

Service and Technical Reference Guide

HP xw3400 Workstation



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Service and Technical Reference Guide

HP xw3400 Workstations

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About This Book

- ⚠ **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.
 - 📝 **NOTE:** Text set off in this manner provides important supplemental information.
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Table of contents

1 Install the operating system

Installing or upgrading device drivers	1
Transferring files and settings	2
Creating a disc recovery set	2

2 Computer Setup (F10) utility

Computer Setup (F10) utilities	3
Using Computer Setup (F10) utilities	4
Computer Setup—File	5
Computer Setup—Storage	6
Computer Setup—Security	9
Computer Setup—Power	11
Computer Setup—Advanced	12
Recovering the configuration settings	14

3 HP Insight Diagnostics

HP Insight Diagnostics	15
Accessing HP Insight Diagnostics	15
Survey tab	16
Test tab	16
Status tab	17
Log tab	18
Help tab	18
Saving and printing information in HP Insight Diagnostics	18
Downloading the latest version of HP Insight Diagnostics	19
Protecting the software	19
Restoring the software	19

4 Desktop management

Initial configuration and deployment	21
HP OpenView Agent	22
Altiris Deployment Solution Agent	22
HP Backup and Recovery Manager	22
Remote system installation	24
Software updating and management	24
HP Client Management Interface	24
HP System Software Manager	25
HP Client Manager	25

HP ProtectTools Security Manager	26
HP Client Management Premium Suite	26
HP Client Foundation Suite	27
HP OpenView Client Configuration Manager	27
HP OpenView Workstation Configuration Management solutions	27
Proactive change notification	28
Subscriber's Choice	28
Retired solutions	28
ROM Flash	28
Remote ROM Flash	29
HPQFlash	29
Boot Block Emergency Recovery Mode	29
Replicating the setup	30
Copying to single workstation	30
Copying to multiple workstations	30
Creating a bootable device	31
Supported USB flash media device	31
Unsupported USB flash media device	33
Dual-State power button	34
HP web site support	35
Industry standards	35
Asset tracking and security	35
Password security	37
Establishing a Setup password using Computer Setup	38
Establishing a power-on password Using Computer Setup	38
Entering a power-on password	38
Entering a Setup password	38
Changing a power-on or Setup password	39
Deleting a power-on or Setup password	40
National keyboard delimiter characters	40
Clearing passwords	40
DriveLock	41
Using DriveLock	41
DriveLock applications	41
Smart Cover Sensor	43
Setting the Smart Cover Sensor protection level	43
Smart Cover Lock	43
Locking the Smart Cover Lock	44
Unlocking the Smart Cover Lock	44
Using the Smart Cover FailSafe Key	44
Cable Lock provision	44
Fingerprint identification technology	45
Fault notification and recovery	45
Drive protection system	45
Surge-tolerant power supply	45
Thermal sensor	45

5 Serial and Parallel ATA drive guidelines and features

SATA hard drives	47
SATA hard drive cables	48

SATA data cable	48
SATA power cable	48
PATA device information	49
ATA SMART Drives	49
Hard drive capacities	49

6 Identifying routine care and disassembly preparation

Electrostatic discharge information	52
Generating static	52
Preventing electrostatic damage to equipment	52
Personal grounding methods and equipment	53
Grounding the work area	53
Recommended materials and equipment	53
Operating guidelines	55
Routine care	55
General cleaning safety precautions	55
Cleaning the workstation case	55
Cleaning the keyboard	56
Cleaning the monitor	56
Cleaning the mouse	57
Service considerations	57
Power supply fan	57
Tools and software requirements	57
Screws	57
Cables and connectors	58
Hard drives	58
Lithium coin cell battery	58

7 Removal and replacement procedures

Preparation for disassembly	59
External security devices	60
Installing a cable lock	60
Installing a padlock	60
Access panel	61
Front bezel	62
Front drive bezels	63
Cable management	64
Cable connections	65
Memory	66
Expansion cards	67
Drives	74
Drive positions	74
Removing an external drive	74
Disconnecting optical cables	75
Disconnecting diskette drive cables	75
Releasing the drives	76
Installing an external drive	76
Replacing an internal hard drive	79
Chassis fan	83

Fan shroud	84
Front I/O panel housing assembly	85
Heatsink	86
Processor	87
Speaker	89
Power supply	90
System board	91
Battery	92
Type 1 Battery Holder	93
Type 2 Battery Holder	93
Type 3 Battery Holder	94

Appendix A Connector pin assignments

Keyboard	95
Mouse	95
Ethernet BNC	95
Ethernet RJ-45	96
Ethernet AUI	96
Parallel interface	97
Serial interface, powered and non-powered	97
USB	98
Microphone	98
Headphone	98
Line-in audio	98
Line-out audio	98
External infrared transceiver	99
Monitor	99
ATA/ATAPI (IDE) Standard drive cable	100
24-Pin Power	100
4-Pin Power (for CPU)	101
SATA data and power	101
PCI Express	101
PCI Express	102
DVI connector	103

Appendix B Power cord set requirements

General requirements	105
Japanese power cord requirements	105
Country-specific requirements	105

Appendix C POST error messages

Power-On Self-Test (POST)	107
POST numeric codes and text messages	108
Interpreting POST diagnostic front panel LEDs and audible codes	115

Appendix D Troubleshooting without diagnostics

Safety and comfort	119
Before you call for technical support	119
Helpful hints	120

Solving general problems	122
Solving power problems	126
Solving diskette problems	127
Solving hard drive problems	130
Solving media card reader problems	132
Solving display problems	134
Solving audio problems	138
Solving printer problems	140
Solving keyboard and mouse problems	141
Solving hardware installation problems	143
Solving network problems	145
Solving memory problems	148
Solving processor problems	150
Solving CD-ROM and DVD problems	151
Solving drive key problems	154
Solving front panel component problems	155
Solving internet access problems	156
Solving software problems	158

Appendix E System board and riser board reference designators

.....	159
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Appendix F Memory

DDR2-SDRAM DIMMs	165
Populating DIMM sockets	166

Index 169

1 Install the operating system

△ **CAUTION:** Do not add optional hardware or third-party devices to your workstation until the operating system is successfully installed. Doing so may cause errors and may prevent the operating system from installing properly. Once the automatic installation has begun, **DO NOT TURN OFF THE WORKSTATION UNTIL THE PROCESS IS COMPLETE**. Turning off the workstation during the installation process might damage the software that runs the workstation or prevent its proper installation.

📖 **NOTE:** Be sure there is a 10.2-cm (4-inch) clearance at the back of the unit and above the monitor to permit the required airflow.

The first time the workstation is turned on, the operating system is automatically installed. This takes approximately 10 minutes, depending on the operating system being installed. Carefully read and follow the instructions that appear on the screen to complete the installation.

📖 **NOTE:** If the workstation shipped with more than one operating system language on the hard drive, the installation process could take up to 60 minutes.

If the workstation was not shipped with a Microsoft operating system, some portions of this documentation do not apply. For complete operating system installation and configuring instructions, refer to the operating system documentation. Additional information is available in online help.

Microsoft security updates are available on the Microsoft Web site.

Installing or upgrading device drivers

To install optional hardware devices after the operating system installation is complete, the drivers for each of the devices must also be installed.

If prompted for the I386 directory, replace the path specification with C:\i386, or use the **Browse** button in the dialog box to locate the i386 folder. This action points the operating system to the appropriate drivers.

Obtain the latest support software, including support software for the operating system from www.hp.com/support. Select the appropriate country and language then, select **Download drivers and software**, enter the model number of the workstation, and press **Enter**.

You can also obtain the latest support software on CDs. The following Web site provides information on how to purchase a support software CD subscription: <http://h18000.www1.hp.com/support/files/desktops/us/purchase.html>.

📖 **NOTE:** If the workstation has a writable optical drive, install the appropriate application to be able to write to the drive.

Transferring files and settings

Use the Microsoft Windows XP Files and Settings Transfer Wizard to move files and settings from an old workstation to a new one. Click **Start > All Programs > Accessories > System Tools > Files and Settings Transfer Wizard**. Follow the wizard to transfer the files and settings to the new workstation.

Creating a disc recovery set

- △ **CAUTION:** HP no longer ships the *Restore Plus!* CD with workstations. Instead, HP Backup and Recovery Manager is pre-loaded on each system. HP recommends the creation of a recovery CD as soon as the workstation has been set up. Creating the *Restore Plus!* CD set is important in the event that you ever need to restore the system hard drive to its factory installed state.

HP Backup and Recovery Manager can create the *Restore Plus* CD set, This set includes the *Restore Plus* CD, the Operating System CD, and any Supplemental Software CDs.

- △ **CAUTION:** The *Restore Plus* CD set will not include any system settings or user data created after the initial system setup.

To create the *Restore Plus* CD set:

1. Click **Start > HP Backup and Recovery > HP Backup and Recovery Manager** to open the Backup and Recovery Wizard, then click **Next**.
2. Select Create factory software recovery CDs or DVDs to recover the system.
3. Follow the instructions in the wizard.

The HP Backup and Recovery Manager can be used to back up data and system files to the hard drive, to network drives, or to removable media, such as CDs, DVDs, or flash media. If data or system files are lost, deleted, or corrupted, Backup and Recovery Manager allows you to retrieve data or restore the last good system image.

- △ **CAUTION:** HP recommends that a backup schedule be created immediately to ensure continued system and data protection. Automatic backups can be scheduled using the HP Backup and Recovery Wizard. Recovery Points, Entire Drive Backups, and File Backups can be automatically backed up without user intervention. HP recommends scheduling Recovery Points Backups to provide the most comprehensive coverage.

- 📖 **NOTE:** If HP Backup and Recovery Manager is preinstalled, the *Restore Plus* CD set and the initial recovery point may be saved to disc as often as necessary, but only a single copy of the Microsoft Windows CD can be created, due to licensing constraints.

NOTE: You can access a user manual at **Start > HP Backup and Recovery > HP Backup and Recovery Manager Manual**.

NOTE: If **Create factory software recovery CDs or DVDs to recover the system** is unavailable on the system, the HP *Restore Plus* CD set can be obtained through product support on http://welcome/country/us/en/contact_us.html.

2 Computer Setup (F10) utility

Computer Setup (F10) utilities

Use Computer Setup (F10) utility to do the following:

- Change factory default settings.
- Set the system date and time.
- Set, view, change, or verify the system configuration, including settings for processor, graphics, memory, audio, storage, communications, and input devices.
- Modify the boot order of bootable devices such as hard drives, diskette drives, optical drives, or USB flash media devices.
- 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 the system to:
 - always Quick Boot (default);
 - periodically Full Boot (from every 1 to 30 days); or
 - always Full Boot.
- Select Post Messages Enabled or Disabled to change the display status of Power-On Self-Test (POST) messages. Post Messages Disabled suppresses most POST messages, such as memory count, product name, and other non-error text messages. If a POST error occurs, the error is displayed regardless of the mode selected. To manually switch to Post Messages Enabled during POST, press any key (except F1 through F12).
- Establish an Ownership Tag, the text of which is displayed each time the system is turned on or restarted.
- Enter the Asset Tag or property identification number assigned by the company to this workstation.
- Enable the power-on password prompt during system restarts (warm boots) as well as during power-on.
- Establish a setup password that controls access to Computer Setup (F10) Utility and the settings described in this section.
- Secure 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 removable media boot ability.
- Enable or disable legacy diskette write ability (when supported by hardware).

- Solve system configuration errors detected but not automatically fixed during the Power-On Self-Test (POST).
- Replicate the system setup by saving system configuration information on diskette and restoring it on one or more workstations.
- Execute self-tests on a specified ATA hard drive (when supported by drive).
- Enable or disable DriveLock security (when supported by drive).

Using Computer Setup (F10) utilities

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

1. Turn on or restart the workstation. If you are in Microsoft Windows, click **Start > Shut Down > Restart**.
2. As soon as the workstation is turned on, press **F10** when the monitor light turns green to enter Computer Setup. Press **Enter** to bypass the title screen, if necessary.

 **NOTE:** If you do not press **F10** at the appropriate time, you must restart the workstation and again press **F10** when the monitor light turns green to access the utility.

3. Select your language from the list and press **Enter**.
4. A choice of five headings appears in the Computer Setup Utilities menu: File, Storage, Security, Power and Advanced.
5. Use the arrow (left and right) keys to select the appropriate heading. Use the arrow (up and down) keys to select the option you want, then press **Enter**. To return to the Computer Setup Utilities menu, press **Esc**.
6. To apply and save changes, select **File > Save Changes and Exit**.
 - If you have made changes that you do not want applied, select **Ignore Changes and Exit**.
 - To reset to factory settings or previously saved default settings (some models), select **Apply Defaults and Exit**. This option will restore the original factory system defaults.

 **CAUTION:** Do NOT turn the workstation power OFF while the BIOS is saving the Computer Setup (F10) changes because the CMOS could become corrupted. It is safe to turn off the workstation only after exiting the F10 Setup screen.

Table 2-1 Computer Setup (F10) Utility

Heading	Table
File	Table 2-2 Computer Setup—File on page 5
Storage	Table 2-3 Computer Setup—Storage on page 6
Security	Table 2-4 Computer Setup—Security on page 9
Power	Table 2-5 Computer Setup—Power on page 11
Advanced	Table 2-6 Computer Setup—Advanced (for advanced users) on page 12

Computer Setup—File

 **NOTE:** Support for specific Computer Setup options may vary depending on the hardware configuration.

Table 2-2 Computer Setup—File

Option	Description
System Information	Lists: <ul style="list-style-type: none">• Product name• SKU number (some models)• Processor type/speed/stepping• Cache size (L1/L2) (dual core processors have this listed twice)• Installed memory size/speed, number of channels (single or dual) (if applicable)• Integrated MAC address for embedded, enabled NIC (if applicable)• System BIOS (includes family name and version)• Chassis serial number• Asset tracking number
About	Displays copyright notice.
Set Time and Date	Allows you to set system time and date.
Flash System ROM (some models)	Allows you to select a drive containing a new BIOS.
Replicated Setup	Save to Removable Media Saves system configuration, including CMOS, to a formatted 1.44-MB diskette, a USB flash media device, or a diskette-like device (a storage device set to emulate a diskette drive). Restore from Removable Media Restores system configuration from a diskette, a USB flash media device, or a diskette-like device.
Default Setup	Save Current Settings as Default Saves the current system configuration settings as the default. Restore Factory Settings as Default Restores the factory system configuration settings as the default.
Apply Defaults and Exit	Applies the currently selected default settings and clears any established passwords.
Ignore Changes and Exit	Exits Computer Setup without applying or saving any changes.
Save Changes and Exit	Saves changes to system configuration or default settings and exits Computer Setup.

Computer Setup—Storage

 **NOTE:** Support for specific Computer Setup options may vary depending on the hardware configuration.

Table 2-3 Computer Setup—Storage

Option	Description
Device Configuration	<p>Lists all installed BIOS-controlled storage devices.</p> <p>When a device is selected, detailed information and options are displayed. The following options may be presented.</p> <p>Diskette Type (Legacy Diskettes only)</p> <p>Identifies the highest capacity media type accepted by the diskette drive. Options are 3.5" 1.44 MB and 5.25" 1.2 MB.</p> <p>Drive Emulation</p> <p>Allows you to select a drive emulation type for a certain storage device. (For example, a Zip drive can be made bootable by selecting diskette emulation.)</p> <p>Drive Type Emulation Options</p> <p>ATAPI Zip drive:</p> <ul style="list-style-type: none">• None (treated as Other).• Diskette (treated as diskette drive). <p>Legacy Diskette: No emulation options available.</p> <p>CD-ROM: No emulation options available.</p> <p>ATAPI LS-120:</p> <ul style="list-style-type: none">• None (treated as Other).• Diskette (treated as diskette drive). <p>Hard Disk</p> <ul style="list-style-type: none">• None (prevents BIOS data accesses and disables it as a boot device).• Hard Disk (treated as hard disk). <p>Multisector Transfers (ATA disks only)</p> <p>Specifies how many sectors are transferred per multi-sector PIO operation. Options (subject to device capabilities) are Disabled, 8, and 16.</p> <p>Transfer Mode (IDE devices only)</p> <p>Specifies the active data transfer mode. Options (subject to device capabilities) are PIO 0, Max PIO, Enhanced DMA, Ultra DMA 0, and Max UDMA.</p> <p>Translation Mode (ATA disks only)</p> <p>Lets you select the translation mode to be used for the device. This enables the BIOS to access disks partitioned and formatted on other systems and may be necessary for users of older versions of UNIX (e.g., SCO UNIX version 3.2). Options are Automatic, Bit-Shift, LBA Assisted, User, and None.</p> <p>CAUTION: 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.</p>

Table 2-3 Computer Setup—Storage (continued)

	<p>Translation Parameters <i>(ATA disks only)</i></p> <p>NOTE: This feature appears only when User translation mode is selected.</p> <p>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.</p> <p>Default Values IDE/SATA</p> <p>Allows you to specify the default values for the Multisector Transfers, Transfer Mode, and Translation Mode for ATA devices.</p>
Storage Options	<p>Removable Media Boot</p> <p>Enables/disables ability to boot the system from removable media.</p> <p>Legacy Diskette Write</p> <p>Enables/disables ability to write data to legacy diskettes.</p> <p>BIOS DMA Data Transfers</p> <p>Allows you to control how BIOS disk I/O requests are serviced. When Enable is selected, the BIOS will service ATA disk read and write requests with DMA data transfers. When Disable is selected, the BIOS will service ATA disk read and write requests with PIO data transfers.</p> <p>SATA Emulation</p> <p>Allows you to choose how the SATA controller and devices are accessed by the operating system. The only supported option is IDE, which is the default.</p> <p>NOTE: RAID is not supported on the xw3400 Workstation.</p> <p>SATA 0 and 2</p> <p>Allows you to enable or disable DOS and boot accesses to the Primary channel of the first SATA controller. This feature only applies when SATA Emulation = IDE.</p> <p>NOTE: Advanced operating systems like Windows may reenable the channel.</p> <p>SATA 1 and 3</p> <p>Allows you to enable or disable DOS and boot accesses to the Secondary channel of the first SATA controller. This feature only applies when SATA Emulation = IDE.</p> <p>NOTE: Advanced operating systems like Windows may reenable the channel.</p> <p>SATA 4 (some models)</p> <p>Allows you to enable or disable DOS and boot accesses to the Primary channel of the second SATA controller. This feature only applies when SATA Emulation = IDE.</p> <p>NOTE: Advanced operating systems like Windows may reenable the channel.</p> <p>SATA 5 (some models)</p> <p>Allows you to enable or disable DOS and boot accesses to the Secondary channel of the second SATA controller. This feature only applies when SATA Emulation = IDE.</p> <p>NOTE: Advanced operating systems like Windows may reenable the channel.</p>
DPS Self-Test	<p>Allows you to execute self-tests on ATA hard drives capable of performing the Drive Protection System (DPS) self-tests.</p>

Table 2-3 Computer Setup—Storage (continued)

NOTE: This selection will only appear when at least one drive capable of performing the DPS self-tests is attached to the system.

Boot Order

Allows you to:

- Specify the order in which attached devices (such as a USB flash media device, diskette drive, hard drive, optical drive, or network interface card) are checked for a bootable operating system image. Each device on the list may be individually excluded from or included for consideration as a bootable operating system source.
- Specify the order of attached hard drives. The first hard drive in the order will have priority in the boot sequence and will be recognized as drive C (if any devices are attached).

NOTE: MS-DOS drive lettering assignments may not apply after a non-MS-DOS operating system has started.

Shortcut to Temporarily Override Boot Order

To boot **one time** from a device other than the default device specified in Boot Order, restart the workstation and press **F9** when the monitor light turns green. After POST is completed, a list of bootable devices is displayed. Use the arrow keys to select the preferred bootable device and press **Enter**. The workstation then boots from the selected non-default device for this one time.

Computer Setup—Security

 **NOTE:** Support for specific Computer Setup options may vary depending on the hardware configuration.

Table 2-4 Computer Setup—Security

Option	Description
Smart Card Options (some models)	Allows you to enable/disable the Smart Card to be used in place of the Power-On Password.
Setup Password	<p>Allows you to set and enable setup (administrator) password.</p> <p>NOTE: If the setup password is set, it is required to change Computer Setup options, flash the ROM, and make changes to certain plug and play settings under Windows.</p> <p>See the <i>Troubleshooting Guide</i> on the <i>Documentation and Diagnostics CD</i> for more information.</p>
Power-On Password	<p>Allows you to set and enable power-on password. The power-on password prompt appears after a power cycle. If the user does not enter the correct power-on password, the unit will not boot.</p> <p>NOTE: This password does not appear on warm boots , such as Ctrl + Alt + Delete or Restart from Windows, unless enabled in Password Options, below.</p> <p>See the <i>Troubleshooting Guide</i> on the <i>Documentation and Diagnostics CD</i> for more information.</p>
Password Options (This selection appears only if a power-on password or setup password is set.)	<p>Allows you to:</p> <ul style="list-style-type: none"> • Lock legacy resources (appears if a setup password is set) • Enable/disable network server mode (appears if a power-on password is set) • Specify whether the password is required for warm boot (Ctrl + Alt + Delete) (appears if a power-on password is set) • Enable/Disable Setup Browse Mode (appears if a setup password is set) (allows viewing, but not changing, the F10 Setup Options without entering setup password) <p>See the <i>Desktop Management Guide</i> on the <i>Documentation and Diagnostics CD</i> for more information.</p>
Embedded Security (This menu item only appears after the Embedded Security Device is made available under Device Security.)	<p>Allows you to:</p> <ul style="list-style-type: none"> • Enable/disable the Embedded Security device • Reset the device to Factory Settings • Enable/disable power-on authentication support. (some models) • Reset authentication credential. (some models) <p>This feature is supported on some models only. See the <i>Desktop Management Guide</i> on the <i>Documentation and Diagnostics CD</i> for more information.</p>
Device Security	<p>Allows you to set Device Available/Device Hidden for</p> <ul style="list-style-type: none"> • Serial ports • Parallel port • All USB ports • Front USB ports • System audio

Table 2-4 Computer Setup—Security (continued)

	<ul style="list-style-type: none">• Network controllers (some models)• Embedded security device (some models)
Network Service Boot	Enables/disables the workstation's ability to boot from an operating system installed on a network server. (Feature available on NIC models only; the network controller must be either a PCI expansion card or embedded on the system board.)
System IDs	Allows you to set: <ul style="list-style-type: none">• Asset tag (18-byte identifier) and ownership tag (80-byte identifier displayed during POST). See the <i>Desktop Management Guide</i> on the <i>Documentation and Diagnostics CD</i> for more information.• Ownership Tag. This tag is a string that is displayed under the POST splash screen that may be used to identify the owner of the workstation.• Chassis serial number or Universal Unique Identifier (UUID) number. The UUID can only be updated if the current chassis serial number is invalid. (These ID numbers are normally set in the factory and are used to uniquely identify the system.)• Keyboard locale setting (for example, U.S. or Deutsch) for System ID entry.
DriveLock Security	Allows you to assign or modify a master or user password for hard drives. When this feature is 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. NOTE: This selection will only appear when at least one drive that supports the DriveLock feature is attached to the system. See the <i>Desktop Management Guide</i> on the <i>Documentation and Diagnostics CD</i> for more information.
OS Security (some models)	NOTE: An OS Security selection is in effect only if the processor and operating system being used comprehend and utilize the security feature. <ul style="list-style-type: none">• Data Execution Prevention (some models) (enable/disable) Helps prevent OS security breaches.• Intel Virtualization Technology (some models) (enable/disable) Changing this setting requires turning the workstation off and then back on.
Setup Security Level	Provides a method to allow end-users limited access to change specified setup options, without having to know the Setup Password. This feature allows the administrator the flexibility to protect changes to essential setup options, while allowing the user to view system settings and configure nonessential options. The administrator specifies access rights to individual setup options on a case-by-case basis via the Setup Security Level menu. By default, all setup options are assigned Setup Password, indicating the user must enter the correct Setup Password during POST to make changes to any of the options. The administrator may set individual items to None, indicating the user can make changes to the specified options when setup has been accessed with invalid passwords. The choice, None, is replaced by Power-On Password if a Power-On Password is enabled. NOTE: Setup Browse Mode must be set to Enable in order for the user to enter Setup without knowing the setup password.

Computer Setup—Power

 **NOTE:** Support for specific Computer Setup options may vary depending on the hardware configuration.

Table 2-5 Computer Setup—Power

Option	Description
OS Power Management	<ul style="list-style-type: none">• Runtime Power Management— Enable/Disable. Allows certain operating systems to reduce processor voltage and frequency when the current software load does not require the full capabilities of the processor.• Idle Power Savings—Extended/Normal. Allows certain operating systems to decrease the processors power consumption when the processor is idle.• ACPI S3 Hard Disk Reset—Enabling this causes the BIOS to ensure hard disks are ready to accept commands after resuming from S3 before returning control to the operating system.• ACPI S3 PS2 Mouse Wakeup—Enables or disables waking from S3 due to PS2 mouse activity.• USB Wake on Device Insertion (some models)—Allows system to wake from Standby on USB device insertion.• Unique Sleep Blink Rates—This feature is designed to give the user a visual indication of the sleep state the system is in. Each sleep state has a unique blink pattern:<ul style="list-style-type: none">◦ S0 = Solid green LED.◦ S3 = 3 blinks at 1Hz (50% duty cycle) followed by a pause of 2 seconds (green LED), i.e., repeated cycles of 3 blinks and a pause.◦ S4 = 4 blinks at 1Hz (50% duty cycle) followed by a pause of 2 seconds (green LED), i.e., repeated cycles of 4 blinks and a pause.◦ S5 = LED is off.If this feature is disabled, S4 and S5 both have the LED off. S1 (no longer supported) and S3 use 1 blink per second.
Hardware Power Management	SATA power management enables or disables SATA bus and/or device power management.
Thermal	<ul style="list-style-type: none">• Fan idle mode—This bar graph controls the minimum permitted fan speed. <p>NOTE: This setting only changes the minimum fan speed. The fans are still automatically controlled.</p>

Computer Setup—Advanced

 **NOTE:** Support for specific Computer Setup options may vary depending on the hardware configuration.

Table 2-6 Computer Setup—Advanced (for advanced users)

Option	Heading
Power-On Options	<p>Allows you to set:</p> <ul style="list-style-type: none"> • POST mode (QuickBoot, FullBoot, or FullBoot every 1–30 days). • POST messages (enable/disable). • F9 prompt (enable/disable or hidden/displayed). Enabling this feature will display the text F9 = Boot Menu during POST. Disabling this feature prevents the text from being displayed. However, pressing F9 will still access the Shortcut Boot [Order] Menu screen. See Storage > Boot Order for more information. • F10 prompt (enable/disable or hidden/displayed). Enabling this feature will display the text F10 = Setup during POST. Disabling this feature prevents the text from being displayed. However, pressing F10 will still access the Setup screen. • F12 prompt (enable/disable or hidden/displayed). Enabling this feature will display the text F12 = Network Service Boot during POST. Disabling this feature prevents the text from being displayed. However, pressing F12 will still force the system to attempt booting from the network. • Option ROM prompt (enable/disable) Enabling this feature will cause the system to display a message before loading option ROMs. (This feature is supported on some models only.) • Remote wakeup boot source (remote server/local hard drive). • After Power Loss (off/on/previous state): Setting this option to: <ul style="list-style-type: none"> ◦ Off—causes the workstation to remain powered off when power is restored. ◦ On—causes the workstation to power on automatically as soon as power is restored. ◦ On—allows you to power on the workstation using a power strip switch, if the workstation is connected to an electric power strip. ◦ Previous state—causes the workstation to power on automatically as soon as power is restored, if it was on when power was lost. <p>NOTE: If you turn off power to the workstation using the switch on a power strip, you will not be able to use the suspend/sleep feature or the Remote Management features.</p> <ul style="list-style-type: none"> • POST Delay (None, 5, 10 15, or 20 seconds). Enabling this feature will add a user-specified delay to the POST process. This delay is sometimes needed for hard disks on some PCI cards that spin up very slowly, so slowly that they are not ready to boot by the time POST is finished. The POST delay also gives you more time to select F10 to enter Computer (F10) Setup. • I/O APIC Mode (enable/disable). Enabling this feature will allow Microsoft Windows Operating Systems to run optimally. This feature must be disabled for certain non-Microsoft Operating Systems to work properly. • Limit CPUID Maximum Value to 3. Restricts the number of CPUID functions reported by the microprocessor. (Enable this feature if booting to Windows NT.)
Execute Memory Test (some models)	Restarts the workstation and executes the POST memory test.
BIOS Power-On	Allows you to set the workstation to turn on automatically at a time you specify.
Onboard Devices	Allows you to set resources for or disable onboard system devices (diskette controller, serial port, or parallel port).

Table 2-6 Computer Setup—Advanced (for advanced users) (continued)

PCI Devices	<ul style="list-style-type: none">• 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 ACPI-based operating system.
PCI VGA Configuration	Displayed only if there are one or more PCI graphics controllers in the system and the integrated video is enabled. Allows you to specify which VGA controller will be the “boot” or primary VGA controller.
Bus Options	On some models, allows you to enable or disable: <ul style="list-style-type: none">• PCI SERR# generation.• PCI VGA palette snooping, which sets the VGA palette snooping bit in PCI configuration space; only needed when more than one graphics controller is installed.
Device Options	Allows you to set: <ul style="list-style-type: none">• Printer mode (Bi-Directional, EPP + ECP, Output Only).• Num Lock state at power-on (off/on).• S5 Wake on LAN (enable/disable).<ul style="list-style-type: none">◦ To disable Wake on LAN during the off state (S5), use the arrow (left and right) keys to select the Advanced > Device Options menu and set the S5 Wake on LAN feature to Disable. This obtains the lowest power consumption available on the workstation during S5. It does not affect the ability of the workstation to Wake on LAN from suspend or hibernation, but will prevent it from waking from S5 via the network. It does not affect operation of the network connection while the workstation is on.◦ If a network connection is not required, completely disable the network controller (NIC) by using the arrow (left and right) keys to select the Security > Device Security menu. Set the Network Controller option to Device Hidden. This prevents the network controller from being used by the operating system and reduces the power used by the workstation in S5.• Processor cache (enable/disable).• Integrated Graphics Memory Size (Automatic, 32M, 64M, 128M, 256M). This allows the user to control the size of the memory used by the integrated graphics controller. Automatic allows the BIOS to choose the optimal size. Available sizes may be limited by the installed system memory.• Integrated Video (enable/disable). Allows you to use integrated video and PCI Up Solution video at the same time (available on some models only).<p>NOTE: After Integrated Video is enabled and changes saved, a new menu item appears under Advanced to allow you to select the primary VGA controller video device.</p>• Internal speaker (some models) (enable/disable) (does not affect external speakers)• Monitor Tracking (enable/disable). Allows BIOS to save monitor asset information.• NIC PXE Option ROM Download (enable/disable). The BIOS contains an embedded NIC option ROM to allow the unit to boot through the network to a PXE server. This is typically used to download a corporate image to a hard drive. The NIC option ROM takes up memory space below 1MB commonly referred to as DOS Compatibility Hole (DCH) space. This space is limited. This F10 option will allow users to disable the downloading of this embedded NIC option ROM thus giving more DCH space for additional PCI cards which may need option ROM space. The default will be to have the NIC option-ROM-enabled.• Surround View (enable/disable). This enables the ATI Surround View option that allows the integrated graphics controller and an ATI PCI Express graphics card to work at the same time for multi-monitor support.

Recovering the configuration settings

This method of recovery requires that you first perform the **Save to Removable Media** command with the Computer Setup (F10) Utility before **Restore** is needed. (See [Save to Removable Media on page 5](#) in the Computer Setup—File table.)

 **NOTE:** It is recommended that you save any modified workstation configuration settings to a diskette, a USB flash media device, or a diskette-like device (a storage device set to emulate a diskette drive) and save the diskette or device for possible future use.

To restore the configuration, insert the diskette, USB flash media device, or other storage media emulating a diskette with the saved configuration and perform the **Restore from Removable Media** command with the Computer Setup (F10) Utility. (See [Restore from Removable Media on page 5](#) in the Computer Setup—File table.)

3 HP Insight Diagnostics

HP Insight Diagnostics

 **NOTE:** HP Insight Diagnostics is included on CD with some workstation models only.

The HP Insight Diagnostics utility allows you to view information about the hardware configuration of the workstation and perform hardware diagnostic tests on the subsystems of the workstation. The utility simplifies the process of effectively identifying, diagnosing, and isolating hardware issues.

The Survey tab is displayed when you invoke HP Insight Diagnostics. This tab shows the current configuration of the workstation. From the Survey tab, there is access to several categories of information about the workstation. Other tabs provide additional information, including diagnostic test options and test results. The information in each screen of the utility can be saved as an html file and stored on a diskette or USB HP Drive Key.

Use HP Insight Diagnostics to determine if all the devices installed on the workstation are recognized by the system and functioning properly. Running tests is optional but recommended after installing or connecting a new device.

You should run tests, save the test results, and print them so that you have printed reports available before placing a call to the Customer Support Center.

 **NOTE:** Third party devices may not be detected by HP Insight Diagnostics.

Accessing HP Insight Diagnostics

You must boot to the *Documentation and Diagnostics CD*, as described in the steps below, to access HP Insight Diagnostics.

1. While the workstation is on, insert the *Documentation and Diagnostics CD* into an optical drive on the workstation.
2. Shut down the operating system and turn off the workstation.
3. Turn on the workstation. The system will boot to the CD.

