical outlet and then from the workstation.

7. Disconnect all peripheral device cables from the workstation.

4.3 removal and replacement of components

This section discusses the procedures necessary to remove and install various hardware components on your workstation. Review the safety and precautions and the "service considerations" section at the beginning of this chapter, as well as the *Safety and Regulatory Guide,* before servicing or upgrading your system.

The following general outline will help you to successfully work on the system.

1. Read all safety information and precautions.

2. Locate and clear a suitable work area.

3. Shutdown the system and remove power from the unit.

4. Gather your tools.

5. Service your unit.

6. Restore power to your unit.

4.3.1 security lock (optional)

If a security padlock is installed, it should be removed before servicing the unit. To remove the padlock, unlock it and slide it out of the padlock loop as shown in the following illustration.
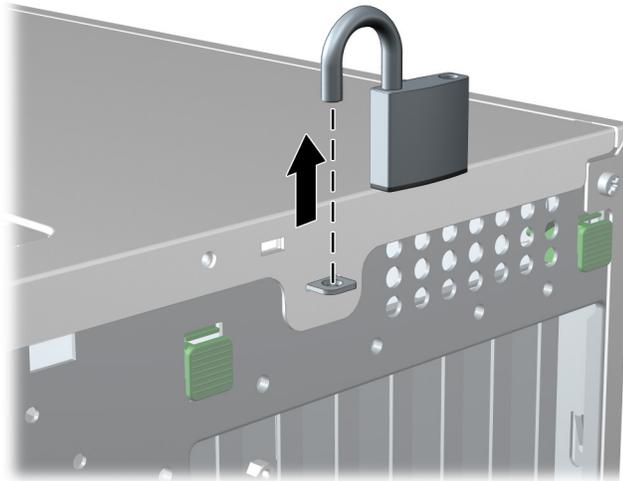
4.3.2 cable lock (optional)

If a cable lock is installed, it should be removed before servicing the unit. To remove the cable lock, unlock it and pull it out of the cable lock slot as shown in the following illustration.
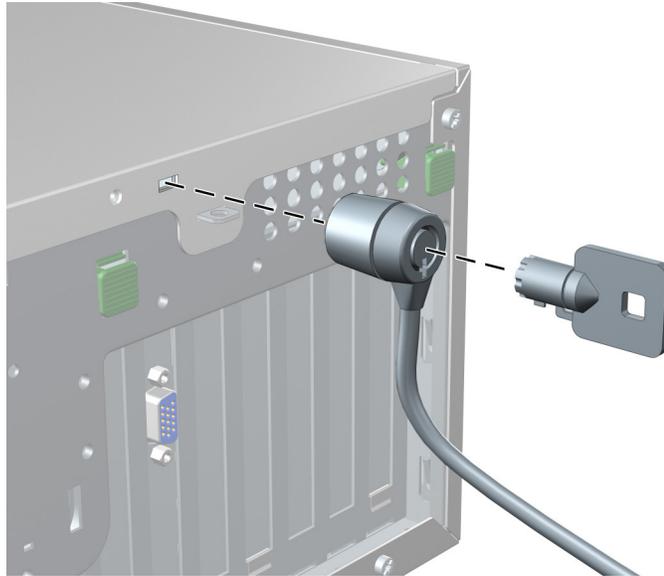
4.3.3 hood cover

Before accessing the internal components of the hp workstation xw4100, the hood cover must be removed. To remove the panel, follow these instructions.

⚠ **WARNING:** Before removing the workstation hood cover, ensure that the workstation is turned off and that the power cord is disconnected from the electrical outlet.

1. Remove power from the system.

2. Lay the unit in the desktop position as shown in the following illustration.

3. If necessary, unlock the panel.

4. Pull up and out on the cover latch ❶ and at the same time slide the cover ❷ away from the bezel and then lift up.
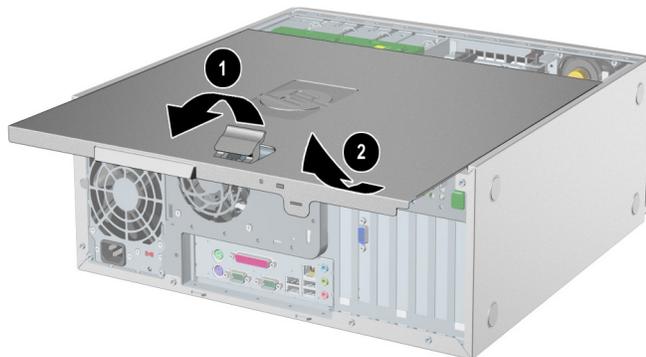
To replace the hood cover, slide the cover back on until it snaps into place.

4.3.4 front bezel

Follow these steps to remove the bezel:

1. With the power disconnected and the hood cover removed, lift up on the two tabs ❶ located on the front bezel.

2. Rotate the front bezel ❷ away from the chassis as shown in the following illustration and remove the bezel.
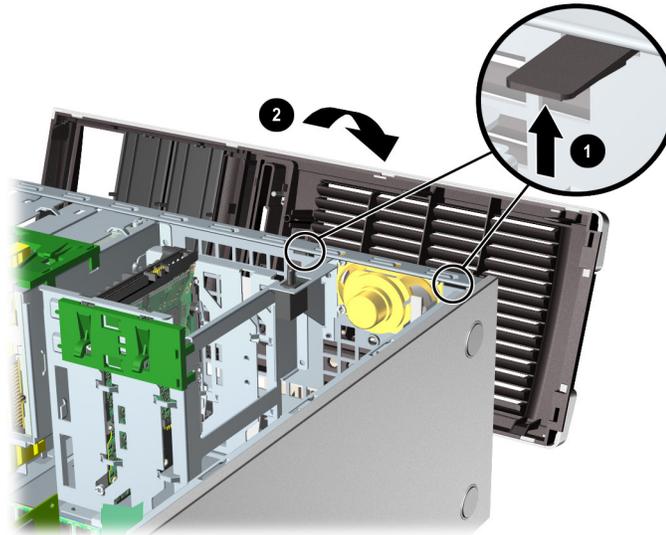
4.3.5 bezel blanks

To remove the bezel blanks do the follow:

1. After removing the front bezel, gently pull the subpanel ❶, with the bezel blanks secured in it, away from the front bezel.

2. Remove the desired bezel blank ❷ by pulling the blank away from the subpanel.
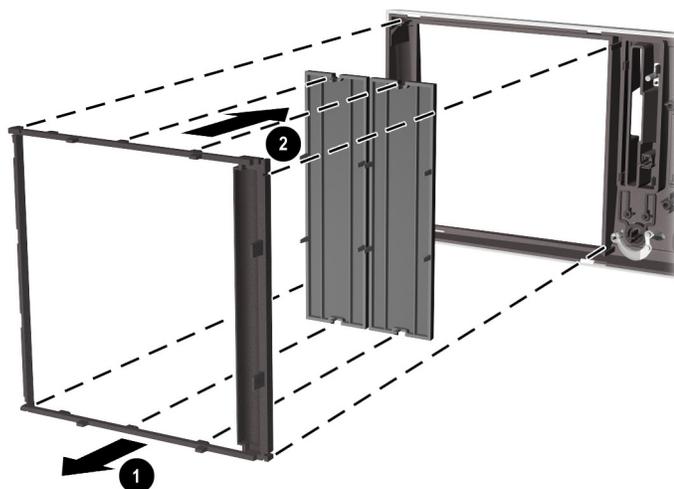
NOTE: The bezel blanks are keyed to assist you in replacing the blanks.

4.3.6 chassis feet

The hp workstation xw4100 ships in a minitower configuration and chassis feet are installed on the base of the workstation. The unit ships with additional feet should you convert the unit to a desktop. To install the chassis feet on a desktop-oriented workstation:

1. Situate the unit into the appropriate position as shown in the following illustration.

2. Place the feet into the embossed areas of the unit.

4.3.7 IEEE-1394 (optional)

To install an optional IEEE-1394 adapter:

1. Install the IEEE-1394 card ❶ into the PCI socket.

2. Close the PCI levers ❷.

3. Connect the power cable ❸ into the card.

4. Connect the IEEE-1394 cable adapter ❹ to the card.

5. Connect the front IEEE-1394 pre-installed cable ❺ to the adapter cable as illustrated in the following figure.
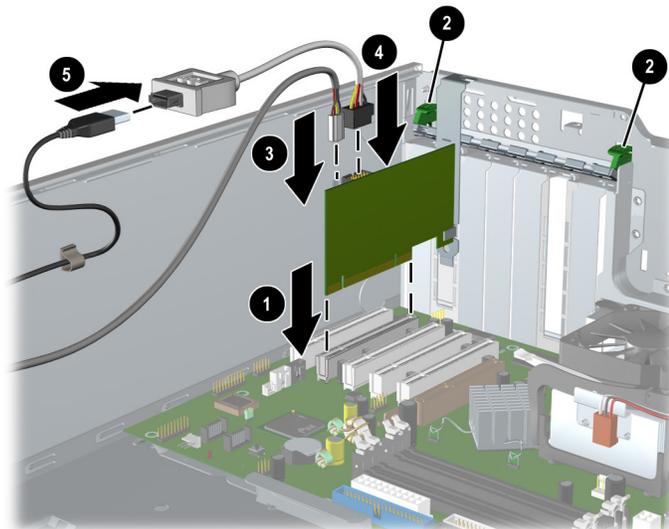
4.3.8 front panel assembly

To remove the front panel assembly:

1. Remove the front bezel.

2. Disconnect the front panel assembly cable from the system board.

3. Remove the two screws ❶ that hold the assembly shield to the chassis as shown in the following illustration.

4. Slide the front panel assembly ❷ (with shield attached) out about two inches away from the chassis.

5. Remove the two screws ❸ that hold the shield and assembly together and separate the shield away from the front panel assembly ❹.
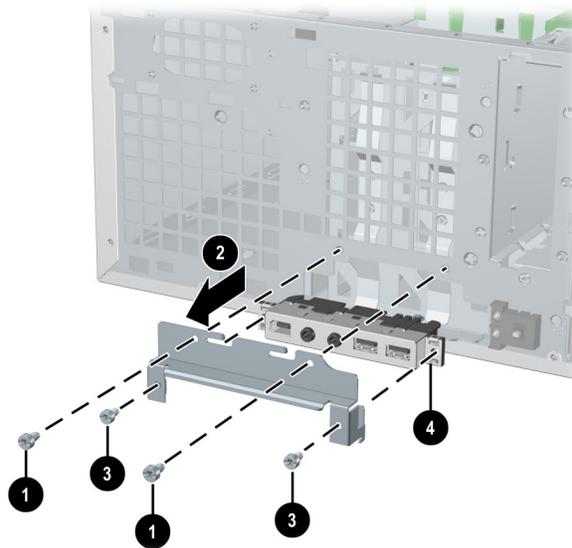
⚠ **WARNING:** The next step requires the removal of cables through the chassis. Some edges on the chassis may be sharp. Care must be taken when removing these cables.

6. Slide the front panel cables through the chassis and out the front of the unit.

To replace the front panel assembly, reverse the previous steps.

4.3.9 power button assembly

To remove the front power button assembly:

1. Remove the front bezel.

2. Disconnect the power assembly cable from the system board.

3. Slide the power button assembly out from the front of the chassis as shown in the following illustration.
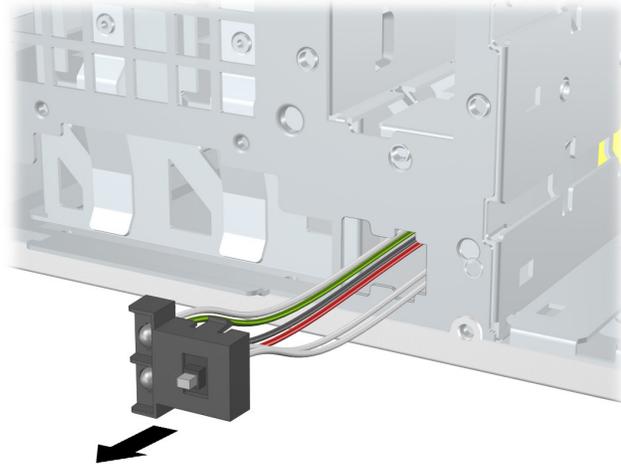
4.3.10 power supply

To remove the power supply:

1. Disconnect the power supply from the system board.

2. Disconnect the optical drive(s), diskette drive, hard drive(s), and graphics card (select models only) from the power supply.

3. Remove the four screws ❶ from the back panel as shown in the following illustration.
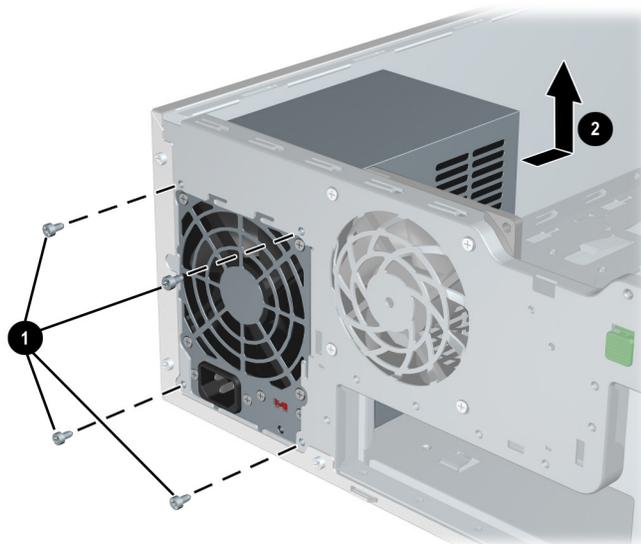
4. Slide the power supply ❷ toward the front and lift up to remove it from the chassis.

To install the power supply, reverse the previous steps.

4.3.11 system fan

To remove the system fan:

1. Disconnect the fan connector from the system board.

2. Remove the four screws ❶ from the back of the chassis back panel.
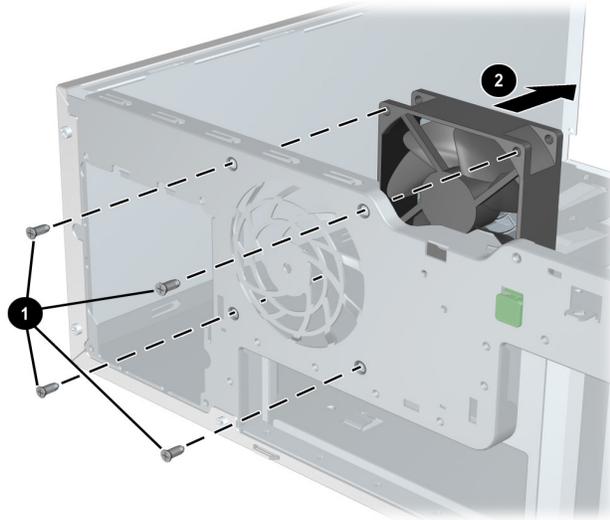
3. Slide the fan ❷ toward the front of the unit and remove it.

To replace a system fan, reverse the previous steps.

⚠️ **CAUTION:** When installing the system fan, ensure that the fan is situated so that the airflow direction is going out of the chassis.

4.3.12 hood cover sensor (optional)

To remove the hood cover sensor:

1. Disconnect the hood cover sensor from the system board.

2. Slide the hood cover sensor ❶ forward as shown in the following illustration.

⚠ **CAUTION:** Be careful when sliding the hood sensor forward. The hood cover sensor bracket and the chassis contain sharp edges that present a safety hazard.

3. Pull the hood cover sensor ❷ down and remove it from the chassis.
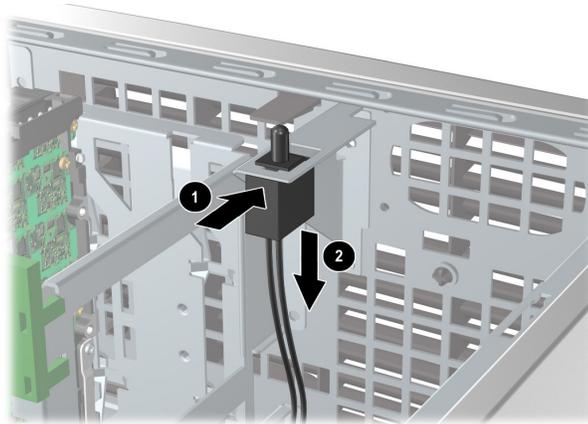
To replace the hood cover sensor, reverse the previous steps.

4.3.13 solenoid hood cover lock (optional)

To remove the solenoid hood cover lock:

1. Disconnect the hood cover lock cable from the system board.

2. Using the FailSafe key, unscrew the two screws ❶ from the back of the chassis as shown in the following diagram.

3. Slide the hood cover lock assembly ❷ away from the chassis and out of the unit.
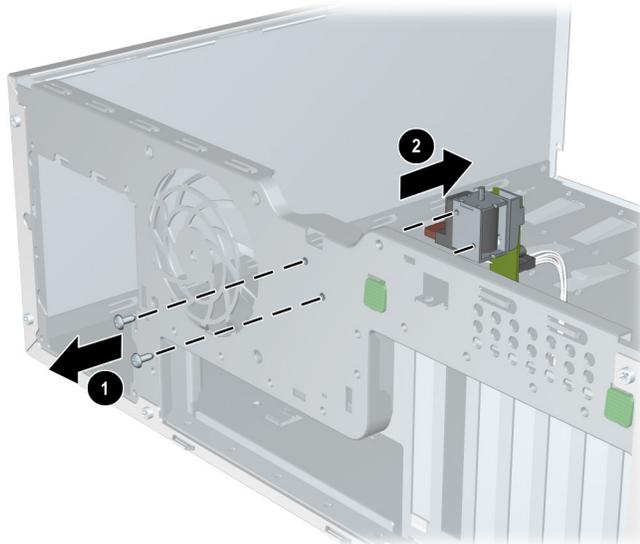
To replace the hood cover lock assembly, reverse the previous steps.

4.3.14 system speaker

To remove the speaker:

1. Disconnect the speaker from the system board.

2. Remove the four screws as shown in the following illustration.
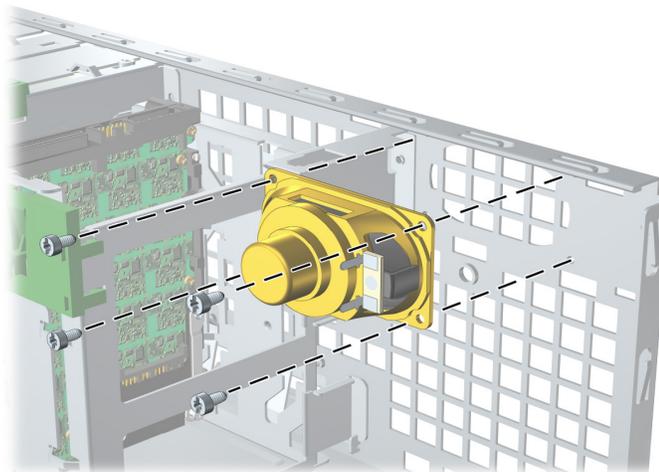
3. Slide the speaker out of the chassis.

To replace the speaker, reverse the previous steps.

4.3.15 processor heatsink

To remove the heatsink:

NOTE: The heatsink illustrated below is typical of what you might have in your workstation. Be aware that different variations of the bracket levers ❶ exist, but the overall procedures listed are sufficient to assist you in removing the heatsink.

1. Disconnect the heatsink fan from the system board.

2. Pull up on the two bracket levers ❶.

3. Pull up on the brackets ❷ and lift them ❸ away from the heatsink assembly as shown in the following illustration.

4. Rotate the heatsink ❹ slightly to break the adhesive compound between the heatsink and processor.

5. Lift the heatsink ❺ unit.
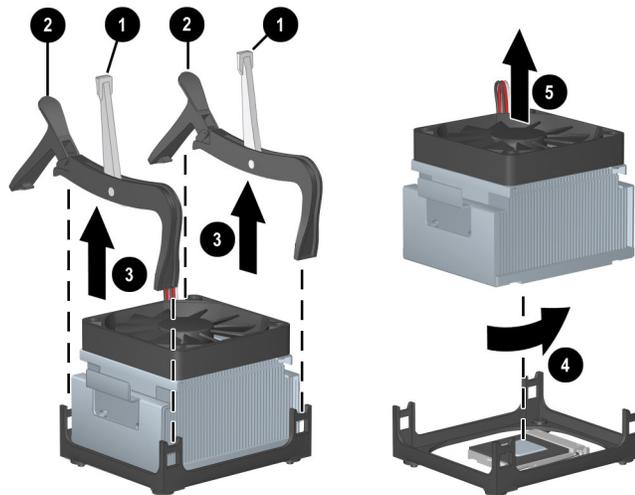
To replace the heatsink assembly, reverse the previous steps. New thermal grease must be applied between the heatsink and processor.

4.3.16 memory

There are four memory sockets in the hp workstation xw4100. The system supports industry-standard 184-pin, PC 2700 (ECC or non-ECC) compliant or PC 3200 (ECC only) compliant 2.5V unbuffered DDR-SDRAM.

The system is capable of supporting up to 4 GB of memory (1 GB DIMM in each socket). Although a single 128 MB DIMM configuration is possible (on XMM1 only), DIMMs should be installed in pairs for optimal dual channel operation.

The following parameters relate to the supported memory:

- Supported DIMM sizes include 128 MB, 256 MB, 512 MB, and 1 GB.

- Paired DIMMs must be of the same type, size, and speed.

- The first pair of DIMMs must be installed in XMM1 and XMM3.

- The mixing of ECC and non-ECC memory is not supported.

- Registered memory is not supported.

To remove DIMMs from the unit:

1. Gently push outwards on the socket levers ❶ as shown in the following illustration.

2. Lift the DIMM ❷ straight up and remove it from the unit.
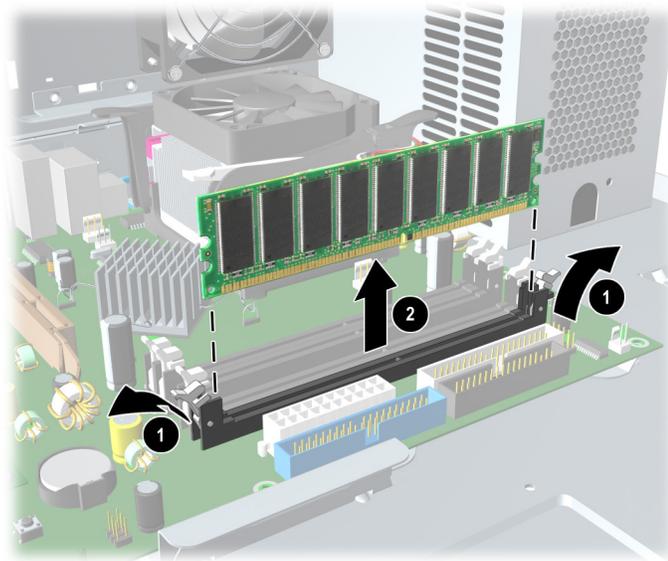
To replace memory, reverse the previous steps.

NOTE: DIMMs and the DIMM sockets are keyed for proper installation. Make sure these guides line up when installing a DIMM.

4.3.17 AGP cards

To install an AGP card:

1. Lift the PCI levers ❶ by first pressing down on them and then out.

2. Lift and remove the PCI slot cover ❷ directly behind the AGP socket.

3. Insert the AGP card ❸ into the AGP socket.

4. Close the PCI levers ❹.
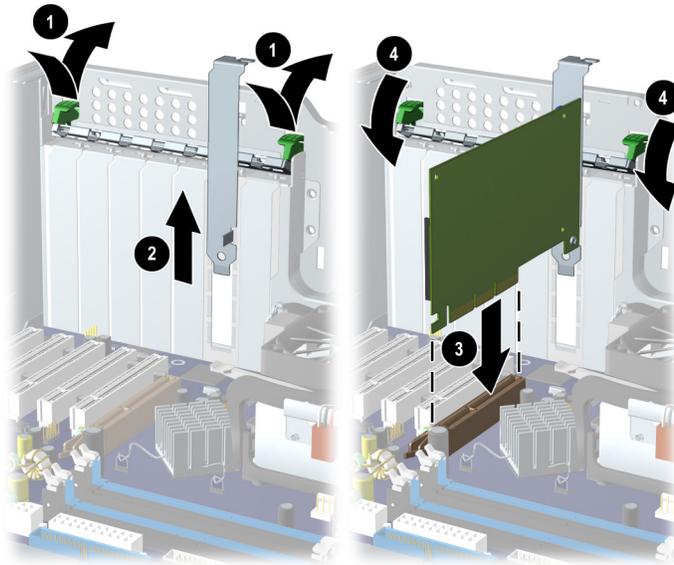
5. To remove an AGP card, open the PCI levers ❶ by first pressing down and then out.

