



Maintenance & Service Guide

HP Compaq 8200 Elite All-in-One Business PC

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Maintenance & Service Guide


HP Compaq 8200 Elite All-in-One Business PC

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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.

Table of contents

1 Product Features	1
Overview	1
Front Components	3
Side Components	4
Rear Components	5
Adjusting Tilt	6
2 Installing and Customizing the Software	7
Installing the Operating System	7
Downloading Microsoft Windows Updates	7
Installing or Upgrading Device Drivers (Windows systems)	8
Accessing Disk Image (ISO) Files	8
Protecting the Software	8
3 Computer Setup (F10) Utility	9
Computer Setup (F10) Utilities	9
Using Computer Setup (F10) Utilities	10
Computer Setup—File	11
Computer Setup—Storage	12
Computer Setup—Security	14
Computer Setup—Power	17
Computer Setup—Advanced	18
4 Serial ATA (SATA) Drive Guidelines and Features	20
SATA Hard Drives	20
SATA Hard Drive Cables	20
SATA Data Cable	20
SMART ATA Drives	21
Hard Drive Capacities	21

5 Identifying the Chassis, Routine Care, and Disassembly Preparation	22
Chassis Designation	22
All-in One	22
Electrostatic Discharge Information	23
Generating Static	23
Preventing Electrostatic Damage to Equipment	23
Personal Grounding Methods and Equipment	24
Grounding the Work Area	24
Recommended Materials and Equipment	24
Operating Guidelines	25
Routine Care	26
General Cleaning Safety Precautions	26
Cleaning the Computer Case	26
Cleaning the Keyboard	26
Cleaning the Monitor	27
Cleaning the Mouse	27
Service Considerations	27
Tools and Software Requirements	27
Screws	27
Cables and Connectors	28
Hard Drives	28
Lithium Coin Cell Battery	28
 6 Removal and Replacement Procedures All-in One (AIO) Chassis	 29
Preparing to Disassemble the Computer	29
Synchronizing the Optional Wireless Keyboard or Mouse	30
Center Access Panel	32
Stand	33
Memory Access Panel	34
Drive Access Panel	35
Optical Drive	37
Hard Drive	39
Memory	42
Top Panel	45
Webcam Module	46
Rear Cover	48
System Board Cover	49
Sidekey Board	51
Converter Board	54
Speakers	56
WLAN Module	57

Heat Sink (Thermal Module)	59
Processor	61
Fan Assembly	63
Display Cable	65
System Board	67
Stand Bracket	71
Hard Drive and Optical Drive Cables and Connectors	73
Front Bezel	75
Display Panel	76
Appendix A Password Security and Resetting CMOS	81
Establishing a Setup or Power-on Password	82
Resetting a Setup or Power-on Password	83
Clearing and Resetting the CMOS	84
Appendix B POST Error Messages	86
POST Numeric Codes and Text Messages	87
Interpreting POST Diagnostic Front Panel LEDs and Audible Codes	94
Appendix C Troubleshooting Without Diagnostics	97
Safety and Comfort	97
Solving General Problems	98
Solving Power Problems	101
Solving Diskette Problems	102
Solving Hard Drive Problems	104
Solving Media Card Reader Problems	107
Solving Display Problems	108
Solving Audio Problems	112
Solving Printer Problems	114
Solving Keyboard and Mouse Problems	114
Solving Hardware Installation Problems	117
Solving Network Problems	118
Solving Memory Problems	121
Solving Processor Problems	122
Solving CD-ROM and DVD Problems	123
Solving USB Flash Drive Problems	125
Solving Internet Access Problems	126
Solving Software Problems	128
Contacting Customer Support	129

Appendix D Connector Pin Assignments 130

 Ethernet BNC 130

 USB 130

 Microphone 130

 Headphone 131

 Line-in Audio 131

 Line-out Audio 131

Appendix E Power Cord Set Requirements 132

 General Requirements 132

 Japanese Power Cord Requirements 132

 Country-Specific Requirements 133

Appendix F Specifications 134

 All-in One Models 134

Index 135

1 Product Features

Overview

Figure 1-1 HP Compaq 8200 Elite All-in-One Business PC



The HP Compaq 8200 Elite All-In One Business PC offers the following features:

- Integrated All-in-One form factor
- 23-inch diagonal widescreen, full HD, LED, anti-glare display
- Adjustable tilt
- Second generation Intel® Core™ i processors and Intel Pentium processors
- Intel Q67 chipset
- Windows 7 Professional 32- or 64-bit, FreeDOS, or FreeLnx operating system
- Integrated Intel HD Graphics
- Integrated Gigabit Network Connection
- Up to 8 GB of DDR3 SDRAM memory

- Up to 1-TB hard drive, 320-GB Self Encrypting Drive, or 160-GB solid state drive
- HP Blu-ray Combo Drive
- 6-in-1 Media Card Reader
- 6 USB ports
- 150W, 90% efficient external, active PFC power adapter
- 1.3-MP webcam, microphone, and stereo speakers
- HP 802.11 a/b/g/n PCIe Minicard Wireless Module and Bluetooth® Combo available as an option
- High-definition audio support, internal stereo speakers, microphone and headphone ports
- Certifications: UL, CSA, FCC Compliance, ENERGY STAR®, EPEAT® Silver, EUP Lot6 Tier2
- HP USB Keyboard and HP USB Optical Scroll Mouse
- Software: HP ProtectTools¹²; Microsoft® Office 2010 Preloaded - Purchase Key¹³, HP Power Assistant¹⁴, Norton Internet Security 2011¹⁵, PDF Complete Corporate Edition

Front Components

Figure 1-2 Front Components

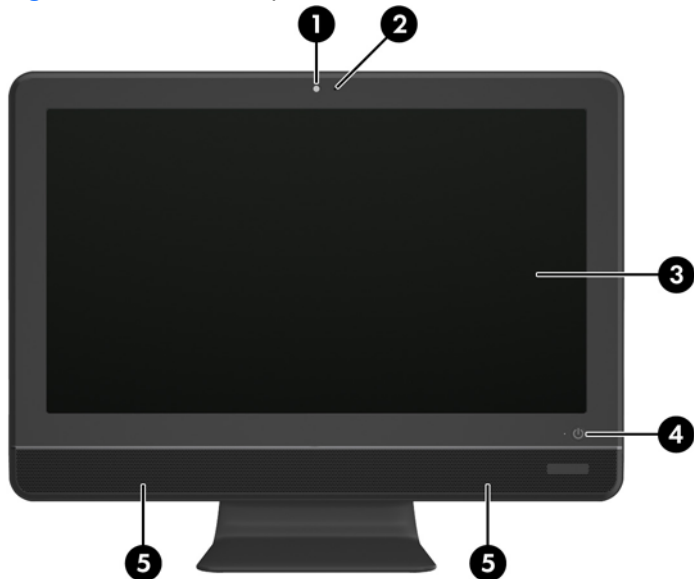


Table 1-1 Front Components

Component		Component	
(1)	Webcam	(4)	Power button and LED
(2)	Single microphone array	(5)	High-performance stereo speakers
(3)	23-inch diagonal 16:9 widescreen LED-backlit full HD LCD display		

Side Components

Figure 1-3 Side Components



Table 1-2 Side Components

Component		Component	
(1)	HP 6-in-1 Media Card Reader	(6)	Tray-load optical drive
(2)	(2) USB 2.0 ports	(7)	Optical drive eject button
(3)	Microphone/line in jack	(8)	Brightness increase button
(4)	Headphone jack	(9)	Brightness decrease button
(5)	Optical drive activity LED	(10)	Hard drive activity LED

Rear Components

Figure 1-4 Rear Components

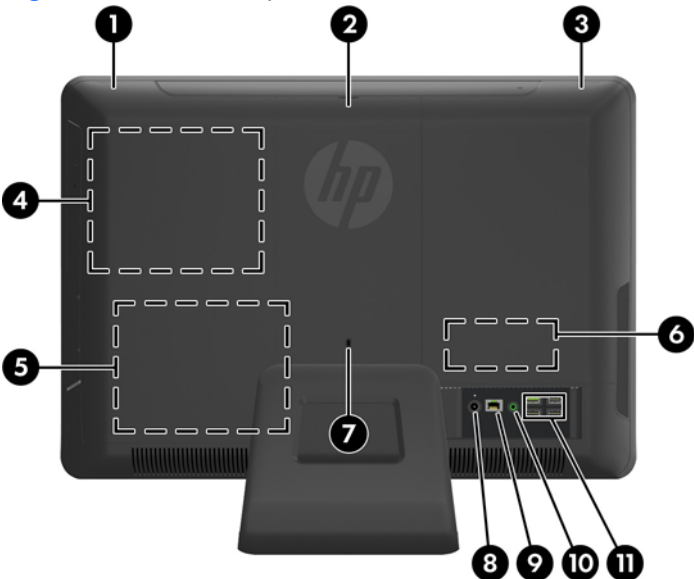


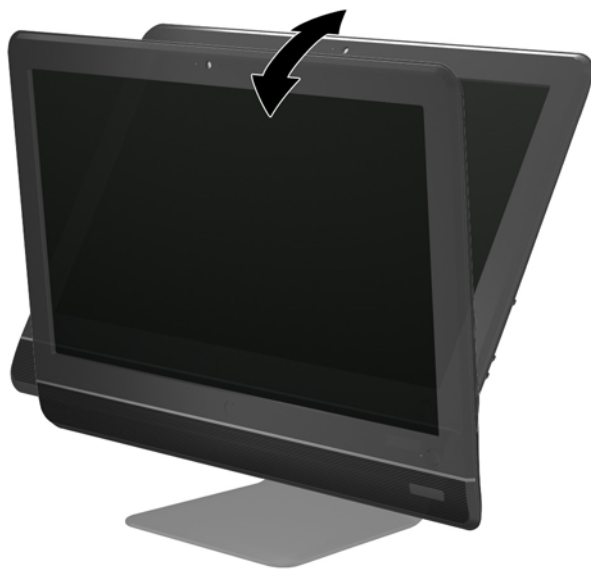
Table 1-3 Rear Components

Component	Component
(1) Drive access panel	(7) Security lock slot
(2) Center access panel	(8) Power connector with LED indicator
(3) Memory access panel	(9) RJ-45 Gigabit Ethernet port
(4) Optical drive location	(10) Stereo audio line out
(5) Hard drive location	(11) (4) USB 2.0 ports
(6) Memory location	

Adjusting Tilt


Tilt the computer forward up to 5 degrees or backward up to 20 degrees to set it to a comfortable eye level.


Figure 1-5 Adjusting Tilt




2 Installing and Customizing the Software

If your computer was not shipped with a Microsoft operating system, some portions of this documentation do not apply. Additional information is available in online help after you install the operating system.


 **NOTE:** If the computer was shipped with Windows 7 loaded, you will be prompted to register the computer with HP Total Care before installing the operating system. You will see a brief movie followed by an online registration form. Fill out the form, click the **Begin** button, and follow the instructions on the screen.


 **CAUTION:** Do not add optional hardware or third-party devices to the computer until the operating system is successfully installed. Doing so may cause errors and prevent the operating system from installing properly.

 **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.

Installing the Operating System

The first time you turn on the computer, the operating system is installed automatically. This process takes about 5 to 10 minutes, depending on which operating system is being installed. Carefully read and follow the instructions on the screen to complete the installation.

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

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

If your computer was not shipped with a Microsoft operating system, some portions of this documentation do not apply. Additional information is available in online help after you install the operating system.

Downloading Microsoft Windows Updates

1. To set up your Internet connection, click **Start > Internet Explorer** and follow the instructions on the screen.
2. Once an Internet connection has been established, click the **Start** button.

3. Select the **All Programs** menu.
4. Click on the **Windows Update** link.

In Windows 7, the **Windows Update** screen appears. Click **view available updates** and make sure all critical updates are selected. Click the **Install** button and follow the instructions on the screen.

It is recommended that you install all of the critical updates and service packs.

5. After the updates have been installed, Windows will prompt you to reboot the machine. Be sure to save any files or documents that you may have open before rebooting. Then select **Yes** to reboot the machine.

Installing or Upgrading Device Drivers (Windows systems)

When installing optional hardware devices after the operating system installation is complete, you must also install the drivers for each of the devices.

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 <http://www.hp.com/support>. Select your country and language, select **Download drivers and software (and firmware)**, enter the model number of the computer, and press **Enter**.

Accessing Disk Image (ISO) Files

There are disk image files (ISO files) included on your PC that contain the installation software for additional software. These CD image files are located in the folder `C:\SWSetup\ISOs`. Each .iso file can be burned to CD media to create an installation CD. It is recommended that these disks be created and the software installed in order to get the most from your PC. The software and image file names are:

- Corel WinDVD SD and BD – installation software for WinDVD – used to play DVD movies
- HP Insight Diagnostics OR Vision Diagnostics – software to perform diagnostic activities on your PC

Protecting the Software

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

3 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, 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 computer.
- 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 the Computer Setup (F10) Utility and the settings described in this section.
- Secure integrated I/O functionality, including USB, audio, or embedded NIC, so that they cannot be used until they are unsecured.
- Enable or disable removable media boot ability.

- 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 a USB flash drive and restoring it on one or more computers.
- 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 computer on or restarting the system. To access the Computer Setup Utilities menu, complete the following steps:

1. Turn on or restart the computer.
2. Press **Esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.



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

3. Press **F10** to enter Computer Setup.
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 computer 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 computer only after exiting the F10 Setup screen.

Computer Setup—File



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

Table 3-1 Computer Setup—File

Option	Description
System Information	<p>Lists:</p> <ul style="list-style-type: none">• Product name• SKU number (some models)• Processor type/speed/stepping• Cache size (L1/L2/L3)• 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• ME Firmware Version• ME Management Mode
About	Displays copyright notice.
Set Time and Date	Allows you to set system time and date.
Flash System ROM	Allows you to update the system ROM with a BIOS image file located on removable media.
Replicated Setup	<p>Save to Removable Media</p> <p>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).</p> <p>Restore from Removable Media</p> <p>Restores system configuration from a diskette, a USB flash media device, or a diskette-like device.</p>
Default Setup	<p>Save Current Settings as Default</p> <p>Saves the current system configuration settings as the default.</p> <p>Restore Factory Settings as Default</p> <p>Restores the factory system configuration settings as the default.</p>
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 3-2 Computer Setup—Storage

Option	Description
Device Configuration	Lists all installed BIOS-controlled storage devices.
	When a device is selected, detailed information and options are displayed. The following options may be presented:
	Hard Disk: Size, model, firmware, serial number, connector color, SMART, translation mode.
	Translation mode 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.
	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.
Storage Options	Translation parameters (ATA disks only; this feature appears only when User translation mode is selected.): 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.
	Default Values: Allows you to specify the default values for the Multisector Transfers, Transfer Mode, and Translation Mode for ATA devices.
	CD-ROM: Model, firmware, serial number, connector color. No emulation options available.
	Removable Media Boot
Storage Options	Enables/disables ability to boot the system from removable media. Default is enable.
	SATA Emulation
	Allows you to choose how the SATA controller and devices are accessed by the operating system. There are two supported options: AHCI and IDE.
	AHCI (default option) - Allows operating systems with AHCI device drivers loaded to take advantage of more advanced features of the SATA controller.
	IDE - This is the most backwards-compatible setting of the two options. Operating systems usually do not require additional driver support in IDE mode.
Storage Options	NOTE: The AHCI device driver must be installed prior to attempting to boot from an AHCI volume. If you attempt to boot from an AHCI volume without the required device driver installed, the system will crash (blue screen).

Table 3-2 Computer Setup—Storage (continued)

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> <p>NOTE: This selection will only appear when at least one drive capable of performing the DPS self-tests is attached to the system.</p>
Boot Order	<p>Allows you to:</p> <ul style="list-style-type: none">• Specify the order in which EFI boot sources and legacy boot sources (such as a USB flash media device, 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). <p>Press F5 to disable a device. Press Enter to select a device. Press the arrow keys to drag a selected device.</p> <p>NOTE: MS-DOS drive lettering assignments may not apply after a non-MS-DOS operating system has started.</p> <p>Shortcut to Temporarily Override Boot Order</p> <p>To boot one time from a device other than the default device specified in Boot Order, restart the computer and press F9 before the computer boots to the operating system. 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 computer then boots from the selected non-default device for this one time.</p>

Computer Setup—Security



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

Table 3-3 Computer Setup—Security

Option	Description
Setup Password	<p>Allows you to set and enable a 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>Desktop Management Guide</i> for more information.</p>
Power-On Password	<p>Allows you to set and enable a 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 (see below).</p> <p>See the <i>Desktop Management Guide</i> for more information.</p>
Password Options (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). Default is enable.• 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). Default is enable.• Specify whether the password is required for warm boot (Ctrl+Alt+Delete) (appears if a power-on password is set). Default is enable.• Enable/disable network server mode (appears if a power-on password is set). Default is disable.
Device Security	<p>Allows you to set Device Available/Device Hidden for:</p> <ul style="list-style-type: none">• Embedded Security Device• System Audio• Network Controller (some models)• SATA0• SATA1
USB Security	<p>Allows you to enable or disable groups of USB ports or individual USB ports. Default is device available.</p> <ul style="list-style-type: none">• Front USB Ports<ul style="list-style-type: none">◦ USB Port 1◦ USB Port 2• Rear USB Ports<ul style="list-style-type: none">◦ USB Port 1◦ USB Port 2

Table 3-3 Computer Setup—Security (continued)

	<ul style="list-style-type: none">◦ USB Port 3◦ USB Port 4• internal USB Ports<ul style="list-style-type: none">◦ USB Port 1◦ USB Port 2◦ USB Port 3◦ USB Port 10
Slot Security	Allows you to disable or enable the PCI Express x1 slot. Default is enable.
Network Boot	Enables/disables the computer'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 Express expansion card or embedded on the system board.) Default is enable.
System IDs	<p>Allows you to update:</p> <ul style="list-style-type: none">• Asset tag (18-byte identifier).• Ownership tag (80-byte identifier displayed during POST).• Chassis serial number or Universal Unique Identifier (UUID) number. The UUID can only be updated if the current chassis serial number is invalid. (These ID numbers are normally set in the factory and are used to uniquely identify the system.)• Keyboard locale setting (for example, English or German) for System ID entry.

Table 3-3 Computer Setup—Security (continued)

System Security (some models: these options are hardware dependent)	<p>Data Execution Prevention (some models) (enable/disable) - Helps prevent operating system security breaches. Default is enabled.</p> <p>PAVP (Models with Blu-ray drives) (disabled/min/max) - PAVP enables the Protected Audio Video Path in the Chipset. This may allow viewing of some protected high definition content that would otherwise be prohibited from playback. Selecting Max will assign 96 Megabytes of system memory exclusively to PAVP.</p> <p>Virtualization Technology (VTx) (some models) (enable/disable) - Controls the virtualization features of the processor. Changing this setting requires turning the computer off and then back on. Default is disabled.</p> <p>Virtualization Technology Directed I/O (VTd) (some models) (enable/disable) - Controls virtualization DMA remapping features of the chipset. Changing this setting requires turning the computer off and then back on. Default is disabled.</p> <p>Intel TXT (LT) Support (some models) (enable/disable) - Controls the underlying processor and chipset features needed to support a virtual appliance. Changing this setting requires turning the computer off and then back on. Default is disabled. To enable this feature you must enable the following features:</p> <ul style="list-style-type: none">• Embedded Security Device Support• Virtualization Technology• Virtualization Technology Directed I/O <p>Embedded Security Device (some models) (enable/disable) - Permits activation and deactivation of the Embedded Security Device. Changing this setting requires turning the computer off and then back on.</p> <p>NOTE: To configure the Embedded Security Device, a Setup password must be set.</p> <ul style="list-style-type: none">• Reset to Factory Settings (some models) (Do not reset/Reset) - Resetting to factory defaults will erase all security keys. Changing this setting requires turning the computer off and then back on. Default is Do not reset. <p>CAUTION: The embedded security device is a critical component of many security schemes. Erasing the security keys will prevent access to data protected by the Embedded Security Device. Choosing Reset to Factory Settings may result in significant data loss.</p> <p>OS management of Embedded Security Device (some models) (enable/disable) - This option allows the user to limit operating system control of the Embedded Security Device. Changing this setting requires turning the computer off and then back on. This option allows the user to limit OS control of the Embedded Security Device. Default is enable.</p> <ul style="list-style-type: none">• Reset of Embedded Security Device through OS (some models) (enable/disable) - This option allows the user to limit the operating system ability to request a Reset to Factory Settings of the Embedded Security Device. Changing this setting requires turning the computer off and then back on. Default is disable. <p>NOTE: To enable this option, a Setup password must be set.</p>
DriveLock Security	<p>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.</p> <p>NOTE: This selection will only appear when at least one drive that supports the DriveLock feature is attached to the system.</p>

Computer Setup—Power



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

Table 3-4 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. Default is enabled.• Idle Power Savings—Extended/Normal. Allows certain operating systems to decrease the processors power consumption when the processor is idle. Default is extended.• USB Wake on Device Insertion (some models)—Allows system to wake from Standby on USB device insertion.• Unique Sleep State Blink Rates—Enable/Disable. This feature is designed to provide a visual indication of what sleep state the system is in. Each sleep state has a unique blink pattern. Default is disabled.<ul style="list-style-type: none">◦ S0 (On) = Solid green LED.◦ S3 (Stand By)= 3 blinks at 1Hz (50% duty cycle) followed by a pause of 2 seconds (green LED) — repeated cycles of 3 blinks and a pause.◦ S4 (Hibernation)= 4 blinks at 1Hz (50% duty cycle) followed by a pause of 2 seconds (green LED) — repeated cycles of 4 blinks and a pause.◦ S5 (Soft Off) = LED is off. <p>NOTE: If this feature is disabled, S4 and S5 both have the LED off. S1 (no longer supported) and S3 use 1 blink per second.</p>
Hardware Power Management	<ul style="list-style-type: none">• SATA Power Management—Enables or disables the SATA bus and/or device power management. Default is enabled.• S5 Maximum Power Savings—Turns off power to all nonessential hardware when system is off to meet EUP Lot 6 requirement of less than 1 Watt power usage. Enabling this feature will disable any wake events and management devices while in S5. Default is disabled.
Thermal	Displays the system fan speed (RPMs).

