



Maintenance & Service Guide

HP Pro 3420 All-in-One Business PC

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Maintenance & Service Guide


HP Pro 3420 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.

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1 Product Features

Overview

Figure 1-1 HP Pro 3420 All-in-One Business PC



HP Pro 3420 All-in-One Business PC offers the following features:

- Integrated All-in-One form factor
- 20-inch diagonal widescreen LED HD+ anti-glare display (non-touch)
- Adjustable tilt stand
- Intel® 2nd Generation Core™ i3 and Intel Pentium Processors
- Intel H61 Chipset
- Genuine Windows 7 Home Basic, Genuine Windows 7 Home Premium, Genuine Windows 7 Professional, Genuine Windows 7 Starter, Redflag, or FreeDOS (APJ only)
- Integrated Intel HD Graphics
- Integrated Network Connection (10/100/1000 NIC)
- Integrated low-light webcam; stereo speakers
- Wireless connectivity: HP Wireless NIC 802.11b/g/n Mini Card

- Up to 8 GB of DDR3 SDRAM supported, dual channel memory support
- Up to 2 TB hard drive
- HP Slim SATA 8X SuperMulti Drive
- 6-in-1 Media Card Reader
- USB Keyboard and Mouse
- ENERGY STAR® qualified (for Windows OS only), EPEAT® Silver registered (where applicable/ supported)
- BFR/PVC Free*

*Meeting the industry definition of 'BFR/PVC-free' per the iNEMI Position Statement on "Low Halogen" Electronics. Plastic parts incorporated into the chassis generally contain < 1000 ppm (0.1%) of bromine or chlorine. Printed circuit board and substrate laminates generally contain < 1500 ppm (0.15%) of total bromine and chlorine. Service parts after purchase may not be BFR/PVC-free. External accessories, including power supplies, power cords, and peripherals are not BFR/PVC-free.

Front Components

Figure 1-2 Front Components

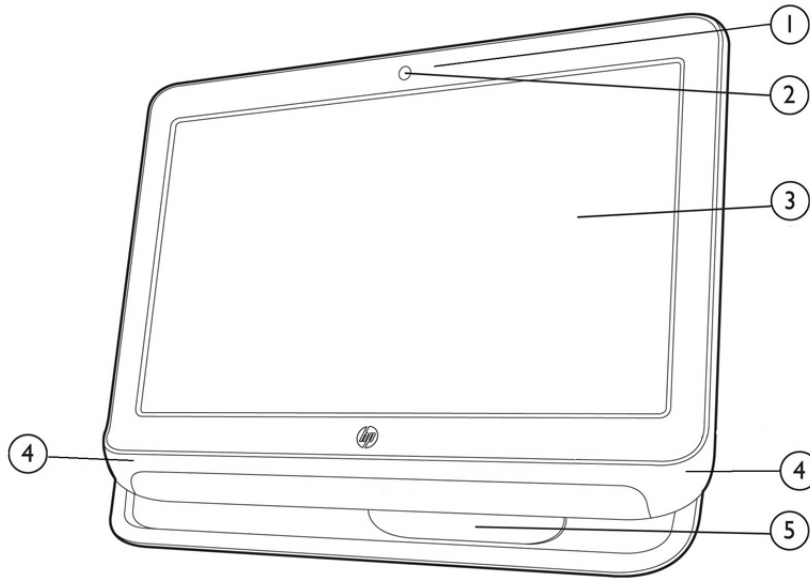


Table 1-1 Front Components

Component	Component
1 Dual microphones	4 Stereo speakers
2 Integrated low-light webcam	5 Adjustable tilt stand
3 20-inch diagonal widescreen LED HD+ anti-glare display	