 **NOTE:** If the system does not boot to the CD in the optical drive, you may need to change the boot order in the Computer Setup (F10) utility so that the system attempts to boot to the optical drive before booting to the hard drive. Refer to Section 2.2 for more information.

4. Select the appropriate language and click **Continue**.

 **NOTE:** It is recommended that you accept the assigned default keyboard for your language unless you want to test your specific keyboard.

5. In the End User License Agreement page, click **Agree** if you agree with the terms. The HP Insight Diagnostics utility launches with the Survey tab displayed.

Survey tab

The **Survey** tab displays important system configuration information.

In the **View level** field, you can select the **Summary** view to see limited configuration data or select the **Advanced** view to see all the data in the selected category.

In the **Category** field, you can select the following categories of information to display:

All—Gives a listing of all categories of information about the workstation.

Overview—Gives you a listing of general information about the workstation.

Architecture—Provides system BIOS and PCI device information.

Asset Control—Shows product name, asset tag, system serial number, and processor information.

Communication—Shows information about the workstation parallel (LPT) and serial (COM) port settings, plus USB and network controller information.

Graphics—Shows information about the graphics controller of the workstation.

Input Devices—Shows information about the keyboard, mouse, and other input devices connected to the workstation.

Memory—Shows information about all memory in the workstation. This includes memory slots on the system board and any memory modules installed.

Miscellaneous—Shows HP Insight Diagnostics version information, workstation configuration memory (CMOS) information, system board data, and system management BIOS data.

Storage—Shows information about storage media connected to the workstation. This list includes all fixed disks, diskette drives, and optical drives.

System—Shows information about the workstation model, processor, chassis, and BIOS, plus internal speaker and PCI bus information.

Test tab

The Test tab allows you to choose various parts of the system to test. You can also choose the type of test and testing mode.

There are three types of tests to choose from:

- **Quick Test**—Provides a predetermined script where a sample of each hardware component is exercised and requires no user intervention in either Unattended or Interactive mode.
- **Complete Test**—Provides a predetermined script where each hardware component is fully tested. There are more tests available in the Interactive mode, but these require user intervention.
- **Custom Test**—Provides the most flexibility in controlling the testing of a system. The Custom Test mode allows you to specifically select which devices, tests, and test parameters are run.

For each test type, there are two test modes to choose from:

- **Interactive Mode**—Provides maximum control over the testing process. The diagnostic software will prompt you for input during tests that require your interaction. You may also determine whether the test passed or failed.
- **Unattended Mode**—Does not display prompts and requires no interaction. If errors are found, they are displayed when testing is complete.

To begin testing:

1. Select the Test tab.
2. Select the tab for the type of test you want to run: **Quick**, **Complete**, or **Custom**.
3. Select the **Test Mode: Interactive** or **Unattended**.
4. Choose how you want the test to be executed, either **Number of Loops** or **Total Test Time**. When choosing to run the test over a specified number of loops, enter the number of loops to perform. If you desire to have the diagnostic test for a specified time period, enter the amount of time in minutes.
5. If performing a Quick Test or Complete Test, select the device to be tested from the drop-down list. If performing a Custom Test, Click the **Expand** button and select the devices to be tested or click the **Check All** button to select all devices.
6. Click the **Begin Testing** button at the bottom right corner of the screen to start the test. The Status tab, which allows you to monitor the progress of the test, is automatically displayed during the testing process. When the test is complete, the Status tab shows whether the device passed or failed.
7. If errors are found, go to the Log tab and click the **Error Log** to display more detailed information and recommended actions.

Status tab

The Status tab displays the status of the selected tests. The type of test executed (**Quick**, **Complete**, or **Custom**) is also displayed. The main progress bar displays the percent complete of the current set of tests. While testing is in progress, a **Cancel Testing** button is displayed for use if you want to cancel the test.

After testing has completed, the **Cancel Testing** button is replaced with a **Retest** button. The **Retest** button will retest the last set of tests executed. This enables you to re-run the set of tests without having to re-enter the data in the Test tab.

The Status tab also shows:

- The devices being tested
- The test status (running, passed, or failed) of each device being tested
- The overall test progress of all devices being tested
- The test progress for each device being tested
- The elapsed test times for each device being tested

Log tab

The Log tab contains a **Test Log** tab and an **Error Log** tab.

The **Test Log** displays all tests that have been executed, the number of times of execution, the number of times failed, and the time it took to complete each test. The **Clear Test Log** button will clear the contents of the **Test Log**.

The **Error Log** displays the tests for devices that have failed during the diagnostic testing and includes the following columns of information.

- The **Device** section displays the device tested.
- The **Test** section displays the type of test run.
- The **Description** section describes the error that the diagnostic test found.
- The **Recommended Repair** will give a recommended action that should be performed to resolve the failed hardware.
- The **Failed Count** is the number of times the device has failed a test.
- The **Error Code** provides a numerical code for the failure. The error codes are defined in the Help tab.

The **Clear Error Log** button will clear the contents of the Error Log.

Help tab

On the Help tab contains an **HP Insight Diagnostics** tab, an **Error Codes** tab, and a **Test Components** tab.

The **HP Insight Diagnostics** tab contains help topics and includes search and index features.

The **Error Codes** tab provides a description of each numerical error code that may appear in the **Error Log** tab located on the **Log** tab. Each code has a corresponding error **Message** and a **Recommended Repair** action that should help solve the problem. To find an error code description quickly, enter the code in the box at the top of the tab and click the **Find Error Codes** button.

The **Test Components** tab displays low-level information on tests that are run.

Saving and printing information in HP Insight Diagnostics

You can save the information displayed in the HP Insight Diagnostics **Survey** and **Log** tabs to a diskette or a USB 2.0 HP Drive Key (64MB or higher). You can not save to the hard drive. The system will automatically create an html file that has the same appearance as the information displayed on the screen.

1. Insert a diskette or USB 2.0 HP Drive Key (capacity must be 64MB or higher). USB 1.0 Drive Keys are not supported.
2. Click **Save** in the bottom right corner of the screen.
3. Select **Save to the floppy** or **Save to USB key**.
4. Enter a file name in the **File Name** box and click the **Save** button. An html file will be saved to the inserted diskette or USB HP Drive Key.

 **NOTE:** Do not remove the diskette or USB key until you see a message indicating that the html file has been written to the media.

5. Print the information from the storage device used to save it.

 **NOTE:** To exit HP Insight Diagnostics, click Exit Diagnostics button in the bottom left corner of the screen then remove the *Documentation and Diagnostics CD* from the optical drive.

Downloading the latest version of HP Insight Diagnostics

1. Go to <http://www.hp.com>.
2. Click the **Software & Driver Downloads** link.
3. Enter your product number (for example, xw3400) in the text box and press the **Enter** key.
4. Select your specific workstation model.
5. Select your OS.
6. Click the **Diagnostic** link.
7. Click **HP Insight Diagnostics Offline Edition**.
8. Select a language and click **Download**.

 **NOTE:** The download includes instructions on how to create the bootable CD.

Protecting the software

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

Restoring the software

The HP Backup and Recovery Manager is an easy-to-use, versatile application that is pre-loaded on each system and allows you to:

- create Recovery Points to back up the entire system incrementally
- back up the entire hard drive in a single archive
- back up individual files

Backups can be scheduled to occur automatically at designated intervals, or they can be initiated manually. Recovery can be performed from the Recovery Partition on the hard drive or the Recovery Disc Set. The Recovery Disc Set includes the *Restore Plus!* CD, the Microsoft Operating System, and any Supplemental Software CDs.

 **NOTE:** HP highly recommends that you create a Recovery Disc Set immediately before using the workstation and schedule regular automatic Recovery Point backups.

The HP Backup and Recovery Manager provides two basic recovery methods. The first, recovery of files and folders, operates in Windows. The second, Workstation Recovery, requires a reboot to the Recovery

Partition or from the Recovery Disc Set. To reboot to the Recovery Partition, press F11 at startup when you see the message "Press F11 for Emergency Recovery."

 **NOTE:** For more information on using HP Backup and Recovery Manager, refer to the *HP Backup and Recovery Manager User Guide* by selecting **Start > HP Backup and Recovery > HP Backup and Recovery Manager Manual**.

4 Desktop management

HP Client Management Solutions provides standards-based solutions for managing and controlling desktops, workstations, and notebook PCs in a networked environment. HP pioneered desktop manageability in 1995 with the introduction of the industry's first fully manageable desktop personal workstations. HP is a patent holder of manageability technology. Since then, HP has led an industry-wide effort to develop the standards and infrastructure required to effectively deploy, configure, and manage desktops, workstations, and notebook PCs. HP develops its own management software and works closely with leading management software solution providers in the industry to ensure compatibility between HP Client Management Solutions and these products. HP Client Management Solutions are an important aspect of our broad commitment to providing you with solutions that assist you in lowering the total cost of owning and maintaining the PCs throughout their lifecycle.

The key capabilities and features of desktop management are:

- Initial configuration and deployment
- Remote system installation
- Software updating and management
- ROM flash
- Asset tracking and security
- Fault notification and recovery

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

Initial configuration and deployment

The workstation comes with a preinstalled system software image. After a brief software “unbundling” process, the workstation is ready to use.

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 HP OpenView Client Configuration Manager, HP OpenView Configuration Management Solutions Radia OS Manager, or Altiris Deployment Solution, 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 Workstation Deployment section of the HP Lifecycle Service Web site (<http://h20219.www2.hp.com/>)

<services/cache/80906-0-0-225-121.html>) provides information to help you select the best deployment method.

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

 **NOTE:** See [HP Backup and Recovery Manager on page 22](#) for information on creating the *Restore Plus!* CD.

HP OpenView Agent

The Radia Management Agent (RMA) used by both HP OpenView Client Configuration Manager and HP OpenView Workstation Configuration Management Solutions (Radia) is pre-loaded on the workstation. When installed, it enables communication with the HP OpenView management console.

To install the Radia Management Agent:

1. Click **Start**.
2. Click **All Programs**.
3. Click **HP Manageability**.
4. Click **Radia Management Agent Readme**.
5. Review and follow the instructions contained in the Readme file to install the Radia Management Agent.

Altiris Deployment Solution Agent

This program is pre-loaded on the workstation. When installed, it enables communication with the administrator Altiris Deployment Solution console.

To install Altiris Deployment Solution Agent:

1. Click **Start**.
2. Click **All Programs**.
3. Click **Software Setup**.
4. Click **Next**.
5. Scroll down and click on the link to install Altiris AClient.

The Altiris Deployment Solution Agent is a key infrastructure component for enabling the HP Client Foundation Suite and the Client Premium Suite. To learn about the other infrastructure components necessary for implementing the HP Client Foundation Suite and Client Premium Suite, please visit www.hp.com/go/easydeploy.

HP Backup and Recovery Manager

 **CAUTION:** HP no longer ships the *Restore Plus!* CD set with workstations. Instead, HP Backup and Recovery Manager is pre-loaded on each system. HP recommends that you create a recovery CD set as soon as you have set up the new workstation. Creating the *Restore Plus!* CD set is important in the event that you ever need to restore the system hard drive to its factory installed state.

HP Backup and Recovery Manager can create the *Restore Plus!* CD set. This set includes the *Restore Plus!* CD, the Operating System CD, and any Supplemental Software CDs.

△ **CAUTION:** The *Restore Plus!* CD set will not include any system settings or user data created after the initial system setup.

To create the *Restore Plus!* CD set:

1. Click **Start > HP Backup and Recovery > HP Backup and Recovery Manager** to open the Backup and Recovery Wizard, then click **Next**.
2. Select **Create factory software recovery CDs or DVDs to recover the system**.
3. Follow the instructions in the wizard.

In addition to allowing you to create the *Restore Plus!* CD set, HP Backup and Recovery Manager can be used to back up data and system files to the hard drive, to network drives, or to removable media, such as CDs, DVDs, or flash media. If data or system files are lost, deleted, or corrupted, Backup and Recovery Manager allows you to retrieve data or restore the last good system image.

△ **CAUTION:** HP recommends that a backup schedule be created immediately to ensure continued system and data protection. Automatic backups can be scheduled using the HP Backup and Recovery Manager Wizard. Recovery Points, Entire Drive Backups, and File Backups can be automatically backed up without user intervention. HP recommends scheduling Recovery Point Backups to provide the most comprehensive coverage.

 **NOTE:** If HP Backup and Recovery Manager is preinstalled, the *Restore Plus!* CD set and the initial recovery point may be saved to disc as often as necessary, but only a single copy of the Microsoft Windows CD can be created, due to licensing constraints.

You can access a user manual at **Start > HP Backup and Recovery > HP Backup and Recovery Manager Manual**. We suggest that you print this document for easy reference in case of future emergency.

If **Create factory software recovery CDs or DVDs to recover the system** is unavailable on your system, the HP *Restore Plus!* CD set can be obtained through product support on http://welcome.hp.com/country/us/en/contact_us.html.

Remote system installation

Remote System Installation allows you to start and set up the system using the software and configuration information located on a network server by initiating the Preboot Execution Environment (PXE). The Remote System Installation feature is usually used as a system setup and configuration tool, and can be used for the following tasks:

- Formatting a hard drive
- Deploying a software image on one or more new workstations
- Remotely updating the system BIOS in flash ROM ([Remote ROM Flash on page 29](#))
- Configuring the system BIOS settings

To initiate Remote System Installation, press **F12** when the **F12 = Network Service Boot** message appears in the lower-right corner of the HP logo screen when the workstation is booting up. Follow the instructions on the screen to continue the process. The default boot order is a BIOS configuration setting that can be changed to always attempt to PXE boot.

Software updating and management

HP provides several tools for managing and updating software on desktops, workstations, and notebooks:

- HP Client Manager
- HP System Software Manager
- HP ProtectTools Security Manager
- HP Client Management Premium Suite
- HP Client Foundation Suite
- HP OpenView Client Configuration Manager
- HP OpenView Management Suite for Desktops using Radia
- HP Proactive Change Notification
- HP Subscriber's Choice

HP Client Management Interface

Regardless of the system management tools your IT department uses, managing both your hardware and software assets is important to keeping your IT costs low and your business agile.

With the HP Client Management Interface (HP CMI), new HP workstations seamlessly integrate into your managed IT environment. HP CMI provides an interface that simplifies the integration of HP workstations with popular industry system management tools (including Microsoft Systems Management Server, IBM Tivoli Software, and HP OpenView Operations) and custom inhouse developed management applications. Using HP CMI, systems management tools and applications can request in-depth client inventory, receive health status information, and manage system BIOS settings by communicating directly with the client workstation, reducing the need for agent or connector software to achieve integration.

 **NOTE:** The system management tools mentioned above do not automatically connect into HP CMI. Some script development is typically required to interface with HP CMI.

HP Client Management Interface is based on industry standards that include Microsoft Windows Management Interface (MS WMI), Web-Based Enterprise Management (WBEM), System Management BIOS (SMBIOS), and Advanced Configuration and Power Interface (ACPI). HP CMI is a foundation technology utilized in HP Client Management Solutions. With HP CMI, HP gives you flexibility in choosing how you manage your HP client workstations.

HP Client Management Interface used in conjunction with system management software can:

- Request in-depth client inventory information—Capture detailed information about the processors, hard drives, memory, BIOS, drivers, including sensor information (such as fan speed, voltage, and temperature)
- Receive health status information—Subscribe for a wide range of client hardware alerts (such as over-temperature, fan stall, and hardware configuration changes) to be sent to the system management console, application, or to the local client workstation. Alerts are sent real-time when triggered by hardware events.
- Manage system BIOS settings—Perform F10 functions including setting and changing the BIOS passwords and workstation boot order remotely from your system management console on any or all of your client systems without having to visit each machine.

HP System Software Manager

HP System Software Manager (SSM) is a free utility that automates remote deployment of device drivers and BIOS updates for your networked workstations. When SSM runs, it silently (without user interaction) determines the revision levels of drivers and BIOS installed on each networked client system and compares this inventory against system software SoftPaqs that have been tested and stored in a central file store. SSM then automatically updates any down-revision system software on the networked workstations to the later levels available in the file store. Since SSM only allows distribution of SoftPaq updates to the correct client system models, administrators can confidently and efficiently use SSM to keep system software updated.

System Software Manager integrates with enterprise software distribution tools such as HP OpenView Management Suite using Radia and Microsoft Systems Management Server (SMS). Using SSM, you can distribute customer-created or third-party updates that have been packaged in the SSM-format.

SSM may be downloaded at no charge by visiting www.hp.com/go/ssm.

HP Client Manager

HP Client Manager, developed with Altiris, is available free for all supported HP business desktop, notebook, and workstation models. SSM is integrated into HP Client Manager, and enables central tracking, monitoring, and management of the hardware aspects of HP client systems.

Use HP Client Manager to:

- Get valuable hardware information such as CPU, memory, video, and security settings
- Monitor system health to fix problems before they occur
- Automatically acquire and install drivers and BIOS updates without visiting each workstation
- Remotely configure BIOS and security settings
- Automate processes to quickly resolve hardware problems

Tight integration with HP Instant Support tools reduces hardware troubleshooting time.

- Diagnostics—remotely run & view reports on HP desktop, notebook, and workstation models
- System Health Scan—check for known hardware issues in your installed base of HP client systems
- Active Chat—connect to HP customer support to resolve issues
- HP Knowledgebase—link to expert information
- Automated SoftPaq collection and delivery process for fast resolution of hardware problems
- Identify, inventory, and initialize systems with HP ProtectTools embedded security chip
- Option for health alerts to display locally on the client system
- Report basic inventory information for non-HP clients

For more information on HP Client Manager, visit www.hp.com/go/clientmanager.

HP ProtectTools Security Manager

ProtectTools Security Manager software provides security features that help protect against unauthorized access to the workstation, networks, and critical data. Enhanced security functionality is provided by the following modules:

- Smart Card Security for ProtectTools
- Embedded Security for ProtectTools
- BIOS Configuration for ProtectTools
- Credential Manager for ProtectTools

The modules available for your workstation may vary depending on your model. For example, Embedded Security for ProtectTools requires that the Trusted Platform Module (TPM) embedded security chip (some models only) be installed on your workstation, and Smart Card Security for ProtectTools requires an optional smart card and reader.

ProtectTools modules may be preinstalled, preloaded, or available for purchase from the HP Web site. Visit <http://www.hp.com/products/security> for more information.

HP Client Management Premium Suite

HP Client Premium Suite (HP CPS) is designed for organizations wanting full client hardware and software lifecycle management from a single, Web-based management console. It combines:

- HP Client Manager
- HP Systems Insight Manager Connector
- HP OpenView Connector
- Altiris Client Manager Suite - Level 1
- Altiris Connector Solution
- Altiris Local Recovery Pro
- Altiris AuditExpress

For more information on HP Client Management Premium Suite, visit www.hp.com/go/easydeploy.

HP Client Foundation Suite

The HP Client Foundation Suite (HP CFS) is designed for organizations wanting essential client management functionality. It combines:

- HP Client Manager
- HP Systems Insight Manager Connector
- Altiris Migration Suite
- Altiris Local Recovery Pro

For more information about the HP Client Foundation Suite, visit <http://www.hp.com/go/easydeploy>.

HP OpenView Client Configuration Manager

HP OpenView Client Configuration Manager is a simplified, out-of-the-box, and easy-to-use solution that solves immediate workstation software configuration management needs.

- Integrated software management
 - Inventory collection
 - Operating system deployment and settings migration
 - Patch management
 - Software distribution
 - Software usage metering
- Integrated hardware management
 - Remote control
 - HP alert monitoring
 - HP hardware driver and BIOS updates
 - Integration with HP ProtectTools
 - Free add-on support for Intel Active Management Technology (AMT)

For more information about the HP OpenView Client Configuration Manager, visit <http://www.managementsoftware.hp.com/products/ccm/index.html>.

HP OpenView Workstation Configuration Management solutions

HP OpenView Configuration Management solutions automate the management of software such as operating systems, applications, patches, content, and configuration settings to ensure that each computing device is maintained in the right configuration.

Proven across enterprises of every size and complexity, HP's adaptive, policy-based model for software Configuration Management, automates the entire software lifecycle management process - from discovery, deployment, and ongoing management through to migration and retirement.

By substituting automation for manual intervention, HP helps its customers lower costs, significantly reduce software related problems, and ensure the software supporting their business operations is reliable and secure.

For more information on HP OpenView Workstation Configuration Management Solution, visit <http://h20229.www2.hp.com/solutions/ascm/index.html>.

Proactive change notification

The Proactive Change Notification program uses the Subscriber's Choice Web site in order to proactively and automatically:

- Send you Proactive Change Notification (PCN) e-mail informing you of hardware and software changes to most commercial workstations and servers, up to 60 days in advance
- Send you e-mail containing Customer Bulletins, Customer Advisories, Customer Notes, Security Bulletins, and Driver alerts for most commercial workstations and servers

You create your own profile to ensure that you only receive the information relevant to a specific IT environment. To learn more about the Proactive Change Notification program and create a custom profile, visit <http://h30046.www3.hp.com/subhub.php>

Subscriber's Choice

Subscriber's Choice is a client-based service from HP.

Based on your profile, HP will supply you with personalized product tips, feature articles, and/or driver and support alerts/notifications.

Subscriber's Choice Driver and Support Alerts/Notifications will deliver e-mails notifying you that the information you subscribed to in your profile is available for review and retrieval. To learn more about Subscriber's Choice and create a custom profile, visit <http://h30046.www3.hp.com/subhub.php>.

Retired solutions

Two software packages, Altiris Local Recovery, and Dantz Retrospect, will no longer be shipping on HP business desktops, notebooks, or workstations. Starting with new business desktops, notebooks, and workstations released in 2006, all will ship with HP Backup and Recovery Manager.

ROM Flash

The workstation's BIOS is stored in a programmable flash ROM (read only memory). By establishing a setup password in the Computer Setup (F10) Utility, you can protect the ROM from being unintentionally updated or overwritten. This is important to ensure the operating integrity of the workstation. Should you need or want to upgrade the BIOS, you may download the latest BIOS images from the HP driver and support page, <http://www.hp.com/support/files>.

- △ **CAUTION:** For maximum ROM protection, be sure to establish a setup password. The setup password prevents unauthorized ROM upgrades. System Software Manager allows the system administrator to set the setup password on one or more PCs simultaneously. For more information, visit <http://www.hp.com/go/ssm>.

Remote ROM Flash

Remote ROM Flash allows the system administrator to safely upgrade the BIOS on remote HP workstations directly from the centralized network management console. Enabling the system administrator to perform this task remotely on multiple workstations results in a consistent deployment of, and greater control over, HP workstation BIOS images over the network. It also results in greater productivity and lower total cost of ownership.

 **NOTE:** The workstation must be powered on, or turned on through Remote Wakeup, to take advantage of Remote ROM Flash.

For more information on Remote ROM Flash, refer to the HP Client Manager Software or System Software Manager at <http://h18000.www1.hp.com/im/prodinfo.html>.

HPQFlash

The HPQFlash utility is used to locally update or restore the system BIOS of individual PCs from a Windows operating system.

For more information on HPQFlash, visit <http://www.hp.com/support/files> and enter the model number of the workstation when prompted.

Boot Block Emergency Recovery Mode

Boot Block Emergency Recovery Mode permits system recovery in the unlikely event of a ROM flash failure. For example, if a power failure were to occur during a BIOS upgrade, the ROM flash would be incomplete. This would render the system BIOS unusable. The Boot Block is a flash-protected section of the ROM that contains code that checks for a valid system BIOS image when the system is turned on.

- If the system BIOS image is valid, the system starts normally.
- If the system BIOS image is not valid, a failsafe Boot Block BIOS provides enough support to
 - search removable media for BIOS image files. If an appropriate BIOS image file is found, it is automatically flashed into the ROM.
 - start the system from bootable removable media that automatically invokes system BIOS upgrade utilities.

When an invalid system BIOS image is detected, the system power LED will blink red 8 times, one blink every second. Simultaneously, the speaker will beep 8 times. If the portion of the system ROM containing the video option ROM image is not corrupt, **Boot Block Emergency Recovery Mode** will be displayed on the screen.

To recover the system after it enters Boot Block Emergency Recovery Mode, complete the following steps:

1. Turn off the power.
2. Insert a diskette, CD, or USB flash device containing the desired BIOS image file in the root directory.

 **NOTE:** The media must be formatted using the FAT12, FAT16, or FAT32 file system.

3. Turn on the workstation.

If no appropriate BIOS image file is found, the failsafe Boot Block BIOS will attempt to start the system from a bootable device. If no bootable device is found, you will be prompted to insert media containing a BIOS image file or BIOS upgrade utility.

If the system successfully reprograms the ROM, the system will automatically power off.

4. Remove the removable media used to upgrade the BIOS.
5. Turn the power on to restart the workstation.

Replicating the setup

The following procedures give an administrator the ability to easily copy one setup configuration to other workstations of the same model. This allows for faster, more consistent configuration of multiple workstations.

 **NOTE:** Both procedures require a diskette drive or a supported USB flash media device, such as an HP Drive Key.

Copying to single workstation

 **CAUTION:** A setup configuration is model-specific. File system corruption may result if source and target workstations are not the same model. For example, do not copy the setup configuration from a xw3400 Workstation to a xw3400 Workstation.

1. Select a setup configuration to copy. Turn off the workstation. If you are in Windows, click **Start > Shut Down > Shut Down**.
2. If you are using a USB flash media device, insert it now.
3. Turn on the workstation.
4. As soon as the workstation is turned on, press **F10** when the monitor light turns green to enter Computer Setup. Press **Enter** to bypass the title screen, if necessary.

 **NOTE:** If you do not press **F10** at the appropriate time, you must restart the workstation and again press **F10** when the monitor light turns green to access the utility.

5. If you are using a diskette, insert it now.
6. Click **File > Replicated Setup > Save to Removable Media**. Follow the instructions on the screen to create the configuration diskette or USB flash media device.
7. Turn off the workstation to be configured and insert the configuration diskette or USB flash media device.
8. Turn on the workstation to be configured.
9. As soon as the workstation is turned on, press **F10** when the monitor light turns green to enter Computer Setup. Press **Enter** to bypass the title screen, if necessary.
10. Click **File > Replicated Setup > Restore from Removable Media**, and follow the instructions on the screen.
11. Restart the workstation when the configuration is complete.

Copying to multiple workstations

 **CAUTION:** A setup configuration is model-specific. File system corruption may result if source and target workstations are not the same model. For example, do not copy the setup configuration from a xw3400 Workstation to a xw3400 Workstation.

This method takes a little longer to prepare the configuration diskette or USB flash media device, but copying the configuration to target workstations is significantly faster.

 **NOTE:** A bootable diskette is required for this procedure or to create a bootable USB flash media device. If Windows XP is not available to use to create a bootable diskette, use the method for copying to a single workstation instead (see [Copying to single workstation on page 30](#)).

1. Create a bootable diskette or USB flash media device. See [Supported USB flash media device on page 31](#) or [Unsupported USB flash media device on page 33](#).

△ **CAUTION:** Not all workstations can be booted from a USB flash media device. If the default boot order in the Computer Setup (F10) Utility lists the USB device before the hard drive, the workstation can be booted from a USB flash media device. Otherwise, a bootable diskette must be used.

2. Select a setup configuration to copy. Turn off the workstation. If you are in Windows, click **Start > Shut Down > Shut Down**.
3. If you are using a USB flash media device, insert it now.
4. Turn on the workstation.
5. As soon as the workstation is turned on, press **F10** when the monitor light turns green to enter Computer Setup. Press **Enter** to bypass the title screen, if necessary.

 **NOTE:** If you do not press **F10** at the appropriate time, you must restart the workstation and again press **F10** when the monitor light turns green to access the utility.

6. If you are using a diskette, insert it now.
7. Click **File > Replicated Setup > Save to Removable Media**. Follow the instructions on the screen to create the configuration diskette or USB flash media device.
8. Download a BIOS utility for replicating setup (repset.exe) and copy it onto the configuration diskette or USB flash media device. To obtain this utility, go to [tap//welcome.hp.com/support/files](http://tap/welcome.hp.com/support/files) and enter the model number of the workstation.
9. On the configuration diskette or USB flash media device, create an autoexec.bat file containing the following command:

```
repset.exe
```
10. Turn off the workstation to be configured. Insert the configuration diskette or USB flash media device and turn the workstation on. The configuration utility will run automatically.
11. Restart the workstation when the configuration is complete.

Creating a bootable device

Supported USB flash media device

Supported devices have a preinstalled image to simplify the process of making them bootable. All HP or Compaq and most other USB flash media devices have this preinstalled image. If the USB flash media device being used does not have this image, use the procedure later in this section (see [Unsupported USB flash media device on page 33](#)).

To create a bootable USB flash media device, you must have:

- a supported USB flash media device
- a bootable DOS diskette with the FDISK and SYS programs (If SYS is not available, FORMAT may be used, but all existing files on the USB flash media device will be lost.)
- a workstation that is bootable from a USB flash media device

△ **CAUTION:** Some older PCs may not be bootable from a USB flash media device. If the default boot order in the Computer Setup (F10) Utility lists the USB device before the hard drive, the workstation can be booted from a USB flash media device. Otherwise, a bootable diskette must be used.

1. Turn off the workstation.
2. Insert the USB flash media device into one of the workstation's USB ports and remove all other USB storage devices except USB diskette drives.
3. Insert a bootable DOS diskette with FDISK.COM and either SYS.COM or FORMAT.COM into a diskette drive and turn on the workstation to boot to the DOS diskette.
4. Run FDISK from the **A:** prompt by typing FDISK and pressing Enter. If prompted, click **Yes (Y)** to enable large disk support.
5. Enter Choice [5] to display the drives in the system. The USB flash media device will be the drive that closely matches the size of one of the drives listed. It will usually be the last drive in the list. Note the letter of the drive.

USB flash media device drive: _____

△ **CAUTION:** If a drive does not match the USB flash media device, do not proceed. Data loss can occur. Check all USB ports for additional storage devices. If any are found, remove them, reboot the workstation, and proceed from step 4. If none are found, either the system does not support the USB flash media device or the USB flash media device is defective. DO NOT proceed in attempting to make the USB flash media device bootable.

6. Exit FDISK by pressing the **Esc** key to return to the **A:** prompt.
7. If your bootable DOS diskette contains SYS.COM, go to step 8. Otherwise, go to step 9.
8. At the **A:** prompt, enter `SYS x:` where x represents the drive letter noted above.

△ **CAUTION:** Be sure that you have entered the correct drive letter for the USB flash media device.

After the system files have been transferred, SYS will return to the **A:** prompt. Go to step 13.

9. Copy any files you want to keep from your USB flash media device to a temporary directory on another drive (for example, the system's internal hard drive).
10. At the **A:** prompt, enter `FORMAT /S X:` where X represents the drive letter noted before.

△ **CAUTION:** Be sure that you have entered the correct drive letter for the USB flash media device.

FORMAT will display one or more warnings and ask you each time whether you want to proceed. Enter **Y** each time. FORMAT will format the USB flash media device, add the system files, and ask for a Volume Label.

11. Press **Enter** for no label or enter one if desired.

12. Copy any files you saved in step 9 back to your USB flash media device.
13. Remove the diskette and reboot the workstation. The workstation will boot to the USB flash media device as drive C.

 **NOTE:** The default boot order varies from workstation to workstation, and it can be changed in the Computer Setup (F10) Utility.

If you have used a DOS version from Windows 9x, you may see a brief Windows logo screen. If you do not want this screen, add a zero-length file named LOGO.SYS to the root directory of the USB flash media device.

Return to [Copying to multiple workstations on page 30](#).

Unsupported USB flash media device

To create a bootable USB flash media device, you must have:

- a USB flash media device
- a bootable DOS diskette with the FDISK and SYS programs (If SYS is not available, FORMAT may be used, but all existing files on the USB flash media device will be lost.)
- a workstation that is bootable from a USB flash media device

△ **CAUTION:** Some older PCs may not be bootable from a USB flash media device. If the default boot order in the Computer Setup (F10) Utility lists the USB device before the hard drive, the workstation can be booted from a USB flash media device. Otherwise, a bootable diskette must be used.

1. If there are any PCI cards in the system that have SCSI or SATA drives attached, turn off the workstation and unplug the power cord.

△ **CAUTION:** The power cord **MUST** be unplugged.

2. Open the workstation and remove the PCI cards.
3. Insert the USB flash media device into one of the workstation's USB ports and remove all other USB storage devices except USB diskette drives. Close the workstation cover.
4. Plug in the power cord and turn on the workstation.
5. As soon as the workstation is turned on, press **F10** when the monitor light turns green to enter Computer Setup. Press **Enter** to bypass the title screen, if necessary.

 **NOTE:** If you do not press **F10** at the appropriate time, you must restart the workstation and again press **F10** when the monitor light turns green to access the utility.

6. Go to **Advanced > PCI Devices** to disable both the PATA and SATA controllers. When disabling the SATA controller, note the IRQ to which the controller is assigned. You will need to reassign the IRQ later. Exit setup, confirming the changes.

SATA IRQ: _____

7. Insert a bootable DOS diskette with FDISK.COM and either SYS.COM or FORMAT.COM into a diskette drive and turn on the workstation to boot to the DOS diskette.
8. Run FDISK and delete any existing partitions on the USB flash media device. Create a new partition and mark it active. Exit FDISK by pressing the **Esc** key.