Computer Setup—Advanced



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

Table 3-5 Computer Setup—Advanced

Option	Heading
Power-On Options	<p>Allows you to set:</p> <ul style="list-style-type: none">• POST mode (QuickBoot, Clear Memory, FullBoot, or FullBoot Every x Days).<ul style="list-style-type: none">◦ QuickBoot (default) = Do not clear memory or perform a memory test.◦ FullBoot = Memory test (count) on cold boot. Clears memory on all boots.◦ Clear Memory = No memory count on cold boot. Clears memory on all boots.◦ FullBoot Every x Days = Memory count on 1st cold boot on or after the xth day. No more memory counts until 1st cold boot on or after x days. Clears memory on all boots.• POST messages (enable/disable). 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.• Press the ESC key for Startup Menu (Enable/Disable). Default is enabled.• After Power Loss (off/on/previous state): Setting this option to:<ul style="list-style-type: none">◦ Power Off—causes the computer to remain powered off when power is restored.◦ Power On—causes the computer to power on automatically as soon as power is restored.◦ Previous state—causes the computer 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 computer 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.• Remote Wakeup Boot Source (remote server/local hard drive). Default is Local hard drive.• System Recovery Boot Support (Enable/Disable). Setting this feature to enabled will display the text F11 = Recovery during POST. Disabling the feature prevents the text from being displayed. However, pressing F11 will still attempt to boot to the HP Backup and Recovery partition. See Factory Recovery Boot Support for more information. Default is disabled.• Bypass F1 Prompt on Configuration Changes (Enable/Disable). Allows you to set the computer not to confirm when changes were made. Default is disabled.
BIOS Power-On	<p>Allows you to set the computer to turn on automatically at a time you specify.</p>
Bus Options	<p>On some models, allows you to enable or disable:</p> <ul style="list-style-type: none">• PCI SERR# Generation. Default is enable.• 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. Default is disable.
Onboard Devices	<p>Allows you to set resources for or disable on-board system devices (serial ports).</p>

Table 3-5 Computer Setup—Advanced (continued)

Device Options	<p>Allows you to set:</p> <ul style="list-style-type: none">• Turbo Mode (enable/disable). Allows you to enable and disable the Intel Turbo Mode feature, which allows one core of the system to run at a higher than standard frequency and power if other cores are idle. Default is enabled.• Num Lock State at Power-On (off/on). Default is on.• LVDS Panel Select. Auto-select, LG, Samsung.• Internal Speaker (some models) (does not affect external speakers). Default is enabled.• NIC 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 1 MB 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. Default is-enabled.• Multi-Processor (enable/disable). Use this option to disable multi-processor support under the OS. Default is enabled.
AMT Configuration	<p>Allows you to set:</p> <ul style="list-style-type: none">• AMT (enable/disable). Allows you to enable or disable functions of the embedded Management Engine (ME) such as Active Management Technology (AMT). If set to disable, the Management Engine is set to a temporarily disabled state and will not provide functions beyond necessary system configuration. Default is enabled.• Unconfigure AMT/ME (enable/disable). Allows you to unconfigure any provisioned management settings for AMT. The AMT settings are restored to factory defaults. This feature should be used with caution as AMT will not be able to provide any set AMT management functions once unconfigured. Default is disabled.• Watchdog Timer (enable/disable). Allows you to set amount of time for a operating system and BIOS watchdog alert to be sent if the timers are not deactivated. BIOS watchdog is deactivated by BIOS and would indicate that a halt occurred during execution if the alert is sent to the management console. An operating system alert is deactivated by the operating system image and would indicate that a hang occurred during its initialization. Default is enabled.

4 Serial ATA (SATA) Drive Guidelines and Features



NOTE: HP only supports the use of SATA hard drives on these models of computer. No Parallel ATA (PATA) drives are supported.

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 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.

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

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 computer 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				
			Maximum Size	
File System	Controller Type	Operating System	Partition	Drive
FAT 32	ATA	Windows 7	32 GB	2 TB
NTFS	ATA	Windows 7	2 TB	2 TB

5 Identifying the Chassis, Routine Care, and Disassembly Preparation

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

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

Chassis Designation

An all-in one form factor is available.

All-in One



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 computer:

- Keep the computer away from excessive moisture, direct sunlight, and extremes of heat and cold.
- Operate the computer on a sturdy, level surface. Leave a 10.2-cm (4-inch) clearance on all vented sides of the computer and above the monitor to permit the required airflow.
- Never restrict the airflow into the computer 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 computer. Lint, dust, and other foreign matter can block the vents and limit the airflow. Be sure to unplug the computer before cleaning the air vents.
- Never operate the computer with the cover removed.
- Do not place computers so near each other that they are subject to each other's re-circulated or preheated air.
- Keep liquids away from the computer 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 computer.
2. Never immerse any parts in water or cleaning solutions; apply any liquids to a clean cloth and then use the cloth on the component.
3. Always unplug the computer when cleaning with liquids or damp cloths.
4. Always unplug the computer before cleaning the keyboard, mouse, or air vents.
5. Disconnect the keyboard before cleaning it.
6. Wear safety glasses equipped with side shields when cleaning the keyboard.

Cleaning the Computer Case

Follow all safety precautions in [General Cleaning Safety Precautions on page 26](#) before cleaning the computer.

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


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

Cleaning the Keyboard

Follow all safety precautions in [General Cleaning Safety Precautions on page 26](#) before cleaning the keyboard.

To clean the tops of the keys or the keyboard body, follow the procedures described in [Cleaning the Computer Case on page 26](#).

When cleaning debris from under the keys, review all rules in [General Cleaning Safety Precautions on page 26](#) 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 Computer Case on page 26](#).

Cleaning the Mouse

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

- Clean the mouse ball by first removing the retaining plate and the ball from the housing. Pull out any debris from the ball socket and wipe the ball with a clean, dry cloth before reassembly.
- To clean the mouse body, follow the procedures in [Cleaning the Computer Case on page 26](#).

Service Considerations

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

Tools and Software Requirements

To service the computer, you need the following:

- Torx T-15 screwdriver (HP screwdriver with bits, PN 161946-001)
- 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 computer are not interchangeable. They may have standard or metric threads and may be of different lengths. If an incorrect screw is used during the reassembly process, it can damage the unit. HP strongly recommends that all screws removed during disassembly be kept with the part that was removed, then returned to their proper locations.

⚠ CAUTION: As each subassembly is removed from the computer, 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 computer, ensure that cables are placed in their proper location during the reassembly process. Improper cable placement can damage the computer.

Hard Drives


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


- If a drive must be mailed, place the drive in a bubble-pack mailer or other suitable protective packaging and label the package “Fragile: Handle With Care.”
- Do not remove hard drives from the shipping package for storage. Keep hard drives in their protective packaging until they are actually mounted in the CPU.
- Avoid dropping drives from any height onto any surface.
- If you are inserting or removing a hard drive, turn off the computer. Do not remove a hard drive while the computer is on or in standby mode.
- Before handling a drive, ensure that you are discharged of static electricity. While handling a drive, avoid touching the connector. For more information about preventing electrostatic damage, refer to [Electrostatic Discharge Information on page 23](#)
- 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 computer 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 computer contains a lithium battery. There is a risk of fire and chemical burn if the battery is handled improperly. Do not disassemble, crush, puncture, short external contacts, dispose in water or fire, or expose it to temperatures higher than 140°F (60°C). 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.


6 Removal and Replacement Procedures All-in One (AIO) Chassis

The following sections provide information about disassembling various components of the computer.

Preparing to Disassemble the Computer

To avoid injury and equipment damage, always complete the following steps in order, when opening the HP Pro All-in-One.

1. Remove all media (CD, DVD, etc.) from the computer.
2. Shut down the computer.
3. After the system has completely shut down, disconnect the power adapter from the back of the computer.
4. Disconnect all other attached cables from the back of the computer.
5. Place the computer face down on a soft flat surface. HP recommends that you set down a blanket, towel, or other soft cloth to protect the screen surface from scratches or other damage.

 **WARNING!** Beware of sharp edges inside the chassis.

Synchronizing the Optional Wireless Keyboard or Mouse

The optional wireless keyboard and mouse are easy to set up. Just remove the battery tabs on both the keyboard and the mouse. Also, make sure the Power switch on the bottom of the mouse is in the On position (the keyboard does not have a Power switch). Then, turn on the computer. If you have trouble using the keyboard and mouse, manually synchronize them as described below.



NOTE: For better mouse battery life and performance, avoid using your mouse on a dark or high-gloss surface, and turn mouse power off when not in use.

The wireless keyboard and mouse are pre-synchronized to work with your computer. The keyboard and mouse should work immediately after you first pull the battery tabs to activate the preinstalled batteries, and then turn on the mouse.

You may need to manually synchronize the wireless keyboard or mouse if they are not functioning. To synchronize them:

1. Make sure the keyboard and mouse are next to the computer, within 30 cm (1 foot) and away from interference from other devices.
2. Turn on the computer.
3. Insert the wireless receiver into a USB port on the computer.

Figure 6-1 Installing the wireless receiver




4. Make sure the Power switch on the bottom of the mouse is in the On position **(1)**.
5. Press the Connect button on the bottom of the mouse **(2)** for five seconds. The blue activity LED from the wireless receiver illuminates when the synchronization command has been received and turns off when synchronization is complete.

6. Press the Connect button on the bottom of the keyboard (3) for five seconds. The blue activity LED from the wireless receiver illuminates when the synchronization command has been received and turns off when synchronization is complete.

Figure 6-2 Synchronizing the wireless keyboard and mouse



 **NOTE:** If the procedure does not work, remove and then re-insert the wireless keyboard and mouse receiver from the back of the computer and then synchronize the keyboard and mouse again.

Center Access Panel

The center access panel is located above the stand. You must remove it to remove the drive cover and memory cover.

Figure 6-3 Center access panel location



To remove the center access panel:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 29](#)).
2. Pull outward on the panel at the slot on the top edge of the panel.

Figure 6-4 Removing the center access panel



To replace the center access panel, reverse the removal procedures.

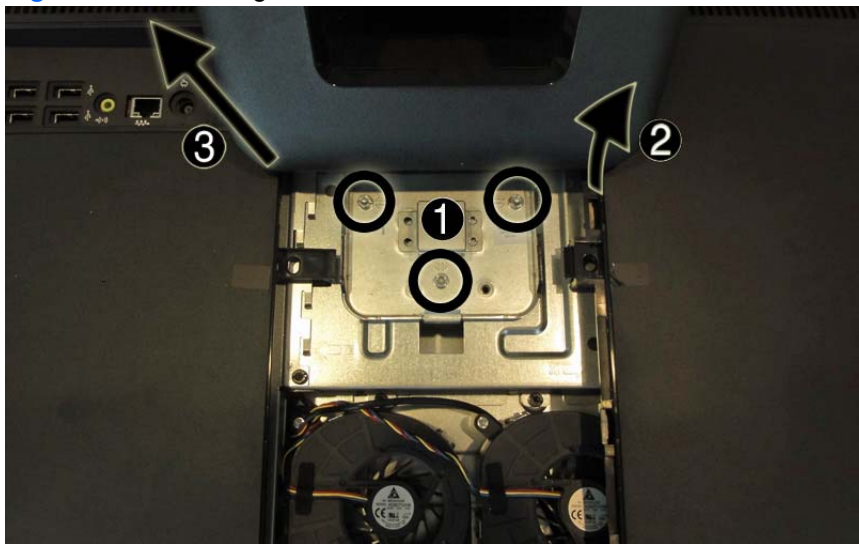
Stand

The stand is secured with three Torx screws. You must remove the center access panel to remove the stand.

To remove the stand:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 29](#)).
2. Remove the center access panel (see [Center Access Panel on page 32](#)).
3. Remove the three silver Torx screws (1) that secure the stand to the computer.
4. Rotate the stand upward (2), and then lift the stand off the computer (3).

Figure 6-5 Removing the stand



To replace the stand, reverse the removal procedures.

Memory Access Panel

The memory access panel is located on the rear, right side of the computer (viewed from behind). You must remove it to access the memory modules and to remove the main rear cover.

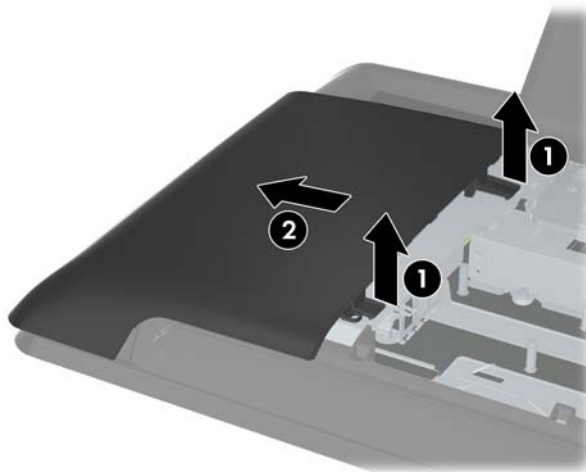
Figure 6-6 Memory access panel location



To remove the memory access panel:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 29](#)).
2. Remove the center access panel (see [Center Access Panel on page 32](#)).
3. Pull upward on the two tabs on the inside edge of the panel **(1)** and slide the panel off the computer **(2)**.

Figure 6-7 Removing the memory access panel



To replace the memory access panel, reverse the removal procedures.

Drive Access Panel

The drive access panel is located on the rear, left side of the computer (viewed from behind). You must remove it to access the hard drive and optical drive and to remove the main rear cover.

Figure 6-8 Drive access panel location

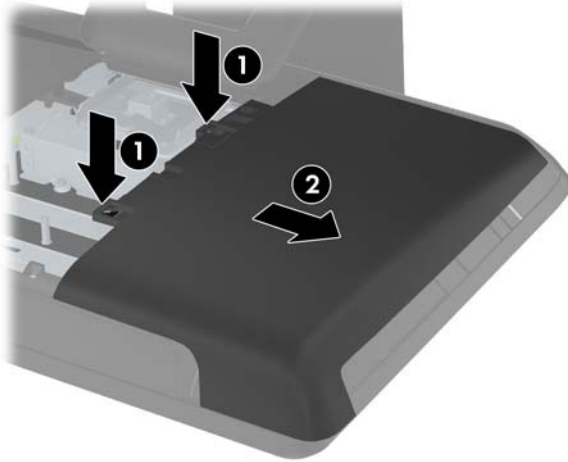


To remove the drive access panel:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 29](#)).
2. Remove the center access panel (see [Center Access Panel on page 32](#)).

3. Push downward on the two tabs on the inside edge of the panel (1) and slide the panel off the computer (2).

Figure 6-9 Removing the drive access panel



To replace the drive access panel, reverse the removal procedures.

Optical Drive

The optical drive is located under the drive access panel on the left side of the computer (viewed from behind). It is secured with one Torx screw.

Figure 6-10 Optical drive location

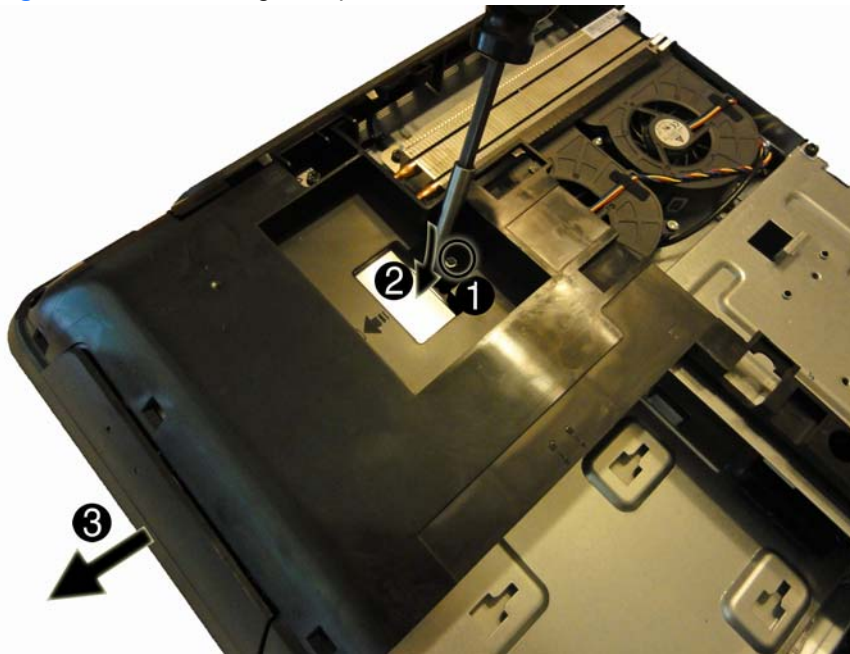


To remove the optical drive:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 29](#)).
2. Remove the center access panel (see [Center Access Panel on page 32](#)).
3. Remove the drive access panel (see [Drive Access Panel on page 35](#)).
4. Remove the black Torx screw **(1)** that secures the drive to the computer.

5. Insert a flat-bladed screwdriver or finger to push the bracket on the rear side of the optical drive(2) to disengage the drive from the connector, and then slide the drive out of the computer (3).

Figure 6-11 Removing the optical drive



6. If you need to remove the drive bracket from the drive, remove the two screws (1) that secure the bracket to the drive, and then remove the bracket from the drive (2).


 **NOTE:** Optical drive spare part kits do not include replacement brackets. Reuse the existing bracket.

Figure 6-12 Removing the optical drive bracket



To install an optical drive, reverse the removal procedures.

Hard Drive

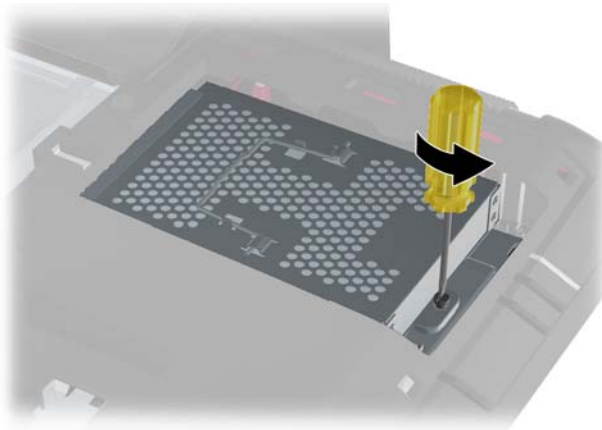
The hard drive is located under the drive access panel on the left side of the computer (viewed from behind). The drive is secured with one captive Torx screw and is housed in a removable cage.

Figure 6-13 Hard drive location



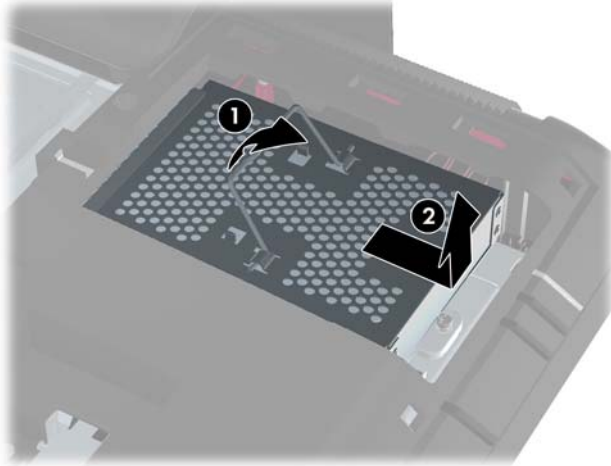
1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 29](#)).
2. Remove the center access panel (see [Center Access Panel on page 32](#)).
3. Remove the drive access panel (see [Drive Access Panel on page 35](#)).
4. Loosen the captive Torx screw next to the front of the drive that secures the drive to the computer. You can use either a Torx or slotted screwdriver to loosen the screw.