6. Press in on the AGP socket release latch ❷ as shown in the following illustration.

7. Lift the AGP card ❸ out of the socket.
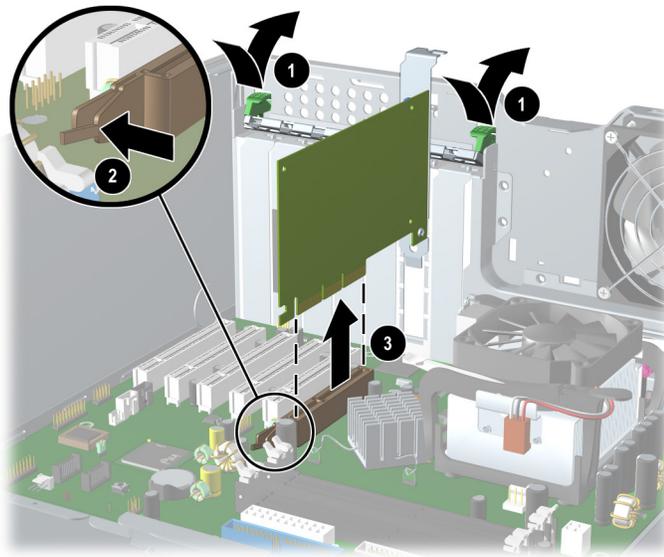
4.3.18 PCI expansion cards (optional)

To remove an optional PCI expansion card:

1. Lift the PCI levers ❶ by first pressing down on them and then out.

2. Lift the PCI expansion card ❷ and remove it from the system.
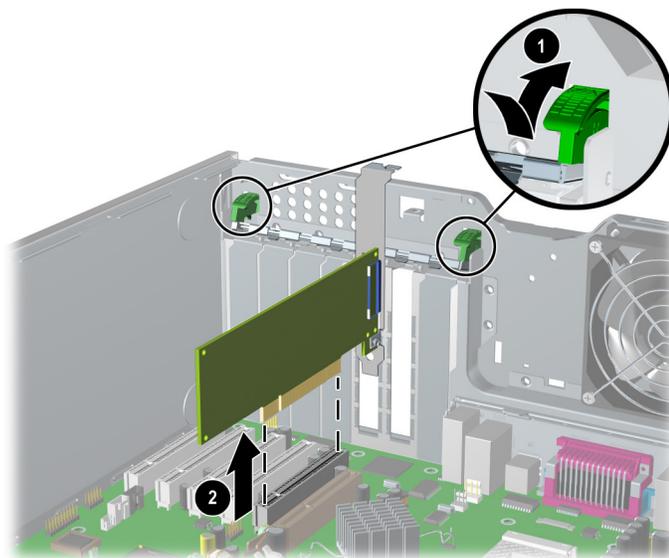
To install an optional PCI expansion card:

1. Lift the PCI levers ❶ by first pressing down on them and then out.

2. Remove the PCI slot cover ❷ as shown in the following illustration.

3. Install the PCI expansion card ❸. Verify that the keyed components of the card align with the PCI socket.

4. Close the PCI levers ❹ as shown.
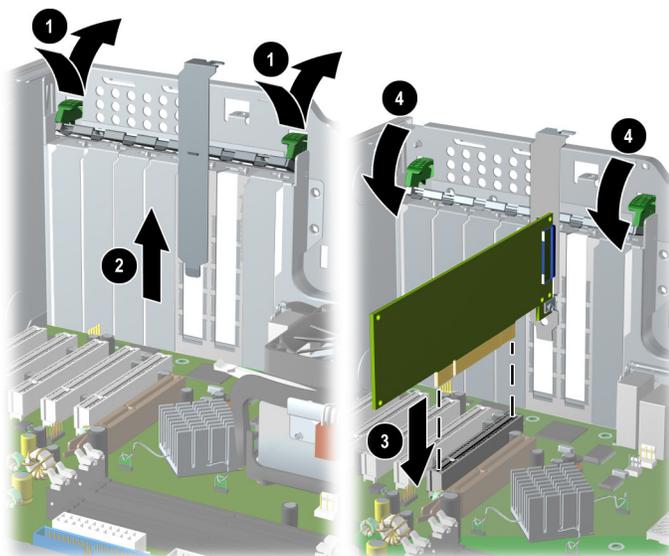
4.3.19 battery

⚠️ **CAUTION:** Before removing the battery, make sure your CMOS settings are backed up as all CMOS settings will be lost when the battery is removed. To back up the CMOS settings, use Computer Setup and run the Save to Diskette option from the File menu.

To remove the battery:

1. Press on the release tab ❶ of the battery holder as shown in the following illustration.

2. Slide and lift the battery ❷ out.
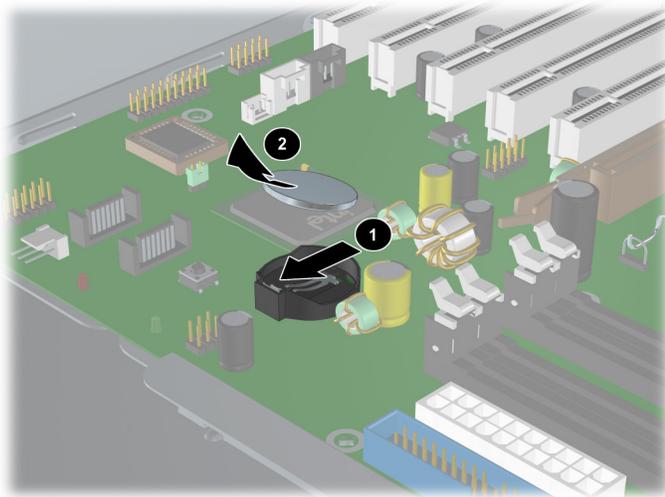
To install the battery slide the battery back in until it snaps back into place.

4.3.20 optical drive (minitower position)

To remove an optional optical drive, you must first release the drivelock. To release the drivelock:

1. Disconnect the power ❶, drive ❷, and audio ❸ cables from the drive.
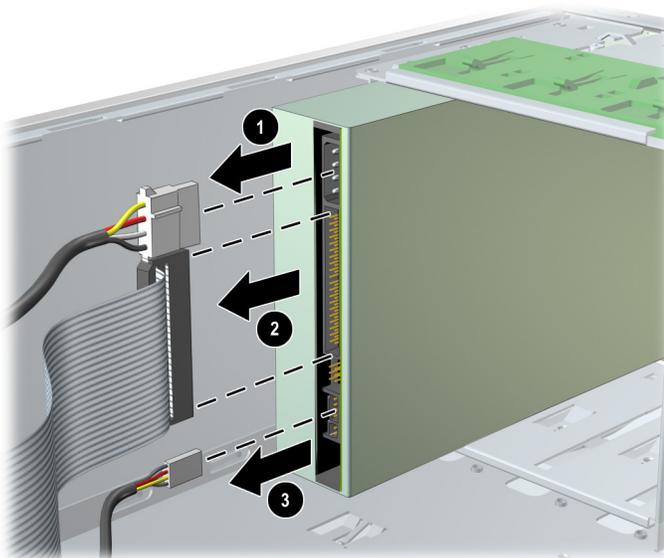
2. After the front bezel and bezel blanks have been removed, lift the green drivelock release lever ❶ and gently slide the drive ❷ out of the chassis.
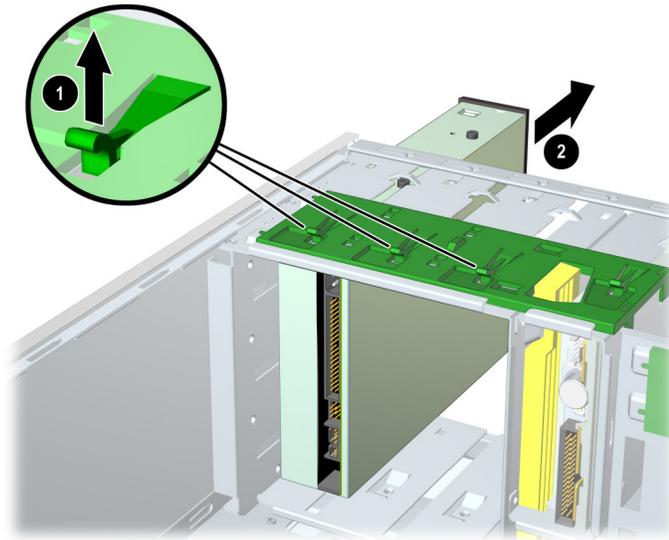
3. After pulling the drive ❶ out, remove the four guide screws ❷ from the drive as shown in the following illustration.
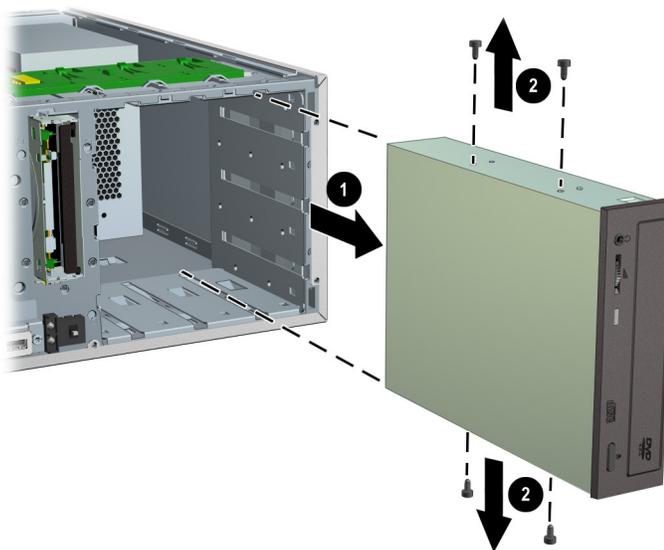
4. Verify the jumper settings of the new drive are set correctly.

5. To install a drive, insert the four guide screws ❶ and slide the drive ❷ into the unit until it snaps into place.
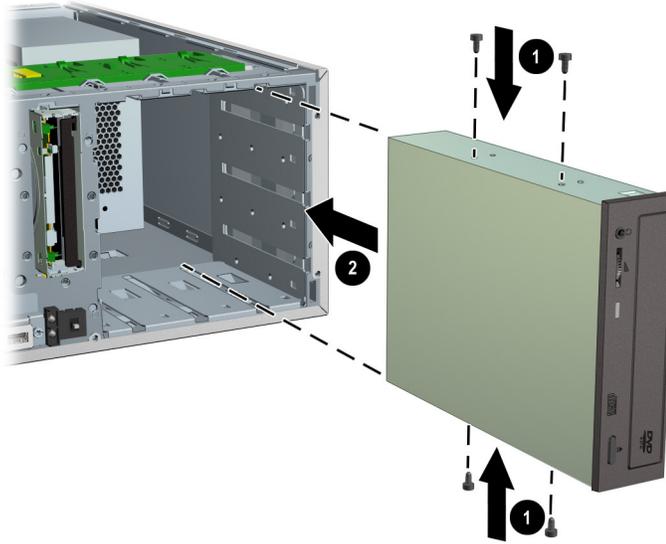
6. Connect the drive, power, and audio cables.

4.3.21 optical drive (desktop position)

To remove an optional optical drive, you must first release the drivelock. To release the drivelock:

1. Disconnect the audio ❶ , drive ❷, and power ❸ cables from the drive.
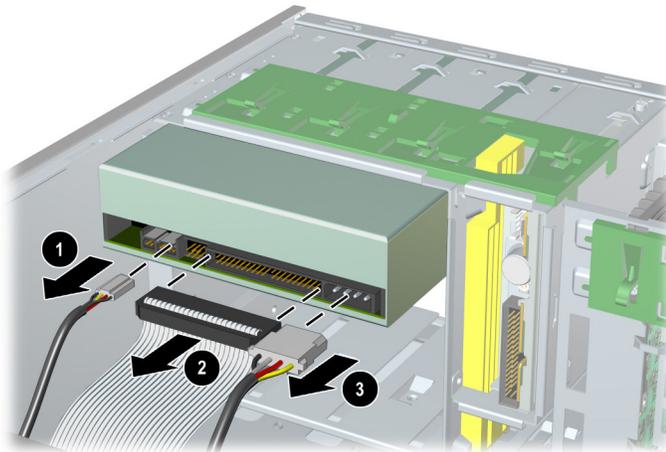
2. After the front bezel and bezel blanks have been removed, press down on the yellow drivelock as shown in the following illustration. As you press on the yellow drivelock ❶, gently slide the drive ❷ out of the chassis.
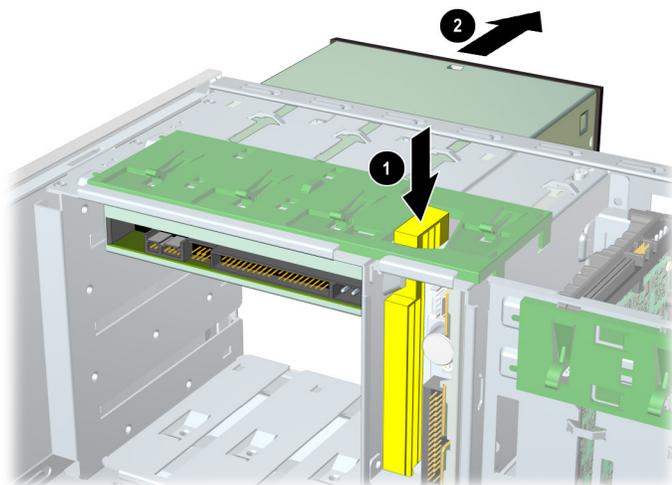
3. After pulling the drive ❶ out, remove the four guide screws ❷ from the drive as shown in the following illustration.
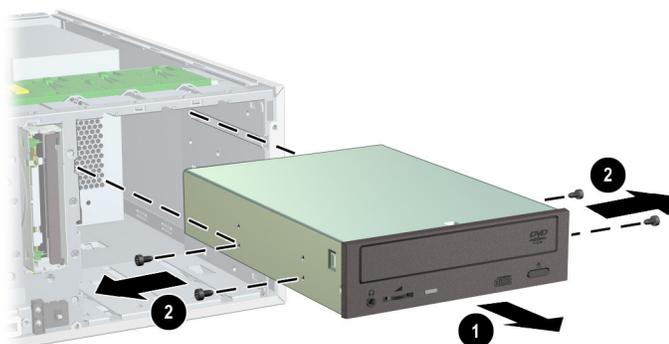
4. Verify the jumper settings on the new drive are set correctly.

5. To install a drive, insert the four guide screws ❶ and slide the drive ❷ into the unit until it snaps into place.
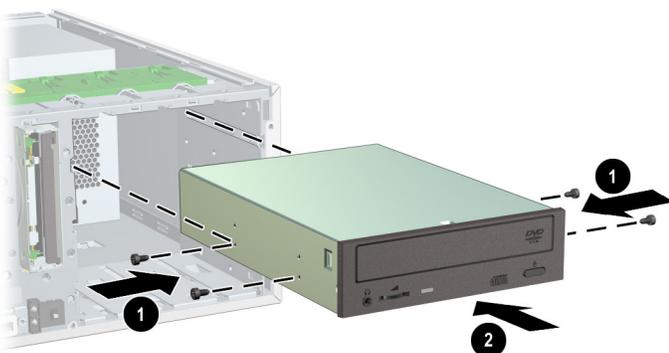
6. Connect the drive, power, and audio cables.

4.3.22 diskette drive

To remove an optional diskette drive:

1. Disconnect the cables from the back of the diskette drive.

2. Lift the green drivelock release tab ❶ and slide the drive ❷ out at the same time.
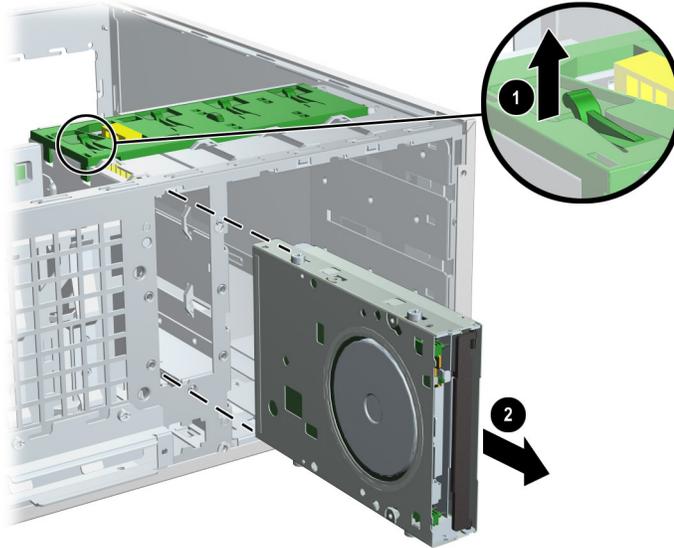
To replace an optional diskette drive, reverse the previous steps.

4.3.23 hard drive

To remove a hard drive:

1. Disconnect the cables from the back of the hard drive.

2. Lift up on the green drivelock release tab ❶ and slide the hard drive ❷ out of the chassis at the same time.
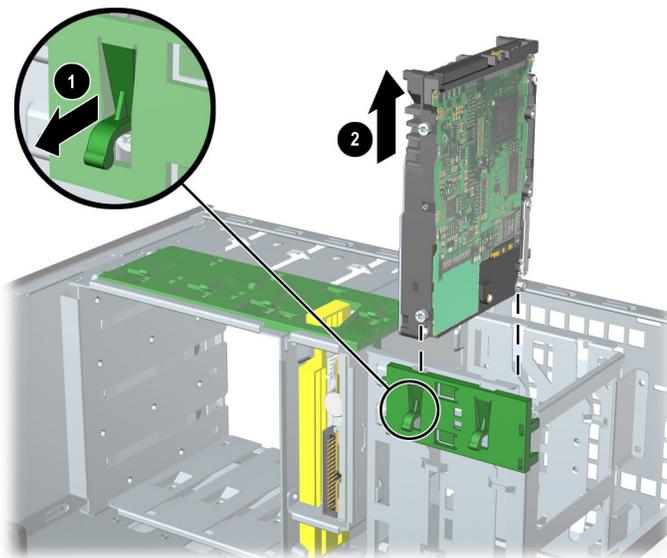
To install a hard drive, reverse the previous steps, but verify that the jumper settings are set.

IDE hard drive performance

When installing an IDE hard drive on a Linux-based workstation, the performance is set to 16-bit transfers with Direct Memory Access (DMA) turned off by default. This can be confirmed by running the following command:

```
hdparm -c -d /dev/hda
```

The command returns the following:

```
/dev/hda:
I/O support = 0 (default 16-bit)
using_dma = 0 (off)
```

To optimize IDE hard drive performance, manually set the transfer rate to 32-bit and turn DMA on by runnning the following command:

```
hdparm -c 1 -d 1 /dev/hda
```

The command returns the following:

```
/dev/hda:
setting 32-bit I/O support flag to 1
setting using dma to 1 (on)
I/O support = 1 (32-bit)
using_dma = 1 (on)
```

4.3.24 system board

To remove the system board:

1. Disconnect all cabling from the system board.

NOTE: Make note of the cable connections before disconnecting them from the system board.

---

2. Remove all expansion boards and graphics cards.

3. Press the release tab ❶ as shown in the following illustration.

4. Slide the board ❷ toward the front of the chassis and then lift it out of the unit.
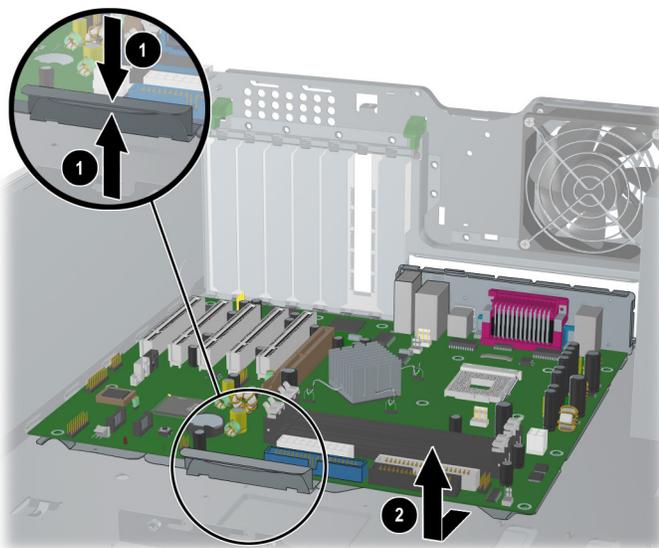
To replace the system board, slide the board back in and lay it down until the release tab snaps it back into place. Re-install all cards and reconnect all cables.

5

system diagnostics and troubleshooting

This chapter discusses the various means and tools available to assist you in diagnosing and troubleshooting system issues.

5.1   E-Support

For online access to technical support information and tools, go to http://www.hp.com/support. Support resources include Web-based troubleshooting tools, technical knowledge databases, driver and patch downloads, online communities, and proactive notification services.

5.2   preliminary troubleshooting checklist

If you encounter some minor problem with the workstation or a software application, go through the following checklist for possible solutions before running any of the diagnostic utilities:

■   Are the workstation and monitor connected to a working electrical outlet?

■   Is the workstation turned on?

■   Is the green power light illuminated?

■   Is the monitor turned on?

■   Is the green monitor light illuminated?

■   Turn up the monitor brightness and contrast controls if the monitor is dim.

■   Press and hold any key. If the system beeps, then the keyboard is operating correctly.

■   Check all cables for loose or incorrect connections.

■   Reconfigure the workstation after installing a non–Plug and Play expansion board or other option, such as a diskette drive.

■   Are all of the necessary device drivers installed?

■   Have all printer drivers been installed for each application?

■   Remove all diskettes and CDs from the drives before you turn on the system.

■   Are all switches set correctly, including the power supply voltage select switch?

■   Is the NIC Remote Wakeup cable (featured on some models) connected between the NIC and the riser/system board?

5.3 Diagnostics for Windows

The Diagnostics for Windows (DFW) utility is a component of Intelligent Manageability that allows you to view information about the hardware and software configuration of the workstation while running Microsoft Windows (Microsoft Windows 2000 and Microsoft Windows XP). It also allows you to perform hardware and software tests on the subsystems of the workstation.

When you invoke Diagnostics for Windows, the current configuration of the workstation is shown on the Overview screen. There is access from this screen to several categories of information about the workstation and the Test tab. The information in every screen of the utility can be saved to a file or printed.

NOTE: Diagnostics for Windows is not available on Linux-based workstations.

NOTE: To test all subsystems, you must log in as the administrator. If you do not log in as the administrator, you will be unable to test some subsystems. The inability to test a subsystem will be indicated by an error message under the subsystem name in the Test window or by shaded check boxes that cannot be selected.

Use Diagnostics for Windows in the following instances to:

■ Determine if all the devices installed on the workstation are recognized by the system and functioning properly. Running tests is optional but recommended after installing or connecting a new device.

■ Third party devices not supported by HP may not be detected. Save, print, or display the information generated by the utility.

5.3.1 detecting Diagnostics for Windows

Some workstations ship with the Diagnostics for Windows preloaded, but not preinstalled.

To determine whether Diagnostics for Windows is installed:

1. Access the location of the Diagnostics icons:

   ❏ In Windows 2000 Professional, select Start > Settings > Control Panel.

   ❏ In Windows XP Professional, select Start > Control Panel > Performance and Maintenance.

2. If icons for Configuration Record and Diagnostics for Windows are present, the Diagnostics for Windows utility is installed. If the icons are not present, the utility is either not preloaded or not installed.

5.3.2 installing Diagnostics for Windows

If Diagnostics for Windows is not preloaded, you can download the Diagnostics for Windows SoftPaq from the following Web site:

http://www.hp.com/support/files

Once the software has been downloaded onto the hard drive it may be installed by performing these steps:

1. Close all Windows applications.

2. Install the Diagnostics for Windows utility:

   ❏ In Windows XP, select Start > Setup Software icon. Select Diagnostics for Windows > Next button, then follow the instructions on the screen.

   ❏ In Windows 2000, select the Setup Software icon on the Desktop > Diagnostics for Windows > Next button, then follow the instructions on the screen.

   ❏ In either Windows XP or Windows 2000, if the Setup Software icon is not on the Desktop or in the Start menu, run the Setup program from the **C:\CPQAPPS\DIAGS** directory or select Start > Run and type the following in the command line: **C:\CPQAPPS\DIAGS\SETUP.**

3. Click Next to install Diagnostics for Windows.

4. After the program has finished installing, you may be prompted to restart the workstation, or it may automatically restart. If prompted, click Finish to restart the workstation or Cancel to exit the program. You must restart the workstation to complete the installation.

NOTE: If you want to upgrade an existing version of Diagnostics for Windows installed on the workstation, visit http://www.hp.com/support/files and click on an applicable product. Locate the desired software and download the latest version. Execute the downloaded file and select Repair to update the installed version. This causes the new version to overwrite the old version.

5.3.3 using Categories in Diagnostics for Windows

To use categories:

1. Click Start > HP Information Center > Diagnostics for Windows. You can also select the Diagnostics for Windows icon, located in the Control Panel.

   The screen displays the overview of the workstation hardware and software.

   ❏ In Windows 2000 Professional, select Start > Settings > Control Panel, then select Diagnostics for Windows.

   ❏ In Windows XP Professional, select Start > Control Panel > Performance and Maintenance, then select Diagnostics for Windows.

2. For specific hardware and software information, select a category from the Categories pull-down menu or the appropriate icon on the toolbar.

NOTE: As the cursor moves over the toolbar icons, the corresponding category name is displayed.

3. To display more detailed information in a selected category, click More in the Information Level box in the lower left corner of the window or click Level at the top of the screen and select More.

4. Review, print, and/or save this information as desired.

   ❏ To print the information, click File > Print. Select one of the following options: Detailed Report (All Categories), Summary Report (All Categories), or Current Category. Click OK to print the report you selected.

