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service reference guide
hp workstation xw4000
hp workstation xw6000

Document Part Number: 304898-002

October 2003

This guide provides removal and replacement procedures for subassemblies and key components of the computers covered. This guide also covers basic operating system installation information.

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

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

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Contents

4 Ultra ATA Drive Guidelines and Features

5 SCSI Devices

6 SATA Devices

7 Identifying the Chassis, Routine Care, and Disassembly Preparation

8 Removal and Replacement Procedures Security Components

9 Removal and Replacement Procedures Drives

10 Removal and Replacement Procedures Chassis

11 Removal and Replacement Procedures Expansion Cards and Memory

12 Removal and Replacement Procedures System Board with Major Components

13 Removal and Replacement Procedures Main Power and Cooling

A Connector Pin Assignments

B Power Cord Set Requirements

C POST Error Messages

D Diagnostic Indicator Lights

E Diagnostic Error Codes

F Troubleshooting Without Diagnostics

G System Board and Riser Board Reference Designators

H Model Number Naming for hp Products

Index

1

Installing or Restoring the Operating System

Depending on the workstation model, Microsoft Windows 2000 Professional (with latest Service Pack), Microsoft XP Professional, or Red Hat® Linux® is preinstalled. The operating system is configured automatically the first time the computer is turned on.

> ⚠ **CAUTION:** Do not add optional hardware devices to your computer 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 COMPUTER UNTIL THE PROCESS IS COMPLETE. Turning off the computer during the installation process might damage the software that runs the computer.

1.1 Installing the Operating System and Software

The following sections discuss the operating system and HP software installation procedures.

1.1.1 Installing Microsoft Windows 2000 Professional

The first time you turn on the computer, 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 this process, do not turn off your computer 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.

To locate the most current device drivers go to www.hp.com.

The I386 directory and its subdirectories provide the HP-specific integration of the operating system for the computer 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 browse the computer for the I386 folder.

> ✎ The service pack for Windows 2000 Professional has been integrated into the program.

Creating an Emergency Repair Diskette - Windows 2000

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 - Windows 2000

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

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.

1.1.2 Installing Microsoft Windows XP Professional

The first time you turn on the computer, 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 this process, do not turn off your computer 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 screen.

1.1.3 **Installing 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.

✎ 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.

✎ 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 at www.redhat.com to check availability of additional device drivers.

1.1.4 **hp Software**

The Microsoft Windows 2000 Professional or Windows XP Professional operating system is preinstalled on the computer and will be configured automatically the first time the computer is turned on. The following HP software will also be installed at that time on selected models:

■ Setup Utilities and diagnostic features

■ Support Software including device drivers

■ HP Configuration Record

■ Online *Safety & Comfort Guide*

■ HP Intelligent Manageability

■ HP Insight Manager

■ Diagnostics for Windows

■ DMI Support

■ Power Management with energy saver features

■ 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 two ways:

■ Support CD kit

■ HP web site at www.hp.com

1.2 Restoring the operating system

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

1.2.1 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.

1.2.2 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.

1.3 Converting to NTFS

Hard drives are formatted according to a file system format that sets a maximum partition size. With the increase in drive size and changes in operating systems the FAT32 file system format has become outdated. The NTFS file system format is preferred for the latest drive sizes and operating systems.

1.3.1 Windows 2000 Professional

The hard drive may be automatically converted to NTFS when Windows 2000 is configured. On some systems the following procedure may be required.

To convert an existing partition from a FAT 32 partition to an NTFS partition, double-click the NTFS Convert icon on the desktop. Carefully read and follow the directions that appear on the screen.

$\triangle$ **CAUTION:** Converting from a FAT32 partition to NTFS may result in loss of data. Back up all data files before changing the file system format.

1.3.2 Windows XP Professional

During the initial unbundling of the operating system, the system will start out with a FAT32 partition but will automatically convert to NTFS. The Windows XP operating system is not designed to run in a FAT32 partition on these systems.

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 using the Computer Setup (F10) system utility. To do this, run F10 Setup during boot up and select Advanced > Device Options > Hyper-Threading, and enable the Hyper-Threading Technology.

Note the following:

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

■   The Hyper-Threading Technology is recommended for use with Microsoft® 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.

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

■   The Hyper-Threading Technology is 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.

2

Setup Utilities and Diagnostic Features

Setup Utilities (F10) and diagnostic features provide information needed about the computer system when contacting HP Customer Support. These tools can also be used 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 computer are recognized by the system and functioning properly.

■ Determine information about the operating environment of the computer.

■ 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.

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

Power-On Self-Test (POST)

POST is a series of diagnostic tests that runs automatically when the system is turned on, POST checks the following items to ensure that the computer system is functioning properly:

■ Keyboard

■ Memory modules

■ Diskette drives

■ All IDE and SCSI mass storage devices

■ Processors

■ Controllers

✎ 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. Refer to Chapter 3 for information on setting, deleting, or bypassing the password.

If POST finds an error in the system, an audible and/or visual message occurs. Refer to Appendix C for POST error messages and their solutions.

2.1 Computer Setup Utilities

Use Computer Setup Utilities (F10) to:

■ 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, CD-ROM drives, DVD-ROM drives, or PD-CD drives.

■ Configure Quiet Drive options (for drives that support this feature).

■ 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 computer to boot the operating system when the power-on password is enabled. 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 F10 or F12).

■ Establish 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 to this computer.

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

■ Establish a setup password that controls access to Computer Setup and the settings described in this section.

■ 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.

■ 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 computers.

■ Execute self-tests on a specified IDE hard drive.

■ Configure various energy-saving features including energy saver mode, system and hard drive timeouts, power button mode, and power LED behavior.

2.1.1 Using Computer Setup Utilities

To access the Computer Setup Utilities (F10) menu, complete the following steps:

1. Turn on or restart the computer. To restart the computer 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 (for English only).

✎ If you do not press the **F10** key while the message is displayed, you must turn the computer off, then on again, to access the utility.

Pressing the **F12** key initiates Network Service Boot for Remote System Installation.

A choice of five headings appears in the Computer Setup Utilities menu: File, Storage, Security, Power, and Advanced. Section 2.1.2 in this chapter provides more information about the features that are available.

3. Using the arrow keys or the Tab key, select the option you want and press Enter. To return to the Computer Setup Utilities menu, press Esc.

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

   ❏ If you selected an option that automatically restarted the computer, changes were applied at that time.

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

   ❏ If you have already applied changes you now want to eliminate, select Set Defaults and Exit. This option will restore the original system defaults.

✎ Be sure to configure new options and drivers in the operating system after they have been configured by the Setup Utility.

2.1.2 Computer Setup Menu

Heading	Option	Description
File	System Information	Lists product name/type/speed/stepping, cache size, system ROM family and version, installed memory size, system board revision, chassis serial number, integrated MAC for enabled or embedded NIC (if applicable), and asset tracking number.
	About	Provides 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.
	Restore from Diskette	Restores system configuration from a diskette.
	Set Defaults and Exit	Restores factory default settings and clears all 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 storage devices. The following options appear when a device is selected:

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, 3.5" 720 KB, 5.25" 1.2 MB, 5.25" 360 KB, 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
Hard disk	No emulation options available.
Diskette	None (treated as diskette drive)
	Disk (treated as hard drive)
CD-ROM	None (treated as CD-ROM drive)
	Diskette (treated as diskette drive)
	Disk (treated as hard drive)
Other (e.g., Zip drive)	None (treated as Other)
	CD-ROM (treated as CD-ROM drive)
	Diskette (treated as diskette drive)

Heading	**Option**	**Description** *(Continued)*
		Disk (treated as hard drive)
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 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 ATA devices only*) Specifies how many sectors are transferred per multi-sector PIO operation. Options (subject to device capabilities) are Disabled, 8, and 16.
		Quiet Drive *(available on select drives only)* • Performance Allows the drive to operate at maximum performance. • Quiet Reduces noise from the drive during operation. When set to Quiet, the drive will not operate at maximum performance. ✎ If the drive does not support Quiet mode, the Quiet Drive option will not be displayed.
	Options	**Removable Media Boot** Enables/disables ability to boot the system from removable media. ✎ After saving changes to Removable Media Boot, the computer will restart. Manually, turn the computer off, then on.
		Primary IDE Controller Allows you to enable or disable the primary IDE controller.
		Secondary IDE Controller Allows you to enable or disable the secondary IDE controller.

Heading	Option	Description *(Continued)*
Storage (continued)	Options (continued)	**Diskette MBR Validation** Allows you to enable or disable strict validation of the diskette Master Boot Record (MBR). ✎ 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.
	DPS Self-Test	Allows you to execute self-tests on IDE hard drives capable of performing the Drive Protection System (DPS) self-tests. ✎ 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	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. The selection will not appear if all hard drives are attached to the embedded IDE controllers.
	SCSI Narrow Termination	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 boot order of installed peripheral devices (such as LS-120 drive, diskette drive, hard drive, SCSI drive, CD-ROM drive, or DVD-ROM drive).
Security	Setup Password	Enables setup (administrator) password. See Section 3.4, "Asset Tracking and Security," for more information.
	Power-On Password	Enables power-on password. See Section 3.4, "Asset Tracking and Security," for more information.
	Password Options	Enables/disables network server mode. Specifies prompting for power-on password. See Section 3.4, "Asset Tracking and Security," for more information. This selection will appear only if a power-on password is set and the network server mode is disabled.
	Smart Cover	Enables/disables Smart Cover Sensor and Cover Lock. (Feature supported on select models only.) Lists most recent cover removal. (Feature supported on select models only.) See Section 3.4, "Asset Tracking and Security," for more information.

Heading	Option	Description *(Continued)*
Security (continued)	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 computer 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 password if one is set. ✎ 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. ✎ Only appears if MBR Security is enabled.
	Restore Master Boot Record*	Restores the backup Master Boot Record to the current bootable disk. ✎ 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.
	Device Security	Enables/disables serial ports A & B; parallel and USB ports; system audio; network controller (some models); and SCSI controllers.
	Network Service Boot	Enables/disables Network Service Boot. (Feature supported on select models only.)

*Option not supported on all products.

Heading	Option	Description *(Continued)*
Security (continued)	System IDs	Allows you to set Asset Tag and Ownership Tag.
		Allows setting of Chassis Serial Number if current number is invalid.
		Also allows you to set keyboard locale setting (e.g., English or German) for System ID entry.
		Allows setting of Ownership Tag and Universal Unique Identifier (UUID).
		See Section 3.4, "Asset Tracking and Security," for more information.
Power	Energy Saver	Allows you to set energy saver mode to Advanced, Disabled, or Minimal.
		✎ In the minimal energy saver mode setting, the hard drive and system do not go into energy saver mode, but the setting allows you to press the power button to suspend the system. This option does not apply under ACPI-enabled operating systems.
	Timeouts	Allows you to enable/disable or manually select timeout values.
		✎ This selection will appear only when energy saver mode is set to advanced. This option does not apply under ACPI-enabled operating systems.
	Energy Saver Options	Allows you to set power button configuration (on/off or sleep/wakeup.)
		Allows user to enable/disable power LED blink in suspend mode.
		✎ This selection will appear only if the energy saver mode is enabled. This option does not apply under ACPI-enabled operating systems.
Advanced**	Power-On Options	Allows you to set POST mode (QuickBoot or FullBoot every *n* days where *n* = 1 to 30), enables/disables POST messages, and delay POST.
		Enables/disables Safe Post, F9 prompt, F10 prompt, F12 prompt, option ROM prompt, UUID, I/O APIC Mode, USB Buffer @ Top of Memory, and Hot-Pluggable MB Floppy.
		Allows you to select the wakeup boot source (local hard drive or remote server).
		Allows you to select computer state after a power loss (On or Off).
		✎ The suspend/sleep feature of Remote Management cannot be used if If the computer was turned off using a power strip.
	Onboard Devices	Allows you to set resources for onboard system devices (serial port, parallel port, diskette controller, etc.).

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

Heading	Option	Description *(Continued)*
	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.
Advanced (continued)**	Bus Options	Enables/disables PCI bus mastering, PCI VGA palette snooping, PCI SERR# generation, and ECC on select models.
	Device options	Allows you to set printer mode (EEP+ECP), Output only, bidirectional, and NumLock state at power-on.
		Enable/disable Power Management Events (PME) wakeup events, processor cache, processor number, ACPI thermal mode, and ACPI S3 support. (When ACPI S3 is enabled you may also enable/disable ACPI S3 video repost, PS/2 mouse wakeup, and hard disk reset.)
		Allows you to select AGP aperture size (4, 8, 16, 32, 64, 128, or 256 MB).
		Enables monitor tracking.
	PCI VGA Configuration	Allows users to specify which VGA controller will be the "boot" or primary VGA controller.
		Appears only if there are multiple PCI video adapters in the system.

*Option not supported on all products.
**These options should be used by advanced users only.

2.2 Computer Diagnostics

✎ The following section applies only to computers equipped with a diskette drive and running an OS that supports the production of a Diagnostics diskette.

HP strongly recommends that you create a diagnostics diskette as soon as you begin to use the computer. This is a bootable diskette that allows you to test and inspect the hardware outside of the operating system by running the Computer Checkup (TEST) or View System Information (INSPECT) diagnostic programs. The diskette will play an important role in the restoration process if you ever experience a major system failure.

Another diagnostic feature is Diagnostics for Windows, described in Section 2.2.4.

2.2.1 Create a Diagnostics Diskette

DOS-Based

To create a bootable, DOS-based Diagnostic Diskette (some models may require two 1.44-MB diskettes), run the SoftPaq executable file found in C:\DIAGDISK\ to extract the necessary files. Insert a blank 1.44MB formatted diskette into the diskette drive, then run C:\DIAGDISK\PDIAG\MAKEDISK.BAT

✎ To obtain the SoftPaq executable filename, run DIR C:\DIAGDISK\SP*.EXE

Windows-Based

NOTE: Not all versions of Windows support this feature.

Using the Windows operating system:

Click Start > Compaq Information Center > Create Diagnostics Disk. Insert a diskette into the diskette drive and follow the instructions on the screen.

2.2.2 Computer Checkup (TEST)

Use Computer Checkup (TEST) in the following instances to:

■ Determine if all the devices installed on the computer are recognized by the system and functioning properly. Running TEST 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 TEST. You should run TEST and have the printed report available before placing a call to the Compaq Customer Support Center.

■ Reproduce the same environment on another computer for testing.

✎ Before you run TEST, you must create a diagnostics diskette. See Section 2.2.1, "Create a Diagnostics Diskette," for instructions.

Running TEST

1. Turn off the computer.

2. Disconnect all peripheral devices other than the keyboard and monitor. Do not disconnect the printer if you want to test it or use it to log error messages.

3. Install loop-back and terminating plugs to test external ports if desired.

4. Cold boot the computer from the diagnostics diskette you have created. Press Enter to bypass the title screen, if necessary.

5. Select Computer Checkup (TEST).

6. Select the option to view the device list. A list of installed hardware devices appears.

7. Verify that TEST correctly detected the devices installed. This utility will detect all devices manufactured or supported by HP; devices from other manufacturers may not be detected.

   ❏ If the list is correct, select OK and go to step 8.

   ❏ If the list is incorrect, be sure that any new devices are installed properly.

8. Select one of the following from the test option menu:

   ❏ Quick Check Diagnostics—This option runs a quick, general test on each device with a minimal number of prompts. If errors occur, they are displayed when the testing is complete. This option will only test the first 16 MB of memory.

   ❏ Automatic Diagnostics—This option runs unattended, maximum testing of each device with minimal prompts. You can choose how many times to run the tests, to stop on errors, or to print or file a log of errors.

   ❏ Prompted Diagnostics—This option allows maximum control over the device testing process. You can choose attended or unattended testing, decide to stop on errors, or choose to print or file a log of errors.

✎ If attended testing is selected, the test itself may result in data loss.

Follow the instructions on the screen as the diagnostic tests are run on the devices. When the testing is complete, the TEST option menu is displayed again.

9. To exit TEST, press the Esc key to reach the Exit option. Then press Enter.

✎ Refer to Appendix E for a listing of the Diagnostic Error Codes.

2.2.3 View System Information (INSPECT)

Use View System Information (INSPECT) to:

■ View information about the system once it has been configured.

■ Save, print, or display the information generated by INSPECT. You should run INSPECT and have the printed report available before placing a call to the HP Customer Support Center.

■ Assist your HP/Compaq authorized dealer, reseller, or service provider in analyzing the system by allowing the service provider to reproduce the same environment on another computer for testing.

The information provided by INSPECT includes:

■ Contents of the operating system startup files

■ Current memory configuration

■ ROM versions

■ Type of processor and co-processor

■ Diskette, CD-ROM, DVD-ROM, tape, or hard drives installed

■ Active printer and communications interfaces

■ Modem type installed

■ Graphics settings

■ Windows WIN.INI file details

✎ Categories or items of information displayed by INSPECT are similar to but may vary slightly from those available in Diagnostics for Windows.

Before you run INSPECT, you must create a diagnostics diskette. See Section 2.2.1, "Create a Diagnostics Diskette," for instructions.

Running INSPECT

1. Cold boot the computer from the diagnostics diskette you have created. Press Enter to bypass the title screen, if necessary.

2. Select View System Information (INSPECT).

3. Select one of the available options using the Esc key:

   ❏ Print the INSPECT status.

   ❏ Save the INSPECT status to a file.

   ❏ Add comments to a parameter status.

   ❏ Exit the utility.

4. To exit INSPECT, press the Esc key to reach the Exit option. Then press Enter.

2.2.4 Diagnostics for Windows

Diagnostics for Windows is a component of Intelligent Manageability that allows you to view:

■   System overview

■   AssetControl information

■   Input devices

■   Communications ports

■   Storage devices

■   Graphics information

■   Memory configuration

■   Security management settings

■   System health

■   Operating system

■   Windows version

Depending on the version, Diagnostics for Windows may include diagnostic tests to determine if all the devices installed on the computer are recognized by the system and are functioning properly.

Using Diagnostics for Windows

1. Select the Diagnostics for Windows icon, located in the Control Panel.

2. The screen displays an overview of the computer hardware and software.

3. For specific hardware and software information, select a category from the Categories menu or from the toolbar.

✎ As you move your cursor over the toolbar icons, the corresponding category names appear near the cursor.

4. To display more detailed information in a selected category, click More in the Information Level box.

✎ Categories or items of information displayed by Diagnostics for Windows are similar to but may vary slightly from the information presented in View System Information (INSPECT).

5. Review and print this information.

✎ To print the information, click File, then select 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.

6. To exit Diagnostics for Windows, click File, then click Exit.

Running Diagnostic Tests

If your version of Diagnostics for Windows includes diagnostic testing utilities, four tabs will appear next to Overview: Test, Status, Log, and Error.

1. Select the Test tab.

2. Select one of the following options:

   ❏ Quick Test—Runs a quick, general test on each device with a minimal number of prompts.

   ❏ Complete Test—Runs maximum testing of each device with minimal prompts.

   ❏ Custom Test—Runs only the tests you select. To select specific devices or tests, find the device in the list, then click the box beside each test to select or deselect it. When selected, a red check mark appears in the box.

3. Select Interactive Mode or Unattended Mode.

4. 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.

5. Click the Begin Testing button.

6. Test Status is displayed, showing the progress and result of each test.

7. If errors are found, click the Error tab to display more detailed information and recommended actions. By following the recommended actions, you may be able to solve some problems yourself.

8. Click Print or Save the error information in case you need to contact your HP authorized dealer, reseller, or service provider for assistance.

9. To exit Diagnostics for Windows, click File, then click Exit.

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. The *Restore* CD or the *Restore Plus!* CD that accompanies many desktop and workstation models enables the user to selectively restore the original system software. You can order a replacement copy of the *Restore* CD from HP at nominal cost for all of the software preinstalled on the computer. Refer to the operating system or backup utility documentation for instructions on making backup copies of data files.

2.3.1 Ordering Backup Software

You can order all software that shipped with the product from HP as a single set, or you can order the various software packages separately.

✎ Before calling HP to place your order, be sure to have the serial number of the computer available. This number is necessary for all diskette purchases.

2.3.2 Restore CD

The Windows-based systems ship with either the *Restore* CD or the *Restore Plus!* CD that offer easy deployment and recovery of system software. Along with the Microsoft operating system CD, the *Restore* and *Restore Plus!* CDs enable the user to selectively restore the original system software. This can be extremely helpful in the event of hard drive failure or corruption. Required drivers that are not included on the *Restore* CD or the *Restore Plus!* CD may be downloaded from the HP web site at www.hp.com.

3

Desktop Management

HP Intelligent Manageability provides standards-based solutions for managing and controlling workstations in a networked environment. This guide 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

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

3.1 Initial Configuration and Deployment

HP workstations come with a preinstalled system software image. After a very brief software "unbundling" process, the computer 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 (www.compaq.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 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/Compaq logo screen. Follow the instructions on the screen to continue the process.

3.3 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 for Compaq, 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.

3.3.1 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 computer, 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 computers.

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.

3.3.2 PC Transplant Pro and PC Transplant for Compaq

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 computer.

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

3.3.3 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/Compaq 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

3.3.4 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.

3.3.5 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.

3.3.6 Remote ROM Flash

Your computer 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 computer. 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 computers directly from the centralized network management console. Enabling the system administrator to perform this task remotely on multiple computers 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 computer to be restarted, in the unlikely event of an unsuccessful ROM flash.

✎ Your computer 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 computer.

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.

✎ 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 computer.

3.3.7 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 computers, results in consistent deployment of and greater control over client computer security parameters over the network.

✎ Your computer 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.

3.3.8 Remote Wakeup and Remote Shutdown

If your computer has an optional 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 computer from a remote location supported by PC LAN management tools.

✎ Third-party software tools are required to remotely distribute software.

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

✎ The computer 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 computer 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.

3.3.9 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.

3.3.10 Replicating Your Setup

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

1. Access the Computer Setup Utilities menu.

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

✎ This requires an internal diskette drive, a MultiBay LS-120 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.

3.3.11 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 computer 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. Refer to the *Computer Setup (F10) Utility 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.

✎ 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 computer is in suspend. Refer to the *Computer Setup (F10) Utility Guide* for more information on using Computer Setup.

3.3.12 Power Management

Power Management is a feature that saves energy by shutting down certain components of the computer when they are not in use, saving energy without having to shut down the computer. Timeouts (the period of inactivity allowed before shutting down these components) can be enabled, customized, or disabled using Computer Setup.

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. Refer to the *Computer Setup (F10) Utility Guide* for more detailed information about the features of Computer Setup.

5. Select File > Save Changes and Exit.

✎ To avoid conflicts, never enable monitor timeouts in Windows 98 while system timeouts are enabled in Computer Setup.

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.

3.3.13 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 or Microsoft Windows NT Workstation that is different from the version included with your computer, 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.

3.3.14 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.*

3.3.15 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)

3.4 Asset Tracking and Security

The asset control features incorporated into the computer 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 Smart Cover Sensor and the Smart Cover Lock, available on select models, help to prevent unauthorized access to the internal components of the personal computer. By disabling parallel, serial, or USB ports, or by disabling removable media boot capability, you can protect valuable data assets. Memory Change and Smart Cover Sensor alerts can be automatically forwarded to HP Insight Manager products to deliver proactive notification of tampering with a computer's internal components.