9. If the system did not automatically restart when exiting FDISK, press **Ctrl+Alt+Del** to reboot to the DOS diskette.
10. At the **A:** prompt, type `FORMAT C: /S` and press **Enter**. Format will format the USB flash media device, add the system files, and ask for a Volume Label.
11. Press **Enter** for no label or enter one if desired.
12. Turn off the workstation and unplug the power cord. Open the workstation and re-install any PCI cards that were previously removed. Close the workstation cover.
13. Plug in the power cord, remove the diskette, and turn on the workstation.
14. As soon as the workstation is turned on, press **F10** when the monitor light turns green to enter Computer Setup. Press **Enter** to bypass the title screen, if necessary.
15. Go to **Advanced > PCI Devices** and re-enable the PATA and SATA controllers that were disabled in step 6. Put the SATA controller on its original IRQ.
16. Save the changes and exit. The workstation will boot to the USB flash media device as drive C.

 **NOTE:** The default boot order varies from workstation to workstation, and it can be changed in the Computer Setup (F10) Utility. Refer to Section 2.2 for instructions.

If you have used a DOS version from Windows 9x, you may see a brief Windows logo screen. If you do not want this screen, add a zero-length file named LOGO.SYS to the root directory of the USB flash media device.

Return to [Copying to multiple workstations on page 30](#).

Dual-State power button

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

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

1. Left click on the **Start Button**, then select **Control Panel > Power Options**.
2. In the **Power Options Properties**, select the **Advanced** tab.
3. In the **Power Button** section, select **Stand by**.

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

 **CAUTION:** Do not use the power button to turn off the workstation unless the system is not responding; turning off the power without operating system interaction could cause damage to or loss of data on the hard drive.

HP web site support

HP engineers rigorously test and debug software developed by HP and third-party suppliers, and develop operating system specific support software, to ensure performance, compatibility, and reliability for HP workstations.

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

HP has made the task of locating, accessing, evaluating, and installing the latest support software easier. You can download the software from <http://www.hp.com/support>.

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

Industry standards

HP management solutions integrate with other systems management applications, and are based on industry standards, such as:

- Web-Based Enterprise Management (WBEM)
- Windows Management Interface (WMI)
- Wake on LAN Technology
- ACPI
- SMBIOS
- Pre-boot Execution (PXE) support

Asset tracking and security

Asset tracking features incorporated into the workstation provide key asset tracking data that can be managed using HP Systems Insight Manager, HP Client Manager, HP OpenView Configuration Management and Asset Management solutions, or other system management applications. Seamless, automatic integration between asset tracking features and these products enables you to choose the management tool that is best suited to the environment and to leverage the investment in existing tools.

HP also offers several solutions for controlling access to valuable components and information. HP Embedded Security for ProtectTools, if installed, prevents unauthorized access to data and checks system integrity and authenticates third-party users attempting system access. (For more information, refer to the *HP ProtectTools Security Manager Guide* at www.hp.com.) Security features such as HP Embedded Security for ProtectTools, the Smart Cover Sensor and the Smart Cover Lock, available on some models, help to prevent unauthorized access to the internal components of the personal workstation. 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 system management applications to deliver proactive notification of tampering with a workstation's internal components.

 **NOTE:** HP Embedded Security for ProtectTools, the Smart Cover Sensor, and the Smart Cover Lock are available as options on some systems.

Use the following utilities to manage security settings on the HP workstation:

- Locally, using the Computer Setup Utilities. See the *Computer Setup (F10) Utility Guide* on the *Documentation and Diagnostics CD* included with the workstation for additional information and instructions on using the Computer Setup Utilities. Some workstations also have HP BIOS Configuration for ProtectTools, which is a Windows-based component of ProtectTools that allows administrators to configure BIOS security settings from within the running OS.
- Remotely, using HP Client Manager Software or System Software Manager. This software enables the secure, consistent deployment and control of security settings from a simple command-line utility.

The following table and sections refer to managing security features of the workstation locally through the Computer Setup (F10) Utilities.

Table 4-1 Security Features Overview

Option	Description
Setup Password	<p>Allows you to set and enable setup (administrator) password.</p> <p>NOTE: If the setup password is set, it is required to change Computer Setup options, flash the ROM, and make changes to certain plug and play settings under Windows.</p> <p>See the <i>Computer Setup (F10) Utility Guide</i> on the <i>Documentation and Diagnostics CD</i> for more information.</p>
Power-On Password	<p>Allows you to set and enable power-on password.</p> <p>See the <i>Computer Setup (F10) Utility Guide</i> on the <i>Documentation and Diagnostics CD</i> for more information.</p>
Password Options (This selection will appear only if a power-on password is set.)	<p>Allows you to specify whether the password is required for warm boot (Ctrl+Alt+Del).</p> <p>See the <i>Computer Setup (F10) Utility Guide</i> on the <i>Documentation and Diagnostics CD</i> for more information.</p>
Pre-Boot Authorization	<p>Allows you to enable/disable the Smart Card to be used in place of the Power-On Password.</p>
Smart Cover	<p>Allows you to:</p> <ul style="list-style-type: none"> • Enable/disable the Cover Lock. • Enable/disable the Cover Removal Sensor. <p>NOTE: <i>Notify User</i> alerts the user that the sensor has detected that the cover has been removed. <i>Setup Password</i> requires that the setup password be entered to boot the workstation if the sensor detects that the cover has been removed.</p> <p>This feature is supported on some models only. See the <i>Computer Setup (F10) Utility Guide</i> on the <i>Documentation and Diagnostics CD</i> for more information.</p>
Embedded Security	<p>Allows you to:</p> <ul style="list-style-type: none"> • Enable/disable the Embedded Security device. • Reset the device to Factory Settings. <p>This feature is supported on some models only. See the <i>HP ProtectTools Security Manager Guide</i> at www.hp.com</p>
Device Security	<p>Enables/disables serial ports, parallel port, front USB ports, system audio, network controllers (some models), and SCSI controllers (some models).</p>

Table 4-1 Security Features Overview (continued)

Option	Description
Network Service Boot	Enables/disables the workstation's ability to boot from an operating system installed on a network server. (Feature available on NIC models only; the network controller must reside on the PCI bus or be embedded on the system board.)
System IDs	Allows you to set: <ul style="list-style-type: none">• Asset tag (18-byte identifier) and ownership Tag (80-byte identifier displayed during POST). See the <i>Computer Setup (F10) Utility Guide</i> on the <i>Documentation and Diagnostics CD</i> for more information.• Chassis serial number or Universal Unique Identifier (UUID) number. The UUID can only be updated if the current chassis serial number is invalid. (These ID numbers are normally set in the factory and are used to uniquely identify the system.) Keyboard locale setting (for example, English or German) for System ID entry.
DriveLock (some models)	Allows you to assign or modify a master or user password for ATA hard drives. When this feature is 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. NOTE: This selection will only appear when at least one ATA drive that supports the ATA Security command set is attached to the system. See the <i>Computer Setup (F10) Utility Guide</i> on the <i>Documentation and Diagnostics CD</i> for more information.

For more information about Computer Setup, see the *Computer Setup (F10) Utility Guide* on the *Documentation and Diagnostics CD*.

Support for security features may vary depending on the specific workstation configuration.

Password security

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

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

Establishing a Setup password using Computer Setup

If the system is equipped with an embedded security device, refer to the *HP ProtectTools Security Manager Guide* at www.hp.com. Establishing a setup password through Computer Setup prevents reconsideration of the workstation (use of the Computer Setup (F10) utility) until the password is entered.

1. Turn on or restart the workstation. If you are in Windows, click **Start > Shut Down > Restart**.
2. As soon as the workstation is turned on, press **F10** when the monitor light turns green to enter Computer Setup. Press **Enter** to bypass the title screen, if necessary.

 **NOTE:** If you do not press **F10** at the appropriate time, you must restart the workstation and again press **F10** when the monitor light turns green to access the utility.

3. Select **Security**, then select **Setup Password** and follow the instructions on the screen.
4. Before exiting, click **File > Save Changes and Exit**.

Establishing a power-on password Using Computer Setup

Establishing a power-on password through Computer Setup prevents access to the workstation when power is turned on, unless the password is entered. When a power-on password is set, Computer Setup presents **Password Options** under the **Security** menu. Password options include **Password Prompt on Warm Boot**. When **Password Prompt on Warm Boot** is enabled, the password must also be entered each time the workstation is rebooted.

1. Turn on or restart the workstation. If you are in Windows, click **Start > Shut Down > Restart**.
2. As soon as the workstation is turned on, press **F10** when the monitor light turns green to enter Computer Setup. Press **Enter** to bypass the title screen, if necessary.

 **NOTE:** If you do not press **F10** at the appropriate time, you must restart the workstation and again press **F10** when the monitor light turns green to access the utility.

3. Select **Security**, then **Power-On Password** and follow the instructions on the screen.
4. Before exiting, click **File > Save Changes and Exit**.

Entering a power-on password

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

1. Turn on or restart the workstation. If you are in Windows, click **Start > Shut Down > Restart the Computer**.
2. When the key icon appears on the monitor, type the current password, then press **Enter**.

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

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

Entering a Setup password

If the system is equipped with an embedded security device, refer to the *HP ProtectTools Security Manager Guide* at www.hp.com.

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

1. Turn on or restart the workstation. If you are in Windows, click **Start > Shut Down > Restart**.
2. As soon as the workstation is turned on, press **F10** when the monitor light turns green to enter Computer Setup. Press **Enter** to bypass the title screen, if necessary.

 **NOTE:** If you do not press **F10** at the appropriate time, you must restart the workstation and again press **F10** when the monitor light turns green to access the utility.

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

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

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

Changing a power-on or Setup password

If the system is equipped with an embedded security device, refer to the *HP ProtectTools Security Manager Guide* at www.hp.com.

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

2. To change the Power-On password, go to step 3.

To change the Setup password, as soon as the workstation is turned on, press **F10** when the monitor light turns green to enter Computer Setup. Press **Enter** to bypass the title screen, if necessary.

 **NOTE:** If you do not press **F10** at the appropriate time, you must restart the workstation and again press **F10** when the monitor light turns green to access the utility.

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

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

4. Press **Enter**.

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

 **NOTE:** Refer to the [National keyboard delimiter characters on page 40](#) for information about the alternate delimiter characters. The power-on password and setup password may also be changed using the Security options in Computer Setup.

Deleting a power-on or Setup password

If the system is equipped with an embedded security device, refer to the *HP ProtectTools Security Manager Guide* at www.hp.com.

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

2. To delete the Power-On password, go to step 3.

To delete the Setup password, as soon as the workstation is turned on, press **F10** when the monitor light turns green to enter Computer Setup. Press **Enter** to bypass the title screen, if necessary.

 **NOTE:** If you do not press **F10** at the appropriate time, you must restart the workstation and again press **F10** when the monitor light turns green to access the utility.

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

4. Press **Enter**.

 **NOTE:** Refer to [National keyboard delimiter characters on page 40](#) 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 to change or delete the password depend on the keyboard that came with the workstation.

National Keyboard Delimiter Characters

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

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

Clearing passwords

If you forget the password, you cannot access the workstation. Refer to the *Troubleshooting Guide* on the *Documentation and Diagnostics CD* for instructions on clearing passwords.

If the system is equipped with an embedded security device, refer to the *HP ProtectTools Security Manager Guide* at www.hp.com.

DriveLock

DriveLock is an industry-standard security feature that prevents unauthorized access to the data on ATA hard drive. DriveLock has been implemented as an extension to Computer Setup. It is only available when hard drives that support the ATA Security command set are detected. DriveLock is intended for HP customers for whom data security is the paramount concern. For such customers, the cost of the hard drive and the loss of the data stored on it is inconsequential when compared with the damage that could result from unauthorized access to its contents. In order to balance this level of security with the practical need to accommodate a forgotten password, the HP implementation of 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 lost. 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. For users who do not fit the previously defined customer profile, this may be an unacceptable risk. For users who do fit the customer profile, it may be a tolerable risk given the nature of the data stored on the hard drive.

Using DriveLock

When one or more hard drives that support the ATA Security command set are detected, 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. On a cold boot, either the master or the user password may be used. On a warm boot, enter the same password used to unlock the drive during the preceding cold-boot. Users will have two attempts to enter a correct password. On a cold boot, if neither attempt succeeds, POST will continue but the drive will remain inaccessible. On a warm boot or restart from Windows, if neither attempt succeeds, POST will halt and the user will be instructed to cycle power.

DriveLock applications

The most practical use of the DriveLock security feature is in a corporate environment. The system administrator would be responsible for configuring the hard drive which would involve, among other things, setting the DriveLock master password and a temporary user 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.

Smart Cover Sensor

CoverRemoval Sensor, available on some models, is a combination of hardware and software technology that can alert you when the workstation cover or side panel has been removed. There are three levels of protection, as described in the following table.

Table 4-2 Smart Cover Sensor Protection Levels

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

NOTE: These settings can be changed using Computer Setup. For more information about Computer Setup, see the *Computer Setup (F10) Utility Guide* on the *Documentation and Diagnostics CD*.

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 workstation. If you are in Windows, click **Start > Shut Down > Restart**.
2. As soon as the workstation is turned on, press **F10** when the monitor light turns green to enter Computer Setup. Press **Enter** to bypass the title screen, if necessary.
 **NOTE:** If you do not press **F10** at the appropriate time, you must restart the workstation and again press **F10** when the monitor light turns green to access the utility.
3. Select **Security > Smart Cover > Cover Removal Sensor**, and select the desired security level.
4. Before exiting, click **File > Save Changes and Exit**.

Smart Cover Lock

The Smart Cover Lock is a software-controllable cover lock featured on some HP computers. This lock prevents unauthorized access to the internal components. Computers ship with the Smart Cover Lock in the unlocked position.

- △ **CAUTION:** For maximum cover lock security, be sure to establish a setup password. The setup password prevents unauthorized access to the Computer Setup utility.
-  **NOTE:** The Smart Cover Lock is available as an option on some systems.

Locking the Smart Cover Lock

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

1. Turn on or restart the workstation. If you are in Windows, click **Start > Shut Down > Restart**.
2. As soon as the workstation is turned on, press **F10** when the monitor light turns green to enter Computer Setup. Press **Enter** to bypass the title screen, if necessary.

 **NOTE:** If you do not press **F10** at the appropriate time, you must restart the workstation and again press **F10** when the monitor light turns green to access the utility.

3. Select **Security > Smart Cover > Cover Lock > Lock option**.
4. Before exiting, click **File > Save Changes and Exit**.

Unlocking the Smart Cover Lock

1. Turn on or restart the workstation. If you are in Windows, click **Start > Shut Down > Restart**.
2. As soon as the workstation is turned on, press **F10** when the monitor light turns green to enter Computer Setup. Press **Enter** to bypass the title screen, if necessary.

 **NOTE:** If you do not press **F10** at the appropriate time, you must restart the workstation and again press **F10** when the monitor light turns green to access the utility.

3. Select **Security > Smart Cover > Cover Lock > Unlock**.
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 the password to disable the lock, you will need a Smart Cover FailSafe Key to open the workstation cover. You will need the key in any of the following circumstances:

- Power outage
- Startup failure
- Workstation 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 at an authorized reseller.

To obtain the FailSafe Key, call the appropriate number listed in the warranty.

For more information about using the Smart Cover FailSafe Key, consult the *Hardware Reference Guide* on the *Documentation and Diagnostics CD*.

Cable Lock provision

The rear panel of the workstation accommodates a cable lock so that the workstation can be physically secured to a work area.

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

Fingerprint identification technology

Eliminating the need to enter user passwords, HP Fingerprint Identification Technology tightens network security, simplifies the login process, and reduces the costs associated with managing corporate networks. Affordably priced, it is not just for high-tech, high-security organizations anymore.

 **NOTE:** Support for Fingerprint Identification Technology varies by model.

For more information, visit:

<http://h18004.www1.hp.com/products/security/>.

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.

If the workstation is connected to a network managed by HP Client Manager, the workstation sends a fault notice to the network management application. With HP Client Manager Software, you can also remotely schedule diagnostics to automatically run on all managed PCs and create a summary report of failed tests.

Drive protection system

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

When HP computers are built, 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. You can use this information to help diagnose conditions that caused you to run the DPS software.

Surge-tolerant power supply

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

Thermal sensor

The thermal sensor is a hardware and software feature that tracks the internal temperature of the workstation. 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.

5 Serial and Parallel ATA drive guidelines and features

 **NOTE:** Serial ATA = SATA

Parallel ATA = PATA

HP only supports the use of SATA hard drives on these models of workstation. The USDT model is the only product that supports a PATA optical drive. No PATA drives are supported on any other model.

SATA hard drives

Serial ATA Hard Drive Characteristics	
Number of pins/conductors in data cable	7/7
Number of pins in power cable	15
Maximum data cable length	39.37 in (100 cm)
Data interface voltage differential	400-700 mV
Drive voltages	3.3 V, 5 V, 12 V
Jumpers for configuring drive	N/A
Data transfer rate	3.0 Gb/s

SATA connectors on the system board are color coded to make identification easier.

SATA Identification	Color	Port	Attachment Sequence
Primary channel, device 0	Dark blue	SATA 0	1
Primary channel, device 1	Light Blue	SATA 2	4
Secondary channel, device 0	White	SATA 1	2
Secondary channel, device 1	Orange	SATA 3	3

 **NOTE:** If there is an error on the application of the attach rules, a POST error message may be displayed.

SATA hard drive cables

SATA data cable

Always use an HP approved SATA 3.0 Gb/s cable as it is fully backwards compatible with the SATA 1.5 Gb/s drives.

Current HP desktop products ship with SATA 3.0 Gb/s hard drives.

SATA data cables are susceptible to damage if overflexed. Never crease a SATA data cable and never bend it tighter than a 30 mm (1.18 in) radius.

The SATA data cable is a thin, 7-pin cable designed to transmit data for only a single drive. As shown in the table, each cable has 3 grounds, and 4 transmit/receive pins.

Pin Number	Usage	Device Plug	Host Plug
P1	Ground	Ground	Ground
P2*	A+	Transmit data	Receive data
P3*	A-	Transmit data	Receive data
P4	Ground	Ground	Ground
P5**	B-	Receive data	Transmit data
P6**	B+	Receive data	Transmit data
P7	Ground	Ground	Ground

*P2 and P3 differential signal pair

**P5 and P6 differential signal pair

SATA power cable

Pin	Usage	Notes	Pin	Usage	Notes
P1	V3.3	3.3 V power	P9	V5	5 V power
P2	V3.3	3.3 V power	P10	Ground	
P3	V3.3	3.3 V power	P11	Ground	
P4	Ground		P12	Ground	
P5	Ground		P13	V12	12 V power
P6	Ground		P14	V12	12 V power
P7	V5	5 V power	P15	V12	12 V power
P8	V5	5 V power			

PATA device information

The USDT model is the only product that supports a PATA optical drive. No PATA drives are supported on any other model.

ATA SMART Drives

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

Hard drive capacities

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

Because of the differences in the way that drive sizes are calculated, the size reported by the operating system may differ from that marked on the hard drive or listed in the workstation specification. Drive size calculations by drive manufacturers are bytes to the base 10 while calculations by Microsoft are bytes to the base 2.

Drive/Partition Capacity Limits				
File System	Controller Type	Operating System	Maximum Size	
			Partition	Drive
FAT 32	ATA	XP	32 GB	2 TB
NTFS	ATA	XP	2 TB	2 TB

6 Identifying routine care and disassembly preparation

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

-
- △ **CAUTION:** When the workstation 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 workstation to prevent system board or component damage.
-

Electrostatic discharge information

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

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

Generating static

The following table shows that:

- Different activities generate different amounts of static electricity.
- Static electricity increases as humidity decreases.

Event	Relative Humidity		
	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.

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

Preventing electrostatic damage to equipment

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

- To avoid hand contact, transport products in static-safe containers such as tubes, bags, or boxes.
- Protect all electrostatic parts and assemblies with conductive or approved containers or packaging.
- Keep electrostatic sensitive parts in their containers until they arrive at static-free stations.
- Place items on a grounded surface before removing them from their container.
- 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.

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 \pm 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 \pm 10% resistance between the operator and ground.

Static Shielding Protection Levels	
Method	Voltage
Antistatic plastic	1,500
Carbon-loaded plastic	7,500
Metallized laminate	15,000

Grounding the work area

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

- Cover the work surface with approved static-dissipative material. Provide a wrist strap connected to the work surface and properly grounded tools and equipment.
- Use static-dissipative mats, foot straps, or air ionizers to give added protection.
- Handle electrostatic sensitive components, parts, and assemblies by the case or PCB laminate. Handle them only at static-free work areas.
- Turn off power and input signals before inserting and removing connectors or test equipment.
- Use fixtures made of static-safe materials when fixtures must directly contact dissipative surfaces.
- Keep work area free of nonconductive materials such as ordinary plastic assembly aids and Styrofoam.
- Use field service tools, such as cutters, screwdrivers, and vacuums, that are conductive.

Recommended materials and equipment

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

- Antistatic tape
- Antistatic smocks, aprons, or sleeve protectors
- Conductive bins and other assembly or soldering aids

- Conductive foam
- Conductive tabletop workstations with ground cord of one-megohm +/- 10% resistance
- Static-dissipative table or floor mats with hard tie to ground
- Field service kits
- Static awareness labels
- Wrist straps and footwear straps providing one-megohm +/- 10% resistance
- Material handling packages
- Conductive plastic bags
- Conductive plastic tubes
- Conductive tote boxes
- Opaque shielding bags
- Transparent metallized shielding bags
- Transparent shielding tubes

Operating guidelines

To prevent overheating and to help prolong the life of the workstation:

- Keep the workstation away from excessive moisture, direct sunlight, and extremes of heat and cold.
- Operate the workstation on a sturdy, level surface. Leave a 10.2-cm (4-inch) clearance on all vented sides of the workstation and above the monitor to permit the required airflow.
- Never restrict the airflow into the workstation by blocking any vents or air intakes. Do not place the keyboard, with the keyboard feet down, directly against the front of the desktop unit as this also restricts airflow.
- Occasionally clean the air vents on all vented sides of the workstation. Lint, dust, and other foreign matter can block the vents and limit the airflow. Be sure to unplug the workstation before cleaning the air vents.
- Never operate the workstation with the cover or side panel removed.
- Do not stack computers on top of each other or place computers so near each other that they are subject to each other's re-circulated or preheated air.
- If the workstation is to be operated within a separate enclosure, intake and exhaust ventilation must be provided on the enclosure, and the same operating guidelines listed above will still apply.
- Keep liquids away from the workstation and keyboard.
- Never cover the ventilation slots on the monitor with any type of material.
- Install or enable power management functions of the operating system or other software, including sleep states.

Routine care

General cleaning safety precautions

1. Never use solvents or flammable solutions to clean the workstation.
2. Never immerse any parts in water or cleaning solutions; apply any liquids to a clean cloth and then use the cloth on the component.
3. Always unplug the workstation when cleaning with liquids or damp cloths.
4. Always unplug the workstation before cleaning the keyboard, mouse, or air vents.
5. Disconnect the keyboard before cleaning it.
6. Wear safety glasses equipped with side shields when cleaning the keyboard.

Cleaning the workstation case

Follow all safety precautions in [General cleaning safety precautions on page 55](#) before cleaning the workstation.

To clean the workstation case, follow the procedures described below:

- To remove light stains or dirt, use plain water with a clean, lint-free cloth or swab.
- For stronger stains, use a mild dishwashing liquid diluted with water. Rinse well by wiping it with a cloth or swab dampened with clear water.
- For stubborn stains, use isopropyl (rubbing) alcohol. No rinsing is needed as the alcohol will evaporate quickly and not leave a residue.
- After cleaning, always wipe the unit with a clean, lint-free cloth.
- Occasionally clean the air vents on the workstation. Lint and other foreign matter can block the vents and limit the airflow.

Cleaning the keyboard

Follow all safety precautions in [General cleaning safety precautions on page 55](#) before cleaning the keyboard.

To clean the tops of the keys or the keyboard body, follow the procedures described in [Cleaning the workstation case on page 55](#).

When cleaning debris from under the keys, review all rules in [General cleaning safety precautions on page 55](#) 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.

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 [Cleaning the workstation case on page 55](#).

Cleaning the mouse

Before cleaning the mouse, ensure that the power to the workstation is turned off.

- Clean the mouse ball by first removing the retaining plate and the ball from the housing. Pull out any debris from the ball socket and wipe the ball with a clean, dry cloth before reassembly.
- To clean the mouse body, follow the procedures in [Cleaning the workstation case on page 55](#).

Service considerations

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

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 always on when the workstation is in the “On” mode. The cooling fan is off when the workstation is in “Standby,” “Suspend,” or “Off” modes.

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

Tools and software requirements

To service the workstation, you need the following:

- Torx T-15 screwdriver (HP 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)
- Phillips #2 screwdriver
- Diagnostics software
- HP tamper-resistant T-15 wrench (Smart Cover FailSafe Key, PN 166527-001) or HP tamper-resistant bits (Smart Cover FailSafe Key, PN 166527-002)

Screws

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

- △ **CAUTION:** Metric screws have a black finish. U.S. screws have a silver finish and are used on hard drives only.

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

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

Hard drives

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

- If a drive must be mailed, place the drive in a bubble-pack mailer or other suitable protective packaging and label the package "Fragile: Handle With Care."
- Do not remove hard drives from the shipping package for storage. Keep hard drives in their protective packaging until they are actually mounted in the CPU.
- Avoid dropping drives from any height onto any surface.
- If you are inserting or removing a hard drive, turn off the workstation. Do not remove a hard drive while the workstation is on or in standby mode.
- Before handling a drive, ensure that you are discharged of static electricity. While handling a drive, avoid touching the connector. For more information about preventing electrostatic damage, refer to [Electrostatic discharge information on page 52](#)
- Do not use excessive force when inserting a drive.
- Avoid exposing a hard drive to liquids, temperature extremes, or products that have magnetic fields such as monitors or speakers.

Lithium coin cell battery

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

See the appropriate removal and replacement chapter for the chassis you are working on in this guide for instructions on the replacement procedures.

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

📄 **NOTE:** 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.

7 Removal and replacement procedures

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.

 **NOTE:** Not all features listed in this guide are available on all workstations.

Preparation for disassembly

See [Identifying routine care and disassembly preparation on page 51](#) for initial safety procedures.

1. Remove/disengage any security devices that prohibit opening the workstation ([External security devices on page 60](#)).
2. Close any open software applications.
3. Exit the operating system.
4. Remove any diskette or compact disc from the workstation.
5. Turn off the workstation and any peripheral devices that are connected to it.

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

Regardless of the power-on state, voltage is always present on the system board as long as the system is plugged into an active AC outlet. In some systems the cooling fan is on even when the workstation is in the "Standby," or "Suspend" modes. The power cord should always be disconnected before servicing a unit.

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

 **NOTE:** During disassembly, label each cable as you remove it, noting its position and routing. Keep all screws with the units removed.

△ **CAUTION:** The screws used in the workstation are of different thread sizes and lengths; using the wrong screw in an application may damage the unit.

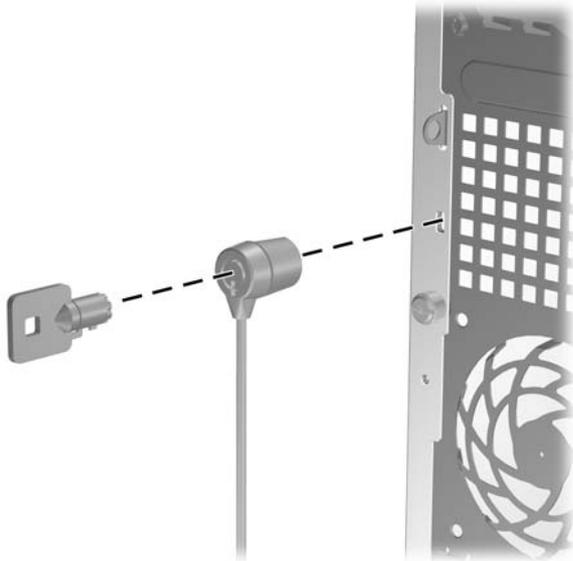
External security devices

The following security devices are used to prevent unauthorized access to the internal components of the workstation and/or secure the workstation to a fixed object.

Installing a cable lock

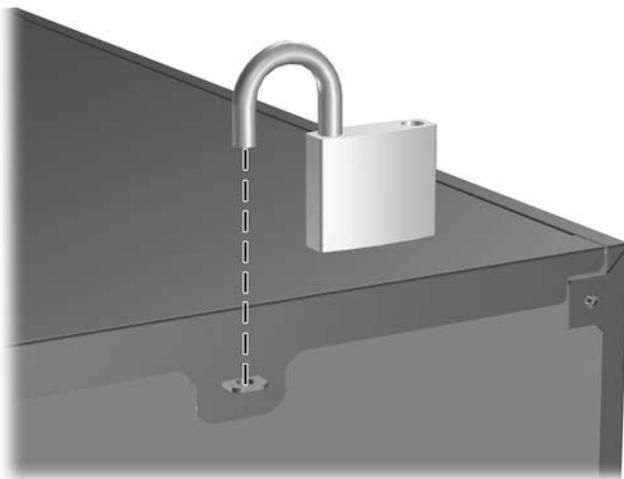
The cable lock may be used to secure the workstation access panel to the chassis and, at the same time, secure the workstation to a fixed object.

Insert the cable lock in the location shown below.



Installing a padlock

A padlock may be used by itself to secure the access panel to the workstation chassis. A padlock may also be used with a security cable to secure the workstation to a fixed object.



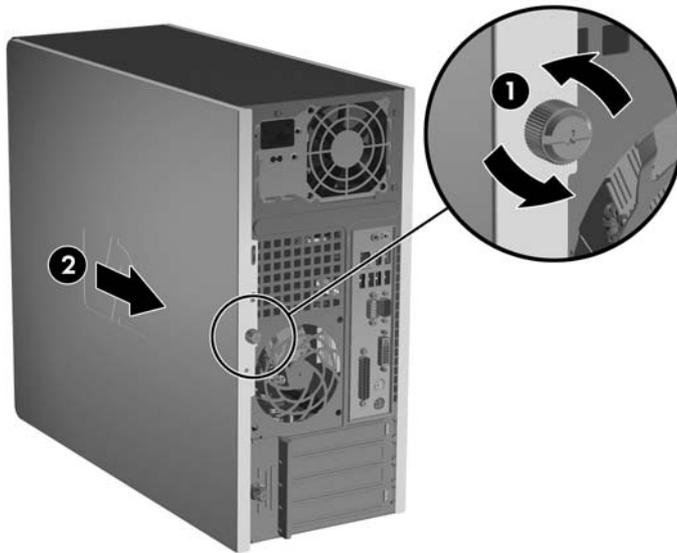
Access panel

1. Prepare the workstation for disassembly ([Preparation for disassembly on page 59](#)).

CAUTION: Before removing the workstation access panel, ensure that the workstation is turned off and that the power cord is disconnected from the electrical outlet.

2. Loosen the captive thumbscrew (1) that secures the access panel to the workstation chassis.
3. Slide the access panel (2) back about 1.3 cm (1/2 inch), then lift it off the unit.

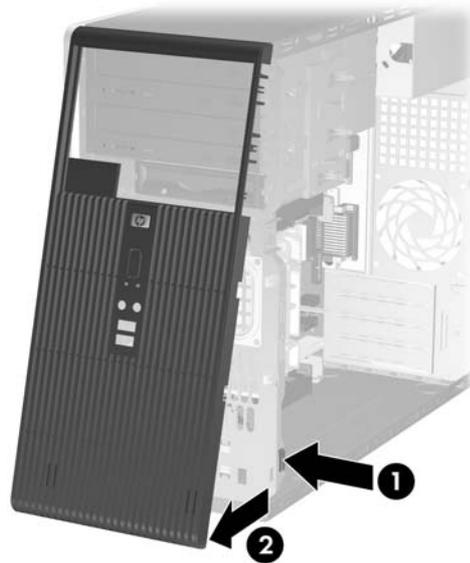
NOTE: You may want to lay the workstation on its side to install internal parts. Be sure the side with the access panel is facing up.



To install the access panel, reverse the removal procedure.

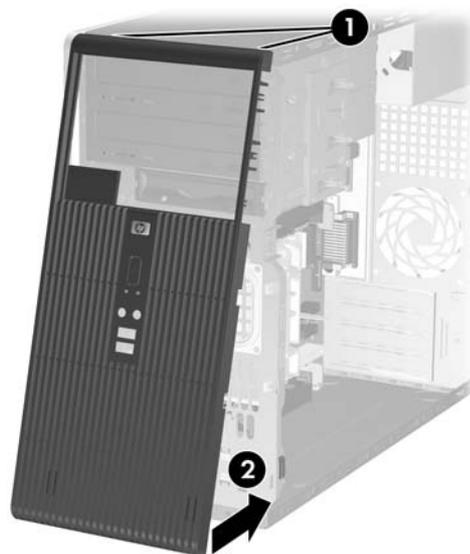
Front bezel

1. Prepare the workstation for disassembly ([Preparation for disassembly on page 59](#)).
2. Remove the access panel ([Access panel on page 61](#)).
3. To remove the front bezel, press the green latch on the bottom right of the chassis (1) to release the bottom of the bezel, then swing the bottom of the bezel away from the chassis (2) to release the top of the bezel.