   ❏ To save the information, click File > Save As. Select one of the following options: Detailed Report (All Categories), Summary Report (All Categories), or Current Category. Click OK to save the report you selected.

5. To exit Diagnostics for Windows, click File, and then click Exit.

menu bar—File, Categories, Navigation, Level, Tab, Help

At the top of the Diagnostics for Windows screen is the Menu Bar consisting of six pull-down menus. Selecting an item will provide the following information on the system:

■ File—Save As, Print, Printer Setup, Exit

■ Categories

   ❏ System—System board, ROM, date, and time

   ❏ Asset Control—Asset tag, system serial number, and processor

   ❏ Input Devices—Keyboard, mouse, and joystick(s)

   ❏ Communication—Ports

   ❏ Storage—Storage drives

   ❏ Graphics—Graphics

   ❏ Memory—System board and Windows memory

   ❏ Multimedia—Optical storage (CD, DVD, and so on) and audio

   ❏ Windows—Windows

   ❏ Architecture—PCI Device

   ❏ Resources—IRQ, I/O, and Memory Map

   ❏ Health—Status of system temperature and hard drives

   ❏ Miscellaneous—CMOS, DMI, BIOS, System, Product Name, and Serial Number

■ Navigation—Previous Category (**F5**), Next Category (**F6**)

■ Level—Less (**F7**), More (**F8**) <information on the screen>

■ Tab

   ❏ Overview—Displays general information about the workstation. This window is displayed when first starting the utility. The left side of the window shows hardware information, while the right side shows software information.

   ❏ Test—Allows you to choose various parts of the system to test. You can also choose the type of test and testing mode.

   ❏ Status—Displays the status of each test in progress. You can cancel testing by clicking the Cancel Testing button.

   ❏ Log—Displays a log of tests for each device.

   ❏ Error—Displays any errors that occurred during device testing. The window lists the device being tested, the type and number of errors, and the error code.

■ Help—Contents, How to use Help, About.

5.3.4 running diagnostic tests in Diagnostics for Windows

To run diagnostic tests:

1. Click Start > HP Information Center > Diagnostics for Windows.

   Alternately, you can access Diagnostics for Windows via the control panel.

   The screen displays the overview of the workstation hardware and software. Five tabs are displayed below the row of icons: Overview, Test, Status, Log, and Error.

2. Click the Test tab, or click Tab at the top of the screen and select Test.

3. Select one of the following options:

   ❏ Quick Test—Runs a quick, general test on each device. Requires no user intervention if Unattended Mode is selected.

   ❏ Complete Test—Runs maximum testing of each device. The user can select Interactive Mode or Unattended Mode.

   ❏ Custom Test—Runs only the tests you select. To select specific devices or tests, find the device in the list, then select the check box beside each test. When selected, a red check mark is displayed in the box. Some tests selected may require user intervention.

NOTE: To test all subsystems, you must log in as the administrator. If you do not log in as the administrator, you will be unable to test some subsystems. The inability to test a subsystem will be indicated by an error message under the subsystem name in the Test window or by shaded boxes that cannot be checked.

---

4. Select Interactive Mode or Unattended Mode. In Interactive Mode, the diagnostic software will prompt you for input during tests that require it. Some tests require interaction and will display errors or halt testing if selected in conjunction with Unattended Mode.

   ❏ Interactive Mode provides maximum control over the testing process. You determine whether the test passed or failed and may be prompted to insert or remove devices.

   ❏ Unattended Mode does not display prompts. If errors are found, they are displayed when testing is complete.

5. Click the Begin Testing button at the bottom of the window. Test Status is displayed, showing the progress and result of each test. For more details on the tests run, click the Log tab or click Tab at the top of the screen and select Log.

6. To view a test report, select one of three tabs:

   ❏ **Status**—Summarizes the tests run, passed, and failed during the current testing session.

   ❏ **Log**—Lists tests run on the system, the numbers of times each test has run, the number of errors found on each test, and the total run time of each test.

   ❏ **Error**—Lists all errors found on the workstation with their error codes.

7. To save a test report:

   ❏ Select the Log tab Save button to save a Log tab report.

   ❏ Select the Error tab Save button to save an Error tab report.

8. To print a test report:

   ❏ If the report is on the Log tab, select File > Save As, and print the file.

   ❏ If the report is on the Error tab, select the Error tab Print button.

---

9. If errors are found, click the Error tab to display more detailed information and recommended actions.

10. Click Print or save the error information for future reference.

11. To exit Diagnostics for Windows, click File > Exit.

5.4 troubleshooting using HP Intelligent Manageability features

The Local Alert Pop-Up Dialog notifies you of an impending or actual hardware failure. If the workstation is connected to a network and the HP Insight Management Agents are installed and configured, a Simple Network Management Protocol (SNMP) trap (message) is sent to the specified SNMP-compliant management application.

The Local Alert Pop-Up Dialog also tells you the steps you need to take prior to a hardware failure to avoid loss of data and damage to the workstation. The system administrator can create a customized action message that might include contact telephone or pager numbers.

To close the Local Alert Pop-Up Dialog, click the Close button. To retrieve fault information after closing the dialog, run HP Insight.

For more detailed information, refer to the online *Intelligent Manageability Guide.*

5.5 diagnostic error codes

This sections gives an overview of the diagnostic lights and error codes that are related to the hp workstation xw4100.

5.5.1 diagnostic light codes

chassis indicator lights

power LED and sound activity	diagnosis and service action
none	System does not power on Press power button. If HDD LED = GREEN, then: 1. Verify voltage selected. 2. Remove expansion cards one-at-a-time until the 3.3 V_Aux light on the system board illuminates. 3. Replace system board. OR Press power button. If HDD LED does not illuminate, then: 1. Verify workstation plugged into live AC outlet. 2. Verify power button harness connected to system board. 3. Verify that both power supply cables are properly connected to the system board. 4. Verify that the 3.3 V_Aux light on the system board is illuminated. If on, replace the power button harness. 5. If the 3.3 V_Aux light on the system board is not illuminated, replace the power supply. 6. Replace system board.
Solid GREEN Power LED.	Workstation on. No action required.
Solid YELLOW or ORANGE.	Workstation is in Standby. No action required.
GREEN Power LED flashes 1 X each 2 seconds.	Workstation in Suspended to RAM mode (select models) or normal Suspend mode. No action required.
none	Workstation in Suspend to Disk or "Hibernate" mode. No action required.
Solid RED LED.	CPU not installed: 1. Install CPU. 2. Reseat CPU.
Blinks RED 2 X, once per second, then 2 second pause.	Thermal Shutdown: 1. Ensure the workstation air vents are not blocked and cooling fan is running. 2. Open hood, press power button, and see if processor fan spins. If not spinning, ensure fan cable is plugged into the system board. ensure fan is fully/properly seated. 3. If fan is plugged in and seated but not spinning, then replace processor fan. 4. Reseat CPU heatsink and verify fan assembly properly attached.

chassis indicator lights *(continued)*

power LED and sound activity	diagnosis and service action
Blinks RED 1 X each 2 seconds.	Power supply failure: 1. Check that voltage selector set to proper voltage. 2. Open the hood cover and ensure the 4-wire power supply cable is properly connected to the system board. 3. Locate faulty device by removing all devices and then reinstalling one-at-a-time until workstation fails. Replace the device causing the failure. Continue adding devices to ensure all are functioning properly. 4. Replace the power supply. 5. Replace the system board.
Blinks RED 5 X, once per second, then 2 second pause. 5 Beeps.	1. Reseat memory modules. 2. Replace memory modules one-at-a-time to find the faulty module. 3. Replace third-party modules with HP memory. 4. Replace system board.
Blinks RED 6 X, once per second, then 2 second pause. 6 Beeps.	For system with integrated graphics replace system board. For system with AGP card: 1. Reseat AGP card. 2. Replace AGP card. 3. Replace system board.
Blinks RED 7 X, once per second, then 2 second pause. 7 Beeps.	System board failure (ROM detected failure prior to video). Replace system board.
Blinks RED 8 X, once per second, then 2 second pause. 8 Beeps.	Invalid ROM based on bad checksum. 1. Reflash ROM. 2. Replace system board.

5.5.2 error codes

Diagnostic error codes occur if the system recognizes a problem while running the HP Diagnostics program. These error codes help identify possibly defective subassemblies.

Diagnostic error messages consist of three components, AABB-CC, where

AA = Device Code

BB = Subtest Code

CC = Error Code

The following table lists the device codes (<u>AA</u>BB-CC) and the subtest code (AA<u>BB</u>-CC) covered by HP Diagnostics Tests. Some codes listed in this table will not apply to the workstations described in this manual and will not be detailed in the tables that follow.

summary of test error codes

error code range	device description	error code range	device description
0100 - 0199	Processor (P1)	3113 - 3199	Third Processor (P3)
0200 - 0210	Memory	3206 - 3206	Audio System
0301 - 0304	Keyboard	3300 - 3333	Mediavision Spectrum 16
0401 - 0498	Parallel Port		Multimedia
0501 - 0516	Video Display Unit	3400 - 3401	TV Tuner Card Fourth
0600 - 0699	Diskette Drive	4113 - 4199	Processor
0802 - 0824	Monochrome Video Card	5100 - 5130	Plasma Display System
1101 - 1109	Serial Port	5234 - 5240	Advanced Color Graphics (AGC)
1201 - 1210	Modem	6000 - 6089	Network Card
1700 - 1799	Hard Drive	6500 - 6599	SCSI Hard Drives
1800 - 1823	CD-ROM	6600 - 6699	CD-ROM Drives
1900 - 1906	Tape Drive	6700 - 6799	SCSI Tape Drives
2113 - 2199	Second Processor (P2)	7000	Server Manager/R Card
2402 - 2480	Enhanced Color Graphics (ECG/VGA)	8601	Auxiliary Input Interface
		8700 - 8702	Game Port
2502	Pen/Digitizer		

The remaining tables list possible error codes (AABB-<u>CC</u>), descriptions of each error condition, and recommended actions to resolve the error condition.

NOTE: Retest the system after completing each step. If the problem has been resolved, do not proceed with the remaining steps.

For assistance in the removal and replacement of a particular subassembly, see Chapter 4 in this manual.

microprocessor

error code	description	recommended action
0101-xx	CPU test failed.	The following steps apply to 0101-xx through 0102-xx:
0102-xx	Coprocessor error.	1. Run Computer Checkup or Computer Setup and retest. 2. Replace processor and retest. 3. Replace the system board and retest.
0103-xx	DMA controller failed.	The following step applies to 0103-xx through 0106-xx:
0104-xx	Interrupt controller failed.	Replace the system board and retest.
0105-xx	Port error.	
0106-xx	Keyboard controller self-test failed.	
0107-xx	CMOS RAM test failed.	The following steps apply to 0107-xx through 0110-xx:
0108-xx	CMOS interrupt test failed.	1. Replace the battery/clock module and retest.
0109-xx	CMOS clock test failed.	2. Replace the system board and retest.
0110-xx	Programmable timer test failed.	
0113-01	Protected mode test failed.	Replace the system board and retest.
0114-01	Speaker test failed.	Verify the speaker connection. Replace speaker (if applicable) and retest. Replace the system board and retest.
0199-xx	Installed devices test failed.	Check system configuration. Verify cable connections. Check switch settings. Run Diagnostics utility. Remove all devices except processor and replace one-at-a-time until a failure occurs. Replace the system board.

memory

error code	description	recommended action
0200-xx	Machine ID test failed.	Reinsert memory modules and retest.
0202-xx	System ROM checksum failed.	The following steps apply to 0202-xx through 0212-xx:
0203-xx	Write/read test failed.	1. Remove one memory module at a time until the error message stops.
0204-xx	Address test failed.	2. Replace other removed modules one at a time, testing each to ensure the error does not return.
0205-xxx	Walking 1s test failed.	
0209-xxx	RAM long test failed.	
0211-xx	Random pattern test failed.	3. Replace defective modules.
0212-xxx	Cache test failed.	4. If error continues, replace system board and retest.
0214-xx	Noise test failed.	The following steps apply to 0214-xx through 0215-xx:
0215-xx	Random address test failed.	1. Remove one memory module at a time until the error message stops.
		2. Replace other removed modules one at a time, testing each to ensure the error does not return.
		3. Replace the system board and retest.

keyboard

error code	description	recommended action
0300-xx	ID test failed.	The following steps apply 0300-xx through 0304-xx:
0301-xx	Self-test/interface test failed.	1. Check the keyboard connection. If disconnected, turn the workstation off and connect the keyboard.
0302-xx	Individual key test failed.	
0304-xx	Repeat test failed.	
		2. Replace the keyboard and retest.
		3. Replace the system board and retest.

NOTE: Holding any key down during the boot-up sequence causes the Basic Input Output System (BIOS) to beep, as a warning of possible keyboard problems. Wait until after the system has booted, then press the **Num Lock** key. If the **Num Lock** light on the keyboard toggles on and off with each press of the key, the keyboard is functioning properly.

parallel port

error code	description	recommended action
0401-xx	Failed or not connected.	The following steps apply to 0401-xx through 0403-xx:
0402-xx	Printer port test failed.	1. Connect the printer.
0403-xx	Pattern test failed.	2. Check power to the printer.
		3. Install the loop-back connector and retest.
		4. Replace system board and retest.

diskette drive

error code	description	recommended action
0600-xx	ID drive types test failed.	The following steps apply to 0600-xx through 0698-xx:
0601-xx	Format failed.	1. Replace the diskette media and retest.
0602-xx	Read test failed.	2. Reseat and/or replace the diskette power and signal cables and retest.
0603-xx	Write, read, compare test failed.	3. Replace the diskette drive and retest.
0604-xx	Random seek test failed.	4. Replace the system board and retest.
0605-xx	ID media test failed.	
0606-xx	Speed test failed.	
0609-xx	Diskette reset controller failed.	
0610-xx	Change line test failed.	
0697-xx	Diskette type error.	
0698-xx	Diskette drive speed not within limits.	
0699-xx	Diskette drive/media error.	1. Replace the diskette media and retest. 2. Run Computer Setup and TEST.

serial port

error code	description	recommended action
1101-xx	Serial port test failed.	1. Run Computer Setup or Windows 2000 or Windows XP. 2. Replace the system board and retest.

modem communications

error code	description	recommended action
1201-xx	Internal test failed.	The following steps apply to 1201-xx through 1210-xx:
1203-xx	External termination test failed.	1. Disconnect from the phone line and retest.
1204-xx	Auto originate test failed.	2. Check the phone number.
1205-xx	Auto answer test failed.	3. Check the modem line.
1210-xx	Direct connect test failed.	4. Replace the modem and retest.

hard drive

error code	description	recommended action
1701-xx	Format test failed.	The following steps apply to 1701-xx through 1736-xx:
1702-xx	Read test failed.	1. Run Computer Setup and verify drive type.
1703-xx	Write/read/compare test failed.	2. Reseat or replace the hard drive signal and power cables and retest.
1704-xx	Random seek test failed.	3. Clear CMOS.
1705-xx	Controller test failed.	4. Run the hard drive DPS test.
1708-xx	Format bad track test failed.	5. Replace the hard drive and retest.
1710-xx	Park head test failed.	6. Replace the system board and retest.
1715-xx	Head select test failed.	
1716-xx	Conditional format test failed.	
1717-xx	ECC* test failed.	
1719-xx	Power mode test failed.	
1724-xx	Network preparation test failed.	
1736-xx	Monitoring test failed.	

*Error Correction Code

tape drive

error code	description	recommended action
1900-xx	ID test failed.	The following steps apply to 1900-xx through 1910-xx
1901-xx	Servo test failed.	1. Replace the tape cartridge and retest.
1902-xx	Format or format verification test failed.	2. Reseat and/or replace the signal cable and retest.
1903-xx	Sensor test failed.	3. Check the switch settings on the adapter card (if applicable).
1904-xx	BOT/EOT test failed.	
1905-xx	Read test failed.	4. Replace the tape adapter card (if applicable) and retest.
1906-xx	Write/read/compare failed.	5. Replace the tape drive and retest.
1910-xx	Tape erase test failed.	6. Replace the system board and retest.

video

error code	description	recommended action
501-xx	Graphics controller test failed.	The following steps apply to 501-xx through 516-xx:
502-xx	Video memory test failed.	1. Replace the monitor and retest.
503-xx	Video attribute test failed.	2. Replace the graphics controller and retest.
504-xx	Video character test failed.	3. Replace the system board and retest.
505-xx	Video 80 × 25 mode 9 × 14 character cell test failed.	
506-xx	Video 80 × 25 mode 8 × 8 character cell test failed.	
507-xx	Video 40 × 25 mode test failed.	
508-xx	Video 300 × 200 mode color set 0 test failed.	
509-xx	Video 320 × 200 mode color set 1 test failed.	
510-xx	Video 640 × 200 mode test failed.	
511-xx	Video screen memory page test failed.	
512-xx	Video gray scale test failed.	
514-xx	Video white screen test failed.	
516-xx	Video noise pattern test failed.	
2401-xx	Graphics controller test failed.	1. Reseat the video card (if applicable) and retest.
		2. Replace the video card and retest.
		3. Replace the system board and retest.

error code	description	recommended action
2402-xx	Memory test failed.	The following steps apply to 2402-xx through 2419-xx:
2403-xx	Attribute test failed.	
2404-xx	Character set test failed.	1. Reseat the video card (if applicable) and retest.
2405-xx	80 × 25 mode 9 × 14 character cell test failed.	2. Run the Configuration and Diagnostics utilities.
2406-xx	80 × 25 mode 8 × 8 character cell test failed.	3. Replace the monitor and retest.
2408-xx	320 × 200 mode color set 0 test failed.	4. Replace the video/system board and retest.
2409-xx	320 × 200 mode color set 1 test failed.	
2410-xx	640 × 200 mode test failed.	
2411-xx	Screen memory page test failed.	
2412-xx	Gray scale test failed.	
2418-xx	ECG/VGC memory test failed.	
2419-xx	ECG/VGC ROM checksum test failed.	
2420-xx	Graphics attribute test failed.	Replace the monitor and retest.
2421-xx	ECG/VGC 640 × 200 graphics mode test failed.	1. Reseat the video card (if applicable) and retest.
		2. Replace the video/system board and retest.
2422-xx	ECG/VGC 640 × 350 16 color set test failed.	The following steps apply to 2422-xx through 2456-xx:
2423-xx	ECG/VGC 640 × 350 64 color set test failed.	1. Reseat the video card (if applicable) and retest.
2424-xx	ECG/VGC monochrome text mode test failed.	2. Run the Configuration and Diagnostics utilities.
2425-xx	ECG/VGC monochrome graphics mode test failed.	3. Replace the monitor and retest.
2431-xx	640 × 480 graphics test failed.	4. Replace the video/system board and retest
2432-xx	320 × 200 graphics (256 color mode) test failed.	
2448-xx	Advanced VGA Controller test failed.	
2451-xx	132-column Advanced VGA test failed.	
2456-xx	Advanced VGA 256 Color test failed.	

error code	description	recommended action
2458-xx	Advanced VGA BitBLT test.	The following steps apply to 2458-xx through 2480-xx:
2468-xx	Advanced VGA DAC test.	
2477-xx	Advanced VGA data path test.	1. Reseat the video card (if applicable) and retest.
2478-xx	Advanced VGA BitBLT test.	2. Replace the video card and retest.
2480-xx	Advanced VGA Linedraw test.	3. Replace the system board and retest.

audio

error code	description	recommended action
3206-xx	Audio System Internal Error.	Replace the system board and retest.

NOTE: When Windows 2000 or Windows XP is installed, changes to ESS sound device configuration do not take effect until the workstation is restarted (turned off and on).

network interface

error code	description	recommended action
6000-xx	ID test failed.	The following steps apply to 6000-xx through 6089-xx:
6014-xx	Configuration test failed.*	
6016-xx	Reset test failed.*	1. Run Computer Setup or Windows 2000 or Windows XP utilities.
6028-xx	Internal test failed.*	
6029-xx	External test failed.*	2. Verify test procedures.
6054-xx	Configuration test failed.**	3. Replace the network card, if installed.
6056-xx	Reset test failed.**	4. Replace the system board.
6068-xx	Internal test failed.**	
6069-xx	External test failed.**	
6089-xx	Open test failed.**	

*Ethernet only.
**Token Ring only.

CD-ROM and DVD-ROM

error code	description	recommended action
3301-xx	CD-ROM drive read test failed.	The following steps apply to 3301-xx through 3305-xx and 6600-xx through 6623-xx:
3305-xx	CD-ROM drive seek test failed.	1. Replace the CD media and retest.
		2. Check the jumper settings on the adapter card.
6600-xx	ID test failed.	
6605-xx	Read test failed.	3. Verify that the speakers are connected.
6608-xx	Controller test failed.	4. Reseat and/or replace the power and signal cables and retest.
6623-xx	Random read test failed.	5. Replace the CD-ROM drive and retest.

pointing devices

error code	description	recommended action
8601-xx	Mouse test failed.	The following steps apply to 8601-xx through 8602-xx:
8602-xx	Interface test failed.	1. Replace with a working mouse and retest. 2. Replace the system board and retest.

5.5.3 special error codes

This section includes the error codes for the following devices:

■ SCSI hard drives

■ SCSI tape drives

■ SCSI PD-CD drives

■ All CD-ROM drives

The SCSI error codes consist of three components, AABB-CC, where

AA = Device Name

BB = Test Name

CC = Error Code

For example, a diagnostic error code of 6523-05 indicates that the diagnostics program was testing the hard drive random-read function and received a seek failure. The device is faulty and must be replaced.

device names

65XX-XX	Hard Drive
66XX-XX	CD-ROM Drive and PD-CD Drive
67XX-XX	Tape Drive

test names

XX00-XX	ID
XX05-XX	Read
XX06-XX	SA/Media
XX08-XX	Controller
XX09-XX	Media erase
XX23-XX	Random read
XX28-XX	Media load/unload

test error codes

error code	description	recommended action
XXXX-02	Drive not installed.	Check cable connections.
XXXX-03	Media not in drive.	Check for and install data CD or write-enabled tape in drive.
XXXX-05	Seek failure.	Replace the indicated device.
XXXX-06	Drive timed out.	Replace the indicated device.
XXXX-07	Drive busy.	Replace the indicated device.
XXXX-08	Drive already reserved.	Replace the indicated device.
XXXX-09	Unknown.	
XXXX-10	Unknown.	
XXXX-11	Media soft error.	Replace the indicated device.
XXXX-12	Drive not ready.	Replace the indicated device.
XXXX-13	Media error.	Replace the indicated device.
XXXX-14	Drive hardware error.	Replace the indicated device.
XXXX-15	Illegal drive command.	Replace the indicated device.
XXXX-16	Media was changed.	Replace the indicated device.
XXXX-17	Tape write-protected.	1. Disable write-protect on tape cartridge. 2. Replace tape drive.
XXXX-18	No data detected.	Replace the indicated device.
XXXX-21	Drive command aborted.	Replace the indicated device.
65XX-24	Media hard error.	1. Back up data and perform Surface Analysis to reallocate defect. 2. Replace drive.
66XX-24	Media hard error.	1. Replace current data CD with different data CD. 2. Replace drive.
67XX-24	Media hard error.	1. Ensure correct media type for this tape drive. 2. Replace current tape with new tape. 3. Replace tape drive.
XXXX-25	Unknown.	
XXXX-30	Controller timed out.	Replace the indicated device.
XXXX-31	Unrecoverable error.	Replace the indicated device.
XXXX-32	Controller/drive disconnected.	Replace the indicated device.
XXXX-33	Illegal controller command.	Replace the indicated device.
XXXX-34	Invalid SCSI bus phase.	Replace the indicated device.

error code	description	recommended action
XXXX-35	Invalid SCSI bus phase.	Replace the indicated device.
XXXX-36	Invalid SCSI bus phase.	Replace the indicated device.
XXXX-39	Error status from drive.	Replace the indicated device.
XXXX-40	Target timed out.	Replace the indicated device.
XXXX-41	SCSI bus stayed busy.	Replace the indicated device.
XXXX-42	ACK/REQ lines bad.	Replace the indicated device.
XXXX-43	ACK did not deassert.	Replace the indicated device.
XXXX-44	Parity error.	Replace the indicated device.
XXXX-50	Data pins bad.	Replace the indicated device.
XXXX-51	Data line 7 bad.	Replace the indicated device.
XXXX-52	MSG, C/D, and/or I/O lines bad.	Replace the indicated device.
XXXX-53	BSY never went busy.	Replace the indicated device.
XXXX-54	BSY stayed busy.	Replace the indicated device.
XXXX-60	Controller CONFIG-1 register bad	Replace the indicated device.
XXXX-61	Controller CONFIG-2 register bad	Replace the indicated device.
XXXX-65	Media not unloaded.	Replace the indicated device.
XXXX-90	Fain failure.	1. Ensure fan(s) connected. 2. Replace nonfunctional fan(s).
XXXX-91	Over temperature.	1. Ensure proper air flow. 2. Perform required maintenance and cleaning.
XXXX-99	Autoloader reported tapes not loaded properly.	1. Install tape(s) in autoloader tape drive according to test instructions. 2. Change autoloader magazine.