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

■ Locally, using the Setup Utilities. See the *Computer Setup (F10) Utility Guide* included with the computer 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 computer 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 computer 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 computer (use of the Computer Setup Utilities) until the password is entered.	From the Setup Utilities menu.
Network Server Mode	Provides unique security features for computers being used as servers.	From the Setup Utilities menu.
DriveLock	Prevents unauthorized access to the data on specific hard drives. This feature is available on select models only.	From the Setup Utilities menu.
Smart Cover Sensor	Indicates that computer cover or side panel has been removed. Can be set to require the setup password to restart the computer, after the cover or side panel has been removed.	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*.

Security Features Overview *(Continued)*

Feature	Purpose	How It Is Established
Ownership Tag	Displays ownership information, as defined by the system administrator, during system startup (protected by setup password).	From the Setup Utilities menu.
Kensington Cable Lock Provision	Inhibits access to the interior of the computer to prevent unwanted configuration changes or component removal. Can also be used to secure the computer to a fixed object to prevent theft.	Install a Kensington cable lock to secure the computer to a fixed object.

✎ For more information about Computer Setup, see the *Computer Setup (F10) Utility Guide*.

3.4.1 Password Security

The power-on password prevents unauthorized use of the computer by requiring entry of a password to access applications or data each time the computer 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 computer.

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 computer (use of the Computer Setup utility) until the password is entered.

1. Turn on or restart the computer. 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.

✎ If you do not press the F10 key while the message is displayed, you must restart the computer 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 computer 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 computer 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 computer 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 computer. 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.

✎ If you do not press the F10 key while the message is displayed, you must restart the computer 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 computer. 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.

✎ 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 computer, then turn it on again before you can continue.

Entering a Setup Password

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

1. Turn on or restart the computer. 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.

✎ If you do not press the F10 key while the message is displayed, you must restart the computer to access the utility.

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

✎ 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 computer, then turn it on again before you can continue.

Changing a Power-On or Setup Password

1. Turn on or restart the computer. 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

✎ 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 computer.

✎ Refer to 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.

3.4.2 Deleting a Power-On or Setup Password

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

✎ Refer to "National Keyboard Delimiter Characters" table 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 computer.

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	/

National Keyboard Delimiter Characters

Arabic	/	Greek	-	Russian	/
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 computer. Refer to the *Troubleshooting Guide* for instructions on clearing passwords.

3.4.3 Network Server Mode

Network Server Mode provides unique security features for computers 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).

3.4.4 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.

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 device's user password, 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

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.

3.4.5 Smart Cover Sensor

Smart Cover Sensor is a combination of hardware and software technology that can alert you when the computer cover or side panel has been removed. There are three levels of protection, as described in the following table.

Smart Cover Sensor Protection Levels

Level	Setting	Description
Level 0	Smart Cover = Disabled	Smart Cover Sensor is disabled (default).
Level 1	Smart Cover = Notify User	When the computer is restarted, the screen displays a message indicating that the computer cover or side panel has been removed.
Level 2	Setup Password = enabled and Smart Cover = notify user	When the computer is restarted, the screen displays a message indicating that the computer cover or side panel has been removed. You must enter the setup password to continue.

Setting the Smart Cover Sensor Protection Level

To set the Smart Cover Sensor protection level, complete the following steps:

1. Turn on or restart the computer. 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.

✎ If you do not press the F10 key while the message is displayed, you must restart the computer to access the utility.

3. Select Security, then Smart Cover, and follow the instructions on the screen.

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

3.4.6 Smart Cover Lock

The Smart Cover Lock is available as an option on hp workstation xw4000 models. When installed, the Smart Cover Lock can prevent unauthorized access to the internal components.

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

Locking the Smart Cover Lock

To activate and lock the Smart Cover Lock, complete the following steps:

1. Turn on or restart the computer. 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.

✎ If you do not press the F10 key while the message is displayed, you must restart the computer to access the utility.

3. Select Security, then select Smart Cover and the Locked option.

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

Unlocking the Smart Cover Lock

1. Turn on or restart the computer. 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.

✎ If you do not press the F10 key while the message is displayed, you must restart the computer to access the utility.

3. Select Security > Smart Cover > Unlocked.

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

Using the Smart Cover FailSafe Key

If you enable the Smart Cover Lock and cannot enter your password to disable the lock, you will need a Smart Cover FailSafe Key to open the computer 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 Smart 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.

For more information about using the Smart Cover FailSafe Key, consult the *Hardware Reference Guide.*

3.4.7 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 computer. 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.

> If you do not press the F10 key while the message is displayed, you must restart the computer 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.

> 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 computer 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:

<div align="center">1999 - Master Boot Record has changed.</div>

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:

<div align="center">2000 - Master Boot Record Hard Drive has changed.</div>

 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:

<div align="center">1998 - Master Boot Record has been lost.</div>

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 computer is turned on or restarted. To disable MBR Security, complete the following steps:

1. Turn on or restart the computer. 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.

✎ If you do not press the F10 key while the message is displayed, you must restart the computer to access the utility.

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

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

3.4.8 Cable Lock Provision

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

For illustrated instructions, please see the *Hardware Reference Guide* on the *Documentation Library CD*.

3.4.9 Fingerprint Identification Technology

Eliminating the need to enter user passwords, Compaq Fingerprint Identification Technology tightens network security, simplifies the login process, and reduces the costs associated with managing corporate networks.

✎ Support for Fingerprint Identification Technology varies by model.

See www.compaq.com/products/options/fit/index.html for more information.

3.5 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 computer 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 computer is connected to a network managed by a HP Insight Manager product or other management products from HP Management Solutions Partners, the computer also sends a fault notice to the network management application.

3.5.1 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.

3.5.2 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 computer detects an abnormal number of transmission errors, the computer displays a Local Alert message with recommended actions.

3.5.3 ECC Fault Prediction and Prefailure Warranty

When the computer encounters an excessive number of error checking and correcting (ECC) memory errors, the computer 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.

✎ To use this feature, you must replace the standard DIMMs or RIMMs with ECC DIMMs or ECC RIMMs.

3.5.4 Surge-Tolerant Power Supply

An integrated surge-tolerant power supply provides greater reliability when the computer is hit with an unpredictable power surge. This power supply is rated to withstand a power surge of up to 2000 volts without incurring any system downtime or data loss.

3.5.5 Thermal Sensor

The thermal sensor is a hardware and software feature that tracks the internal temperature of the computer. This feature displays a warning message when the normal range is exceeded, which gives you time to take action before internal components are damaged or data is lost.

4

Ultra ATA Drive Guidelines and Features

4.1 Ultra ATA Jumpers

Ultra ATA drives are configured by means of jumper settings. These systems use 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.

✎ 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.

4.2 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-100, -66, and slower -33 drives in the same system, each drive will operate at its appropriate data transfer rate.
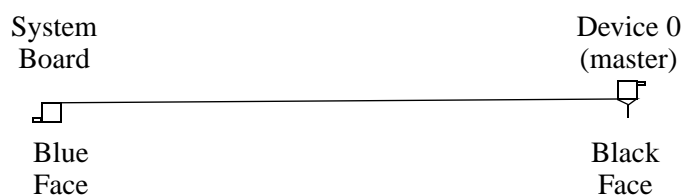
4.2.1 Cable Layout

The faces of industry-standard cable connectors are color coded for easy recognition:

■ System board connector = blue face

■ Device 0 connector = black face
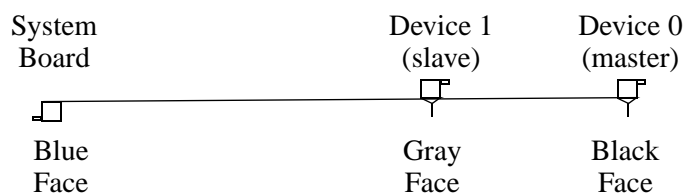
■ Device 1 connector = gray face

✎ 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.

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

4.3 Drive Installation Guidelines

Most computer 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 computer 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.

✎ 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 computer 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.

4.3.1 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.

4.3.2 Attach Sequence Rules by Class Priority

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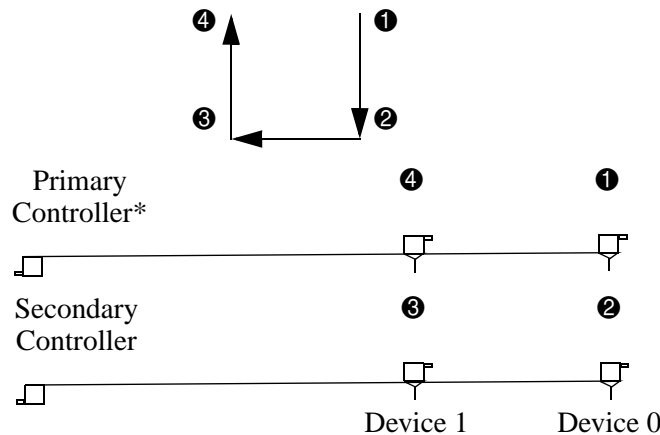
*If there are three or more devices, two or more of which are hard drives, two hard drives should be attached to the primary controller first before following the General Attach Sequence Rule.

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.

4.3.3 Attach Sequence Worksheet

Use the worksheet below for obtaining optimum system performance when setting up a computer 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
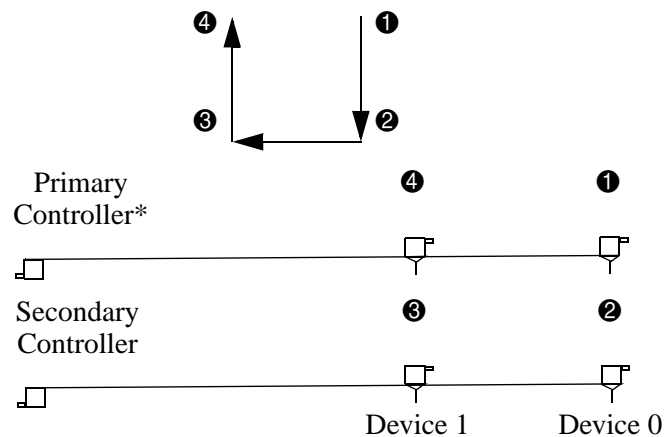
■ Four device installation

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	1	Primary	0
DVD drive	2	2	Secondary	0
CD-ROM drive	3	3	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	1	Primary	0
DVD-CDR/W drive	2	2	Secondary	0
ZIP-250 drive	4	3	Secondary	1
Ultra ATA-100 hard drive*	1	4	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.
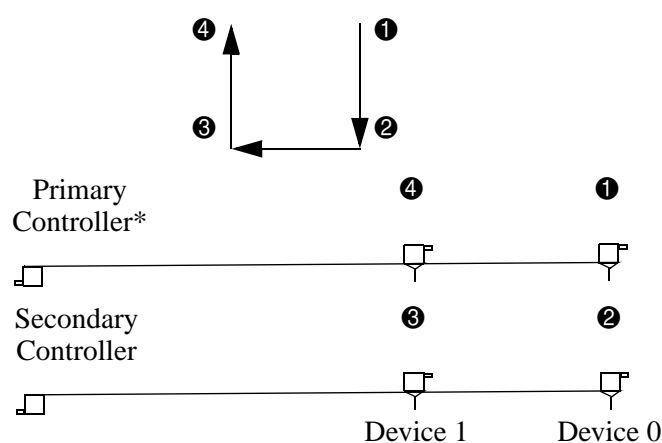
4.3.4 Additional Drive Application Notes

■ 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 Setup).

4.4 SMART

The Self Monitoring Analysis and Recording Technology (SMART) ATA drives for the 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. The SMART drives track 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.

4.5 Drive Capacities

The combination of the file system and the operating system used in the computer 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 computer 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
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 16	ATA or SCSI	DOS/Windows 95	2 GB	128 GB
FAT 16	ATA or SCSI	Windows NT	4 GB	128 GB
FAT 32	ATA or SCSI	Windows 98/SE	64 GB	128 GB
FAT 32	ATA	Windows 98/SE with QFE* and Windows ME	128 GB	128 GB
FAT 32	SCSI	Windows 98/SE with QFE* and Windows ME	2 TB	2 TB
FAT 32	ATA	Windows 2000/ XP	32 GB	128 GB
FAT 32	SCSI	Windows 2000/ XP	32 GB	2 TB
NTFS	ATA	Windows NT/2000/XP	128 GB	128 GB
NTFS	SCSI	Windows NT/2000/XP	2TB	2TB

*For Windows 98/SE with QFE see www.microsoft.com, search for Q263044 for details on how to expand partition size.

5

SCSI Devices

5.1 SCSI Guidelines

✎ 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 (Compaq number 199618-001) or an external cable adapter (Compaq number 270187-B21).

⚠ **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 computer 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 computer.

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

5.2 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.
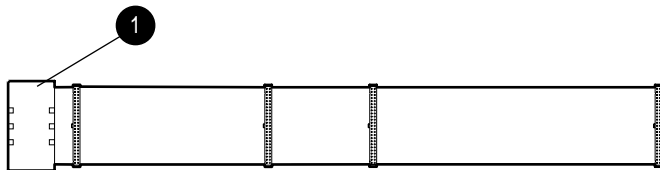
✎ The multi-mode cable included with the computer may differ from the one pictured.

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

5.3 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/Compaq 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

✎ For additional information about configuring POST message display status, refer to the *Computer Setup (F10) Utility Guide*.

5.4 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.

5.5 Jumpers

The specifications included below are the standard drive configurations.

5.5.1 Ultra3 SCSI Hard Drive
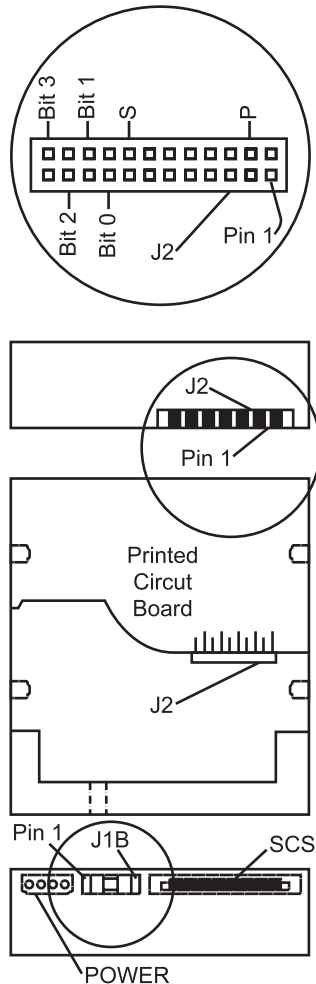
SCSI ID Settings

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.

5.5.2 CD-ROM or DVD-ROM Drive

5.5.3 Zip Drive

Default
Settings
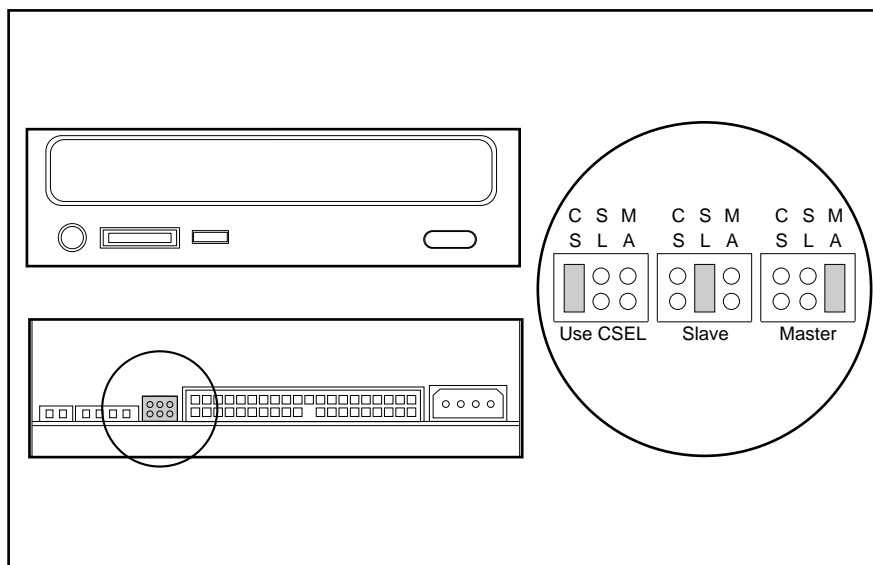
Jumper Setting
for Cable Select
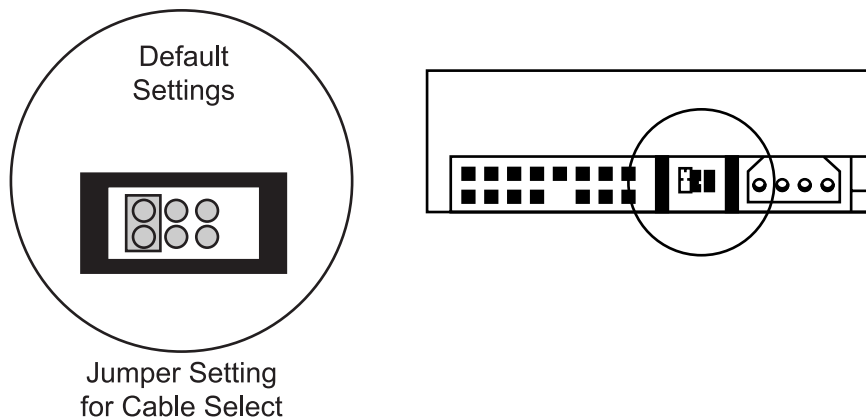
Jumper Settings

Configuration	Pair 1	Pair 2	Pair 3
Device 0 (Master)			jumper
Device 1 (Slave)			
Cable Select (Default)	jumper		

After changing the jumper settings, reboot the computer to recognize the new address.

6

SATA Devices

6.1   SATA guidelines

✎ The xw6000 system supports 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:

■ 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).

■ Use the 14 inch SATA data cable with a straight connectors (326965-004) for the hard drive bays.

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

To maintain Class B standards for radiated emissions, SATA cables on HP workstation xw6000 systems must be routed so they do not contact the access panel. Loosely tie-wrap the SATA cables to the audio cable as shown in the following illustrations.
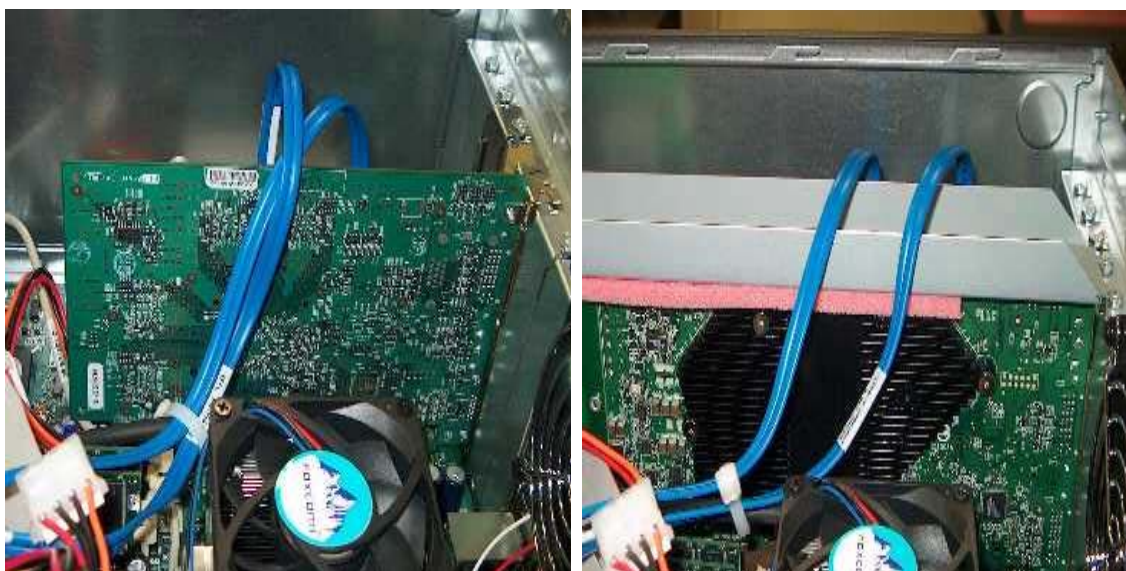
cable routing shown with a standard graphics card (left photo) and with an AGP support bracket (right photo)

6.2 boot order

The following flow diagram shows the boot order of hard drives (C:) connected to the different controllers in the workstation system.
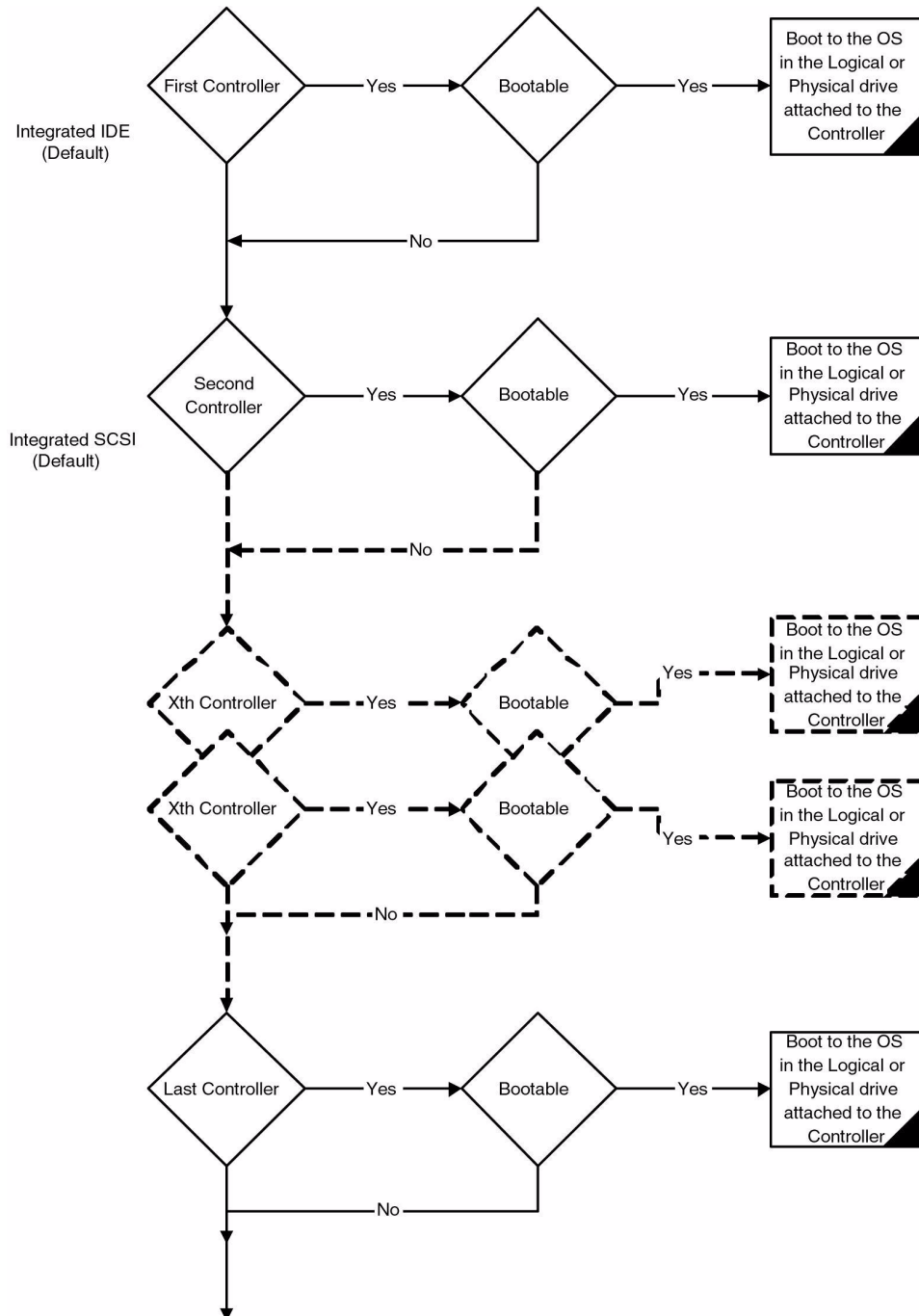
Using the F10 Computer Setup Utility, you can modify the boot order by arranging the Controller Order on the Storage tab. Although not shown, other bootable device options such as a diskette, CD-ROM, USB, network, and so on can be set up from the Storage tab as well.