Rear Components

Figure 1-3 Rear Components

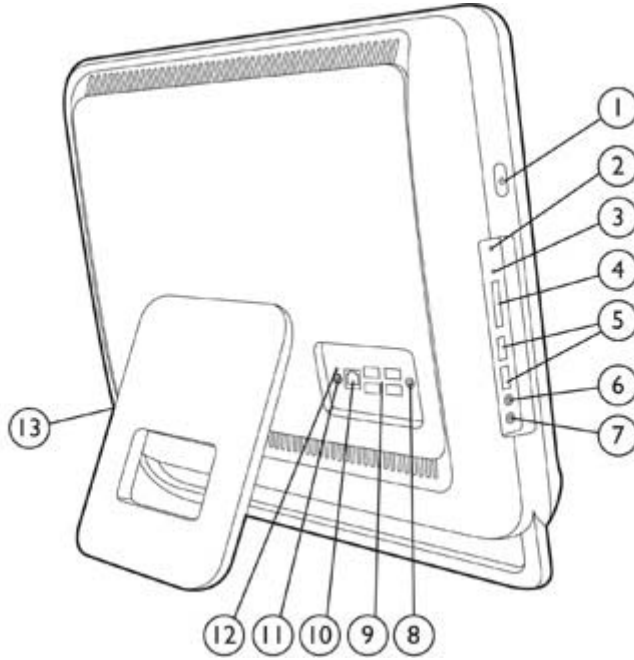




Table 1-2 Rear Components


Component	Component
1 Power Button	8 Line out
2 LED Indicator (HDD activity)	9 4 USB 2.0 ports
3 LED Indicator (Card reader activity)	10 RJ 45/Ethernet
4 6-in-1 Media Card Reader	11 Power Connector
5 2 USB 2.0 ports	12 LED Indicator (DC-IN)
6 MIC jack (IN)	13 Lock slot
7 Headphone jack (OUT)	

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 Vista or 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.

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
--------	-------------

Table 3-1 Computer Setup—File (continued)

System Information	Lists: <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	Save to Removable Media <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> Restore from Removable Media <p>Restores system configuration from a diskette, a USB flash media device, or a diskette-like device.</p>
Default Setup	Save Current Settings as Default <p>Saves the current system configuration settings as the default.</p> Restore Factory Settings as Default <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	<p>Lists all installed BIOS-controlled storage devices.</p> <p>When a device is selected, detailed information and options are displayed. The following options may be presented:</p> <p>Hard Disk: Size, model, firmware, serial number, connector color, SMART, translation mode.</p> <p>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.</p> <p>CAUTION: Ordinarily, the translation mode selected automatically by the BIOS should not be changed. If the selected translation mode is not compatible with the translation mode that was active when the disk was partitioned and formatted, the data on the disk will be inaccessible.</p> <p>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.</p> <p>Default Values: Allows you to specify the default values for the Multisector Transfers, Transfer Mode, and Translation Mode for ATA devices.</p> <p>CD-ROM: Model, firmware, serial number, connector color. No emulation options available.</p>
Storage Options	<p>Removable Media Boot</p> <p>Enables/disables ability to boot the system from removable media. Default is enable.</p> <p>SATA Emulation</p> <p>Allows you to choose how the SATA controller and devices are accessed by the operating system. There are two supported options: AHCI and IDE.</p> <p>AHCI (default option) - Allows operating systems with AHCI device drivers loaded to take advantage of more advanced features of the SATA controller.</p> <p>IDE - This is the most backwards-compatible setting of the two options. Operating systems usually do not require additional driver support in IDE mode.</p> <p>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).</p>

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	Allows you to update: <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	Allows you to set the computer to turn on automatically at a time you specify.
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	Allows you to set resources for or disable on-board system devices (serial ports).

Table 3-5 Computer Setup—Advanced (continued)

Device Options	Allows you to set: <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	Allows you to set: <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 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.

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 23](#) 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 23](#) 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 23](#).

When cleaning debris from under the keys, review all rules in [General Cleaning Safety Precautions on page 23](#) 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 23](#).

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 23](#).

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)
- Torx T15 screwdriver
- Phillips #2 screwdriver
- Phillips #1 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 20](#)
- 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.