5.6 troubleshooting scenarios and solutions

This section presents an extensive overview of various troubleshooting scenarios and includes possible solutions for each.

5.6.1 solving minor problems

solving minor problems

problem	cause	possible solution
Workstation appears locked up and will not turn off when the power button is pressed.	Software control of the power switch is not functional.	1. Press and hold the power button for at least four seconds until the workstation turns off. 2. Disconnect electrical plug from outlet.
Workstation will not respond to USB keyboard or mouse.	Workstation is in standby mode.	Press the power button to resume from standby mode.

⚠ When attempting to resume from standby mode, do not hold down the power button for more than four seconds. Otherwise, the workstation will shut down and you will lose your data.

problem	cause	possible solution
Workstation date and time display is incorrect.	RTC (real-time clock) battery may need to be replaced.	1. Reset the date and time under Control Panel. 2. Replace the RTC battery.
Workstation appears to pause periodically.	Network driver is loaded and no network connection is established.	Establish a network connection, or use Computer Setup or Microsoft Windows Device Manager to disable the network controller.
Cursor will not move using the arrow keys on the keypad.	The **Num Lock** key may be on.	Press the **Num Lock** key. The **Num Lock** key can be disabled (or enabled) in Computer Setup.
Cannot remove hood cover.	Solenoid hood cover lock, featured on some workstations, is locked.	1. Unlock the solenoid hood cover lock using Computer Setup. 2. Use the hood cover FailSafe Key in case of forgotten password, power loss, or workstation malfunction.
Poor performance is experienced.	Processor is hot.	1. Ensure airflow to the workstation is not blocked. 2. Ensure the fans are connected and working properly (some fans only operate when needed). 3. Ensure the processor heatsink is installed properly.
	Hard drive is full.	Transfer data from the hard drive to create more space on the hard drive.

solving minor problems *(continued)*

problem	cause	possible solution
Workstation powered off automatically and the Power LED flashes Red two times, once every second, followed by a two second pause.	Processor thermal protection activated: A fan may be blocked or not turning. OR The heatsink is not properly attached to the processor.	1. Ensure workstation air vents are not blocked and the cooling fan is running. 2. Open hood, press power button, and see if the processor fan spins. If not spinning, make sure the fan's cable is plugged onto the system board header. Ensure the fan is fully/properly seated or installed. 3. Replace the processor fan. 4. Reseat processor heatsink and verify that the fan assembly is properly attached.

System does not power on and the LEDs on the front of the workstation are not flashing.	System unable to power on.	Press and hold the power button for less than 4 seconds. If the hard drive LED turns green, then:
		
		  1. Check that the voltage selector is set to the appropriate voltage.
		
		  2. Remove the expansion cards one at a time until the 3.3 V_aux light on the system board turns on.
		
		  3. Replace the system board.
		
		OR
		
		Press and hold the power button for less than 4 seconds. If the hard drive LED does not turn on green then:
		
		  1. Check that the unit is plugged into a working AC outlet.
		
		  2. Open hood and check that the power button harness is properly connected to the system board.
		
		  3. Check that both power supply cables are properly connected to the system board.
		
		  4. If the 3.3 V_aux light on the system board is on, then replace the power button harness.
		
		  5. If the 3.3 V_aux light on the system board is off, then replace the power supply.
		
		  6. Replace the system board.

5.6.2 solving power supply problems

solving power supply problems

problem	cause	solution
Power supply shuts down intermittently.	Voltage selector switch on rear of workstation chassis not switched to correct line voltage.	Select the proper AC voltage.
	Power supply fault.	Replace the power supply.
Workstation powered off automatically and the Power LED flashes Red two times, once every second, followed by a two second pause.	Processor thermal protection activated: A fan may be blocked or not turning. OR The heatsink/fan assembly is not properly attached to the processor.	1. Ensure that the workstation air vents are not blocked and the cooling fan is running. 2. Open hood, press the power button, and see if the processor fan spins. If the processor fan is not spinning, make sure the fan's cable is plugged onto the system board header. Ensure the fan is fully/properly seated or installed. 3. Replace the processor fan. 4. Reseat processor heatsink and verify that the fan assembly is properly attached.
Power LED flashes Red, once every two seconds.	Power failure (power supply is overloaded).	1. Check that the voltage selector, is set to the appropriate voltage. 2. Open the hood and ensure the 4-wire power supply cable is seated into the connector on the system board. 3. Check if a device is causing the problem by removing ALL attached devices). Power on the system. If the system enters the POST, then power off and replace one device at a time and repeat this procedure until failure occurs. Replace the device causing the failure. Continue adding devices one at a time to ensure all devices are functioning properly. 4. Replace the power supply. 5. Replace the system board.

5.6.3 solving diskette problems

solving diskette problems

problem	cause	solution
Diskette drive light stays on.	Diskette is damaged.	In Microsoft Windows 2000 and Microsoft Windows XP, right-click Start, click Explore, and select a drive. Select File > Properties > Tools. Under Error-checking, click Check Now.
	Diskette is incorrectly inserted.	Remove diskette and reinsert.
	Drive button is not pushed in.	Push in drive button.
	Files on diskette are damaged.	Check the program diskettes.
	Drive cable is not properly connected.	Reconnect power cable. Ensure that all four pins are connected.
Drive not found.	Cable is loose.	Reseat diskette drive data and power cables.
	Removable drive is not seated properly.	Reseat the drive.
Diskette drive cannot write to a diskette.	Diskette is not formatted.	Format the diskette.
	Diskette is write-protected.	Use another diskette or remove the write protection.
	Writing to the wrong drive.	Check the drive letter in the path statement.
	Not enough space is left on the diskette.	Use another diskette.
	Diskette write control is enabled.	Use Computer Setup to check the storage security feature disabled settings.
	Diskette is damaged.	Replace the damaged disk.

solving diskette problems *(continued)*

problem	cause	solution
Cannot format diskette.	Invalid media reported.	When formatting a disk in MS-DOS, you may need to specify diskette capacity. For example, to format a 1.44-MB diskette, type the following command at the MS-DOS prompt: **FORMAT A: /F:1440**
A problem has occurred with a disk transaction.	The directory structure is bad, or there is a problem with a file.	In Windows 2000 and Windows XP, right-click Start, click Explore, and select a drive. Select File > Properties > Tools. Under Error-checking, click Check Now.
Diskette drive cannot read a diskette.	Diskette is not formatted.	Format the diskette.
	You are using the wrong diskette type for the drive type.	Check the type of drive that you are using and use the correct diskette type.
	You are reading the wrong drive.	Check the drive letter in the path statement.
	Diskette is damaged.	Replace the diskette with a new one.
"Invalid system disk" message is displayed.	A diskette that does not contain the system files needed to start the workstation has been inserted in the drive.	When drive activity stops, remove the diskette and press the **Spacebar.** The workstation should start up.
	Diskette error has occurred.	Restart the workstation by pressing the power button.
Cannot Boot to Diskette.	Diskette is not bootable.	Replace with a bootable diskette.
	Diskette boot has been disabled in Computer Setup.	Run Computer Setup and enable diskette boot in Storage > Boot Order.
	Removable media boot has been disabled in Computer Setup.	Run Computer Setup and enable Removable Media Boot in Storage > Storage Options.
	Diskette MBR validation is enabled.	Run Computer Setup and disable Diskette MBR Validation in Storage > Storage Options.

5.6.4 solving hard drive problems

solving hard drive problems

problem	cause	solution
Hard drive error occurs.	Hard disk has bad sectors or has failed.	Use a utility to locate and block usage of bad sectors. If necessary, reformat the hard disk.
Disk transaction problem.	Either the directory structure is bad or there is a problem with a file.	In Windows 2000 and Windows XP, right-click Start, click Explore, and select a drive. Select File > Properties > Tools. Under Error-checking, click Check Now.
Drive not found (identified).	Loose cable.	Check cable connections.
	The system may not have automatically recognized a newly installed device.	1. Run Computer Setup. 2. If the system still does not recognize the new device, check to see if the device is listed within Computer Setup. If it is listed, the probable cause is a driver problem. If it is not listed, the probable cause is a hardware problem. 3. If this is a newly installed drive, enter Setup and try adding a POST delay under Advanced > Power-On.
	Drive jumper settings may be incorrect.	If the drive is a secondary drive that has just been installed on the same cable as the primary drive, verify that the jumpers for both drives are set correctly.
	Drive's IDE (ATA) controller is disabled in Computer Setup.	Run Computer Setup and enable the Primary and Secondary IDE (ATA) controllers in Storage > Storage Options.
	Drive responds slowly immediately after power-up.	Run Computer Setup and increase the POST Delay in Advanced > Power-On Options.
Nonsystem disk/NTLDR missing message.	System is trying to start from a non-bootable diskette.	Remove the diskette from the diskette drive.

solving hard drive problems *(continued)*

problem	cause	solution
Nonsystem disk/NTLDR missing message. (continued)	System is trying to start from a damaged hard drive.	1. Insert a bootable diskette into the diskette drive and restart the workstation.
		2. If the hard drive is still inaccessible and MBR Security is enabled, try restoring the previously saved MBR image by entering Setup and selecting Security > Restore Master Boot Record.
	System files missing or not properly installed.	1. Insert a bootable system diskette and restart.
		2. Verify hard drive is partitioned and formatted.
		3. Install system files for the appropriate operating system if necessary.
	Hard drive boot disabled in Computer Setup.	Run Computer Setup and enable the hard drive entry in the Storage > Boot Order list.
Second Ultra ATA hard drive does not perform optimally.	Using the wrong cable for the drive type.	Reinstall the second Ultra ATA hard drive using an 80-conductor cable (standard on select models.)
	Both slow and fast UATA devices are on the same data cable.	Connect slower UATA devices to a separate data cable connected to the secondary IDE (ATA) controller.
Workstation will not start.	Hard drive is damaged.	Observe the beeps and LED lights on the front of the workstation. See the "Power-On Self-Test (POST) and error messages" section in this chapter.
Workstation seems to be locked up.	Program in use has stopped responding to commands.	1. Attempt the normal Windows "Shut Down" procedure.
		2. Press the power button for four or more seconds to turn off the power.
		3. Restart the workstation using the power button.

5.6.5 solving display problems

solving display problems

problem	cause	solution
Blank screen (no video).	The cable connections are not correct.	Check the cable connections from the monitor to the workstation and to the electrical outlet.
	Screen blanking utility installed or energy saver features enabled.	Press any key or click the mouse button and, if set, type your password.
	System ROM is bad; system is running in FailSafe Boot Block mode (indicated by eight beeps).	Reflash the ROM using a ROMPaq diskette.
	Fixed-sync monitor will not sync at the resolution chosen.	Ensure that the monitor can accept the same horizontal scan rate as the resolution chosen.
	Computer is in standby mode.	Press the power button to resume from standby mode.

⚠ When attempting to resume from standby mode, do not hold down the power button for more than four seconds. Otherwise, the workstation will shut down and you will lose your data.

problem	cause	solution
	Monitor cable plugged into the wrong connector.	If the workstation system has both an integrated graphics connector and an AGP card connector, plug the monitor cable into the AGP card connector.
	Monitor settings in the workstation are not compatible with the monitor.	1. Restart the workstation and press **F8** during startup when you see "Press F8" in the bottom right corner of the screen.
		2. Using the keyboard arrow keys, select Enable VGA Mode and press **Enter.**
		3. In Windows Control Panel, double-click the Display icon and select the Settings tab.
		4. Use the sliding control to reset the resolution.
Power LED flashes Red six times, once every second, followed by a two second pause, and the workstation beeps six times.	Pre-video graphics error.	For systems with a graphics card:
		1. Reseat the graphics card.
		2. Replace the graphics card.
		3. Replace the system board.
		For systems with integrated graphics, replace the system board.

solving display problems *(continued)*

problem	cause	solution
Monitor does not function properly when used with energy saver features.	Monitor without energy saver capabilities is being used with energy saver features enabled.	Disable monitor energy saver feature.
Dim characters.	The brightness and contrast controls are not set properly.	Adjust the monitor brightness and contrast controls.
	Cables are not properly connected.	Check that the graphics cable is securely connected to the graphics card and the monitor.
Blurry video or requested resolution cannot be set.	If the graphics controller was upgraded, the correct video drivers may not be loaded.	Install the video drivers included in the upgrade kit.
	Monitor is not capable of displaying requested resolution.	Change requested resolution.
The picture is broken up, rolls, jitters, or flashes.	The monitor connections may be incomplete or the monitor may be incorrectly adjusted.	1. Be sure the monitor cable is securely connected to the workstation. 2. In a two-monitor system or if another monitor is in close proximity, be sure the monitors are not interfering with each other's electromagnetic field by moving them apart. 3. Fluorescent lights or fans may be too close to the monitor.
	Monitor needs to be degaussed.	Degauss the monitor.
Vibrating or rattling noise coming from inside a CRT monitor when powered on.	Monitor degaussing coil has been activated.	None. It is normal for the degaussing coil to be activated when the monitor is powered on.
Clicking noise coming from inside a CRT monitor.	Electronic relays have been activated inside the monitor.	None. It is normal for some monitors to make a clicking noise when turned on and off, when going in and out of standby mode, and when changing resolutions.
High pitched noise coming from inside a flat panel monitor.	Brightness and/or contrast settings are too high.	Lower brightness and/or contrast settings.

solving display problems *(continued)*

problem	cause	solution
Fuzzy focus; streaking, ghosting, or shadowing effects; horizontal scrolling lines; faint vertical bars; or unable to center the picture on the screen. (Flat panel monitors using an analog VGA input connection only.)	Flat panel monitor's internal digital conversion circuits may be unable to correctly interpret the output synchronization of the graphics card.	1. Select the monitor's Auto-Adjustment option in the monitor's on-screen display menu. 2. Manually synchronize the Clock and Clock Phase on-screen display functions. Download SoftPaq SP20930 or SP22333, depending on the monitor, to assist with the synchronization.
Certain typed symbols do not appear correct.	The font you are using does not support that particular symbol.	Use the Character Map to locate the and select the appropriate symbol. Click Start > All Programs > Accessories > System Tools > Character Map. You can copy the symbol from the Character Map into a document.

5.6.6 solving audio problems

solving audio problems

problem	cause	solution
Sound does not come out of the speaker or headphones.	Software volume control is turned down.	Double-click the Speaker icon on the taskbar and use the volume slider to adjust the volume.
	The external speakers are not turned on.	Turn on the external speakers.
	External speakers plugged into the wrong audio jack.	See the sound card documentation for proper speaker connection.
	Audio cable not connected.	Connect audio cable between CD or DVD-ROM drive and the system board.
	Digital CD audio is not enabled.	Enable digital CD audio: 1. From the Control Panel, select System. 2. On the Hardware tab, click the Device Manager button. 3. Right-click on the CD/DVD device and select Properties. 4. On the Properties tab, make sure "Enable digital CD audio for this CD-ROM device" is checked.

solving audio problems *(continued)*

problem	cause	solution
	Headphones or devices connected to the line-out connector mute the internal speaker.	Turn on and use headphones or external speakers, if connected, or disconnect headphones or external speakers.
	Volume is muted.	1. From the Control Panel program, click Sound, Speech and Audio Devices, then click Sounds and Audio Devices. 2. Click the Mute check box to remove the check mark from the box.
	Computer is in standby mode.	Press the power button to resume from standby mode.

⚠ When attempting to resume from standby mode, do not hold down the power button for more than four seconds. Otherwise, the workstation will shut down and you will lose your data.

problem	cause	solution
Noise or no sound comes out of the speakers or headphones.		1. If using digital speakers that have a stereo jack and want the system to auto-switch to digital, use a stereo-to-mono adapter to properly engage the auto-sense feature or use the multimedia device properties to manually switch the audio signal from analog to digital. 2. If the headphones have a mono jack, use the multimedia device properties to switch the system to analog out.

NOTE: If you set digital as the Output Mode, the internal speaker and external analog speakers will no longer output audio until you switch back to an auto-sense or analog mode.

If you set analog as the Output Mode, external digital speakers will not function until you change the output mode back to an auto-sense or digital mode.

problem	cause	solution
Sound cuts in and out.	Processor resources are being used by other open applications.	Shut down all open processor-intensive applications.
Workstation appears to be locked up while recording audio.	The hard disk may be full.	1. Before recording, make sure there is enough free space on the hard disk. 2. Try recording the audio file in a compressed format.

5.6.7 solving printer problems

solving printer problems

problem	cause	solution
Printer will not print.	Printer is not turned on and online.	Turn the printer on and make sure it is online.
	The correct printer driver for the application are not installed.	1. Install the correct printer driver for the application. 2. Try printing using the MS-DOS command: **DIR C:\ > [printer port]** where **[printer port]** is the address of the printer being used. If the printer works, reload the printer driver.
	If you are on a network, you may not have made the connection to the printer.	Make the proper network connections to the printer.
	Printer may have failed.	Run printer self-test.
Printer will not turn on.	The cables may not be connected properly.	Reconnect all cables.
Printer prints garbled information.	The correct printer driver is not installed.	Install the correct printer driver for the application.
	The cables may not be connected properly.	Reconnect all cables.
	Printer memory may be overloaded.	Reset the printer by turning it off for one minute, then turn it back on.
Printer is offline.	The printer may be out of paper.	1. Check the paper tray and refill it if it is empty. 2. Select online.

5.6.8 solving keyboard and mouse problems

solving keyboard problems

problem	cause	solution
Keyboard commands and typing are not recognized by the workstation.	Keyboard connector is not properly connected.	1. Turn off the workstation. 2. Reconnect the keyboard to the back of the workstation and restart the workstation.
	Program in use has stopped responding to commands.	Shut down the workstation using the mouse and then restart the workstation.
	Keyboard needs repairs.	Replace the keyboard.
	Workstation is in standby mode.	Press the power button to resume from standby mode.

⚠ When attempting to resume from standby mode, do not hold down the power button for more than four seconds. Otherwise, the workstation will shut down and you will lose your data.

problem	cause	solution
Cursor will not move using the arrow keys on the keypad.	The **Num Lock** key may be on.	Press the **Num Lock** key. The **Num Lock** light should not be on if you want to use the arrow keys. The **Num Lock** key can be disabled (or enabled) in Computer Setup.
Mouse does not respond to movement or is too slow.	Mouse connector is not properly plugged into the back of the workstation.	1. Shut down the workstation using the keyboard. 2. Plug the mouse connector into the back of the workstation (or the keyboard) and restart the workstation.
	Program in use has stopped responding to commands.	Shut down the workstation using the keyboard and then restart the workstation.
	Mouse needs repairs.	Replace the mouse.
	Workstation is in standby mode.	Press the power button to resume from standby mode.

⚠ When attempting to resume from standby mode, do not hold down the power button for more than four seconds. Otherwise, the workstation will shut down and you will lose your data.

problem	cause	solution
Mouse will only move vertically or horizontally, or movement is jerky.	Mouse roller ball is dirty.	Remove roller ball cover from the bottom of the mouse and clean it.

5.6.9 solving front panel component problems

If you are experiencing problems with one of the front panel ports, you might be able to try your device in the corresponding port on the back side of the computer. If this does not fix the problem, or you need to use the front panel ports, continue troubleshooting.

Some problems in this section are also discussed in other troubleshooting suggestions in this chapter.

solving front panel component problems

problem	cause	solution
If a USB device, headphone, or microphone is not recognized by the workstation.	It is not properly connected.	1. Turn off the workstation. 2. Reconnect the device to the front of the workstation and restart the workstation.
	The device does not have power.	If the USB device requires AC power, be sure one end is connected to the device and one end is connected to a live outlet.
	The correct device driver is not installed.	1. Install the correct driver for the device. 2. You might need to reboot the workstation.
	The cable from the device to the computer does not work.	1. If possible, replace the cable. 2. Restart the workstation.
	The device is not working.	1. Replace the device. 2. Restart the workstation.
A device in the IEEE-1394 port is not responsive.	Cable(s) of new external device are loose or power cables are unplugged.	Ensure that all cables are properly and securely connected.
	The power switch on the device is not turned on.	Turn off the workstation, turn on the external device, then turn on the workstation to integrate the device with the workstation system.
The IEEE-1394 port is not active.	The port is not there because it was not purchased with the system.	You can buy an IEEE1394 connection. Contact an HP seller.

solving front panel component problems *(continued)*

problem	cause	solution
	The IEEE-1394 cable might not be connected to the adapter cable.	1. Turn off the workstation.
		2. Remove the hood cover. See "hood cover" for more information.
		3. Be sure the power cable is connected to the card. See "IEEE-1394 (optional)"
		4. Be sure to connect the IEEE-1394 cable adapter to the card. See "IEEE-1394 (optional)"
		5. Be sure to connect the front IEEE-1394 pre-installed cable to the adapter cable. See "IEEE-1394 (optional)"

5.6.10 solving hardware installation problems

You may need to reconfigure the workstation when you add or remove hardware, such as an additional diskette drive. If you install a plug and play device, Windows 2000 and Windows XP automatically recognize the device and configure the workstation. If you install a non-plug and play device, you must reconfigure the workstation after completing installation of the new hardware. In Windows 2000, select the Add New Hardware icon in the Control Panel (for Windows XP, use the Add Hardware Wizard) and follow the instructions that appear on the screen.

solving hardware installation problems

problem	cause	solution
A new device is not recognized as part of the system.	Device is not seated or connected properly.	Ensure that the device is properly and securely connected and that pins in the connector are not bent down.
	Cable(s) of new external device are loose or power cables are unplugged.	Ensure that all cables are properly and securely connected and that pins in the cable or connector are not bent down.
	Power switch of new external device is not turned on.	Turn off the workstation, turn on the external device, then turn on the workstation to integrate the device with the workstation system.
	When the system advised you of changes to the configuration, you did not accept them.	Reboot the workstation and follow the instructions for accepting the changes.
	A plug and play board may not automatically configure when added if the default configuration conflicts with other devices.	Use Windows 2000 or Windows XP Device Manager to deselect the automatic settings for the board and choose a basic configuration that does not cause a resource conflict. You can also use Computer Setup to reconfigure or disable devices to resolve the resource conflict.
Workstation will not start.	Wrong memory modules were used in the upgrade or memory modules were installed in the wrong location.	1. Review the documentation that came with the system to determine if you are using the correct memory modules and to verify the proper installation. 2. Observe the beeps and LED lights on the front of the workstation. See the "Power-On Self-Test (POST) and error messages" section to determine possible causes.

solving hardware installation problems *(continued)*

problem	cause	solution
Power LED flashes Red five times, once every second, followed by a two second pause, and the workstation beeps five times.	Memory is installed incorrectly or is bad.	1. Reseat DIMMs. 2. Replace DIMMs one at a time to isolate the faulty module. 3. Replace third-party memory with HP memory. 4. Replace the system board.
Power LED flashes Red six times, once every second, followed by a two second pause, and the workstation beeps six times.	Video card is not seated properly or is bad, or system board is bad.	For systems with a graphics card: 1. Reseat the graphics card. Power on the system. 2. Replace the graphics card. 3. Replace the system board. For systems with integrated graphics, replace the system board.

5.6.11 solving network problems

These guidelines do not discuss the process of debugging the network cabling.

solving network problems

problem	cause	solution
Wake-on-LAN feature is not functioning.	Wake-on-LAN is not enabled.	Use the Network control application to enable Wake-on-LAN.
Network driver does not detect network controller.	Network controller is disabled.	Run Computer Setup and enable network controller.
	Incorrect network driver.	Check the network controller documentation for the correct driver or obtain the latest driver from the manufacturer's Web site.
Network status link light does not turn on or it never flashes. **NOTE:** The network status light should flash when there is network activity.	No active network is detected.	Check cabling and network equipment for proper connection.
	Network controller is not set up properly.	Use the Network control application to verify that the device is working properly.
	Network driver is not properly loaded.	Reinstall network drivers.
	System cannot autosense the network.	Disable auto-sensing capabilities and force the system into the correct operating mode.

solving network problems *(continued)*

problem	cause	solution
Diagnostics reports a failure.	The cable is not securely connected.	Ensure that both ends of the data cable are securely connected.
	The cable is attached to the incorrect connector.	Ensure that the cable is attached to the correct connector.
	There is a problem with the cable or a device at the other end of the cable.	Ensure that the cable and device at the other end are operating correctly.
	Network controller interrupt is shared with an expansion board.	Under the Computer Setup Advanced menu, change the resource settings for the board.
	The network controller is defective.	Replace the NIC.
Diagnostics passes, but the workstation does not communicate with the network.	Network drivers are not loaded, or driver parameters do not match current configuration.	1. Make sure the network drivers are loaded and that the driver parameters match the configuration of the network controller. 2. Make sure the correct network client and protocol is installed.
	The network controller is not configured for this workstation.	Select the Network icon in the Control Panel and configure the network controller.
Network controller stopped working when an expansion board was added to the workstation.	Network controller interrupt is shared with an expansion board.	Under the Computer Setup Advanced menu, change the resource settings for the board.
	The network controller requires drivers.	Verify that the drivers were not accidentally deleted when the drivers for a new expansion board were installed.
	The expansion board installed is a network card (NIC) and conflicts with the embedded NIC.	Under the Computer Setup Advanced menu, change the resource settings for the board.
Network controller stops working without apparent cause.	The files containing the network drivers are corrupted.	Reinstall the network drivers, using the *Restore Plus!* CD.
	The cable is not securely connected.	Ensure that both ends of the cable are securely attached to the correct devices.
	The network controller is defective.	Replace the NIC.

solving network problems *(continued)*

problem	cause	solution
New network card will not boot.	New network card may be defective or may not meet industry-standard specifications.	Install a working, industry-standard NIC, or change the boot sequence to boot from another source.
Cannot connect to network server when attempting Remote System Installation.	The network controller is not configured properly.	Verify Network Connectivity, that a DHCP Server is present, and that the Remote System Installation Server contains the NIC drivers for your NIC.
System setup utility reports unprogrammed EEPROM.	Unprogrammed EEPROM.	Flash the ROM.