✎ The F10 Computer Setup Utility can be accessed by pressing F10 during boot.

6.3   hard drive configurations

The following table presents common physical hard drive configurations for the HP workstation xw6000.

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

✎   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 are only recommended for RAID purposes.

7

# Identifying the Chassis, Routine Care, and Disassembly Preparation

This chapter provides general service information for the computer. Adherence to the procedures and precautions described in this chapter is essential for proper service.

⚠ **CAUTION:** When the computer is plugged into an AC power source voltage is always applied to the system board. You must disconnect the power cord from the power source before opening the computer to prevent system board or component damage.

7.1 Chassis Type

The hp workstation xw4000 and hp workstation xw6000 series use a Convertible Minitower chassis. The Convertible Minitower chassis features a hard drive bay cluster that may be rotated, allowing the chassis to be configured either as a minitower (vertical) or a desktop (horizontal).
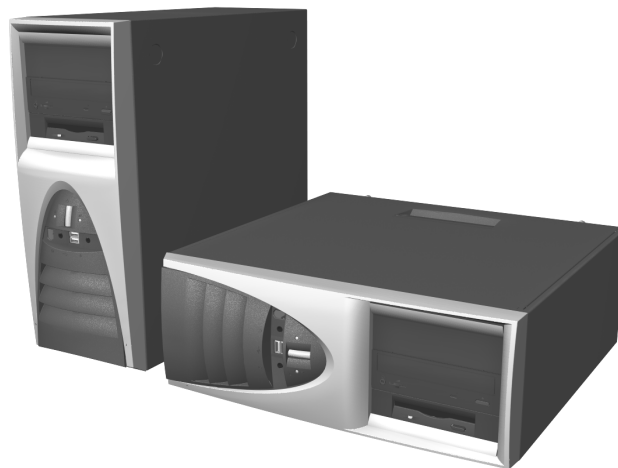
The chassis of the hp workstation xw4000 and the hp workstation xw6000 are very similar when viewed from the front. When viewed from the rear the systems are distinguished by the number of fans (two on the xw4000, three on the xw6000) and minor differences in I/O layout.

7.2 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.

7.2.1 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 DIPs* from plastic tube	400 V	700 V	2,000 V
Removing DIPs* from vinyl tray	2,000 V	4,000 V	11,500 V
Removing DIPs* from Styrofoam	3,500 V	5,000 V	14,500 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

*These are then multi-packaged inside plastic tubes, trays, or Styrofoam.

✎ 700 volts can degrade a product.

7.2.2 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.

■ Always be properly grounded when touching a sensitive component or assembly.

■ Avoid contact with pins, leads, or circuitry.

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

7.2.3 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/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

7.2.4 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.

7.2.5 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

7.3 Routine Care

7.3.1 General Cleaning Safety Precautions

1. Never use solvents or flammable solutions to clean the computer.

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 computer when cleaning with liquids or damp cloths.

4. Always unplug the computer 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.

7.3.2 Cleaning the Computer Case

Follow all safety precautions in Section 6.2.1 before cleaning the computer.

To clean the computer 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 computer. Lint and other foreign matter can block the vents and limit the airflow.

7.3.3 Cleaning the Keyboard

Follow all safety precautions in Section 6.2.1 before cleaning the keyboard.

To clean the tops of the keys or the keyboard body, follow the procedures described in Section 6.2.2.

When cleaning debris from under the keys, review all rules in Section 6.2.1 before following these procedures:

△ **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.

⚠ **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.

7.3.4 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 6.2.2.

7.3.5 Cleaning the Mouse

Before cleaning the mouse, ensure that the power to the computer 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 6.2.2.

7.4 Service Considerations

Listed below are some of the considerations that you should keep in mind during the disassembly and assembly of the computer.

7.4.1 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 computer is turned off or the power cable has been disconnected.

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

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

7.4.2 Tools and Software Requirements

To service the computer, you need the following:

■ Torx T-15 screwdriver (Compaq screwdriver with bits, PN 161946-001)

■ Torx T-15 screwdriver with small diameter shank (for certain front bezel removal)

■ Flat-bladed screwdriver (may sometimes be used in place of the Torx screwdriver)

■ Diagnostics software

■ Compaq tamper-resistant T-15 wrench (Smart Cover FailSafe Key, PN 166527-001) or Compaq tamper-resistant bits (Smart Cover FailSafe Key, PN 166527-002)

7.4.3 Screws

The screws used in the computer 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.

✎ Metric screws have a black finish.
U.S. screws have a silver finish.

✎ As each subassembly is removed from the computer, it should be placed away from the work area to prevent damage.

7.4.4 Cables and Connectors

Most cables used throughout the unit are flat, flexible cables. These 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 computer, ensure that cables are placed in their proper location during the reassembly process. Improper cable placement can damage the computer.

7.4.5 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 CPU.

■ Avoid dropping drives from any height onto any surface.

■ If you are inserting or removing a hard drive, turn off the computer. Do not remove a hard drive while the computer 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, refer to Section 6.1, "Electrostatic Discharge Information."

■ 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.

7.4.6 Lithium Coin Cell Battery

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

See Chapter 9, "Removal and Replacement Procedures–Small Components," for instructions on the replacement procedures.

⚠ **WARNING:** This computer 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.

8

Removal and Replacement Procedures Security Components

This chapter describes the security components for the Convertible Minitower chassis. For an overview of the chassis refer to Chapter 6 "Identifying the Chassis, Routine Care, and Disassembly Preparation."

⚠️ **CAUTION:** When the computer is plugged into an AC power source voltage is always applied to the system board. You must disconnect the power cord from the power source before opening the computer to prevent system board or component damage.

This chapter provides general service information for the computer. Adherence to the procedures and precautions described in this chapter is essential for proper service.

After completing all necessary removal and replacement procedures, run the Diagnostics utility to verify that all components operate properly.

✏️ Not all features listed in this guide are available on all computers.

8.1 Preparation for Disassembly

See Chapter 6, "Identifying the Chassis, Routine Care, and Disassembly Preparation," for initial procedures.

1. Remove/disengage any security devices that prohibit opening the computer.
2. Close any open software applications.
3. Exit the operating system.
4. Remove any diskette, compact disc, or MultiBay device from the computer.
5. Turn off the computer and any peripheral devices that are connected to it.

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

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

6. Disconnect the power cord from the electrical outlet and then from the computer.
7. Disconnect all peripheral device cables from the computer.

8.2 Security Devices

8.2.1 Smart Cover Lock

The hp workstation xw4000 supports an optional Smart Cover Lock. This software-controllable lock prevents unauthorized access to the internal components when the Smart Cover Lock and setup password are enabled.

If you enabled the Smart Cover Lock, use Computer Setup to unlock it. If you cannot enter your password to disable the lock, you will need a Smart Cover FailSafe Key (Compaq spare PN 166527-001 or 166527-002) to open the computer cover. You will also need the key in any of the following circumstances:

■ Power outage

■ Startup failure

■ PC component (e.g., processor or power supply) failure

■ Lost password

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

1. Prepare the computer for disassembly.

2. Using the Smart Cover FailSafe Key, remove the two tamper-proof screws that secure the Smart Cover Lock to the chassis. Use the special Compaq tamper-resistant T-15 wrench (PN 166527-001) or screwdriver bit (PN 166527-002) for this operation.
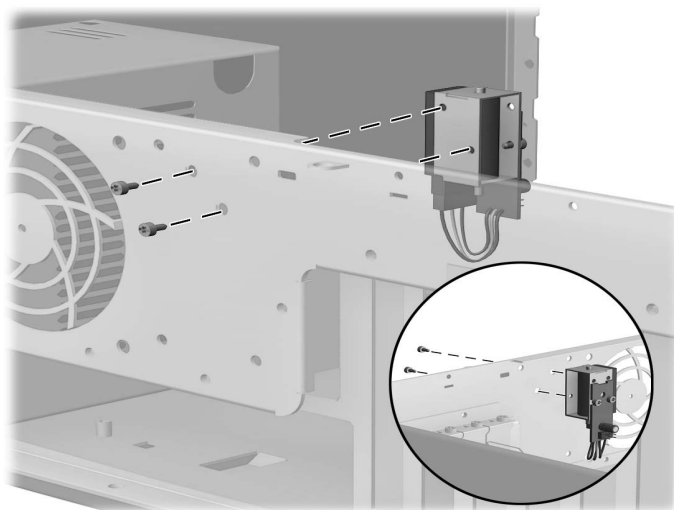
smart cover lock mounting (hp workstation xw4000 shown)

3. Remove the Smart Cover Lock.

To reattach the Smart Cover Lock, secure the lock in place with the tamper-proof screws.

8.2.2 Smart Cover Sensor

The Smart Cover Sensor is a software-controllable feature standard on hp workstation xw4000 and hp workstation xw6000 systems. This sensor can be activated with the Setup utility to detect access panel removal and can be used as a security or maintenance aid. The sensor switch is located on a mounting bracket toward the front of the chassis next to the drive bay area.

To remove the sensor switch use the following procedure:

1. Prepare the computer for disassembly.
2. Remove the access panel.
3. Disconnect the sensor switch cable ❶ from the system board.
4. Push the sensor switch toward the front of the chassis ❷ and then remove it downward from the mounting bracket ❸.
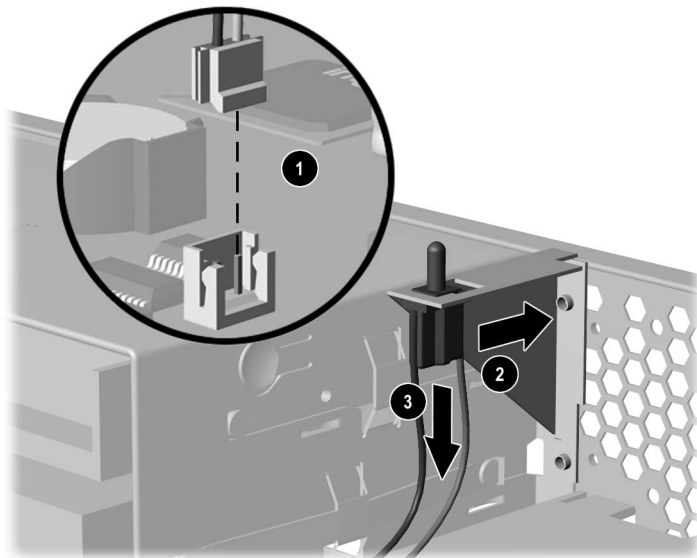
Installation is the reverse of removal.

8.2.3 Security Lock Bracket

The computer includes a provision for securing the access panel and/or computer with an optional lock. With the access panel in place a padlock may be hooked through a holed flange (as shown in the figure below) to deter unauthorized access to the inside of the computer.

A cable lock may be attached (using the same method as with a padlock) to secure the unit to a desk and/or other equipment.

9
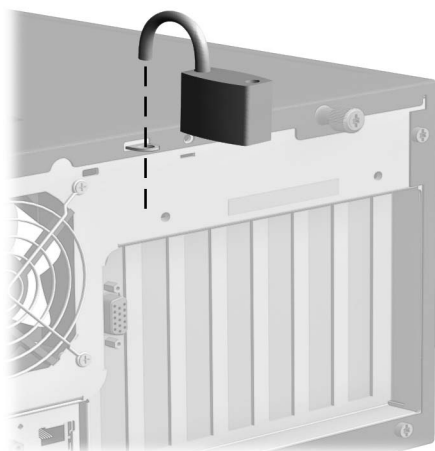
Removal and Replacement Procedures Drives

This chapter describes the procedures for removal and replacement of hard drives. For an overview of the Convertible Minitower chassis, refer to Chapter 6 "Identifying the Chassis, Routine Care, and Disassembly Preparation."

⚠ **WARNING:** Power is applied 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.

9.1 Introduction

When installing additional drives, follow these guidelines:

■ For optimal performance, connect hard drives to the primary controller. Connect expansion devices, such as CD-ROM, IDE tape, and diskette drives to the secondary controller.

✎ Refer to Chapter 4 for more detailed information on Ultra ATA drives and to Chapter 5 for SCSI drives.

■ You must install guide screws to ensure that the drive lines up correctly in the drive cage. Extra guide screws are provided that are installed in the front of the computer chassis behind the front bezel. Some options require metric hardware. Factory-supplied metric screws are black.

■ Drive installation requires no jumper setting changes on the existing or optional drives. All factory-installed drives have the jumpers preset for cable-select installation.

■ The system automatically recognizes hard drives any Plug and Play hard drive and will automatically reconfigure the computer. If you installed a hard drive that is not a Plug and Play device, you must run Computer Setup to reconfigure the computer.

✎ If installing a second device on the primary controller, you must use an 80-conductor Ultra ATA cable for optimal performance. This cable is available as an HP option.

⚠ **CAUTION:** When servicing the computer, ensure that cables are placed in their proper locations during the reassembly process. Improper cable placement can damage the computer.

9.2 **Removing a Drive**

Use the following procedure for removing a hard drive:

1. Prepare the computer for disassembly.

✎ The computer should be placed in the horizontal (desktop) position for best stability.

2. Remove the access panel.

3. Remove the front bezel.

4. Disconnect the power, data, and audio (if applicable) cables from the back of the drive.

5. Press the drivelock mechanism to unlock the drives. Drivelock ❶ (yellow) secures the external drives in the desktop configuration; drivelock ❷ (green) secures all drives in the minitower configuration and the internal drives in the desktop configuration.
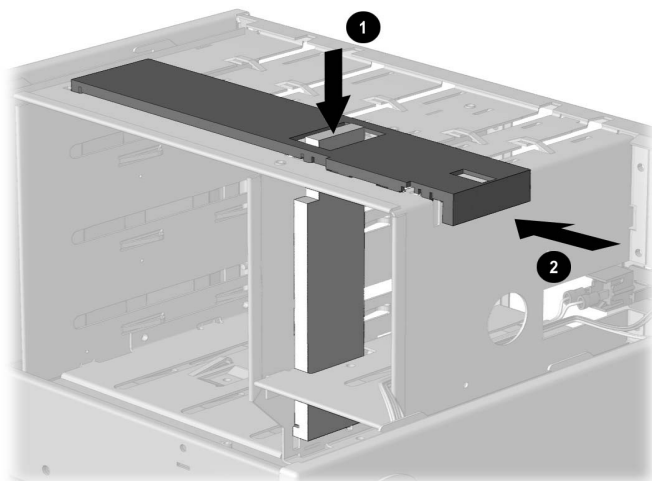
6. While holding the drivelock in the unlocked position, remove the drive from the drive bay.
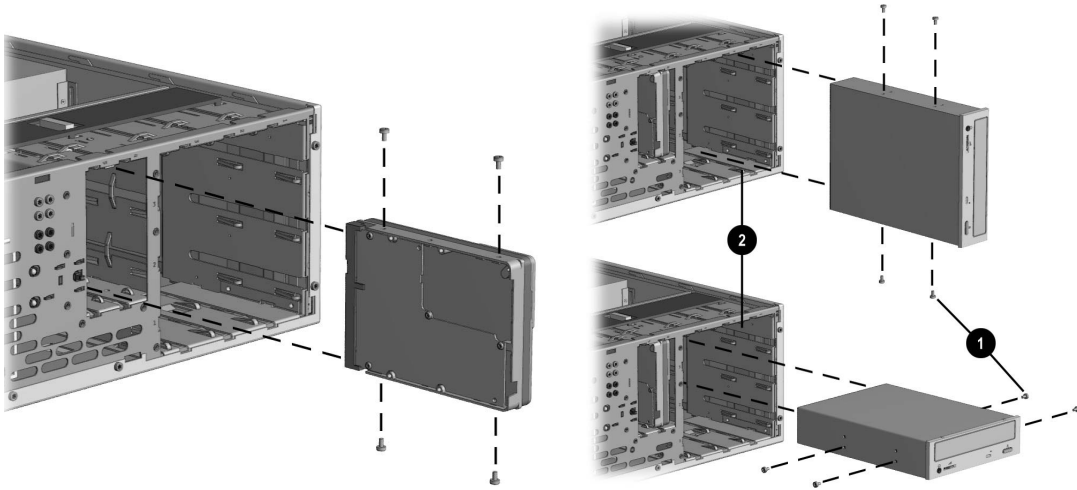
7. Remove the four guide screws from the drive.

8. Install two guide screws on each side of the replacement drive.

✎ Metric screws (M3) have a black finish; U.S. screws have a silver finish.

Replace the drive by reversing the above procedure.

⚠ **CAUTION:** Use only 3/16-inch or 5-mm long screws as guide screws. Longer screws can damage the internal components of the drive.

9.3   Installing a New Drive

Use the following procedure for installing a hard drive:

1. Install two guide screws on each side of the replacement drive ❶.

2. Ensure that the guide screws line up with the guide slots ❷, then slide the drive into the drive bay until it snaps into place.

3. Connect the power and signal cables to the back of the drive.

4. Remove the bezel blank from the subpanel, if necessary.

5. Reinstall the subpanel and the front bezel.

✎ Refer to the previous drawing for these steps.

9.4 Removing a 3.5-Inch Drive From a 5.25-Inch Drive Adapter

A 3.5-inch drive must be installed into a 5.25-inch drive adapter in order to install the smaller drive into a standard 5.25-inch drive bay.

1. Remove the bracket brace ❶ from the top of the drive adapter by squeezing inward on both sides, then rotating the brace up and out.

2. Remove the drive bezel ❷.

✎ Buttonless drives use a different front bezel but the removal procedure is the same.

3. Remove the three screws ❸ that secure the drive to the left and right sides of the drive adapter.

4. Slide the drive ❹ to the rear of the drive adapter until the diskette drive eject button is free of the button protector, then lift the drive out of the drive adapter.

5. Remove the guide screws from the drive ❺.
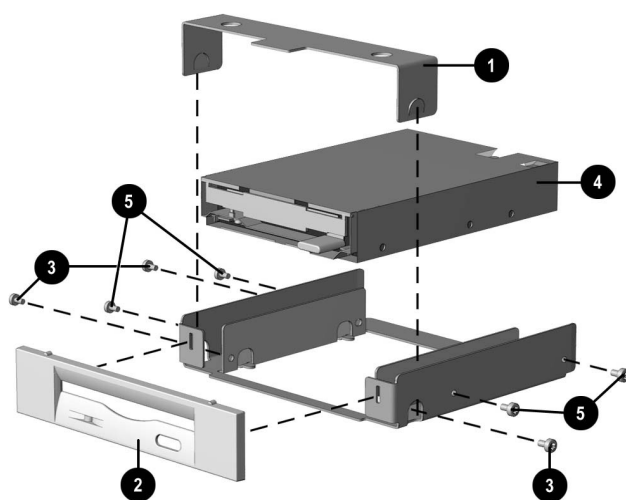
To replace the drive, reverse the previous procedures.

✎ The primary 3.5-inch diskette drive should only be installed into bay 3 (the bottom bay in the minitower).

When replacing the drive, use the existing screws. Metric screws (M3) have a black finish while U.S. screws (#6) have a silver finish.

⚠ **CAUTION:** Use only 3/16-inch or 5-mm long screws as guide screws. Longer screws can damage the internal components of the drive.

Removal and Replacement Procedures Chassis

This chapter describes the procedures for removal and replacement of chassis subassemblies. For an overview of the chassis refer to Chapter 6 "Identifying the Chassis, Routine Care, and Disassembly Preparation."

⚠ **CAUTION:** When the computer is plugged into an AC power source, voltage is always applied to the system board. You must disconnect the power cord from the power source before opening the computer to prevent system board or component damage.
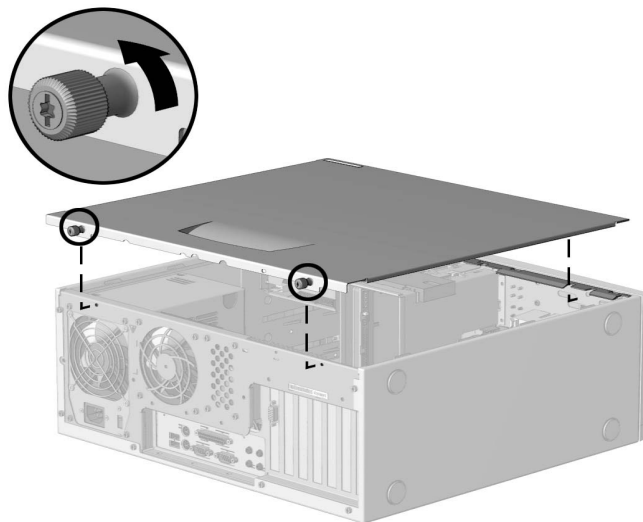
10.1 Access Panel Removal

⚠ **CAUTION:** The cooling fan is off **only** when the computer is turned off or the power cable has been disconnected. The cooling fan is always on when the computer is in the "On," "Standby," or "Suspend" modes.Access Panel Models with Thumbscrews

1. Prepare the computer for disassembly.

2. Loosen the thumbscrews that secure the access panel to the back of the computer chassis.

✎ Not all thumbscrews used are captive. Thumbscrew design may vary by model.

3. Slide the access panel backward approximately 1-inch (2.5-cm); then lift it up and off the unit.

removing CMT access panel

10.2 Front Bezel and Related Components

10.2.1 Front Bezel Removal - Tabs

The front bezel assembly consists of a bezel base and a bezel front and is removed as a single assembly. The front bezel assembly is connected to the chassis using tabs.

1. Prepare the computer for disassembly.

2. Remove the computer cover.

3. Press the two release tabs ❶ to disconnect the bezel from the left side of the chassis.. .

4. Swing the front bezel towards the right of the chassis and unhook it from the unit.
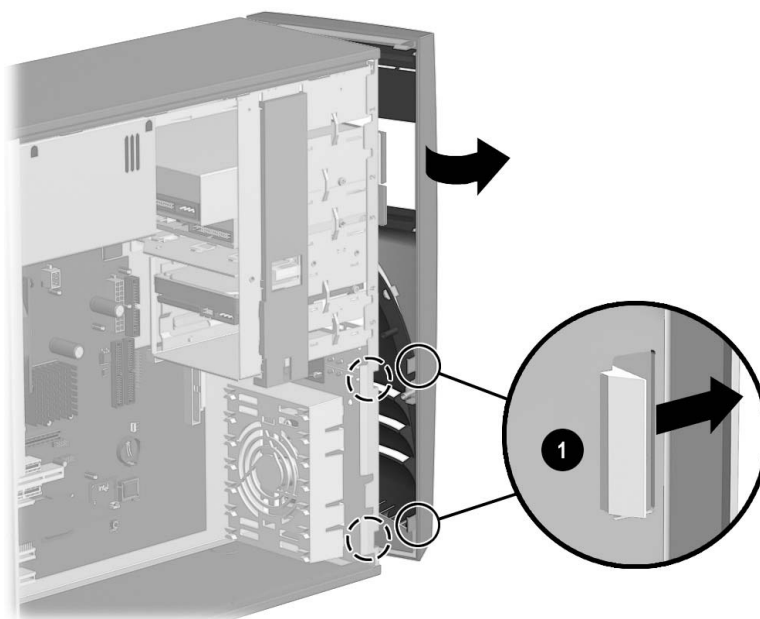
✎ When replacing the front bezel, ensure that the bottom hinge points are properly placed in the chassis before rotating the front bezel back into its original position.