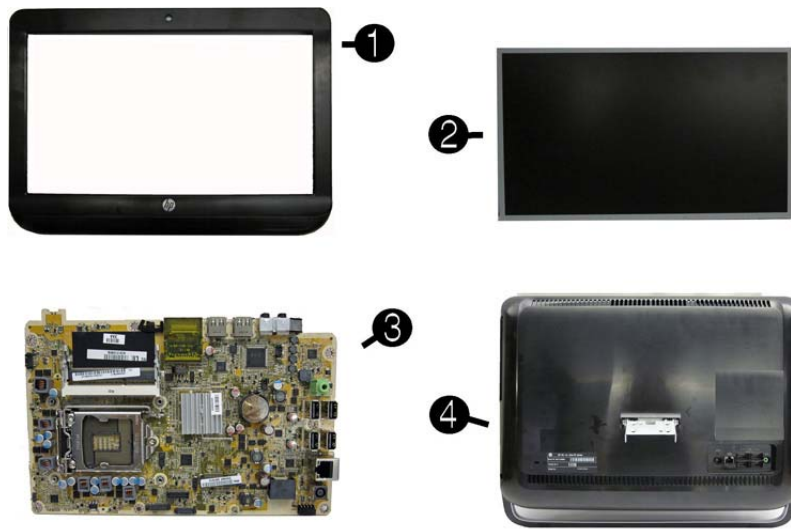
See the appropriate removal and replacement chapter for the chassis you are working on in this guide for instructions on the replacement procedures.

 **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.

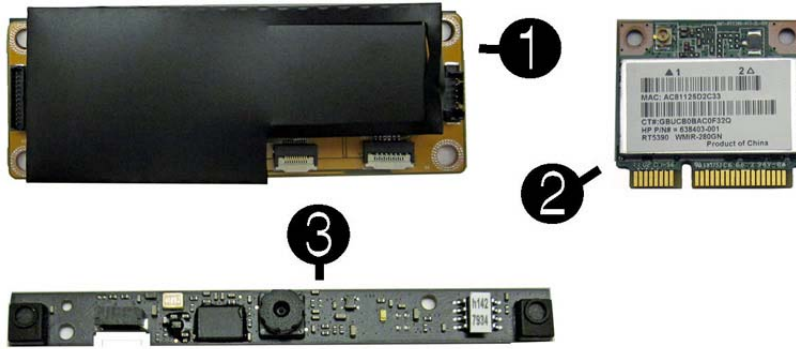
6 Illustrated parts catalog

Computer major components



Item	Description	Spare part number
(1)	Front bezel	
	For use in models with a webcam	667106-001
	For use in models without a webcam	667107-001
(2)	Display panel (20.5-inch, non-ZBD)	
	CMI	665474-001
	Samsung	665473-001
	LG	665472-001
(3)	System board	665465-001
(4)	Rear cover	665478-001
	Stand (not illustrated)	665477-001