To reinstall the front bezel:

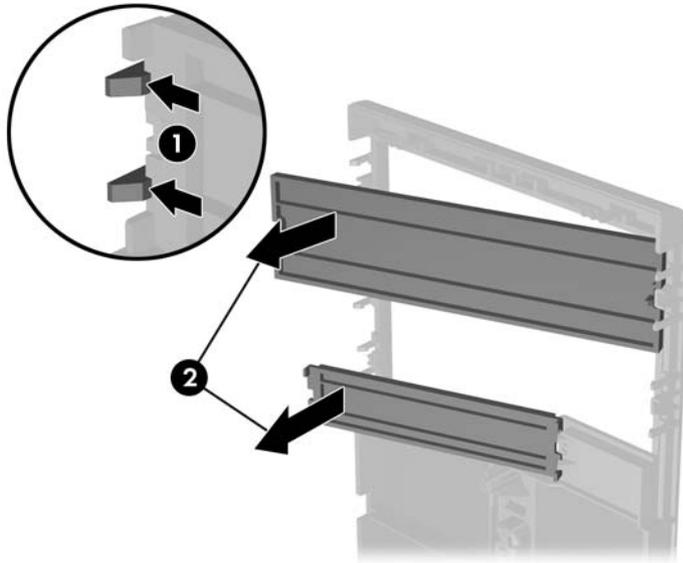
1. Position the chassis in the upright position.
2. Insert the two hooks on the top of the bezel into the rectangular holes on the chassis (1) then rotate the bottom of the bezel onto the chassis (2) so that the bottom two hooks on the bezel snap into place.



Front drive bezels

Follow these steps when removing or installing a front drive bezel.

1. Prepare the workstation for disassembly ([Preparation for disassembly on page 59](#)).
2. Remove the access panel ([Access panel on page 61](#)).
3. Remove the front bezel ([Front bezel on page 62](#)).
4. Press the two retaining tabs on the inside of the bezel towards the outer edge of the bezel (1) and pull the bezel blank inwards to remove it (2).



To install a bezel blank, reverse the removal procedure.

Cable management

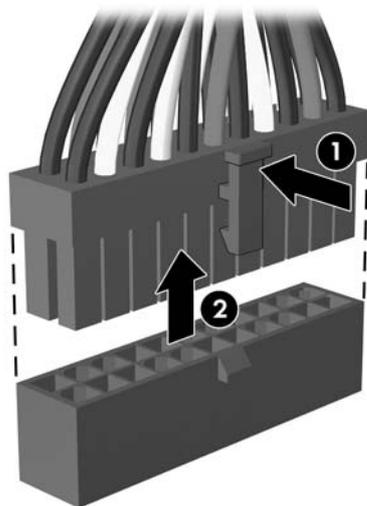
Always follow good cable management practices when working inside the workstation.

- Keep cables away from major heat sources like the heatsink.
- Do not jam cables on top of expansion cards or memory modules. Printed circuit cards like these are not designed to take excessive pressure on them.
- Keep cables clear of sliding or moveable parts to prevent them from being cut or crimped when the parts are moved.
- When folding a flat ribbon cable, never fold to a sharp crease. Sharp creases may damage the wires.
- Some flat ribbon cables come prefolded. Never change the folds on these cables.
- Do not bend any cable sharply. A sharp bend can break the internal wires.
- Never bend a SATA data cable tighter than a 30 mm (1.18 in) radius.
- Never crease a SATA data cable.
- Do not rely on components like the drive cage, power supply, or access panel to push cables down into the chassis. Always position the cables to lay properly by themselves.

When removing the power supply power cables from the P1 or P3 connectors on the system board, always follow these steps:

1. Squeeze on the top of the retaining latch attached to the cable end of the connector (1).
2. Grasp the cable end of the connector and pull it straight up (2).

△ **CAUTION:** Always pull the connector - NEVER pull on the cable. Pulling on the cable could damage the cable and result in a failed power supply.



Cable connections

System board connectors are color-coded to make it easier to find the proper connection.

Cable	To	Cable Designator
Power Supply	System board	P1
Power Supply	CPU power	P3
Power Supply	2nd SATA Hard drive	P4
Power Supply	1st SATA Hard drive	P5
Power Supply	1st Optical drive	P7
Power Supply	2nd Optical drive	P8
Power Supply	Diskette drive	P9

Cable	To	PCA Designator
Front power button/LED	System board	P5
Speaker	System board	P6 (White)
Chassis fan	System board	P9 (Red)
Diskette drive	System board	P10, FLOPPY (Black)
Second ODD Audio cable	System board	P11 AUX (if required)
Front I/O USB	System board	P24 (Yellow)
Serial port B	System board	P52
1st SATA Hard drive	System board	P60, SATA 0 (Dark Blue)
1st ODD or 2nd Hard drive if no ODD present	System board	P61, SATA 1 (White)
2nd or 4th Hard drive if no ODD present	System board	P62, SATA 2 (Light blue)
2nd ODD or 3rd HDD if no ODD present	System board	P63, SATA 3 (Orange)
Heatsink fan	System board	P70
Media Card Reader	System board	P150

Memory

- △ **CAUTION:** The 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.

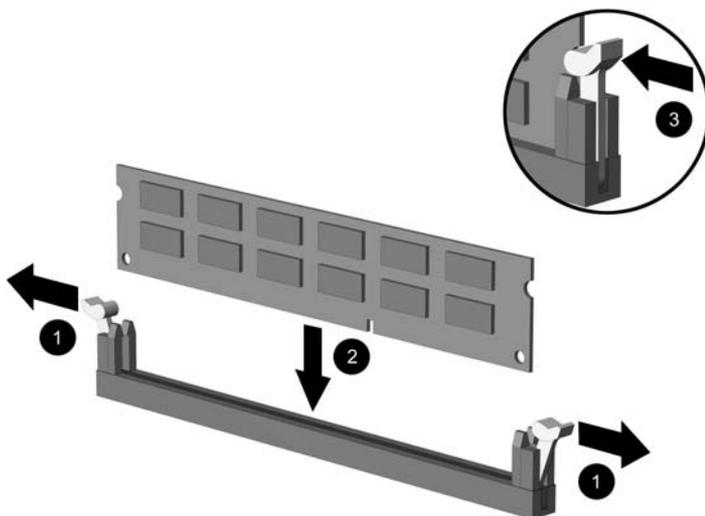
Static electricity can damage the electronic components of the workstation or optional cards. Before beginning these procedures, ensure that you are discharged of static electricity by briefly touching a grounded metal object. Refer to [Electrostatic discharge information on page 52](#) for more information.

When handling a memory module, be careful not to touch any of the contacts. Doing so may damage the module.

1. Prepare the workstation for disassembly ([Preparation for disassembly on page 59](#)).
2. Remove the access panel and rotate the workstation so the system board is parallel to the table to make it easier to work on ([Access panel on page 61](#)).

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

3. Open both latches of the memory module socket (1), and insert the memory module into the socket (2). Refer to the [Memory on page 165](#) appendix for the correct sequence for installing memory modules to get optimal performance.



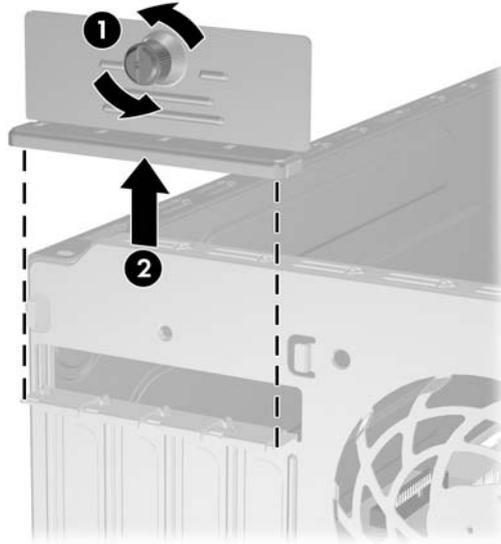
- 📄 **NOTE:** A memory module can be installed in only one way. Match the notch on the module with the tab on the memory socket. It may be easier to install a memory module in some cases if the main power cable from the power supply to the system board is temporarily disconnected. The workstation automatically recognizes the additional memory when the workstation is turned on.

4. Push the module down into the socket, ensuring that the module is fully inserted and properly seated. Make sure the latches are in the closed position (3).

To reassemble the workstation, reverse the removal procedure.

Expansion cards

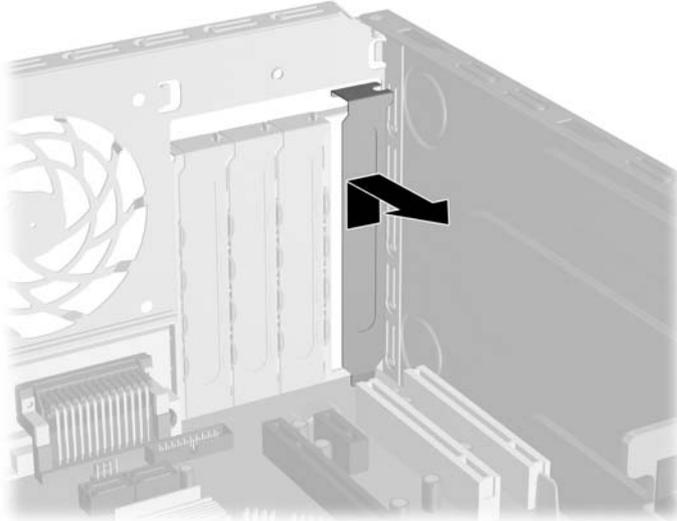
1. Prepare the workstation for disassembly ([Preparation for disassembly on page 59](#)).
2. Remove the access panel and rotate the workstation so the system board is parallel to the table to make it easier to work on ([Access panel on page 61](#)).
3. On the rear of the workstation, a sliding slot cover lock secures the expansion card brackets and expansion slot covers in place. Remove the captive thumbscrew that holds the slot cover lock in place (1) and slide the slot cover lock up and off the chassis (2).



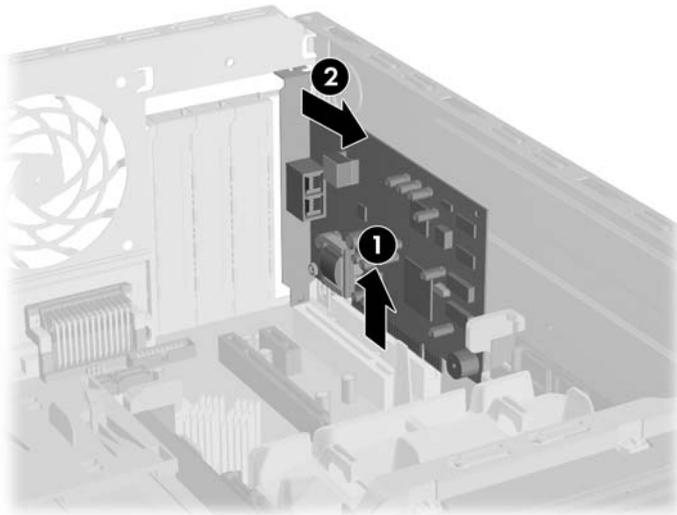
4. Before installing an expansion card, remove the expansion slot cover or the existing expansion card.

 **NOTE:** Before removing an installed expansion card, disconnect any cables that may be attached to the expansion card.

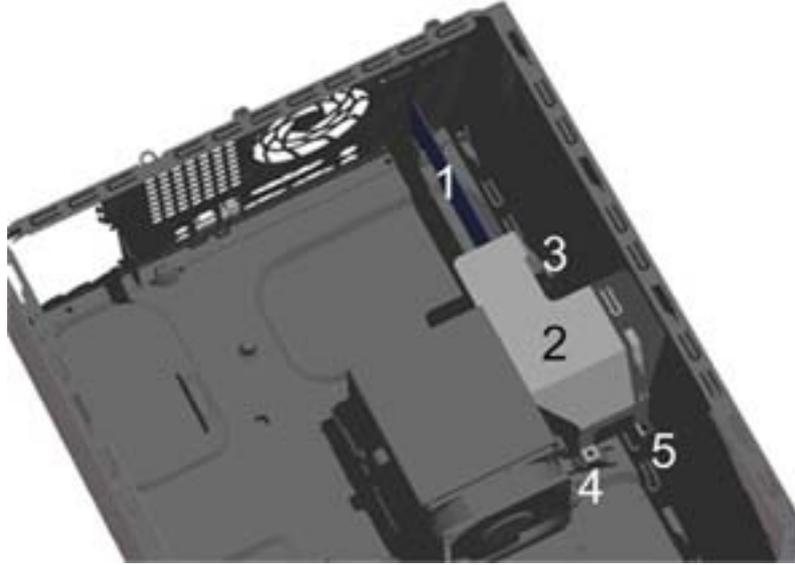
- a. If you are installing an expansion card in a vacant socket, remove the appropriate expansion slot cover on the back of the chassis. Pull the slot cover straight up from the socket then away from the inside of the chassis.



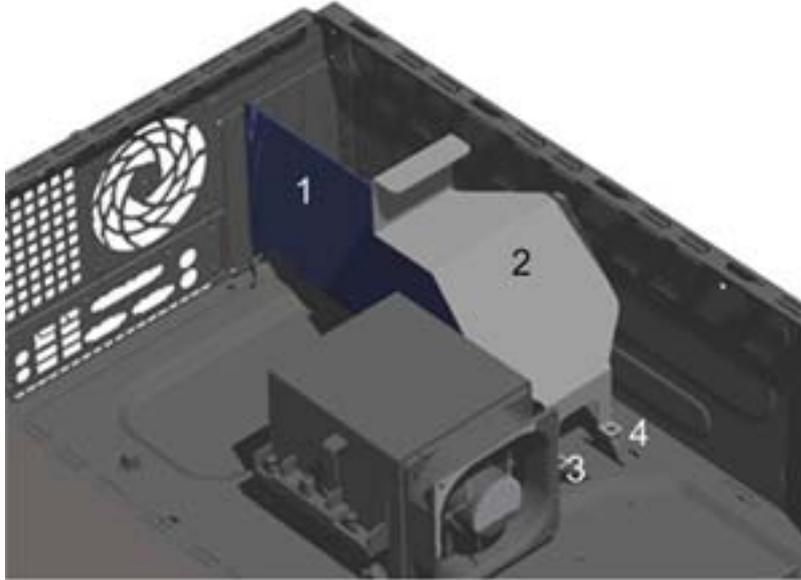
- b. If removing a standard PCI expansion card, hold the card at each end, and carefully rock it back and forth until the connectors pull free from the socket. Pull the expansion card straight up from the socket (1) then away from the inside of the chassis (2) to release it from the chassis frame. Be sure not to scrape the card against the other components.



- c. **Low Profile PCI Express Card with Rigid Hold-down Bracket:** If your workstation is configured with a low profile PCI Express x16 card and a rigid, non-hinged hold-down bracket (as shown in the following illustration), you must first remove screws 3, 4, and 5 and then remove the bracket (2) before removing the card (1). Retain the screws for reinstallation of the bracket and proceed to Step f. to remove the card. After you replace or reinstall a low profile PCI Express x16 card, reverse this process to reinstall the hold-down bracket after inserting the card.

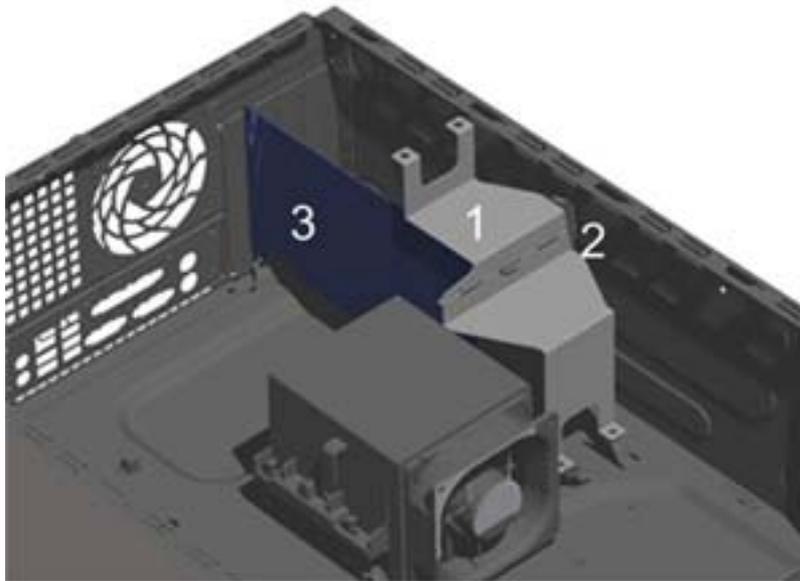


- d. **Full Height PCI Express Card with Rigid Hold-down Bracket:** If your workstation is configured with a full height PCI Express x16 card (1) and a rigid, non-hinged hold-down bracket (2), as shown below, you must first remove screws 3 and 4 and then remove the bracket before removing the card. Retain the screws for reinstallation of the bracket and proceed to Step f. to remove the card. After you reinstall or replace the full height PCI Express x16 card, reverse this process to reinstall the hold-down bracket after inserting the card.

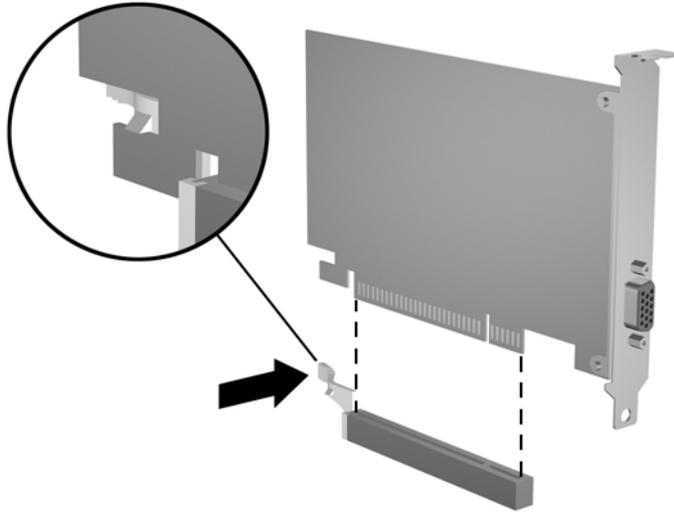


- e. **Low Profile or Full Height PCI Express Card with Dual Purpose Hold-down Bracket:** If your workstation is configured with a dual purpose (both low profile and full height) hinged PCI Express x16 card hold-down bracket, as shown below, do not remove any screws from the bracket. Merely rotate the hinged upper portion of the bracket (2) upward and back over the hinge (3), away from the top of the card (1) before removing the card, and proceed to Step f. to remove the card. After you reinstall or replace the PCI Express x16 card, rotate the upper portion hold-down bracket back over the card so that it rests on top edge of the card (as shown in the following illustration) before replacing the chassis cover panel.

 **NOTE:** The dual purpose hinged hold-down bracket can be used to hold down either a low profile or full height PCI Express x16 card, depending on how the bracket is mounted in the workstation chassis. For example, if the bracket is currently configured to hold down a low profile card, you can remove the two bracket mounting screws, then use them to reinstall the bracket up-side-down from its original installation in order to hold down a full height card. The following illustration shows the hold-down bracket mounted in position to retain a full height PCI Express x16 card.

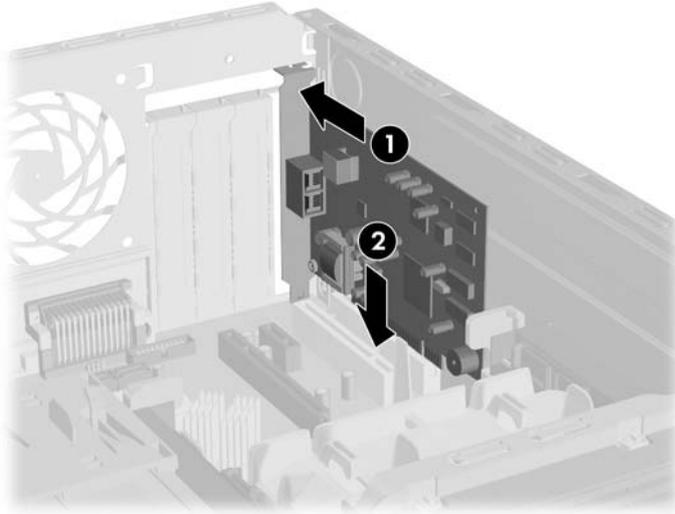


- f. With the hold-down bracket either removed or rotated away from the top of the card (depending on workstation configuration), pull the retention arm on the PCI Express x16 card (located on the back of the expansion socket) away from the card, and carefully rock the card back-and-forth until the connectors pull free from the socket. Pull the expansion card straight up from the socket then away from the inside of the chassis to release it from the chassis frame. Be sure not to scrape the card against the other components.



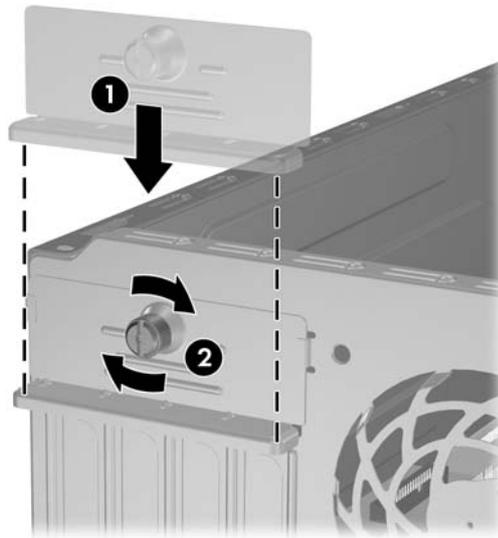
5. Store the removed card in anti-static packaging.
 6. If not replacing the old expansion card with a new expansion card, install an expansion slot cover to close the open slot. Insert the metal slot cover in the opened slot and slide the slot cover lock down to secure the slot cover in place.
- △ **CAUTION:** After removing an expansion card, you must replace it with a new card or expansion slot cover for proper cooling of internal components during operation.

7. If replacing or adding a new expansion card, hold the card just above the expansion slot on the system board then move the card toward the rear of the chassis (1) so that the bracket on the card is aligned with the open slot on the rear of the chassis. Press the card straight down into the expansion slot on the system board (2).



NOTE: When installing an expansion card, press firmly on the card so that the whole connector seats properly in the expansion card slot.

8. If you are replacing an expansion card, store the old card in the anti-static packaging that contained the new card.
9. While holding the expansion card bracket against the chassis, slide the slot cover lock down toward the expansion card brackets and slot covers (1) to secure them in place and replace the thumbscrew (2) that secures the slot cover lock.



10. Connect external cables to the installed card, if needed. Connect internal cables to the system board, if needed.

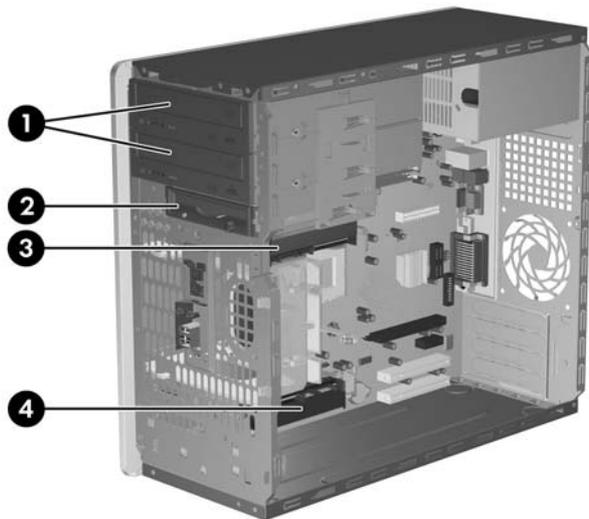
Drives

The workstation supports up to five drives that may be installed in various configurations.

This Section describes the procedure for replacing or upgrading the storage drives. A Torx T-15 screwdriver is needed to remove and install the guide screws on a drive.

△ **CAUTION:** Make sure personal files on the hard drive are backed up to an external storage device before removing the hard drive. Failure to do so will result in data loss. After replacing the primary hard drive, you will need to run the *Restore Plus!* CD to load the HP factory-installed files.

Drive positions



Drive Positions

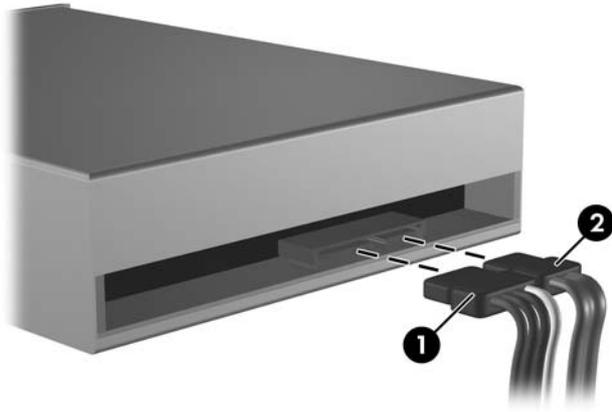
Item	Description
1	Two 5.25-inch, half-height bays for optional drives (optical drives shown)
2	One 3.5-inch external drive bay for optional drive (1.44-MB diskette drive shown)
3	Primary 3.5-inch internal hard drive bay
4	Secondary internal hard drive bay for optional hard drive

Removing an external drive

1. Remove any removable media, such as a compact disc or diskette, from the drive.
2. Prepare the workstation for disassembly ([Preparation for disassembly on page 59](#)).
3. Remove the access panel and rotate the workstation so the system board is parallel to the table to make it easier to work on ([Access panel on page 61](#)).

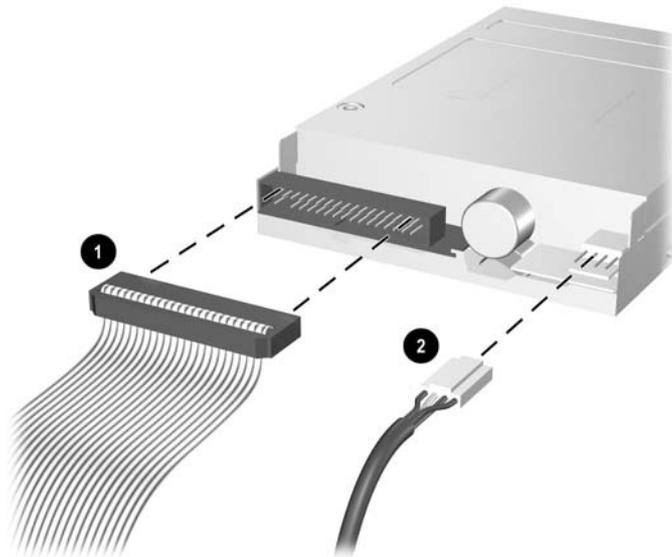
4. Remove the front bezel ([Front bezel on page 62](#)).
5. Disconnect the power and data cables from the back of the drive, as shown in the following illustrations.

Disconnecting optical cables



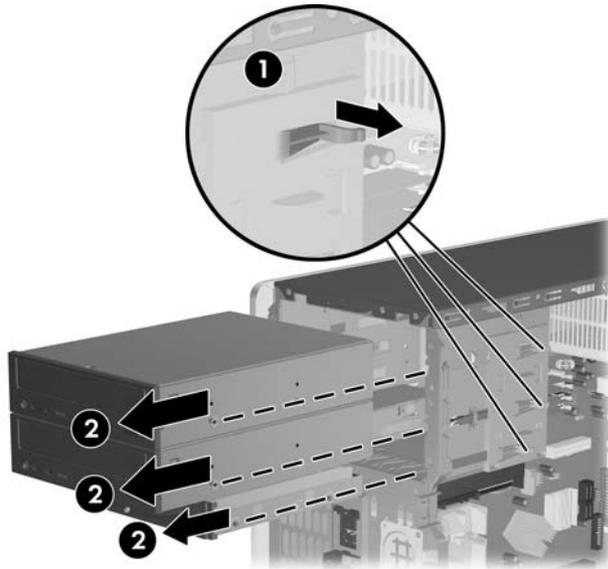
 **NOTE:** Some products use straight cable connectors while others use right angle connectors.

Disconnecting diskette drive cables



Releasing the drives

1. A latch drive bracket with release tabs secures the drives in the drive bay. Lift the release tab on the latch drive bracket (1) for the drive you want to remove, then slide the drive from its drive bay (2).



2. Remove the four guide screws (two on each side) from the old drive. You will need these screws to install a new drive.

Installing an external drive

△ **CAUTION:** To prevent loss of work and damage to the workstation or drive:

If you are inserting or removing a hard drive, shut down the operating system properly, then turn off the workstation. Do not remove a hard drive while the workstation is on or in standby mode.

Before handling a drive, ensure that you are discharged of static electricity. While handling a drive, avoid touching the connector. Refer to [Electrostatic discharge information on page 52](#) for more information about preventing electrostatic damage.

Handle a drive carefully; do not drop it.

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.

📄 **NOTE:** An optical drive is a CD-ROM, CD-R/RW, DVD-ROM, DVD+R/RW, or CD-RW/DVD Combo drive.

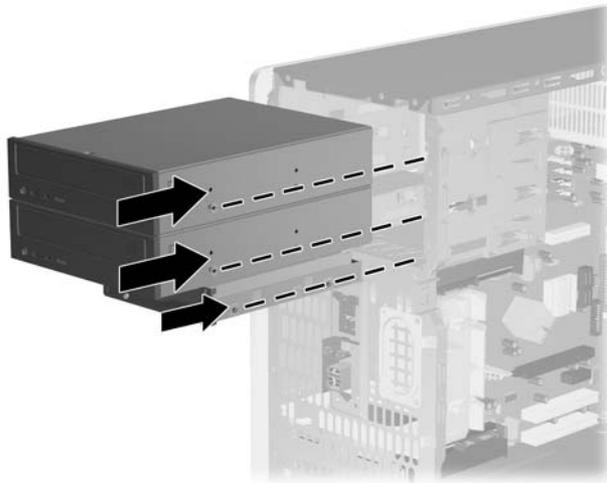
The system does not support Parallel ATA (PATA) optical drives.

1. Install four guide screws (two on each side) into the new drive. The screws help guide the drive into its proper position in the bay.
 - If this is a new installation, guide screws are provided on the front of the chassis under the front bezel.
 - If this is a replacement drive, use the screws removed from the old drive.



NOTE: There are a total of eight extra guide screws on the front of the chassis. Four have 6-32 standard threads and four have M3 metric threads. Standard screws are used for hard drives and have a silver finish. Metric screws are used for all other drives and have a black finish. Make sure to install the appropriate guide screws into the drive.

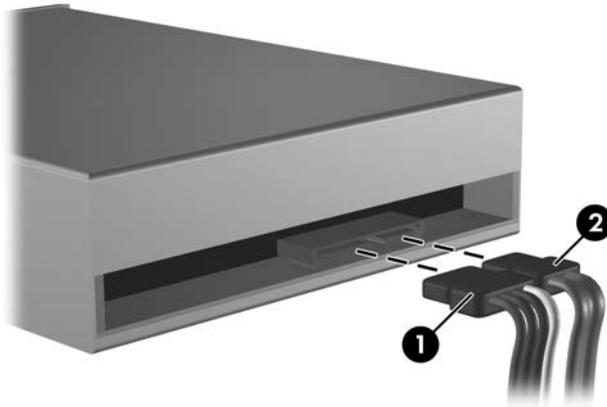
2. Slide the drive into the drive bay, making sure to align the guide screws with the guide slots, until the drive snaps into place.



3. Reconnect the power and data cables to the drive as shown in the following illustrations.

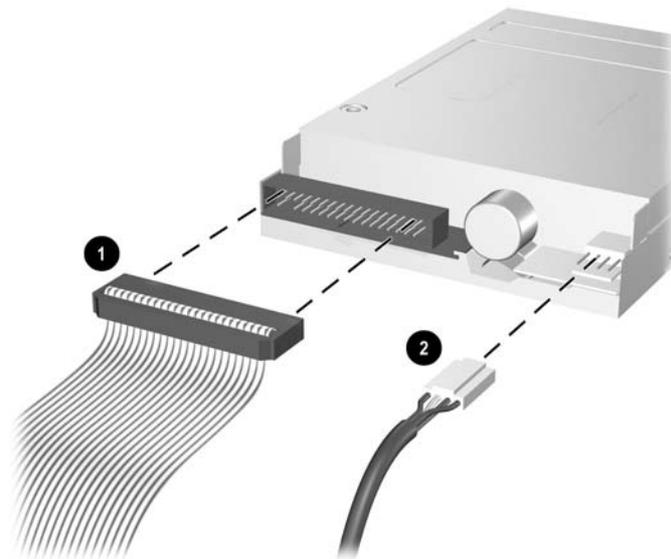
 **NOTE:** Refer to [Serial and Parallel ATA drive guidelines and features on page 47](#) for information on attaching the cabling to get optimum performance.

- a. Refer to the illustration below to connect optical drive cables.



 **NOTE:** Some products use straight cable connectors while others use right angle connectors.

- b. Refer to the illustration below to connect diskette drive cables.



4. Install the front bezel ([Front bezel on page 62](#)).
5. Install the access panel ([Access panel on page 61](#)).
6. Turn on the workstation.

Replacing an internal hard drive

△ **CAUTION:** To prevent loss of work and damage to the workstation or drive:

If you are inserting or removing a hard drive, shut down the operating system properly, then turn off the workstation. Do not remove a hard drive while the workstation is on or in standby mode.

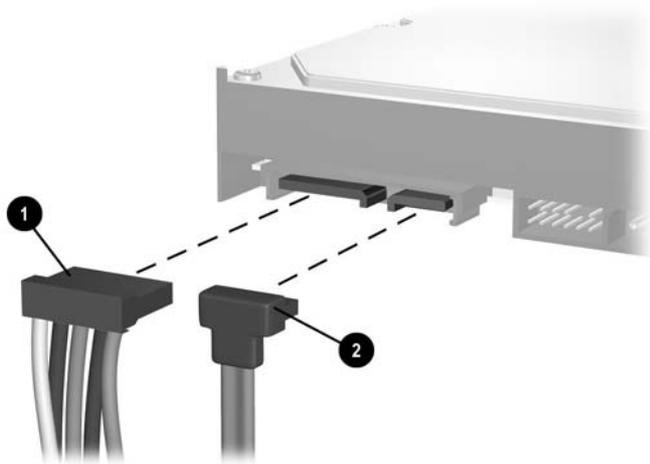
Before handling a drive, ensure that you are discharged of static electricity. While handling a drive, avoid touching the connector. Refer to [Electrostatic discharge information on page 52](#) for more information about preventing electrostatic damage.