To replace the front bezel, reverse the removal procedure.

## 10.2.2 Subpanel and Bezel Blanks

The subpanel and bezel blanks must be removed from the front bezel if you are installing a mass storage device for the first time, or if you are converting the unit from a desktop to a minitower configuration or from a minitower to a desktop. See Section 9.7 in this book for more information on changing unit configuration.

1. Prepare the computer for disassembly.

2. Lay the computer down on its large base for greater stability.

3. Remove the access panel.

4. Remove the front bezel.

5. Pull on the subpanel to remove it from the inside of the front bezel.

⚠ **CAUTION:** Hold the subpanel straight when you pull it away from the front bezel. Pulling at an angle could damage the pins that align the subpanel within the front bezel.

6. Gently push on the bezel blanks to remove them from the subpanel.
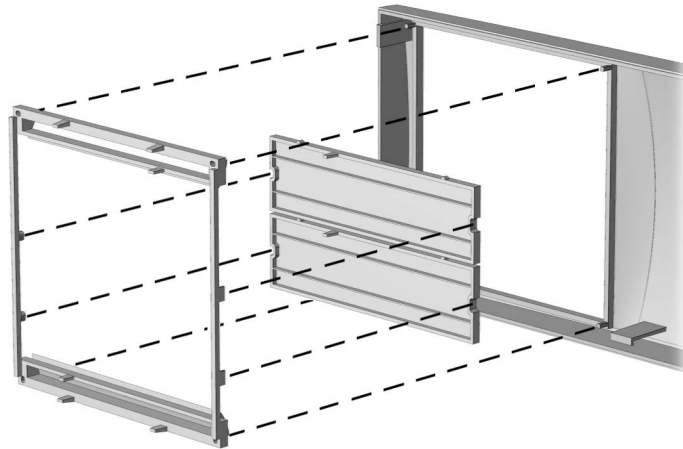
⚠ **CAUTION:** When replacing the subpanel, ensure that the aligning pins and any remaining bezel blanks are in the proper orientation to prevent damage to the alignment pins.

✎ The subpanel has markings on it to facilitate installation.

To reassemble the front bezel assembly, reverse the disassembly procedure.

Front Bezel USB/Audio/1394 Card

1. Prepare the computer for disassembly.

2. Lay the computer down on its large base for greater stability.

3. Remove the access panel.

4. Remove the front bezel assembly.

5. Disconnect the audio and USB cables (that are attached to the USB/Audio/1394 card) from the system board.

6. Disconnect the 1394 cable from the 1394 card (if present).

7. Remove the two screws that secure the card to the chassis ❶.

8. Remove the card from the chassis by first sliding it away from the chassis panel until the audio jacks are clear from the chassis cutouts and then lifting the card out.
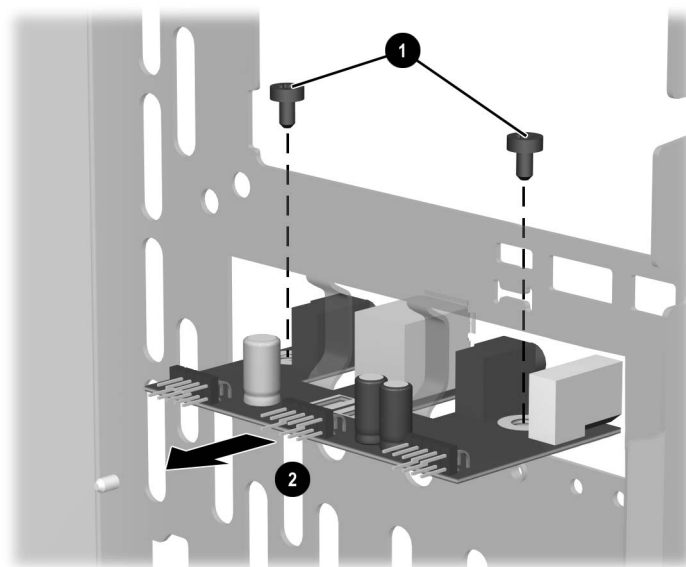
To replace the card, reverse the removal procedures. If necessary, replace the front bezel insert with the appropriate insert to allow access to the new ports.

10.3 Power Switch

To remove the power switch use the following procedure:

1. Prepare the computer for disassembly.

2. Remove the access panel.

3. Remove the front bezel.

4. Move/remove any components necessary to gain access to the power switch.

5. Disconnect the Power/LED cable from the system board ❶.

6. Push the release tab ❷ toward the drive bays, then remove the power switch assembly from the chassis.
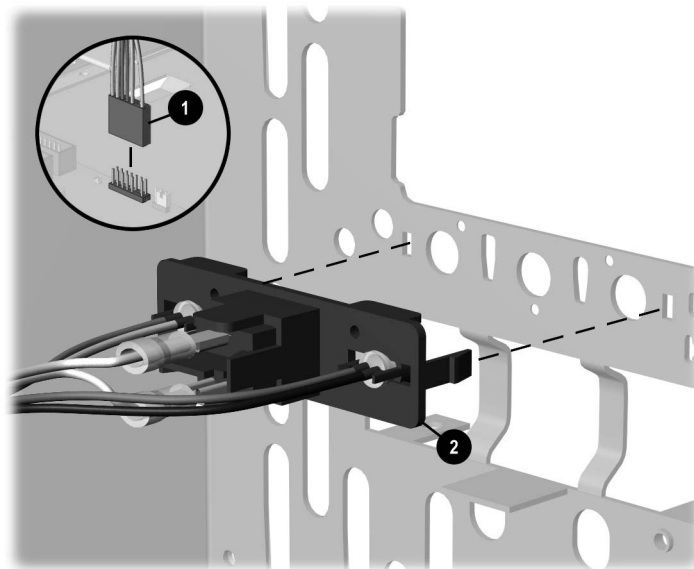
Power switch removal

To install the new power switch, reverse the above procedure. Ensure that the orienting pins are properly aligned with the locating holes before seating the switch assembly. The switch is fully seated when it snaps into place.

To install a Power/LED cable, reverse the above procedure. The Power/LED connector is keyed to ensure proper installation.

✎ When replacing the power switch, make sure that the power switch LED cable assembly is routed under the hard drive.

10.4 Board Guide

On the hp workstation xw4000, it is necessary to remove the board guide before removing the speaker. On the hp workstation xw6000, it is necessary to remove the board guide in order to install or replace the chassis fan. To remove the board guide use the following procedure:

1. Prepare the computer for disassembly.
2. Remove the access panel.
3. Move/remove any components necessary to gain access to the board guide.
4. Remove any full-length expansion boards.
5. On the hp workstation xw6000, disconnect the front chassis fan cable from the system board.
6. Push down on the two tabs on the side of the board guide.
7. While holding the tabs down, remove the guide from the chassis.
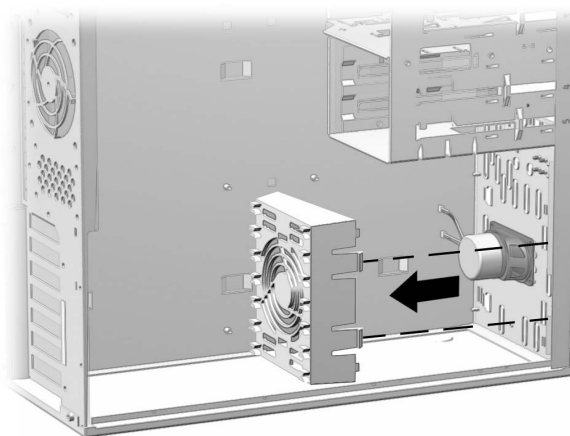
hp workstation xw4000 CMT shown

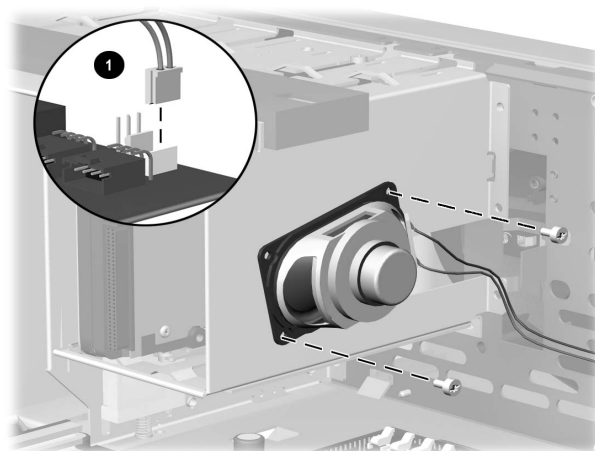To install the board guide, reverse the removal procedure.

10.5 Speaker

In hp workstation xw4000 models the speaker is mounted on the front of the chassis behind the board guide. In hp workstation xw6000 models the speaker is mounted on the drive bay next to the board guide. The speaker is held in place by screws that are removed from the inside of the chassis. To remove the speaker use the following procedure:

1. Prepare the computer for disassembly.

2. Remove the access panel.

3. On hp workstation xw4000 models remove the board guide as described in section 9.4.

4. Disconnect the speaker wire ❶ from the system board.

5. Remove the screws that secure the speaker to the chassis.

6. Remove the speaker.
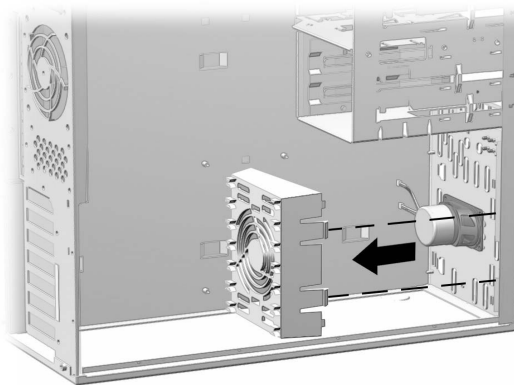

hp workstation xw4000 speaker mounting

hp workstation xw6000 speaker mounting

To install the speaker, reverse the removal procedure.

10.6 Feet

Four (4) rubber feet are mounted to the chassis, as shown below. No parts have to be removed to access the feet. The replacement feet have an adhesive surface and are shipped with a protective backing in place. Remove the backing from the feet before installation.

If necessary, remove the old feet and remove any adhesive residue from the chassis before attaching the replacements.
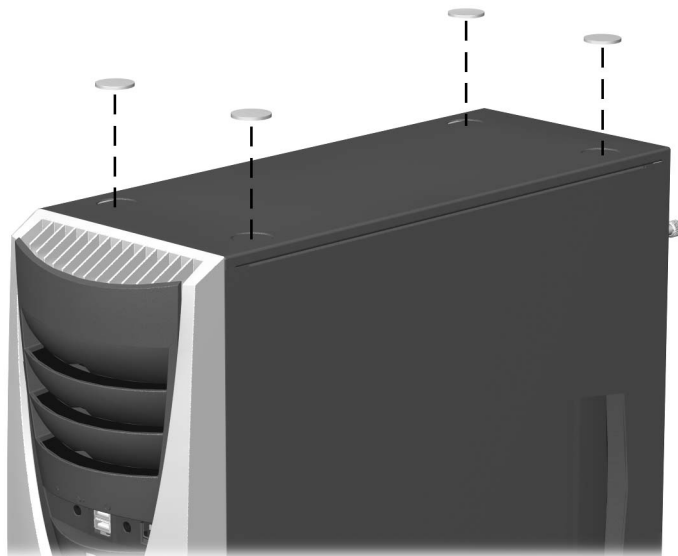
10.7 Converting a Desktop to a Minitower

1. Prepare the computer for disassembly.

2. Lay the computer down on its large base for greater stability.

3. Remove the access panel.

4. Remove the front bezel.

5. Remove the drives from the 5.25-inch drive bays by pressing drivelock ❶ for desktop configuration, drivelock ❷ for minitower configuration.
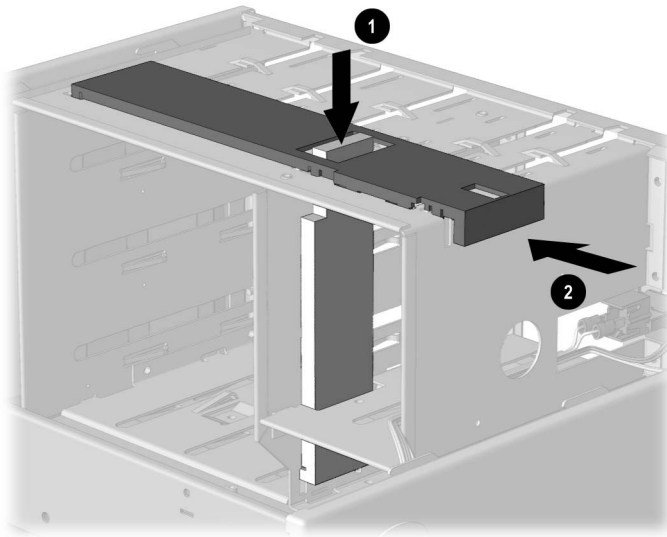
6. Rotate the drives 90 degrees, then reinstall them into the drive bays.

✎ The diskette drive should always be placed in bay number 3, the bay nearest the internal 3.5-inch drives, for proper placement within the chassis.
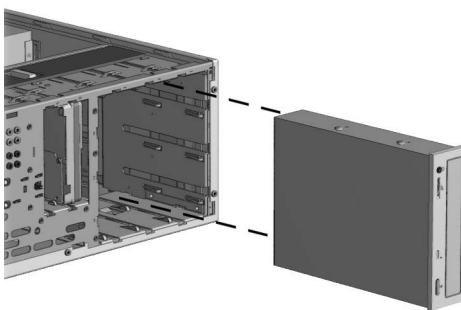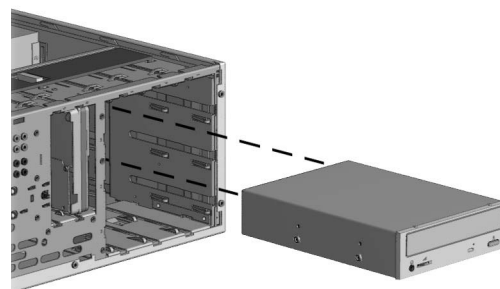
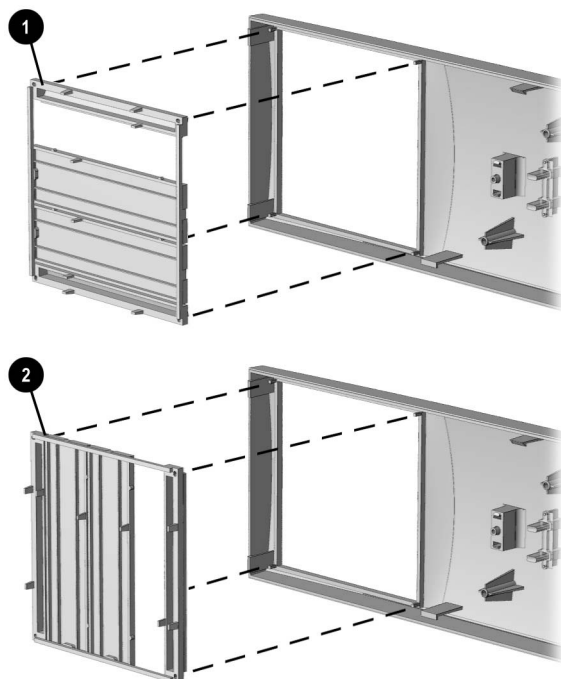**Minitower configuration**   **Desktop configuration**

⚠ **CAUTION:** The use of unnecessary force may result in damage to the drives.

7. Reconnect the power, signal, and audio cables to the drives.

8. Remove the subpanel and rotate it 90 degrees in a clockwise direction.

⚠ **CAUTION:** Hold the subpanel straight when you pull it away from the front bezel. Pulling the subpanel away at an angle could damage the pins that align it within the front bezel.

❶ *= Desktop configuration;* ❷ *= Minitower configuration*

9. Replace the subpanel, front bezel, and the computer access panel.

10. Rotate the nameplate 180 degrees so that it can be easily read when looking at it from the front of the computer.

11. Reassemble the computer.

11

Removal and Replacement Procedures Expansion Cards and Memory

For an overview of the different chassis discussed in this chapter, refer to Chapter 6 "Identifying the Chassis, Routine Care, and Disassembly Preparation."

⚠ **CAUTION:** .Voltage is always applied to the system board when the system is plugged into an AC power source. You must disconnect the power cord from the power source before opening the computer to prevent system board or component damage.

11.1 Memory Expansion

11.1.1 hp workstation xw4000 DDR Memory

The hp workstation xw4000 DDR system features an Intel 845E-based system board that includes two memory sockets that accept industry-standard double-data rate (DDR) SDRAM DIMMs. The two memory module slots are populated with at least one preinstalled memory module. To achieve the maximum memory support, you may be required to replace the preinstalled DIMM with a higher capacity DIMM.

For proper system operation, the DIMMs must be industry-standard 184-pin, unbuffered PC2100- compliant DDR DIMMs. The DIMMs must support CAS Latency 2 or 2.5 (CL = 2 or CL = 2.5). They must also contain the mandatory Joint Electronic Device Engineering Council (JEDEC) Serial Presence Detect (SPD) information. DIMMs constructed with x4 SDRAM (16 ICs per side) are not supported; the system will not start using unsupported DIMMs.

The Intel 845E chipset supports both PC1600 and PC2100 DDR DIMMs. These systems are shipped with PC2100 DDR DIMMs, which provide optimal (266-MHz) performance. If both PC1600 and PC2100 DDR DIMMs are installed in a computer, the system memory will run at the lower (200-MHz) speed.

✎ The Intel 845E chipset-based systems ship with non-ECC memory, but will support ECC memory. To utilize ECC functionality **all** installed DIMMs must be ECC types. Mixing ECC and non-ECC DIMMs is **not** supported.

⚠ **CAUTION:** Memory module sockets have gold metal contacts. When upgrading the memory, it is important to use memory modules with gold metal contacts to prevent corrosion and/or oxidation resulting from having incompatible metals in contact with each other.

11.1.2 hp workstation xw6000 Memory

The hp workstation xw6000 system features an Intel E7505 chipset-based system board that provides dual-channel DDR SDRAM memory support. The four memory module slots accept industry-standard 184-pin DDR SDRAM DIMMs and are configured with at least two preinstalled DDR DIMMs (one per channel). To achieve the maximum memory support, you may be required to replace the preinstalled DDR DIMMs with higher-capacity DDR DIMMs. The DDR DIMMs must support CAS Latency 2 or 2.5 (CL = 2 or CL = 2.5) and must also contain the mandatory Joint Electronic Device Engineering Council (JEDEC) Serial Presence Detect (SPD) information. DIMMs constructed with x4 SDRAM are not supported; the system will not start using unsupported DIMMs.

The Intel E7505 chipset supports both PC1600 and PC2100 DDR DIMMs. These systems are shipped with PC2100 DDR DIMMs, which provide optimal (266-MHz) performance. If a mix of PC1600 and PC2100 DDR DIMMs are installed in the computer, the system memory will run at the lower (200-MHz) speed.

When adding, upgrading, or replacing PC2100 DDR SDRAM memory modules in the hp workstation xw6000, care must be taken to avoid incorrect pairing of modules in the same channel. This system does not support mixed DIMM pairing on the same channel.

⚠ **WARNING:** To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching.

⚠ **WARNING:** To reduce the risk of personal injury when replacing or removing DIMMs, allow the module being removed from the DIMM socket sufficient time to cool. DIMM temperatures can reach 212° F (100° C).

⚠ **CAUTION:** When handling a memory module, do not touch any of the contacts. Doing so may damage the module.

⚠ **CAUTION:** Static electricity can damage the electronic components of the workstation or option boards. Before beginning these procedures, ensure that you are discharged of static electricity by briefly touching a grounded metal object.

⚠ **CAUTION:** Memory module sockets have gold metal contacts. When upgrading the memory, it is important to use memory modules with gold metal contacts to prevent corrosion and/or oxidation resulting from having incompatible metals in contact with each other.

✎ The Intel E7505 chipset-based systems support ECC memory. To utilize ECC functionality **all** installed DIMMs must be ECC types. Mixing ECC and non-ECC DIMMs is **not** supported.

✎ The xw6000 only suports registered (buffered) DDR DIMMs.

✎ The hp workstation xw6000 can be configured with up to eight gigabytes of memory using 2-GB DIMMs (when available). Windows XP Server, Windows XP Advanced Server, and Red Hat Linux operating systems support eight gigabytes of memory. The Windows XP Professional and Windows 2000 operating systems support up to four gigabytes of memory.

■ DIMMs should be installed in pairs.

■ Do not mix DIMMs of different memory speeds. Performance will reflect the speed of the slowest DIMM.

■ Each DIMM within a pair should be identical in size. For example, a 256MB DIMM must be paired with a similar 256MB DIMM.

■ Each DIMM within a pair should be identical in technology. For example, you cannot mix a 256 MB 9-device DIMM with a 128MB 18-device DIMM on the same channel.

✎ To identify which DIMM technology you are using, compare the memory size and number of DRAM components on the module. A 128 MB DIMM has 18 DRAM components that fully populate both sides of the module. A 256MB DIMM has 9 DRAM components; four on one side, five on the other.

■ The first pair of DIMMS should be installed in slots 1 and 2. The DIMM slots are numbered sequentially. Slot 1 is closest to the CPUs.

■ The second pair of DIMMS, if any, should be installed in slots 3 and 4.

■ DIMMs must be installed correctly. Be sure to match the keyed slot on the DIMM with the tab on the DIMM socket.

■ For optimal system performance, DIMMs should be installed in identical pairs in the following three configurations: slot 1 and 2, slot 3 and 4, or all DIMM slots populated in paired format.

■ If you are using a single DIMM configuration, the DIMM should be installed in slot 1 or slot 3.

✎ Although a single-DIMM configuration is possible, it does not provide the optimal system performance that a dual-DIMM (dual-channel) of matching sizes, configuration provides.

■ If you are installing two DIMMs of different sizes, they can only be installed in slot 1 and slot 3 with each DIMM occupying either slot.

✎ Although a mixed size dual-DIMM configuration is possible, it does not provide the optimal system performance that a dual-DIMM (dual-channel) of matching sizes, configuration provides.

■ No other memory configurations are supported. Attempts to install memory in other configurations will result in unpredictable system performance.

✎ The following table provides acceptable pairing configurations but do not cover all module capacities. However, the same pairing configuration applies regardless of the module type and capacity.

Available Memory Configurations for the xw6000

Module Total	Channel A		Channel B	
	Slot XMM1	Slot XMM3	Slot XMM2	Slot XMM4
2	9-device	Empty	9-device	Empty
2	Empty	18-device	Empty	18-device
2	18-device	Empty	18-device	Empty
2	Empty	9-device	Empty	9-device
4	18-device	9-device	18-device	9-device
4	9-device	18-device	9-device	18-device

NOTE: Modules must be paired as indicated in this table where slots indicated by like shading must contain like modules.

11.1.3 DIMM Installation

1. If the computer has a locked Smart Cover Lock, use Computer Setup to unlock the lock and disable the Smart Cover Sensor.

2. Shut down the operating system properly and turn off the computer and any external devices; then, disconnect the power cord from the power outlet.

3. Remove the access panel and locate the memory module sockets.

⚠ **WARNING:** To reduce risk of personal injury from hot surfaces, allow the internal system components to cool before touching.