Figure 6-14 Loosening the hard drive security screw



5. Grasp the handle on top of the hard drive cage (1) and slide the cage toward the outer edge of the computer, then lift the cage out of the computer (2).

Figure 6-15 Removing the hard drive cage



6. Remove the four mounting screws that secure the drive to the cage. Do not remove the blue rubber grommets behind each screw. They must stay attached to the cage when installing a new hard drive.


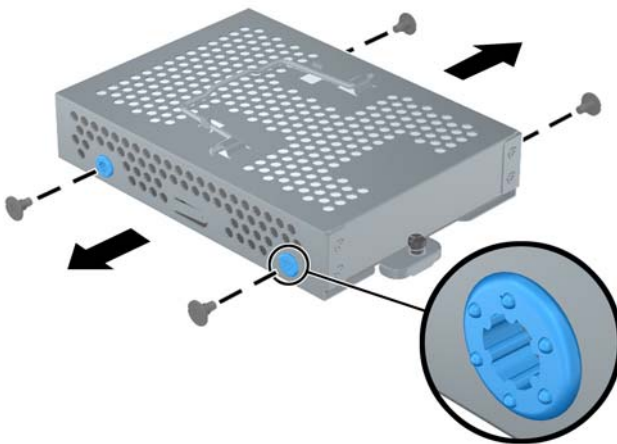
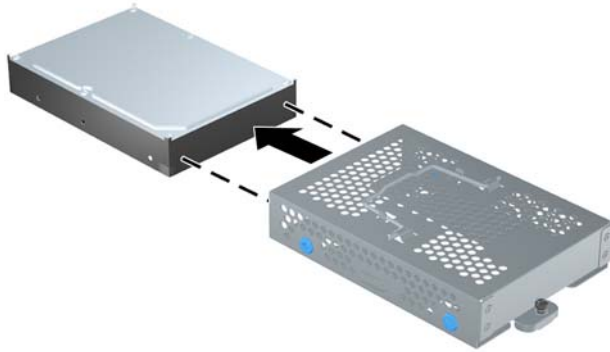
 **NOTE:** Inspect the four blue rubber grommets in case some of them are damaged or lost. Grommet spare parts are available.

Figure 6-16 Removing the hard drive mounting screws



7. Slide the hard drive out of the cage.

Figure 6-17 Removing the hard drive from the cage



To replace the hard drive, reverse the removal procedures.

Memory

Memory modules are located on the right side of the computer (viewed from behind) under the memory cover. The computer has two memory slots.

Figure 6-18 Memory module location



The computer comes with double data rate 3 synchronous dynamic random access memory (DDR3-SDRAM) small outline dual inline memory modules (SODIMMs).

The memory sockets on the system board can be populated with up to two industry-standard SODIMMs. These memory sockets are populated with at least one preinstalled SODIMM. To achieve the maximum memory support, you can populate the system board with up to 8 GB of memory.

For proper system operation, the SODIMMs must be:

- industry-standard 204-pin
- unbuffered non-ECC PC3-10600 DDR3-1333 MHz-compliant
- 1.5 volt DDR3-SDRAM SODIMMs

The DDR3-SDRAM SODIMMs must also:

- support CAS latency 9 DDR3 1333 MHz (9-9-9 timing)
- contain the mandatory Joint Electronic Device Engineering Council (JEDEC) specification

In addition, the computer supports:

- 512-Mbit, 1-Gbit, and 2-Gbit non-ECC memory technologies
- single-sided and double-sided SODIMMS
- SODIMMs constructed with x8 and x16 devices; SODIMMs constructed with x4 SDRAM are not supported

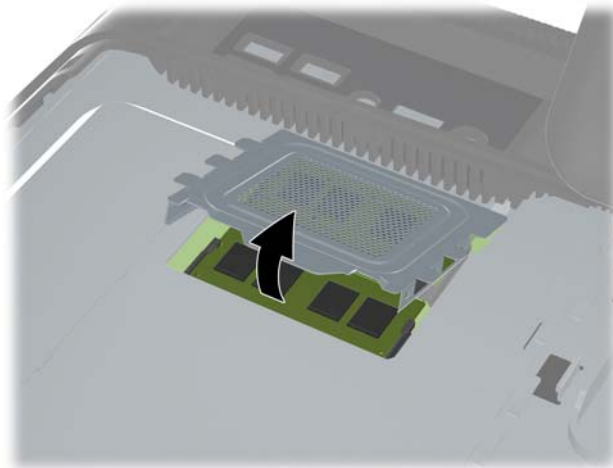
 **NOTE:** The system will not operate properly if you install unsupported SODIMMs.

There are two memory sockets on the system board located behind the memory access panel. To remove or install memory modules:

To remove a memory module:

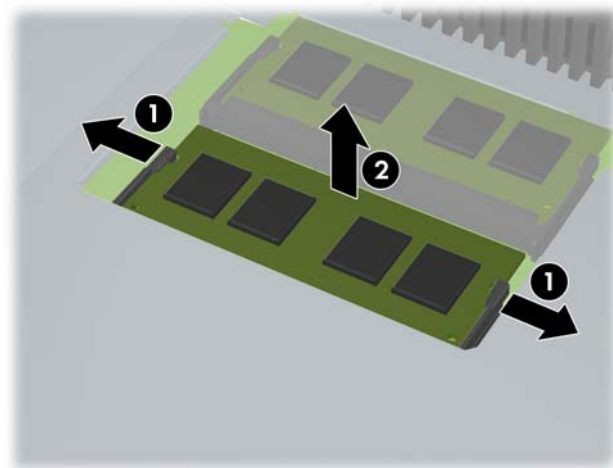
1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 29](#)).
2. Remove the center access panel (see [Center Access Panel on page 32](#)).
3. Remove the memory access panel (see [Memory Access Panel on page 34](#)).
4. Pull upward on the two raised tabs on the memory cover and lift the cover off the rear panel.

Figure 6-19 Removing the memory cover



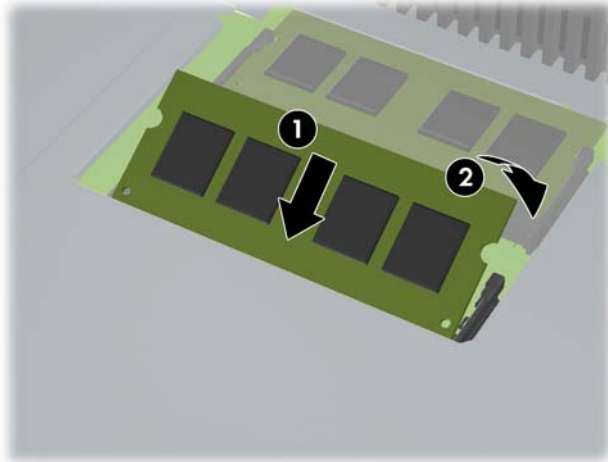
5. To remove a memory module, press outward on the two latches on each side of the SODIMM (1) then pull the SODIMM out of the socket (2).


Figure 6-20 Removing a memory module



6. To install a memory module, slide the SODIMM into the socket at approximately a 30° angle (1) then press the SODIMM down (2) so that the latches lock it in place.

Figure 6-21 Installing a Memory Module



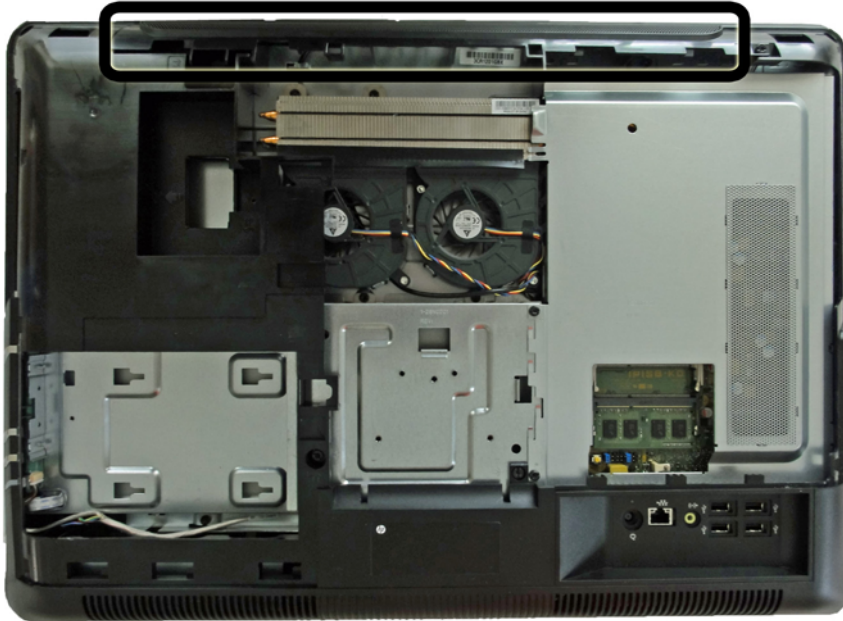
 **NOTE:** A memory module can be installed in only one way. Match the notch on the module with the tab on the memory socket.

The computer automatically recognizes the additional memory when you turn on the computer.

Top Panel

The top panel is secured with two Torx screws. Removing it allows access to the webcam and allows you to remove the main rear cover.

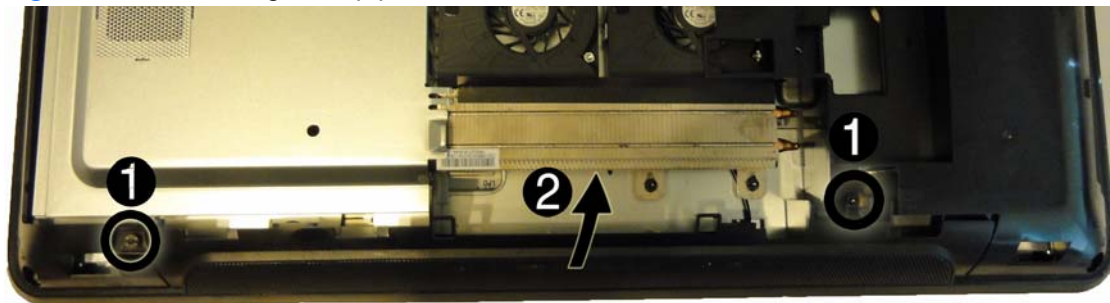
Figure 6-22 Top panel location



To remove the top panel:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 29](#)).
2. Remove the center access panel (see [Center Access Panel on page 32](#)).
3. Remove the memory access panel (see [Memory Access Panel on page 34](#)).
4. Remove the drive access panel (see [Drive Access Panel on page 35](#)).
5. From the top of the computer, remove the two black Torx screws (1) that secure the top panel to the computer.
6. Rotate the top of the panel outward (2), and then lift the panel off the computer.

Figure 6-23 Removing the top panel

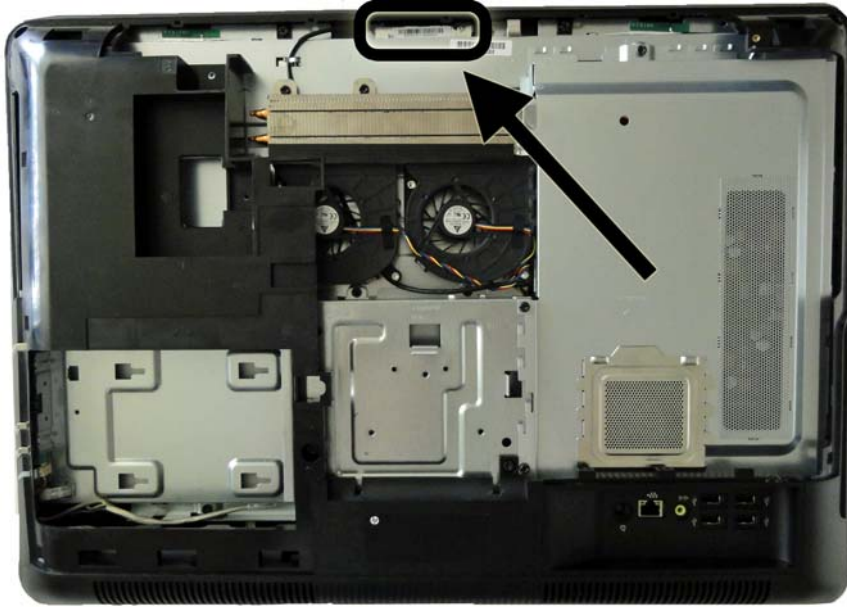


To replace the top panel, reverse the removal procedures.

Webcam Module

The webcam module is located at the top of the computer beneath the top panel. It is secured with two silver Phillips screws and has one connector.

Figure 6-24 Webcam module location

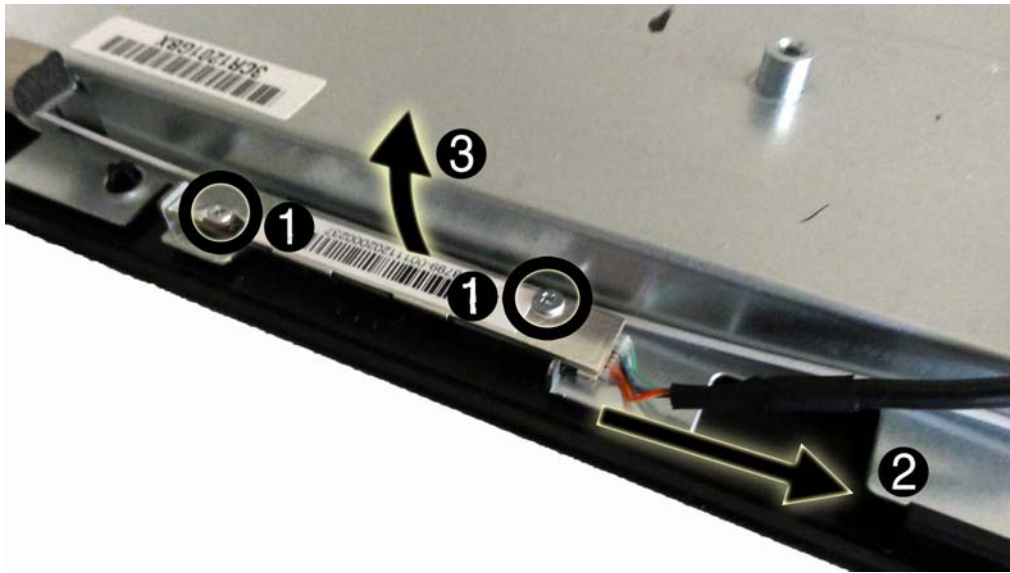


To remove the webcam module:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 29](#)).
2. Remove the center access panel (see [Center Access Panel on page 32](#)).
3. Remove the memory access panel (see [Memory Access Panel on page 34](#)).
4. Remove the drive access panel (see [Drive Access Panel on page 35](#)).
5. Remove the top panel (see [Top Panel on page 45](#)).
6. Remove the two silver Phillips screws **(1)** that secure the webcam module to the computer.
7. Lift the webcam module as much as the cable allows, and then disconnect the cable from the module **(2)**.

8. Remove the webcam from the computer (3).

Figure 6-25 Removing the webcam module



To install a webcam module, reverse the removal procedures.

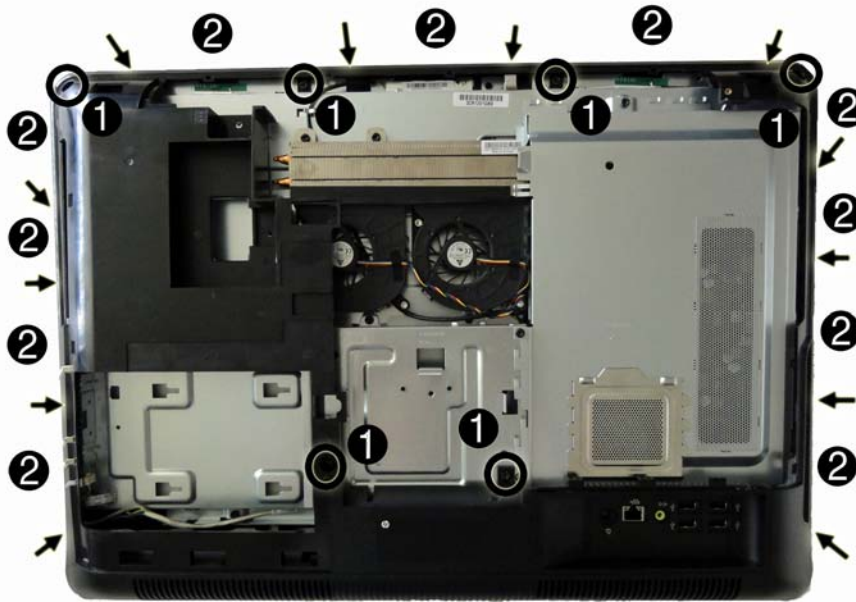
Rear Cover

The rear cover is secured with six Torx screws. You must pry it off at the seams around the edges of the computer.

To remove the rear cover:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 29](#)).
2. Remove the center access panel (see [Center Access Panel on page 32](#)).
3. Remove the memory access panel (see [Memory Access Panel on page 34](#)).
4. Remove the drive access panel (see [Drive Access Panel on page 35](#)).
5. Remove the stand (see [Stand on page 33](#)).
6. Remove the optical drive (see [Optical Drive on page 37](#)).
7. Remove the top panel (see [Top Panel on page 45](#)).
8. Remove the six black Torx screws that secure the panel to the computer (1).
9. *Working from left to right*, pry the cover off the computer by pulling the edges (2) of the cover up and away from the computer.

Figure 6-26 Removing the rear cover



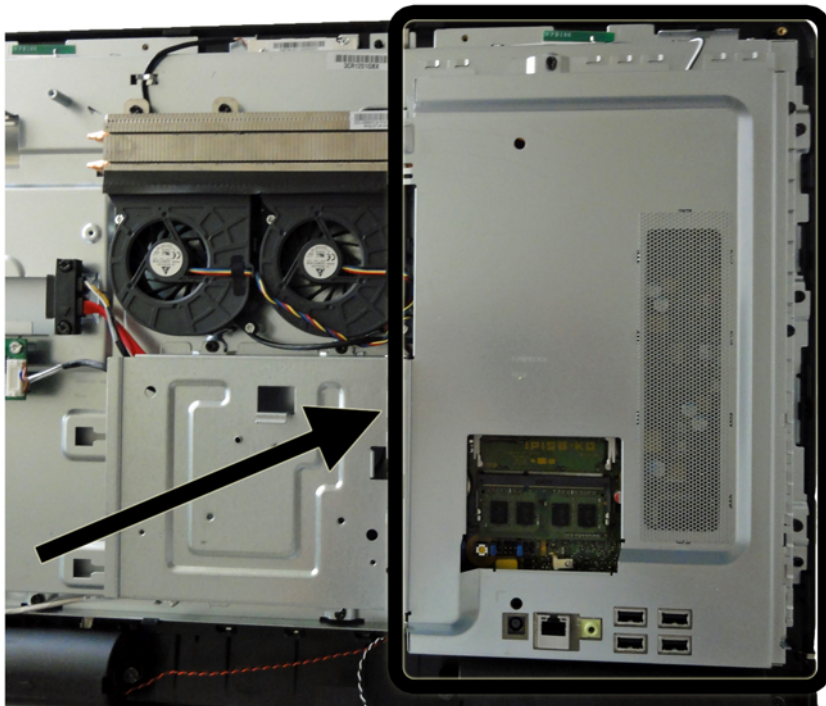
10. Remove the rear cover from the computer.

To replace the rear cover, reverse the removal procedures.

System Board Cover

The system board cover protects the system board. It is secured with six Torx screws.

Figure 6-27 System board cover location

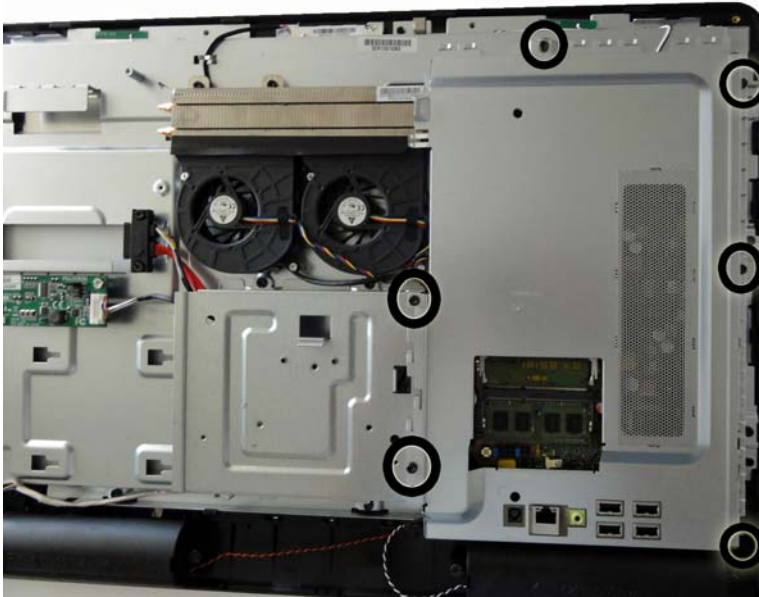


To remove the system board cover:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 29](#)).
2. Remove the center access panel (see [Center Access Panel on page 32](#)).
3. Remove the memory access panel (see [Memory Access Panel on page 34](#)).
4. Remove the drive access panel (see [Drive Access Panel on page 35](#)).
5. Remove the stand (see [Stand on page 33](#)).
6. Remove the optical drive (see [Optical Drive on page 37](#)).
7. Remove the top panel (see [Top Panel on page 45](#)).
8. Remove the rear cover (see [Rear Cover on page 48](#)).