Handle a drive carefully; do not drop it.

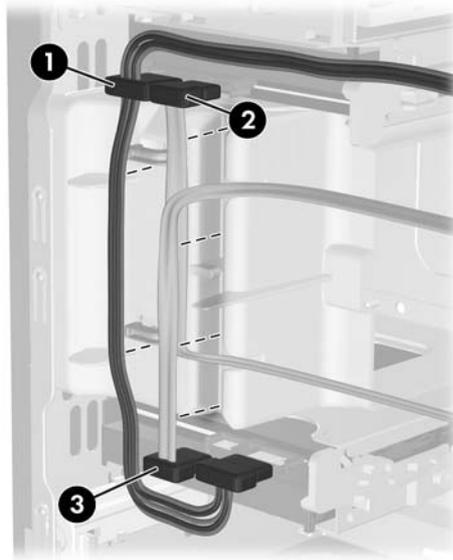
Do not use excessive force when inserting a drive.

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

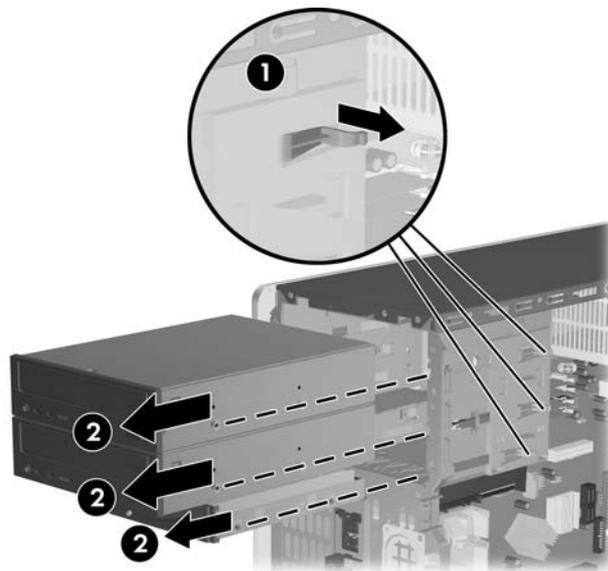
1. Remove any removable media, such as a compact disc or diskette, from the drive.
2. Prepare the workstation for disassembly ([Preparation for disassembly on page 59](#)).
3. Remove the access panel and rotate the workstation so the system board is parallel to the table to make it easier to work on ([Access panel on page 61](#)).
4. Remove the front bezel ([Front bezel on page 62](#)).
5. Disconnect the power (1) and data (2) cables from the back of the drive.



6. Remove the power cable (1) and primary data cable (2) and secondary data cable (if necessary) (3) from the cable retainers to make it easier to access the drive.

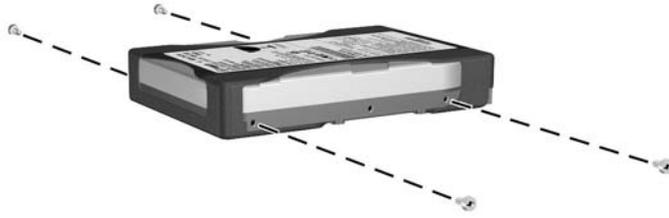


7. Release the drive by pulling the green release tab away from the drive (1) and sliding the drive out of the bay (2).



8. Remove the four guide screws (two on each side) from the old drive. You will need these screws to install a new drive.

9. Install the four guide screw (two on each side) that were removed from the old drive into the new drive. The screws help guide the drive into its proper position in the bay. Extra guide screws are provided on the front of the chassis under the front bezel.



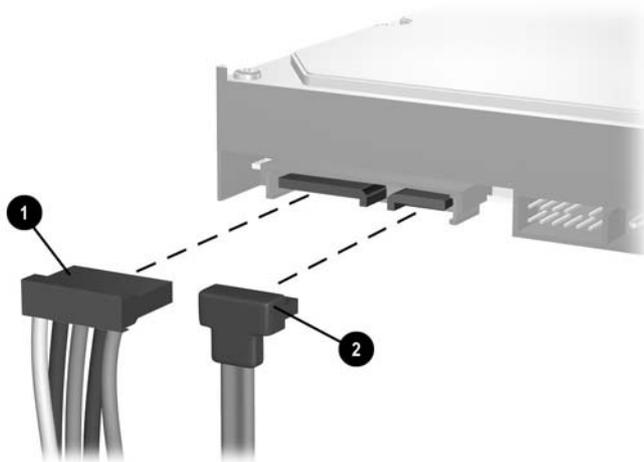
NOTE: There are a total of eight extra guide screws on the front of the chassis. Four have 6-32 standard threads and four have M3 metric threads. Standard screws are used for hard drives and have a silver finish. Metric screws are used for all other drives and have a black finish. Make sure to install the appropriate guide screws into the drive.

10. Slide the drive into the drive bay, making sure to align the guide screws with the guide slots, until the drive snaps into place. The upper bay is for the primary hard drive. The bottom bay is for the optional secondary hard drive.



11. Connect the power 1 and data 2 cables to the back of the hard drive.

 **NOTE:** If you are installing a primary hard drive, use the power connector labeled P5. If you are installing a secondary hard drive use the power cable labeled P4.



12. If installing a new drive, connect the opposite end of the data cable to the appropriate system board connector.

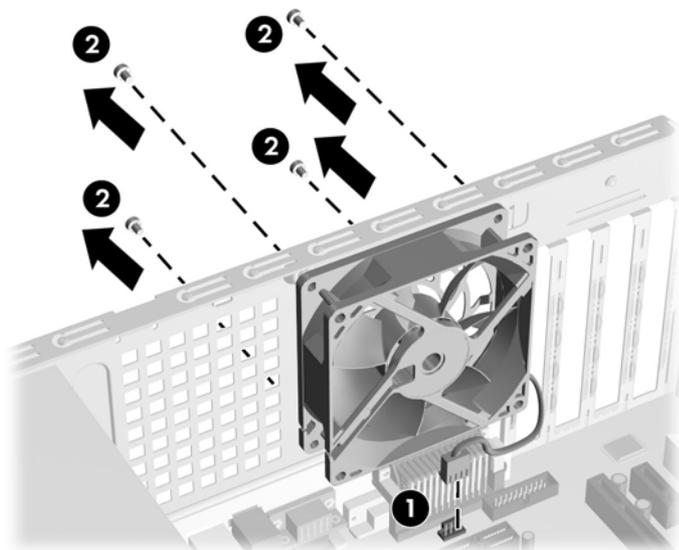
 **NOTE:** If your system only has one SATA hard drive, you must connect the hard drive cable to the dark blue connector labeled SATA0 to avoid any hard drive performance problems. If you are adding a second hard drive, connect the data cable to the next available (unpopulated) SATA connector in the system board in the following order: SATA0, SATA1, SATA3, SATA2.

13. Route the power and data cables into their cable retainers.
14. Replace the front bezel and workstation access panel.
15. Reconnect the power cord and any external devices, then turn on the workstation.

 **NOTE:** If you replaced the primary hard drive, use the *Restore Plus!* CD set that was created when starting the workstation for the first time. When the restore process has completed, reinstall any personal files that were backed up before replacing the hard drive.

Chassis fan

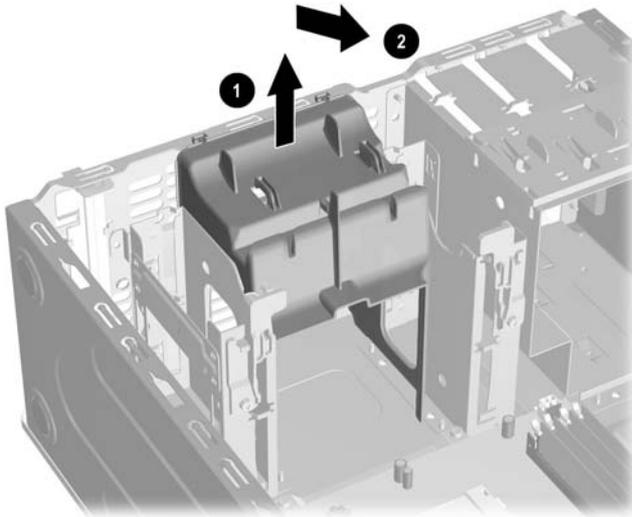
1. Prepare the workstation for disassembly ([Preparation for disassembly on page 59](#)).
2. Remove the access panel and rotate the workstation so the system board is parallel to the table to make it easier to work on ([Access panel on page 61](#)).
3. Disconnect the power cable that connects the chassis fan to the system board (1).
4. Remove the four screws from the exterior rear of the chassis that secure the fan (2).
5. Remove the fan from the chassis.



To install the chassis fan, reverse the removal procedure.

Fan shroud

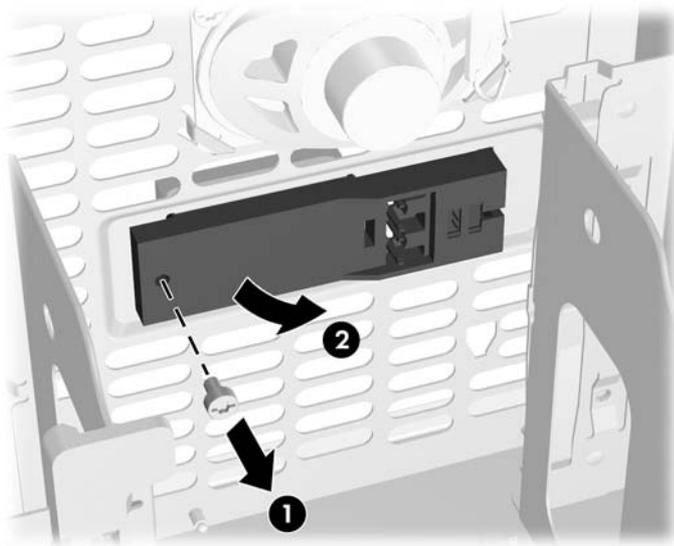
1. Prepare the workstation for disassembly ([Preparation for disassembly on page 59](#)).
2. Remove the access panel and rotate the workstation so the system board is parallel to the table to make it easier to work on ([Access panel on page 61](#)).
3. Remove the hard drive cables from the plastic shroud at the front of the chassis and from the hard drives.
4. Lift the shroud straight up (1) about 5-mm (3/16-in) before pulling it into the chassis (2) to remove it.



 **NOTE:** To install the shroud, reverse the removal process.

Front I/O panel housing assembly

1. Prepare the workstation for disassembly ([Preparation for disassembly on page 59](#)).
2. Remove the access panel and rotate the workstation so the system board is parallel to the table to make it easier to work on ([Access panel on page 61](#)).
3. Remove the hard drive cables from the plastic shroud at the front of the chassis and from the hard drives.
4. Remove the shroud from the chassis ([Fan shroud on page 84](#)).
5. Disconnect the power switch/LED cable, the front USB cable, and the front audio cable from the system board.
6. Remove the single screw that secure the housing to the chassis (1), then push the housing to the inside of the chassis (2).



To install the housing assembly, reverse the removal procedures.

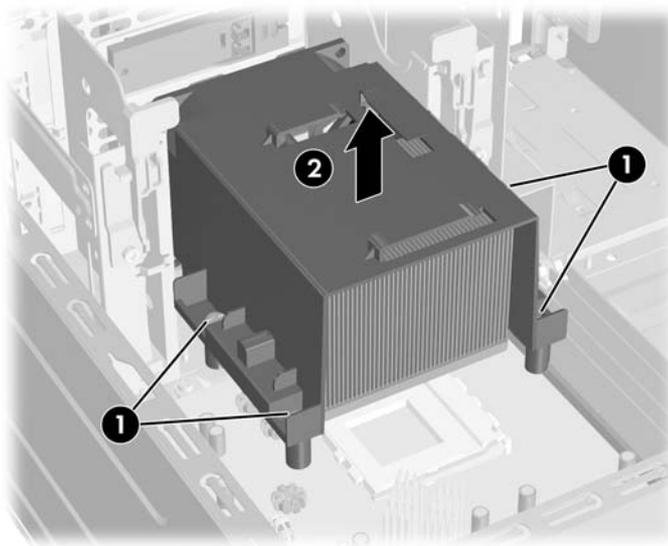
 **NOTE:** When installing the housing, insert the power-button end into the opening and then rotate the USB end into position before inserting the retaining screw.

Heatsink

1. Prepare the workstation for disassembly ([Preparation for disassembly on page 59](#)).
2. Remove the access panel and rotate the workstation so the system board is parallel to the table to make it easier to work on ([Access panel on page 61](#)).
3. Disconnect the heatsink fan cable from the system board.
4. Loosen the four captive screws (1) that secure the heatsink to the system board.

△ CAUTION: Heatsink retaining screws should be removed in diagonally opposite pairs (as in an X) to even the downward forces on the processor. This is especially important as the pins on the socket are very fragile and any damage to them may require replacing the system board.

5. Lift the heatsink from atop the processor (2) and set it on its side to keep from contaminating the work area with thermal grease.



When reinstalling the heatsink, make sure that its bottom has been cleaned with an alcohol wipe and fresh thermal grease has been applied to the top of the processor.

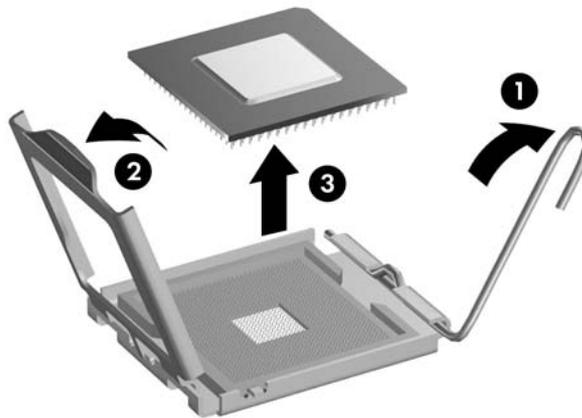
- △ CAUTION:** Heatsink retaining screws should be tightened in diagonally opposite pairs (as in an X) to evenly seat the heatsink on the processor. This is especially important as the pins on the socket are very fragile and any damage to them may require replacing the system board.
-

Processor

1. Prepare the workstation for disassembly ([Preparation for disassembly on page 59](#)).
2. Remove the access panel ([Access panel on page 61](#)).
3. Disconnect the heatsink control cable from the system board and remove the heatsink ([Heatsink on page 86](#)).
4. Rotate the locking lever to its full open position (1).
5. Raise and rotate the microprocessor retainer to its fully open position (2).
6. Carefully lift the processor from the socket (3).

△ **CAUTION:** Do NOT handle the pins in the processor socket. These pins are very fragile and handling them could cause irreparable damage. Once pins are damaged it may be necessary to replace the system board.

The heatsink must be installed within 24 hours of installing the processor to prevent damage to the processor's solder connections.



To install a new processor:

1. Place the processor in its socket and close the retainer.
 2. Secure the locking lever. If reusing the existing heatsink, go to step 3. If using a new heatsink, go to step 6.
 3. If reusing the existing heatsink, clean the bottom of the heatsink with the alcohol pad provided in the spares kit.
- △ **CAUTION:** Before reinstalling the heatsink you must clean the top of the processor and the bottom of the heatsink with an alcohol pad supplied in the spares kit. After the alcohol has evaporated, apply thermal grease to the top of the processor from the syringe supplied in the spares kit.
4. Apply the thermal grease provided in the spares kit to the top of the processor and install the heatsink atop the processor.

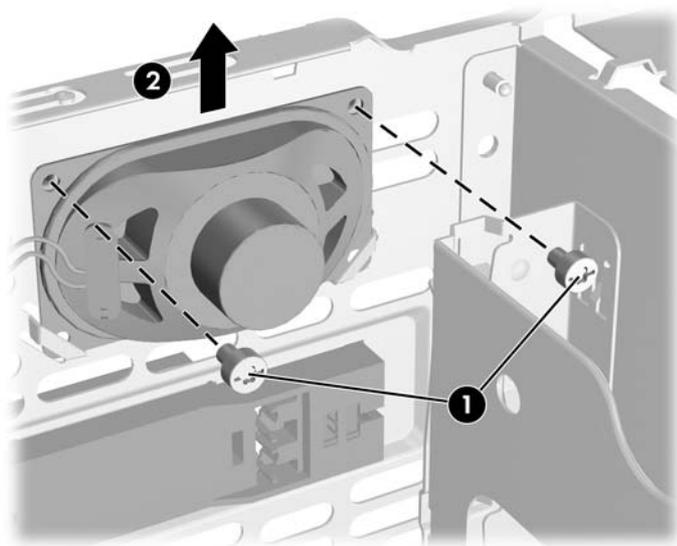
5. Go to step 7.
6. If using a new heatsink, remove the protective covering from the bottom of the heatsink and place it in position atop the processor.
7. Secure the heatsink to the system board and system board tray with the four captive screws and attach the heatsink control cable to the system board.

△ **CAUTION:** Heatsink retaining screws should be tightened in diagonally opposite pairs (as in an X) to evenly seat the heatsink on the processor. This is especially important as the pins on the socket are very fragile and any damage to them may require replacing the system board.

 **NOTE:** After installing a new processor onto the system board, always update the system ROM to ensure that the latest version of the BIOS is being used on the workstation. The latest system BIOS can be found on the Web at: <http://h18000.www1.hp.com/support/files>.

Speaker

1. Prepare the workstation for disassembly ([Preparation for disassembly on page 59](#)).
2. Remove the access panel and rotate the workstation so the system board is parallel to the table to make it easier to work on ([Access panel on page 61](#)).
3. Remove the hard drive cables from the plastic shroud at the front of the chassis and from the hard drives.
4. Remove the shroud from the chassis ([Fan shroud on page 84](#)).
5. Disconnect the speaker wire from the system board connector.
6. Remove the two screws (1) that secure the speaker to the chassis.
7. Remove the speaker by lifting it up (2) and out of the retaining clips.

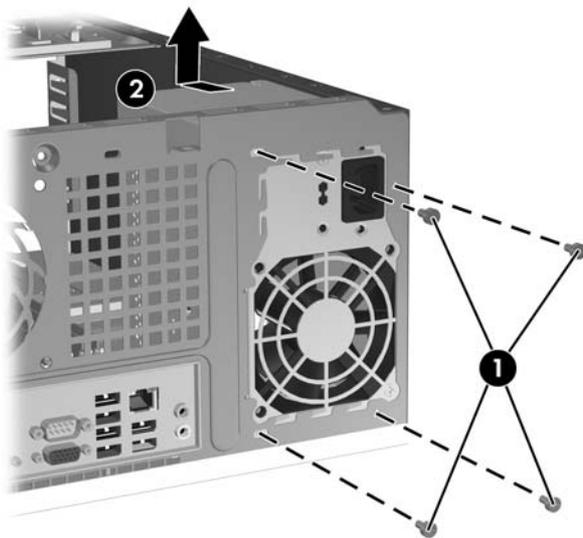


To install the speaker, reverse the removal procedures making sure that the speaker wire is at the upper left of the speaker when viewed from inside the chassis.

Power supply

⚠ WARNING! Voltage is always present on the system board when the workstation is plugged into an active AC outlet. To avoid possible personal injury and damage to the equipment the power cord should be disconnected from the workstation and/or the AC outlet before opening the workstation.

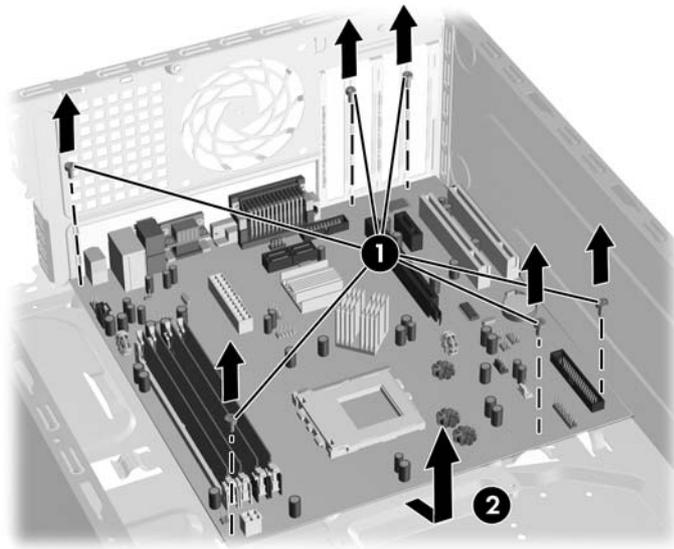
1. Prepare the workstation for disassembly ([Preparation for disassembly on page 59](#)).
2. Remove the access panel and rotate the workstation so the system board is parallel to the table to make it easier to work on ([Access panel on page 61](#)).
3. Disconnect all power cables from the mass storage devices and from the system board.
4. Remove the screws that connect the power supply to the chassis (1).
5. Pull the power supply towards the front of the chassis then, lift the power supply from the chassis (2).



To install the power supply, reverse the removal procedure.

System board

1. Prepare the workstation for disassembly ([Preparation for disassembly on page 59](#)).
2. Remove the access panel and rotate the workstation so the system board is parallel to the table to make it easier to work on ([Access panel on page 61](#)).
3. Remove all PCI expansion cards ([Expansion cards on page 67](#)).
4. Disconnect all cables connected to the system board, noting their location for reinstallation.
5. Remove the six screws that secure the system board to the chassis (1), then slide the system board towards the front of the chassis to remove it (2).



To install the system board, reverse the removal procedures.

Battery

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

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

 **WARNING!** This workstation 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 workstation CMOS settings. When the battery is removed or replaced, the CMOS settings will be cleared. Refer to Section 2.2 for information on backing up the CMOS settings.

 **NOTE:** HP encourages customers to recycle used electronic hardware, HP original print cartridges, and rechargeable batteries. For more information about recycling programs, go to <http://www.hp.com/recycle>.

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

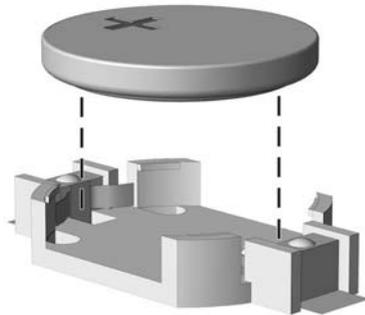
-
1. Prepare the workstation for disassembly ([Preparation for disassembly on page 59](#)).
 2. Remove the access panel and rotate the workstation so the system board is parallel to the table to make it easier to work on ([Access panel on page 61](#)).

 **NOTE:** It may be necessary to remove an expansion card to gain access to the battery.

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

Type 1 Battery Holder

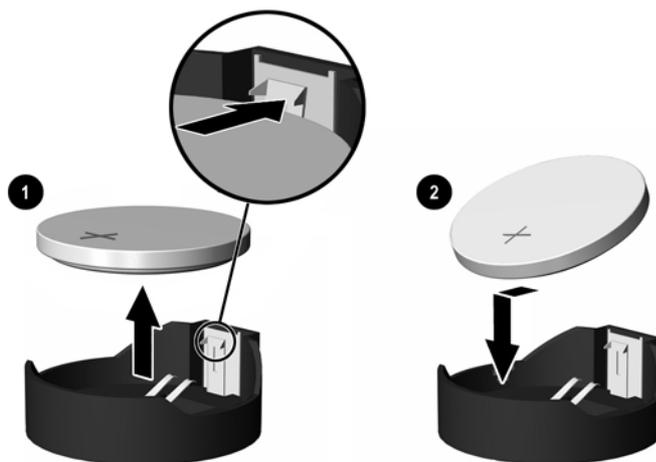
1. Lift the battery out of its holder.



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 workstation access panel ([Access panel on page 61](#)).
5. Plug in the workstation and turn on power to the workstation.
6. Reset the date and time, your passwords, and any special system setups, using Computer Setup. Refer to Section 2.2.

Type 2 Battery Holder

1. To release the battery from its holder, squeeze the metal clamp that extends above one edge of the battery. When the battery pops up, lift it out (1).
2. To insert the new battery, slide one edge of the replacement battery under the holder's lip with the positive side up (2). Push the other edge down until the clamp snaps over the other edge of the battery.

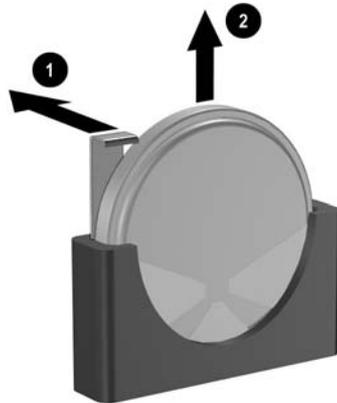


3. Replace the workstation cover or access panel ([Access panel on page 61](#)).

4. Plug in the workstation and turn on power to the workstation.
5. Reset the date and time, your passwords, and any special system setups, using Computer Setup. Refer to Section 2.2.

Type 3 Battery Holder

1. Pull back on the clip (1) that holds the battery in place, then remove the battery (2).
2. Insert the new battery and position the clip back in place.



3. Replace the workstation access panel ([Access panel on page 61](#)).
4. Plug in the workstation and turn on power to the workstation.
5. Reset the date and time, your passwords, and any special system setups, using Computer Setup. Refer to Section 2.2.

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.

Keyboard

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

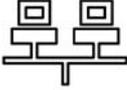
Mouse

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

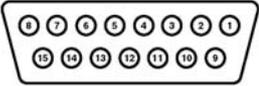
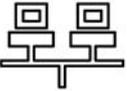
Ethernet BNC

Connector and Icon	Pin	Signal
	1	Data
	2	Ground

Ethernet RJ-45

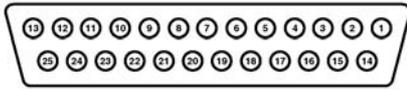
Connector and Icon		Pin	Signal
 		1	(+) Transmit Data
		2	(-) Transmit Data
		3	(+) Receive Data
		4	Unused
		5	Unused
		6	(-) Receive Data
		7	Unused
		8	Unused

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

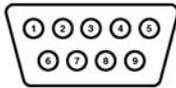
Connector and Icon



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

Serial interface, powered and non-powered

Connector and Icon

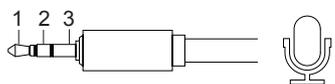


Pin	Signal
1	Carrier Detect (12V if powered)
2	Receive Data
3	Transmit Data
4	Data Terminal Ready
5	Signal Ground
6	Data Set Ready
7	Request to Send
8	Clear to Send
9	Ring Indicator (5V if powered)

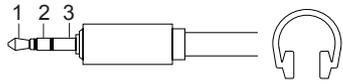
USB

Connector and Icon	Pin	Signal
	1	+5 VDC
	2	- Data
	3	+ Data
	4	Ground

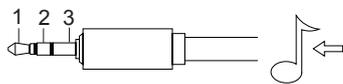
Microphone

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

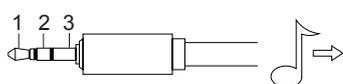
Headphone

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

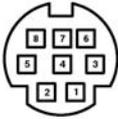
Line-in audio

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

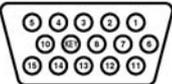
Line-out audio

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

External infrared transceiver

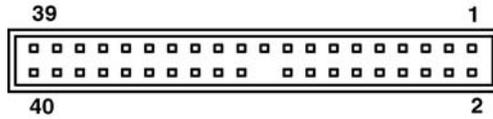
Connector and Icon	Pin	Signal
 	1	Transmit
	2	Receive
	3	Ground
	4	5V
	5	Mode
	6	Not Used
	7	Not Used
	8	Not Used

Monitor

Connector and Icon			
 			
Pin	Signal	Pin	Signal
1	Red Analog	9	+5V (fused)
2	Green Analog	10	Ground
3	Blue Analog	11	Not used
4	Not used	12	DDC Serial Data
5	Ground	13	Horizontal Sync
6	Ground	14	Vertical Sync
7	Ground	15	DDC Serial Clock
8	Ground		

ATA/ATAPI (IDE) Standard drive cable

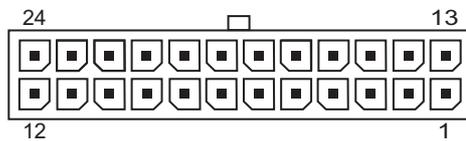
Connector



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

24-Pin Power

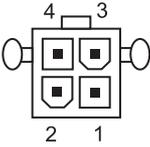
Connector



Front

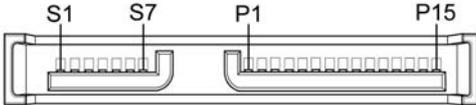
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	+3.3V	7	GND	13	+3.3V	19	GND
2	+3.3V	8	POK	14	-12V	20	open
3	GND	9	+5 Vaux	15	GND	21	+5V
4	+5V	10	+12V	16	PSON	22	+5V
5	GND	11	+12V	17	GND	23	+5V
6	+5V	12	+3.3V	18	GND	24	GND

4-Pin Power (for CPU)

Connector and Icon	Pin	Signal
	1	GND
	2	GND
	3	+12V CPU
	4	-12V CPU

SATA data and power

Drive Connector

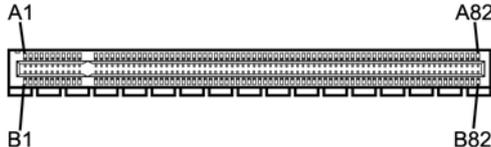


Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
S1	Ground	S2	A+	S3	A-	S4	Ground
S5	B-	S6	B+	S7	Ground		
P1	Ground	P2	V 3.3	P3	V 3.3	P4	Ground
P5	B-	P6	Ground	P7	V 5	P8	V 5
P9	V 5	P10	Ground	P11	Reserved	P12	Ground
P13	V 12	P14	V12	P15	V 12		

*S = Data, P = Power

PCI Express

x1, x4, x8, and x16 PCI Express Connector



Pin A									
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	PRSENT1	6	JTAG3	11	PERST#	16	PERp0	21	PERp1
2	+12V	7	JTAG4	12	GND	17	PERn0	22	PERn1
3	+12V	8	JTAG5	13	REFCLK+	18	GND	23	GND

4	GND	9	+3.3V	14	REFCLK-	19	RSVD	24	GND
5	JTAG2	10	+3.3V	15	GND	20	GND	25	PERp2
26	PERn(2)	31	GND	36	PERn4	41	GND	46	GND
27	GND	32	RSVD	37	GND	42	GND	47	PERp7
28	GND	33	RSVD	38	GND	43	PERp6	48	PERn7
29	PERp3	34	GND	39	PERp5	44	PERn6	49	GND
30	PERn3	35	PERp4	40	PERn5	45	GND	50	RSVD
51	GND	56	PERp9	61	PERn10	66	GND	71	GND
52	PERp8	57	PERn9	62	GND	67	GND	72	PERp13
53	PERn8	58	GND	63	GND	68	PERp12	73	PERn13
54	GND	59	GND	64	PERp11	69	PERn12	74	GND
55	GND	60	PERp10	65	PERn11	70	GND	75	GND
76	PERp14	81	PERn15						
77	PERn14	82	GND						
78	GND								
79	GND								
80	PERp15								

Pin B information is on the next page

NOTE: x1 PCI Express uses pins 1-18

x4 PCI Express uses pins 1-32

x8 PCI Express uses pins 1-49

x16 PCI Express uses pins 1-8

PCI Express

x1, x4, x8, and x16 PCI Express Connector



Pin B

Pin	Signal								
1	+12V	6	SMDAT	11	WAKE#	16	GND	21	GND
2	+12V	7	GND	12	RSVD	17	GND	22	GND

3	RSVD	8	+3.3 V	13	GND	18	PETp1	23	PETp2
4	GND	9	JTAG1	14	PETp0	19	PETn1	24	PETn2
5	SMCLK	10	3.3vAux	15	PETn0	20		25	GND
26	GND	31	PRSNT2#	36	GND	41	PETp6	46	PETn7
27	PETp3	32	GND	37	PETp5	42	PRTn6	47	GND
28	PETn3	33	PETp4	38	PETn5	43	GND	48	PRSNT2#
29	GND	34	PETn4	39	GND	44	GND	49	GND
30	RSVD	35	GND	40	GND	45	PETp7	50	PETp8
51	PETn8	56	GND	61	GND	66	PETp12	71	PETn13
52	GND	57	GND	62	PETp11	67	PETn12	72	GND
53	GND	58	PETp10	63	PETn11	68	GND	73	GND
54	PETp9	59	PETn10	64	GND	69	GND	74	PETp14
55	PETn9	60	GND	65	GND	70	PETp13	75	PETn14
76	GND	81	PRSNT2#						
77	GND	82	RSVD						
78	PETp15								
79	PETn15								
80	GND								

Pin B information is on the next page

NOTE: x1 PCI Express uses pins 1-18

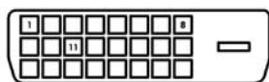
x4 PCI Express uses pins 1-32

x8 PCI Express uses pins 1-49

x16 PCI Express uses pins 1-8

DVI connector

Connector and Icon



Pin	Signal	Pin	Signal
1	T.M.D.S. Data2-	13	T.M.D.S. Data3+
2	T.M.D.S. Data2+	14	+5V Power
3	T.M.D.S. Data2/4 Shield	15	Ground (for +5V)
4	T.M.D.S. Data4-	16	Hot Pug Detect

5	T.M.D.S. Data4+	17	T.M.D.S. Data0-
6	DDC Clock	18	T.M.D.S. Data0+
7	DDC Data	19	T.M.D.S. Data0/5 Shield
8	No Connect	20	T.M.D.S. Data5-
9	T.M.D.S. Data1-	21	T.M.D.S. Data5+
10	T.M.D.S. Data1+	22	T.M.D.S. Data Shield
11	T.M.D.S. Data1/3 Shield	23	T.M.D.S. Clock+
12	T.M.D.S. Data3-	24	T.M.D.S. Clock-

B Power cord set requirements

The power supplies on some computers have external power switches. The voltage select switch feature on the workstation permits it to operate from any line voltage between 100-120 or 220-240 volts AC. Power supplies on those computers that do not have external power switches are equipped with internal switches that sense the incoming voltage and automatically switch to the proper voltage.