4. Open both latches of the memory module socket ❶, and insert the memory module into the socket ❷.

   Begin by installing a module into the socket nearest the preinstalled module, and install the modules following the numerical order of the sockets.

   A memory module can be installed only one way. Match the notch on the module with the tab on the memory socket. Push the module down into the socket, ensuring that the module is fully inserted and properly seated ❸.
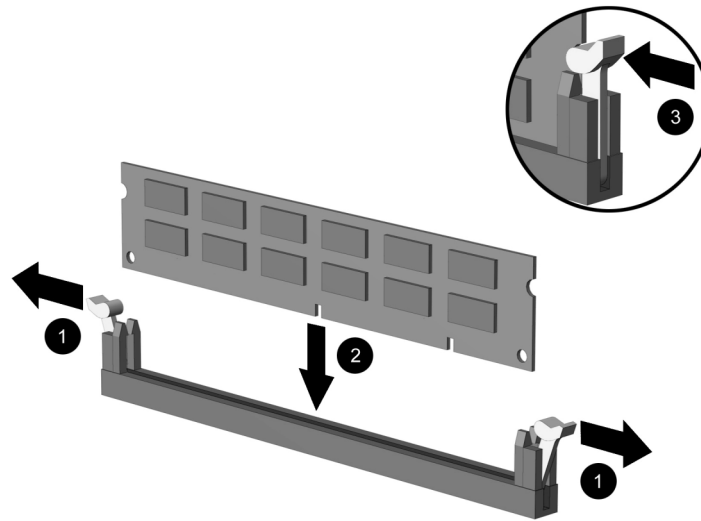
✎ When the computer starts up, it will recognize the system memory upgrades and automatically reconfigure the computer.

Do not exceed 1 GB of memory on a system. Exceeding that limit will cause the system to halt.
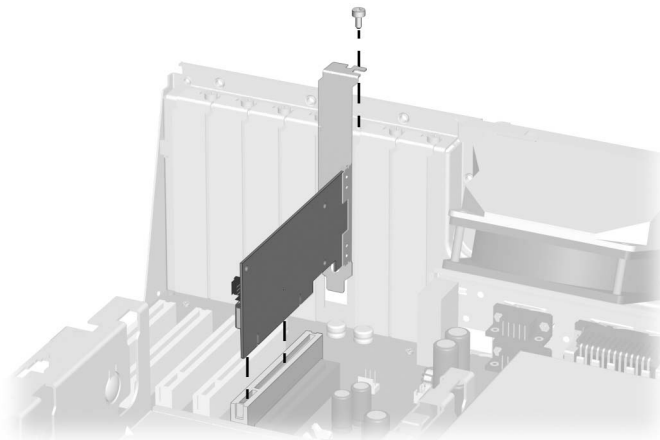
11.2 Expansion Cards

Expansion cards in these systems are installed in slots on the system board and secured to the chassis with a single screw. For removing or installing an expansion card, use the following procedure:

1. Prepare the computer for disassembly.

2. Remove the access panel. If installing an expansion card, skip to step 8.

3. To remove an expansion card, disconnect any cables attached to the expansion card.

4. Remove the screw at the top of the expansion slot.

5. Hold the card at each end and carefully rock it back and forth until the connectors pull free from the socket. Be sure not to scrape the card against other components.

6. Store the card in anti-static packaging.

7. Install an expansion slot cover or new expansion card to close the open slot.

If installing an expansion card, skip to step 9.
If not installing a new expansion card, skip to step 10.

8. Remove the expansion slot cover.

9. Slide the expansion card into the expansion socket and press it firmly into place.

✎ When installing an expansion card, make sure you press firmly on the card so that the entire connector seats properly in the expansion card socket.

10. Replace the screw at the top of the expansion slot.

11. Replace the access panel.

12. Connect external cables to the installed card, if needed.

13. Reconfigure the computer, if necessary.

11.3 Graphics Sockets with Retention Mechanisms

The AGP expansion socket may come with a retention mechanism installed around it to hold the graphics cards securely in place. There are two different types of retention mechanisms that may be installed around the AGP expansion socket.
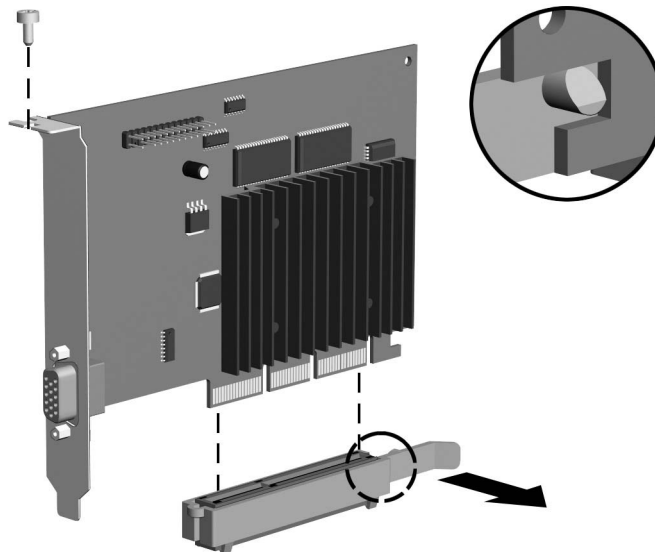
11.3.1 AGP Card with a Type 1 Retention Mechanism

✎ The AGP type 1 retention method is not used on hp workstation xw6000 systems.

To remove an AGP card use the following procedure.

1. Prepare the computer for disassembly.
2. Remove the access panel.
3. Remove the screw at the top of the expansion slot.
4. Pull the arm on the right side of the retention mechanism.
5. Pull the card straight up to remove it from the expansion socket.

To install the graphics card, reverse the above procedures.

✎ Some models may not require a retaining screw.

11.3.2 AGP Card with a Type 2 Retention Mechanism

To remove an remove an AGP card use the following procedure.

1. Prepare the computer for disassembly.
2. Remove the access panel.
3. Remove the screw at the top of the expansion slot.
4. Pull the arm on the right side of the retention mechanism.
5. Pull the card straight up to remove it from the expansion socket.

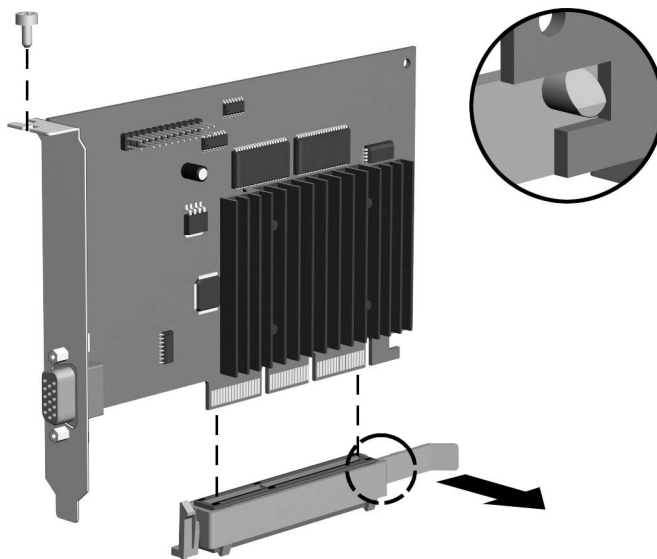To install the graphics card, reverse the above procedures.

✎ Some models may not require a retaining screw.

11.3.3 AGP Card with Type 1 or Type 2 Retention Mechanism

To remove an AGP card using these types of mechansims use the following procedure.

1. Prepare the computer for disassembly.

2. Remove the access panel.

3. Remove the screw at the top of the expansion slot.

4. Remove the AGP graphics card as you would any PCI expansion card.
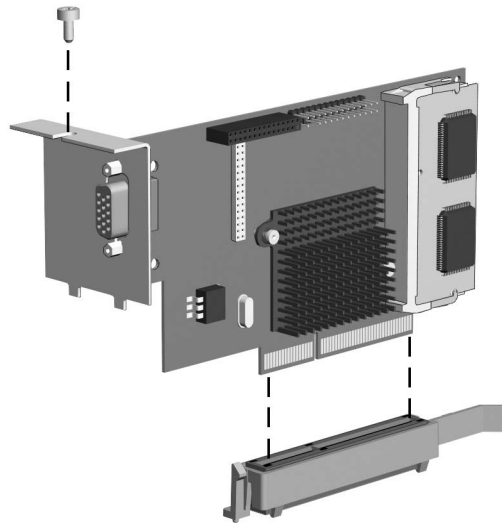
To install the graphics card, reverse the above procedures.

✎ Some models may not require a retaining screw.

Removal and Replacement Procedures
System Board with Major Components

For an overview of the chassis discussed in this chapter, refer to Chapter 6 "Identifying the Chassis, Routine Care, and Disassembly Preparation."

⚠ **CAUTION:** When the computer is plugged into an AC power source, voltage is always applied to the system board. You must disconnect the power cord from the power source before opening the computer to prevent system board or component damage.

12.1 Identifying the System Board

The xw6000 workstation contains one of two types of system boards and processor heatsinks (fansinks). Use this section to identify which type you have.

12.1.1 Configuration 1

This board is identified by the presence of a cooling tower over the primary processor and a secondary VRM socket. The system board part number is 263661-xxx.

cooling tower

secondary VRM socket
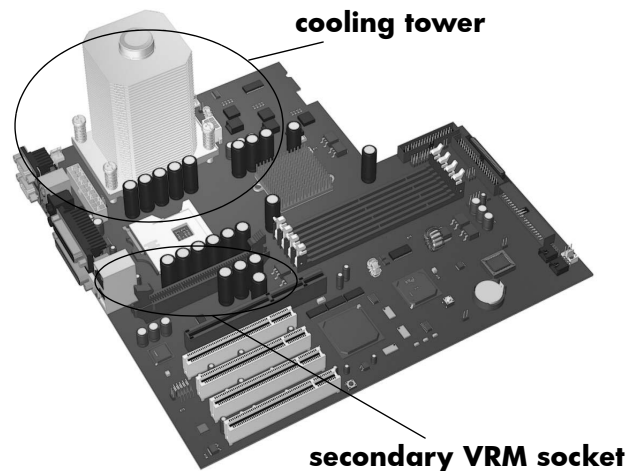
12.1.2 Configuration 2

This board is identified by the presence of a fansink over the primary processor. The system board part number is 339100-xxx.

12.2 Heatsink/Processor
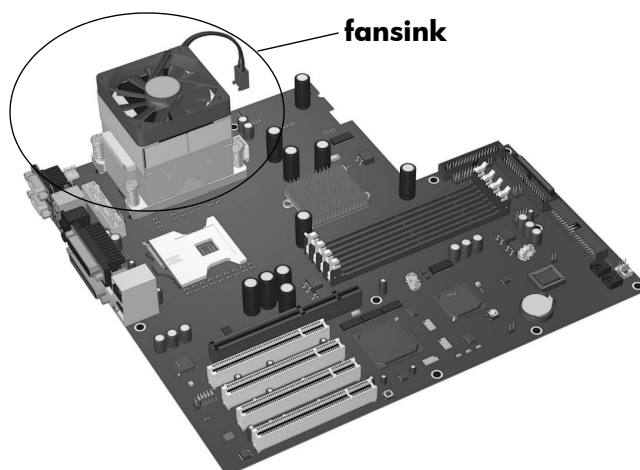
The processor(s) in these systems may be upgraded by replacing it with a faster component. The hp workstation xw6000 systems may also be upgraded by adding a second processor to the system board.

12.2.1 Preparing the System for Processor Removal

Removal of a processor requires first separating the heatsink from the processor, which are bonded together with a compound. To break the compound bond between the heatsink and the processor the heatsink processor assembly must be cooled or heated to the optimum temperature as described in the following subsections:

■ Heatsink Cool-Down Time

■ Heatsink Warm-up Time

⚠ **WARNING:** To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching them.

⚠ **CAUTION:** Installing the processor incorrectly may cause damage to the processor and/or system board. Processor removal and replacement should be performed by qualified personnel. Read all instructions carefully before beginning the procedure.

⚠ **CAUTION:** Electrostatic discharge (ESD) can damage electronic components. Before beginning these procedures discharge your body by touching a ground metal object. Use of a grounding strap is recommended when handling system boards and/or electronic components. Review static discharge information and procedures in chapter 6.

Heatsink Cool-Down Time

The heat generated from the processor core transfers to the heatsink, making the assembly too hot to handle. After transitioning from a power-on state to a power-off state (assuming the system has been on for a while), the heatsink takes about 13 minutes to cool sufficiently so that it can be handled comfortably while the bonding compound is still pliable enough to break.

Heatsink Warm-Up Time

A shut-down (cold) system requires minimal warm-up time to bring the heatsink-processor assembly to the temperature necessary to make the bonding compound pliable enough to safely break.

⚠ **CAUTION:** Lifting the heatsink straight up while it is cold can result in pulling the processor out of the processor socket, resulting in possible damage to the processor and/or socket. If no socket damage has occurred, remember to open the socket by raising the retention lever before installing the new processor.

To warm up the heatsink/processor assembly:

1. Turn on the workstation and allow the operating system to boot and the "desktop" to appear.

✎ The system requires approximately four to eight minutes of running time for the primary heatsink/processor assembly to reach the temperature required for loosening the bond between the heatsink and processor. A secondary heatsink/processor assembly (if present) requires about 12 minutes of running time to reach the necessary temperature for separation.

2. Shut down the operating system normally, allowing the software to turn off the system hardware. If necessary, turn off the system manually.

## 12.2.2 Removing the Heatsink/Processor Assembly

Once the system has been prepared (section 11.1.1) for processor removal, the heatsink may be separated from the processor using the following procedure:

1. Prepare the computer for disassembly.

2. Remove the access panel, and, if necessary, rotate the computer to ensure that the system board is parallel to the work table (desktop position).

3. On hp workstation xw4000 systems use the following procedure (for hp workstation xw6000 systems go to step 4):

   a. Disconnect the heatsink fan power cable ❶ from the system board connector (see the figure below).

   b. Ensure that the heatsink is warm to the touch. Release the two clips ❷ retaining the heatsink/fan assembly to the processor socket and twist the heatsink/fan assembly off the processor.

$\triangle$ **CAUTION:** Always twist when trying to remove a heatsink. If the bond between the heatsink and the processor does not break with moderate twisting pressure then repeat the warm-up procedure described previously. <u>Never</u> pull the heatsink straight out or damage may occur to the processor, socket, or both.

   c. Raise the processor locking lever ❸ up to the upright position.

   d. Remove the processor by grasping it by the edges and pulling it straight up and out of the socket.
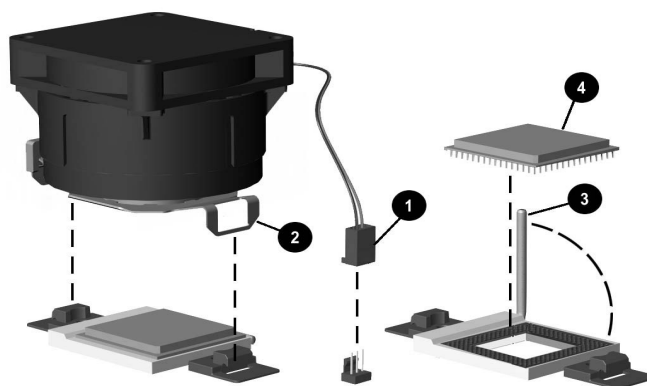
hp workstation xw4000 heatsink and processor components

4. On hp workstation xw6000 systems use the following procedure:

   a. Remove the air baffle by lifting it straight up and out.
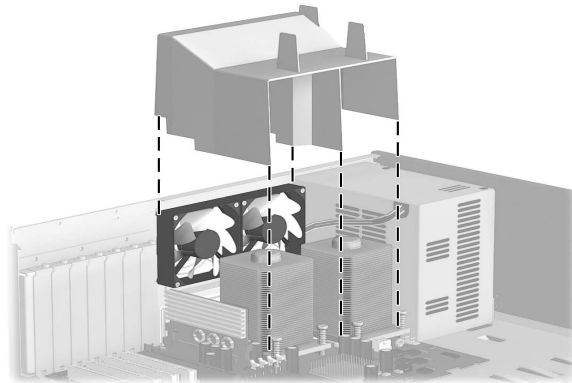
hp workstation xw6000 (Configuration 1) air baffle removal

✎ The xw6000 Configuration 2 does not have an air baffle to remove.

   b. On the Configuration 2 system, disconnect the fansink from the system board.

   c. Loosen the four captive screws ❶ securing the heatsink to the chassis.

   d. Remove the heatsink ❷ by first twisting then lifting it off the processor.

⚠ **CAUTION:** The captive screws allow minimal but adequate lateral movement of the heatsink. If the bond between the heatsink and the processor does not break with moderate twisting pressure then repeat the warm-up procedure described previously. Never pull the heatsink straight out or damage may occur to the processor, socket, or both.

   e. Raise the handle ❸ on the ZIF socket about 135°.

   f. Remove the processor by grasping it by the edges and pulling it straight up and out of the socket.
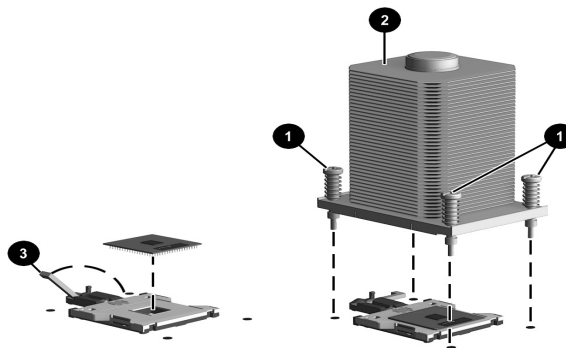
hp workstation xw6000 (Configuration 1) heatsink and processor components

To install a heatsink and processor refer to section 11.1.3.

12.2.3 Installing the Heatsink/Processor Assembly

1. Raise the socket locking lever into the vertical (fully open) position.

2. Place the processor into the processor socket.

3. While holding the processor in place with a finger, lower the locking lever into the down (horizontal) position. Install the processor and latch it securely in the socket. Ensure that the processor is flush to the top of the socket (fully seated). See section 11.1.2 in this chapter.

△ **CAUTION:** Multiprocessor-capable systems require that the primary processor socket be occupied in order for the system to operate. The primary processor should be installed before installing a secondary processor.

4. On hp workstation xw6000, Configuration 1 systems, a secondary VRM must be installed before installing the secondary processor. See the following illustration.
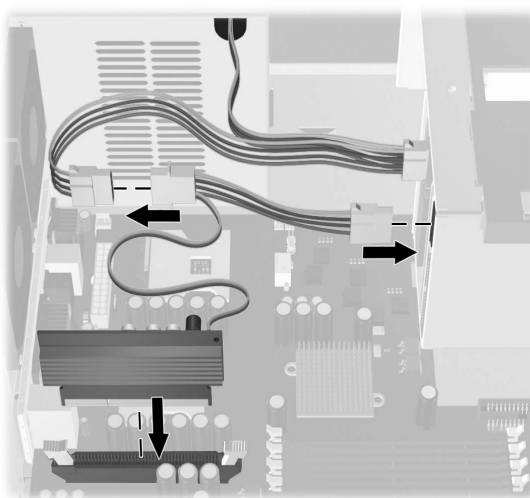
5. Use an alcohol pad or a clean dry wipe to clean the top of the replacement processor. If reusing the heatsink, clean any residue from the bottom of the heatsink. Allow the alcohol to dry before continuing.

△ **CAUTION:** The processor should be installed on the system board prior to cleaning to prevent damaging its pins.

6. Apply the thermal grease evenly onto the top of the processor or remove the thermal grease protective liner from the bottom of the heatsink.

△ **CAUTION:** Not using thermal interface material could result in the system overheating and could cause a computer failure.

7. Install the heatsink, ensuring that it is properly seated before securing it in place with the clips or screws.

8. On hp workstation xw4000 and xw6000 (Configuration 2) systems connect the heatsink fan cable to the system board. On hp workstation xw6000 (Configuration 1) systems, install the air baffle.

9. Replace the access panel.

10. Connect the power cord and power up the computer.

12.2.4 Multiprocessor Information

The hp workstation xw6000 systems have multiprocessor capability. When installing a second processor, remember that the secondary processor must be the same speed, cache size, and type as the primary processor.

⚠ **CAUTION:** A primary processor must be installed in the primary processor socket before installing a second processor or the workstation will not function. The primary processor socket is the upper most socket on the system board (when in the vertical or tower configuration).

⚠ **CAUTION:** The Voltage Regulator Module (VRM) circuitry for the primary processor is integrated onto the hp workstation xw6000 system board. When installing a secondary processor a VRM board (HP-approved) must also be installed. Using a VRM board that is incompatible with the primary VRM board may severely or permanently damage the system board.

✎ Units that ship with only one processor will have two screws installed in two of the four heatsink mounting holes of the secondary processor. These screws must be removed before installing the secondary processor and heatsink.

Hardware Abstraction Layer

To update Windows NT 4.0 or Windows 2000 to recognize a second processor using the Hardware Abstraction Layer (HAL), complete the following steps:

1. Start Windows.

2. Insert the upgrade diskette. Then select Start > Run.

3. Type

<div align="center">A:\setup.exe</div>

and select OK.

4. Select Uniprocessor HAL and Kernel.

5. Select Upgrade and insert the media used to upgrade the operating system to a new Service Pack if requested; then click Retry.

6. If prompted, insert the operating system CD and click OK.

7. After the installation is complete, close the setup program and restart the computer.

✎ A manual upgrade is necessary when installing a second processor after the system has gone through the software bundling process. If a second processor is installed prior to unbundling, a manual upgrade is not necessary.

12.3 System Board

1. Prepare the computer for disassembly.

2. Remove the access panel.

3. On the hp workstation xw6000 system, remove the air baffle and processor heatsink) as described in section 11.1.2

✎ The processor does not need to be removed in order to remove the system board. However, if the processor is to be removed from the system board refer to Section 11.1.1 in this chapter for complete instructions.

4. Remove all expansion boards.

5. Remove all graphics cards.

6. Disconnect all cables connected to the system board, noting their location for reinstallation.

7. Remove the screws connecting the system board to the chassis (see figures on next page for screw positions).

✎ On hp workstation xw6000 units, the processor heatsink(s) must be removed prior to removing the system board. Refer to Section 11.1.2 in this chapter for heatsink removal.

8. After checking the position of all cables and wires, carefully lift the system board straight up and out of the computer.

⚠ **CAUTION:** The hp workstation xw4000 system board actually consists of two boards: the main system board and a PCI slot expansion board. These boards are removed as one assembly. Insure that the all mounting screws for both boards are removed before removing the assembly or damage may result.