9. Remove the six black Torx screws that secure the cover to the computer.

Figure 6-28 Removing the system board cover screws



10. Lift the cover from the computer.

Figure 6-29 Removing the system board cover



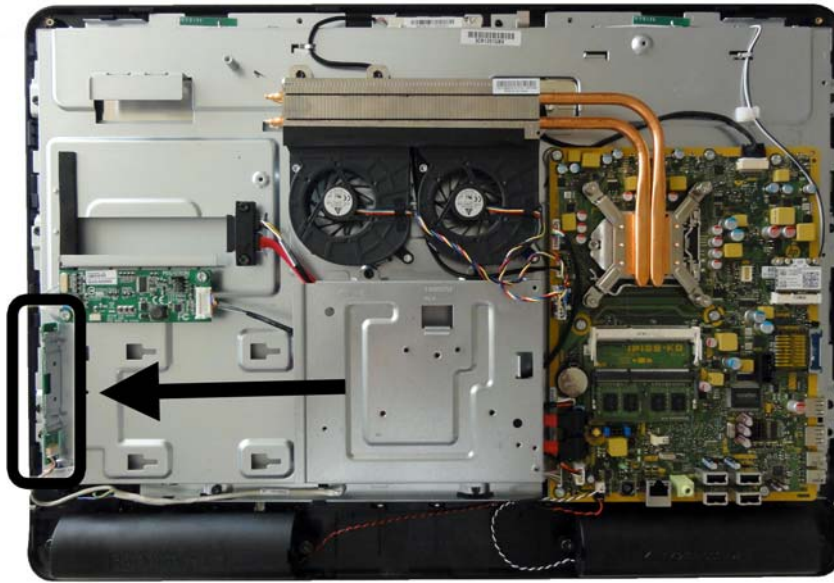
To install the system board cover, reverse the removal procedures.

Sidekey Board

The sidekey board is located on the bottom left side of the computer (viewed from behind). It is secured with two Torx screws and has one connector.

The associated cable connects to the front power switch assembly. To remove it, you must remove the stand bracket, disassembly of which is shown later in this document at [Stand Bracket on page 71](#).

Figure 6-30 Sidekey board location



To remove the sidekey board:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 29](#)).
2. Remove the center access panel (see [Center Access Panel on page 32](#)).
3. Remove the memory access panel (see [Memory Access Panel on page 34](#)).
4. Remove the drive access panel (see [Drive Access Panel on page 35](#)).
5. Remove the stand (see [Stand on page 33](#)).
6. Remove the optical drive (see [Optical Drive on page 37](#)).
7. Remove the top panel (see [Top Panel on page 45](#)).
8. Remove the rear cover (see [Rear Cover on page 48](#)).
9. If replacing the cable, remove the system board cover (see [System Board Cover on page 49](#)).
10. Disconnect the cable from the sidekey board (1).

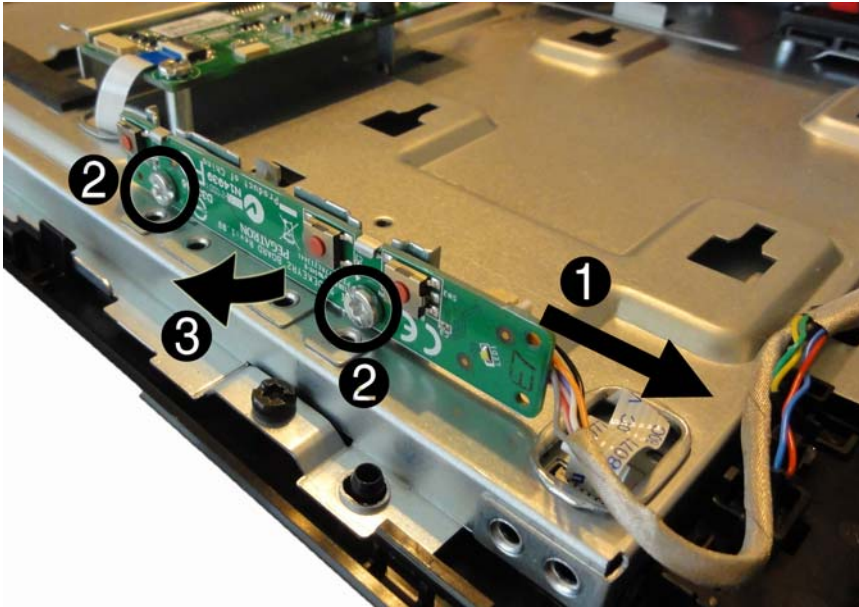


NOTE: Be careful not to damage the cable when disconnecting it from the board. Do not pull on the wires.

11. Remove the two silver Torx screws (2) that secure the board to the computer.

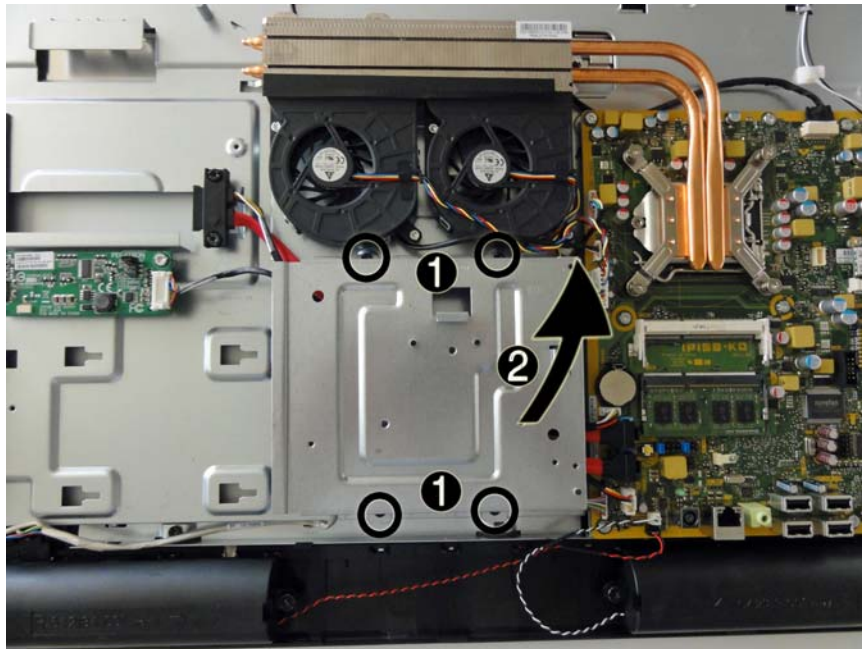
12. Rotate the bottom of the board upward (3), and then remove the board from the computer.

Figure 6-31 Removing the sidekey board



13. If you need to remove the cable:
 - a. Remove the stand bracket by removing the four black Torx screws that secure it to the computer (1), and then lifting the bracket from the computer (2).

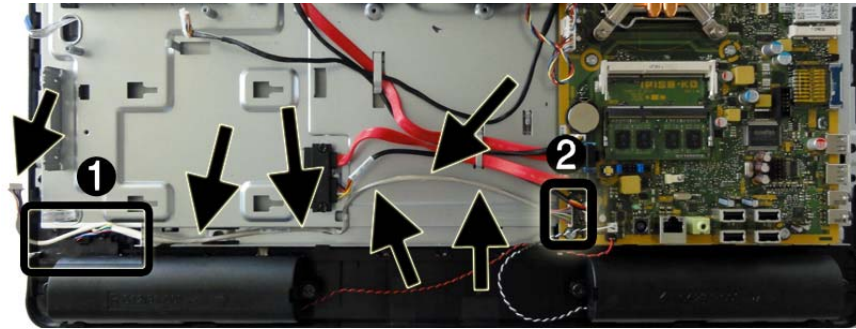
Figure 6-32 Removing the stand bracket



- b. Disconnect the cable from the PB/LED connector on the system board. The following image shows the cable highlighted by arrows.

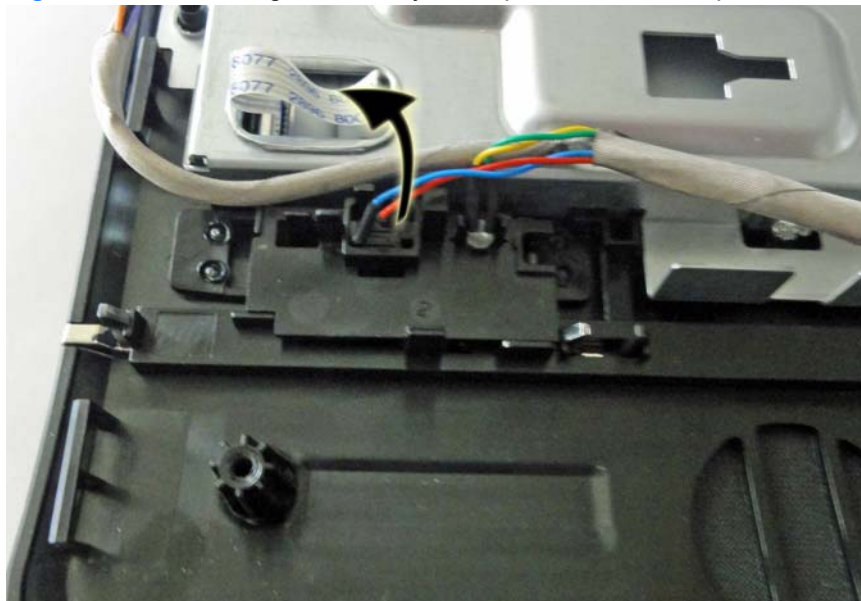
- c. The cable includes the power switch assembly (shown by callout **(1)** in the following image). The cable routes beneath the stand bracket (not shown in the following image) to the PB/LED system board connector (shown by callout **(2)** in the following image).

Figure 6-33 Sidekey cable assembly



- d. Lift the power switch assembly up and off the front bezel.

Figure 6-34 Removing the sidekey cable power switch component



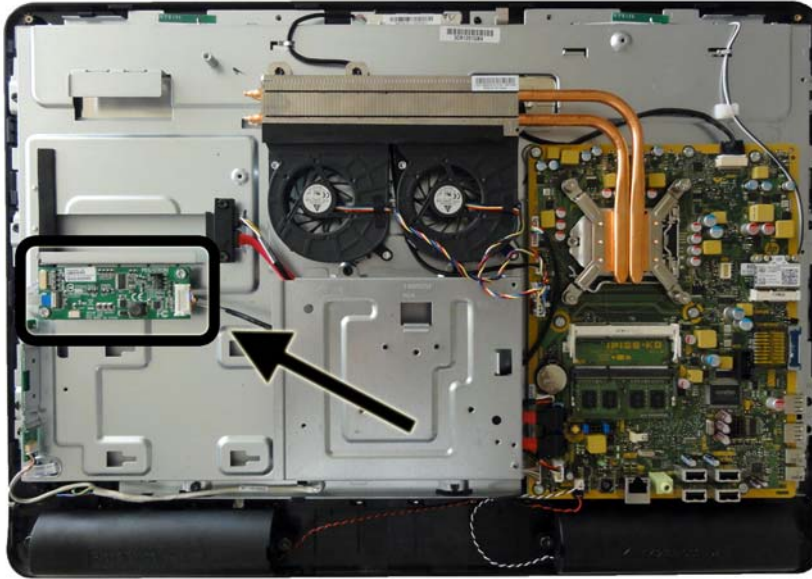
- e. Lift the cable out of the computer.

To install the sidekey board or cable, reverse the removal procedures.

Converter Board


The converter board is located on the left side of the computer. It is secured with two Torx screws and has two connectors.

Figure 6-35 Converter board location



To remove the converter board:

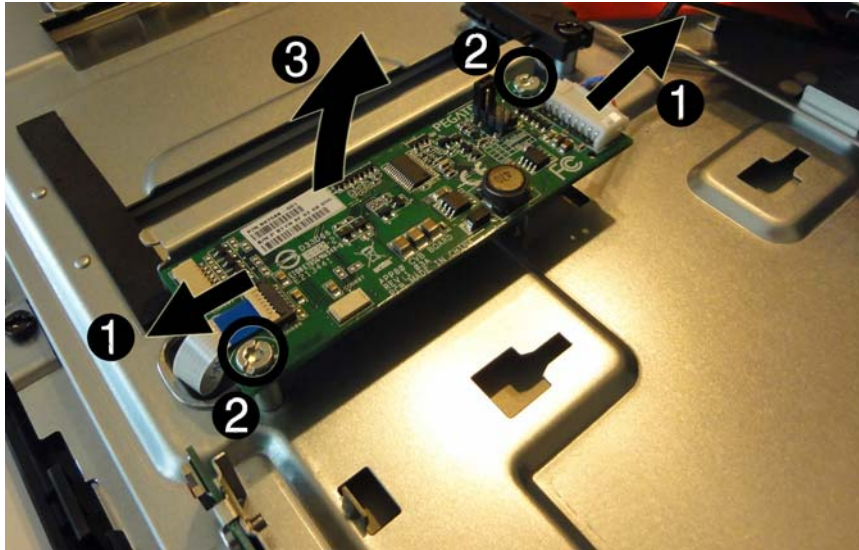
1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 29](#)).
2. Remove the center access panel (see [Center Access Panel on page 32](#)).
3. Remove the memory access panel (see [Memory Access Panel on page 34](#)).
4. Remove the drive access panel (see [Drive Access Panel on page 35](#)).
5. Remove the stand (see [Stand on page 33](#)).
6. Remove the optical drive (see [Optical Drive on page 37](#)).
7. Remove the top panel (see [Top Panel on page 45](#)).
8. Remove the rear cover (see [Rear Cover on page 48](#)).
9. Disconnect the two cables from the board **(1)**.

 **NOTE:** Be careful not to damage the cables when disconnecting them from the board. Do not pull on the wires.

10. Remove the two silver Torx screws **(2)** that secure the board to the computer.

11. Lift the converter board from the computer (3).

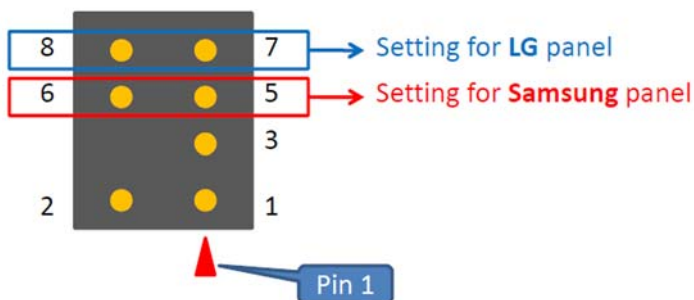
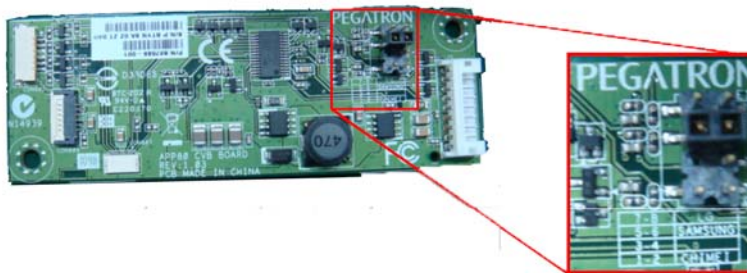
Figure 6-36 Removing the converter board



Be sure to correctly position the jumpers on the converter board for the installed display panel, as follows:

CAUTION: Incorrect jumper placement can result in damage to the converter board.

- LG panel: pins 8 & 7
- Samsung panel: pins 6 & 5

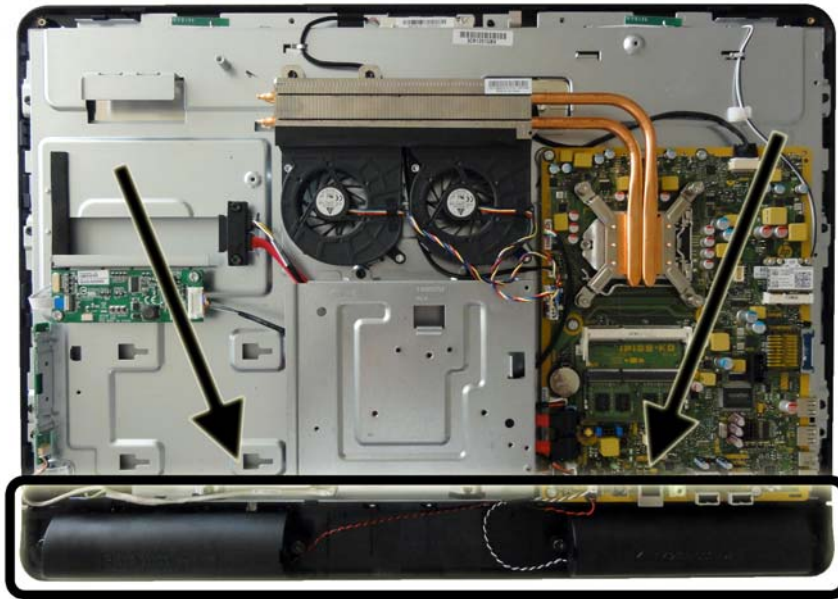


To install the converter board, reverse the removal procedures.

Speakers

The speakers are located at the bottom of the computer. Two separate speakers are each secured by two Torx screws and have separate cables and system board connectors.

Figure 6-37 Speaker location

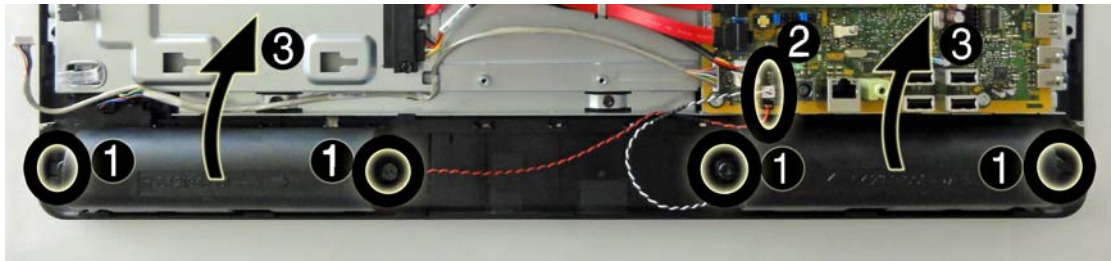


To remove the speakers:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 29](#)).
2. Remove the center access panel (see [Center Access Panel on page 32](#)).
3. Remove the memory access panel (see [Memory Access Panel on page 34](#)).
4. Remove the drive access panel (see [Drive Access Panel on page 35](#)).
5. Remove the stand (see [Stand on page 33](#)).
6. Remove the optical drive (see [Optical Drive on page 37](#)).
7. Remove the top panel (see [Top Panel on page 45](#)).
8. Remove the rear cover (see [Rear Cover on page 48](#)).
9. Remove the system board cover (see [System Board Cover on page 49](#)).
10. Remove two Torx screws **(1)** that secure each speaker to the computer.
11. Disconnect the speaker cables from the system board connectors **(2)**. The left speaker connects to the white connector labeled SPKR_L. The right speaker connects to the black connector labeled SPKR_R.

12. Remove the speakers from the computer (3).

Figure 6-38 Removing the speakers

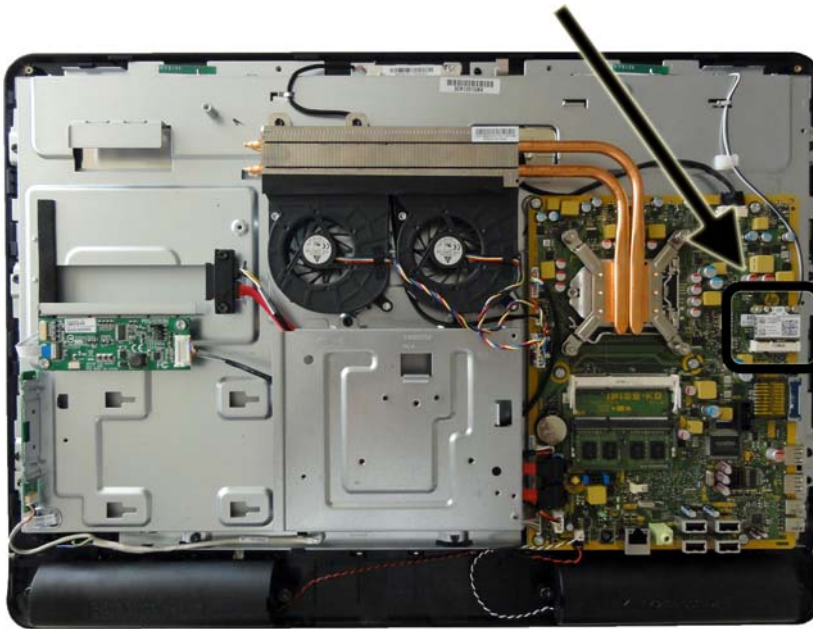


To install the speakers, reverse the removal procedures.