5.6.12 solving memory problems

⚠ **CAUTION:** For those systems that support ECC memory, HP does not support mixing ECC and non-ECC memory. Otherwise, the system will not boot the operating system.

solving memory problems

problem	cause	solution
System will not boot or does not function properly after installing additional memory modules.	Memory module is not the correct type or speed or the new memory module is not seated properly.	Replace module with the correct industry-standard device for the workstation.
		On some models, ECC and non-ECC memory modules cannot be mixed.
Out of memory error.	Memory configuration may not be set up correctly.	Use the Device Manager to check memory configuration.
	You have run out of memory to run the application.	Check the application documentation to determine the memory requirements.
Memory count during POST is wrong.	The memory modules may not be installed correctly.	Check that the memory modules have been installed correctly and that proper modules are used.
Insufficient memory error during operation.	Too many Terminate and Stay Resident programs (TSRs) are installed.	Delete any TSRs that you do not need.
	You have run out of memory for the application.	Check the memory requirements for the application or add more memory to the workstation.

solving memory problems *(continued)*

problem	cause	solution
Power LED flashes Red five times, once every second, followed by a two second pause, and the workstation beeps five times.	Memory is installed incorrectly or is bad.	1. Reseat DIMMs. 2. Replace DIMMs one at a time to isolate the faulty module. 3. Replace third-party memory with HP memory. 4. Replace the system board.

5.6.13 solving processor problems

solving processor problems

problem	cause	solution
Poor performance is experienced.	Processor is hot.	1. Make sure the airflow to the workstation is not blocked. 2. Make sure the fans are connected and working properly (some fans only operate when needed). 3. Make sure the processor heatsink is installed properly.
Power LED is Red and stays on.	Processor is not seated properly or not installed.	1. Check to see that the processor is present. 2. Reseat the processor.

5.6.14 solving CD-ROM and DVD problems

solving CD-ROM and DVD problems

problem	cause	solution
System will not boot from CD-ROM or DVD drive.	The CD-ROM or DVD boot is not enabled through the Computer Setup utility.	Run the Computer Setup utility and enable booting to removable media and verify boot order settings.
	Non-bootable CD in drive.	Try a bootable CD in the drive.
CD-ROM or DVD devices are not detected or driver is not loaded.	Drive is not connected properly or not properly configured.	1. Reconnect power and data cables to the drive. 2. Install correct device driver.
Movie will not play in the DVD drive.	Movie may be regionalized for a different country.	See the documentation that came with the DVD drive.
	Decoder software is not installed.	Install decoder software.

solving CD-ROM and DVD problems *(continued)*

problem	cause	solution
Cannot eject compact disc (tray-load unit).	Disc not properly seated in the drive.	1. Turn off the workstation and insert a thin metal rod into the emergency eject hole and push firmly. 2. Slowly pull the tray out from the drive until the tray is fully extended, then remove the disc.
CD-ROM, CD-RW, DVD-ROM, or DVD-R/RW drive cannot read a disc or takes too long to start.	CD has been inserted upside down.	Re-insert the CD with the label facing up.
	The DVD-ROM drive takes longer to start because it has to determine the type of media played, such as audio or video.	Wait at least 30 seconds to let the DVD-ROM drive determine the type of media being played. If the disc still does not start, read the other solutions listed for this topic.
	CD or DVD disc is dirty.	Clean CD or DVD with a CD cleaning kit.
	Windows does not detect the CD-ROM or DVD-ROM drive.	1. Use Device Manager to remove or uninstall the device in question. 2. Restart the workstation and let Windows detect the device.
Recording audio CDs is difficult or impossible.	Wrong or poor quality media type.	1. Try using a slower recording speed. 2. Verify that you are using the correct media for the drive. 3. Try a different brand of media. Quality varies widely between manufacturers.

5.6.15 solving DiskOnKey problems

solving DiskOnKey problems

problem	cause	solution
DiskOnKey is not seen as a drive letter in Windows XP.	The drive letter after the last physical drive is not available.	Change the default drive letter for the DiskOnKey in Windows XP.
The workstation boots to DOS after making a bootable DiskOnKey.	DiskOnKey is bootable.	Install the DiskOnKey after the operating system boots.

5.6.16 solving Internet access problems

solving internet access problems

problem	cause	solution
Unable to connect to the Internet.	Internet Service Provider (ISP) account is not set up properly.	Verify Internet settings or contact the ISP for assistance.
	Modem is not set up properly.	Reconnect the modem. Verify the connections are correct using the quick setup documentation.
	Web browser is not set up properly.	Verify that the Web browser is installed and set up to work with your ISP.
	Cable/ DSL modem is not plugged in.	Plug in cable/DSL modem. You should see a "power" LED light on the front of the cable/DSL modem.
	Cable/DSL service is not available or has been interrupted due to bad weather.	Try connecting to the Internet at a later time or contact your ISP. (If the cable/DSL service is connected, the "cable" LED light on the front of the cable/DSL modem will be on.)
	The CAT5 10/100 cable is disconnected.	Connect the CAT5 10/100 cable between the cable modem and the workstations's RJ-45 connector. (If the connection is good, the "PC" LED light on the front of the cable/DSL modem will be on.)
	IP address is not configured properly.	Contact the ISP for the correct IP address.
	Cookies are corrupted.	*Windows 2000* 1. Select Start > Settings > Control Panel. 2. Double-click Internet Options. 3. On the General tab, click the Delete Cookies button. *Windows XP* 1. Select Start > Control Panel. 2. Double-click Internet Options. 3. On the General tab, click the Delete Cookies button.
Cannot automatically launch Internet programs.	You must log on to the ISP before some programs will start.	Log on to the ISP and launch the desired program.

solving internet access problems *(continued)*

problem	cause	solution
Internet takes too long to download Web sites.	Modem is not set up properly.	Verify that the correct modem speed and COM port are selected.
		For Windows 2000
		Select Start > Settings > Control Panel.
		Continue with step #2.
		For Windows XP
		1. Select Start > Control Panel.
		Continue with step #2.
		2. Double-click System.
		3. Click the Hardware tab.
		4. In the Device Manager area, click the Device Manager button.
		5. Double-click Ports (COM & LPT).
		6. Right-click the COM port your modem uses, then click Properties.
		7. Under Device status, verify that the modem is working properly.
		8. Under Device usage, verify the modem is enabled.
		9. If there are further problems, click the Troubleshoot button and follow the on-screen instructions.

5.7 Power-On Self-Test (POST) and error messages

POST is a series of diagnostic tests that runs automatically when the system is turned on. An audible and/or visual message occurs if the POST encounters a problem. POST checks the following items to ensure that the workstation system is functioning properly:

- Keyboard
- Memory modules
- Diskette drives
- All IDE and SCSI mass storage devices
- Processors
- Controllers

NOTE: If the Power-On Password is set, a key icon appears on the screen while POST is running. You will need to enter the password before continuing.

POST error messages

screen message	probable cause	recommended action
101-Option ROM Error	System ROM checksum.	Verify the correct ROM. Flash the ROM if needed. If an expansion card was recently added, remove it and see if the problem remains. Clear CMOS. If the message disappears, there may be a problem with the expansion card. Replace the system board.
102-System Board Failure	DMA, timers, etc.	Clear CMOS. Remove expansion boards. Replace the system board.
103-System Board Failure	DMA, timers, etc.	Clear CMOS. Remove expansion boards. Replace the system board.
110-Out of Memory for Option ROMs	Option ROM for a device was unable to run due to memory constraints.	Run Computer Setup and enable the ACPO/USB Buffers @ Top of Memory under the Advanced > Power-On option.
150-SafePost Active	A PCI expansion card is not responding.	Restart the workstation. Disable SafePost. If the expansion card does not respond, replace the card.

POST error messages *(continued)*

screen message	probable cause	recommended action
162-System Options Not Set	Configuration incorrect. RTC (real-time clock) battery may need to be replaced.	Run Computer Setup (F10 Setup). Set the date and time under Control Panel or in F10 Setup depending on the operating system. If the problem persists, replace the RTC battery.
163-Time & Date Not Set	Invalid time or date in configuration memory. RTC (real-time clock) battery may need to be replaced. CMOS jumper may not be properly installed.	Set the date and time under Control Panel or in F10 Setup depending on the operating system. If the problem persists, replace the RTC battery.
164-Memory Size Error	Memory configuration is incorrect.	Run Computer Setup (F10 Setup) or Windows utilities. Make sure memory module(s) (if any) are installed properly. If third party memory has been added, test using HP-only memory. Verify proper memory module type.
183-Invalid Processor Jumper Setting	System board jumper improperly set.	Reset system board jumpers to match processor and bus speeds (select models).
201-Memory Error	RAM failure.	Run Computer Setup (F10 Setup) or Windows utilities. Ensure memory and continuity modules are installed correctly. Verify proper memory module type. Remove and replace memory module(s) one at a time to isolate faulty module. Replace the faulty memory module(s). If error persists after replacing memory modules, replace the system board.
202-Memory Type Mismatch	Memory modules do not match each other.	Replace memory modules with matched sets.
207-ECC Corrected Single Bit Errors in Memory Socket(s) y,y	Single Bit ECC error.	Verify proper memory module type. Try another memory socket. Replace memory module if problem persists.
212-Failed Processor	Processor has failed to initialize.	Reseat the processor in its socket. If the processor does not respond, replace it.

POST error messages *(continued)*

screen message	probable cause	recommended action
213-Incompatible memory Module in memory Socket(s) X,X, X	A memory module in memory socket identified in the error message is missing critical SPD information, or is incompatible with the chipset.	Verify proper memory module type. Try another memory socket. Replace memory with a module conforming to the SPD standard.
214-DIMM Configuration Warning	DIMMs not installed correctly (not paired correctly).	Refer to the " memory" section of Chapter 4 for the correct memory configurations and reseat the DIMMs accordingly.
301-Keyboard Error	Keyboard failure.	Reconnect keyboard with workstation turned off. Check connector for bent or missing pins. Ensure that none of the keys are depressed. Replace keyboard.
303-Keyboard Controller Error	I/O board keyboard controller.	Reconnect keyboard with workstation turned off. Replace the system board.
304-Keyboard or System Unit Error	Keyboard failure.	Reconnect the keyboard with workstation turned off. Ensure that none of the keys are depressed. Replace keyboard. Replace system board.
401-Parallel Port 1 Address Assignment Conflict	IRQ address conflicts with another device.	Reset the IRQ.
402-Parallel Port 2 Address Assignment Conflict	IRQ address conflicts with another device.	Reset the IRQ.
403-Parallel Port 3 Address Assignment Conflict	IRQ address conflicts with another device.	Reset the IRQ.
404-Parallel Port Address Conflict Detected	Both external and internal ports are assigned to parallel port X.	Remove any parallel expansion cards. Clear CMOS. Reconfigure card resources and/or run Computer Setup (F10 Setup).
410-Audio Interrupt Conflict	IRQ address conflicts with another device.	Reset the IRQ.
411-Network Interface Card Interrupt Conflict	IRQ address conflicts with another device.	Reset the IRQ.

POST error messages *(continued)*

screen message	probable cause	recommended action
501-Display Adapter Failure	Graphics display controller.	Reseat the graphics card (if applicable). Clear CMOS. Verify that the monitor is attached and turned on. Replace the graphics controller.
510-Splash Screen image corrupted	Splash Screen image has errors.	Install latest version of ROMPaq to restore image.
511-CPU, CPUA, or CPUB Fan not detected	Fan is not connected or may have malfunctioned.	Reseat fan cable. Reseat the fan. Replace the fan.
512-Chassis, rear chassis, or front chassis fan not detected	Fan is not connected, may have malfunctioned.	Reseat chassis, rear chassis, or front chassis fan cable. Reseat chassis, rear chassis, or front chassis fan. Replace chassis, rear chassis, or front chassis fan.
514-CPU or Chassis Fan not detected.	CPU fan is not connected or may have malfunctioned.	Reseat CPU or chassis fan. Replace CPU or chassis fan.
601-Diskette Controller Error	Diskette controller circuitry or diskette drive circuitry incorrect.	Run Computer Setup (F10 Setup). Check and/or replace cables. Clear CMOS. Replace diskette drive. Replace the system board.
602-Diskette Boot Record Error	Diskette in drive A not bootable.	Replace the diskette.
605-Diskette Drive Type Error	Mismatch in drive type.	Run Computer Setup (F10 Setup). Disconnect any other diskette controller devices (tape drives). Clear CMOS.
610-External Storage Device Failure	External tape drive not connected.	Reinstall tape drive or press **F1** and allow system to reconfigure without the drive.
611-Primary Diskette Port Address Assignment Conflict	Configuration error.	Run Computer Setup (F10 Setup). Remove expansion cards. Clear CMOS.
612-Secondary Diskette Port Address Assignment Conflict	Configuration error.	Run Computer Setup (F10 Setup). Remove expansion cards. Clear CMOS.

POST error messages *(continued)*

screen message	probable cause	recommended action
660-Display Cache is Detected Unreliable	Integrated video controller display cache not working properly and will be disabled.	Replace system board if minimal video degrading is an issue.
912-Computer Cover Has Been Removed Since Last System Start Up		No action required.
914-Hood Lock Coil is not Connected	Solenoid hood cover lock mechanism is missing or not connected.	Reconnect or replace hood locking mechanism. Reseat or replace hood locking mechanism cable.
916-Thermal Sensor from Processor Heatsink is not Connected.	Processor heatsink cable not connected to system board.	Reseat or replace the processor heatsink cable going to the system board.
917-Expansion Riser not Detected	Riser board not seated or not installed.	Install riser board if missing or remove and reseat to ensure good connection.
919-Front Panel, MultiPort risers not Detected.	Riser card has been removed or has not been reinstalled properly in the system.	Unplug workstation and install/reinstall riser cord.
1151-Serial Port 1 Address Conflict Detected	Both external and internal serial ports are assigned to COM1.	Remove any Comm port expansion cards. Clear CMOS. Reconfigure card resources and/or run Computer Setup (F10 Setup). Run Computer Setup or Windows utilities.
1152-Serial Port 2 Address Conflict Detected	Both external and internal serial ports are assigned to COM2.	Remove any Comm port expansion cards. Clear CMOS. Reconfigure card resources and/or run Computer Setup (F10 Setup). Run Computer Setup or Windows utilities.
1155-Serial Port Address Conflict Detected	Both external and internal serial ports are assigned to same IRQ.	Remove any Comm port expansion cards. Clear CMOS. Reconfigure card resources and/or run Computer Setup (F10 Setup). Run Computer Setup or Windows utilities.
1201-System Audio Address Conflict Detected	Device IRQ address conflicts with another device.	Reset the IRQ.
1202-MIDI Port Address Conflict Detected	Device IRQ address conflicts with another device.	Reset the IRQ.
1203-Game Port Address Conflict Detected	Device IRQ address conflicts with another device.	Reset the IRQ

POST error messages *(continued)*

screen message	probable cause	recommended action
1720 SMART Hard Drive Detect Imminent Failure	Hard drive is about to fail. (Some hard drives have a firmware patch that will fix an erroneous error message.)	Determine if hard drive is giving correct error message. Run the Drive Protection System test if applicable. Apply firmware patch if applicable. (see www.hp.com/support) Back up contents and replace hard drive.
1782-Disk Controller Failure	Hard drive circuitry error.	Run Computer Setup (F10 Setup). Clear CMOS. Check cable seating/jumper settings. Run hard drive diagnostics. Disconnect additional drives. Run the Drive Protection System test if available. Check www.hp.com\support\ techpubs\customer_advisories for possible changes when using Windows NT4.0 Service Pack 4. Replace the hard drive. Replace the system board.
1793-Secondary Controller or Disk Failure	Hard drive circuitry error.	Run Computer Setup (F10 Setup). Clear CMOS. Check cable seating/jumper settings. Run hard drive diagnostics. Disconnect additional drives. Run the Drive Protection System test if available. Replace the hard drive.
1800-Temperature Alert	Internal temperature exceeds specification.	Check that workstation air vents are not blocked and cooling fan is running. Verify processor speed selection. Replace the processor. Replace the system board.
1801-Microcode Patch Error	Processor not supported by ROM BIOS.	Upgrade BIOS to proper version.
1998-Master Boot Record has been lost.	The previously saved copy of the MBR has been corrupted.	Run Computer Setup and save the MBR of the current bootable disk.

POST error messages *(continued)*

screen message	probable cause	recommended action
1998-Master Boot Record has been changed.	The current MBR does not match the previously saved copy of the MBR.	Use extreme caution, The MBR may have been updated due to normal disk maintenance activities (disk manager, fdisk, or format). Replacing the previously saved MBR in such situations can cause data loss. If certain that the MBR change is unintentional and undesired (e.g. due to a virus), run Computer Setup and restore the previously saved MBR copy. Otherwise, run Computer Setup and either disable MBR security or save the MBR of the current bootable disk.
2000-Master Boot Record Hard Drive has Changed.	The current bootable hard drive is not the same as the one that was present when MBR security was enabled.	Run Computer Setup and either disable MBR security or save the MBR of the current bootable disk.
Invalid Electronic Serial Number.	Electronic serial number has become corrupted.	Run Computer Setup. If Setup already has data in the field or will not allow the serial number to be entered, download from http://www.hp.com and run SP5572.EXE (SNZERO.EXE). Run Computer Setup and try to enter serial number under Security, System ID, then save changes.
ECC Multiple Bit Error Detected in Memory Module.	Chipset has detected more than one bad bit in a 64-bit quadword of the memory array.	Replace the memory module.
Parity Check 2.	Parity RAM failure.	Run Computer Setup and Diagnostic utilities.

5.8 Remote Diagnostics Enabling Agent

This utility provides a Web browser interface to Diagnostics for Windows. It enables remote control of the diagnostics and facilitates easy transfer of workstation information from remote machines to a service provider.

The Remote Diagnostics Enabling Agent captures hardware configuration and provides the ability to perform tests remotely to diagnose workstation problems. In addition, the Remote Diagnostics Enabling Agent identifies any workstation hardware device problems signaled by the HP Management Agents. These hardware devices are automatically selected for testing by the Remote Diagnostics Enabling Agent.

NOTE: The Remote Diagnostics Enabling Agent only works if Diagnostics for Windows is also installed.

The Remote Diagnostics Enabling Agent is pre-loaded on some workstations and is available through a SoftPaq at http://www.hp.com under Support and Drivers.

5.8.1 installing or upgrading Remote Diagnostics Enabling Agent

1. Visit http://www.hp.com/support/files and click on the applicable product.
2. Locate the appropriate software and download the latest version.
3. Execute the downloaded file. If you are upgrading an existing version, select Repair for the new version to overwrite the old version.

5.8.2 running the Remote Diagnostics Enabling Agent

Select the **Remote Diagnostics** icon located in the Control Panel.

NOTE: The Remote Diagnostics Enabling Agent allows you to run Diagnostic Test or the Configuration Record in a browser window. Both of these utilities can be run remotely or locally.

To exit Remote Diagnostics, click File and then click Close.

A

Ultra ATA drive guidelines and features

Ultra ATA jumpers

Ultra ATA drives are configured by means of jumper settings. Factory-installed drives ship with the jumpers preset to the cable-select mode; therefore, no jumper setting changes are required on factory preinstalled, replacement, or option drives. With cable-select, the drive is configured as either Master (Drive/Device 0) or Slave (Drive/Device 1) by its physical attachment to the cable.

If you purchase a third-party hard drive, refer to the documentation included with the drive kit to ensure proper cable installation and configuration.

NOTE: All drives on a controller channel need to have their jumpers either in the cable-select mode or have the individual drive jumper installed on the appropriate Master (Drive/Device 0) or Slave (Drive/Device 1) position.

Ultra ATA cables

When installing a second device on either the primary or secondary controller, you must use an industry standard 80-conductor Ultra ATA cable for optimal performance. These cables have a maximum length of 18 inches and a maximum distance of 6 inches between the two devices for a two-drive cable.

Drives operating at speeds faster than those of the Ultra ATA-33 devices require industry-standard 40-pin, 80-conductor cables to maintain the higher data transfer rates possible with the improved technology.

When using Ultra ATA-133, -100, -66, and slower -33 drives in the same system, each drive will operate at its appropriate data transfer rate.

cable layout

The faces of industry-standard cable connectors are color coded for easy recognition:
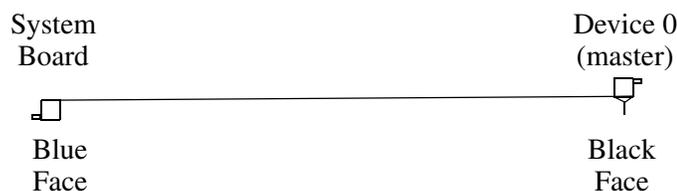
■ System board connector = blue face

■ Device 0 connector = black face

■ Device 1 connector = gray face

NOTE: The color code of an industry-standard cable is valid only if the drive's jumper is in the cable-select position.

single-drive cable

System Board   Device 0 (master)

Blue Face   Black Face

two-drive cable

System Board   Device 1 (slave)   Device 0 (master)

Blue Face   Gray Face   Black Face
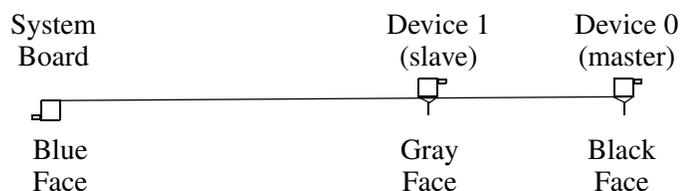
On a two-drive cable, the Drive/Device 0 connector is always the farthest one from the system board connector and the Drive/Device 1 connector is always the closest to the system board connector.

NOTE: Some cables may be labeled "Drive 0" instead of "Device 0" and "Drive 1" instead of "Device 1".

drive installation guidelines

Most workstation system boards have two ATA (IDE) controller channels with a dedicated connector for each controller. One controller is designated as the primary and the other as the secondary controller.

Each of the two controllers can have up to two devices attached to it. Each workstation system may therefore have a maximum of four ATA/ATAPI drives. All drives are connected to these controllers using an industry-standard 80-conductor cable.

NOTE: The industry standard 1.44 MB diskette drive has its own separate channel and is not included as a part of the maximum four drives.

Any drive attached to a controller must have a drive designation. If only a single drive is connected to a controller and its jumper is in the cable-select position, it is designated as the Master Drive (Drive/Device 0) by its attachment to the Drive/Device 0 cable position. If two cable-selected drives are connected to a single controller, one will be designated by its attachment to the cable as the Master (Drive/Device 0) and the other as Slave (Drive/Device 1).

For optimal performance of a workstation system, all drives need to be attached to the ATA controllers in a specified sequence. This sequence is determined by the device class of the drives and by specific attach sequence rules.

device classes

In order to determine the best drive attach sequence, ATA/ATAPI drives are segregated into four different classes based upon the bandwidth demands they place on an ATA controller. The most demanding devices are in Class 1 and the least demanding are in Class 4.

class 1 hard drives	class 2 high speed optical drives	class 3 optical storage drives	class 4 magnetic storage drives
ATA-100	DVD	R/W CD-ROM	LS-120
ATA-66	DVD-CD R/W	CD-ROM	Tape
ATA-33			Zip

general attach guidelines

■ The lower the device class number, the faster the device and the more bandwidth required.

■ Drives installed in the Device 0 positions on both the primary and secondary controllers receive the greatest possible bandwidth.

■ The bootable ATA hard drive should always be installed on the primary controller in the Device 0 position.

attach sequence rules by class priority

Drives should be attached in the sequence shown for optimum performance starting at position ❶.
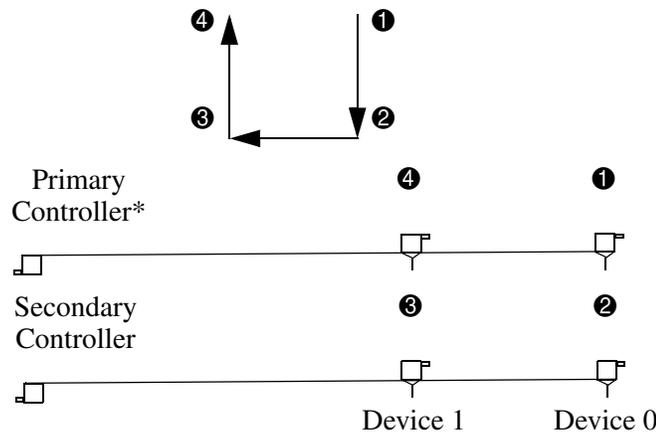
*If there are three or more devices, two or more of which are hard drives, two hard drives should be attached to the primary controller first before following the General Attach Sequence Rule.