The power cord set received with the workstation 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 workstation.

General requirements

The requirements listed below are applicable to all countries:

1. The power cord must be approved by an acceptable accredited agency responsible for evaluation in the country where the power cord set will be installed.
2. The power cord set must have a minimum current capacity of 10A (7A Japan only) and a nominal voltage rating of 125 or 250 volts AC, as required by each country's power system.
3. The diameter of the wire must be a minimum of 0.75 mm² or 18AWG, and the length of the cord must be between 1.8 m (6 feet) and 3.6 m (12 feet).

The power cord should be routed so that it is not likely to be walked on or pinched by items placed upon it or against it. Particular attention should be paid to the plug, electrical outlet, and the point where the cord exits from the product.

△ **WARNING!** Do not operate this product with a damaged power cord set. If the power cord set is damaged in any manner, replace it immediately.

Japanese power cord requirements

For use in Japan, use only the power cord received with this product.

△ **CAUTION:** Do not use the power cord received with this product on any other products.

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 Type HO5VV-F, 3-conductor, 0.75mm² 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 SVT 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, 0.75 mm² conductor size. Wall plug must be a two-pole grounding type with a Japanese Industrial Standard C8303 (7A, 125V) configuration.

C POST error messages

This appendix lists the error codes, error messages, and the various indicator light and audible sequences that you may encounter during Power-On Self-Test (POST) or workstation restart, the probable source of the problem, and steps you can take to resolve the error condition.

POST Message Disabled suppresses most system messages during POST, such as memory count and non-error text messages. If a POST error occurs, the screen will display the error message. To manually switch to the POST Messages Enabled mode during POST, press any key (except **F10** or **F12**). The default mode is POST Message Disabled.

The speed at which the workstation loads the operating system and the extent to which it is tested are determined by the POST mode selection.

Quick Boot is a fast startup process that does not run all of the system level tests, such as the memory test. Full Boot runs all of the ROM-based system tests and takes longer to complete.

Full Boot may also be enabled to run every 1 to 30 days on a regularly scheduled basis. To establish the schedule, reconfigure the workstation to the Full Boot Every x Days mode, using Computer Setup.

 **NOTE:** For more information on Computer Setup, see the *Computer Setup (F10) Utility Guide* on the *Documentation and Diagnostics CD*.

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 workstation system is functioning properly:

- Keyboard
- Memory modules
- All mass storage devices
- Processors
- Controllers

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

If POST finds an error in the system, an audible and/or visual message occurs.

POST numeric codes and text messages

This section covers those POST errors that have numeric codes associated with them. The section also includes some text messages that may be encountered during POST.

 **NOTE:** The workstation will beep once after a POST text message is displayed on the screen.

Table C-1 Numeric Codes and Text Messages

Control panel message	Description	Recommended action
101-Option ROM Checksum Error	System ROM or expansion board option ROM checksum.	<ol style="list-style-type: none"> 1. Verify the correct ROM. 2. Flash the ROM if needed. 3. If an expansion board was recently added, remove it to see if the problem remains. 4. Clear CMOS. 5. If the message disappears, there may be a problem with the expansion card. 6. Replace the system board.
103-System Board Failure	DMA or timers.	<ol style="list-style-type: none"> 1. Clear CMOS. 2. Remove expansion boards. 3. Replace the system board.
110-Out of Memory Space for Option ROMs	Recently added PCI expansion card contains an option ROM too large to download during POST.	<ol style="list-style-type: none"> 1. If a PCI expansion card was recently added, remove it to see if the problem remains. 2. In Computer Setup, set Advanced > Device Options > NIC PXE Option ROM Download to DISABLE to prevent PXE option ROM for the internal NIC from being downloaded during POST to free more memory for an expansion card's option ROM. Internal PXE option ROM is used for booting from the NIC to a PXE server. 3. Ensure the ACPI/USB Buffers @ Top of Memory setting in Computer Setup is enabled.
162-System Options Not Set	Configuration incorrect. RTC (real-time clock) battery may need to be replaced.	<p>Run Computer Setup and check the configuration in Advanced > Onboard Devices.</p> <p>Reset the date and time under Control Panel. If the problem persists, replace the RTC battery. See the <i>Hardware Reference Guide</i> on the <i>Documentation and Diagnostics CD</i> for instructions on installing a new battery, or contact an authorized dealer or reseller for RTC battery replacement.</p>
163-Time & Date Not Set	Invalid time or date in configuration memory.	Reset the date and time under Control Panel (Computer Setup can also be used). If the problem persists, replace the RTC battery.

Table C-1 Numeric Codes and Text Messages (continued)

Control panel message	Description	Recommended action
	RTC (real-time clock) battery may need to be replaced.	See the <i>Hardware Reference Guide</i> on the <i>Documentation and Diagnostics CD</i> for instructions on installing a new battery, or contact an authorized dealer or reseller for RTC battery replacement.
163-Time & Date Not Set	CMOS jumper may not be properly installed.	Check for proper placement of the CMOS jumper if applicable.
164-MemorySize Error	Memory amount has changed since the last boot (memory added or removed).	Press the F1 key to save the memory changes.
164-MemorySize Error	Memory configuration incorrect.	<ol style="list-style-type: none">1. Run Computer Setup or Windows utilities.2. Make sure the memory module(s) are installed properly.3. If third-party memory has been added, test using HP-only memory.4. Verify proper memory module type.
201-Memory Error	RAM failure.	<ol style="list-style-type: none">1. Run Computer Setup or Windows utilities.2. Ensure memory modules are correctly installed.3. Verify proper memory module type.4. Remove and replace the identified faulty memory module(s).5. If the error persists after replacing memory modules, replace the system board.
213-Incompatible Memory Module in Memory Socket(s) X, X, ...	A memory module in memory socket identified in the error message is missing critical SPD information, or is incompatible with the chipset.	<ol style="list-style-type: none">1. Verify proper memory module type.2. Try another memory socket.3. Replace DIMM with a module conforming to the SPD standard.
214-DIMM Configuration Warning	Populated DIMM Configuration is not optimized.	Rearrange the DIMMs so that each channel has the same amount of memory.
219-ECC Memory Module Detected ECC Modules not supported on this Platform	Recently added memory module(s) support ECC memory error correction.	<ol style="list-style-type: none">1. If additional memory was recently added, remove it to see if the problem remains.2. Check product documentation for memory support information.
301-Keyboard Error	Keyboard failure.	<ol style="list-style-type: none">1. Reconnect keyboard with workstation turned off.2. Check connector for bent or missing pins.3. Ensure that none of the keys are depressed.4. Replace keyboard.

Table C-1 Numeric Codes and Text Messages (continued)

Control panel message	Description	Recommended action
303-Keyboard Controller Error	I/O board keyboard controller.	<ol style="list-style-type: none">1. Reconnect keyboard with workstation turned off.2. Replace the system board.
304-Keyboard or System Unit Error	Keyboard failure.	<ol style="list-style-type: none">1. Reconnect the keyboard with workstation turned off.2. Ensure that none of the keys are depressed.3. Replace the keyboard.4. Replace the system board.
404-Parallel Port Address Conflict Detected	Both external and internal ports are assigned to parallel port X.	<ol style="list-style-type: none">1. Remove any parallel port expansion cards.2. Clear CMOS.3. Reconfigure card resources and/or run Computer Setup.
410-Audio Interrupt Conflict	IRQ address conflicts with another device.	Enter Computer Setup and reset the IRQ in Advanced > Onboard Devices .
411-Network Interface Card Interrupt Conflict	IRQ address conflicts with another device.	Enter Computer Setup and reset the IRQ in Advanced > Onboard Devices .
501-Display Adapter Failure	Graphics display controller.	<ol style="list-style-type: none">1. Reseat the graphics card (if applicable).2. Clear CMOS.3. Verify monitor is attached and turned on.4. Replace the graphics card (if possible).
510-Flash Screen Image Corrupted	Flash Screen image has errors.	Reflash the system ROM with the latest BIOS image.
511-CPU, CPUA, or CPUB Fan not Detected	CPU fan is not connected or may have malfunctioned.	<ol style="list-style-type: none">1. Reseat CPU fan.2. Reseat fan cable.3. Replace CPU fan.
512-Chassis, Rear Chassis, or Front Chassis Fan not Detected	Chassis, rear chassis, or front chassis fan is not connected or may have malfunctioned.	<ol style="list-style-type: none">1. Reseat chassis, rear chassis, or front chassis fan.2. Reseat fan cable.3. Replace chassis, rear chassis, or front chassis fan.
514-CPU or Chassis Fan not Detected	CPU or chassis fan is not connected or may have malfunctioned.	<ol style="list-style-type: none">1. Reseat CPU or chassis fan.2. Reseat fan cable.3. Replace CPU or chassis fan.
601-Diskette Controller Error	Diskette controller circuitry or floppy drive circuitry incorrect.	<ol style="list-style-type: none">1. Run Computer Setup.2. Check and/or replace cables.3. Clear CMOS.

Table C-1 Numeric Codes and Text Messages (continued)

Control panel message	Description	Recommended action
		<ol style="list-style-type: none"> 4. Replace diskette drive. 5. Replace the system board.
605-Diskette Drive Type Error	Mismatch in drive type.	<ol style="list-style-type: none"> 1. Run Computer Setup. 2. Disconnect any other diskette controller devices (tape drives). 3. Clear CMOS.
610-External Storage Device Failure	External tape drive not connected.	Reinstall tape drive or press F1 and allow system to reconfigure without the drive.
611-Primary Floppy Port Address Assignment Conflict	Configuration error.	Run Computer Setup and check the configuration in Advanced > Onboard Devices .
660-Display cache is detected unreliable	Integrated graphics controller display cache is not working properly and will be disabled.	Replace system board if minimal graphics degrading is an issue.
912-Computer Cover Has Been Removed Since Last System Startup	Workstation cover was removed since last system startup.	No action required.
917-Front Audio Not Connected	Front audio harness has been detached or unseated from motherboard.	Reconnect or replace front audio harness.
918-Front USB Not Connected	Front USB harness has been detached or unseated from motherboard.	Reconnect or replace front USB harness.
921-Device in PCI Express slot failed to initialize	There is an incompatibility/problem with this device and the system or PCI Express Link could not be retrained to an x1.	Try rebooting the system. If the error reoccurs, the device may not work with this system
1151-Serial Port A Address Conflict Detected	Both external and internal serial ports are assigned to COM1.	<ol style="list-style-type: none"> 1. Remove any serial port expansion cards. 2. Clear CMOS. 3. Reconfigure card resources and/or run Computer Setup or Windows utilities.
1152-Serial Port B Address Conflict Detected	Both external and internal serial ports are assigned to COM2.	<ol style="list-style-type: none"> 1. Remove any serial port expansion cards. 2. Clear CMOS. 3. Reconfigure card resources and/or run Computer Setup or Windows utilities.
1155-Serial Port Address Conflict Detected	Both external and internal serial ports are assigned to same IRQ.	<ol style="list-style-type: none"> 1. Remove any serial port expansion cards. 2. Clear CMOS. 3. Reconfigure card resources and/or run Computer Setup or Windows utilities.
1201-System Audio Address Conflict Detected	Device IRQ address conflicts with another device.	Enter Computer Setup and reset the IRQ in Advanced > Onboard Devices .
1202-MIDI Port Address Conflict Detected	Device IRQ address conflicts with another device.	Enter Computer Setup and reset the IRQ in Advanced > Onboard Devices .
1203-Game Port Address Conflict Detected	Device IRQ address conflicts with another device.	Enter Computer Setup and reset the IRQ in Advanced > Onboard Devices .

Table C-1 Numeric Codes and Text Messages (continued)

Control panel message	Description	Recommended action
1720-SMART Hard Drive Detects Imminent Failure	Hard drive is about to fail. (Some hard drives have a hard drive firmware patch that will fix an erroneous error message.)	<ol style="list-style-type: none">1. Determine if hard drive is giving correct error message. Enter Computer Setup and run the Drive Protection System test under Storage > DPS Self-test.2. Apply hard drive firmware patch if applicable. (Available at http://www.hp.com/support.)3. Back up contents and replace hard drive.
1796-SATA Cabling Error	One or more SATA devices are improperly attached. For optimal performance, the SATA 0 and SATA 1 connectors must be used before SATA 2 and SATA 3.	Ensure SATA connectors are used in ascending order. For one device, use SATA 0. For two devices, use SATA 0 and SATA 1. For three devices, use SATA 0, SATA 1, and SATA 2.
1797-SATA Drivelock is not supported in RAID mode.	Drivelock is enabled on one or more SATA hard drives, and they cannot be accessed while the system is configured for RAID mode.	RAID is not supported on the xw3400 Workstation. Either remove the Drivelocked SATA device or disable the Drivelock feature. To disable the Drivelock feature, enter Computer Setup, change Storage > Storage Options > SATA Emulation to IDE , and select File > Save Changes and Exit . Reenter Computer Setup and select Security > Drivelock . For each listed Drivelock-capable SATA device, ensure Drivelock is Disabled .
1801-Microcode Patch Error	Processor is not supported by ROM BIOS.	<ol style="list-style-type: none">1. Upgrade BIOS to proper version.2. Change the processor.
2200-PMM Allocation Error during MEBx Download	Memory error during POST execution of the Management Engine (ME) BIOS Extensions option ROM	<ol style="list-style-type: none">1. Reboot the workstation.2. Unplug the power cord, re-seat the memory modules, and reboot the workstation.3. If the memory configuration was recently changed, unplug the workstation, restore the original memory configuration, and reboot the workstation.4. If the error persists, replace the system board.
2201-MEBx Module did not checksum correctly	Memory error during POST execution of the Management Engine (ME) BIOS Extensions option ROM	<ol style="list-style-type: none">1. Reboot the workstation.2. Unplug the power cord, re-seat the memory modules, and reboot the workstation.3. If the memory configuration was recently changed, unplug the power cord, restore the original memory configuration, and reboot the workstation.4. If the error persists, replace the system board.

Table C-1 Numeric Codes and Text Messages (continued)

Control panel message	Description	Recommended action
2202-PMM Deallocation Error during MEBx cleanup	Memory error during POST execution of the Management Engine (ME) BIOS Extensions option ROM	<ol style="list-style-type: none">1. Reboot the workstation.2. Unplug the power cord, re-seat the memory modules, and reboot the workstation.3. If the memory configuration was recently changed, unplug the power cord, restore the original memory configuration, and reboot the workstation.4. If the error persists, replace the system board.
2203-Setup error during MEBx execution	MEBx selection or exit resulted in a setup failure.	<ol style="list-style-type: none">1. Reboot the workstation.2. Unplug the power cord, re-seat the memory modules, and reboot the workstation.3. If the memory configuration was recently changed, unplug the power cord, restore the original memory configuration, and reboot the workstation.4. If the error persists, replace the system board.
2204-Inventory error during MEBx execution	BIOS information passed to the MEBx resulted in a failure.	<ol style="list-style-type: none">1. Reboot the workstation.2. If the error persists, update to the latest BIOS version.3. If the error still persists, replace the system board.
2205-Interface error during MEBx execution	MEBx operation experienced a hardware error during communication with ME.	<ol style="list-style-type: none">1. Reboot the workstation.2. If the error persists, update to the latest BIOS version.3. If the error still persists, replace the system board.
Invalid Electronic Serial Number	Electronic serial number has become corrupted.	<ol style="list-style-type: none">1. Run Computer Setup. If Setup already has data in the field or will not allow the serial number to be entered, download from http://www.hp.com and run SP5572.EXE (SNZERO.EXE).2. Run Computer Setup and try to enter serial number under Security, System ID, then save changes.
Network Server Mode Active and No Keyboard Attached	Keyboard failure while Network Server Mode enabled.	<ol style="list-style-type: none">1. Reconnect keyboard with workstation turned off.2. Check connector for bent or missing pins.3. Ensure that none of the keys are depressed.4. Replace keyboard.

Table C-1 Numeric Codes and Text Messages (continued)

Control panel message	Description	Recommended action
Parity Check 2	Parity RAM failure.	Run Computer Setup and Diagnostic utilities.
System will not boot without fan	CPU fan not installed or disconnected in VSFF chassis.	<ol style="list-style-type: none">1. Remove the workstation cover, press the power button, and see if the processor fan spins. If the processor fan is not spinning, make sure the fan's cable is plugged onto the system board header. Ensure the heatsink is properly seated and installed.2. If the fan is plugged in and the heatsink is properly seated but the fan does not spin, then replace the heatsink-fan assembly.

Interpreting POST diagnostic front panel LEDs and audible codes

This section covers the front panel LED codes as well as the audible codes that may occur before or during POST that do not necessarily have an error code or text message associated with them.

⚠ WARNING! When the workstation is plugged into an AC power source, voltage is always applied to the system board. To reduce the risk of personal injury from electrical shock and/or hot surfaces, be sure to disconnect the power cord from the wall outlet and allow the internal system components to cool before touching.

Look for the LED on the system board. If the LED is illuminated, the system still has power. Power off the workstation and remove the power cord before proceeding.

📖 NOTE: If you see flashing LEDs on a PS/2 keyboard, look for flashing LEDs on the front panel of the workstation and refer to the following table to determine the front panel LED codes.

Recommended actions in the following table are listed in the order in which they should be performed.

Not all diagnostic lights and audible codes are available on all models.

Table C-2 Diagnostic Front Panel LEDs and Audible Codes

Activity	Beeps	Possible Cause	Recommended Action
Green Power LED On.	None	Workstation on.	None
Green Power LED flashes every two seconds.	None	Workstation in Suspend to RAM mode (some models only) or normal Suspend mode.	None required. Press any key or move the mouse to wake the workstation.
Red Power LED flashes two times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	2	Processor thermal protection activated: A fan may be blocked or not turning. OR The heatsink/fan assembly is not properly attached to the processor.	<ol style="list-style-type: none"> 1. Ensure that the workstation air vents are not blocked and the processor cooling fan is running. 2. Open hood, press power button, and see if the processor fan spins. If the processor fan is not spinning, make sure the fan's cable is plugged onto the system board header. 3. If fan is plugged in, but is not spinning, then replace heatsink/fan assembly.
Red Power LED flashes three times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	3	Processor not installed (not an indicator of bad processor).	<ol style="list-style-type: none"> 1. Check to see that the processor is present. 2. Reseat the processor.

Table C-2 Diagnostic Front Panel LEDs and Audible Codes (continued)

Activity	Beeps	Possible Cause	Recommended Action
Red Power LED flashes four times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	4	Power failure (power supply is overloaded).	<ol style="list-style-type: none">1. Open the hood and ensure the 4 or 6-wire power supply cable is seated into the connector on the system board.2. Check if a device is causing the problem by removing ALL attached devices (such as hard, diskette, or optical drives, and expansion cards). Power on the system. If the system enters the POST, then power off and replace one device at a time and repeat this procedure until failure occurs. Replace the device that is causing the failure. Continue adding devices one at a time to ensure all devices are functioning properly.3. Replace the power supply.4. Replace the system board.
Red Power LED flashes five times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	5	Pre-video memory error.	<p>CAUTION: To avoid damage to the DIMMs or the system board, you must unplug the workstation power cord before attempting to reseat, install, or remove a DIMM module.</p> <ol style="list-style-type: none">1. Reseat DIMMs.2. Replace DIMMs one at a time to isolate the faulty module.3. Replace third-party memory with HP memory.4. Replace the system board.
Red Power LED flashes six times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	6	Pre-video graphics error.	<p>For systems with a graphics card:</p> <ol style="list-style-type: none">1. Reseat the graphics card.2. Replace the graphics card.3. Replace the system board. <p>For systems with integrated graphics, replace the system board.</p>
Red Power LED flashes seven times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	7	System board failure (ROM detected failure prior to video).	Replace the system board.
Red Power LED flashes eight times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	8	Invalid ROM based on bad checksum.	<ol style="list-style-type: none">1. Reflash the system ROM with the latest BIOS image. See the "Boot Block Emergency Recovery Mode" section 3.4.2. Replace the system board.

Table C-2 Diagnostic Front Panel LEDs and Audible Codes (continued)

Activity	Beeps	Possible Cause	Recommended Action
Red Power LED flashes nine times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	9	System powers on but is unable to boot.	<ol style="list-style-type: none">1. Check that the voltage selector, located on the rear of the power supply (some models), is set to the appropriate voltage. Proper voltage setting depends on your region.2. Replace the system board.3. Replace the processor.
Red Power LED flashes ten times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	10	Bad option card.	<ol style="list-style-type: none">1. Check each option card by removing the card (one at a time if multiple cards), then power on the system to see if fault goes away.2. Once a bad card is identified, remove and replace the bad option card.3. Replace the system board.
System does not power on and LEDs are not flashing.	None	System unable to power on.	<p>Press and hold the power button for less than 4 seconds. If the hard drive LED turns green, the power button is working correctly. Try the following:</p> <ol style="list-style-type: none">1. Check that the voltage selector (some models), located on the rear of the power supply, is set to the appropriate voltage. Proper voltage setting depends on your region.2. Replace the system board. <p>OR</p> <p>Press and hold the power button for less than 4 seconds. If the hard drive LED does not turn on green then:</p> <ol style="list-style-type: none">1. Check that the unit is plugged into a working AC outlet.2. Open hood and check that the power button harness is properly connected to the system board.3. Check that both power supply cables are properly connected to the system board.4. Check to see if the 5V_aux light on the system board is turned on. If it is turned on, then replace the power button harness. If the problem persists, replace the system board.5. If the 5V_aux light on the system board is not turned on, remove the expansion cards one at a time until the 5V_aux light on the system board turns on. If the problem persists, replace the power supply.

D Troubleshooting without diagnostics

This chapter provides information on how to identify and correct minor problems, such as diskette drive, hard drive, optical drive, graphics, audio, memory, and software problems. If you encounter problems with the workstation, refer to the tables in this chapter for probable causes and recommended solutions.

 **NOTE:** For information on specific error messages that may appear on the screen during Power-On Self-Test (POST) at startup, refer to Appendix A, [POST error messages on page 107](#).

Safety and comfort

 **WARNING!** Misuse of the workstation or failure to establish a safe and comfortable work environment may result in discomfort or serious injury. Refer to the *Safety & Comfort Guide* on the *Documentation and Diagnostics CD* and available on the Web site at <http://www.hp.com/ergo> for more information on choosing a workspace and creating a safe and comfortable work environment. This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. For more information, refer to *Safety & Regulatory Information* on the *Documentation and Diagnostics CD*.

Before you call for technical support

If you are having problems with the workstation, try the appropriate solutions below to try to isolate the exact problem before calling for technical support.

- Run the diagnostics utility. Refer to Chapter 1, [HP Insight Diagnostics on page 15](#) for more information.
- Run the Drive Protection System (DPS) Self-Test in Computer Setup. Refer to Section 2.2 for more information.
- Check the Power LED on the front of the workstation to see if it is flashing red. The flashing lights are error codes that will help you diagnose the problem. Refer to Appendix A, [POST error messages on page 107](#) for more information.
- If the screen is blank, plug the monitor into a different video port on the workstation if one is available. Or, change out the monitor with a monitor that you know is functioning properly.
- If you are working on a network, plug another workstation with a different cable into the network connection. There may be a problem with the network plug or cable.
- If you recently added new hardware, remove the hardware and see if the workstation functions properly.
- If you recently installed new software, uninstall the software and see if the workstation functions properly.

- Boot the workstation to the Safe Mode to see if it will boot without all of the drivers loaded. When booting the operating system, use “Last Known Configuration.”
- Refer to the comprehensive online technical support at <http://www.hp.com/support>.
- Refer to the following [Helpful hints on page 120](#) section in this guide.

To assist you in resolving problems online, HP Instant Support Professional Edition provides you with self-solve diagnostics. If you need to contact HP support, use HP Instant Support Professional Edition's online chat feature. Access HP Instant Support Professional Edition at: <http://www.hp.com/go/ispe>.

Access the Business Support Center (BSC) at <http://www.hp.com/go/bizsupport> for the latest online support information, software and drivers, proactive notification, and worldwide community of peers and HP experts.

If it becomes necessary to call for technical assistance, be prepared to do the following to ensure that your service call is handled properly:

- Be in front of your workstation when you call.
- Write down the workstation serial number and product ID number, and the monitor serial number before calling.
- Spend time troubleshooting the problem with the service technician.
- Remove any hardware that was recently added to your system.
- Remove any software that was recently installed.
- Restore the system to a Recovery Point created in HP Backup and Recovery Manager or run the *Restore Plus!* CD. For more information on using HP Backup and Recovery Manager, refer to the *HP Backup and Recovery Manager User Guide* by selecting **Start > HP Backup and Recovery > HP Backup and Recovery Manager Manual**.

△ **CAUTION:** Running the *Restore Plus!* CD will erase all data on the hard drive.

Helpful hints

If you encounter problems with the workstation, monitor, or software, see the following list of general suggestions before taking further action:

- Check that the workstation and monitor are plugged into a working electrical outlet.
- Check to see that the voltage select switch (some models) is set to the appropriate voltage for your region (115V or 230V).
- Check to see that the workstation is turned on and the green power light is on.
- Check to see that the monitor is turned on and the green monitor light is on.
- Check the Power LED on the front of the workstation to see if it is flashing red. The flashing lights are error codes that will help you diagnose the problem. Refer to Appendix A, [POST error messages on page 107](#) for more information.
- Turn up the brightness and contrast controls of the monitor if the monitor is dim.
- Press and hold any key. If the system beeps, then the keyboard should be operating correctly.
- Check all cable connections for loose connections or incorrect connections.

- Wake the workstation by pressing any key on the keyboard or pressing the power button. If the system remains in suspend mode, shut down the workstation by pressing and holding the power button for at least four seconds then press the power button again to restart the workstation. If the system will not shut down, unplug the power cord, wait a few seconds, then plug it in again. The workstation will restart if automatic start on power loss is set in Computer Setup. If it does not restart, press the power button to start the workstation.
 - Reconfigure the workstation after installing a non–plug and play expansion board or other option. See [Solving hardware installation problems on page 143](#) for instructions.
 - Be sure that all the needed device drivers have been installed. For example, if you are using a printer, you need a driver for that model printer.
 - Remove all bootable media (diskette, CD, or USB device) from the system before turning it on.
 - If you have installed an operating system other than the factory-installed operating system, check to be sure that it is supported on the system.
 - If the system has multiple video sources (embedded, PCI, or PCI-Express adapters) installed (embedded video on some models only) and a single monitor, the monitor must be plugged into the monitor connector on the source selected as the primary VGA adapter. During boot, the other monitor connectors are disabled and if the monitor is connected into these ports, the monitor will not function. You can select which source will be the default VGA source in Computer Setup.
-
- △ **CAUTION:** When the workstation is plugged into an AC power source, there is always voltage applied to the system board. You must disconnect the power cord from the power source before opening the workstation to prevent system board or component damage.
-

Solving general problems

You may be able to easily resolve the general problems described in this section. If a problem persists and you are unable to resolve it yourself or if you feel uncomfortable about performing the operation, contact an authorized dealer or reseller.

- ⚠ **WARNING!** When the workstation is plugged into an AC power source, voltage is always applied to the system board. To reduce the risk of personal injury from electrical shock and/or hot surfaces, be sure to disconnect the power cord from the wall outlet and allow the internal system components to cool before touching.

Look for the LED on the system board. If the LED is illuminated, the system still has power. Power off the workstation and remove the power cord before proceeding.

Table D-1 Solving General Problems

Workstation appears locked up and will not turn off when the power button is pressed.

Cause	Solution
Software control of the power switch is not functional.	<ol style="list-style-type: none">1. Press and hold the power button for at least four seconds until the workstation turns off.2. Disconnect the power cord from the electrical outlet.

Workstation will not respond to USB keyboard or mouse.

Cause	Solution
Workstation is in standby mode.	To resume from standby mode, press the power button. CAUTION: When attempting to resume from standby mode, do not hold down the power button for more than four seconds. Otherwise, the workstation will shut down and you will lose any unsaved data.
System has locked up.	Restart workstation.

Workstation date and time display is incorrect.

Cause	Solution
RTC (real-time clock) battery may need to be replaced. NOTE: Connecting the workstation to a live AC outlet prolongs the life of the RTC battery.	First, reset the date and time under Control Panel (Computer Setup can also be used to update the RTC date and time). If the problem persists, replace the RTC battery. See the <i>Hardware Reference Guide</i> on the <i>Documentation and Diagnostics CD</i> for instructions on installing a new battery, or contact an authorized dealer or reseller for RTC battery replacement.

Cursor will not move using the arrow keys on the keypad.

Cause	Solution
The Num Lock key may be on.	Press the Num Lock key. The Num Lock light should not be on if you want to use the arrow keys. The Num Lock key can be disabled (or enabled) in Computer Setup.

Table D-1 Solving General Problems (continued)**There is no sound or sound volume is too low.**

Cause	Solution
System volume may be set low or muted.	<ol style="list-style-type: none"> 1. Check the F10 BIOS settings to make sure the internal system speaker is not muted (this setting does not affect the external speakers). 2. Make sure the external speakers are properly connected and powered on and that the speakers' volume control is set correctly. 3. Use the system volume control available in the operating system to make sure the speakers are not muted or to increase the volume.
The audio device may be connected to the wrong jack on the rear of the workstation or the jack has been retasked to perform a different function.	Ensure that the device is connected to the correct jack on the rear of the workstation. If the correct jack is being used and the problem persists, the jack may have been retasked to perform a function that is different from the default function. Open the Realtek control panel by clicking the Realtek HD Audio Manager icon in the task tray or the Realtek entry in the operating system's Control Panel and set the jack to the desired function.

Poor performance is experienced.

Cause	Solution
Processor is hot.	<ol style="list-style-type: none"> 1. Make sure airflow to the workstation is not blocked. Leave a 10.2-cm (4-inch) clearance on all vented sides of the workstation and above the monitor to permit the required airflow. 2. Make sure fans are connected and working properly (some fans only operate when needed). 3. Make sure the processor heatsink is installed properly.
Hard drive is full.	Transfer data from the hard drive to create more space on the hard drive.
Low on memory.	Add more memory.
Hard drive fragmented.	Defragment hard drive.
Program previously accessed did not release reserved memory back to the system.	Restart the workstation.
Virus resident on the hard drive.	Run virus protection program.
Too many applications running.	<ol style="list-style-type: none"> 1. Close unnecessary applications to free up memory. Some applications run in the background and can be closed by right-clicking on their corresponding icons in the task tray. To prevent these applications from launching at startup, go to Start > Run and type <code>msconfig</code>. On the Startup tab of the System Configuration Utility, uncheck applications that you do not want to launch automatically. CAUTION: Do not prevent applications from launching at startup that are required for proper system operation. 2. Add more memory.

Table D-1 Solving General Problems (continued)

Poor performance is experienced.

Cause	Solution
Some software applications, especially games, are stressful on the graphics subsystem	<ol style="list-style-type: none">1. Lower the display resolution for the current application or consult the documentation that came with the application for suggestions on how to improve performance by adjusting parameters in the application.2. Add more memory.3. Upgrade the graphics solution.
Cause unknown.	Restart the workstation.

Workstation powered off automatically and the Power LED flashes Red two times, once every second, followed by a two second pause, and the workstation beeps two times. (Beeps stop after fifth iteration but LEDs continue flashing).

Cause	Solution
Processor thermal protection activated: A fan may be blocked or not turning. OR The heatsink is not properly attached to the processor.	<ol style="list-style-type: none">1. Ensure that the workstation air vents are not blocked and the processor cooling fan is running.2. Open hood, press power button, and see if the processor fan spins. If the processor fan is not spinning, make sure the fan's cable is plugged onto the system board header.3. If fan is plugged in, but is not spinning, then replace the heatsink/fan assembly.

System does not power on and the LEDs on the front of the workstation are not flashing.

Cause	Solution
System unable to power on.	<p>Press and hold the power button for less than 4 seconds. If the hard drive LED turns green, then:</p> <ol style="list-style-type: none">1. Check that the voltage selector, located on the rear of the power supply on some models, is set to the appropriate voltage. Proper voltage setting depends on your region.2. Remove the expansion cards one at a time until the 5V_aux light on the system board turns on.3. Replace the system board. <p>OR</p> <p>Press and hold the power button for less than 4 seconds. If the hard drive LED does not turn on green then:</p> <ol style="list-style-type: none">1. Check that the unit is plugged into a working AC outlet.2. Open hood and check that the power button harness is properly connected to the system board.3. Check that both power supply cables are properly connected to the system board.

Table D-1 Solving General Problems (continued)

System does not power on and the LEDs on the front of the workstation are not flashing.

Cause	Solution
	<ol style="list-style-type: none"><li data-bbox="879 275 1465 352">4. Check to see if the 5V_aux light on the system board is turned on. If it is turned on, then replace the power button harness.<li data-bbox="879 380 1465 432">5. If the 5V_aux light on the system board is off, then replace the power supply.<li data-bbox="879 459 1171 478">6. Replace the system board.

Solving power problems

Common causes and solutions for power problems are listed in the following table.