WLAN Module

The WLAN module is located on the right side of the system board. The module is secured with two Phillips screws and has two connected antennas.

Figure 6-39 WLAN module location

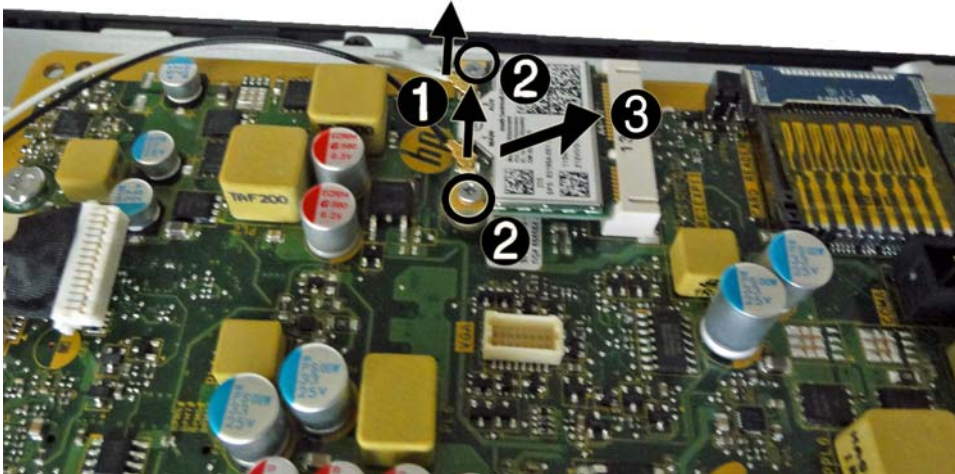


To remove the WLAN module:


1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 29](#)).
2. Remove the center access panel (see [Center Access Panel on page 32](#)).
3. Remove the memory access panel (see [Memory Access Panel on page 34](#)).
4. Remove the drive access panel (see [Drive Access Panel on page 35](#)).
5. Remove the stand (see [Stand on page 33](#)).
6. Remove the optical drive (see [Optical Drive on page 37](#)).

7. Remove the top panel (see [Top Panel on page 45](#)).
8. Remove the rear cover (see [Rear Cover on page 48](#)).
9. Remove the system board cover (see [System Board Cover on page 49](#)).
10. Disconnect the antenna cables from the module (1).
11. Remove the two Phillips screws (2) that secure the module to the computer.
12. Lift the module to a 45-degree angle (3), and then pull it away to remove it from the socket.

Figure 6-40 Removing the WLAN module

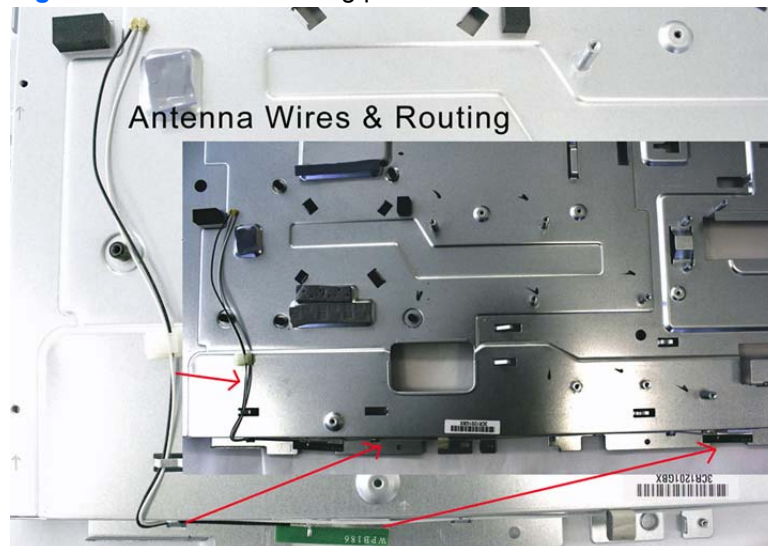


To install the WLAN module, reverse the removal procedures.

 **NOTE:** WLAN modules are designed with a notch to prevent incorrect insertion.

The following image shows the WLAN antenna routing paths.

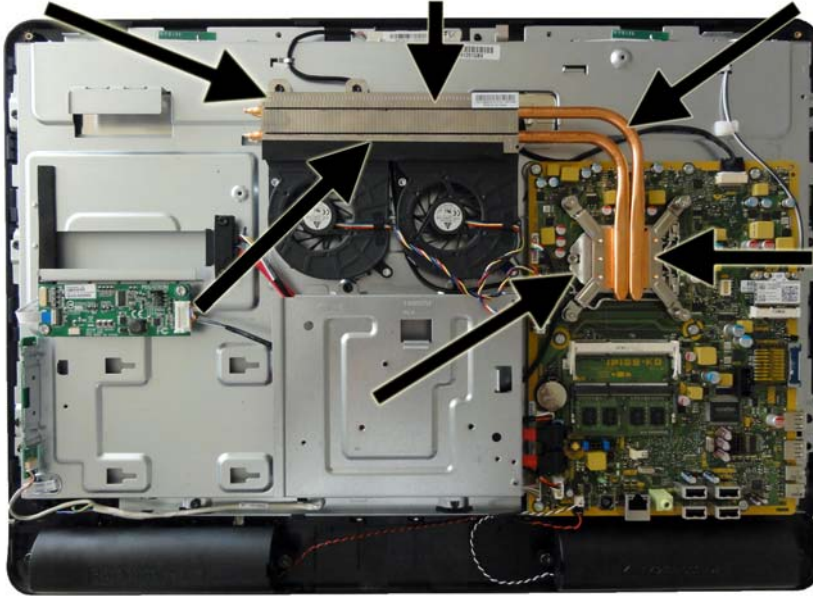
Figure 6-41 Antenna routing paths



Heat Sink (Thermal Module)

The heat sink is secured with six Torx screws. You do not have to remove the fans to remove the heat sink.

Figure 6-42 Heat sink location



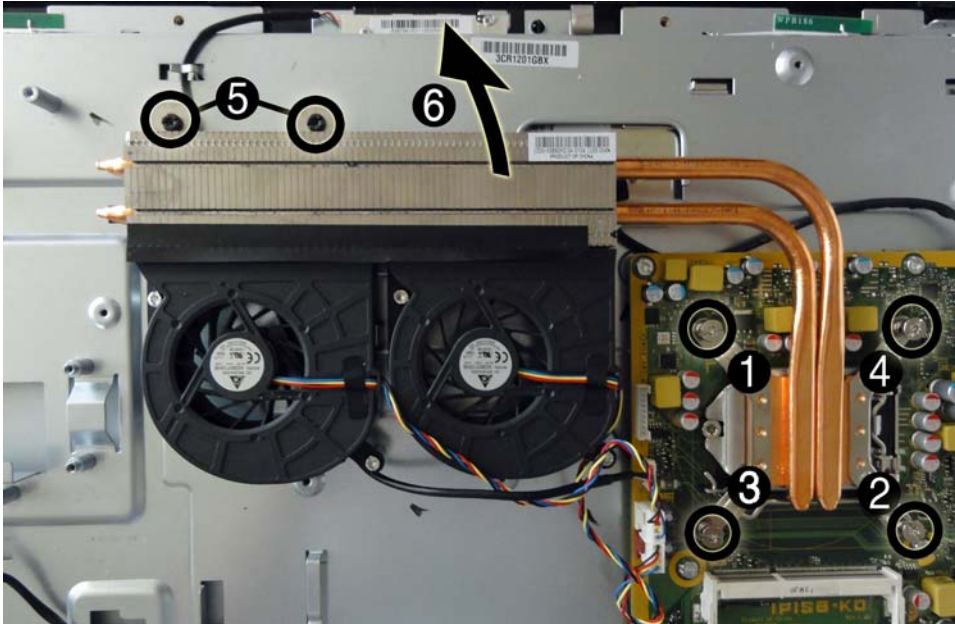
To remove the heat sink:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 29](#)).
2. Remove the center access panel (see [Center Access Panel on page 32](#)).
3. Remove the memory access panel (see [Memory Access Panel on page 34](#)).
4. Remove the drive access panel (see [Drive Access Panel on page 35](#)).
5. Remove the stand (see [Stand on page 33](#)).
6. Remove the optical drive (see [Optical Drive on page 37](#)).
7. Remove the top panel (see [Top Panel on page 45](#)).
8. Remove the rear cover (see [Rear Cover on page 48](#)).
9. Remove the system board cover (see [System Board Cover on page 49](#)).
10. Loosen the four silver captive Torx screws in the order indicated on the heat sink **(1) - (4)**.
11. Remove the two black Torx screws from the top of the heat sink **(5)**.

12. Lift the heat sink from the computer (6).

CAUTION: To reduce a degradation in thermal performance, be sure not to touch the thermal grease on the surface of the processor or the heat sink.

Figure 6-43 Removing the heat sink



To replace the heat sink, reverse the removal procedures.

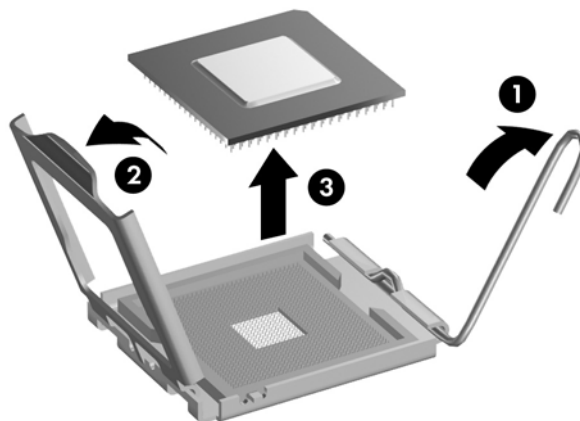
Processor

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 29](#)).
2. Remove the center access panel (see [Center Access Panel on page 32](#)).
3. Remove the memory access panel (see [Memory Access Panel on page 34](#)).
4. Remove the drive access panel (see [Drive Access Panel on page 35](#)).
5. Remove the stand (see [Stand on page 33](#)).
6. Remove the optical drive (see [Optical Drive on page 37](#)).
7. Remove the top panel (see [Top Panel on page 45](#)).
8. Remove the rear cover (see [Rear Cover on page 48](#)).
9. Remove the system board cover (see [System Board Cover on page 49](#)).
10. Remove the heat sink (see [Heat Sink \(Thermal Module\) on page 59](#)).
11. Rotate the locking lever to its full open position **(1)**.
12. Raise and rotate the microprocessor retainer to its fully open position **(2)**.
13. 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 heat sink must be installed within 24 hours of installing the processor to prevent damage to the processor's solder connections.

Figure 6-44 Removing the processor





To install a new processor:

1. Place the processor in its socket and close the retainer. Make sure the slot in the processor fits into the post on the socket.
2. Secure the locking lever. If reusing the existing heat sink, go to step 3. If using a new heat sink, go to step 6.
3. If reusing the existing fan sink, clean the bottom of the fan sink with the alcohol pad provided in the spares kit.

 **CAUTION:** Before reinstalling the fan sink you must clean the top of the processor and the bottom of the fan sink 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 fan sink atop the processor.
5. Go to step 7.
6. If using a new fan sink, remove the protective covering from the bottom of the fan sink and place it in position atop the processor.
7. Secure the fan sink to the system board and system board tray.

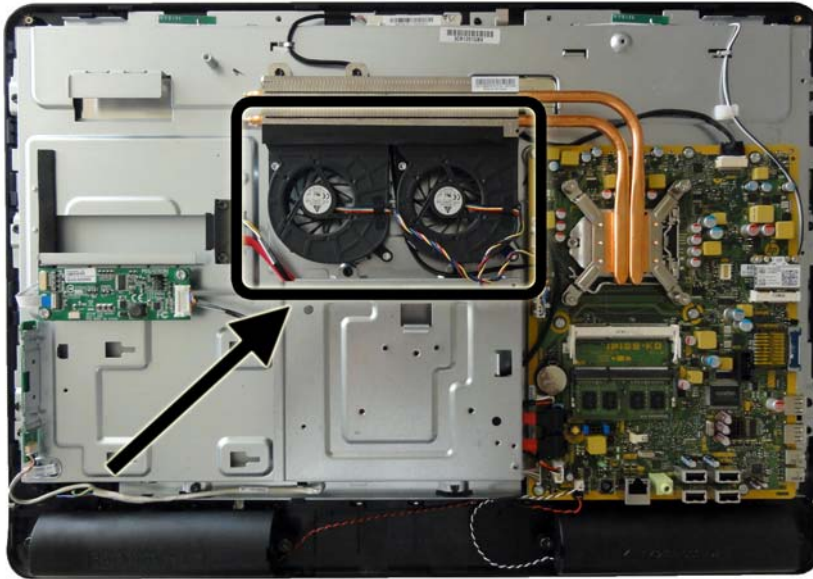
 **CAUTION:** Fan sink retaining screws should be tightened in diagonally opposite pairs (as in an X) to evenly seat the fan sink on the processor. This is especially important as the pins on the socket are very fragile and any damage to them may require replacing the system board.

 **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 computer. The latest system BIOS can be found on the Web at: <http://h18000.www1.hp.com/support/files>.

Fan Assembly

The fan assembly consists of two fans located near the top of the computer below the heat sink. The assembly is secured with four Torx screws (two per fan) and connects to the system board using two separate connectors. You do not have to remove the heat sink to remove the fans.

Figure 6-45 Fan assembly location

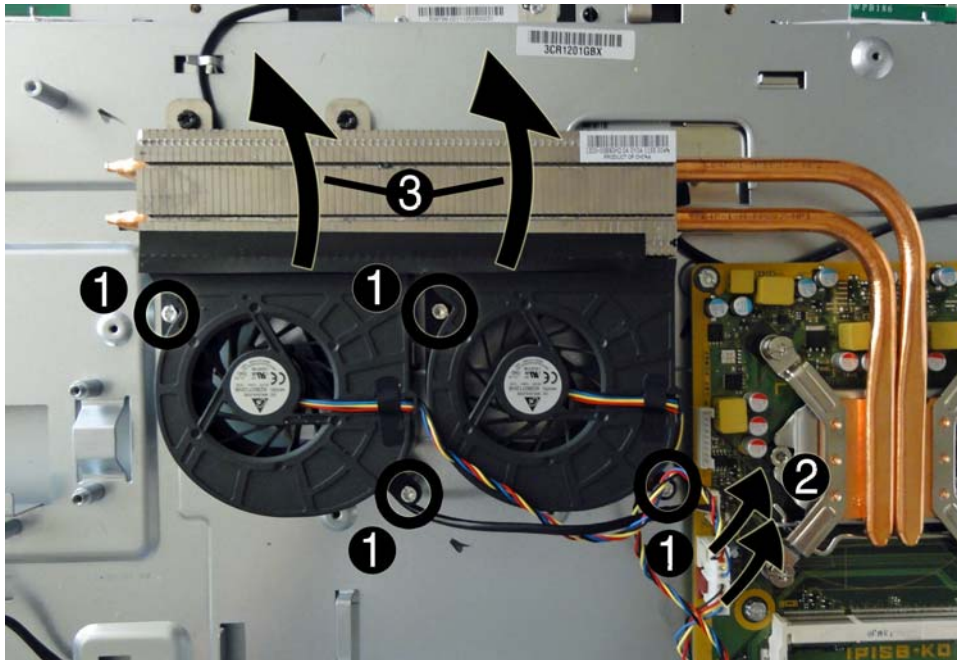


To remove the fan assembly:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 29](#)).
2. Remove the center access panel (see [Center Access Panel on page 32](#)).
3. Remove the memory access panel (see [Memory Access Panel on page 34](#)).
4. Remove the drive access panel (see [Drive Access Panel on page 35](#)).
5. Remove the stand (see [Stand on page 33](#)).
6. Remove the optical drive (see [Optical Drive on page 37](#)).
7. Remove the top panel (see [Top Panel on page 45](#)).
8. Remove the rear cover (see [Rear Cover on page 48](#)).
9. Remove the system board cover (see [System Board Cover on page 49](#)).
10. Remove the four silver Torx screws **(1)** that secure the fan assembly to the computer.
11. Disconnect the fan cables **(2)** from the system board connectors labeled CHFAN and CPUFAN.

12. Lift the fan assembly from the computer (3).

Figure 6-46 Removing the fan assembly

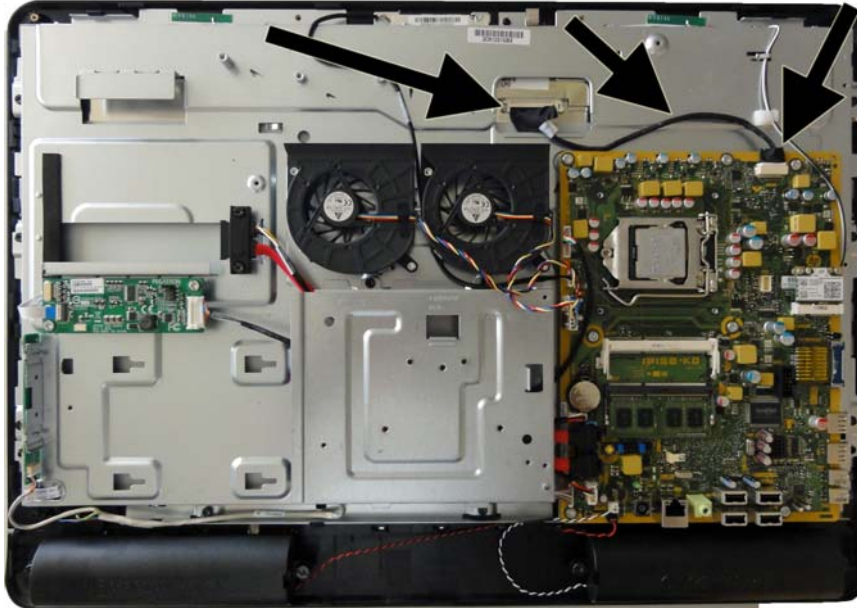


To install the fan assembly, reverse the removal procedures.

Display Cable

The main display cable is located just above the system board. The heat sink covers the connector on the display panel.

Figure 6-47 Display cable location

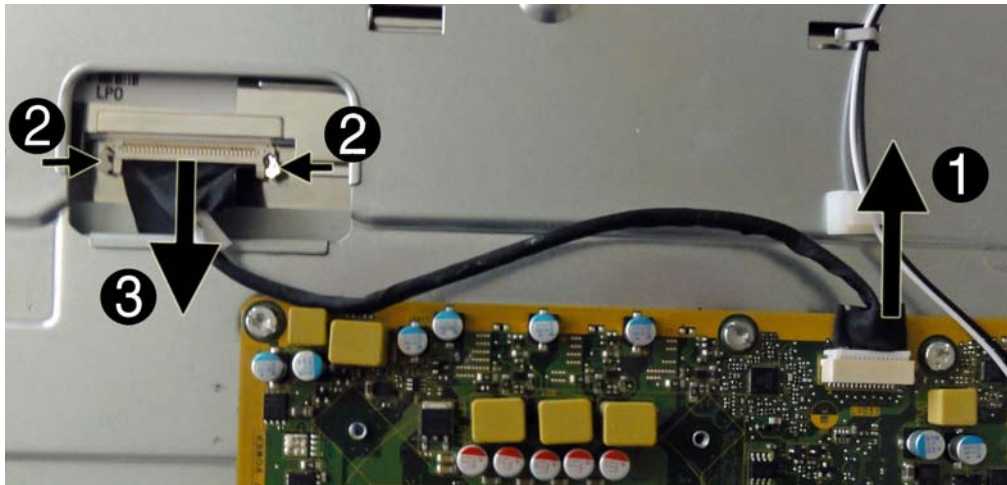


To remove the display cable:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 29](#)).
2. Remove the center access panel (see [Center Access Panel on page 32](#)).
3. Remove the memory access panel (see [Memory Access Panel on page 34](#)).
4. Remove the drive access panel (see [Drive Access Panel on page 35](#)).
5. Remove the stand (see [Stand on page 33](#)).
6. Remove the optical drive (see [Optical Drive on page 37](#)).
7. Remove the top panel (see [Top Panel on page 45](#)).
8. Remove the rear cover (see [Rear Cover on page 48](#)).
9. Remove the system board cover (see [System Board Cover on page 49](#)).
10. Remove the heat sink (see [Heat Sink \(Thermal Module\) on page 59](#)).
11. Disconnect the cable from the LVDS1 connector on the system board (1).

12. Disconnect the cable from the display panel by pressing in the latches on the side of the cable (2) and pulling it from the connector (3).