The attach sequence rule may also be stated in table format:

general attach sequence rule*	
sequence	**description**
1	The lowest class drive – bootable hard drive recommended.
2	If only two drives, the last drive goes here; otherwise the lowest class of the remaining drives.
3	If only three drives, attach the final drive here. If a fourth drive exists, attach the lowest class drive here.
4	If there is a fourth drive, attach the final drive here - the drive with the highest class number of all devices.

*If there are three or more devices, two or more of which are hard drives, two hard drives should be attached to the primary controller first before following the General Attach Sequence Rule.

The rules allow for:

■ Keeping the hard drive on a separate controller channel maximizes drive performance until a fourth device is added.

■ Keeping the hard drives and removable media drives on separate controller channels maximizes compatibility.

■ Keeping the hard drive and the writable optical drive on separate controller channels maximizes optical drive reliability.

attach sequence worksheet

Use the worksheet below for obtaining optimum system performance when setting up a workstation with multiple drives. Use the General Attach Sequence Rule to determine the best drive installation sequence.

attach sequence worksheet				
device name	**device class**	**position number**	**controller name**	**device number**

Two examples of how to use the worksheet are:

■ Three device installation

■ Four device installation

example 1: three device installation sample

A system has three devices: Ultra ATA-100 hard drive, CD-ROM drive, and a DVD drive. Using the Device Class Table in Section 4.3.1, the devices may be identified as:

■ Ultra ATA-100 hard drive = Class 1

■ DVD drive = Class 2

■ CD-ROM drive = Class 3

attach sequence worksheet – three device installation (sample)

device name	device class	position number	controller name	device number
Ultra ATA-100 hard drive	1	❶	Primary	0
DVD drive	2	❷	Secondary	0
CD-ROM drive	3	❸	Secondary	1
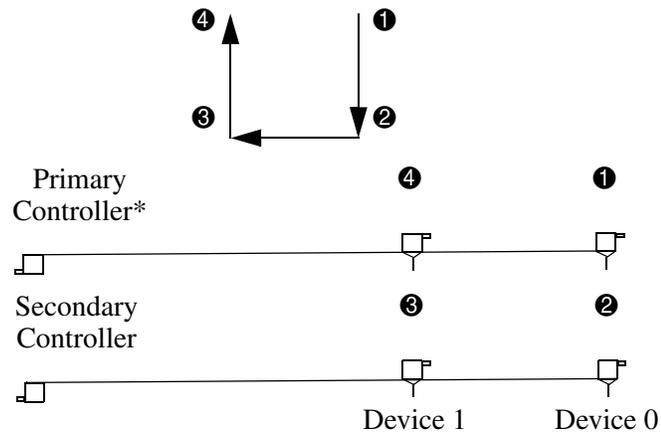
example 2: four device installation sample

A system has four devices: Ultra ATA-100 hard drive, Ultra ATA-100 hard drive, DVD-CDR/W drive, and a ZIP-250 drive. Using the Device Class Table in Section 4.3.1, the devices may be reidentified as:

■ Ultra ATA-100 hard drive = Class 1

■ Ultra ATA-100 hard drive = Class 1

■ DVD-CDR/W drive = Class 2

■ ZIP-250 drive = Class 4

attach sequence worksheet – four device installation (sample)

device name	device class	position number	controller name	device number
Ultra ATA-100 hard drive	1	❶	Primary	0
DVD-CDR/W drive	2	❷	Secondary	0
ZIP-250 drive	4	❸	Secondary	1
Ultra ATA-100 hard drive*	1	❹	Primary	1

*If there are three or more devices, two or more of which are hard drives, two hard drives should be attached to the primary controller first before following the General Attach Sequence Rule.
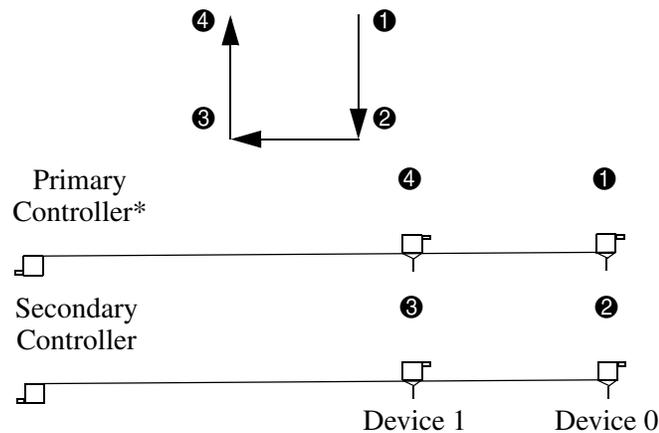
additional drive application notes

■ When replacing a hard drive, the replacement should be of the same type (Ultra ATA -33, -66, or -100) as that being removed to retain the same level of performance.

■ When Ultra ATA and SCSI hard drives are mixed in the same system, the Ultra ATA drive will become the boot drive unless the boot order is changed in Computer Setup (F10).

SMART

The Self Monitoring Analysis and Recording Technology (SMART) ATA drives for HP workstations have built-in drive failure prediction that warns the user or network administrator of an impending failure or crash of the hard drive. The SMART drive tracks fault prediction and failure indication parameters such as reallocated sector count, spin retry count, and calibration retry count. If the drive determines that a failure is imminent, it generates a fault alert.

jumpers

The specifications included below are the standard drive configurations.

CD-ROM or DVD-ROM drive

Zip drive

Default
Settings

Jumper Setting
for Cable Select
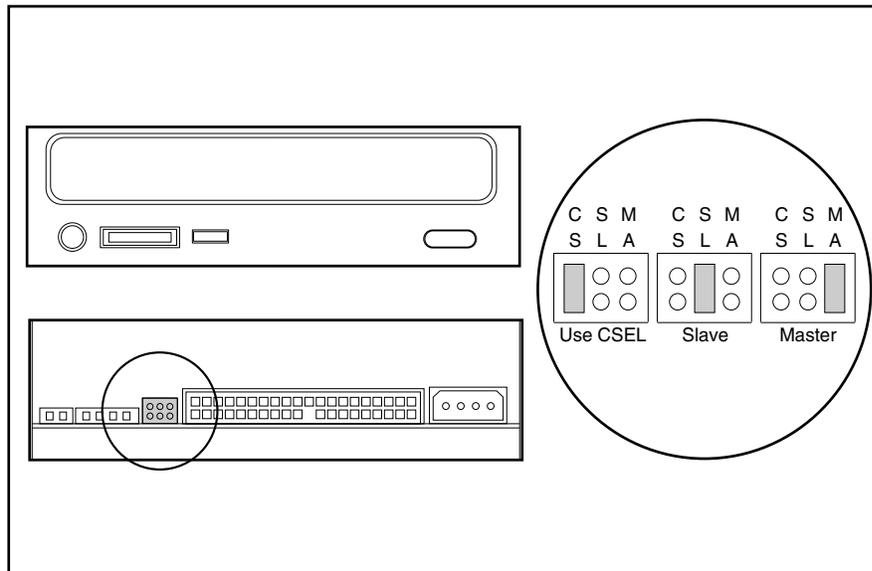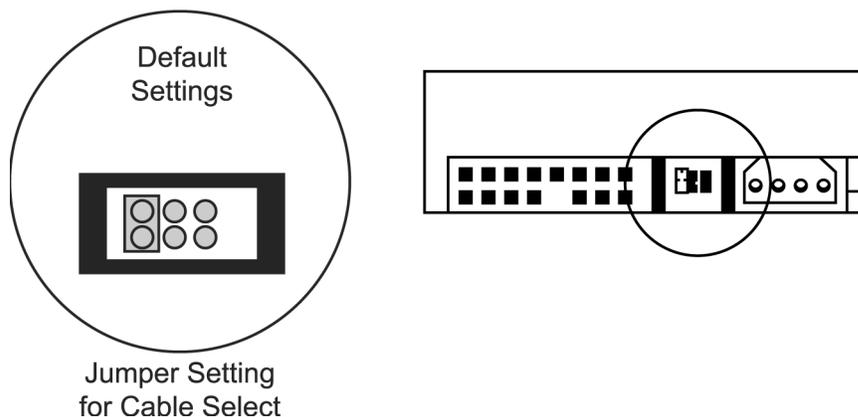
jumper settings

configuration	pair 1	pair 2	pair 3
Device 0 (Master)			jumper
Device 1 (Slave)			
Cable Select (Default)	jumper		

NOTE: After changing the jumper settings, reboot the workstation to recognize the new address.

drive capacities

The combination of the file system and the operating system used in the workstation determines the maximum usable size of a drive partition. A drive partition is the largest segment of a drive that may be properly accessed by the operating system. A single hard drive may therefore be subdivided into a number of unique drive partitions in order to make use of all of its space.

The table that follows identifies the capabilities and restrictions imposed on the workstation by the combinations of file and operating systems.

microsoft to drive manufacturer size conversion table*

drive size as identified by microsoft operating system	drive size as identified by drive manufacturers
2 GB	2.1 GB
4 GB	4.3 GB
32 GB	34.4 GB

*Drive size calculations by drive manufacturers are bytes to the base 10 while calculations by Microsoft are bytes to the base 2.

microsoft to drive manufacturer size conversion table*

drive size as identified by microsoft operating system	drive size as identified by drive manufacturers
64 GB	68.7 GB
128 GB	137 GB
2 TB	2.199 TB

*Drive size calculations by drive manufacturers are bytes to the base 10 while calculations by Microsoft are bytes to the base 2.

drive/partition capacity limits

file system	controller type	operating system	maximum size	
			partition	drive
FAT 32	ATA	Windows 2000/ XP	32 GB	128 GB
FAT 32	SCSI	Windows 2000/ XP	32 GB	2 TB
NTFS	ATA	Windows 2000/XP	128 GB	128 GB
NTFS	SCSI	Windows 2000/XP	2TB	2TB

B

SCSI Devices

SCSI guidelines

NOTE: These systems support a mixed configuration of UATA/IDE and SCSI hard drives. In a mixed configuration the UATA/IDE drive must be specified as the boot drive.

When installing and operating SCSI devices, you must follow these guidelines:

■ A narrow (50-pin) SCSI controller allows you to daisy-chain up to 7 additional SCSI devices. Counting the controller, that amounts to 8 total SCSI devices.

■ A wide (68-pin) SCSI controller allows you to daisy-chain up to 15 additional SCSI devices. Counting the controller, that amounts to 16 total SCSI devices.

■ If two narrow (50-pin) SCSI controllers are each connected to separate system board SCSI connectors, each controller may have seven SCSI devices attached. Counting the controller, this gives a total of 16 SCSI devices on the system.

■ HP does not recommend mixing different width SCSI devices on the same SCSI chain or on the same SCSI channel. Mixing devices of different widths on the same chain or channel will always result in a data transfer rate of the slowest machine in that chain. The only exception to this is that Ultra Wide SCSI devices will cause a speed degradation when mixed with other 68-pin devices.

■ If multiple SCSI devices are used, split the devices between Channels A and B for optimum performance. Cable length for the second channel should not be longer than 18 inches.

■ If two controllers are used, each may use SCSI devices having widths and speeds different from the other. If a 68-pin data cable is used on a controller having 50-pin SCSI devices, use an internal cable adapter or an external cable adapter.

$\triangle$ **CAUTION:** Do not route data cables near the air intake to the power supply. Cables routed in this manner may block the airflow and cause the workstation to overheat.

■ All SCSI controllers require a unique SCSI ID (0-7 or 8-15) for each SCSI device installed. The controller identifies a SCSI device by its SCSI ID number rather than its location. Moving a SCSI device from one position to another on the SCSI chain does not affect communication between the controller and the device. The reserved and available SCSI ID numbers for SCSI devices are:

   ❏ 0 is reserved for the primary hard drive.

   ❏ 7 is reserved for the SCSI controller.

   ❏ 1 through 6 and 8 through 15 are available for all other SCSI devices.

■ 68-pin SCSI controllers require a 53 inch maximum length-twisted pair, LVD cable with built-in terminator, maximum of 5 drives with a minimum driving spacing of 5.25 inches.

■ Every SCSI chain or circuit must be terminated (closed) at both ends. Some system boards have both ends of the SCSI cable connected to, and terminated by, the system board. Termination can be accomplished in one of several ways:

❏ Use a cable with a built-in terminator.

❏ Use a cable with a terminating resistor plug in the last connector.

❏ Connect a SCSI device with its termination enabled into the last connector.

❏ Connect an external SCSI device with its termination enabled to the external SCSI connector on the rear panel of the workstation.

■ Turn on all external SCSI devices before turning on the power to the workstation. This enables the SCSI controller to recognize the external devices.

using the Multi-Mode SCSI cable

Some products ship standard with a multi-mode SCSI cable having a terminator ❶ on one end. This cable supports both low voltage differential (LVD) and single ended (SE) devices. One end of the cable connects to the internal LVD/SE connector on the system board, with the remaining connectors used on the hard drives.
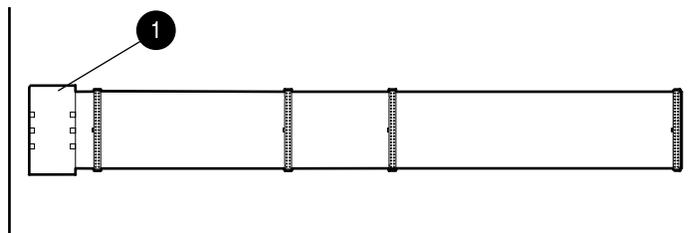
NOTE: The multi-mode cable included with the workstation may differ from the one pictured.

For additional information about installing optional SCSI devices, refer to the documentation included with the device option kit.

using SCSI*Select* with SCSI devices

The Ultra160 and faster SCSI host adapters include the SCSI*Select* utility to configure the host adapter and to run the SCSI disk utilities. To run the SCSI*Select* utility:

■ In POST Messages Enabled mode: Press **Ctrl**+**A** when the "Press<Ctrl><A> for SCSI*Select* Utility" message appears during POST.

■ In POST Messages Disabled mode: When the HP logo screen appears, press any key to exit the logo screen. Immediately after exiting the logo screen, press **Ctrl**+**A** to access the SCSI*Select* utility.

A menu appears with the following options:

■ Configure/View Host Adapter Settings

  ❏ SCSI Bus Interface Definitions

    ◆ Host Adapter SCSI ID

    ◆ SCSI Parity Checking

    ◆ Host Adapter SCSI Termination

  ❏ Additional Options

    ◆ Boot Device Options

    ◆ SCSI Device Configuration

    ◆ Advanced Configuration Options

■ SCSI Disk Utilities

  ❏ Lists all SCSI devices and SCSI ID numbers

NOTE: For additional information about configuring POST message display status, refer to the "Computer Setup menu" section in this guide.

SMART

The Self Monitoring Analysis and Reporting Technology (SMART) IDE and SCSI hard drives for HP workstations have built-in drive failure prediction that warns the user or the network administrator of an impending failure or crash of the hard drive. SMART drives track fault prediction and failure indication parameters such as re-allocated sector count, spin retry count, and calibration retry count. If the drive determines that a failure is imminent, it generates a fault alert.

jumpers

The specifications included below are the standard drive configurations.

U320 SCSI hard drive
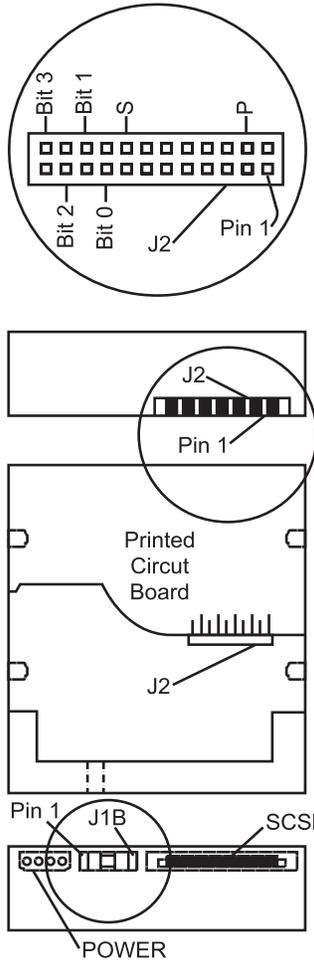
SCSI ID settings

SCSI ID	bit 2	bit 1	bit 0
0			
1			jumper
2		jumper	
3		jumper	jumper
4	jumper		
5	jumper		jumper
6	jumper	jumper	

default settings

signal	description	jumper
S	Start unit command enabled	
P	Parity enabled	jumper
W	Write protect disabled	
X	Switch data transfer enabled	jumper

1. Drive intended only for non-pluggable applications. Migration to a hot-pluggable drive tray is not supported.
2. All jumper and switch settings shown in the factory default setting, including those not labeled.
3. Termination is disabled/removed.

NOTE: After changing the jumper settings, reboot the workstation to recognize the new address.

C

SATA Devices

SATA guidelines

NOTE: These systems support a mixed configuration of UATA/IDE, SCSI, and SATA hard drives. Review the following diagram and table to determine the correct drive configuration for your system.

When installing and operating SATA devices, you must follow these guidelines:

■ Use the SATA data cables with the 90 degree connector (326965-001) for the hard drive bays. The 90 degree connector goes to the hard drive.

■ Use the longest data cable with the straight connectors (326965-002) if installing a hard drive in an optical bay.

■ Connect the 4-2 pin LED cable (225537-001, included with SATA RAID controller kit) from the RAID card header "JP1" (4 pin header) to the system board header labeled "SCSI LED" (2 pin header).

△ **CAUTION:** Do not route data cables near the air intake to the power supply. Cables routed in this manner may block the airflow and cause the workstation to overheat.

boot order

The following flow diagram shows the boot order of hard drives (C:) connected to the different controllers in the workstation system.

Integrated IDE (Default) — First Controller — Yes → Bootable — Yes → Boot to the OS in the Logical or Physical drive attached to the Controller

No

Integrated SATA (Default) — Second Controller — Yes → Bootable — Yes → Boot to the OS in the Logical or Physical drive attached to the Controller

No

Xth Controller — Yes → Bootable — Yes → Boot to the OS in the Logical or Physical drive attached to the Controller

Xth Controller — Yes → Bootable — Yes → Boot to the OS in the Logical or Physical drive attached to the Controller

No

Last Controller — Yes → Bootable — Yes → Boot to the OS in the Logical or Physical drive attached to the Controller

No

You can modify the boot order in the Computer Setup Utility by arranging the Controller Order on the Storage tab.

The diagram does not show other bootable device options such as a diskette, CD-ROM, USB, network, and so on. In the Computer Setup Utility, you can arrange the boot order on the Storage tab.

hard drive configurations

The following table presents common physical hard drive configurations for the HP workstation xw4100. Many other possible different configurations are not listed in the table, but for optimal performance and disk space usage, the following configurations are recommended.

First Hard Drive Bay	Second Hard Drive Bay	Third Hard Drive at Optical Bay
IDE/SATA/SCSI (plug in Controller)	empty	empty
IDE/SATA/SCSI (plug in Controller)	IDE	empty
IDE/SATA/SCSI (plug in Controller)	IDE	IDE
IDE/SATA/SCSI (plug in Controller)	SATA	empty
IDE/SATA/SCSI (plug in Controller)	SATA	SATA
IDE/SATA/SCSI (plug in Controller)	SATA (plug-in Controller)*	SATA (plug-in Controller)*
IDE/SATA/SCSI (plug in Controller)**	SCSI (plug-in Controller)**	empty
IDE/SATA/SCSI (plug in Controller)**	SCSI (plug-in Controller)**	SCSI (plug-in Controller)**
SCSI (plug-in Controller)**	SCSI (plug-in Controller)**	IDE
SCSI (plug-in Controller)**	SCSI (plug-in Controller)**	SATA
SATA (plug-in Controller)*	SATA (plug-in Controller)*	empty
SATA (plug-in Controller)*	SATA (plug-in Controller)*	SATA (plug-in Controller)*
SATA (plug-in Controller)*	SATA (plug-in Controller)*	IDE
SATA (plug-in Controller)*	SATA (plug-in Controller)*	SCSI (plug-in Controller)

*Part of logical hard drive in a RAID array.

** This could be part of logical hard drives in a RAID array or stand alone physical drive.

NOTE: The first hard drive bay is the recommended position for the drive containing the bootable OS.

For systems with bootable RAID array, the bootable logical drive can exist on multiple physical hard drives. SATA plug-in Controller is only recommended for RAID purposes.

D

system board and riser board reference designators

These reference designators are used on most but not all hp system and riser boards.

designator	component
BT1	Battery socket/Battery
CR1	LED - 3.3V Aux
CR2	LED - Power button press
CR3	LED - PS_ON (off), 5.5V Aux (on)
CR11	CPU reset LED
CR34	Power ON LED
CR35	Hard drive activity LED
E14	Boot block header/jumper
E49	Clear Password header/jumper
E50	Clear CMOS header
H5	RTC clock crystal/Tie-down
J6	BNC
J7	RJ-45 Jack
J8	IEEE 1394
J9	Stacked RJ45/Dual USB connector
J10 - 19	ISA slots
J20 - 29	PCI slots
J30	Riser board socket
J31 - J35	Device Bay connectors
J36	AC97 connector
J37	Primary SCSI connector
J38	Secondary SCSI connector
J39	Stacked parallel/SCSI connector
J40	AGP slot
J50	First parallel port
J51	Second parallel port
J52	Double-stacked parallel port
	Top Port B
	Bottom Port A
J53	Parallel port over single Serial Port
J54	Parallel port over Serial Port and Video Port
J55	Parallel port over dual VGA ports
J65	DVI connector
J66	Keyboard connector (Closest to power supply)
J67	Mouse connector

designator	**component** *(continued)*
J68	Double-stacked mouse/keyboard connector
	Top Mouse
	Bottom Keyboard
J69	Video connector
J70	Primary single USB connector
J71	Secondary single USB jack
J72	Microphone jack
J73	Line-in jack
J74	Line-out jack
J75	Headphone jack
J76	Volume control
J77	Double-stacked headphone/microphone connector
	Top Microphone
	Bottom Headphone
J78	Double-stacked line-in/line-out connector
	Top Line in
	Bottom Line out
J80	Stacked serial/audio connector
J81	Primary double-stack USB
	Top Port 2
	Bottom Port 1
J82	Secondary double-stack USB
	Top Port 4
	Bottom Port 3
J83	Triple-stacked audio jack (line in, line out/headphone, microphone)
J101	Security board connector for security card
J113	Video cache connector
JP49	Clear password header/jumper
L1	USB front port choke
L2	USB rear port choke (1st)
L3	USB rear port choke (2nd)
L4	USB rear port choke (3rd)
P1	P/S connector
P2	Second P/S connector (as required)
P3	VCCP 12V header
P5	Main Power/HDD LED connector
P6	Speaker connector
P7	Audio connector (from CD-ROM)
P8	Primary chassis fan connector
P9	Wake on LAN (WOL) connector (NIC cable)
P10	Diskette drive connector
P11	Second Audio connector
P12	Alert on LAN NIC connector
P15	AUI connector
P16	Fan command/fan sink header
P20	Primary IDE connector
P21	Secondary IDE connector

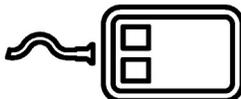| designator	component *(continued)*
P22	Slimline CD-ROM connector
P23	Header for front audio panel
P24	Header for front panel USB
P25 - P26	Video memory upgrade connector
P29	SCSI LED connector
P30	Primary serial ATA (SATA) port
P31	Secondary serial ATA (SATA) port
P50	Serial debug header
P52	Serial port header
P53	First serial port
P54	Second serial port
P55	Double stack serial port
	Top Serial B
	Bottom Serial A
P58	Riser edge connector (male-mates with J30)
P64	VSFF expansion connector
P65	Graphics option connector
P70	Primary (CPU) fan header for fansink
P71	Secondary CPU fan header for fansink
P89	Floating serial port /COM port header
P100	ITP connector
P101	Security card connector, system board
P120	Secondary chassis fan header
P124	Hood lock header
P125	Hood sensor header
P216	White box chassis fan
SW1	Processor speed switch
SW2	Security hood switch
SW50	Clear CMOS switch/push button
SW51	Power button switch
SW52	System reset switch
U15	ROM chip
U100	Security chip
XBT1	Battery socket
XMM1	Memory slot. DIMM1 or RIMM1 populated and tested
XMM2 - XMM5	Following memory slots
XU1	Primary processor socket Secondary processor socket
XU2	ROM socket
XU15	ROM socket
XU100	Security chip socket
Y1	Primary (TH) system clock crystal
Y2	Secondary (SMT) system clock crystal
Y3	Primary (YTH) NIC clock crystal
Y4	Secondary (SMT) NIC clock crystal
Y5	RTC clock crystal/tie-down

E

connector pin assignments

This appendix contains the pin assignments for many workstation connectors. Some of these connectors may not be used on the product being serviced.
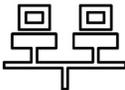
enhanced keyboard

connector and icon		pin	signal
		1	Data
		2	Unused
		3	Ground
		4	+5 VDC
		5	Clock
		6	Unused

mouse

connector and icon		pin	signal
		1	Data
		2	Unused
		3	Ground
		4	+5 VDC
		5	Clock
		6	Unused