Install the system board using the reverse of the removal procedure.
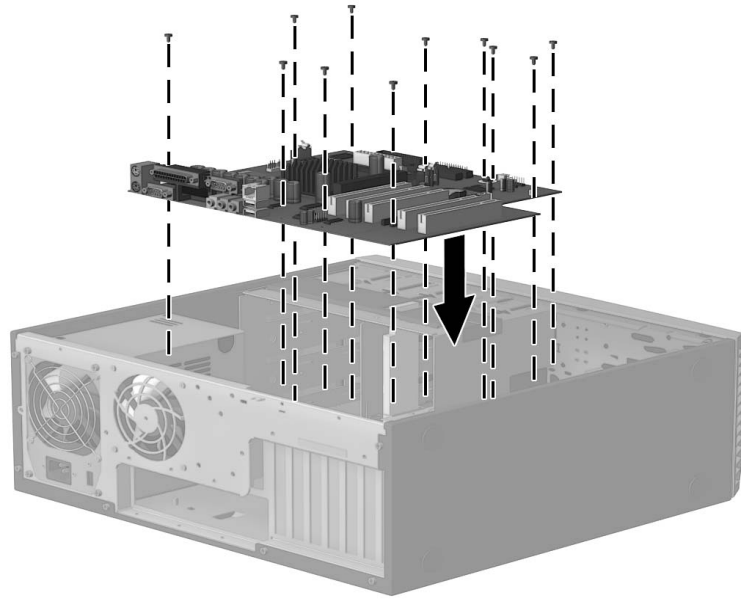
hp workstation xw4000 system board mounting screw locations
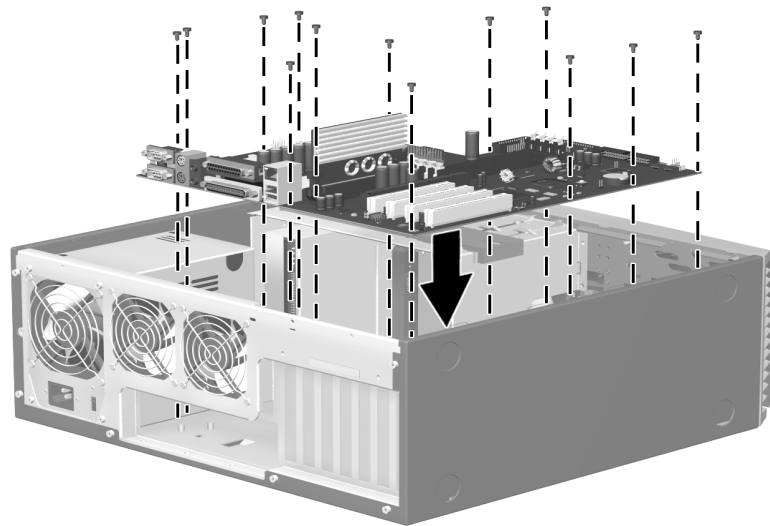
hp workstation xw6000 system board mounting screw locations

12.4 Battery

The battery that comes with your computer provides power to the real-time clock and has a minimum lifetime of about three years. When replacing the battery, use a battery equivalent to the battery originally installed on the computer. The computer comes with a 3-volt lithium coin cell battery.

✎ The lifetime of the lithium battery can be extended by plugging the computer into a live AC wall socket. The lithium battery is only used when the computer is NOT connected to AC power.

⚠ **WARNING:** This computer contains an internal lithium manganese dioxide battery. There is a risk of fire and burns if the battery is not handled properly. To reduce the risk of personal injury:

■ Do not attempt to recharge the battery.
■ Do not expose to temperatures higher than 140°F (60°C)
■ Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.
■ Replace the battery only with the HP spare designated for this product.

⚠ **CAUTION:** Before replacing the battery, it is important to back up the computer CMOS settings. When the battery is removed or replaced, the CMOS settings will be cleared. Refer to the *Troubleshooting Guide* for information on backing up the CMOS settings.

🗑 Batteries, battery packs, and accumulators should not be disposed of together with the general household waste. In order to forward them to recycling or proper disposal, please use the public collection system or return them to HP, their authorized partners, or their agents.

⚠ **CAUTION:** Static electricity can damage the electronic components of the computer or optional equipment. Before beginning these procedures, ensure that you are discharged of static electricity by briefly touching a grounded metal object.

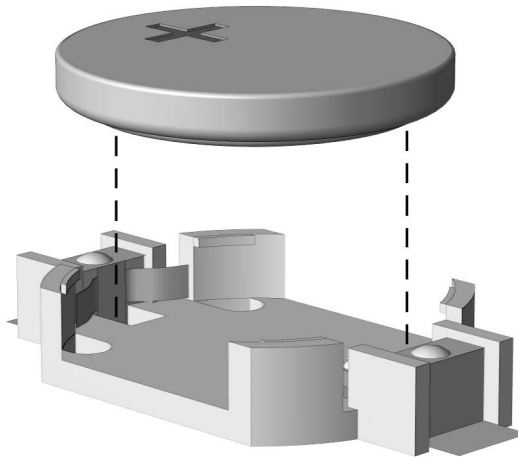1. Prepare the computer for disassembly.

✎ It may be necessary to remove an expansion card to gain access to the battery.

2. Locate the battery and battery holder on the system board.

3. Depending on the type of battery holder on your system board, complete the following instructions to replace the battery.

12.4.1 Type 1 Battery Holder

1. Lift the battery out of its holder.

2. Slide the replacement battery into position, positive side up.

3. The battery holder automatically secures the battery in the proper position.

4. Replace the computer cover or access panel.

5. Plug in the computer and turn on power to the computer.

6. Reset the date and time, your passwords, and any special system setups, using the Setup utility. Refer to the *Computer Setup (F10) Utility Guide.*

12.4.2 Type 2 Battery Holder

1. To release the battery from its holder, squeeze the metal clamp that extends above one edge of the battery.

2. When the battery pops up, lift it out.
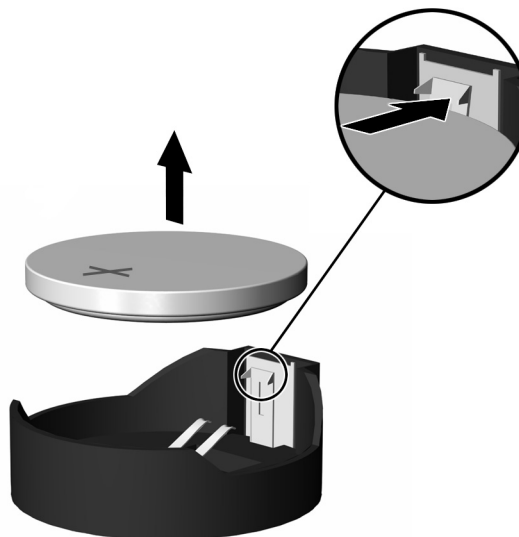
3. To insert the new battery, slide one edge of the replacement battery under the holder's lip with the positive side up. Push the other edge down until the clamp snaps over the other edge of the battery.
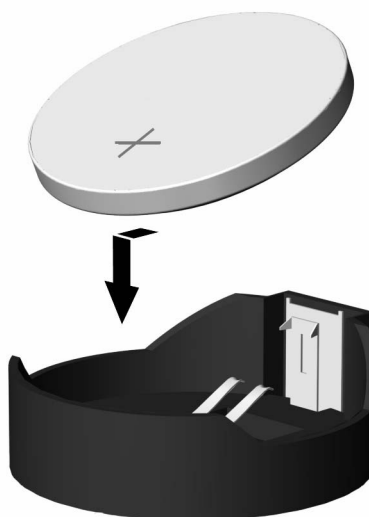
✎ After the battery has been replaced, use the following steps to complete this procedure.

4. Replace the computer cover or access panel.

5. Plug in the computer and turn on power to the computer.

6. Reset the date and time, your passwords, and any special system setups, using the Setup utility. Refer to the *Computer Setup (F10) Utility Guide.*

13

Removal and Replacement Procedures Main Power and Cooling

For an overview of the chassis refer to Chapter 6 "Identifying the Chassis, Routine Care, and Disassembly Preparation."

$\triangle$ **CAUTION:** When the computer is plugged into an AC power source, voltage is always applied to the system board. You must disconnect the power cord from the power source before opening the computer to prevent system board or component damage.

13.1 Power Supply

The power supply is accessed from the rear of the chassis using the following procedure:

1. Power down the computer.

2. Disconnect the power cord from the AC outlet and from the system unit.

✏️ The rest of this procedure is more easily performed with the system unit in the desktop (horizontal) position.

3. Remove the access panel.

4. Disconnect all power cables from the mass storage devices and from the system board.

5. Remove the screws that connect the bracket to the chassis ❶.

6. Remove the screws that connect the power supply to the chassis ❷.

7. Slide the power supply toward the front of the computer until it clears the notches in the base pan, then lift it out of the computer.
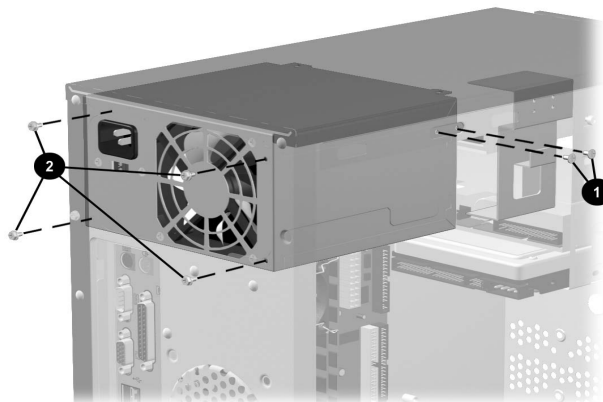
13.2 Air Baffle

The hp workstation xw6000 (Configuration 1) uses a single air baffle that controls airflow for the two chassis-mounted CPU fans. The hp workstation xw6000 (configuration 2) and xw4000 do not use an air baffle. To remove the air baffle on the hp workstation xw6000 (Configuration 1):

1. Prepare the computer for disassembly.

2. Remove the access panel.

✎ Although it is not required, the rest of this procedure is more easily performed with the system unit in the desktop (horizontal) position.

3. The air baffle is removed by lifting it straight up from the fans and processor heat sinks.
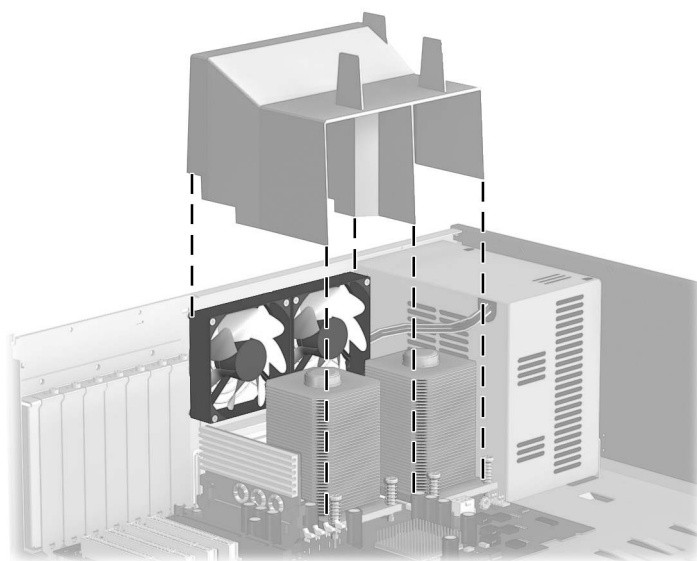
hp workstation xw6000 (Configuration 1 only) air baffle removal

To install the air baffle reverse the removal procedure.

△ **CAUTION:** Always ensure that the air baffle is correctly installed before operating the computer. Failure to do so may cause the computer to overheat and could result in loss of data or damage to the computer.

13.3 Chassis Fans

In addition to the power supply fan, the hp workstation xw4000 series uses a single rear chassis-mounted fan while the hp workstation xw6000 series uses one front chassis fan and two rear chassis-mounted CPU fans. The locations of fan power cable connectors differ between the xw4000 and the xw6000 systems.

13.3.1 Rear Chassis-Mounted Fan

To remove a rear chassis-mounted fan use the following procedure:

1. Power down the computer and disconnect the power cord from the AC outlet.

2. Remove the access panel.

✎ The rest of this procedure is more easily performed with the system unit in the desktop (horizontal) position.

3. On hp workstation xw6000 systems remove the air baffle as described in section 12.2.

4. Disconnect the fan power cable(s) from the system board ❶.

5. Remove the screws that secure the fan to the chassis ❷.

6. Lift the fan out of the chassis ❸.
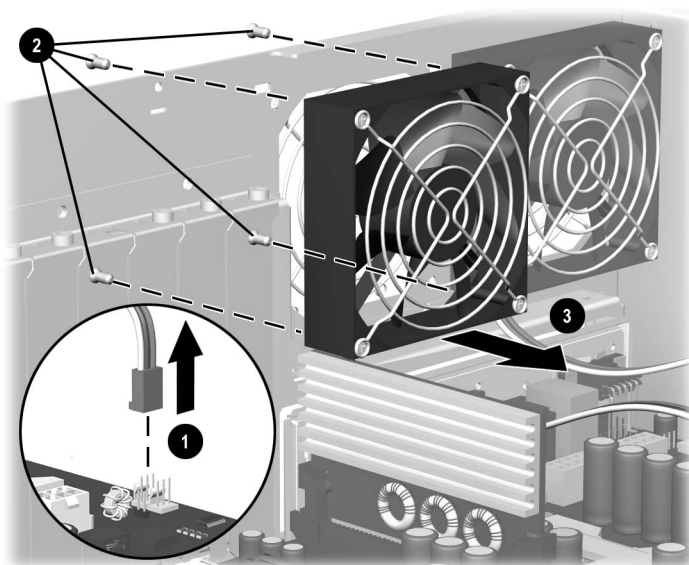
hp workstation xw6000 system shown

To replace the fan(s), reverse the above procedure.

⚠ **CAUTION:** The correct air flow of the computer is front to back. Ensure that the rear fans blow air out or proper cooling will not occur, resulting in overheating and possible data loss and/or damage.

13.3.2 Front Chassis Fan

To remove the front chassis fan of the hp workstation xw6000 system use the following procedure:

1. Prepare the computer for disassembly.

2. Remove the access panel.

3. Remove expansion boards if necessary.

4. Disconnect the fan power cable from the system board.
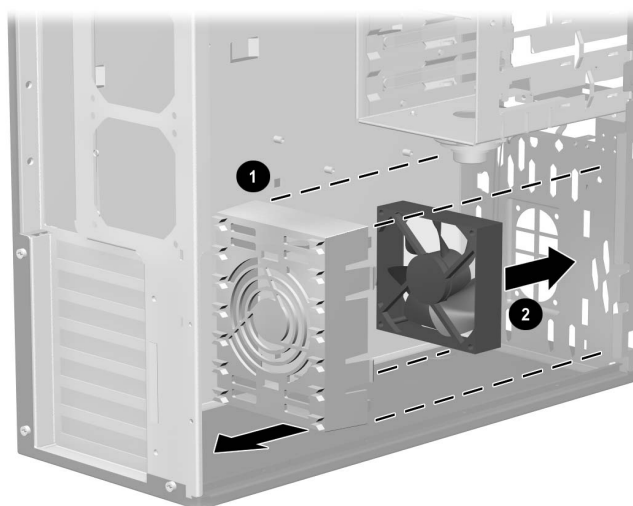
5. Remove the board guide ❶ by pressing two tabs to release the guide from the chassis.

6. The fan ❷ is removed from the board guide by prying the holding tabs back slightly and pulling the fan away from the board guide.

To install the fan proceed as follows:

1. Place the fan in position with the fan power cable next to the inside wall of the board guide and snap into place.

2. Install the board guide as described in Chapter 9, section 9.4.

3. Connect the fan power cable to the system board.

4. Replace expansion boards if necessary.

5. Replace access panel.

6. Connect and power up the computer.

7. Check for proper air flow. If air flow is not correct, fan will need to be repositioned.

⚠ **CAUTION:** The correct air flow of the computer is front to back. Ensure that the front fan pulls air in or proper cooling will not occur, resulting in overheating and possible data loss and/or damage.

A

Connector Pin Assignments

This appendix contains the pin assignments for many computer and 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
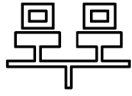
Mouse

Connector and Icon		Pin	Signal
		1	Data
		2	Unused
		3	Ground
		4	+5 VDC
		5	Clock
		6	Unused

Ethernet BNC

Connector and Icon		Pin	Signal
		1 (Center)	Data
		2 (Shield)	Ground

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

Ethernet AUI

Connector and Icon
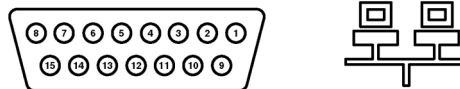
Pin	Signal	Pin	Signal
1	Ground	9	Positive AUI Differential Receive
2	Negative AUI Differential Collision	10	+12V
3	Positive AUI Differential Collision	11	Ground
4	Negative AUI Differential Transmit	12	Ground
5	Positive AUI Differential Transmit	13	Unused
6	Ground	14	Unused
7	Ground	15	Unused
8	Negative AUI Differential Receive	16	Unused

Parallel Interface

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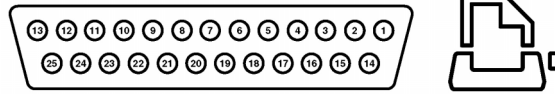
Pin	Signal	Pin	Signal	Pin	Signal
1	Strobe	7	Data Bit 5	13	Select
2	Data Bit 0	8	Data Bit 6	14	Auto Linefeed
3	Data Bit 1	9	Data Bit 7	15	Error
4	Data Bit 2	10	Acknowledge	16	Initialize Printer
5	Data Bit 3	11	Busy	17	Select IN
6	Data Bit 4	12	Paper End	18-25	Signal Ground

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	VCC
	2	- Data
	3	+ Data
	4	Ground

Microphone
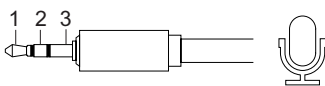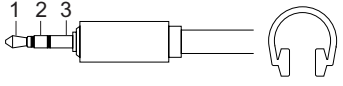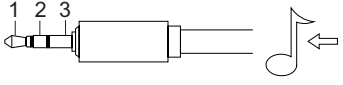
Connector and Icon (1/8" miniphone)	Pin	Signal
	1 (Tip)	Audio
	2 (Ring)	Power
	3 (Shield)	Ground
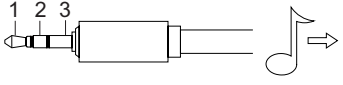
Headphone

Connector and Icon (1/8" miniphone)	Pin	Signal
	1 (Tip)	Audio_Left
	2 (Ring)	Audio_Right
	3 (Shield)	Ground

Line-In Audio

Connector and Icon (1/8" miniphone)	Pin	Signal
	1 (Tip)	Audio_In_Left
	2 (Ring)	Audio_In_Right
	3 (Shield)	Ground

Line-Out Audio

Connector and Icon (1/8" miniphone)	Pin	Signal
	1 (Tip)	Audio_Out_Left
	2 (Ring)	Audio_Out_Right
	3 (Shield)	Ground

SCSI Low Voltage Differential/Single Ended (LVD/SE)

Connector and Icon

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1-16	Ground	40	-D0	49-50	Ground	60	-MSG
17-18	TERMPWR	41	-D1	51-52	TERMPW	61	-SEL
19	Reserved	42	-D1	53	Reserved	62	-C/D
20-34	Ground	43	-D3	54	Ground	63	-REQ
35	-D12	44	-D4	55	-ATN	64	-I/O
36	-D13	45	-D5	56	Ground	65	-D
37	-D14	46	-D6	57	-BSY	66	-D
38	-D15	47	-D7	58	-ACK	67	-D
39	-DP1	48	-DP0	59	-RST	68	-D

SATA

Connector

S1　　S7　　　　P1　　　　　　　P15
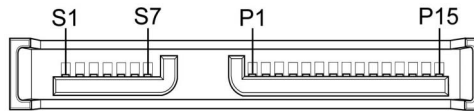
Pin	Signal	Pin	Usage	Pin	Usage
data cable		power cable		power cable	
S-1	Ground	P-1	3.3 V power	P-8	5 V power
S-2*	A+	P-2	3.3 V power	P-9	5 V power
S-3*	A-	P-3	3.3 V power	P-10	Ground
S-4	Ground	P-4	Ground	P-11	Reserved
S-5**	B-	P-5	Ground	P-12	Ground
S-6**	B+	P-6	Ground	P-13	12 V power
S-7	Ground	P-7	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					

Ultra SCSI

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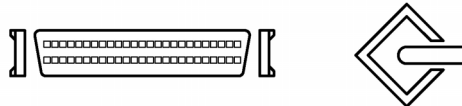
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1-11	Ground	29	DB3	37	Reserved	45	RST #
12	Reserved	30	DB4	38	TERMPWR	46	MSG #
13	Open	31	DB5	39	Reserved	47	SEL #
14	Reserved	32	DB6	40	Ground	48	C/D
15-25	Ground	33	DB7	41	ATN #	49	REQ #
26	DB0	34	DBP	42	Ground	50	Input/Output
27	DB1	35	Ground	43	BSY #		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

External Infrared Transceiver

Connector and Icon
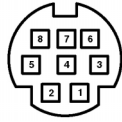
Pin	Signal	Pin	Signal	Pin	Signal
1	Transmit	4	5V	7	Not Used
2	Receive	5	Mode	8	Not Used
3	Ground	6	Not Used		

Monitor

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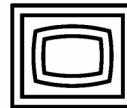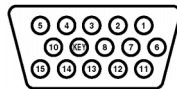
Pin	Signal	Pin	Signal	Pin	Signal
1	Red Analog	6	Ground	11	Monitor ID
2	Green Analog	7	Ground	12	DDC Serial Data
3	Blue Analog	8	Ground	13	Horizontal Sync
4	Monitor ID	9	+5V DC	14	Vertical Sync
5	Ground	10	Ground	15	DDC Serial Clock

ATA/ATAPI (IDE) Standard Drive Cable

Connector

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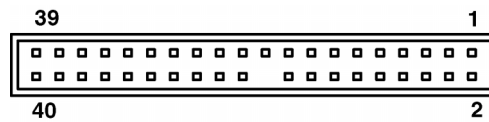
Pin	Signal	Pin	Signal	Pin	Signal
1	Reset	15	DD1	29	DMAK
2	Ground	16	DD14	30	Ground
3	DD7	17	DD0	31	INTRQ
4	DD8	18	DD15	32	IOCS16
5	DD6	19	Ground	33	DA1
6	DD9	20	(Key)	34	PDIAG (cable detect)
7	DD5	21	DMARQ	35	DA0
8	DD10	22	Ground	36	DA2
9	DD4	23	DIOW	37	CS1FX
10	DD11	24	Ground	38	CS3FX
11	DD3	25	DIOR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

MultiBay CD-ROM Adapter

Connector
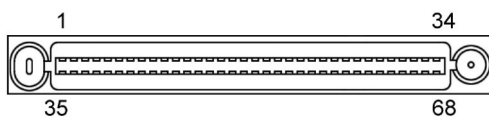
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	RESDRV_	18	D15	35	A0	52	FP05
2	GROUND	19	GROUND	36	A2	53	FP06
3	D07	20	(key)	37	CS1FX	54	FP07
4	D08	21	DRQ	38	CS3FX	55	FP08
5	D06	22	GROUND	39	DASP	56	FP09
6	D09	23	IOW	40	GROUND	57	FP10
7	D05	24	GROUND	41	+5VMLOG	58	FP11
8	D10	25	IOR	42	-5VMOT	59	FP12
9	D04	26	GROUND	43	GROUND	60	FP13
10	D11	27	IOCHDRY	44	AUDIO_L	61	FP14
11	D03	28	CABLE SELECT	45	A_GROUND_R	62	FP15
12	D12	29	DAK	46	A_GROUND_l	63	FP16
13	D02	30	GROUND	47	audio_r	64	FP17
14	D13	31	IRQ	48	FP01	65	FP18
15	D01	32	IO16	49	FP02	66	FP19
16	D14	33	A1	50	FP03	67	FP20
17	D00	34	PDIAG	51	FP04	68	FP21

Accelerated Graphics Port (AGP)