Figure 6-48 Removing the display cable



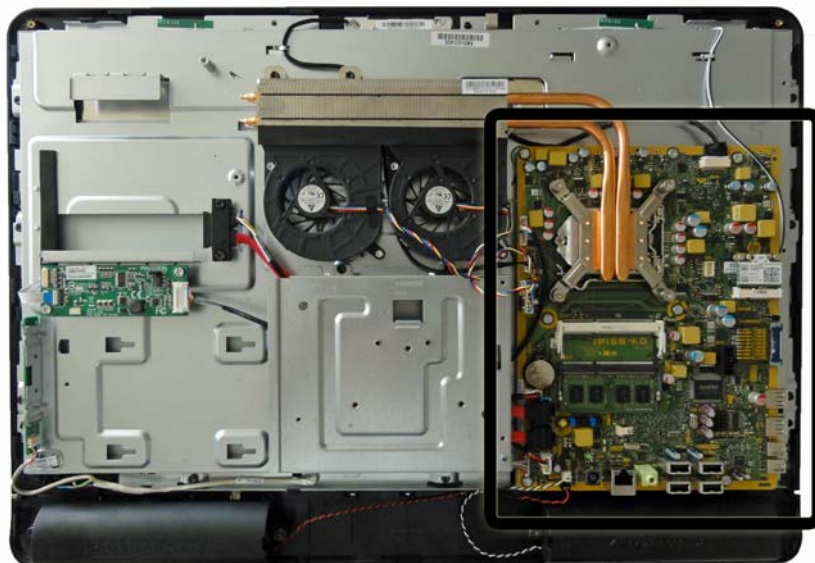
13. Remove the display cable from the computer.

To install the display cable, reverse the removal procedures.

System Board

The system board is located on the right side of the computer (viewed from the rear) under the system board cover. It is secured with seven Torx screws.

Figure 6-49 System board location

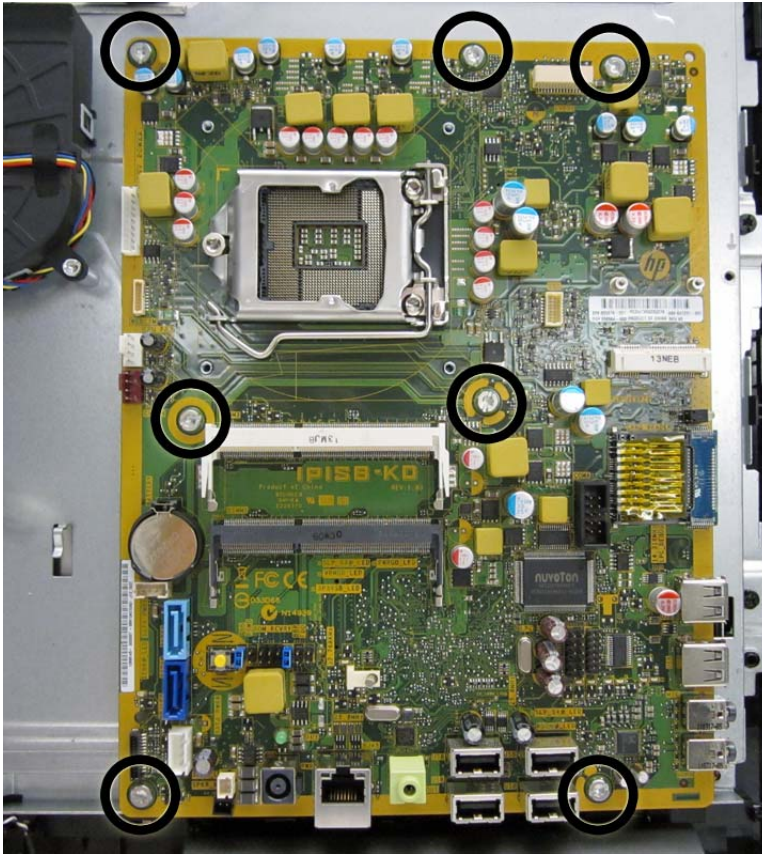


To remove the system board:


1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 29](#)).
2. Remove the center access panel (see [Center Access Panel on page 32](#)).
3. Remove the memory access panel (see [Memory Access Panel on page 34](#)).
4. Remove the memory module (see [Memory on page 42](#)).
5. Remove the drive access panel (see [Drive Access Panel on page 35](#)).
6. Remove the stand (see [Stand on page 33](#)).
7. Remove the optical drive (see [Optical Drive on page 37](#)).
8. Remove the top panel (see [Top Panel on page 45](#)).
9. Remove the rear cover (see [Rear Cover on page 48](#)).
10. Remove the system board cover (see [System Board Cover on page 49](#)).
11. Remove the WLAN module (see [WLAN Module on page 57](#)).
12. Remove the heat sink (see [Heat Sink \(Thermal Module\) on page 59](#)).
13. Remove the processor (see [Processor on page 61](#)).
14. Disconnect all cables from the system board, noting their location for reinstallation.

15. Remove the seven silver Torx screws (circled in image) that secure the system board to the computer.

Figure 6-50 Removing the system board



16. Lift the system board straight up and out of the computer.

 **NOTE:** Before returning the defective system board, remove the CPU cover from the replacement system board and install it on the defective system board.


To install the system board, reverse the removal procedures.

Updating SMBIOS Information

When replacing the system board, you must reprogram the SMBIOS information on the affected computer. Failure to reprogram the board will result in eventual failure, such as an activation failure (need to reactivate the system) or a system recovery failure.

To update SMBIOS information in Computer Setup:

1. Turn on or restart the computer.
2. Press **Esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.

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

3. Press **F10** to enter Computer Setup.

4. Go to **Security > System ID's**.
5. If necessary, press **Ctrl+A** to initiate edit mode.
6. Edit the fields listed. If the feature byte has data or is not editable, then it was not cleared and cannot be edited.

System ID Setup Page

Setup Field Name	Comment	Label
Product Name	Enter the Model name/number or marketing name.	Flexbuild
Serial Number	Enter the Serial Number of Unit.	Support
SKU Number	Enter the SKU or Product Number including Localization Code.	Support
Feature Byte	<p>Enter the Feature Byte string. The feature byte string is case dependent.</p> <p>The label includes spaces after every four characters. You can enter or ignore these spaces – their only purpose is to help with data entry. There is a character limitation of 40 bytes per line. When you reach this limit, go to the next line to continue data entry. BIOS ignores the spaces and lines.</p> <p>If you make an error during data entry, the data will not validate, and the computer asks you to correct your data input.</p>	Flexbuild
Build ID	The Build ID of the unit.	Flexbuild

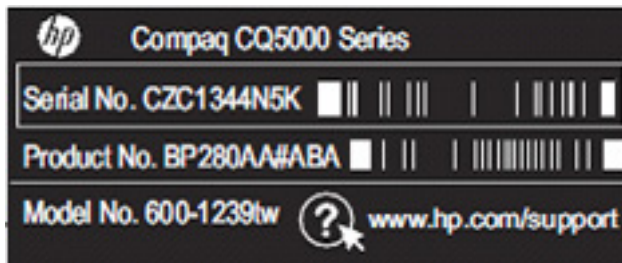
Flexbuild Support Label

Use the following labels to locate the Build ID, Feature Byte, and Product Name.



Support Label

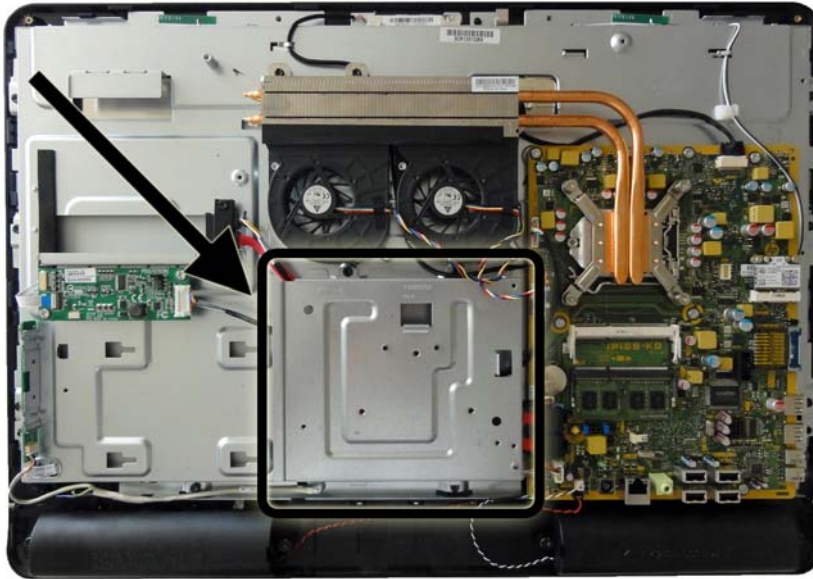
Use the following labels to locate the Serial Number and Product Number.



Stand Bracket

The stand bracket is located near the middle of the computer, below the fans. Remove the bracket to gain access to the drive cables and sidekey board cable assembly. The bracket is secured with four Torx screws.

Figure 6-51 Stand bracket location

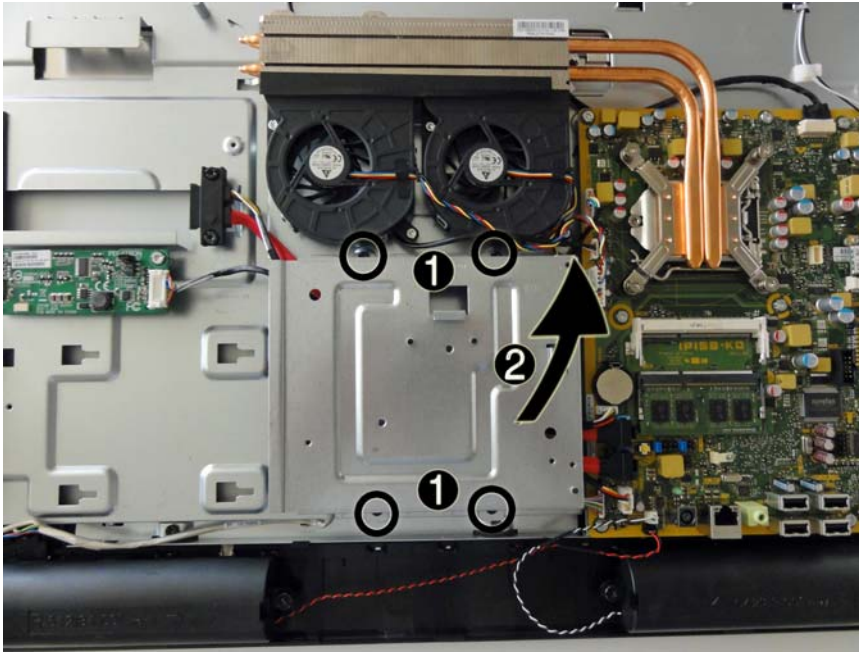


To remove the stand bracket:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 29](#)).
2. Remove the center access panel (see [Center Access Panel on page 32](#)).
3. Remove the memory access panel (see [Memory Access Panel on page 34](#)).
4. Remove the drive access panel (see [Drive Access Panel on page 35](#)).
5. Remove the stand (see [Stand on page 33](#)).
6. Remove the optical drive (see [Optical Drive on page 37](#)).
7. Remove the top panel (see [Top Panel on page 45](#)).
8. Remove the rear cover (see [Rear Cover on page 48](#)).
9. Remove the system board cover (see [System Board Cover on page 49](#)).
10. Remove the four black Torx screws (1) that secure the stand bracket to the computer.

11. Lift the bracket from the computer (2).

Figure 6-52 Removing the stand bracket



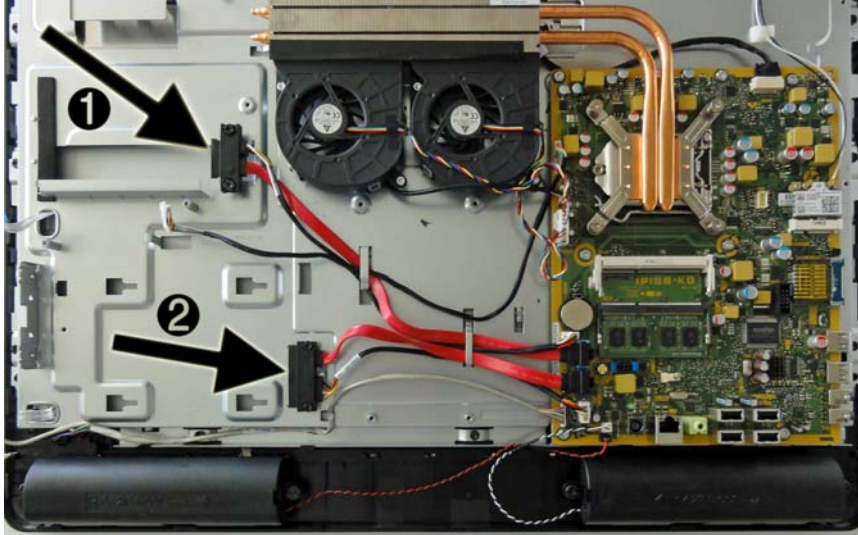
To install the stand bracket, reverse the removal procedures.

Hard Drive and Optical Drive Cables and Connectors

The hard drive and optical drive connectors are located near the middle of the computer, below the fans, and under the bracket that secures the stand. Each connector is secured with two Torx screws and has two cables that connect to the system board.

The optical drive connector **(1)** is positioned above the hard drive connector **(2)**. The optical drive connector cables are longer than the hard drive connector cables.

Figure 6-53 Hard drive cable and optical drive cable location



To remove the hard drive or optical drive connector:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 29](#)).
2. Remove the center access panel (see [Center Access Panel on page 32](#)).
3. Remove the memory access panel (see [Memory Access Panel on page 34](#)).
4. Remove the drive access panel (see [Drive Access Panel on page 35](#)).
5. Remove the stand (see [Stand on page 33](#)).
6. Remove the hard drive (see [Hard Drive on page 39](#)).
7. Remove the optical drive (see [Optical Drive on page 37](#)).
8. Remove the top panel (see [Top Panel on page 45](#)).
9. Remove the rear cover (see [Rear Cover on page 48](#)).
10. Remove the system board cover (see [System Board Cover on page 49](#)).
11. Remove the stand bracket (see [Stand Bracket on page 71](#)).
12. Remove two silver Torx screws that secure the hard drive connector **(1)** or the optical drive connector **(2)** to the computer.
13. Remove the cables from the metal clips **(3)** built into the computer.

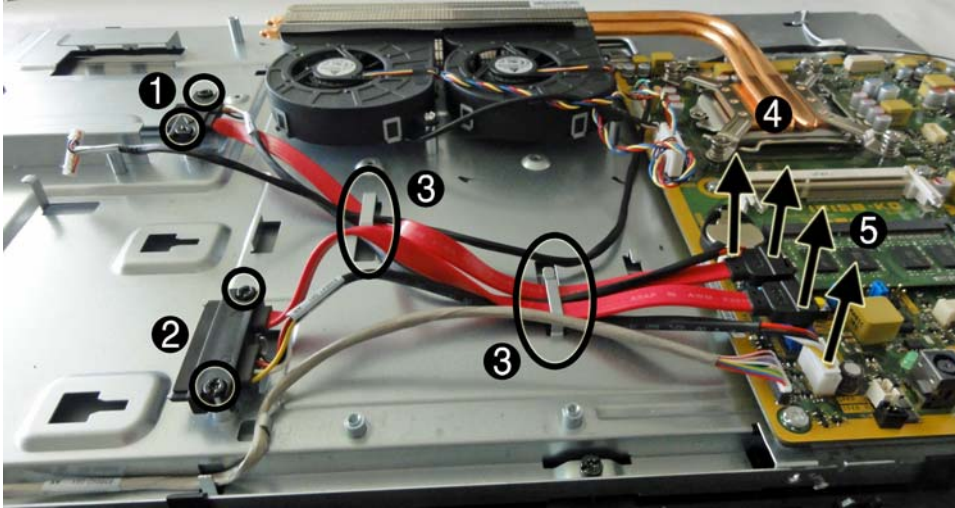
14. Disconnect the hard drive cables (4) or the optical drive cables (5) from the system board.



NOTE: Be careful not to damage the cable when disconnecting it from the board. Do not pull on the wires.

15. Remove the connector from the computer.

Figure 6-54 Removing the hard drive or optical drive connectors



To install the hard drive or optical drive connector, reverse the removal procedures.

Front Bezel

The front bezel is located on the front of the computer and is secured to the main system bracket with eight Torx screws and eight tabs. You must remove the main system bracket from the bezel to gain access to the bezel and to the display panel. The display panel sits between the main bracket and the front bezel.

You can remove the front bezel without disassembling many of the computer's components. Most components can remain attached to the display panel bracket. The following procedure demonstrates removing the bezel while removing the smallest number of components possible.

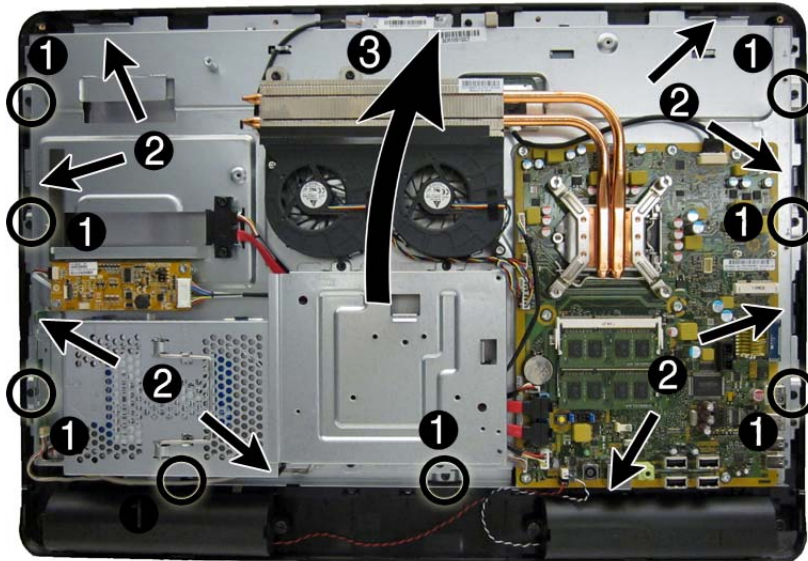
To remove the front bezel:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 29](#)).
2. Remove the center access panel (see [Center Access Panel on page 32](#)).
3. Remove the memory access panel (see [Memory Access Panel on page 34](#)).
4. Remove the memory module (see [Memory on page 42](#)).
5. Remove the drive access panel (see [Drive Access Panel on page 35](#)).
6. Remove the stand (see [Stand on page 33](#)).
7. Remove the optical drive (see [Optical Drive on page 37](#)).
8. Remove the top panel (see [Top Panel on page 45](#)).
9. Remove the rear cover (see [Rear Cover on page 48](#)).
10. Remove the system board cover (see [System Board Cover on page 49](#)).
11. Disconnect the speaker cables from the system board.
12. Disconnect the backlight cable from the converter board.
13. Disconnect the display cable from the system board.
14. Remove the power switch assembly cable from the front bezel. You do not have to remove the remaining cables.
15. Remove the eight black Torx screws **(1)** that secure the bezel to the main system bracket assembly.
16. Lift the eight tabs **(2)** that secure the bezel to the main system bracket assembly. Be sure to slide the bracket free from the tabs as you lift each one.

17. Lift the main system bracket assembly off the front bezel (3).

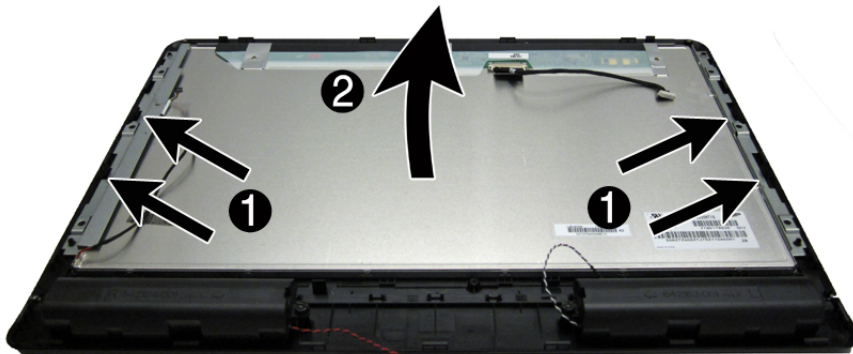
The display panel sits between the main bracket assembly and the front bezel.

Figure 6-55 Removing the main bracket assembly from the front bezel



18. Lift the display panel from the front bezel by pressing the four tabs (two on each side) to release the panel from the bezel, and then lifting the panel off the bezel.

Figure 6-56 Removing the display panel from the front bezel



To install the front bezel, reverse the removal procedures.

Display Panel

Two different display panels are available, LG and Samsung.

To ensure compatibility, when replacing the display panel, remove the backlight cable with the old panel and replace with the new cable supplied in the replacement kit.