Table D-2 Solving Power Problems

Power supply shuts down intermittently.

Cause	Solution
Voltage selector switch on rear of workstation chassis (some models) not switched to correct line voltage (115V or 230V).	Select the proper AC voltage using the selector switch.
Power supply will not turn on because of internal power supply fault.	Replace the power supply.

Workstation powered off automatically and the Power LED flashes Red two times, once every second, followed by a two second pause, and the workstation beeps two times. (Beeps stop after fifth iteration but LEDs continue flashing.)

Cause	Solution
Processor thermal protection activated: A fan may be blocked or not turning. OR The heatsink is not properly attached to the processor.	<ol style="list-style-type: none"> 1. Ensure that the workstation air vents are not blocked and the processor cooling fan is running. 2. Open hood, press power button, and see if the processor fan spins. If the processor fan is not spinning, make sure the fan's cable is plugged onto the system board header. 3. If fan is plugged in, but is not spinning, then replace the heatsink/fan assembly.

Power LED flashes Red four times, once every second, followed by a two second pause, and the workstation beeps four times. (Beeps stop after fifth iteration but LEDs continue flashing.)

Cause	Solution
Power failure (power supply is overloaded).	<ol style="list-style-type: none"> 1. Check that the voltage selector, located on the rear of the power supply (some models), is set to the appropriate voltage. Proper voltage setting depends on your region. 2. Open the hood and ensure the 4- or 6-wire power supply cable is seated into the connector on the system board. 3. Check if a device is causing the problem by removing ALL attached devices (such as hard, diskette, or optical drives, and expansion cards). Power on the system. If the system enters the POST, then power off and replace one device at a time and repeat this procedure until failure occurs. Replace the device that is causing the failure. Continue adding devices one at a time to ensure all devices are functioning properly. 4. Replace the power supply. 5. Replace the system board.

Solving diskette problems

Common causes and solutions for diskette problems are listed in the following table.

 **NOTE:** You may need to reconfigure the workstation when you add or remove hardware, such as an additional diskette drive. See [Solving hardware installation problems on page 143](#) for instructions.

Table D-3 Solving Diskette Problems

Cause	Solution
Diskette drive light stays on.	
Diskette is damaged.	In Microsoft Windows XP, right-click Start , click Explore , and select a drive. Select File > Properties > Tools . Under Error-checking click Check Now .
Diskette is incorrectly inserted.	Remove diskette and reinsert.
Drive cable is not properly connected.	Reconnect drive cable. Ensure that all four pins on the diskette power cable are connected to the drive.
Drive not found.	
Cable is loose.	Reseat diskette drive data and power cables.
Removable drive is not seated properly.	Reseat the drive.
Diskette drive cannot write to a diskette.	
Diskette is not formatted.	Format the diskette. <ol style="list-style-type: none">1. From Windows Explorer select the disk (A) drive.2. Right-click the drive letter and select Format.3. Select the desired options, and click Start to begin formatting the diskette.
Diskette is write-protected.	Use another diskette or remove the write protection.
Writing to the wrong drive.	Check the drive letter in the path statement.
Not enough space is left on the diskette.	<ol style="list-style-type: none">1. Use another diskette.2. Delete unneeded files from diskette.
Legacy diskette writes are disabled in Computer Setup.	Enter Computer Setup and enable Legacy Diskette Write in Storage > Storage Options .
Diskette is damaged.	Replace the damaged disk.

Table D-3 Solving Diskette Problems (continued)**Cannot format diskette.**

Cause	Solution
Invalid media reported.	When formatting a disk in MS-DOS, you may need to specify diskette capacity. For example, to format a 1.44-MB diskette, type the following command at the MS-DOS prompt: FORMAT A: /F:1440
Disk may be write-protected.	Open the locking device on the diskette.
Legacy diskette writes are disabled in Computer Setup.	Enter Computer Setup and enable Legacy Diskette Write in Storage > Storage Options .

A problem has occurred with a disk transaction.

Cause	Solution
The directory structure is bad, or there is a problem with a file.	In Windows XP, right-click Start , click Explore , and select a drive. Select File > Properties > Tools . Under Error-checking , click Check Now .

Diskette drive cannot read a diskette.

Cause	Solution
You are using the wrong diskette type for the drive type.	Check the type of drive that you are using and use the correct diskette type.
You are reading the wrong drive.	Check the drive letter in the path statement.
Diskette is damaged.	Replace the diskette with a new one.

"Invalid system disk" message is displayed.

Cause	Solution
A diskette that does not contain the system files needed to start the workstation has been inserted in the drive.	When drive activity stops, remove the diskette and press the Spacebar . The workstation should start up.
Diskette error has occurred.	Restart the workstation by pressing the power button.

Cannot Boot to Diskette.

Cause	Solution
Diskette is not bootable.	Replace with a bootable diskette.
Diskette boot has been disabled in Computer Setup.	<ol style="list-style-type: none"> 1. Run Computer Setup and enable diskette boot in Storage > Boot Order. 2. Run Computer Setup and enable diskette boot in Storage > Storage Options > Removable Media Boot.

Table D-3 Solving Diskette Problems (continued)

Cannot Boot to Diskette.

Cause	Solution
Network server mode is enabled in Computer Setup.	<p>NOTE: Both steps should be used as the Removable Media Boot function in Computer Setup overrides the Boot Order enable command.</p> <p>Run Computer Setup and disable Network Server Mode in Security > Password Options.</p>

Solving hard drive problems

Table D-4 Solving Hard Drive Problems

Hard drive error occurs.

Cause	Solution
Hard disk has bad sectors or has failed.	<ol style="list-style-type: none">1. In Windows XP, right-click Start, click Explore, and select a drive. Select File > Properties > Tools. Under Error-checking, click Check Now.2. Use a utility to locate and block usage of bad sectors. If necessary, reformat the hard disk.

Disk transaction problem.

Cause	Solution
Either the directory structure is bad or there is a problem with a file.	In Windows XP, right-click Start , click Explore , and select a drive. Select File > Properties > Tools . Under Error-checking , click Check Now .

Drive not found (identified).

Cause	Solution
Cable could be loose.	Check cable connections.
The system may not have automatically recognized a newly installed device.	See reconfiguration directions in the Solving hardware installation problems on page 143 section. If the system still does not recognize the new device, check to see if the device is listed within Computer Setup. If it is listed, the probable cause is a driver problem. If it is not listed, the probable cause is a hardware problem. If this is a newly installed drive, run the Computer Setup utility and try adding a POST delay under Advanced > Power-On Options .
The device is attached to a SATA port that has been disabled in Computer Setup.	Run the Computer Setup utility and ensure the device's SATA port is enabled in Storage > Storage Options .
Drive responds slowly immediately after power-up.	Run Computer Setup and increase the POST Delay in Advanced > Power-On Options .

Nonsystem disk/NTLDR missing message.

Cause	Solution
The system is trying to start from a diskette that is not bootable.	Remove the diskette from the diskette drive.
The system is trying to start from the hard drive but the hard drive may have been damaged.	<ol style="list-style-type: none">1. Insert a bootable diskette into the diskette drive and restart the workstation.2. Check the hard drive format using fdisk: If NTFS formatting, use a third party reader to evaluate the drive. If FAT32 formatting, the hard drive cannot be accessed.

Table D-4 Solving Hard Drive Problems (continued)**Nonsystem disk/NTLDR missing message.**

Cause	Solution
System files missing or not properly installed.	<ol style="list-style-type: none"> 1. Insert a bootable diskette into the diskette drive and restart the workstation. 2. Check the hard drive format using Fdisk: If NTFS formatting, use a third party reader to evaluate the drive. If FAT32 formatting, the hard drive cannot be accessed. 3. Install system files for the appropriate operating system. 4. Restore the system to a recovery point in HP Backup and Recovery Manager. Refer to the <i>HP Backup and Recovery Manager User Guide</i> in the Windows Start menu for more information.
Hard drive boot has been disabled in Computer Setup.	Run the Computer Setup utility and enable the hard drive entry in the Storage > Boot Order list.
Bootable hard drive is not attached as first in a multi-hard drive configuration.	If attempting to boot from a hard drive, ensure it is attached to the system board connector labeled P60 SATA 0.
Bootable hard drive's controller is not listed first in the Boot Order.	Run the Computer Setup utility and select Storage > Boot Order and ensure the bootable hard drive's controller is listed immediately under the Hard Drive entry.

Workstation will not boot from hard drive.

Cause	Solution
The device is attached to a SATA port that has been disabled in Computer Setup.	Run the Computer Setup utility and ensure the device's SATA port is enabled in Storage > Storage Options .
Boot order is not correct.	Run the Computer Setup utility and change boot sequence in Storage > Boot Order .
Hard Drive's "Emulation Type" is set to "None."	Run the Computer Setup utility and change the "Emulation Type" to "Hard Disk" in the device's details under Storage > Device Configuration .
The device is attached to a SATA port that has been disabled in Computer Setup.	Run the Computer Setup utility and ensure the device's SATA port is enabled in Storage > Storage Options .
Hard drive is damaged.	<p>Observe if the front panel Power LED is blinking RED and if any beeps are heard. See Appendix A, POST error messages on page 107 to determine possible causes for the blinking red and beep codes.</p> <p>See the Worldwide Limited Warranty for terms and conditions.</p>

Workstation seems to be locked up.

Cause	Solution
Program in use has stopped responding to commands.	Attempt the normal Windows "Shut Down" procedure. If this fails, press the power button for four or more seconds to turn off the power. To restart the workstation, press the power button again.

Solving media card reader problems

Table D-5 Solving Media Card Reader Problems

Media card will not work in a digital camera after formatting it in Microsoft Windows XP.

Cause	Solution
By default, Windows XP will format any media card with a capacity greater than 32MB with the FAT32 format. Most digital cameras use the FAT (FAT16 & FAT12) format and can not operate with a FAT32 formatted card.	Either format the media card in the digital camera or select FAT file system to format the media card in a workstation with Windows XP.

A write-protected or locked error occurs when attempting to write to the media card.

Cause	Solution
Media card is locked. Locking the media card is a safety feature that prevents writing to and deleting from an SD/Memory Stick/PRO card.	If using an SD card, make sure that the lock tab located on the right of the SD card is not in the locked position. If using a Memory Stick/PRO card, make sure that the lock tab located on the bottom of the Memory Stick/PRO card is not in the locked position.

Can not write to the media card.

Cause	Solution
The media card is a read-only memory (ROM) card.	Check the manufacturer's documentation included with your card to see if it is writable.

Unable to access data on the media card after inserting it into a slot.

Cause	Solution
The media card is not inserted properly, is inserted in the wrong slot, or is not supported.	Ensure that the card is inserted properly with the gold contact on the correct side. The green LED will light if inserted properly.

Do not know how to remove a media card correctly.

Cause	Solution
The workstation's software is used to safely eject the card.	Open My Computer , right-click on the corresponding drive icon, and select Eject . Then pull the card out of the slot. NOTE: Never remove the card when the green LED is flashing.

Table D-5 Solving Media Card Reader Problems (continued)

After installing the media card reader and booting to Windows, the reader and the inserted cards are not recognized by the workstation.

Cause	Solution
The operating system needs time to recognize the device if the reader was just installed into the workstation and you are turning the workstation on for the first time.	Wait a few seconds so that the operating system can recognize the reader and the available ports, and then recognize whatever media is inserted in the reader.

After inserting a media card in the reader, the workstation attempts to boot from the media card.

Cause	Solution
The inserted media card has boot capability.	If you do not want to boot from the media card, remove it during boot or do not select the option to boot from the inserted media card during the boot process.

Workstation will not boot from a USB removable drive or media that is inserted in the USB port on the media card reader.

Cause	Solution
The media card reader is connected to the workstation via the PCI card, which is not supported on the HP Desktop BIOS.	The bootable USB device will have boot support if you connect the media card reader to an available USB connector on the workstation's system board. If no connector is available, plug the bootable device into a different USB port on the workstation.

After installing the media card reader, the front USB ports on the workstation do not work.

Cause	Solution
The USB cable for the front USB ports was disconnected so that the system board connector could be used for the reader.	Reconnect the cable for the front USB ports. Install the PCI card and connect the media reader to the USB connector on the PCI card.

Solving display problems

If you encounter display problems, see the documentation that came with the monitor and to the common causes and solutions listed in the following table.

Table D-6 Solving Display Problems

Blank screen (no video).

Cause	Solution
Monitor is not turned on and the monitor light is not on.	Turn on the monitor and check that the monitor light is on.
Bad monitor.	Try a different monitor.
The cable connections are not correct.	Check the cable connection from the monitor to the workstation and to the electrical outlet.
You may have a screen blanking utility installed or energy saver features are enabled.	Press any key or click the mouse button and, if set, type your password.
System ROM is corrupted; system is running in Boot Block Emergency Recovery Mode (indicated by eight beeps).	Reflash the system ROM with the latest BIOS image. See the "Boot Block Emergency Recovery Mode" section of the <i>Desktop Management Guide</i> on the <i>Documentation and Diagnostics CD</i> for more information.
You are using a fixed-sync monitor and it will not sync at the resolution chosen.	Be sure that the monitor can accept the same horizontal scan rate as the resolution chosen.
Workstation is in standby mode.	Press the power button to resume from standby mode. CAUTION: When attempting to resume from standby mode, do not hold down the power button for more than four seconds. Otherwise, the workstation will shut down and you will lose any unsaved data.
Monitor cable is plugged into the wrong connector.	Ensure that the monitor is plugged into an active connector on the rear of the workstation. If another connector is available, connect the monitor to that connector and reboot the system.
Monitor settings in the workstation are not compatible with the monitor.	<ol style="list-style-type: none"> Restart the workstation and press F8 during startup when you see "Press F8" in the bottom right corner of the screen. Using the keyboard arrow keys, select Enable VGA Mode and press Enter. In Windows Control Panel, double-click the Display icon and select the Settings tab. Use the sliding control to reset the resolution.

Cannot enable integrated graphics after installing a PCI Express graphics card.

Cause	Solution
On systems with ATI integrated graphics, the integrated graphics can be enabled in Computer Setup only if an ATI PCI Express graphics card is installed.	On systems with ATI integrated graphics, install an ATI PCI Express graphics card and enable the integrated graphics in Computer Setup.

Table D-6 Solving Display Problems (continued)

Blank screen and the power LED flashes Red five times, once every second, followed by a two second pause, and the workstation beeps five times. (Beeps stop after fifth iteration but LEDs continue flashing.)

Cause	Solution
Pre-video memory error.	<ol style="list-style-type: none">1. Reseat DIMMs. Power on the system.2. Replace DIMMs one at a time to isolate the faulty module.3. Replace third-party memory with HP memory.4. Replace the system board.

Blank screen and the power LED flashes Red six times, once every second, followed by a two second pause, and the workstation beeps six times. (Beeps stop after fifth iteration but LEDs continue flashing.)

Cause	Solution
Pre-video graphics error.	<p>For systems with a graphics card:</p> <ol style="list-style-type: none">1. Reseat the graphics card. Power on the system.2. Replace the graphics card.3. Replace the system board. <p>For systems with integrated graphics, replace the system board.</p>

Blank screen and the power LED flashes Red seven times, once every second, followed by a two second pause, and the workstation beeps seven times. (Beeps stop after fifth iteration but LEDs continue flashing.)

Cause	Solution
System board failure (ROM detected failure prior to video).	Replace the system board.

Monitor does not function properly when used with energy saver features.

Cause	Solution
Monitor without energy saver capabilities is being used with energy saver features enabled.	Disable monitor energy saver feature.

Dim characters.

Cause	Solution
The brightness and contrast controls are not set properly.	Adjust the monitor brightness and contrast controls.
Cables are not properly connected.	Check that the graphics cable is securely connected to the graphics card and the monitor.

Table D-6 Solving Display Problems (continued)

Blurry video or requested resolution cannot be set.

Cause	Solution
If the graphics controller was upgraded, the correct graphics drivers may not be loaded.	Install the video drivers included in the upgrade kit.
Monitor is not capable of displaying requested resolution.	Change requested resolution.
Graphics card is bad.	Replace the graphics card.

The picture is broken up, rolls, jitters, or flashes.

Cause	Solution
The monitor connections may be incomplete or the monitor may be incorrectly adjusted.	<ol style="list-style-type: none">1. Be sure the monitor cable is securely connected to the workstation.2. In a two-monitor system or if another monitor is in close proximity, be sure the monitors are not interfering with each other's electromagnetic field by moving them apart.3. Fluorescent lights or fans may be too close to the monitor.
Monitor needs to be degaussed.	Degauss the monitor. Refer to the documentation that came with the monitor for instructions.

Image is not centered.

Cause	Solution
Position may need adjustment.	Press the Menu button to access the OSD menu. Select ImageControl/ Horizontal Position or Vertical Position to adjust the horizontal or vertical position of the image.

"No Connection, Check Signal Cable" displays on screen.

Cause	Solution
Monitor video cable is disconnected.	Connect the video cable between the monitor and workstation. CAUTION: Ensure that the workstation power is off while connecting the video cable.

"Out of Range" displays on screen.

Cause	Solution
Video resolution and refresh rate are set higher than what the monitor supports.	Restart the workstation and enter Safe Mode. Change the settings to a supported setting then restart the workstation so that the new settings take effect.

Table D-6 Solving Display Problems (continued)

Vibrating or rattling noise coming from inside a CRT monitor when powered on.

Cause	Solution
Monitor degaussing coil has been activated.	None. It is normal for the degaussing coil to be activated when the monitor is powered on.

Clicking noise coming from inside a CRT monitor.

Cause	Solution
Electronic relays have been activated inside the monitor.	None. It is normal for some monitors to make a clicking noise when turned on and off, when going in and out of standby mode, and when changing resolutions.

High pitched noise coming from inside a flat panel monitor.

Cause	Solution
Brightness and/or contrast settings are too high.	Lower brightness and/or contrast settings.

Fuzzy focus; streaking, ghosting, or shadowing effects; horizontal scrolling lines; faint vertical bars; or unable to center the picture on the screen (flat panel monitors using an analog VGA input connection only).

Cause	Solution
Flat panel monitor's internal digital conversion circuits may be unable to correctly interpret the output synchronization of the graphics card.	<ol style="list-style-type: none">1. Select the monitor's Auto-Adjustment option in the monitor's on-screen display menu.2. Manually synchronize the Clock and Clock Phase on-screen display functions. To download a SoftPak that will assist you with the synchronization, go to the following Web site, select the appropriate monitor, and download either SP32347 or SP32202: http://www.hp.com/support
Graphics card is not seated properly or is bad.	<ol style="list-style-type: none">1. Reseat the graphics card.2. Replace the graphics card.

Certain typed symbols do not appear correct.

Cause	Solution
The font you are using does not support that particular symbol.	Use the Character Map to locate and select the appropriate symbol. Click Start > All Programs > Accessories > System Tools > Character Map . You can copy the symbol from the Character Map into a document.

Solving audio problems

If the workstation has audio features and you encounter audio problems, see the common causes and solutions listed in the following table.

Table D-7 Solving Audio Problems

Sound cuts in and out.

Cause	Solution
Processor resources are being used by other open applications.	Shut down all open processor-intensive applications.
Direct sound latency, common in many media player applications.	In Windows XP: <ol style="list-style-type: none">1. From the Control Panel, select Sounds and Audio Devices.2. On the Audio tab, select a device from the Sound Playback list.3. Click the Advanced button and select the Performance tab.4. Set the Hardware acceleration slider to None and the Sample rate conversion quality slider to Good and retest the audio.5. Set the Hardware acceleration slider to Full and the Sample rate conversion quality slider to Best and retest the audio.

Sound does not come out of the speaker or headphones.

Cause	Solution
Software volume control is turned down.	Double-click the Speaker icon on the taskbar, then make sure that Mute is not selected and use the volume slider to adjust the volume.
Audio is hidden in Computer Setup.	Enable the audio in Computer Setup: Security > Device Security > Audio .
The external speakers are not turned on.	Turn on the external speakers.
The audio device may be connected to the wrong jack on the rear of the workstation or the jack has been retasked to perform a different function.	Ensure that the device is connected to the correct jack on the rear of the workstation. If the correct jack is being used and the problem persists, the jack may have been retasked to perform a function that is different from the default function. Open the Realtek control panel by clicking the Realtek HD Audio Manager icon in the task tray or the Realtek entry in the operating system's Control Panel and set the jack to the desired function.
External speakers plugged into the wrong audio jack on a recently installed sound card.	See the sound card documentation for proper speaker connection.
Digital CD audio is not enabled.	Enable digital CD audio: <ol style="list-style-type: none">1. From the Control Panel, select System.2. On the Hardware tab, click the Device Manager button.

Table D-7 Solving Audio Problems (continued)

Sound does not come out of the speaker or headphones.

Cause	Solution
	<ol style="list-style-type: none">3. Right-click on the CD/DVD device and select Properties.4. On the Properties tab, make sure Enable digital CD audio for this CD-ROM device is checked.
Headphones or devices connected to the line-out connector mute the internal speaker.	Turn on and use headphones or external speakers, if connected, or disconnect headphones or external speakers.
Volume is muted.	<ol style="list-style-type: none">1. From the Control Panel program, click Sound, Speech and Audio Devices, then click Sounds and Audio Devices.2. Click the Mute check box to remove the check mark from the box.
Workstation is in standby mode.	Press the power button to resume from standby mode. CAUTION: When attempting to resume from standby mode, do not hold down the power button for more than four seconds. Otherwise, the workstation will shut down and you will lose any unsaved data.

Sound from headphones is not clear or muffled.

Cause	Solution
Headphones are plugged into the rear audio output connector. The rear audio output connector is for powered audio devices and is not designed for headphone use.	Plug the headphones into the headphone connector on the front of the workstation.

Workstation appears to be locked up while recording audio.

Cause	Solution
The hard disk may be full.	Before recording, make sure there is enough free space on the hard disk. You can also try recording the audio file in a compressed format.

Line-in, Line-out, headphone, or microphone jacks are not functioning properly.

Cause	Solution
Jacks have been reconfigured in the audio driver or application software.	In the audio driver or application software, reconfigure the jacks or set the jacks to their default values.

Solving printer problems

If you encounter printer problems, see the documentation that came with the printer and to the common causes and solutions listed in the following table.

Table D-8 Solving Printer Problems

Printer will not print.

Cause	Solution
Printer is not turned on and online.	Turn the printer on and make sure it is online.
The correct printer drivers for the application are not installed.	<ol style="list-style-type: none">1. Install the correct printer driver for the application.2. Try printing using the MS-DOS command: <pre>DIR C:\ > LPT1</pre>If the printer works, reload the printer driver.
If you are on a network, you may not have made the connection to the printer.	Make the proper network connections to the printer.
Printer may have failed.	Run printer self-test.

Printer will not turn on.

Cause	Solution
The cables may not be connected properly.	Reconnect all cables and check the power cord and electrical outlet.

Printer prints garbled information.

Cause	Solution
The correct printer driver for the application is not installed.	Install the correct printer driver for the application.
The cables may not be connected properly.	Reconnect all cables.
Printer memory may be overloaded.	Reset the printer by turning it off for one minute, then turn it back on.

Printer is offline.

Cause	Solution
The printer may be out of paper.	Check the paper tray and refill it if it is empty. Select online.

Solving keyboard and mouse problems

If you encounter keyboard or mouse problems, see the documentation that came with the equipment and to the common causes and solutions listed in the following table.

Table D-9 Solving Keyboard Problems

Keyboard commands and typing are not recognized by the workstation.

Cause	Solution
Keyboard connector is not properly connected.	<ol style="list-style-type: none">1. On the Windows Desktop, click Start.2. Click Shut Down. The Shut Down Windows dialog box is displayed.3. Select Shut down.4. After the shutdown is complete, reconnect the keyboard to the back of the workstation and restart the workstation.
Program in use has stopped responding to commands.	Shut down your workstation using the mouse and then restart the workstation.
Keyboard needs repairs.	See the Worldwide Limited Warranty for terms and conditions.
Wireless device error.	<ol style="list-style-type: none">1. Check the software, if available, for device status.2. Check/replace device batteries.3. Reset receiver and keyboard.
Workstation is in standby mode.	Press the power button to resume from standby mode. CAUTION: When attempting to resume from standby mode, do not hold down the power button for more than four seconds. Otherwise, the workstation will shut down and you will lose any unsaved data.

Cursor will not move using the arrow keys on the keypad.

Cause	Solution
The Num Lock key may be on.	Press the Num Lock key. The Num Lock light should not be on if you want to use the arrow keys. The Num Lock key can be disabled (or enabled) in Computer Setup.

Table D-10 Solving Mouse Problems

Mouse does not respond to movement or is too slow.

Cause	Solution
Mouse connector is not properly plugged into the back of the workstation.	Shut down the workstation using the keyboard. <ol style="list-style-type: none">1. Press the Ctrl and Esc keys at the same time (or press the Windows logo key) to display the Start menu.2. Use the up or down arrow key to select Shut Down and then press the Enter key.

Table D-10 Solving Mouse Problems (continued)

Mouse does not respond to movement or is too slow.

Cause	Solution
	<ol style="list-style-type: none">Use the up or down arrow key to select the Shut Down option and then press the Enter key.After the shutdown is complete, plug the mouse connector into the back of the workstation (or the keyboard) and restart.
Program in use has stopped responding to commands.	Shut down the workstation using the keyboard then restart the workstation.
Mouse may need cleaning.	Remove the roller ball cover on the mouse and clean the internal components.
Mouse may need repair.	See the Worldwide Limited Warranty for terms and conditions.
Wireless device error.	<ol style="list-style-type: none">Check the software, if available, for device status.Check/replace device batteries.Reset receiver and mouse.
Workstation is in standby mode.	Press the power button to resume from standby mode. CAUTION: When attempting to resume from standby mode, do not hold down the power button for more than four seconds. Otherwise, the workstation will shut down and you will lose any unsaved data.

Mouse will only move vertically, horizontally, or movement is jerky.

Cause	Solution
Mouse roller ball or the rotating encoder shafts that make contact with the ball are dirty.	Remove roller ball cover from the bottom of the mouse and clean the internal components with a mouse cleaning kit available from most workstation stores.

Solving hardware installation problems

You may need to reconfigure the workstation when you add or remove hardware, such as an additional drive or expansion card. If you install a plug and play device, Windows XP automatically recognizes the device and configures the workstation. If you install a non-plug and play device, you must reconfigure the workstation after completing installation of the new hardware. In Windows XP, use the **Add Hardware Wizard** and follow the instructions that appear on the screen.

⚠ **WARNING!** When the workstation is plugged into an AC power source, voltage is always applied to the system board. To reduce the risk of personal injury from electrical shock and/or hot surfaces, be sure to disconnect the power cord from the wall outlet and allow the internal system components to cool before touching.

Look for the LED on the system board. If the LED is illuminated, the system still has power. Power off the workstation and remove the power cord before proceeding.

Table D-11 Solving Hardware Installation Problems

A new device is not recognized as part of the system.

Cause	Solution
Device is not seated or connected properly.	Ensure that the device is properly and securely connected and that pins in the connector are not bent down.
Cable(s) of new external device are loose or power cables are unplugged.	Ensure that all cables are properly and securely connected and that pins in the cable or connector are not bent down.
Power switch of new external device is not turned on.	Turn off the workstation, turn on the external device, then turn on the workstation to integrate the device with the workstation system.
When the system advised you of changes to the configuration, you did not accept them.	Reboot the workstation and follow the instructions for accepting the changes.
A plug and play board may not automatically configure when added if the default configuration conflicts with other devices.	Use Windows XP Device Manager to deselect the automatic settings for the board and choose a basic configuration that does not cause a resource conflict. You can also use Computer Setup to reconfigure or disable devices to resolve the resource conflict.
USB ports on the workstation are disabled in Computer Setup.	Enter Computer Setup (F10) and enable the USB ports.

Workstation will not start.

Cause	Solution
Wrong memory modules were used in the upgrade or memory modules were installed in the wrong location.	<ol style="list-style-type: none">1. Review the documentation that came with the system to determine if you are using the correct memory modules and to verify the proper installation.2. Observe the beeps and LED lights on the front of the workstation. Beeps and flashing LEDs are codes for specific problems.3. If you still cannot resolve the issue, contact Customer Support.

Table D-11 Solving Hardware Installation Problems (continued)

Power LED flashes Red five times, once every second, followed by a two second pause, and the workstation beeps five times. (Beeps stop after fifth iteration but LEDs continue flashing.)

Cause	Solution
Memory is installed incorrectly or is bad.	<p>CAUTION: To avoid damage to the DIMMs or the system board, you must unplug the workstation power cord before attempting to reseat, install, or remove a DIMM module.</p> <ol style="list-style-type: none">1. Reseat DIMMs. Power on the system.2. Replace DIMMs one at a time to isolate the faulty module.3. Replace third-party memory with HP memory.4. Replace the system board.

Power LED flashes Red six times, once every second, followed by a two second pause, and the workstation beeps six times. (Beeps stop after fifth iteration but LEDs continue flashing.)

Cause	Solution
Graphics card is not seated properly or is bad, or system board is bad.	<p>For systems with a graphics card:</p> <ol style="list-style-type: none">1. Reseat the graphics card. Power on the system.2. Replace the graphics card.3. Replace the system board. <p>For systems with integrated graphics, replace the system board.</p>

Power LED flashes Red ten times, once every second, followed by a two second pause, and the workstation beeps ten times. (Beeps stop after fifth iteration but LEDs continue flashing.)

Cause	Solution
Bad option card.	<ol style="list-style-type: none">1. Check each option card by removing the cards one at time (if multiple cards), then power on the system to see if fault goes away.2. Once bad card is identified, remove and replace bad option card.3. Replace the system board.

Solving network problems

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

Table D-12 Solving Network Problems

Wake-on-LAN feature is not functioning.

Cause	Solution
Wake-on-LAN is not enabled.	Enable Wake-on-LAN.
NOTE: Some NICs come with their own configuration applets that allow for more detailed control and configuration of wake features. Refer to the documentation included with the NIC for more information.	<ol style="list-style-type: none">1. Select Start > Control Panel.2. Double-click Network Connections.3. Double-click Local Area Connection.4. Click Properties.5. Click Configure.6. Click the Power Management tab, then select the check box to Allow this device to bring the workstation out of standby.

Network driver does not detect network controller.

Cause	Solution
Network controller is disabled.	<ol style="list-style-type: none">1. Run Computer Setup and enable network controller.2. Enable the network controller in the operating system via Device Manager.
Incorrect network driver.	Check the network controller documentation for the correct driver or obtain the latest driver from the manufacturer's Web site.

Network status link light never flashes.

NOTE: The network status light is supposed to flash when there is network activity.

Cause	Solution
No active network is detected.	Check cabling and network equipment for proper connection.
Network controller is not set up properly.	Check for the device status within Windows, such as Device Manager for driver load and the Network Connections applet within Windows for link status.
Network controller is disabled.	<ol style="list-style-type: none">1. Run Computer Setup and enable network controller.2. Enable the network controller in the operating system via Device Manager.

Table D-12 Solving Network Problems (continued)

Network status link light never flashes.

NOTE: The network status light is supposed to flash when there is network activity.

Cause	Solution
Network driver is not properly loaded.	Reinstall network drivers. See the <i>Network & Internet Communications Guide</i> on the <i>Documentation and Diagnostics CD</i> .
System cannot autosense the network.	Disable auto-sensing capabilities and force the system into the correct operating mode. See the <i>Network & Internet Communications Guide</i> on the <i>Documentation and Diagnostics CD</i> .

Diagnostics reports a failure.

Cause	Solution
The cable is not securely connected.	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.
The cable is attached to the incorrect connector.	Ensure that the cable is attached to the correct connector.
There is a problem with the cable or a device at the other end of the cable.	Ensure that the cable and device at the other end are operating correctly.
Network controller interrupt is shared with an expansion board.	Under the Computer Setup Advanced menu, change the resource settings for the board.
The network controller is defective.	Replace the network controller.

Diagnostics passes, but the workstation does not communicate with the network.

Cause	Solution
Network drivers are not loaded, or driver parameters do not match current configuration.	Make sure the network drivers are loaded and that the driver parameters match the configuration of the network controller. Make sure the correct network client and protocol is installed.
The network controller is not configured for this workstation.	Select the Network icon in the Control Panel and configure the network controller.

Network controller stopped working when an expansion board was added to the workstation.

Cause	Solution
Network controller interrupt is shared with an expansion board.	Under the Computer Setup Advanced menu, change the resource settings for the board.
The network controller requires drivers.	Verify that the drivers were not accidentally deleted when the drivers for a new expansion board were installed.
The expansion board installed is a network card (NIC) and conflicts with the embedded NIC.	Under the Computer Setup Advanced menu, change the resource settings for the board.

Table D-12 Solving Network Problems (continued)

Network controller stops working without apparent cause.

Cause	Solution
The files containing the network drivers are corrupted.	Download the network drivers from http://www.hp.com and reinstall them.
The cable is not securely connected.	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.
The network controller is defective.	Replace the network controller.

New network card will not boot.

Cause	Solution
New network card may be defective or may not meet industry-standard specifications.	Install a working, industry-standard NIC, or change the boot sequence to boot from another source.

Cannot connect to network server when attempting Remote System Installation.

Cause	Solution
The network controller is not configured properly.	Verify Network Connectivity, that a DHCP Server is present, and that the Remote System Installation Server contains the NIC drivers for your NIC.

System setup utility reports unprogrammed EEPROM.

Cause	Solution
Unprogrammed EEPROM.	Contact HP.

Solving memory problems

If you encounter memory problems, some common causes and solutions are listed in the following table.