Ethernet RJ-45

connector and icon		pin	signal
		1	(+) Transmit Data
		2	(-) Transmit Data
		3	(+) Receive Data
		4	Unused
		5	Unused
		6	(-) Receive Data
		7	Unused
		8	Unused

parallel interface

connector and icon
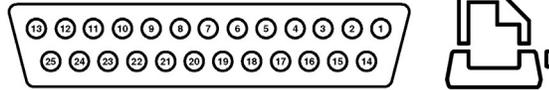
pin	signal	pin	signal	pin	signal
1	Strobe	7	Data Bit 5	13	Select
2	Data Bit 0	8	Data Bit 6	14	Auto Linefeed
3	Data Bit 1	9	Data Bit 7	15	Error
4	Data Bit 2	10	Acknowledge	16	Initialize Printer
5	Data Bit 3	11	Busy	17	Select IN
6	Data Bit 4	12	Paper End	18-25	Signal Ground

serial interface

connector and icon		pin	signal
		1	Carrier Detect
		2	Receive Data
		3	Transmit Data
		4	Data Terminal Ready
		5	Signal Ground
		6	Data Set Ready
		7	Request to Send
		8	Clear to Send
		9	Ring Indicator

USB

connector and icon		pin	signal
		1	+5 VDC
		2	- Data
		3	+ Data
		4	Ground

microphone
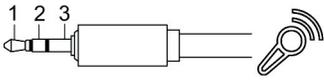
connector and icon (1/8")	pin	signal
	1 (Tip)	Audio
	2 (Ring)	Power
	3(Shield)	Ground

headphone
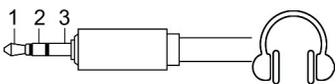
connector and icon (1/8")	pin	signal
	1 (Tip)	Audio_Left
	2 (Ring)	Audio_Right
	3(Shield)	Ground

line-in audio
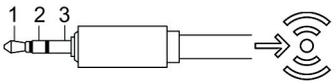
connector and icon (1/8")	pin	signal
	1 (Tip)	Audio_In_Left
	2 (Ring)	Audio_In_Right
	3(Shield)	Ground

line-out audio
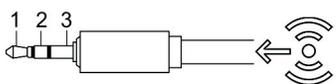
connector and icon (1/8")	pin	signal
	1 (Tip)	Audio_Out_Left
	2 (Ring)	Audio_Out_Right
	3(Shield)	Ground

Ultra SCSI

connector and icon
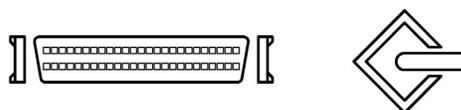
pin	signal	pin	signal	pin	signal	pin	signal
1-11	Ground	29	DB3	37	Reserved	45	RST #
12	Reserved	30	DB4	38	TERMPWR	46	MSG #
13	Open	31	DB5	39	Reserved	47	SEL #
14	Reserved	32	DB6	40	Ground	48	C/D
15-25	Ground	33	DB7	41	ATN #	49	REQ #
26	DB0	34	DBP	42	Ground	50	Input/Output
27	DB1	35	Ground	43	BSY #		
28	DB2	36	Ground	44	ACK #		

SATA

connector
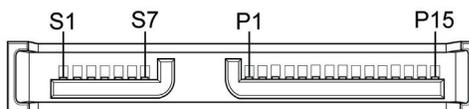
pin	usage	pin	usage	pin	signal
data cable		**power cable**		**power cable**	
S-1	Ground	P-1	3.3 V power	P-8	5 V power
S-2*	A+	P-2	3.3 V power	P-9	5 V power
S-3*	A-	P-3	3.3 V power	P-10	Ground
S-4	Ground	P-4	Ground	P-11	Reserved
S-5**	B-	P-5	Ground	P-12	Ground
S-6**	B+	P-6	Ground	P-13	12 V power
S-7	Ground	P-7	5 V power	P-14	12 V power
* S2 and S3 differential signal pair				P-15	12 V power
**S5 and S6 differential signal pair					

monitor

connector and icon
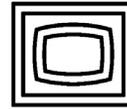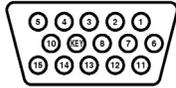
pin	signal	pin	signal	pin	signal
1	Red Analog	6	Ground	11	Monitor ID
2	Green Analog	7	Ground	12	DDC Serial Data
3	Blue Analog	8	Ground	13	Horizontal Sync
4	Monitor ID	9	+5V DC	14	Vertical Sync
5	Ground	10	Ground	15	DDC Serial Clock

NOTE: Monitor connectors may vary depending on your configuration.

ATA/ATAPI (IDE) standard drive cable

connector
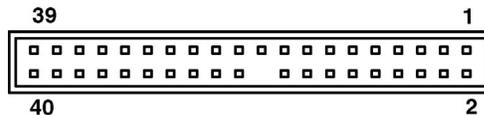
pin	signal	pin	signal	pin	signal
1	Reset	15	DD1	29	DMAK
2	Ground	16	DD14	30	Ground
3	DD7	17	DD0	31	INTRQ
4	DD8	18	DD15	32	IOCS16
5	DD6	19	Ground	33	DA1
6	DD9	20	(Key)	34	PDIAG (cable detect)
7	DD5	21	DMARQ	35	DA0
8	DD10	22	Ground	36	DA2
9	DD4	23	DIOW	37	CS1FX
10	DD11	24	Ground	38	CS3FX
11	DD3	25	DIOR	39	DASP
12	DD12	26	Ground	40	Ground
13	DD2	27	IORDY		
14	DD13	28	CSEL		

accelerated graphics port (AGP)

connector
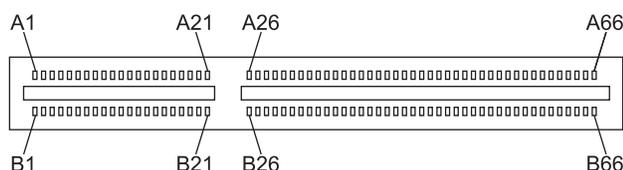
pin	signal A	signal B	pin	signal A	signal B
1	+12 V	OVRCNT#	34	Vddq	Vddq
2	TYPEDET#	+ 5V	35	AD22	AD21
3	Reserved	+ 5V	36	AD20	AD19
4	USB-	USB+	37	Ground	Ground
5	Ground	Ground	38	AD18	AD17
6	INTA#	INTB#	39	AD16	C/BE2#
7	RST#	CLK	40	Vddq	Vddq
8	GNT#	REQ#	41	FRAME#	IRDY#
9	VCC3.3	VCC3.3	42	Reserved	3.3VAux
10	ST1	ST0	43	Ground	Ground
11	Reserved	ST2	44	Reserved	Reserved
12	PIPE#	RBF#	45	VCC 3.3	VCC 3.3
13	Ground	Ground	46	TRDY#	DEVSEL#
14	WBF#	Reserved	47	STOP#	Vddq
15	SBA1	SBA0	48	PME#	PERR#
16	VCC 3.3	VCC 3.3	49	Ground	Ground
17	SBA3	SBA2	50	PAR	SERR#
18	SB_STB#	SB_STB	51	AD15	C/BE1#
19	Ground	Ground	52	Vddq	Vddq
20	SBA5	SBA4	53	AD13	AD14
21	SBA7	SBA6	54	AD11	AD12
22	Reserved	Reserved	55	Ground	Ground
23	Ground	Ground	56	AD9	AD10
24	Reserved	3.3 Vaux	57	C/BE0#	AD8
25	VCC 3.3	VCC 3.3	58	Vddq	Vddq
26	AD30	AD31	59	AD_STB0#	AD_STB0
27	AD28	AD29	60	AD6	AD7
28	VCC 3.3	VCC 3.3	61	Ground	Ground
29	AD26	AD27	62	AD4	AD5
30	AD24	AD25	63	AD2	AD3
31	Ground	Ground	64	Vddq	Vddq
32	AD_STB1#	AD_STB1	65	AD0	AD1
33	C/BE3#	AD23	66	VREFGC	VREFCG

20-pin power

connector
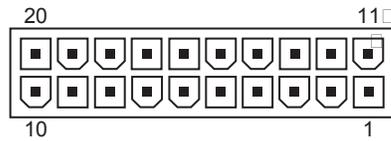
pin	signal	pin	signal	pin	signal	pin	signal
1	+3.3 V	6	+5 V	11	+3.3 V	16	GND
2	+3.3 V	7	GND	12	-12 V	17	GND
3	GND	8	POK	13	GND	18	open
4	+5 V	9	+5 Vaux	14	PSON	19	+5 V
5	GND	10	+12 V	15	GND	20	+5 V

4-pin power (for CPU)

connector and icon	pin	signal	
	1	GND	
	2	GND	
	3	+12 V	
	4	-12 V	

F

power cord set requirements

The power supply for this workstation has a power switch. This feature allows the workstation to be operated on an input voltage of 100-200V or 200-400V.

The power cord set (flexible cord or wall plug) received with this product meets the requirements for use in the country where you purchased the equipment.

If you need to obtain a power cord for a different country, you should purchase a power cord that is approved for use in that country.

The power cord must be rated for the product and for the voltage and current marked on the product's electrical ratings label. The voltage and current rating of the cord should be greater than the voltage and current rating marked on the product. In addition, the diameter of the wire must be a minimum of 0.75 mm^2 or 18AWG, and the length of the cord must be between 6 feet (1.8 m) and 12 feet (3.6 m). If you have questions about the type of power cord to use, contact the HP authorized service provider.

A power cord should be routed so that it is not likely to be walked on or pinched by items placed upon it or against it. Particular attention should be paid to the plug, electrical outlet, and the point where the cord exits from the product.

G

routine care

general cleaning safety precautions

1. Never use solvents or flammable solutions to clean the workstation.

2. Never immerse any parts in water or cleaning solutions; apply any liquids to a clean cloth and then use the cloth on the component.

3. Always unplug the workstation when cleaning with liquids or damp cloths.

4. Always unplug the workstation before cleaning the keyboard, mouse, or air vents.

5. Disconnect the keyboard before cleaning it.

6. Wear safety glasses equipped with side shields when cleaning the keyboard.

cleaning the workstation case

Follow all safety precautions stated earlier before cleaning the workstation.

To clean the workstation case, follow the procedures described below:

■ To remove light stains or dirt, use plain water with a clean, lint-free cloth or swab.

■ For stronger stains, use a mild dishwashing liquid diluted with water. Rinse well by wiping it with a cloth or swab dampened with clear water.

■ For stubborn stains, use isopropyl (rubbing) alcohol. No rinsing is needed as the alcohol will evaporate quickly and not leave a residue.

■ After cleaning, always wipe the unit with a clean, lint-free cloth.

■ Occasionally clean the air vents on the workstation. Lint and other foreign matter can block the vents and limit the airflow.

cleaning the keyboard

Follow all safety precautions stated earlier before cleaning the keyboard.

When cleaning debris from under the keys, review all rules in Section before following these procedures:

$\triangle$ **CAUTION:** Use safety glasses equipped with side shields before attempting to clean debris from under the keys.

- Visible debris underneath or between the keys may be removed by vacuuming or shaking.

- Canned, pressurized air may be used to clean debris from under the keys. Caution should be used as too much air pressure can dislodge lubricants applied under the wide keys.

- If you remove a key, use a specially designed key puller to prevent damage to the keys. This tool is available through many electronic supply outlets.

$\triangle$ **CAUTION:** Never remove a wide leveled key (like the space bar) from the keyboard. If these keys are improperly removed or installed, the keyboard may not function properly.

- Cleaning under a key may be done with a swab moistened with isopropyl alcohol and squeezed out. Be careful not to wipe away lubricants necessary for proper key functions. Use tweezers to remove any fibers or dirt in confined areas. Allow the parts to air dry before reassembly.

cleaning the monitor

- Wipe the monitor screen with a clean cloth moistened with water or with a towelette designed for cleaning monitors. Do not use sprays or aerosols directly on the screen; the liquid may seep into the housing and damage a component. Never use solvents or flammable liquids on the monitor.

- To clean the monitor body follow the procedures in Section .

cleaning the mouse

Before cleaning the mouse, ensure that the power to the workstation is turned off.

- Clean the mouse ball by first removing the retaining plate and the ball from the housing. Pull out any debris from the ball socket and wipe the ball with a clean, dry cloth before reassembly.

- To clean the mouse body, follow the procedures in.

H

additional password security and resetting CMOS

This workstation supports security password features, which can be established through the Computer Setup Utilities menu. These features are:

- setup password
- power-on password

When you establish only a setup password, the power-on password is required to access Computer Setup and any other information on the workstation. When you establish both passwords, only the setup password will give you access to Computer Setup.

When both passwords are set, the setup password can also be used in place of the power-on password as an override to log in to the workstation. This is a useful feature for a network administrator.

If you forget the password for the computer, there are two method for clearing that password so you can gain access to the information on the workstation.

- resetting the password jumper
- using the Clear CMOS button

⚠ **CAUTION:** Pushing the CMOS button resets CMOS values to factory defaults and erases any customized information including passwords, asset numbers, and special settings. It is important to back up the workstation CMOS settings before resetting them in case they are needed later. To back up the CMOS settings, use Computer Setup and run the Save to Diskette option from the File menu.

resetting the password jumper

To disable the power-on or setup password features, or clear the power-on or setup passwords, complete the following steps:

1. Shut down the operating system and then turn off the workstation and any external devices. Disconnect the power cord of the workstation and any external devices from the power outlets.

2. Disconnect the keyboard, monitor, and any other external devices that are connected to the workstation.

⚠ **WARNING:** To reduce the risk of personal injury from electrical shock and/or hot surfaces, be sure to disconnect the power cord from the wall outlet and allow the internal system components to cool before touching.

⚠ **CAUTION:** When the workstation is plugged in, the power supply always has voltage applied to the system board even when the unit is turned off. Failure to disconnect the power cord can result in damage to the system.

⚠ **CAUTION:** Static electricity can damage the electronic components of the workstation or optional equipment. Before beginning these procedures, ensure that you are discharged of static electricity by briefly touching a grounded metal object.

3. Remove the hood cover.

4. Locate the header and jumper.

NOTE: The password jumper is green so that it can be easily identified. For assistance locating the password jumper and other system board components, see the "system board components" section in Chapter 1.

5. Remove the jumper from pins 1 and 2. Place the jumper on either pin 1 or 2, but not both, so it does not get lost.

6. Replace the hood cover.

7. Reconnect the external equipment.

8. Plug in the workstation and turn on the power. Allow the operating system to start. This clears the current passwords and disables the password features.

9. To establish new passwords, repeat steps 1 through 4, replace the password jumper on pins 1 and 2, then repeat steps 6 through 8. Establish the new passwords in Computer Setup.

clearing and resetting the CMOS

The CMOS of the workstation stores password information and information about the workstation configuration. This section describes the steps to successfully clear and reset the CMOS.

using the CMOS button

1. Shut down the operating system and then turn off the workstation and any external devices. Disconnect the power cord of the workstation and any external devices from the power outlets.

2. Disconnect the keyboard, monitor, and any other external devices that are connected to the workstation.

⚠ **WARNING:** To reduce the risk of personal injury from electrical shock and/or hot surfaces, be sure to disconnect the power cord from the wall outlet and allow the internal system components to cool before touching.

⚠ **CAUTION:** When the workstation is plugged in, the power supply always has voltage applied to the system board even when the unit is turned off. Failure to disconnect the power cord can result in damage to the system.

⚠ **CAUTION:** Static electricity can damage the electronic components of the workstation or optional equipment. Before beginning these procedures, ensure that you are discharged of static electricity by briefly touching a grounded metal object.

3. Remove the hood cover.

⚠ **CAUTION:** Pushing the CMOS button resets CMOS values to factory defaults and erases any customized information including passwords, asset numbers, and special settings. It is important to back up the workstation CMOS settings before resetting them in case they are needed later. To back up the CMOS settings, use Computer Setup and run the Save to Diskette option from the File menu.

4. Locate, press, and hold the CMOS button in for five seconds.

NOTE: Make sure that the AC power cord is disconnected from the power outlet. The CMOS button does not clear CMOS if the power cord is connected.

NOTE: For assistance locating the CMOS button and other system board components, see the "system board components" section in Chapter 1.

5. Replace the hood cover.

6. Reconnect any external devices.

7. Plug in the workstation power and turn the power back on.

NOTE: The workstation passwords and any special configurations along with the system date and time will have to be reset.

using Computer Setup to reset CMOS

To reset CMOS using Computer Setup, access the Computer Setup Utilities menu. When the Computer Setup message appears in the lower-right hand corner of the screen, press the F10 key. Press Enter to bypass the title screen, if necessary.

NOTE: If you do not press the **F10** key while the message is displayed, the workstation must be turned off, then on again, to access the utility.

From the Computer Setup menu, select File > Set Defaults and Exit. This restores the soft settings that include boot sequence order and other factory settings. It does not, however, force hardware rediscovery.

NOTE: The workstation passwords and any special configurations along with the system date and time will have to be reset.
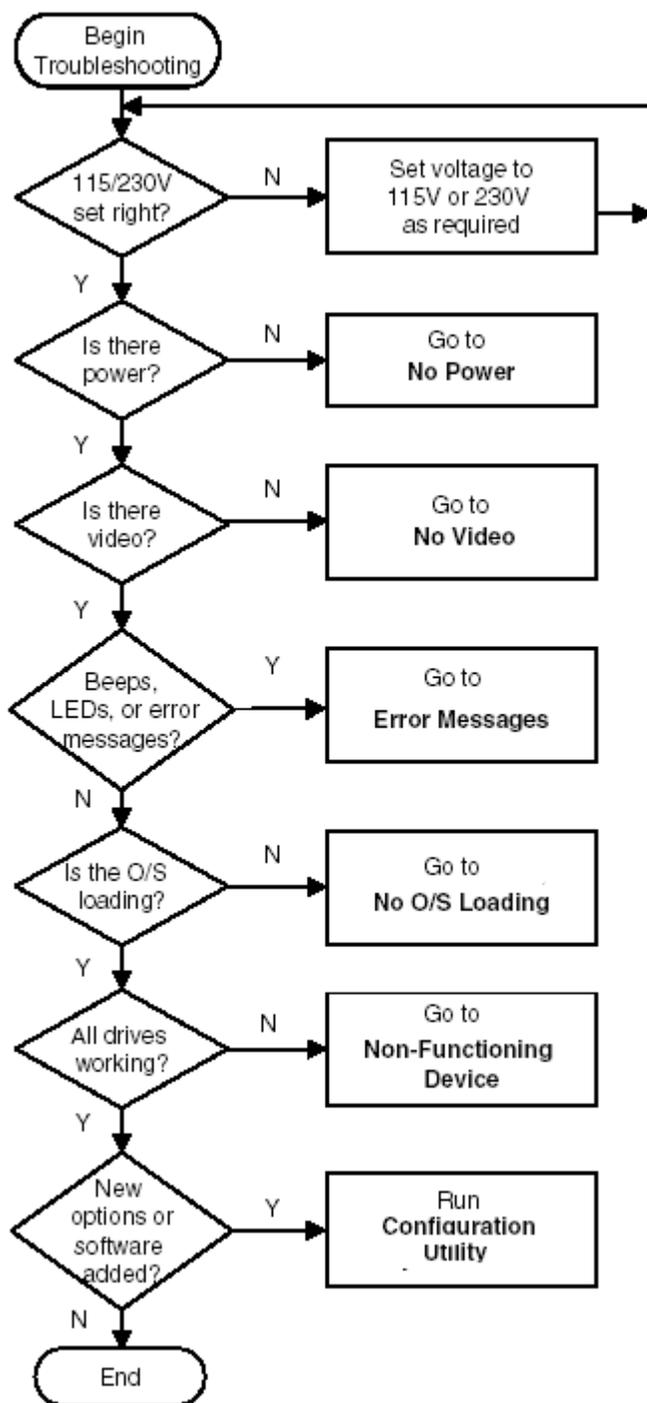
I

quick troubleshooting flowcharts

This appendix presents some quick troubleshooting flowcharts for some common issues. Additional information about troubleshooting can be found in Chapter 5 of this guide.