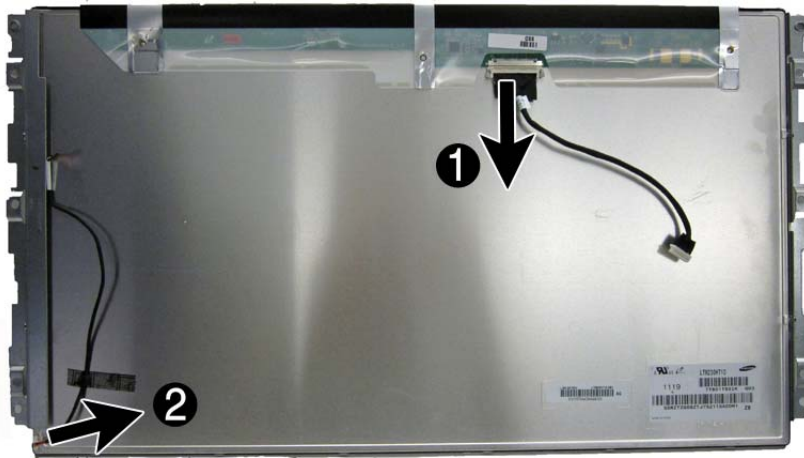
The display panel is secured to the display bracket with four Torx screws, as follows:

- LG - two screws on top, two screws on the bottom
- Samsung - two screws on each side

To remove the display panel:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 29](#)).
2. Remove the center access panel (see [Center Access Panel on page 32](#)).
3. Remove the memory access panel (see [Memory Access Panel on page 34](#)).
4. Remove the memory module (see [Memory on page 42](#)).
5. Remove the drive access panel (see [Drive Access Panel on page 35](#)).
6. Remove the stand (see [Stand on page 33](#)).
7. Remove the optical drive (see [Optical Drive on page 37](#)).
8. Remove the top panel (see [Top Panel on page 45](#)).
9. Remove the rear cover (see [Rear Cover on page 48](#)).
10. Remove the system board cover (see [System Board Cover on page 49](#)).
11. Remove the power switch assembly cable. You do not have to remove the remaining cables.
12. Remove the front bezel (see [Front Bezel on page 75](#)).
13. Disconnect the display cable (1) and the backlight cable (2) from the display panel.

Figure 6-57 Removing the display cable and backlight cables from the display panel



14. Remove the four silver Torx screws that secure the display panel to the frame or brackets.

The LG panel mounts to a large frame using four screws - two on top, two on the bottom.

The Samsung panel mounts to two small brackets, one on each side. Each bracket is secured by two screws.

15. If removing the LG panel, lift the display panel from the frame.

If removing the Samsung panel, remove the brackets from the display panel.

Figure 6-58 Removing the display panel – LG panel

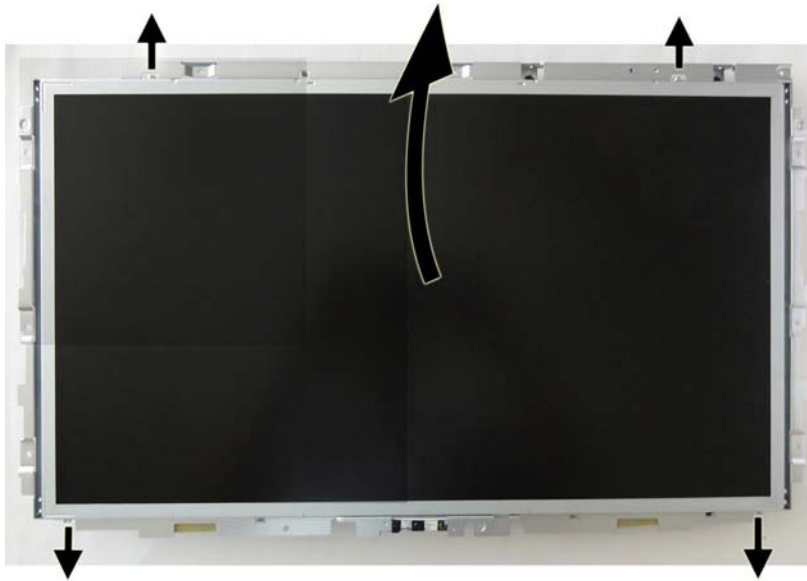


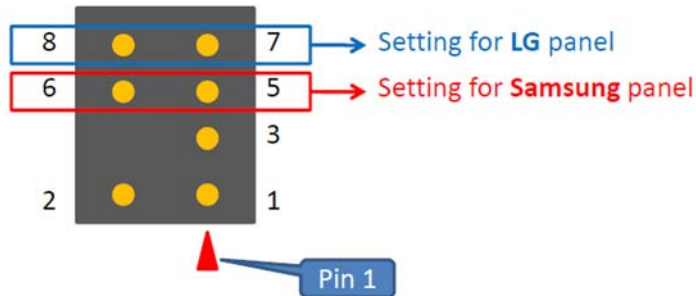
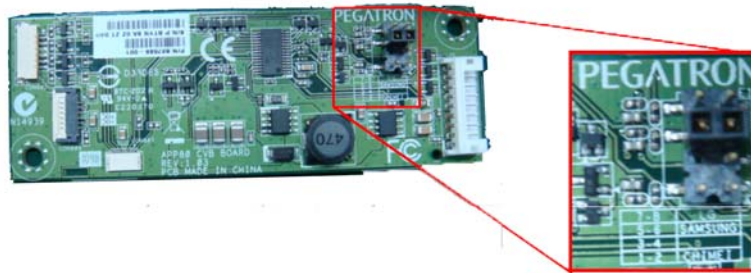
Figure 6-59 Removing the display panel – Samsung panel



16. Be sure to correctly position the jumpers on the converter board for the installed display panel, as follows:

CAUTION: Incorrect jumper placement can result in damage to the converter board.

- LG panel: pins 8 & 7
- Samsung panel: pins 6 & 5



To install a display panel, reverse the removal procedures.

The following images show how the brackets should be installed on Samsung panels. Each bracket is secured to the side of the panel with two Torx screws.

Figure 6-60 Samsung panel bracket locations



Figure 6-61 Samsung panel bracket – left side



Figure 6-62 Samsung panel brackets – right side




A Password Security and Resetting CMOS

This computer supports security password features, which can be established through the Computer Setup Utilities menu.

This computer supports two security password features that are established through the Computer Setup Utilities menu: setup password and power-on password. When you establish only a setup password, any user can access all the information on the computer except Computer Setup. When you establish only a power-on password, the power-on password is required to access Computer Setup and any other information on the computer. When you establish both passwords, only the setup password will give you access to Computer Setup.

When both passwords are set, the setup password can also be used in place of the power-on password as an override to log in to the computer. This is a useful feature for a network administrator.

If you forget the password for the computer, you can clear that password so you can gain access to the information on the computer by resetting the password jumper.

 **CAUTION:** Pushing the CMOS button will reset CMOS values to factory defaults. It is important to back up the computer CMOS settings before resetting them in case they are needed later. Back up is easily done through Computer Setup. See [Computer Setup \(F10\) Utility on page 9](#) for information.

Establishing a Setup or Power-on Password

To establish the power-on or setup password features, complete the following steps:

1. Turn on or restart the computer.
2. As soon as the computer turns on, press the **Esc** key while “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
3. Press the **F10** key to enter Computer Setup.
4. To establish Setup password, select **Security > Setup Password** and follow the instructions.

– or –


To establish a Power-On password, select **Security > Power-On Password** and follow the instructions on the screen


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

Resetting a Setup or Power-on Password

To disable the power-on or setup password features, or to clear the power-on or setup passwords, complete the following steps:


1. Shut down the operating system properly, then turn off the computer and any external devices, and disconnect the power cord from the power outlet.
2. With the power cord disconnected, press the power button again to drain the system of any residual power.

 **WARNING!** To reduce the risk of personal injury from electrical shock and/or hot surfaces, be sure to disconnect the power cord from the wall outlet, and allow the internal system components to cool before touching.

 **CAUTION:** When the computer is plugged in, the power supply always has voltage applied to the system board even when the unit is turned off. Failure to disconnect the power cord can result in damage to the system.

Static electricity can damage the electronic components of the computer or optional equipment. Before beginning these procedures, ensure that you are discharged of static electricity by briefly touching a grounded metal object. See the *Safety & Regulatory Information* guide for more information.

3. Remove the access panel.
4. Locate the header and jumper labeled PSWD (the label may be under the memory module).

 **NOTE:** The password jumper is blue so that it can be easily identified. For assistance locating the password jumper and other system board components, see the Illustrated Parts & Service Map (IPSM). The IPSM can be downloaded from <http://www.hp.com/support>.

5. Remove the jumper.
6. Replace the jumper.
7. Replace the access panel.
8. Reconnect the external equipment.
9. Plug in the computer and turn on power. Allow the operating system to start. This clears the current passwords and disables the password features.
10. Establish the new passwords in Computer Setup. See [Computer Setup \(F10\) Utility on page 9](#) for information.


Clearing and Resetting the CMOS


The computer's configuration memory (CMOS) stores information about the computer's configuration.

The CMOS button resets CMOS but does not clear the power-on and setup passwords.

Clearing CMOS will clear the Active Management Technology (AMT) settings in the Management Engine BIOS Extension (MEBx), including the password. The password will default to "admin" and will need to be reset. The AMT settings will also need to be reset. To access the MEBx, press **Ctrl+P** during POST.


1. Turn off the computer and any external devices, and disconnect the power cord from the power outlet.
2. Disconnect the keyboard, monitor, and any other external equipment connected to the computer.

 **WARNING!** To reduce the risk of personal injury from electrical shock and/or hot surfaces, be sure to disconnect the power cord from the wall outlet, and allow the internal system components to cool before touching.

 **CAUTION:** When the computer is plugged in, the power supply always has voltage applied to the system board even when the unit is turned off. Failure to disconnect the power cord can result in damage to the system.

Static electricity can damage the electronic components of the computer or optional equipment. Before beginning these procedures, ensure that you are discharged of static electricity by briefly touching a grounded metal object. See the *Safety & Regulatory Information* guide for more information.

3. Remove the computer cover or access panel.

 **CAUTION:** Pushing the CMOS button will reset CMOS values to factory defaults. It is important to back up the computer CMOS settings before resetting them in case they are needed later. Back up is easily done through Computer Setup. See [Computer Setup \(F10\) Utility on page 9](#) for information.

4. Locate, press, and hold the CMOS button in for five seconds.




 **NOTE:** Make sure you have disconnected the AC power cord from the wall outlet. The CMOS button will not clear CMOS if the power cord is connected.

Figure A-1 CMOS button



 **NOTE:** For assistance locating the CMOS button and other system board components, see the Illustrated Parts & Service Map (IPSM) for that particular system.

5. Replace the computer cover or access panel.
6. Reconnect the external devices.
7. Plug in the computer and turn on power.

 **NOTE:** You will receive POST error messages after clearing CMOS and rebooting advising you that configuration changes have occurred. Use Computer Setup to reset any special system setups along with the date and time.

See [Computer Setup \(F10\) Utility on page 9](#) for information.

B 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 computer 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](#), [F11](#), or [F12](#)). The default mode is POST Message Disabled.

The speed at which the computer 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 computer to the Full Boot Every x Days mode, using Computer Setup.

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 computer will beep once after a POST text message is displayed on the screen.

Table B-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.
162-System Options Not Set	Configuration incorrect. RTC (real-time clock) battery may need to be replaced.	Run Computer Setup and check the configuration in Advanced > Device Options . Reset the date and time under Control Panel . If the problem persists, replace the RTC battery. See the <i>Hardware Reference Guide</i> for instructions on installing a new battery, or contact an authorized dealer or reseller for RTC battery replacement.
163-Time & Date Not Set	Invalid time or date in configuration memory. RTC (real-time clock) battery may need to be replaced.	Reset the date and time under Control Panel (Computer Setup can also be used). If the problem persists, replace the RTC battery. See the <i>Hardware Reference Guide</i> for instructions on installing a new battery, or contact an authorized dealer or reseller for RTC battery replacement.

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

Control panel message	Description	Recommended action
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. Ensure memory modules are correctly installed. 2. Verify proper memory module type. 3. Remove and replace the identified faulty memory module(s). 4. 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 computer turned off. 2. Check connector for bent or missing pins. 3. Ensure that none of the keys are depressed. 4. Replace keyboard.
303-Keyboard Controller Error	I/O board keyboard controller.	<ol style="list-style-type: none"> 1. Reconnect keyboard with computer turned off. 2. Replace the system board.

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

Control panel message	Description	Recommended action
304-Keyboard or System Unit Error	Keyboard failure.	<ol style="list-style-type: none"> 1. Reconnect the keyboard with computer turned off. 2. Ensure that none of the keys are depressed. 3. Replace the keyboard. 4. Replace the system board.
510-Flash Screen Image Corrupted	Flash Screen image has errors.	Reflash the system ROM with the latest BIOS image.
511-CPU 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-Rear Chassis Fan not Detected	Rear chassis fan is not connected or may have malfunctioned.	<ol style="list-style-type: none"> 1. Reseat rear chassis fan. 2. Reseat fan cable. 3. Replace rear chassis fan.
513-Front Chassis fan not detected	Front chassis fan is not connected or may have malfunctioned.	<ol style="list-style-type: none"> 1. Reseat front chassis fan. 2. Reseat fan cable. 3. Replace front chassis fan.
912-Computer Cover Has Been Removed Since Last System Startup	Computer 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.
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
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.
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.
1802-Processor Not Supported	Recently installed processor is not supported by the system.	Install a processor supported by your system.

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

Control panel message	Description	Recommended action
1805-Ambient Temperature Previously Over Limit	This system was placed in a low power state to prevent damage due to excessive environmental temperature.	<p>Make sure the system meets the HP enclosure guidelines as listed in the QuickSpecs, including the following:</p> <ol style="list-style-type: none">1. Clean the air vents on the front, back, or any other vented side of the computer.2. Ensure that there is a 10.2 cm (4 in) clearance on all vented sides of the computer to permit the required airflow.3. Ensure that computers are not so near each other that they are subject to each other's re-circulated or preheated air.4. If the computer is within an enclosure, ensure that there is proper intake and exhaust ventilation for the enclosure.
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 computer.2. Unplug the power cord, re-seat the memory modules, and reboot the computer.3. If the memory configuration was recently changed, unplug the computer, restore the original memory configuration, and reboot the computer.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 computer.2. Unplug the power cord, re-seat the memory modules, and reboot the computer.3. If the memory configuration was recently changed, unplug the power cord, restore the original memory configuration, and reboot the computer.4. If the error persists, replace the system board.

Table B-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 computer. 2. Unplug the power cord, re-seat the memory modules, and reboot the computer. 3. If the memory configuration was recently changed, unplug the power cord, restore the original memory configuration, and reboot the computer. 4. If the error persists, replace the system board.
2211-Memory not configured correctly for proper MEBx execution	SODIMM1 is not installed.	Make sure there is a memory module in the SODIMM1 socket and that it is properly seated.
2212-USB Key Provisioning failure writing to device	USB device used for USB key provisioning will not allow BIOS to update provision file properly.	<ol style="list-style-type: none"> 1. Try a different USB key device for provisioning. 2. If the error persists, update to the latest BIOS version and ME firmware version. 3. If the error still persists, replace the system board.
2217-ME Firmware Version request failure	ME firmware is not properly responding to BIOS query for version information.	<ol style="list-style-type: none"> 1. Reboot the computer. 2. If the error persists, update to the latest BIOS version and ME firmware version. 3. If the error still persists, replace the system board.
2218-ME Firmware Version should be updated	ME firmware must be updated to match current functionality contained in the system BIOS.	<ol style="list-style-type: none"> 1. Update to the latest ME firmware version. 2. If the error persists and system BIOS has been recently updated, restore previous system BIOS version. 3. If the error still persists, replace the system board.
2219-USB Key Provisioning file has invalid header identifier	Provisioning file contained on the USB key has been corrupted or is not a valid version for the current ME firmware.	<ol style="list-style-type: none"> 1. Recreate the provisioning file using third party management console software. 2. If the error persists and system BIOS has been recently updated, restore previous system BIOS version. Otherwise, update the ME firmware version. 3. If the error still persists, replace the system board.

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


Control panel message	Description	Recommended action
2220-USB Key Provisioning file has mismatch version	Provisioning file contained on the USB key is not a valid version for the current ME firmware.	<ol style="list-style-type: none"> 1. Reboot the computer. 2. If the error persists and system BIOS has been recently updated, restore previous system BIOS version. Otherwise, update the ME firmware version. 3. If the error still persists, replace the system board.
2230-General error during MEBx execution	Error occurred during MEBx execution which fails into the "General" grouping. Status information displayed along with the error provides further clarity into the failure. MEBx handles transference of information between the system BIOS and ME firmware.	<ol style="list-style-type: none"> 1. Reboot the computer. 2. If the error persists, update to the latest BIOS version and ME firmware version. 3. If the error still persists, replace the system board.
2231-ME error during MEBx execution	Error occurred during MEBx execution which fails into "ME" grouping.	<ol style="list-style-type: none"> 1. Reboot the computer. 2. If the error persists, update to the latest BIOS version and ME firmware version. 3. If the error still persists, replace the system board.
2232-AMT error during MEBx execution	Error occurred during MEBx execution which fails into "AMT" grouping.	<ol style="list-style-type: none"> 1. Reboot the computer. 2. If the error persists, update to the latest BIOS version and ME firmware version. 3. If the error still persists, replace the system board.
2233-HECI error during MEBx execution	Error occurred during MEBx execution which fails into "MEI or HECI" grouping.	<ol style="list-style-type: none"> 1. Reboot the computer. 2. If the error persists, update to the latest BIOS version and ME firmware version. 3. If the error still persists, replace the system board.
Invalid Electronic Serial Number	Electronic serial number is missing.	Enter the correct serial number in Computer Setup.


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

Control panel message	Description	Recommended action
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 computer turned off.2. Check connector for bent or missing pins.3. Ensure that none of the keys are depressed.4. Replace keyboard.
Parity Check 2	Parity RAM failure or a PCI/PCIe device is asserting a SERR#.	Run Computer Setup and Diagnostic utilities. To disable a PCI/PCIe device from asserting a SERR#, run the Computer Setup utility and select Advanced > Bus Options > SERR# Generation > Disable .

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 computer 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.

 **NOTE:** If you see flashing LEDs on a PS/2 keyboard, look for flashing LEDs on the front panel of the computer 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 B-2 Diagnostic Front Panel LEDs and Audible Codes

Activity	Beeps	Possible Cause	Recommended Action
Green Power LED On.	None	Computer on.	None
Green Power LED flashes every two seconds.	None	Computer in Suspend to RAM mode (some models only) or normal Suspend mode.	None required. Press any key or move the mouse to wake the computer.
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	Thermal protection activated: Air flow is restricted, a fan may not be functioning, or the heatsink is not properly attached.	<ol style="list-style-type: none">1. Clean the air vents on the front, back, or any other vented side of the computer.2. Ensure that there is a 10.2 cm (4 in) clearance on all vented sides of the computer to permit the required airflow.3. Ensure that computers are not so near each other that they are subject to each other's re-circulated or preheated air.4. If the computer is within an enclosure, ensure that there is proper intake and exhaust ventilation for the enclosure.5. If a message appears on the screen indicating that a fan is not working, replace the fan.6. Ensure that the heat sink is properly attached.
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 B-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 computer 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. 2. Replace the system board.

Table B-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. Unplug the AC power cord from the computer, wait 30 seconds, then plug the power cord back in to the computer. 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.
Red Power LED flashes eleven times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	11	The current processor does not support a feature previously enabled on this system.	<ol style="list-style-type: none"> 1. Install a TXT capable processor. 2. Disable TXT in the Computer Setup (F10) utility. 3. Reinstall the original processor.
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 and the system board needs to be replaced.</p> <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.

C 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 computer, 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 86](#).

Safety and Comfort

 **WARNING!** Misuse of the computer or failure to establish a safe and comfortable work environment may result in discomfort or serious injury. Refer to the *Safety & Comfort Guide* at <http://www.hp.com/ergo> for more information on choosing a workspace and creating a safe and comfortable work environment. For more information, refer to the *Safety & Regulatory Information* guide.

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 computer 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.

Table C-1 Solving General Problems

Computer 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 computer turns off.2. Disconnect the power cord from the electrical outlet.

Computer will not respond to USB keyboard or mouse.

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

Computer date and time display is incorrect.

Cause	Solution
RTC (real-time clock) battery may need to be replaced. NOTE: Connecting the computer 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 Removal and Replacement section 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.

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.

Poor performance is experienced.

Cause	Solution
Processor is hot.	<ol style="list-style-type: none">1. Make sure airflow to the computer is not blocked. Leave a 10.2-cm (4-inch) clearance on all vented sides of the computer 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 heat sink 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 computer.
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.2. Add more 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 > All Programs > Accessories > Run and type <code>msconfig</code>. On the Startup tab of the System Configuration Utility, clear applications that you do not want to launch automatically.
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 computer.

Computer powered off automatically and the Power LED flashes Red two times, once every second, followed by a two second pause, and the computer 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 heat sink is not properly attached to the processor.	<ol style="list-style-type: none"> 1. Ensure that the computer 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 heat sink/fan assembly.