Connector
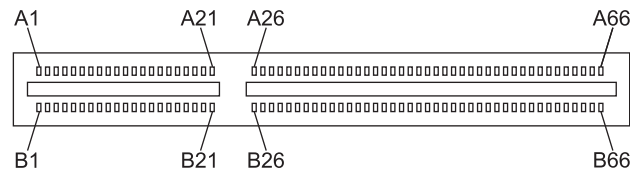
Pin	Signal A	Signal B	Pin	Signal A	Signal B
1	+12 V	OVRCNT#	34	Vddq	Vddq
2	TYPEDET#	+ 5V	35	AD22	AD21
3	Reserved	+ 5V	36	AD20	AD19
4	USB-	USB+	37	Ground	Ground
5	Ground	Ground	38	AD18	AD17
6	INTA#	INTB#	39	AD16	C/BE2#
7	RST#	CLK	40	Vddq	Vddq
8	GNT#	REQ#	41	FRAME#	IRDY#
9	VCC3.3	VCC3.3	42	Reserved	3.3VAux
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

Slimline IDE CD-ROM Connector for SFF chassis using 810 and 810e Chipsets

Connector

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50                                              2
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49                                              1
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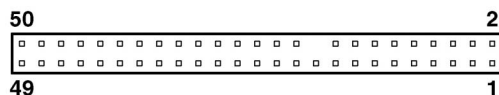
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	RESDRV_	14	GROUND	27	D07	40	D08
2	D06	15	D09	28	D05	41	D10
3	D04	16	D11	29	D03	42	D12
4	D02	17	D13	30	D01	43	D14
5	D00	18	D15	31	Ground	44	(KEY)
6	DREQ	19	Ground	32	IOW	45	Ground
7	IOR	20	Ground	33	OCHRDY	46	CABLE SELECT
8	DAK	21	Ground	34	IRQ	47	IO16
9	A1	22	PDIAG	35	A0	48	A2
10	CS1FX	23	CS3FX	36	DASP	49	Ground
11	AUDIO_R	24	AUDIO_L	37	A_GND_R	49	A_GND_L
12	+5VMOT1	25	+5VMOT2	38	+5VMOT3	50	+5VMOT4
13	+5VMLOG1	26	+5VMLOG2	39	DASP		

14-Pin Power (BX Chipset-Based Board

Connector

```
1                13
┌─────────────────────┐
│ ■ ■ ■ ■ ■ ■ ■ │
│ ■ ■ ■ ■ ■ ■ ■ │
└─────────────────────┘
2                14
```
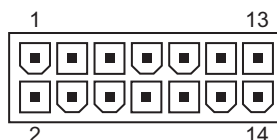
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	+3.3 V	5	RTN	9	-12 v	13	+3.3 V Sense return
2	+3.3 V Sense	6	+5 V	10	Fan OFF	14	+12 V
3	RTN	7	RTN	11	ON/STBY		
4	+5 V	8	+3.3 V	12	+5 V Aux		

14-Pin Power (810, 810E, 820, and 845 Chipset-Based Boards)

Connector

```
   1                13
  ┌──────────────────┐
  │ ■ ■ ■ ■ ■ ■ ■ ■ ■│
  │ ■ ■ ■ ■ ■ ■ ■ ■ ■│
  └──────────────────┘
   2                14
```
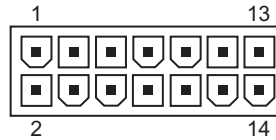
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	+3.3 V	5	RTN	9	-12 v	13	Fan speed
2	+3.3 V Aux	6	+5 V	10	Fan OFF	14	+12 V
3	RTN	7	RTN	11	ON/STBY		
4	+5 V	8	+3.3 V	12	+5 V Aux		

20-Pin Power (Deskpro EP)

Connector

```
   1                      19
  ┌──────────────────────┐
  │ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■│
  │ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■│
  └──────────────────────┘
   2                      20
```
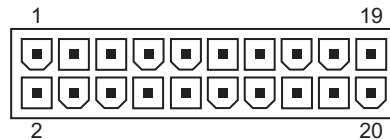
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	+3.3 V	6	+5 V	11	+3.3 V	16	RTN
2	+3.3 V	7	RTN	12	-12 V	17	RTN
3	RTN	8	Fan OFF	13	RTN	18	-5 V
4	+5 V	9	+5 V Aux	14	ON/STBY	19	+5 V
5	RTN	10	+12 V	15	RTN	20	+5 V

20-Pin Power (Deskpro EN)

Connector
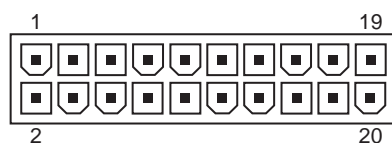
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	3 V	6	+5 V	11	+3 V	16	RTN/RS
2	3 V/RS	7	Aux RTN	12	-12 V	17	RTN
3	RTN	8	Fan OFF	13	RTN	18	-5 V
4	+5 V	9	+5 V Aux	14	ON/STBY	19	+5 V
5	RTN	10	+12 V	15	RTN	20	+5 V

24-Pin Power

Connector
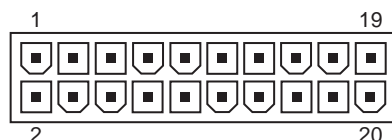
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	+3.3 V	7	Aux RTN	13	+3.3 V	19	RTN
2	+3.3 V	8	Fan OFF	14	-12 V	20	-5 V
3	RTN	9	+5 V Aux	15	RTN	21	+5 V
4	+5 V	10	+12 V	16	ON/STBY	22	+5 V
5	RTN	11	3.3 V Aux	17	RTN	23	3.3 V R/S
6	+5 V	12	Fan CMD	18	RTN/(R/S)	24	Fan Sink

4-Pin Power (for CPU)
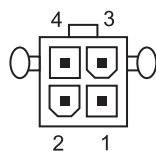
Connector and Icon	Pin	Signal
	1	RTN
	2	RTN
	3	12.8 Vcpu
	4	12.8 Vcpu

6-Pin Power (for CPU)
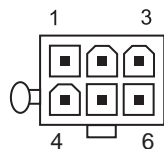
Connector and Icon	Pin	Signal	Pin	Signal
	1	RTN	4	12.8 Vcpu
	2	RTN	5	12.8 Vcpu
	3	RTN	6	12.8 Vcpu

B

Power Cord Set Requirements

The voltage select switch feature on the computer permits it to operate from any line voltage between 100-120 or 220-240 volts AC.

The power cord set received with the computer meets the requirements for use in the country where you purchased the equipment.

Power cord sets for use in other countries must meet the requirements of the country where you use the computer. For more information on power cord set requirements, contact your authorized HP dealer, reseller, or service provider.

General Requirements

The requirements listed below are applicable to all countries:

1. The length of the power cord set must be at least 6.00 feet (1.8 m) and a maximum of 9.75 feet (3.0 m).

2. All power cord sets must be approved by an acceptable accredited agency responsible for evaluation in the country where the power cord set will be used.

3. The power cord set must have a minimum current capacity of 10A and a nominal voltage rating of 125 or 250 volts AC, as required by each country's power system.

4. The appliance coupler must meet the mechanical configuration of an EN 60 320/IEC 320 Standard Sheet C13 connector, for mating with appliance inlet on the Switch Box.

Country-Specific Requirements

Additional requirements specific to a country are shown in parentheses and explained below.

Country	Accrediting Agency	Country	Accrediting Agency
Australia (1)	EANSW	Italy (1)	IMQ
Austria (1)	OVE	Japan (3)	METI
Belgium (1)	CEBC	Norway (1)	NEMKO
Canada (2)	CSA	Sweden (1)	SEMKO
Denmark (1)	DEMKO	Switzerland (1)	SEV
Finland (1)	SETI	United Kingdom (1)	BSI
France (1)	UTE	United States (2)	UL
Germany (1)	VDE		

1. The flexible cord must be <HAR> Type HO5VV-F, 3-conductor, 1.0 mm^2 conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country where it will be used.

2. The flexible cord must be Type SJT or equivalent, No. 18 AWG, 3-conductor. The wall plug must be a two-pole grounding type with a NEMA 5-15P (15A, 125V) or NEMA 6-15P (15A 250V) configuration.

3. Appliance coupler, flexible cord, and wall plug must bear a "T" mark and registration number in accordance with the Japanese Dentori Law. Flexible cord must be Type VCT or VCTF, 3-conductor, 1.0 mm^2 conductor size. Wall plug must be a two-pole grounding type with a Japanese Industrial Standard C8303 (7A, 125V) configuration.

C

POST Error Messages

An error message results if the Power-On Self-Test (POST) encounters a problem. This test runs when the system is turned on, checking assemblies within the computer and reporting any errors found.

POST Error Messages

Screen Message	Beeps*	Probable Cause	Recommended Action
101-Option ROM Error	1L, 1S	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	None	DMA, timers, etc.	Clear CMOS.
			Remove expansion boards.
			Replace the system board.
103-System Board Failure	None	DMA, timers, etc.	Clear CMOS.
			Remove expansion boards.
			Replace the system board.
150-SafePost Active	None	A PCI expansion card is not responding.	Restart the computer.
			Disable SafePost.
			If the expansion card does not respond, replace the card.
162-System Options Not Set	2S	Configuration incorrect. RTC (real-time clock) battery may need to be replaced. Battery life is approximately 3 years.	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.

* L = Long, S = Short

POST Error Messages

Screen Message	Beeps*	Probable Cause	Recommended Action
163-Time & Date Not Set	2S	Invalid time or date in configuration memory. RTC (real-time clock) battery may need to be replaced. Battery life is approximately three years. 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. Check for proper placement of the CMOS jumper.
164-Memory Size Error	2S	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	2S	System board jumper improperly set.	Reset system board jumpers to match processor and bus speeds.
201-Memory Error	None	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	None	Memory modules do not match each other.	Replace memory modules with matched sets.

* L = Long, S = Short

POST Error Messages

Screen Message	Beeps*	Probable Cause	Recommended Action
207-ECC Corrected Single Bit Errors in Memory Socket(s) y,y	2S	Single Bit ECC error.	Verify proper memory module type. Try another memory socket. Replace memory module if problem persists.
212-Failed Processor	None	Processor has failed to initialize.	Reseat the processor in its socket. If the processor does not respond, replace it.
213-Incompatible memory Module in memory Socket(s) X,X, X	2S	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-Memory Device Failure. Error Code: XX Memory Module Socket(s):XX	None	A specific error has occurred in a RDRAM device installed in the identified socket.	Verify proper memory module type. Try another memory socket. Replace memory module if problem persists.
215-RIMM Configuration Error	None	RIMMs not properly installed.	Populate RIMM sockets starting with slot no. 1 and do not leave any memory sockets empty.
301-Keyboard Error	None	Keyboard failure.	Reconnect keyboard with computer turned off. Check connector for bent or missing pins. Ensure that none of the keys are depressed. Replace keyboard.
304-Keyboard or System Unit Error	None	Keyboard failure.	Reconnect the keyboard with computer turned off. Ensure that none of the keys are depressed. Replace keyboard. Replace system board.
401-Parallel Port 1 Address Assignment Conflict	2S	IRQ address conflicts with another device.	Reset the IRQ.

* L = Long, S = Short

POST Error Messages

Screen Message	Beeps*	Probable Cause	Recommended Action
402-Monochrome Adapter Failure	1L, 2S	Monochrome display controller.	Replace monochrome display controller.
403-Parallel Port 3 Address Assignment Conflict	2S	IRQ address conflicts with another device.	Reset the IRQ.
404-Parallel Port Address Conflict Detected	2S	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	2S	IRQ address conflicts with another device.	Reset the IRQ.
411-Network Interface Card Interrupt Conflict	2S	IRQ address conflicts with another device.	Reset the IRQ.
501-Display Adapter Failure	1L, 2S	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	None	Splash Screen image has errors.	Install latest version of ROMPaq to restore image.
511-CPU, Rear, or Front Fan not detected	None	Fan is not connected or may have malfunctioned.	Reseat fan cable. Replace the fan.
512-Chassis fan not detected	None	Fan is not connected, may have malfunctioned, or fan driver on system board is not working.	Reseat fan cable. Replace the fan. Replace system board.
601-Diskette Controller Error	None	Diskette controller circuitry or floppy 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	None	Diskette in drive A not bootable.	Replace the diskette.

* L = Long, S = Short

POST Error Messages

Screen Message	Beeps*	Probable Cause	Recommended Action
605-Diskette Drive Type Error	2S	Mismatch in drive type.	Run Computer Setup (F10 Setup) or Windows NT, Windows 95, or Windows 98 utilities. Disconnect any other diskette controller devices (tape drives). Clear CMOS.
610-External Storage Device Failure	None	External tape drive not connected.	Reinstall tape drive or press F1 and allow system to reconfigure without the drive.
611-Primary Floppy Port Address Assignment Conflict	2S	Configuration error.	Run Computer Setup (F10 Setup). Remove expansion cards. Clear CMOS.
612-Secondary Floppy Port Address Assignment Conflict	2S	Configuration error.	Run Computer Setup (F10 Setup). Remove expansion cards. Clear CMOS.
660-Display Cache is Detected Unreliable	None	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	None		No action required.
914-Hood Lock Coil is not Connected	None	Hood 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.	None	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	None	Riser board not seated or not installed.	Install riser board if missing or remove and reseat to ensure good connection.

* L = Long, S = Short

POST Error Messages

Screen Message	Beeps*	Probable Cause	Recommended Action
1151-Serial Port 1 Address Conflict Detected	2S	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	2S	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	2S	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	2S	Device IRQ address conflicts with another device.	Reset the IRQ.
1202-MIDI Port Address Conflict Detected	2S	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
1611- Fan failure detected	None	Chassis fan not connected to the system board.	Reconnect the fan. Replace the fan. Replace the system board.

* L = Long, S = Short

POST Error Messages

Screen Message	Beeps*	Probable Cause	Recommended Action
1720-SMART Hard Drive Detects Imminent Failure	None	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 available. Apply firmware patch if applicable (see www.compaq.com\support\techpubs\customer_advisories). Back up contents and replace hard drive.
1721-SMART SCSI Hard Drive Detects Imminent Failure	None	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 available. Apply firmware patch if applicable. Back up contents and replace hard drive.
1771-Primary Disk Port Address Assignment Conflict	2S	Internal and external hard drive controllers are both assigned to the primary address.	Remove any disk controller expansion cards. Clear CMOS. Reconfigure card resources and/or run Computer Setup (F10 Setup).
1772-Secondary Disk Port Address Assignment Conflict	2S	Internal and external hard drive controllers are both assigned to the primary address.	Remove any disk controller expansion cards. Clear CMOS. Reconfigure card resources and/or run Computer Setup (F10 Setup).
1780-Disk 0 Failure	None	Hard drive/format error.	Run Computer Setup (F10 Setup). Clear CMOS. Check cables/jumper settings. Run hard drive diagnostics. Disconnect additional drives. Run the Drive Protection System test if available. Replace the hard drive.

* L = Long, S = Short

POST Error Messages

Screen Message	Beeps*	Probable Cause	Recommended Action
1781-Disk 1 Failure	None	Hard drive/format 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.
1782-Disk Controller Failure	None	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.compaq.com\support\techpubs\customer_advisories for possible changes when using Windows NT4.0 Service Pack 4. Replace the hard drive. Replace the system board.

* L = Long, S = Short

POST Error Messages

Screen Message	Beeps*	Probable Cause	Recommended Action
1790-Disk 0 Failure	None	Hard drive error or wrong drive type.	Run Computer Setup (F10 Setup). Clear CMOS. Check cable seating /jumper settings. Run hard drive diagnostics. Disconnect additional drives. Confirm that drive is supported on this computer (large drive ROM support). Run the Drive Protection System test if available. Replace the hard drive. Replace the system board.
1791-Disk 1 Failure	None	Hard drive error or wrong drive type.	Run Computer Setup (F10 Setup). Clear CMOS. Check cable seating /jumper settings. Run hard drive diagnostics. Disconnect additional drives. Confirm that drive is supported on this computer (large drive ROM support). Run the Drive Protection System test if available. Replace the hard drive. Replace the system board.
1792-Secondary Disk Controller Failure	None	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.

* L = Long, S = Short

POST Error Messages

Screen Message	Beeps*	Probable Cause	Recommended Action
1793-Secondary Controller or Disk Failure	None	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	None	Internal temperature exceeds specification.	Check that computer 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	None	Processor not supported by ROM BIOS.	Upgrade BIOS to proper version.
Audible	1L, 3S	System ROM is bad; system is running in Failsafe Boot Block mode.	Reflash the ROM using a ROMPaq diskette. Refer to the "Failsafe Boot Block ROM" section of the Software Reference Guide.
Audible	2S	Power-on successful.	None.
Fixed Disk Parameter Table or BIOS Error System Halted	3L	Configuration or hardware failure.	Run Computer Setup and Diagnostic Utilities.
Flashing Caps Lock LED on Keyboard	1L, 2S	Graphics controller not present or incorrectly initialized.	Clear CMOS. If graphics card has been added, remove and reseat. Reset the riser board.
Flashing Num Lock LED on Keyboard (Most models. Blue LED glows on Evo W8000 Workstation.)	1S, 2L	System memory not present.	Check memory module. Remove and reseat memory module. See "Memory" in Appendix F.

* L = Long, S = Short

POST Error Messages

Screen Message	Beeps*	Probable Cause	Recommended Action
Flashing Scroll Lock LED on Keyboard (Most models. Orange LED glows on Evo W8000 Workstation.)	2L, 1S	System board hardware failure (prior to video).	Replace system board.
Invalid Electronic Serial Number	None	Electronic serial number has become corrupted.	Run Computer Setup (F10 Setup). If Setup already has data in the field or will not allow the serial number to be entered, download and run SP5572.EXE (SNZERO.EXE). Run F10 Setup and try to enter serial number under Security, System ID, then save changes.
Num Lock LED on Keyboard	None	Failed Boot Block.	Reflash the ROM using a ROMPaq diskette.
(Resume = F1 KEY)	None	As indicated to continue.	Press F1.
XXOOOYZZ Parity Check	None	Parity RAM failure.	Run Computer Setup and Diagnostic Utilities.

* L = Long, S = Short

D

Diagnostic Indicator Lights

✎ All indicator lights are not available on all products.

Keyboard Lights

LED	Color	LED Activity	State/Message
Num Lock	Green	Flashing	Memory error
Caps Lock	Green	Flashing	No video
Scroll Lock	Green	Flashing	System board failure, prior to video

Chassis Indicator Lights—Desktop Computers and Workstations

LED	Color	LED Activity	State/Message
Power	Green	On	Computer on
Power	Green	1 blink/second	Normal suspend mode
Power	Green	1 blink/second	Suspend to RAM
Power	None	None	Computer off
Power	Red	On	CPU not installed/fetching code
Power	Red*	4 blinks/second	CPU thermal shutdown
Power	Red*	Computer shuts down	CPU thermal shutdown
Power	Red*	2 blinks 1 second apart followed by 2 second pause then repeat pattern	CPU thermal shutdown
Power	Red	1 blink/second	ROM error
Power	Red	1 blink/2 or more seconds	Power supply overheated
Power and hard drive	Red	On	Riser board not seated

*Varies by model.
**Most models. Blue LED glows on Evo Workstation W8000.

System Board Diagnostic Lights[1]—Desktop Computers and Workstations

Main Power Switch Status	3.3 V_Aux LED	5 V_Aux/ PSON LED	Power Button LED[6]
OFF[2]	ON	ON[4]	OFF
ON[3]	ON	OFF[5]	ON

1. ON and OFF state of LEDs apply only to a good, working system board with AC power applied to the power supply.
2. Power LED is OFF.
3. Power LED is ON. (Green)
4. 5V_Aux is ON.
5. PSON is active = power supply turned ON.
6. All except SFF.

Diagnostic 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 computers 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.

✎ 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 the "Removal and Replacement Procedures" chapter 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 0109-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.	3. Replace the system board and retest.
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.	3. Replace defective modules.
0209-xxx	RAM long test failed.	4. If error continues, replace system board and retest.
0211-xx	Random pattern test failed.	
0212-xxx	Cache test failed.	
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 computer off and connect the keyboard.
0302-xx	Individual key test failed.	2. Replace the keyboard and retest.
0304-xx	Repeat test failed.	3. Replace the system board and retest.

✎ 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 NT, Windows 98/2000/ME utilities. 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.	4. Replace the tape adapter card (if applicable) and retest.
1905-xx	Read test failed.	5. Replace the tape drive and retest.
1906-xx	Write/read/compare failed.	6. Replace the system board and retest.
1910-xx	Tape erase test failed.	

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.
2402-xx	Memory test failed.	The following steps apply to 2402-xx through 2419-xx:
2403-xx	Attribute test failed.	1. Reseat the video card (if applicable) and retest.
2404-xx	Character set test failed.	2. Run the Configuration and Diagnostics utilities.
2405-xx	80 × 25 mode 9 × 14 character cell test failed.	3. Replace the monitor and retest.
2406-xx	80 × 25 mode 8 × 8 character cell test failed.	4. Replace the video/system board and retest.
2408-xx	320 × 200 mode color set 0 test failed.	
2409-xx	320 × 200 mode color set 1 test failed.	

Video

Error Code	Description	Recommended Action
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.	
2458-xx	Advanced VGA BitBLT test.	The following steps apply to 2458-xx through 2480-xx:
2468-xx	Advanced VGA DAC test.	1. Reseat the video card (if applicable) and retest.
2477-xx	Advanced VGA data path test.	2. Replace the video card and retest.
2478-xx	Advanced VGA BitBLT test.	3. Replace the system board and retest.
2480-xx	Advanced VGA Linedraw test.	

Audio

Error Code	Description	Recommended Action
3206-xx	Audio System Internal Error.	Replace the system board and retest.

✎ When Windows 98/2000/ME is installed, changes to ESS sound device configuration do not take effect until the computer 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.*	1. Run Computer Setup or Windows NT, Windows 95, 98, 2000, or ME utilities.
6016-xx	Reset test failed.*	2. Verify test procedures.
6028-xx	Internal test failed.*	3. Replace the network card, if installed.
6029-xx	External test failed.*	4. Replace the system board.
6054-xx	Configuration test failed.**	
6056-xx	Reset test failed.**	
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.
6600-xx	ID test failed.	2. Check the jumper settings on the adapter card.
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 Device

Error Code	Description	Recommended Action
8601-xx	Mouse test failed.	The following steps apply to 8601-xx through 8602-xx:
		1. Replace with a working mouse and retest.
8602-xx	Interface test failed.	2. Replace the system board and retest.

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.

Test Error Codes *(Continued)*

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.

F

Troubleshooting Without Diagnostics

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.

Preliminary Checklist

This section describes some simple, preliminary tests and guidelines for troubleshooting the computer without using the diagnostics.

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

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

■ Is the computer 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 computer 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 from the diskette drives before you turn on the system.

■ Are all switches set correctly?

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

■ Are all memory sockets filled on computers using RIMMs?

■ Ensure that memory module types are not mixed on the same system board. The system will not boot if RIMMs and DIMMs are mixed.