NOTE: The flowcharts presented here are for general troubleshooting purposes only and they may not apply to your specific workstation.
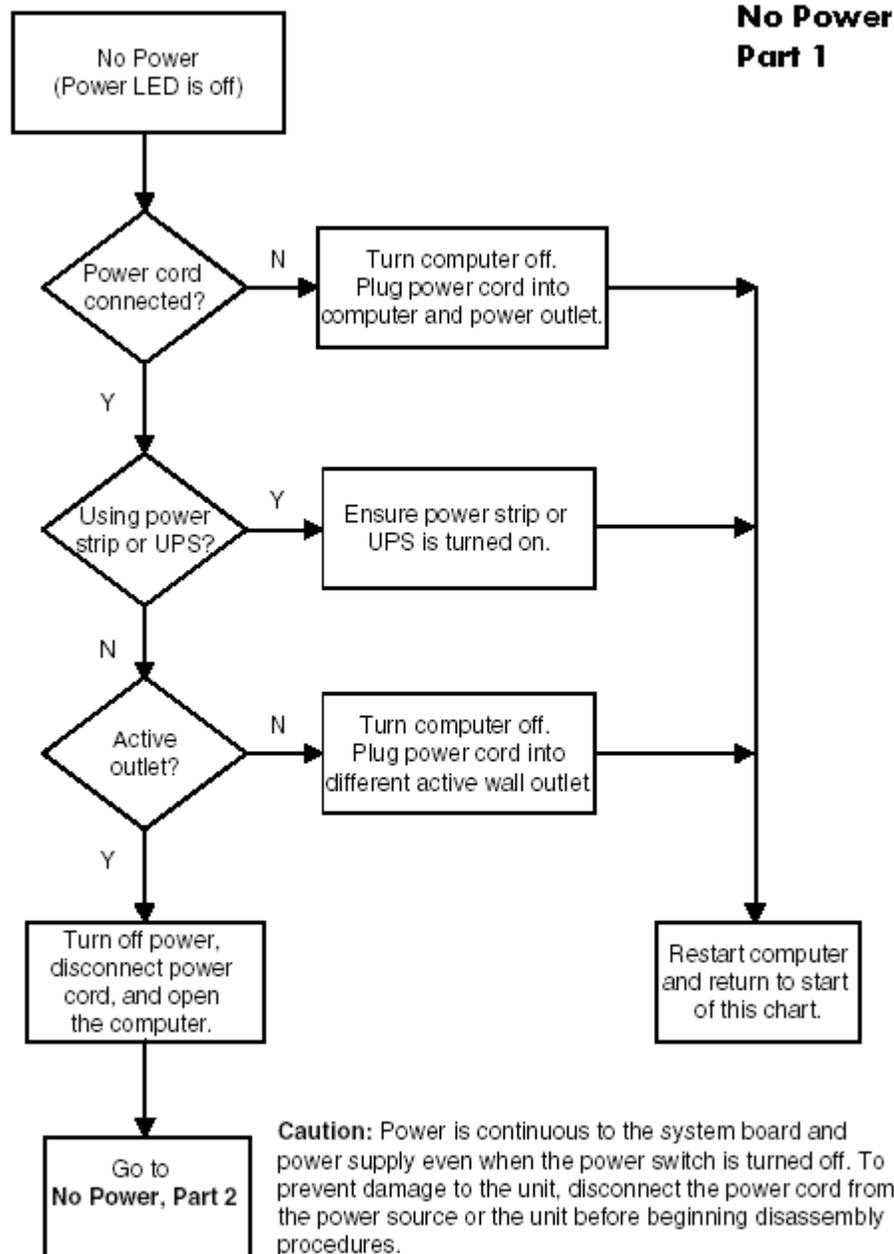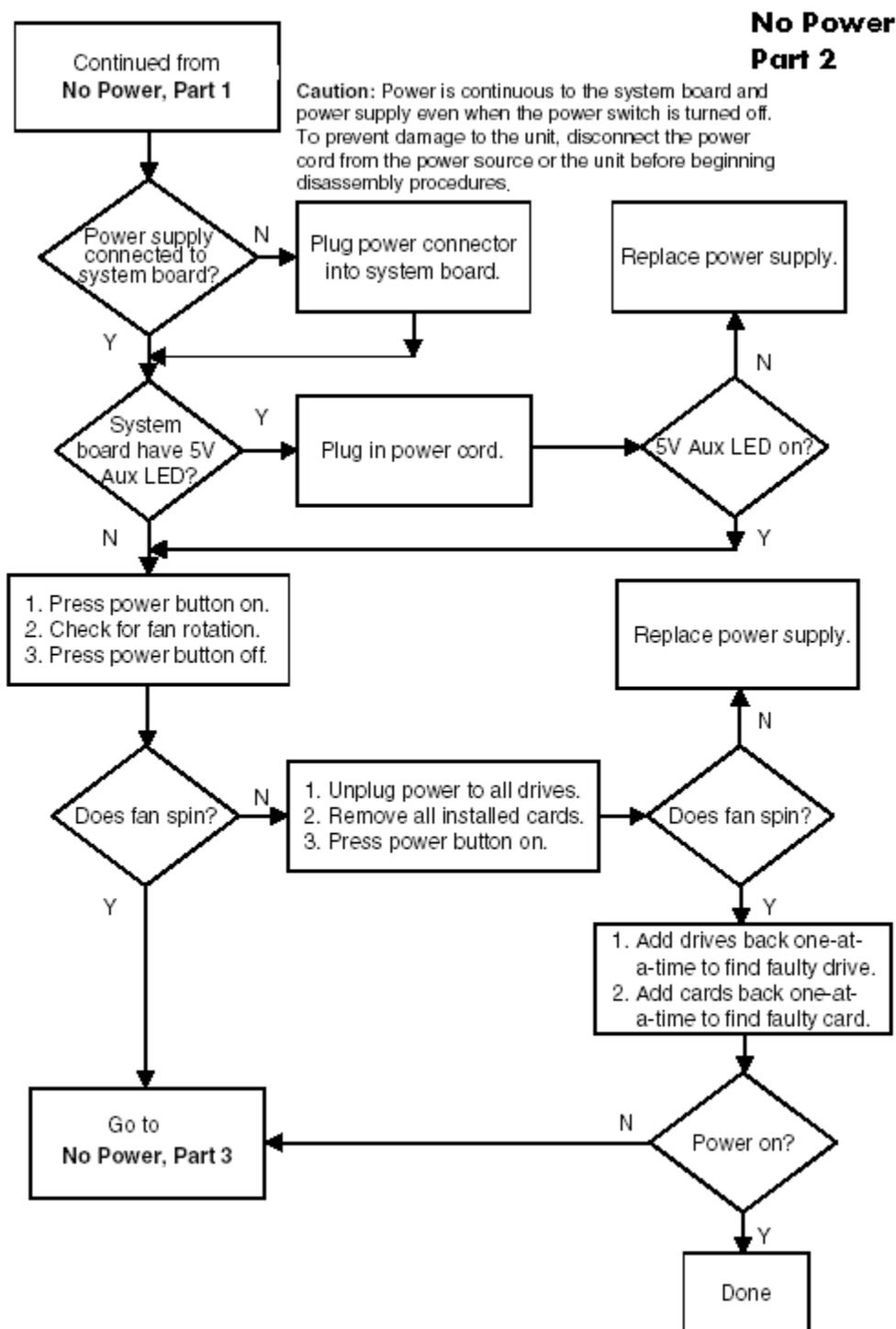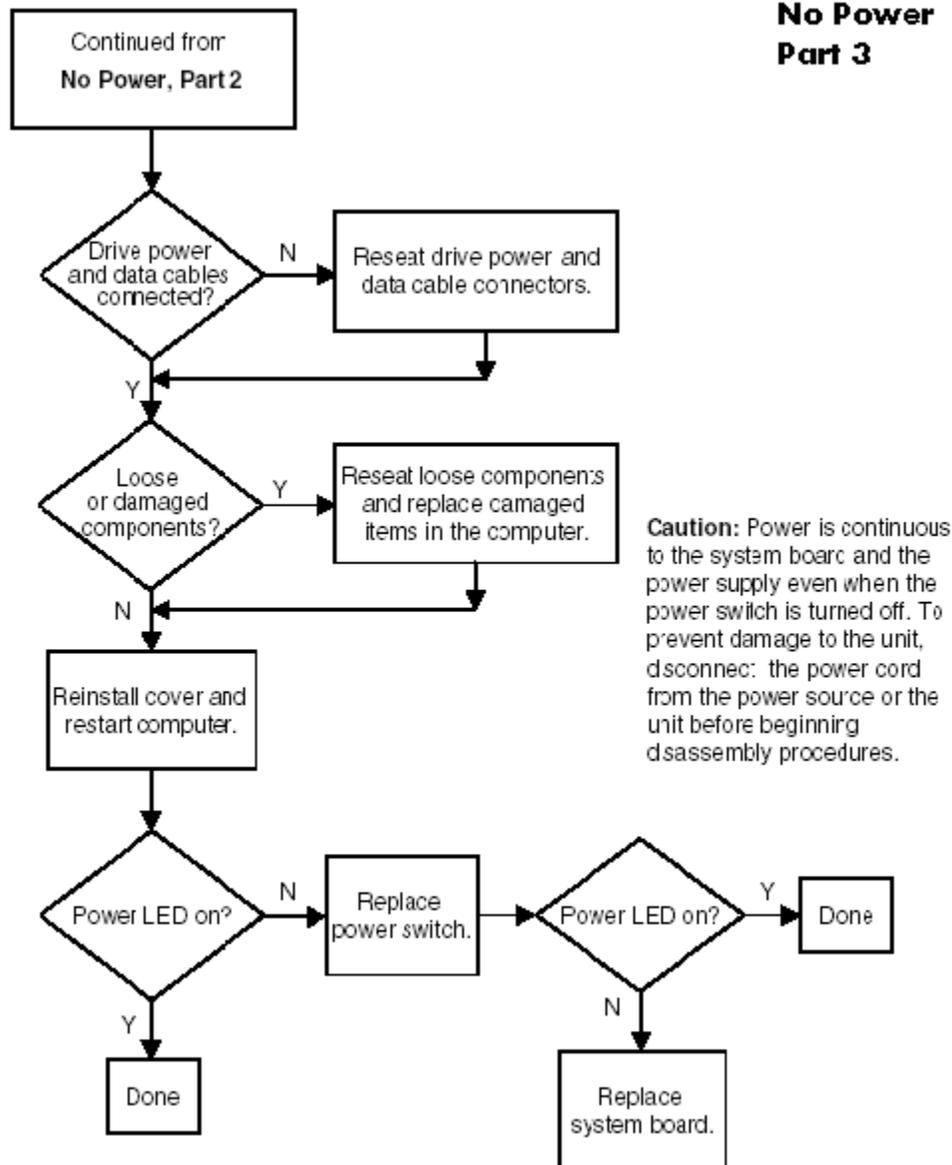
initial troubleshooting

```
        ┌──────────────┐
        │    Begin     │
        │Troubleshooting│
        └──────────────┘
               │
               ▼
        ╱╲                    ┌──────────────────┐
       ╱  ╲      N            │  Set voltage to  │
      ╱115/230╲──────────────▶│  115V or 230V    │
      ╲set right╱             │   as required    │
       ╲  ╱                   └──────────────────┘
        ╲╱
        │ Y
        ▼
        ╱╲                    ┌──────────────────┐
       ╱  ╲      N            │      Go to       │
      ╱Is there╲─────────────▶│    No Power      │
      ╲ power? ╱              └──────────────────┘
       ╲  ╱
        ╲╱
        │ Y
        ▼
        ╱╲                    ┌──────────────────┐
       ╱  ╲      N            │      Go to       │
      ╱Is there╲─────────────▶│    No Video      │
      ╲ video? ╱              └──────────────────┘
       ╲  ╱
        ╲╱
        │ Y
        ▼
        ╱╲                    ┌──────────────────┐
       ╱Beeps,╲    Y          │      Go to       │
      ╱LEDs, or ╲────────────▶│  Error Messages  │
      ╲ error   ╱             └──────────────────┘
       ╲messages╱
        ╲╱
        │ N
        ▼
        ╱╲                    ┌──────────────────┐
       ╱  ╲      N            │      Go to       │
      ╱Is the O/S╲───────────▶│  No O/S Loading  │
      ╲loading?╱              └──────────────────┘
       ╲  ╱
        ╲╱
        │ Y
        ▼
        ╱╲                    ┌──────────────────┐
       ╱  ╲      N            │      Go to       │
      ╱All drives╲───────────▶│ Non-Functioning  │
      ╲working?╱              │     Device       │
       ╲  ╱                   └──────────────────┘
        ╲╱
        │ Y
        ▼
        ╱╲                    ┌──────────────────┐
       ╱ New ╲    Y           │       Run        │
      ╱options or╲───────────▶│  Configuration   │
      ╲software ╱             │     Utility      │
       ╲added? ╱              └──────────────────┘
        ╲╱
        │ N
        ▼
     ┌────────┐
     │  End   │
     └────────┘
```

no power

no power, part 1

**No Power
Part 1**

```
┌─────────────────────┐
│     No Power        │
│ (Power LED is off)  │
└─────────────────────┘
           │
           ▼
      ◇ Power cord          N    ┌──────────────────────────┐
        connected? ─────────────▶│   Turn computer off.     │
                                 │  Plug power cord into     │───┐
           │ Y                   │ computer and power outlet.│   │
           ▼                     └──────────────────────────┘   │
      ◇ Using power         Y    ┌──────────────────────────┐   │
        strip or UPS? ──────────▶│  Ensure power strip or    │───┤
                                 │    UPS is turned on.      │   │
           │ N                   └──────────────────────────┘   │
           ▼                                                     │
      ◇ Active             N    ┌──────────────────────────┐    │
        outlet? ─────────────── ▶│   Turn computer off.     │───┤
                                 │  Plug power cord into     │   │
           │ Y                   │ different active wall outlet│ │
           ▼                     └──────────────────────────┘   │
┌─────────────────────┐                                          ▼
│  Turn off power,    │                          ┌──────────────────────┐
│ disconnect power    │                          │  Restart computer    │
│  cord, and open     │                          │ and return to start  │
│   the computer.     │                          │   of this chart.     │
└─────────────────────┘                          └──────────────────────┘
           │
           ▼
┌─────────────────────┐
│     Go to           │
│ No Power, Part 2    │
└─────────────────────┘
```

Caution: Power is continuous to the system board and power supply even when the power switch is turned off. To prevent damage to the unit, disconnect the power cord from the power source or the unit before beginning disassembly procedures.

no power, part 2

**No Power
Part 2**

Continued from
No Power, Part 1

Caution: Power is continuous to the system board and power supply even when the power switch is turned off. To prevent damage to the unit, disconnect the power cord from the power source or the unit before beginning disassembly procedures.

Power supply connected to system board? — N → Plug power connector into system board.

Replace power supply.

System board have 5V Aux LED? — Y → Plug in power cord. → 5V Aux LED on?

N → Replace power supply.

1. Press power button on.
2. Check for fan rotation.
3. Press power button off.

Does fan spin? — N → 1. Unplug power to all drives. 2. Remove all installed cards. 3. Press power button on. → Does fan spin?

N → Replace power supply.

Y → 1. Add drives back one-at-a-time to find faulty drive. 2. Add cards back one-at-a-time to find faulty card.

Go to
No Power, Part 3

Power on?

Y → Done

no power, part 3

**No Power
Part 3**

Continued from
No Power, Part 2

↓

Drive power and data cables connected? —N→ Reseat drive power and data cable connectors.

Y↓

Loose or damaged components? —Y→ Reseat loose components and replace damaged items in the computer.

Caution: Power is continuous to the system board and the power supply even when the power switch is turned off. To prevent damage to the unit, disconnect the power cord from the power source or the unit before beginning disassembly procedures.

N↓

Reinstall cover and restart computer.

↓

Power LED on? —N→ Replace power switch. → Power LED on? —Y→ Done

Y↓   N↓

Done   Replace system board.

no video

no video, part 1

**No Video
Part 1**

No video

Beeps or
flashing CPU
or keyboard
lights?

Y → Go to
**Error Messages,
Part 1**

Caution: Power is continuous to the system board
and power supply even when the power switch is
turned off. To prevent damage to the unit,
disconnect the power cord from the power source or
the unit before beginning disassembly procedures.

N

Monitor LED
on?

Y → LED color?
(note 1)

Green → Contrast and
brightness
turned up?

N → Turn contrast and
brightness up.

N

Amber

Y

Video
adapter
connected?
(note 2)

Y → Go to
No Video, Part 2

N

Plug in, turn on, and
return to
Initial Troubleshooting.

Monitor
plugged in and
turned on?

Y → Reconnect
monitor (note 3).

→ Video OK?

Y → Done

N

N

Replace monitor.

Plug in and turn on
monitor, then
return to
Initial Troubleshooting.

Notes:

1. Older monitors do not support the amber LED.

2. If more than one adapter is installed, monitor
   must be connected to primary controller.

3. Turn off and unplug computer before
   reconnecting cables.

no video, part 2

**No Video
Part 2**

Continued
from
No Video, Part 1

↓

Turn off power,
disconnect power cord,
and open the computer.

↓

Reseat processor, riser
board, video card, and
memory, then clear CMOS.

Caution: Power is continuous to
the system board and power supply
even when the power switch is
turned off. To prevent damage to
the unit, disconnect the power cord
from the power source or the unit
before beginning disassembly
procedures.

↓

Replace cover and
power cord, then
restart computer.

↓

Video OK,
computer
starts? —N→ Same
symptoms? —N→ Message
"System option
not set"? —Y→ F1
"System
option
not set"
routine

Y↓   Y↓   N↓

Done

Turn off computer and disconnect
power. Replace components in
system one at a time starting with
hard drive. Test system after each
replacement for video or beeps.

↓

Go to
No Video, Part 3

Notes:
1. System boards without a piezo speaker, or chassis
   without an internal speaker require an external
   speaker.
2. Some power supplies require a load greater than
   the system board alone to function properly. When
   disconnecting drives, disconnect the data cables
   but leave the power cables attached.
3. Remove auxiliary video card if integrated video.

no video, part 3

No Video Part 3

Continued from No Video, Part 2

Restart computer.

Caution: Power is continuous to the system board and power supply even when the power switch is turned off. To prevent damage to the unit, disconnect the power cord from the power source or the unit before beginning disassembly procedures.

See codes or flashing lights or hear beeps?

N → Integrated video?

N → Replace video card.

Y ↓ (from See codes)

Turn off computer and disconnect power. Replace components in system one at a time starting with hard drive. Test system after each replacement for video or beeps.

Y ↓ (from Integrated video)

Replace system board.

Video OK?

N → Replace system board.

Y ↓

Done

error messages

error messages, part 1

Beeps,
CPU or Keyboard Lights,
or POST error messages.

**Error Messages
Part 1**

Caution: Power is continuous to the system board and power supply even when the power switch is turned off. To prevent damage to the unit, disconnect the power cord from the power source or the unit before beginning disassembly procedures.

Power LED has no color showing. Computer is off.

Power LED glows green. Computer is on.

Power LED blinks green 1x/second. Normal suspend mode.

Power LED glows red. CPU not installed/fetching code.

Power LED blinks red 4x/second. CPU thermal shutdown.

Power LED blinks red 1x/two or more seconds. Power supply crow bar.

Power and hard drive LEDs glow red. Riser board not seated.

Num Lock LED flashing green. Memory error.

Caps Lock LED flashing green. No video.

Scroll Lock LED flashing green. System board failure, prior to video.

Audible. 1L 3S. System ROM is bad; system is running in FailSafe Boot Block Mode.

Audible. 2S. Power-ON successful.

Continued on **Error Messages, Part 2.**

Notes: Short (S) and long (L) beeps will only be heard if the system has a speaker.
LEDs will only function on PS/2 keyboards, not USB.

error messages, part 2

**Error Messages
Part 2**

Continued from
Error Messages, Part 1

Caution: Power is continuous to the system board and power supply even when the power switch is turned off. To prevent damage to the unit, disconnect the power cord from the power source or the unit before beginning disassembly procedures.

1S 2L. Num Lock blinking. System memory not present or incompatible. Unplug, open computer, and check memory modules. Ensure memory modules are correct type and that they match in size and speed.

1L 2S. Cap Lock blinking. Video controller not present or incorrectly initialized. Ensure monitor is plugged in. Unplug, open computer, and check video card. Reseat card and ensure it is in the proper expansion slot.

1L 3S. All keyboard LEDs blinking. ROM Failure. Create ROM diskette and reload ROM. Download ROMPaq from HP website at www.hp.com.

2L 1S. Scroll Lock blinking. System HW failure prior to video. Unplug, open computer, and check for physical damage. Ensure all cables and cards are seated. Look for burn marks or smoke.

No beeps. HD and Power LED blinking. Riser not detected. Unplug, open computer, and check and reseat riser board.

Continued on **Error Messages, Part 3.**

Notes: Short (S) and long (L) beeps will only be heard if the system has a speaker.
LEDs will only function on PS/2 keyboards, not USB.

error messages, part 3

**Error Messages
Part 3**

Continued from
Error Messages, Part 2

Caution: Power is continuous to the system board and power supply even when the power switch is turned off. To prevent damage to the unit, disconnect the power cord from the power source or the unit before beginning disassembly procedures.

Error 162, 2S Beeps. **System Option not set. Select F1.** If error occurs after reboot, unplug and open computer and check CMOS jumper setting.

Error 163. Time & Date Not Set. Set time and date in F10 or boot to O/S and set time and date. If error occurs after reboot, unplug and open computer, then check CMOS setting.

Error 2xx. Memory Error. Unplug, open computer, and reseat memory modules. Ensure modules are correct type and that they match in size and speed.

Error 30x. Keyboard Error. Do not type on keyboard before POST. Ensure keyboard connected to proper connector.

Error 6xx. Floppy Error. Unplug, open computer, check diskette drive, and check and reseat power and data cables.

Error 91x. Misc. Connection Error. Unplug, open computer, and check hood lock coil, thermal sensor pigtail, and riser for good connection.

Error 178x. Fixed Disk Error. . Unplug, open computer, check hard drive, and check and reseat power and data cables.

Error 1800. Thermal Alert. System overheating. Let computer cool off. Ensure processor has heatsink installed and that speed setting on system board is correct. Remove obstructions to air vents.

All other POST error messages - refer to Chapter 5 for definitions and solutions.

Notes: Short (S) and long (L) beeps will only be heard if the system has a speaker.
LEDs will only function on PS/2 keyboards, not USB.

x = Numbers 1 - 9

no OS loading

No OS Loading

O/S not loading from:

CD-ROM drive
go to
No O/S Loading
from:
CD-ROM drive,

Diskette drive,
go to **No O/S
Loading** from
Diskette drive

Hard drive,
go to **No O/S
Loading** from
Hard drive.

Network,
go to **No O/S
Loading** from
Network
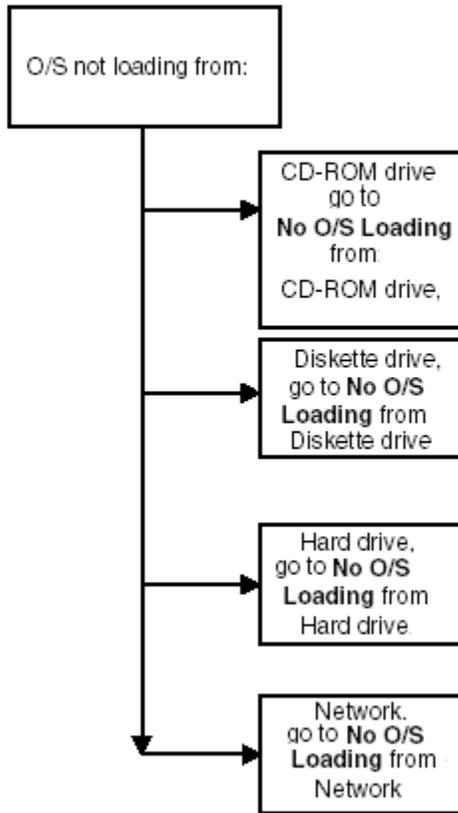
Factory recommended booting priority

1. CD-ROM drive
2. Diskette drive
3. Hard drive
4. Network

NOTE: Before beginning, always check drive jumpers, cable connections, cable ends, and drives for bent or damaged pins.

no OS loading from hard drive

no OS loading from hard drive, part 1

No OS Loading From Hard Drive Part 1

```
O/S not loading from hard drive
        │
        ▼
   Non-System Disk Message? ──N──▶ Go to No O/S Loading from Hard Drive, Part 2
        │
        Y
        ▼
   Boot from CD? ──N──▶ Boot from diskette? ──N──▶ Go to No O/S Loading from Diskette Drive
        │                      │
        Y                      Y
        ▼                      ▼
   Remove CD and reboot.   Remove diskette and reboot.
        │                      │
        ▼                      ▼
   Boot from hard drive?   Boot from hard drive? ──N──▶
        │                      │
        Y                      Y
        ▼                      ▼
      Done                   Done
```

```
   Boot from network? ──N──▶ Go to No O/S Loading from Network
        │
        Y
        ▼
   Change boot priority through Computer Setup and reboot.
        │
        ▼
   Boot from hard drive? ──N──▶ Go to Non-Functioning Device
        │
        Y
        ▼
      Done
```

Factory Recommended Booting Priority

1. CD-ROM drive if bootable drive
2. Diskette drive
3. Hard drive
4. Network

NOTE: Before beginning, always check drive jumpers, cable connections, cable ends and drives for bent or damaged pins.

no OS loading from hard drive, part 2

**No OS Loading
From Hard Drive
Part 2**

Continued from
**No O/S Loading
from
Hard Drive, Part 1**

CD or diskette in drive? — N → Replace hard drive.

Y

Remove diskette and reboot.

Boot from hard drive? — Y → Done

N

Boot from diskette drive? — Y →

N

**Go to
No O/S Loading
from
Diskette Drive**

Access hard drive? — Y → **Go to
No O/S Loading
from Hard Drive, Part 3**

N

Run FDISK

Hard drive partition? — N → Create partition, then format hard drive to bootable C:\ prompt.

Y

Hard drive formatted? — N → Format hard drive and bring to a bootable C:\ prompt.

Y

Load O/S using *Restore CD* if applicable

Computer boot? — Y → Done

N

**Go to
No O/S Loading
from
Hard Drive, Part 3**

no OS loading from hard drive, part 3

**No OS Loading
From Hard Drive
Part 3**

Continued from
No O/S Loading
from Hard Drive, Part 2

System files on hard drive? — N → Install O/S and reboot

Y

Virus on hard drive? — Y → Clean virus. → Boot from hard drive? — N → Run DPS test.

N

Run SCANDISK, check for bad sectors.

Boot from hard drive? — Y → Done

Boot from hard drive? — Y → Done

N → Replace hard drive.

Can bad sectors be fixed? — N → Apply *Restore CD* if applicable.

Y

Fix bad sectors. → Boot from hard drive? — N → Replace hard drive.

Y

Done

no OS loading from diskette drive

**No OS Loading
From Diskette Drive**

O/S not loading
from diskette drive

Non-System Disk message? — Y → Bootable diskette in drive? — N → Install bootable diskette and reboot computer.

Non-System Disk message? — N ↓

Bootable diskette in drive? — Y ↓

Boot from another device? — N → Go to **Non-Functioning Device**

Boot from another device? — Y ↓

Check diskette for system files. Try different diskette.

Diskette drive enabled in Computer Setup? — N → Enable drive and cold boot computer.

Diskette drive enabled in Computer Setup? — Y ↓

Bootable diskette in drive? — N → Install bootable diskette and reboot computer.

Bootable diskette in drive? — Y ↓

Diskette drive boot order correct? — Y → Clear CMOS

Diskette drive boot order correct? — N ↓

Change boot priority. (see notes)

Clear CMOS ↓ Go to **Non-Functioning Device**

**Notes: Factory Recommended
Booting Priority**

1. CD-ROM drive if bootable
2. Diskette drive
3. Hard drive
4. Network

no OS loading from CD-ROM drive

No OS Loading
From CD-ROM Drive

Notes:

Factory Recommended Booting Priority

1. CD-ROM drive if bootable
2. Diskette drive
3. Hard drive
4. Network

no OS loading from network

No OS Loading From Network

No O/S loading from network

C

F12 prompt during POST? — Y → Select F12 on prompt? — Y → WOL or Network cable attached? — Y → Network jack functional? — Y

F12 prompt during POST? — Y (down)

Select F12 on prompt? — N → Reboot computer. Select F12 when prompted.

WOL or Network cable attached? — N → Attach network or WOL cable.

Network jack functional? — N → Connect to working network jack.

Network jack functional? — Y → Go to **Non-Functioning Device**

Compaq supported NIC? — N → Turn off power, disconnect power cord, open computer, and install HP compatible NIC.

Compaq supported NIC? — Y

Boots from network? — N → To **C**

Boots from network? — Y → Done

Boots from another device? — N

Boots from another device? — Y

Boot order correct ? — Y

Boot order correct ? — N → Correct boot order. (see notes)

Go to **Non-Functioning Device**

Notes:

Factory Recommended Booting Sequence

1. CD-ROM drive
2. Diskette drive
3. Hard drive
4. Network

non-functioning device

Non-Functioning Device

Non-functioning device.

Turn off power, disconnect power cord, and open the computer.

Caution: Power is continuous to the system board and power supply even when the power switch is turned off. To prevent damage to the unit, disconnect the power cord from the power source or the unit before beginning disassembly procedures.

Unplug the power and data cable from the non-functioning device. Inspect cables and plugs for bent or broken pins or other damage. For a NIC or SCSI controller, remove the expansion card and inspect leads.

Any physical damage? — Y → Fix or replace broken item.

N

Clear CMOS

Reattach drive. Close computer, plug in power, and reboot.

Drive boots properly? — N →

Hard drive or CD-ROM drive
- **RUN DPS HARD DRIVE TEST.** (hard drive only)
- Check IDE drive jumper settings for Cable Select and Primary/Secondary status.
- Check SCSI drive ID and termination.
- Correct any conflicts.

NIC
Possible bad NIC, replace card. If integrated NIC, replace system board.

Diskette drive
Possible bad diskette drive. Replace drive.

Go to **No O/S Loading.**

N

Drive boots properly?

Y

Done

Y

Done

index