System does not power on and the LEDs on the front of the computer 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. 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 computer and check that the power button board cable is properly connected to the system board. 3. Check that 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 board. 5. If the 5V_aux light on the system board is off, then replace the power supply. 6. Replace the system board.

Solving Power Problems

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

Table C-2 Solving Power Problems

Computer powered off automatically and the Power LED flashes red two times, once every second, followed by a two second pause, and the computer 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 heat sink is not properly attached to the processor.	<ol style="list-style-type: none">1. Ensure that the computer 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 heat sink/fan assembly.

Power LED flashes red four times, once every second, followed by a two second pause, and the computer 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 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.2. Replace the power supply.3. Replace the system board.

Solving Diskette Problems

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



NOTE: The computer does not support internal diskette drives. Only USB diskette drives are supported.



NOTE: You may need to reconfigure the computer when you add or remove hardware, such as an additional diskette drive. See [Solving Hardware Installation Problems on page 117](#) for instructions.

Table C-3 Solving Diskette Problems

Diskette drive light stays on.

Cause	Solution
Diskette is damaged.	Click Start , click Explore , and right-click on a drive. Select Properties then select the Tools tab. 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.

Cause	Solution
Cable is loose.	Reseat diskette drive data and power cable.
Removable drive is not seated properly.	Reseat the drive.
The device has been hidden in Computer Setup.	Run the Computer Setup utility and ensure Device Available is selected for the Legacy Diskette in Security > Device Security .

Diskette drive cannot write to a diskette.

Cause	Solution
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.
Diskette is damaged.	Replace the damaged disk.

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.	Right-click Start , click Explore , and right-click on a drive. Select Properties then select the Tools tab. 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 computer has been inserted in the drive.	When drive activity stops, remove the diskette and press the Spacebar . The computer should start up.
Diskette error has occurred.	Restart the computer by pressing the power button.

Cannot Boot to Diskette.

Cause	Solution
Diskette is not bootable.	Replace with a bootable diskette.

Table C-3 Solving Diskette Problems (continued)**Cannot Boot to Diskette.**

Cause	Solution
Diskette boot has been disabled in Computer Setup.	<ol style="list-style-type: none"> 1. Run Computer Setup and enable USB device in Storage > Boot Order. 2. Run Computer Setup and enable USB device in Storage > Storage Options > Removable Media Boot. <p>NOTE: Both steps should be used as the Removable Media Boot function in Computer Setup overrides the Boot Order enable command.</p>
Network server mode is enabled in Computer Setup.	Run Computer Setup and disable Network Server Mode in Security > Password Options .

Solving Hard Drive Problems

Table C-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. Right-click Start, click Explore, and right-click on a drive. Select Properties then select the Tools tab. 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.	Right-click Start , click Explore , and right-click on a drive. Select Properties then select the Tools tab. Under Error-checking click Check Now .

Drive not found (identified).

Cause	Solution
Cable could be loose.	Check cable connections.

Table C-4 Solving Hard Drive Problems (continued)

Drive not found (identified).	
Cause	Solution
The system may not have automatically recognized a newly installed device.	See reconfiguration directions in the Solving Hardware Installation Problems on page 117 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 .
The device is attached to a SATA port that has been hidden in Computer Setup.	Run the Computer Setup utility and ensure Device Available is selected for the device's SATA port in Security > Device Security .
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 computer. 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.
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 computer. 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.
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 dark blue SATA connector.
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.

Computer will not boot from hard drive.

Cause	Solution
The device is attached to a SATA port that has been hidden in Computer Setup.	Run the Computer Setup utility and ensure Device Available is selected for the device's SATA port in Security > Device Security .
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 .
Hard drive is damaged.	Observe if the front panel Power LED is blinking RED and if any beeps are heard. See Appendix A, POST Error Messages on page 86 to determine possible causes for the blinking red and beep codes. See the Worldwide Limited Warranty for terms and conditions.

Computer 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 computer, press the power button again.

The removable hard drive is not recognized by the computer.

Cause	Solution
The removable hard drive carrier is not fully seated in the enclosure frame or the hard drive is not fully seated in the carrier.	Push the carrier into the enclosure frame so that the connector on the rear of the frame is properly seated. If this does not solve the problem, turn off the computer, remove the carrier, and check to see if the connector on the hard drive is properly seated in the carrier.

The removable hard drive enclosure is beeping and the green LED is flashing.

Cause	Solution
Fan failure alarm on the removable hard drive enclosure has been activated.	Shut down the computer and contact HP for a replacement enclosure.

Solving Media Card Reader Problems

Table C-5 Solving Media Card Reader Problems

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 writable. Refer to the previous section for a list of compatible cards.
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.

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 computer's software is used to safely eject the card.	Open 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

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

Cause	Solution
The operating system needs time to recognize the device if the reader was just installed into the computer and you are turning the PC 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 computer 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.

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 C-6 Solving Display Problems

Blank screen (no video).

Cause	Solution
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.
Computer 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 computer will shut down and you will lose any unsaved data.

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

Cause	Solution
Pre-video graphics error.	For systems with a graphics card: <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. For systems with integrated graphics, replace the system board.

Blank screen and the power LED flashes red seven times, once every second, followed by a two second pause, and the computer 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.

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. 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.2. 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 monitor's Menu button to access the OSD menu. Select ImageControl/ Horizontal Position or Vertical Position to adjust the horizontal or vertical position of the image.

"Out of Range" displays on screen.

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

High pitched noise coming from inside 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
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 computer has audio features and you encounter audio problems, see the common causes and solutions listed in the following table.

Table C-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.

Sound does not come out of the speaker or headphones.

Cause	Solution
Software volume control is turned down or muted.	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 > System Audio .
The external speakers are not turned on.	Turn on the external speakers.
The audio device may be connected to the wrong jack.	Ensure that the device is connected to the correct jack on the computer. The speakers should be plugged into the rear line-out jack and the headphones should be plugged into the front headphone jack.
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. In the Device Manager, right-click on the CD/DVD device and select Properties . 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.
Computer 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 computer will shut down and you will lose any unsaved data.
Internal speaker is disabled in Computer Setup.	Enable the internal speaker in Computer Setup. Select Advanced > Device Options > Internal Speaker .
The application is set to use a different audio device than speakers.	Some graphics cards support audio over the DisplayPort connection, so multiple audio devices may be listed in Device Manager. Make sure the correct device is being used.

Table C-7 Solving Audio Problems (continued)**Sound does not come out of the speaker or headphones.**

Cause	Solution
Some applications can select which audio output device is used.	Make sure the application has selected the correct audio device.
The operating system controls may be set to use a different audio device as the default output device than what is expected.	Set the operating system to use the correct audio device.

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 computer.

Computer 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 jack is not functioning properly.

Cause	Solution
Jack has been reconfigured in the audio driver or application software.	In the audio driver or application software, reconfigure the jack or set the jack to its default value.

There is no sound or sound volume is too low.

Cause	Solution
The application is set to use a different audio device than speakers.	Some graphics cards support audio over the DisplayPort connection, so multiple audio devices may be listed in Device Manager. Make sure the correct device is being used.
Some applications can select which audio output device is used.	Make sure the application has selected the correct audio device.
The operating system controls may be set to use a different audio device as the default output device than what is expected.	Set the operating system to use the correct audio device.

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 C-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: <code>DIR C:\ > [printer port]</code> where [printer port] is the address of the printer being used. If the printer works, reload the printer driver.
If you are on a network, you may not have made the connection to the printer.	Make the proper network connections to the printer.
Printer may have failed.	Run printer self-test.

Printer will not turn on.

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 C-9 Solving Keyboard Problems**Keyboard commands and typing are not recognized by the computer.**

Cause	Solution
Keyboard connector is not properly connected.	<ol style="list-style-type: none">1. Click Start, click the arrow on the lower right corner of the Start menu, then select Shut Down.2. After the shutdown is complete, reconnect the keyboard to the back of the computer and restart the computer.
Program in use has stopped responding to commands.	Shut down your computer using the mouse and then restart the computer.
Keyboard needs repairs.	See the Worldwide Limited Warranty for terms and conditions.
Computer 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 computer 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 C-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 computer.	Shut down the computer 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 arrow keys to select Shut Down and then press the Enter key.3. After the shutdown is complete, plug the mouse connector into the back of the computer (or the keyboard) and restart.
Program in use has stopped responding to commands.	Shut down the computer using the keyboard then restart the computer.
Mouse may need cleaning.	Remove the roller ball cover on the mouse and clean the internal components.

Table C-10 Solving Mouse Problems (continued)

Mouse does not respond to movement or is too slow.

Cause	Solution
Mouse may need repair.	See the Worldwide Limited Warranty for terms and conditions.
Computer 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 computer 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 computer stores.

Solving Hardware Installation Problems

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


 **WARNING!** When the computer 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.

Table C-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 computer, turn on the external device, then turn on the computer to integrate the device with the computer system.
When the system advised you of changes to the configuration, you did not accept them.	Reboot the computer and follow the instructions for accepting the changes.
A plug and play board may not automatically configure when added if the default configuration conflicts with other devices.	Use Windows 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 computer are disabled in Computer Setup.	Run the Computer Setup utility and ensure that Device available is selected for appropriate USB ports under Security > USB Security .

Computer 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. NOTE: DIMM1 or XMM1 must always be installed. DIMM1 must be installed before DIMM2, and DIMM3 must be installed before DIMM4.2. Observe the beeps and LED lights on the front of the computer. Beeps and flashing LEDs are codes for specific problems.3. If you still cannot resolve the issue, contact Customer Support.

Power LED flashes red five times, once every second, followed by a two second pause, and the computer 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 computer 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. <p>NOTE: DIMM1 or XMM1 must always be installed. DIMM1 must be installed before DIMM2, and DIMM3 must be installed before DIMM4</p> <ol style="list-style-type: none">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 computer 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 computer 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 C-12 Solving Network Problems**Wake-on-LAN feature is not functioning.**

Cause	Solution
S5 Maximum Power Saving feature is enabled.	Disable the S5 Maximum Power Saving option in Computer Setup. Select Power > Hardware Power Management > S5 Maximum Power Saving .
S5 Wake on LAN is disabled.	: Enable the S5 Wake on LAN option in Computer Setup. Select Advanced > Device Options > S5 Wake on LAN .
Wake-on-LAN is not enabled.	<ol style="list-style-type: none"> 1. Select Start > Control Panel. 2. Under Network and Internet, select View network status and tasks. 3. Click Local Area Connection. 4. Click the Properties button. 5. Click the Configure button. 6. Click the Power Management tab, then select the check box to Allow this device to wake the computer.

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.
Network driver is not properly loaded.	Reinstall network drivers.
System cannot autosense the network.	Disable auto-sensing capabilities and force the system into the correct operating mode.

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.	Contact an authorized service provider.

Diagnostics passes, but the computer 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 computer.	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 computer.

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.

Network controller stops working without apparent cause.

Cause	Solution
The files containing the network drivers are corrupted.	Reinstall the network drivers, using the Recovery Disc Set created from the hard drive's Recovery Partition.
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.	Contact an authorized service provider.

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 an authorized service provider.

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 computer is turned off (depending on the Management Engine (ME) settings). To avoid damage to the DIMMs or the system board, you must unplug the computer 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 computer will not boot the operating system.

Table C-13 Solving Memory Problems

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

Cause	Solution
A memory module is not installed in the DIMM1 or XMM1 socket.	Ensure that a memory module is installed in the DIMM1 or XMM1 socket on the system board. This socket must be populated with a memory module.
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 computer. 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 computer.

Power LED flashes red five times, once every second, followed by a two second pause, and the computer 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">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.

Solving Processor Problems

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

Table C-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 computer is not blocked. 2. Make sure the fans are connected and working properly (some fans only operate when needed). 3. Make sure the processor heat sink 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.

Power LED flashes red eleven times, once every second, followed by a two second pause.

Cause	Solution
The current processor does not support a feature previously enabled on this system.	<ol style="list-style-type: none"> 1. Install a TXT capable processor. 2. Disable TXT in the Computer Setup (F10) utility. 3. Reinstall the original 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 C-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 hidden in the Computer Setup utility.	Run the Computer Setup utility and ensure Device Available is selected for the device's SATA port in Security > Device Security .
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 117 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 hidden in Computer Setup.	Run the Computer Setup utility and ensure Device Available is selected for the device's SATA port in Security > Device Security .
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.

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 computer 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 computer 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 computer 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.

Solving USB Flash Drive Problems

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

Table C-16 Solving USB Flash Drive Problems

USB flash drive is not seen as a drive letter in Windows.

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

USB flash drive 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 "Front USB Ports" and "Rear 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 flash drive.

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 computer boots to DOS after making a bootable flash drive.

Cause	Solution
Flash drive is bootable.	Install the flash drive only after the operating system boots.

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 C-17 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 computer's RJ-45 connector. (If the connection is good, the "PC" LED light on the front of the cable/DSL modem will be on.)

Table C-17 Solving Internet Access Problems (continued)

Unable to connect to the Internet.	
Cause	Solution
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.)	<ol style="list-style-type: none">1. Select Start > Control Panel.2. Click Network and Internet.3. Click Internet Options.4. In the Browsing history section on the General tab, click the Delete button.5. Select the Cookies check box and click the Delete 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.	<p>Verify that the modem is connected and communicating properly.</p> <ol style="list-style-type: none">1. Select Start > Control Panel.2. Click on Hardware and Sound.3. Click on Device Manager.4. Double-click Modems.5. Double-click Agere Systems PCI-SV92PP Soft Modem.6. On the General tab, click Diagnostics.7. Click Query Modem. A “Success” response indicates the modem is connected and working properly.

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.

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

Table C-18 Solving Software Problems

Computer 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 computer. See Appendix A, POST Error Messages on page 86 to determine possible causes. See the Restore Kit or the Worldwide Limited Warranty for terms and conditions.

Computer will not continue after HP logo screen has appeared.

Cause	Solution
System files may be damaged.	Use recovery diskette to scan hard drive for errors.

“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 computer.

Contacting Customer Support

For help and service, contact an authorized reseller or dealer. To locate a reseller or dealer near you, visit <http://www.hp.com>.




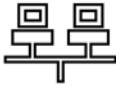
NOTE: If you take the computer to an authorized reseller, dealer, or service provider for service, remember to provide the setup and power-on passwords if they are set.

Refer to the number listed in the warranty or in the *Support Telephone Numbers* guide for technical assistance.

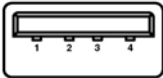

D Connector Pin Assignments

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.



Ethernet BNC

Connector and Icon	Pin	Signal
 	1	Data
	2	Ground

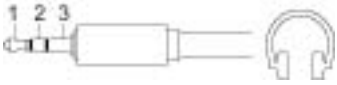
USB

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

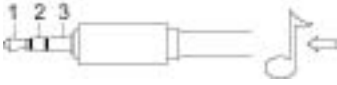
Microphone

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

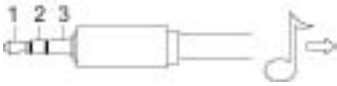
Headphone

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

E Power Cord Set Requirements

The power supplies on some computers have external power switches. The voltage select switch feature on the computer 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 computer meets the requirements for use in the country where you purchased the equipment.


Power cord sets for use in other countries must meet the requirements of the country where you use the computer.

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.

F Specifications

All-in One Models

Table F-1 Specifications

Desktop Dimensions		
Height	23.00 in	58.4 cm
Width	18.58 in	47.2 cm
Depth	9.06 in	23.0 cm
Approximate Weight	18.7 lb	8.5 kg
Display		
Resolution	1920x1080 (16:9)	1920x1080 (16:9)
Contrast ratio	1000:1 (typical)	1000:1 (typical)
Image brightness	250 nits (typical)	250 nits (typical)
Viewing angle (typical)	Up to 170° horizontal/160° vertical	Up to 170° horizontal/160° vertical
Temperature Range		
Operating	50° to 95°F	10° to 35°C
Nonoperating	-22° to 149°F	-30° to 65°C
Relative Humidity (noncondensing)		
Operating	15-80% at 79°F	15-80% at 26°C
Maximum Altitude (unpressurized)		
Operating	0 - 6,562 ft	0 - 2000 m
Nonoperating	0 - 15,000 ft	4,572 m
Power Supply		
Rated Voltage Range	100-240 V	100-240 V
Rated Line Frequency	50-60 Hz	50-60 Hz
Max Operating Power	<180 W	<180 W
Idle Operating Power	Integrated graphics: 58 W	Integrated graphics: 58 W
	Discrete graphics: 66 W	Discrete graphics: 66 W

Index

A

audible codes 94
audio problems 112

B

battery
 disposal 28
beep codes 94
booting options
 Full Boot 86
 Quick Boot 86

C

cable pinouts
 SATA data 20
cautions
 AC power 22
 cables 28
 electrostatic discharge 23
 keyboard cleaning 26
 keyboard keys 27
CD-ROM or DVD problems 123
center access panel
 removing 32
cleaning
 computer 26
 mouse 27
 safety precautions 26
CMOS
 backing up 81
 clearing and resetting 84
components
 front 3
 rear 5
 side 4
computer cleaning 26
connector pin assignments 130
converter board
 removing 54

country power cord set
 requirements 133
Customer Support 129

D

diskette problems 102
display cable
 removing 65
display panel
 removing 76
drive access panel
 removing 35

E

electrostatic discharge (ESD) 23
 preventing damage 23
error
 codes 86, 94
 messages 87
ethernet
 BNC pin assignments 130

F

fan assembly
 removing 63
features
 overview 1
flash drive problems 125
flashing LEDs 94
front bezel
 removing 75
front components 3

G

general problems 98
grounding methods 24

H

hard drive
 proper handling 28

 removing 39
 SATA characteristics 20
hard drive connector
 removing 73
hard drive problems 104
hardware installation problems 117
headphone pin assignments 131
heat sink
 removing 59

I

Internet access problems 126

K

keyboard
 cleaning 26
 synchronizing wireless 30
keyboard problems 114

L

LEDs
 blinking power 94
 blinking PS/2 keyboard 94
line-in audio pin assignments 131
line-out audio pin assignments 131

M

Media Card Reader problems 107
memory access panel
 removing 34
memory module
 removing 42
memory problems 121
microphone pin assignments 130
monitor problems 108

- mouse
 - cleaning 27
 - synchronizing wireless 30
- mouse problems 114

N

- network problems 118
- numeric error codes 87
- O**
- opening the computer 29
- operating guidelines 25
- optical drive
 - removing 37
- optical drive connector
 - removing 73
- optical drive problems 123
- overheating, prevention 25

P

- password
 - clearing 81
 - power-on 81
 - setup 81
- POST error messages 86
- power cord set requirements
 - country specific 133
- power problems 101
- power supply 134
- power-on password 81
- printer problems 114
- problems
 - audio 112
 - CD-ROM or DVD 123
 - diskette 102
 - flash drive 125
 - general 98
 - hard drive 104
 - hardware installation 117
 - Internet access 126
 - keyboard 114
 - Media Card Reader 107
 - memory 121
 - monitor 108
 - mouse 114
 - network 118
 - power 101
 - printer 114
 - processor 122
 - software 128
- processor problems 122

R

- rear components 5
- rear cover
 - removing 48
- removal and replacement procedures
 - All-in One chassis 29
 - center access panel 32
 - converter board 54
 - display cable 65
 - display panel 76
 - drive access panel 35
 - fan assembly 63
 - front bezel 75
 - hard drive 39
 - hard drive connector 73
 - heat sink 59
 - memory 42
 - memory access panel 34
 - optical drive 37
 - optical drive connector 73
 - preparing to disassemble the computer 29
 - rear cover 48
 - sidekey board 51
 - speakers 56
 - stand 33
 - stand bracket 71
 - system board 67
 - system board cover 49
 - thermal module 59
 - top panel 45
 - webcam module 46
 - WLAN module 57
- resetting
 - CMOS 81
 - password jumper 81

S

- safety and comfort 97
- safety precautions
 - cleaning 26
- SATA
 - connectors on system board 20
 - data cable pinouts 20
 - hard drive characteristics 20
- screws, correct size 27
- service considerations 27
- setup password 81

- side components 4
- software
 - problems 128
 - servicing computer 27
- spare part number
 - tamper-resistant wrench 27
 - Torx T-15 screwdriver 27
- speakers
 - removing 56
- specifications
 - computer 134
- stand
 - removing 33
- static electricity 23
- synchronizing wireless keyboard
 - and mouse 30
- system board
 - removing 67
 - SATA connectors 20
- system board cover
 - removing 49

T

- tamper-proof screws
 - tool 27
- temperature control 25
- thermal module
 - removing 59
- tilt adjustment 6
- tools, servicing 27
- top panel
 - removing 45
- Torx T15 screwdriver 27

U

- USB pin assignments 130

V

- ventilation, proper 25
- volume button board
 - removing 51

W

- Wake-on-LAN feature 119
- webcam module
 - removing 46
- WLAN module
 - removing 57