- △ **CAUTION:** Power may still be supplied to the DIMMs when the workstation is turned off. To avoid damage to the DIMMs or the system board, you must unplug the workstation power cord before attempting to reseat, install, or remove a DIMM module.

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

Table D-13 Solving Memory Problems

System will not boot or does not function properly after installing additional memory modules.

Cause	Solution
Memory module is not the correct type or speed grade for the system or the new memory module is not seated properly.	Replace module with the correct industry-standard device for the workstation. On some models, ECC and non-ECC memory modules cannot be mixed.

Out of memory error.

Cause	Solution
Memory configuration may not be set up correctly.	Use the Device Manager to check memory configuration.
You have run out of memory to run the application.	Check the application documentation to determine the memory requirements.

Memory count during POST is wrong.

Cause	Solution
The memory modules may not be installed correctly.	Check that the memory modules have been installed correctly and that proper modules are used.
Integrated graphics may use system memory.	No action required.

Insufficient memory error during operation.

Cause	Solution
Too many Terminate and Stay Resident programs (TSRs) are installed.	Delete any TSRs that you do not need.
You have run out of memory for the application.	Check the memory requirements for the application or add more memory to the workstation.

Table D-13 Solving Memory Problems (continued)

Power LED flashes Red five times, once every second, followed by a two second pause, and the workstation beeps five times. (Beeps stop after fifth iteration but LEDs continue flashing.)

Cause	Solution
Memory is installed incorrectly or is bad.	<ol style="list-style-type: none"><li data-bbox="879 304 1270 329">1. Reseat DIMMs. Power on the system.<li data-bbox="879 354 1461 380">2. Replace DIMMs one at a time to isolate the faulty module.<li data-bbox="879 405 1347 430">3. Replace third-party memory with HP memory.<li data-bbox="879 455 1171 480">4. Replace the system board.

Solving processor problems

If you encounter processor problems, common causes and solutions are listed in the following table.

Table D-14 Solving Processor Problems

Poor performance is experienced.

Cause	Solution
Processor is hot.	<ol style="list-style-type: none">1. Make sure the airflow to the workstation is not blocked.2. Make sure the fans are connected and working properly (some fans only operate when needed).3. Make sure the processor heatsink is installed properly.

Power LED flashes Red three times, once every second, followed by a two second pause.

Cause	Solution
Processor is not seated properly or not installed.	<ol style="list-style-type: none">1. Check to see that the processor is present.2. Reseat the processor.

Solving CD-ROM and DVD problems

If you encounter CD-ROM or DVD problems, see the common causes and solutions listed in the following table or to the documentation that came with the optional device.

Table D-15 Solving CD-ROM and DVD Problems

System will not boot from CD-ROM or DVD drive.

Cause	Solution
The device is attached to a SATA port that has been disabled in the Computer Setup utility.	Run the Computer Setup utility and ensure the device's SATA port is enabled in Storage > Storage Options .
Removable Media Boot is disabled in the Computer Setup utility.	Run the Computer Setup utility and enable booting to removable media in Storage > Storage Options . Ensure CD-ROM is enabled in Storage > Boot Order .
Network Server Mode is enabled in Computer Setup.	Run the Computer Setup utility and disable Network Server Mode in Security > Password Options .
Non-bootable CD in drive.	Try a bootable CD in the drive.
Boot order not correct.	Run the Computer Setup utility and change boot sequence in Storage > Boot Order .

Drive not found (identified).

Cause	Solution
Cable could be loose.	Check cable connections.
The system may not have automatically recognized a newly installed device.	See reconfiguration directions in the Solving hardware installation problems on page 143 section. If the system still does not recognize the new device, check to see if the device is listed within Computer Setup. If it is listed, the probable cause is a driver problem. If it is not listed, the probable cause is a hardware problem. If this is a newly installed drive, run the Computer Setup utility and try adding a POST delay under Advanced > Power-On Options .
The device is attached to a SATA port that has been disabled in Computer Setup.	Run the Computer Setup utility and ensure the device's SATA port is enabled in Storage > Storage Options .
Drive responds slowly immediately after power-up.	Run Computer Setup and increase the POST Delay in Advanced > Power-On Options .

CD-ROM or DVD devices are not detected or driver is not loaded.

Cause	Solution
Drive is not connected properly or not properly configured.	See the documentation that came with the optional device.

Table D-15 Solving CD-ROM and DVD Problems (continued)**Movie will not play in the DVD drive.**

Cause	Solution
Movie may be regionalized for a different country.	See the documentation that came with the DVD drive.
Decoder software is not installed.	Install decoder software.
Damaged media.	Replace media.
Movie rating locked out by parental lock.	Use DVD software to remove parental lock.
Media installed upside down.	Reinstall media.

Cannot eject compact disc (tray-load unit).

Cause	Solution
Disc not properly seated in the drive.	Turn off the workstation and insert a thin metal rod into the emergency eject hole and push firmly. Slowly pull the tray out from the drive until the tray is fully extended, then remove the disc.

CD-ROM, CD-RW, DVD-ROM, or DVD-R/RW drive cannot read a disc or takes too long to start.

Cause	Solution
Media has been inserted upside down.	Re-insert the Media with the label facing up.
The DVD-ROM drive takes longer to start because it has to determine the type of media played, such as audio or video.	Wait at least 30 seconds to let the DVD-ROM drive determine the type of media being played. If the disc still does not start, read the other solutions listed for this topic.
CD or DVD disc is dirty.	Clean CD or DVD with a CD cleaning kit, available from most workstation stores.
Windows does not detect the CD-ROM or DVD-ROM drive.	<ol style="list-style-type: none"> 1. Use Device Manager to remove or uninstall the device. 2. Restart the workstation and let Windows detect the CD or DVD driver.

Recording or copying CDs is difficult or impossible.

Cause	Solution
Wrong or poor quality media type.	<ol style="list-style-type: none"> 1. Try using a slower speed when recording. 2. Verify that you are using the correct media for the drive. 3. Try a different brand of media. Quality varies widely between manufacturers.

USDT workstation boots too slow after removing a CD-ROM or DVD drive.

Cause

Solution

The system is searching for the drive during boot because the drive cable is still attached to the system board.

Disconnect the drive cable from the system board.

Solving drive key problems

If you encounter Drive Key problems, common causes and solutions are listed in the following table.

Table D-16 Solving Drive Key Problems

USB Drive Key is not seen as a drive letter in Windows XP.

Cause	Solution
The drive letter after the last physical drive is not available.	Change the default drive letter for the Drive Key in Windows XP.

USB Drive Key not found (identified).

Cause	Solution
The device is attached to a USB port that has been hidden in Computer Setup.	Run the Computer Setup utility and ensure that "Device available" is selected for "All USB Ports" and "Front USB Ports" under Security > Device Security .
The device was not properly seated before power-up.	Ensure the device is fully inserted into the USB port before applying power to the system.

System will not boot from USB Drive Key.

Cause	Solution
Boot order is not correct.	Run the Computer Setup utility and change boot sequence in Storage > Boot Order .
Removable Media Boot is disabled in the Computer Setup utility.	Run the Computer Setup utility and enable booting to removable media in Storage > Storage Options . Ensure USB is enabled in Storage > Boot Order .
The image on the device is not bootable.	Follow the procedures described in the "ROM Flash: Replicating the Setup: Creating a Bootable Device: Supported USB Flash Media Device" section of the <i>Service Reference Guide</i> .

The workstation boots to DOS after making a bootable Drive Key.

Cause	Solution
Drive Key is bootable.	Install the Drive Key only after the operating system boots.

Solving front panel component problems

If you encounter problems with devices connected to the front panel, refer to the common causes and solutions listed in the following table.

Table D-17 Solving Front Panel Component Problems

A USB device, headphone, or microphone is not recognized by the workstation.

Cause	Solution
Device is not properly connected.	<ol style="list-style-type: none">1. Turn off the workstation.2. Reconnect the device to the front of the workstation and restart the workstation.
The device does not have power.	If the USB device requires AC power, be sure one end is connected to the device and one end is connected to a live outlet.
The correct device driver is not installed.	<ol style="list-style-type: none">1. Install the correct driver for the device.2. You might need to reboot the workstation.
The cable from the device to the workstation does not work.	<ol style="list-style-type: none">1. If possible, replace the cable.2. Restart the workstation.
The device is not working.	<ol style="list-style-type: none">1. Replace the device.2. Restart the workstation.
USB ports on the workstation are disabled in Computer Setup.	Enter Computer Setup (F10) and enable the USB ports.

Solving internet access problems

If you encounter Internet access problems, consult your Internet Service Provider (ISP) or refer to the common causes and solutions listed in the following table.

Table D-18 Solving Internet Access Problems

Unable to connect to the Internet.

Cause	Solution
Internet Service Provider (ISP) account is not set up properly.	Verify Internet settings or contact your ISP for assistance.
Modem is not set up properly.	Reconnect the modem. Verify the connections are correct using the quick setup documentation.
Web browser is not set up properly.	Verify that the Web browser is installed and set up to work with your ISP.
Cable/DSL modem is not plugged in.	Plug in cable/DSL modem. You should see a "power" LED light on the front of the cable/DSL modem.
Cable/DSL service is not available or has been interrupted due to bad weather.	Try connecting to the Internet at a later time or contact your ISP. (If the cable/DSL service is connected, the "cable" LED light on the front of the cable/DSL modem will be on.)
The CAT5 UTP cable is disconnected.	Connect the CAT5 UTP cable between the cable modem and the workstations's RJ-45 connector. (If the connection is good, the "workstation" LED light on the front of the cable/DSL modem will be on.)
IP address is not configured properly.	Contact your ISP for the correct IP address.
Cookies are corrupted. (A "cookie" is a small piece of information that a Web server can store temporarily with the Web browser. This is useful for having the browser remember some specific information that the Web server can later retrieve.)	Windows XP <ol style="list-style-type: none">1. Select Start > Control Panel.2. Double-click Internet Options.3. On the General tab, click the Delete Cookies button.

Cannot automatically launch Internet programs.

Cause	Solution
You must log on to your ISP before some programs will start.	Log on to your ISP and launch the desired program.

Internet takes too long to download Web sites.

Cause	Solution
Modem is not set up properly.	Verify that the correct modem speed and COM port are selected. Windows XP <ol style="list-style-type: none">1. Select Start > Control Panel.2. Double-click System.3. Click the Hardware tab.

Table D-18 Solving Internet Access Problems (continued)

Internet takes too long to download Web sites.

Cause	Solution
	<ol style="list-style-type: none"><li data-bbox="879 275 1458 331">4. In the Device Manager area, click the Device Manager button.<li data-bbox="879 352 1458 380">5. Double-click Ports (COM & LPT).<li data-bbox="879 401 1458 457">6. Right-click the COM port the modem uses, then click Properties.<li data-bbox="879 478 1458 535">7. Under Device status, verify that the modem is working properly.<li data-bbox="879 556 1458 583">8. Under Device usage, verify the modem is enabled.<li data-bbox="879 604 1458 661">9. If there are further problems, click the Troubleshoot button and follow the on-screen instructions.

Solving software problems

Most software problems occur as a result of the following:

- The application was not installed or configured correctly.
- There is insufficient memory available to run the application.
- There is a conflict between applications.
- Be sure that all the needed device drivers have been installed.
- If you have installed an operating system other than the factory-installed operating system, check to be sure it is supported on the system.

 **NOTE:** HP Backup and Recovery Manager can be used to restore the software to a recovery point or to restore the system to its factory configuration. Refer to [Creating a disc recovery set on page 2](#) for more information.

If you encounter software problems, see the applicable solutions listed in the following table.

Table D-19 Solving Software Problems

Workstation will not continue and no HP logo screen has appeared.

Cause	Solution
POST error has occurred.	Observe the beeps and LED lights on the front of the workstation. See Appendix A, POST error messages on page 107 to determine possible causes. See the Restore Kit or the Worldwide Limited Warranty for terms and conditions.

Workstation will not continue after HP logo screen has appeared.

Cause	Solution
System files may be damaged.	Restore the files from the Recovery Disc Set or backups you created in HP Backup and Recovery Manager.

“Illegal Operation has Occurred” error message is displayed.

Cause	Solution
Software being used is not Microsoft-certified for your version of Windows.	Verify that the software is certified by Microsoft for your version of Windows (see program packaging for this information).
Configuration files are corrupt.	If possible, save all data, close all programs, and restart the workstation.

E System board and riser board reference designators

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

Designator	Component
BAT	Battery socket/Battery
CR1	LED - 5V_Aux (on)
CR2	Health-LED
CR3	UID LED
CR4	Power LED
CR35	Hard drive activity LED
E14	Boot block header/jumper
E15	Boot block recovery header
E16	ROM recovery header
E25	CPLD programming header
E49/JP49	Clear Password header/jumper
E50	Clear CMOS header
J7	RJ45 jack
J9	Stacked RJ45/Dual USB
J10	Quad stacked USB
J11	First IEEE 1394 connector
J12	Second IEEE 1394 connector
J13	SPDIF input
J14	SPDIF output
J20 - 29	PCI slots
J30	PCI extender slot (male)
J31 - J35	PCI Express slots
J37	Primary SCSI connector

J38	Secondary SCSI connector
J39	Stacked parallel/SCSI connector
J40	AGP slot
J41	x16 PCI Express slot for graphics
J50	First parallel port
J51	Second parallel port
J52	Double-stacked parallel port, Top = Port B, Bottom = Port A
J53	Parallel port over single Serial Port
J54	Parallel port over Serial Port and Video Port
J55	Parallel port over dual VGA ports
J65	DVI connector
J66	Keyboard connector, PS/2 (Closest to power supply)
J67	Mouse connector, PS/2
J68	Stacked mouse (Top)/keyboard (Bottom) connector
J69	Video connector, VGA
J70	Primary single USB connector
J71	Secondary single USB port
J72	Microphone jack
J73	Line-in jack
J74	Line-out jack
J75	Headphone jack
J76	Volume control
J77	Double-stacked headphone (Bottom)/microphone (Top) connector
J78	Double-stacked line-in (Top)/line-out (Bottom) connector
J80	Stacked serial/audio connector
J81	Primary double-stack USB, Top = Port 2, Bottom = Port 1
J82	Secondary double-stack USB, Top = Port 4, Bottom = Port 3
J83	Triple-stacked audio jack (line in, line out/headphone, microphone)
J101	Security board connector - for security card
J9020-J9029	PCI slots on riser card
J9030-J9034	PCI express slots on riser card
JP49/E49	Clear password header/jumper
L1	USB front port choke (1st)
L2	USB rear port choke (1st)

L3	USB rear port choke (2nd)
L4	USB rear port choke (3rd)
L5	USB front port choke (2nd)
P1	P/S connector (20 or 24 pin)
P2	Second P/S connector (as required)
P3	Processor 12V header
P4	Secondary Processor 12V header
P5	Main Power/HDD LED connector
P6	Speaker connector
P7	Analog audio connector (from CD-ROM)
P8	Primary chassis fan header or primary CPU heatsink fan
P9	Secondary chassis fan header
P10	Diskette drive connector
P11	Auxiliary Audio connector
P12	Alert on LAN connector
P13	VRM module footprint
P15	AUI connector
P16	Fan command/fan sink header (may be 2 or 4 pin)
P17	Digital audio expansion header
P18	SPDIF internal input header
P19	SPDIF internal output header
P20	Primary IDE connector
P21	Secondary IDE/MultiBay connector
P22	Header for NEWCARD
P23	Header for front panel audio
P24	Header for front panel USB
P25	Internal USB connector 1
P26	Internal USB connector 2
P27	MultiBay header
P29	SCSI LED connector
P30	PCI extender slot (female)
P40	Blade workstation graphics connector (outboard)
P41	Blade workstation graphics connector (inboard)
P52	Second serial port

P54	Primary serial port
P55	Double stack serial port, Top = Serial B, Bottom = Serial A
P58	Riser edge connector (male-mates with J30)
P60	Primary Serial ATA (SATA) connector
P61	Second Serial ATA (SATA) connector
P62	Third Serial ATA (SATA) connector
P63	Fourth Serial ATA (SATA) connector
P64	VSFF expansion connector
P65	Graphics option connector
P66	Fifth Serial ATA (SATA) connector
P67	Sixth Serial ATA (SATA) connector
P68	Seventh Serial ATA (SATA) connector
P69	Eighth Serial ATA (SATA) connector
P70	Primary (CPU) fan header for fansink
P71	Secondary CPU fan header for fansink
P80	Primary Serial Attached SCSI (SAS) connector
P81	Second Serial Attached SCSI (SAS) connector
P82	Third Serial Attached SCSI (SAS) connector
P83	Fourth Serial Attached SCSI (SAS) connector
P84	Fifth Serial Attached (SAS) connector
P85	Sixth Serial Attached (SAS) connector
P86	Seventh Serial Attached (SAS) connector
P87	Eighth Serial Attached (SAS) connector
P101	Security board connector, system board
P106	Secondary speaker connector
P124	Hood lock header
P125	Hood sensor header
P126	Flying parallel port header
P150	Media reader header
P216	White box chassis fan header
SW2	Security hood switch on riser card
SW50	Clear CMOS switch/push button
U2	Single chip solution (combined northbridge/southbridge)
U3	North bridge

U4	South bridge
U5	Super I/O
U6	Clock chip
U7	64 bit Bridge
U10	LOM1
U11	LOM1 EEPROM
U12	LOM1 PHY
U13	Audio Codec
U14	Audio amplifier
U16	LOM2
U17	LOM2 EEPROM
U18	LOM2 PHY
U19	SPI ROM - SOIC-8 footprint
U20	Fan controller
U21	SPI ROM - SO16 footprint
U29	TMDS controller
U30	Parallel port diode array
U31	First serial port transceiver
U32	Second serial port transceiver
U46	VRM controller
U50	USB front port power switch
U51	First USB rear port power switch
U52	Second USB rear port power switch
U53	Third USB rear port power switch
XBT	Battery retainer
XMM1	Memory slot. DIMM1 or RIMM1 populated and tested
XMM2 - XMM5	Following memory slots
XU1	Primary processor socket
XU2	Secondary processor socket
XU15/U15	System ROM and Socket (Socket = XU15, ROM = U15)
XU19/U19	SPI ROM and socket (XU19 = socket, U19 = SPI ROM)
Y1	Primary (TH) system clock crystal
Y2	Secondary (SMT) system clock crystal
Y3	Primary NIC clock crystal

Y4	Secondary NIC clock crystal
Y5/H5	RTC clock crystal/tie-down

F Memory

The workstation comes with double data rate 2 synchronous dynamic random access memory (DDR2-SDRAM) dual inline memory modules (DIMMs).

△ **CAUTION:** DDR and DDR2 memory modules are not interchangeable.

DDR2-SDRAM DIMMs

The memory sockets on the system board can be populated with up to four industry-standard DIMMs. These memory sockets are populated with at least one preinstalled DIMM. To achieve the maximum memory support, you can populate the system board with up to 4 GB of memory configured in a high-performing dual channel mode.

For proper system operation, the DDR2-SDRAM DIMMs must be:

- industry-standard 240-pin
- unbuffered PC2-5300 667 MHz-compliant
- 1.8 volt DDR2-SDRAM DIMMs

The DDR2-SDRAM DIMMs must also:

- support CAS latency 4 and 5 for DDR2/667 MHz
- contain the mandatory JEDEC SPD information

In addition, the workstation supports:

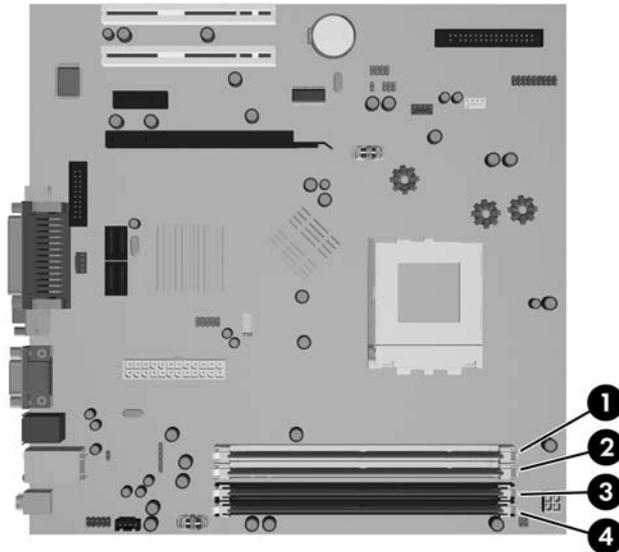
- 256Mbit, 512Mbit, and 1Gbit non-ECC memory technologies
- single-sided and double-sided DIMMs
- DIMMs constructed with x8 and x16 DDR devices; DIMMs constructed with x4 SDRAM are not supported

 **NOTE:** The system will not start if you install unsupported DIMMs.

Populating DIMM sockets

There are four DIMM sockets on the system board, with two sockets per channel. The sockets are labeled XMM1, XMM2, XMM3, and XMM4. Sockets XMM1 and XMM3 operate in memory channel A. Sockets XMM2 and XMM4 operate in memory channel B.

Figure F-1 DIMM socket locations



Item	Description	Socket Color
1	DIMM socket XMM1, Channel A	White
2	DIMM socket XMM2, Channel B	White
3	DIMM socket XMM3, Channel A (populate first)	Black
4	DIMM socket XMM4, Channel B (populate second)	Black

The system will automatically operate in single channel mode or dual channel mode, depending on how the DIMMs are installed.

- The system will operate in a higher-performing dual channel mode if like-sized DIMMs of equal capacity are populated in one or both pairs of sockets. For example, if the Channel A far socket and Channel B far socket (the two black sockets) both have 1024MB DIMMs installed, the system will operate in dual channel mode. If this system had two additional DIMMs added into the white sockets, they could be a pair of 256MB, 512MB, or 1024MB DIMMs and the system would still operate in dual channel mode. For purposes of “like sizes,” a single-sided 512MB DIMM and a double-sided 512MB DIMM would not be the same size because they have different numbers of memory chips on them.
- The system will operate in single channel mode if the DIMMs are populated in any other supported configuration. Supported configurations consist of any combination of one, two, three, or four DIMMs as long as socket XMM3 is populated before socket XMM1 in Channel A, and socket XMM4 is populated before socket XMM2 in Channel B.

- If a single DIMM is installed, it must be installed in the XMM3 socket.
- In either mode, the maximum operational speed is determined by the slowest DIMM in the system.

Index

Symbols/Numerics

- 24-pin power pin assignments 100
- 4-pin power pin assignments 101

A

- access panel
 - removal and replacement 61
- access to workstation, controlling 35
- adding devices 1
- Altiris
 - AClient 22
 - Deployment Solution Agent 22
- asset tracking 35
- ATA/ATAPI (IDE) drive cable pin assignments 100
- audible codes 115
- audio problems 138

B

- Backup and Recovery Manager 2, 19, 22
- battery
 - disposal 58
 - removal and replacement 92
- beep codes 115
- BIOS
 - Boot Block Emergency Recovery Mode 29
 - HPQFlash 29
 - Remote ROM Flash 29
- Boot Block Emergency Recovery Mode 29
- boot problems 153
- bootable device
 - creating 31
 - DiskOnKey 31, 33

- HP Drive Key 31, 33
- USB flash media device 31
- booting options
 - Full Boot 107
 - Quick Boot 107

C

- cable lock
 - cable lock 60
- cable lock provision 44
- cable management 64
- cable pinouts
 - SATA data 48
 - SATA power 48
- cautions
 - AC power 51
 - adding devices 1
 - cables 58
 - cooling fan 57
 - cover lock security 43
 - electrostatic discharge 52
 - FailSafe Key 44
 - keyboard cleaning 56
 - keyboard keys 56
 - operating system installation 1
 - protecting ROM 28
- CD-ROM or DVD problems 151
- change notification 28
- changing operating systems, important information 35
- changing password 39
- chassis fan
 - removal and replacement 83
- cleaning
 - mouse 57
 - safety precautions 55
 - workstation 55
- clearing password 40
- Client Foundation Suite 27

- Client Management Interface 24
- Client Management Premium Suite 26
- Client Manager 25
- cloning tools, software 21
- configuring power button 34
- connections
 - system board 65
- connector pin assignments 95
- controlling access to workstation 35
- country power cord set requirements 105
- cover lock 43
- cover lock security, caution 43
- Customer Support 119
- customizing software 21

D

- deleting password 40
- delimiter characters, table 40
- deployment tools, software 21
- device drivers, installing 1
- diagnostic tool for hard drives 45
- diagnostics utility 15
- disassembly preparation 59
- disk, cloning 21
- diskette drive
 - removal and replacement 74
- diskette drive cable
 - removal and replacement 75
- diskette problems 127
- DiskOnKey
 - bootable 31, 33
 - HP Drive Key 31
- drive bezel
 - 5.25" 63
- drive cable
 - removal and replacement 75
- Drive Key problems 154

- drive positions 74
- drive, external
 - removal and replacement 74
- drive, protecting 45
- DriveLock
 - applications 41
 - using 41
- dual-state power button 34
- DVI pin assignments 103
- E**
- electrostatic discharge (ESD)
 - preventing damage 52
- Emergency Recovery Mode, Boot Block 29
- entering
 - power-on password 38
 - setup password 38
- error
 - codes 107, 115
 - messages 108
- ethernet
 - AUI pin assignments 96
 - BNC pin assignments 95
 - RJ-45 pin assignments 96
- expansion card
 - PCI Express socket removal and replacement 72
 - standard socket removal and replacement 68
- expansion card retainer
 - removal and replacement 67
- expansion slot cover
 - removal and replacement 68
- external security 60
- F**
- FailSafe Key
 - caution 44
 - ordering 44
- fan, chassis
 - removal and replacement 83
- fan, power supply 57
- Fault Notification and Recovery
 - HP Client Manager 45
- fingerprint identification
 - technology 45
- flashing LEDs 115
- front bezel
 - removal and replacement 62
- front I/O panel
 - removal and replacement 85
- front panel problems 155
- G**
- general problems 122
- grounding methods 53
- H**
- hard drive
 - proper handling 58
 - removal and replacement 79
 - SATA characteristics 47
- hard drive problems 130
- hard drives, diagnostic tool 45
- hardware installation
 - problems 143
- headphone pin assignments 98
- heatsink
 - removal and replacement 86
- helpful hints 120
- HP
 - Backup and Recovery Manager 22
 - Client Foundation Suite 27
 - Client Management Interface 24
 - Client Management Premium Suite 26
 - Client Manager 25
 - ProtectTools Security Manager 26
 - System Software Manager 25
- HP Backup and Recovery Manager 2
- HP Drive Key
 - bootable 31, 33
 - DiskOnKey 31
- HP Insight Diagnostics 15
- HP Lifecycle solutions 21
- HP OpenView Agent 22
- HP OpenView Client Configuration Manager 27
- HP OpenView Workstation Management Solution 27
- HPQFlash 29
- I**
- industry standards 35
- infrared (IR) transceiver, external,
 - pin assignments 99
- initial configuration 21
- Insight Diagnostics 15
- internal temperature of workstation 45
- Internet access problems 156
- Internet addresses. See Web sites
- K**
- keyboard
 - cleaning 56
 - pin assignments 95
- keyboard delimiter characters, national 40
- keyboard problems 141
- L**
- LEDs
 - blinking power 115
 - blinking PS/2 keyboard 115
- line—in audio pin assignments 98
- line—out audio pin assignments 98
- locking Smart Cover Lock 44
- M**
- Media Card Reader
 - problems 132
- memory
 - populating sockets 166
 - removal and replacement 66
 - specifications 165
- memory problems 148
- microphone pin assignments 98
- monitor
 - pin assignments 99
- monitor problems 134
- mouse
 - pin assignments 95
- mouse cleaning 57
- mouse problems 141
- N**
- national keyboard delimiter characters 40
- network problems 145
- notification of changes 28
- numeric error codes 108
- O**
- operating guidelines 55

- operating systems, important information about 35
- optical drive
 - removal and replacement 74
- optical drive problems 151
- ordering FailSafe Key 44
- overheating, prevention 55

P

- padlock
 - removal and replacement 60
- parallel interface pin assignments 97
- password
 - changing 39
 - clearing 40
 - deleting 40
 - power-on 38
 - security 37
 - setup 38
- PCI expansion card
 - removal and replacement 68
- PCI Express expansion card
 - removal and replacement 72
- PCI Express pin assignments 101
- PCN (Proactive Change Notification) 28
- POST error messages 107
- power button
 - configuring 34
 - dual-state 34
- power cord set requirements
 - country specific 105
- power problems 126
- power supply
 - fan 57
 - removal and replacement 90
- power supply, surge-tolerant 45
- power-on password
 - changing 39
 - deleting 40
 - entering 38
 - setting 38
- Preboot Execution Environment (PXE) 24
- preinstalled software image 21
- printer problems 140
- Proactive Change Notification (PCN) 28

- problems
 - audio 138
 - CD-ROM or DVD 151
 - diskette 127
 - Drive Key 154
 - front panel 155
 - general 122
 - hard drive 130
 - hardware installation 143
 - Internet access 156
 - keyboard 141
 - Media Card Reader 132
 - memory 148
 - monitor 134
 - mouse 141
 - network 145
 - power 126
 - printer 140
 - processor 150
 - software 158
- processor
 - removal and replacement 87
- processor problems 150
- protecting hard drive 45
- protecting ROM, caution 28
- ProtectTools Security Manager 26
- PXE (Preboot Execution Environment) 24

R

- Radia Management Agent 22
- recovery
 - creating disc recovery set 2
- Recovery Disc Set 19
- Recovery Mode, Boot Block Emergency 29
- recovery, software 21
- reference designators 159
- Remote ROM Flash 29
- remote setup 24
- Remote System Installation 24
- removal and replacement
 - 5.25" drive bezel 63
 - access panel 61
 - battery 92
 - cable lock 60
 - chassis fan 83
 - diskette drive cable 75
 - drive cable 75
 - external drive 74

- front bezel 62
- front I/O panel 85
- hard drive 79
- heatsink 86
- memory 66
- padlock 60
- PCI expansion card 68
- PCI Express expansion card 72
- power supply 90
- processor 87
- shroud 84
- speaker 89
- system board 91
- Restore Plus! CD 2
- retired solutions 28
- riser board
 - reference designators 159
- ROM
 - flash 28
 - Remote Flash 29

S

- safety and comfort 119
- safety precautions
 - cleaning 55
- SATA
 - connectors on system board 47
 - data cable pinouts 48
 - hard drive characteristics 47
 - pin assignments 101
 - power cable pinouts 48
- screws, correct size 57
- SDRAM (synchronous dynamic random access memory) 165
- security
 - cable lock 44
 - DriveLock 41
 - features, table 36
 - fingerprint identification technology 45
 - password 37
 - ProtectTools Security Manager 26
 - settings 35
 - Smart Cover Lock 43
 - Smart Cover Sensor 43
- serial interface pin assignments 97

- service considerations 57
 - setup
 - copying to multiple workstations 30
 - copying to single workstation 30
 - initial 21
 - replicating 30
 - setup password
 - changing 39
 - deleting 40
 - entering 38
 - setting 38
 - shroud
 - removal and replacement 84
 - Smart Cover FailSafe Key, ordering 44
 - Smart Cover Lock
 - FailSafe Key 44
 - locking 44
 - unlocking 44
 - Smart Cover Sensor
 - protection levels 43
 - setting 43
 - software
 - Altiris AClient 22
 - Altiris Deployment Solution Agent 22
 - asset tracking 35
 - backing up 19
 - Drive Protection System 45
 - HP Backup and Recovery Manager 2, 22
 - HP Client Foundation Suite 27
 - HP Client Management Interface 24
 - HP Client Management Premium Suite 26
 - HP Client Manager 25
 - HP Insight Diagnostics 15
 - HP OpenView Client Configuration Manager 27
 - HP OpenView Workstation Management Solution 27
 - HP ProtectTools Security Manager 26
 - HP System Software Manager 25
 - integration 21
 - problems 158
 - recovery 21
 - Remote System Installation 24
 - Restore Plus! 22
 - Restore Plus! CD 2
 - restoring 19
 - servicing workstation 57
 - updating and management tools 24
 - spare part number
 - tamper-resistant wrench 57
 - Torx T-15 screwdriver 57
 - speaker
 - removal and replacement 89
 - specifications
 - memory 165
 - static electricity 52
 - Subscriber's Choice 28
 - surge-tolerant power supply 45
 - system board
 - reference designators 159
 - removal and replacement 91
 - SATA connectors 47
 - System Software Manager 25
- T**
- tamper-proof screws
 - tool 57
 - temperature control 55
 - temperature, internal workstation 45
 - thermal sensor 45
 - tools, servicing 57
 - Torx T15 screwdriver 57
- U**
- unlocking Smart Cover Lock 44
 - URLs (Web sites). See Web sites
 - USB flash media device, bootable 31, 33
 - USB pin assignments 98
- V**
- ventilation, proper 55
- W**
- Wake-on-LAN feature 145
 - Web sites
 - BIOS download 28
 - Fingerprint Identification Technology 45
 - HP Client Foundation Suite 27
 - HP Client Foundation Suite and Client Premium Suite 22
 - HP Client Management Premium Suite 27
 - HP Client Manager 26
 - HP OpenView Client Configuration Manager 27
 - HP OpenView Management Suite 28
 - HP ProtectTools Security Manager 26
 - HPQFlash 29
 - Proactive Change Notification 28
 - Remote ROM Flash 29
 - replicating setup 31
 - Restore Plus! 23
 - ROM Flash 28
 - software support 35
 - Subscriber's Choice 28
 - Subscriber's Choice 28
 - System Software Manager download 25
 - workstation deployment 21
 - workstation cleaning 55
 - workstation deployment 21
 - Workstation Setup Utilities 30