Solving Minor Problems

Problem	Possible Solution
Computer will not turn on.	1. Ensure that the computer is properly connected to an external power source and the wall outlet is active. 2. A PCI or ISA card that has been installed is defective. Remove any expansion card that was just installed. 3. Reseat drive power, data, and power supply cables. 4. Disconnect all drive cables and reboot. Add devices back one at a time to isolate problem.
Computer appears locked up and won't turn off when the power button is pressed.	Software control of the power button may not be functional. Press and hold the button for four seconds, then release. This invokes the hardware override for the power button.
Computer date and time display is incorrect.	First, reset the date and time under Control Panel. If the problem persists, the real-time clock (RTC) battery may need to be replaced. Refer to Section 9.1 in this guide. When booting from a network, the PC clock may be reset to that of the server. The PC clock may also change when using other services through the server.
Computer powered off automatically.	1. The unit temperature was exceeded because the unit is in an exceedingly hot environment or the fan is blocked. Let the unit cool down. 2. The fan may not be functioning correctly or the air vents are blocked. 3. The unit temperature was exceeded because the computer was functioning with the cover or side panel removed. Replace cover or side panel, and let the computer cool down. 4. The unit temperature was exceeded because the air baffle is not properly installed to direct air flow over the processor.
Insufficient power to the components.	Ensure that both power supply cables are connected to the system board (on some workstations).
Computer appears to pause periodically	Network driver is loaded and no network connection is established. Establish a network connection, or use Computer Setup or Windows Device Manager to disable the network controller.
Cannot remove computer cover or side panel.	1. Smart Lock, featured on some computers, is locked. Unlock the Smart Cover Lock using Computer Setup. 2. The Smart Cover FailSafe Key, a device for manually disabling the Smart Cover Lock, is available from Compaq. You need the FailSafe Key in cases of forgotten password, power loss, or computer malfunction.
Computer does not boot up and power and hard drive LEDs are blinking.	Ensure that the riser board is properly seated.

Solving Minor Problems *(Continued)*

Problem	Possible Solution
Computer does not boot up and Num Lock LED is blinking; you may hear one short and two long beeps.	Memory may be improperly installed or may be bad.
The Caps Lock LED is flashing; you may hear one long and two short beeps.	The video controller is not present or is incorrectly initialized. Clear configuration memory (CMOS). If a video card has been added, remove and reseat it.
Computer does not boot up and the Scroll Lock LED is flashing; you may hear two long and one short beeps.	System board hardware failure (prior to video). Replace system board.

✎ If the standard keyboard has been replaced with a Universal Serial Bus (USB) keyboard, you will hear the beep sequences mentioned above but will not see the flashing lights.

Diskette Drive

Problem	Possible Solution
Diskette drive light stays on.	1. Diskette is damaged. In Windows 98, 2000, or Me run ScanDisk. Click Start > Programs > Accessories > System Tools > ScanDisk. In Windows NT, right–click Start, click Explore, and select a drive. Select File > Properties > Tools. Under Error-checking, click Check Now. 2. Diskette is incorrectly inserted. Remove the diskette and reinsert. 3. Software program may be damaged. Check the program diskettes. 4. Drive button is not pushed in. Push in drive button. 5. Drive cable is not properly connected. Reconnect drive cable.
Diskette drive cannot write to a diskette.	1. Diskette is not formatted. Format the diskette. 2. Diskette is write-protected. Either use another diskette that is not write-protected or disable the write protection on the diskette. 3. Writing to the wrong drive. Check the drive letter in the path statement. 4. Not enough space is left on the diskette. Use another diskette. 5. Diskette write control is enabled. Check the Removable Media write settings in Computer Setup.
Cannot format diskette.	Invalid media reported. When formatting a diskette in DOS, you may need to specify diskette capacity. For example, to format a 1.44-MB diskette, type the following command at the DOS prompt: FORMAT A: /F:1440

Diskette Drive *(Continued)*

Problem	Possible Solution
Diskette drive cannot read a diskette.	1. Diskette is not formatted. Format the diskette. 2. Using the wrong diskette type for the drive type. Check the drive type and use a compatible diskette. 3. Reading the wrong drive. Check the drive letter in the path statement. 4. Diskette drive has been disabled by Computer Setup, Windows NT, Windows 98, 2000 or Me utilities. Run Computer Setup and enable the diskette drive.
A problem has occurred with a disk transaction.	The directory structure is bad, or there is a problem with a file. In Windows 98, 2000, or Me run ScanDisk. Click Start > Programs > Accessories > System Tools > ScanDisk. In Windows NT, right–click Start, click Explore, and select a drive. Select File > Properties > Tools. Under Error-checking, click Check Now.
Non-system disk message.	The system is trying to start from a nonsystem diskette. Remove the diskette from the drive.
Drive not found.	1. Reseat the diskette drive cable. 2. If a second diskette drive has been installed, follow the computer reconfiguration directions in the "Hardware Installation Problems" section.
System has misidentified the diskette drive type.	If a diskette drive other than a 3.5-inch, 1.44-MB drive has been installed, ensure that the drive type is identified correctly under Computer Setup.

Display

Problem	Possible Solution
Screen is blank.	1. Monitor is not turned on and the monitor light is not on. Turn on the monitor and check that the monitor light is on.
	2. Screen save has been initiated. Press any key or move the mouse to light the screen.
	3. The cable connections are not correct. Check the cable connection from the monitor to the computer and to the electrical outlet.
	4. The brightness need adjusting. Adjust the brightness control.
	5. The energy saver feature has been enabled. Press any key or click the mouse button and, if one has been set, type the password.
	6. The RGB (Red, Green, Blue) input switch on the back of the monitor is incorrectly set. Set the monitor's input switch to 75 ohms and, if there is a sync switch, set it to External.
	7. System ROM is bad and system is running in FailSafe Boot Block mode (indicated by one long beep and three short beeps). Reflash the ROM using a ROMPaq diskette. Refer to "FailSafe Boot Block ROM" in section 3.4.3 of this book.
	8. If a fixed-sync monitor is used, be sure that the monitor can accept the same sweep rate as the resolution chosen.
	9. Ensure the VGA/BNC selector is properly set.
Graphics colors are wrong.	Either the cabling or the monitor impedance is incorrect.
	1. Ensure that the Red, Green, and Blue BNC cables are connected to the corresponding monitor connectors.
	2. Be sure the monitor's RGB inputs are set to 75 ohms.
Characters are dim.	1. Adjust the monitor's brightness and contrast controls.
	2. Check that the video cable is securely connected to the graphics card and monitor.
	3. Set the RGB switch (and sync options, if available) to 75 ohms, with the sync set to External. Refer to the documentation included with the monitor.
Monitor does not function properly when used with the energy saver features.	Monitor without the energy saver feature is being used with energy saver features enabled. Disable the monitor energy saver features.
Blurry display or requested resolution cannot be set.	If the graphics controller was upgraded, the correct display drivers may not be loaded. Install the correct display drivers from the diskette included in the upgrade kit.

Display *(Continued)*

Problem	Possible Solution
The picture is broken up; it rolls, jitters, or blinks.	1. Be sure the monitor cable is securely connected to the computer. 2. In a two-monitor system or if another monitor is in close proximity, move the monitors apart to be sure they are not interfering with the other's magnetic field. 3. Fluorescent lights or fans may be too close to the monitor.
Screen goes blank.	A screen blanking utility may be installed or energy saver features may be enabled. Press any key or type password.
Monitor overheats.	There is not enough ventilation space for proper airflow. Leave at least 3 inches (7.6 cm) of ventilation space. Be sure there is nothing on top of the monitor obstructing the air flow.
Cursor will not move using the arrow keys on the numeric keypad.	The Num Lock key is on. Press the key to turn it off. The Num Lock light should not be on when you want to use the arrow keys.

SCSI

Problem	Possible Solution
System with IDE and SCSI drives will not boot from SCSI hard drive.	The IDE drive needs to be disabled. Under the Computer Setup Advanced menu, disable the primary IDE controller.
System will not boot from a SCSI drive.	1. The SCSI drive is not configured correctly. 2. Ensure that drive cabling and jumpers are set correctly. To boot a SCSI drive, the drive ID number must be set to 0.

Printer

Problem	Possible Solution
Printer will not print.	1. Printer is not turned on and online. Turn the printer on and ensure it is online.
	2. Run printer self-test.
	3. Reseat both ends of the printer cable.
	4. Verify that printer port is enabled in BIOS and in Windows using F10 Setup.
	5. Try printing using the DOS command C:\ [printer port]. Where [printer port] is the port address to which the printer is connected. If the printer works, the problem is with the printer driver. Reload the driver.
	6. If the computer is on a network, you may not have made the connection to the printer. Make the proper network connections to the printer.
Printer will not turn on.	The cables may not be connected properly. Reconnect all cables and check the power cord and electrical outlet.
Prints garbled information.	1. The correct printer driver for the application are not installed. Install the correct printer driver for the application.
	2. The cables may not be connected properly. Reconnect all cables.
Printer is offline.	The printer may be out of paper. Check the paper tray and refill it if empty. Select online.

Hard Drive

The information provided by the diagnostics tests includes: error code, system serial number, drive serial number, drive model, and drive firmware revision. Specific details of the drive failure are not included.

When you run the diagnostics, the test results are stored in a log. After completing the test, you can print this log to a local printer or save it to a file. Alternatively, before running the test, you can configure the test options to send the results to a local printer or file.

Hard Drive

Problem	Possible 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 98, 2000, or Me run ScanDisk. Click Start > Programs > Accessories > System Tools > ScanDisk. In Windows NT, right–click Start, click Explore, and select a drive. Select File > Properties > Tools. Under Error-checking, click Check Now.
Drive not found (identified).	1. Cable could be loose. Check cable connections. 2. The system may not have automatically recognized a newly installed device. See reconfiguration directions in the "Hardware Installation Problems" section. If 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. Check drive jumper settings. If the drive is a secondary drive that has just been installed on the same controller as the primary drive, verify that the jumpers for both drives are set correctly. 4. Check SCSI IDs to ensure none are duplicated.
Nonsystem disk message.	1. The system is trying to start from a diskette that is not bootable. Remove the diskette from the diskette drive. 2. The system is trying to start from the hard drive but the hard drive may have been damaged. Insert a bootable diskette into the diskette drive and restart the computer. 3. Diskette boot has been disabled in Computer Setup. Run Computer Setup and enable diskette boot.
Second Ultra ATA hard drive does not perform optimally.	The cable is not compatible with the drive type. Reinstall the second Ultra ATA hard drive using an 80-conductor cable.

Audio

Problem	Possible Solution
Sound does not come out of the speaker.	Software volume control is turned down electronically, or CD-ROM volume control on the front or back of the computer is turned down. Double–click on the speaker icon located on the taskbar, then set the volume by adjusting the volume slider.
	CD or DVD volume control on the front of the computer may be turned down. Increase the volume by turning the volume control dial.
	External speakers not turned on. Turn on the speakers.
	External speakers plugged into wrong jacks. Refer to the *Computer User's Guide* or sound card documentation for proper speaker connection.
	Audio cable not connected. Connect audio cable between CD or DVD drive and the system board.
Noise or silence comes from the speakers or headphones.	Computer may not detect correct speaker/headphone type or output or analog–to–digital auto–sense is not engaged. 1. If using digital speakers with a stereo jack, use the stereo–to–mono adapter to engage the auto–sense feature. 2. If a the stereo–to–mono adapter is not available, use the multimedia device properties to manually switch the audio signal from analog to digital. 3. If the headphones have a mono jack, use the multimedia device properties to manually switch the system to analog out. ✎ 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 your Output Mode, external digital speakers will not function until you change the output mode back to auto–sense or digital mode.

Hardware Installation

You may need to reconfigure the computer when you add or remove hardware, such as an additional diskette drive. If you install a Plug and Play device, Windows 98, 2000, or Me in most cases will automatically recognize the device and configures the computer. If a third-party Plug and Play device is not recognized, contact the device manufacturer. If you install a non–Plug and Play device, you must reconfigure the computer after completing installation of the new hardware. In Windows 98, 2000, or Me, select the Add New Hardware icon in the Control Panel and follow the instructions that appear on the screen. To reconfigure the computer in Windows NT Workstation 4.0 after installing new hardware, use the utility provided with the hardware.

Hardware Installation

Problem	Possible Solutions
A new device is not automatically recognized as part of the computer system.	1. The computer needs to be reconfigured to recognize the new device. Follow the reconfiguration instructions above. If system still does not recognize the new device, but the device is listed within Computer Setup, use Computer Setup to address any resource conflicts.
	2. When the system advised you of changes to the configuration, you did not accept them. Reboot the computer and follow the instructions for accepting the changes.
	3. A Plug and Play board may not automatically configure when added if the default configuration conflicts with other devices. Use Windows 98, 2000, or Me Device Manager to deselect the automatic settings for the board and choose a basic configuration that doesn't cause a resource conflict. You can also use Computer Setup to reconfigure or disable devices to resolve the resource conflict.
	4. The cables for the new external device are loose or the power cables are unplugged. Check all cables, and check that pins in the cable or connector are not bent down.
	5. The power switch for the new external device is not turned on. Turn off the computer, turn on the external device, and then turn the computer on to integrate the new device with the computer.
	6. If the drive is a secondary drive that has just been installed on the same controller as the primary drive, verify that the jumpers for both drives are set correctly.
Insufficient power to the components.	Ensure both power supply cables are connected to the system board (some Workstations).
Installed third-party SCSI hard drive adapter not participating in the hard drive ordering sequence provided in F10 Setup and/or is always coming up as the boot device regardless of the predetermined sequence.	The third-party adapter is either not supporting BIOS Boot Specification or the Boot Vector option. A solution is not available.

DVD-ROM and CD-ROM

Problem	Possible Solution
Cannot read compact disc.	1. CD is not properly seated in the drive. Eject the CD, correctly seat it in the drive, then reload.
	2. CD has been loaded upside down. Eject the CD, turn it over, then reload.
System will not boot from CD-ROM or DVD drive.	1. The CD-ROM or DVD boot is not enabled through the Computer Setup utility. Run the Computer Setup utility and set the drive priorities.
	2. Ensure that drive cabling and jumpers are set correctly. To boot a SCSI drive, the drive ID number must be set to 0.
Cannot eject compact disc (tray-load unit).	CD is not properly seated in the drive. Turn off the computer and insert a thin metal rod into the emergency eject hole and push firmly (a straightened paper clip can be used). Slowly pull the tray out from the drive until the tray is fully extended, then remove the CD.
Cannot eject compact disc (slot-load unit).	1. Remove the drive from the chassis.
	2. Remove the front bezel from the drive.
	3. Remove the top and bottom drive covers.
	4. Release the clamping mechanism to retrieve the CD.
CD-ROM or DVD device is not detected; driver is not loaded.	CD-ROM or DVD drive is not connected properly or not properly terminated. Open the computer and check the drive cable.
Movie will not play in the DVD drive.	Movie may be regionalized for a different country. Refer to the documentation that came with the device.

Processor

Problem	Possible Solution
Computer does not recognize the second processor.	Hardware Abstract Layer (HAL) installed is for a single processor. Install the multi-processor HAL.

Memory

Problem	Possible Solution
System won't boot or does not function properly after installing additional memory modules.	Memory module is not the correct type or speed grade for the system. Replace module with the correct industry-standard device for the computer.
Out of Memory error.	1. Memory configuration may not be set up correctly; check memory configuration using Device Manager. 1. The computer has run out of memory for the application. Check the application documentation to determine the memory requirements.
Memory count during POST is wrong.	Memory modules may not have been installed correctly or incorrect modules may have been used. ✎ On system boards having integrated Intel video that use 1 MB of memory for video it is normal for POST to have the memory count 1 MB short.
Insufficient memory error during operation.	1. Too many Terminate and Stay Resident programs (TSRs) are installed. Delete any unnecessary TSRs. 2. There is not enough memory for the application. Check the memory requirements for the application or add more memory.
Unit is on but there is no video and the power LED is blinking red.	Memory is not installed correctly and system is not booting. Reinstall memory modules.

Network

Some common causes and solutions for network problems are listed in the following table. These guidelines do not discuss the process of debugging network cabling.

Network

Problem	Possible Solution
The Remote Wakeup feature is not functioning.	1. The feature is not available when using an AUI network connection; use an RJ-45 network connection.
	2. Remote Wakeup is not enabled. Use the network control application to enable Remote Wakeup.
Network driver does not detect network controller.	Network controller is disabled. Run Computer Setup and enable network controller.
Network status link light does not turn on or flashes.	1. No active network is detected. Check cabling and network equipment for proper connection.
	2. Network connection is not set up properly. Use the network control application to verify that the device is working properly.
	3. System is configured for AUI connection; link LED does not apply to AUI connections.
	4. Network driver is not properly loaded. Reinstall network drivers.
	5. System cannot autosense the network. Disable autosensing capabilities and force the system into the correct operating mode.
Diagnostics reports a failure.	Refer to www.compaq.com/support/files for the latest version of diagnostics.
	1. The cable is not securely connected or is attached incorrectly. Ensure that the cable is securely attached to the network connector and that the other end of the cable is securely attached to the correct device.
	2. 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.
	3. The network controller is defective. Replace the controller or the system board.
	4. Network controller interrupt is shared with an expansion board. Under the Computer Setup Advanced menu, change the resource settings for the board.

Network *(Continued)*

Problem	Possible Solution
Diagnostics passes, but the computer does not communicate with the network.	1. Network drivers are not loaded, or driver parameters do not match current configuration. Make sure the network drivers are loaded and the driver parameters match the configuration of the network controller.
	2. The network controller is not configured for this computer. In Windows 98/2000/Me/Windows NT, select the Network icon at the Control Panel.
	3. Network controller interrupt with an expansion board. Under the Computer Setup Advanced menu, change the resource settings for the board.
Network controller stopped working when an expansion board was added to the computer.	1. Network drivers are not loaded or driver parameters do not match the current configuration. Make sure that the drivers are loaded and that the driver parameters match the configuration of the network controller.
	2. The cable is not securely connected or is attached incorrectly. Ensure that the cable is securely attached to the network connector and that the other end of the cable is securely attached to the correct device.
	3. Network controller interrupt is shared with an expansion board. Under the Computer Setup Advanced menu, change the resource settings for the board.
	4. Network drivers were accidentally deleted when the drivers for the new expansion board were installed, or the files containing the network drivers are corrupted. Reinstall the network drivers, using backup diskettes.
Network controller stopped working without apparent cause.	1. The files containing the network drivers are corrupted. Reinstall the network drivers, using backup diskettes or the Restore CD.
	2. The cable is not securely connected or is attached incorrectly. Ensure that the cable is securely attached to the network connector and that the other end of the cable is securely attached to the correct device.
	3. The network controller is defective. Replace the network controller or system board.
Cannot connect to the network server when attempting Remote System Installation.	The network controller is not configured properly. Run Computer Setup and modify the Embedded NIC Settings.
System Setup utility reports unprogrammed EPROM.	1. Boot the workstation without the network drivers using a system boot diskette and reconfigure the controller.
	2. Replace the controller.
	3. Replace the system board.

Resolving Audio Hardware Conflicts

Hardware conflicts occur when two or more peripheral devices contend for the same signal lines or channels. Conflicts between the audio interface and another peripheral device may be due to the settings of the base I/O addresses, interrupts, or DMA channels. The audio interface typically has the following settings:

Item	Setting
Base I/O address	220H
FM Synthesizer I/O address	388-38Bh
Interrupt	IRQ 5
8-bit DMA	Channel 1

To resolve hardware conflicts:

1. Change the hardware settings of your audio card or the peripheral card in your system if the peripheral card is using the audio interface setting. You can change settings for integrated audio using Computer Setup.

2. If you are unsure of the settings of the peripheral cards, you can isolate the source of the problem by temporarily removing all cards and other essential cards such as the disk controller. After that, add the cards back one at a time until the card that is causing the conflict is found.

Troubleshooting Using HP Intelligent Manageability Features

The Local Alert Pop-Up Dialog notifies you of an impending or actual hardware failure. If the computer 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 computer. 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.*

G

System Board and Riser Board Reference Designators

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

NOTE: To determine which xw6000 system board you have, see the "Identifying the System Board" section of this guide for additional information.

Designator	Component
CR1	LED - 3.3V Aux
CR2	LED - Power button press
CR3	LED - PS_ON, 5.5V Aux
CR34	Power ON LED
CR35	Hard drive activity LED
E49	Clear Password header
E50	CMOS header
E51	Video pass-through header
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

Designator	**Component** *(Continued)*
J53	Parallel port over single Serial Port
J54	Parallel port over Serial Port and Video Port
J55	Parallel port over dual VGA ports
J66	Keyboard connector (Closest to monitor connector)
J67	Mouse connector
J68	Double-stacked mouse/keyboard connector
	TopMouse
	BottomKeyboard
J69	Video connector
J70	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
	TopMicrophone
	BottomHeadphone
J78	Double-stacked line-in/line-out connector
	TopLine in
	BottomLine out
J80	Stacked serial/audio connector
J81	Primary double-stack USB
	TopPort 2
	BottomPort 1
J82	Secondary double-stack USB
	TopPort 4
	BottomPort 3
J83	Triple-stacked audio jack (line in, line out/headphone, microphone)
J113	Video cache connector
P1	P/S connector
P2	Second P/S connector (as required)
P3	Third P/S connector (as required)
P5	Main Power switch and HDD and power LED connector (pins 1-9) and SCSI LED connector (pins 10-11)
P6	Speaker connector
P7	Audio connector (from CD-ROM)
P8	Chassis fan connector
P8	Primary chassis fan connector (xw6000 configuration 2)
P9	WOL connector (NIC cable)
P10	Diskette drive connector
P11	Second Audio connector
P12	Alert on LAN NIC connector
P15	AUI connector

Designator	**Component** *(Continued)*
P20	Primary IDE connector
P21	Secondary IDE (Multibay) connector
P22	Slimline CD-ROM connector
P23	Header for front audio panel
P24	Header for front panel USB
P25 - P26	Video memory upgrade connector
P27	MultiBay header
P29	SCSI LED connector
P30	Primary serial ATA port
P31	Secondary serial ATA port
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)
P70	Primary chassis fan header (xw6000 Configuration 1)
P70	Primary CPU fan header (xw6000 Configuration 2)
P70	CPU fan header (xw4000)
P71	Secondary chassis fan header (xw6000 Configuration 1)
P71	Secondary CPU fan header (xw6000 Configuration 2)
P89	Floating serial port /COM port header
P100	ITP connector
P101	Security card connector
P120	Front chassis fan header (xw6000)
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
SW51	Power button switch
XBT1	Battery socket
XMM1	Memory slot. DIMM1 or RIMM1 populated and tested
XMM2 - XMM5	Following memory slots
XU1	Primary processor socket
XU2	Secondary processor socket
XU15	ROM socket

H

Model Number Naming for hp Products

hp workstations

X4CP/2.6+/40S+/256D/MXRd

Workstation Series

X4 = xw4000
X6 = xw6000

Chassis Type

C = CMT

OS Type

K= Win2000
X= WinXP Pro
P= Win2K / XP Pro

Processor

n.n = speed in GHz

xw4000 system:

blank = 400 MHz FSB
F = 533 MHz FSB

xw6000 system:

+ = 2nd processor

Hard Drive Size, GB

nnn= capacity in GB

+ = 2nd Hard Drive

= 3rd Hard drive

Memory

0 = no memory
nnn = amount in MB
n = amount in GB

Drive Type

S = SCSI (10K RPM)
K = SCSI (15K RPM)
A = UATA

Memory Type

R =RDRAM
S = SDRAM
D = DDR

Graphics

X = no graphics
EX = Quadro2 EX
MXR = Quadro2 MXR
Pro = Quadro2 Pro
FG2 = FireGL2
45D = Matrox G450 DualHead
20Q = Matrox G200 MMS Quad
55D = Matrox G550 DualHead
200 = Quadro4 200NVS
400 = Quadro4 400NVS

Removable Storage

c = CD-ROM
d = DVD-ROM
r = CDRW
z = ZIP
blank = no device

Index