Boards, memory, processors



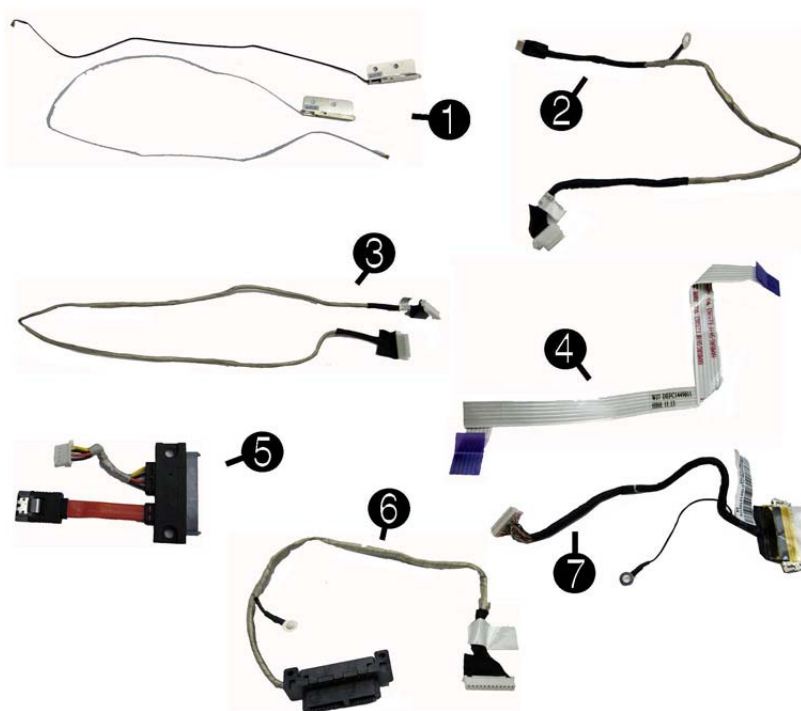
Item	Description	Spare part number
(1)	Converter	665466-001
(2)	WLAN modules	
	HP WLAN combo 802.11b/g/n + Bluetooth 2.1 card	652279-001
	802.11b/g/n (1x1) WLAN module	634906-001
(3)	Webcam module	665475-001
	Webcam lens cover (not illustrated)	665769-001
	Memory modules (PC3-10600, 1333-MHz; not illustrated)	
	4-GB	646801-001
	2-GB	646800-001
	1-GB	647448-001
	Intel Core i3 processors (includes replacement thermal material; not illustrated)	
	<ul style="list-style-type: none"> 2130 (3.4-GHz, 3-MB L3 cache; not for use in Brazil) 	665120-001
	<ul style="list-style-type: none"> 2120 (3.3-GHz, 3-MB L3 cache; not for use in Brazil) 	638629-001
	<ul style="list-style-type: none"> 2105 (3.1-GHz, 3-MB L3 cache) 	655970-001
	<ul style="list-style-type: none"> 2100 (3.1-GHz, 3-MB L3 cache) 	638628-001
	Intel Pentium Dual-Core processors (includes replacement thermal material; not illustrated)	
	<ul style="list-style-type: none"> G860 (3.0-GHz, 3-MB L3 cache) 	665123-001
	<ul style="list-style-type: none"> G850 (2.9-GHz, 3-MB L3 cache) 	655973-001
	<ul style="list-style-type: none"> G840 (2.8-GHz, 3-MB L3 cache) 	655972-001
	<ul style="list-style-type: none"> G630 (2.6-GHz, 3-MB L3 cache) 	665122-001
	<ul style="list-style-type: none"> G620 (2.6-GHz, 3-MB L3 cache) 	655971-001
	Intel Celeron processors (includes replacement thermal material; not illustrated)	
	<ul style="list-style-type: none"> G540 (2.5 GHz, 2-MB L3 cache) 	665119-001

Item	Description	Spare part number
	<ul style="list-style-type: none"> G530 (2.4 GHz, 2-MB L3 cache) 	665117-001
	<ul style="list-style-type: none"> G440 (1.6 GHz, 1-MB L3 cache) 	665467-001

Mass storage devices (not illustrated)

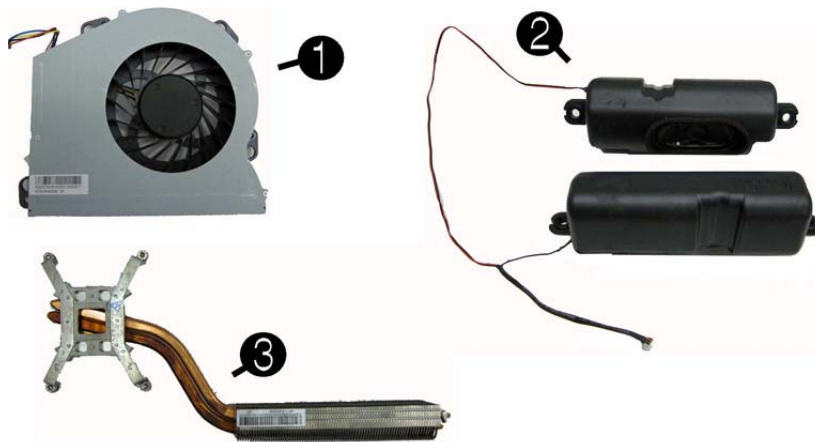
Description	Spare part number
Optical drives	
HP SuperMulti DVD Writer Drive, LightScribe (includes bezel)	595115-001
HP SuperMulti DVD Writer Drive, non-LightScribe (includes bezel)	657958-001
Hard drives	
2-TB, 7200-rpm	613210-001
2-TB, 5400-rpm	616608-001
1.5-TB, 7200-rpm	613209-001
1.5-TB, 5400-rpm	652272-001
1-TB	621418-001
750-GB	632938-001
500-GB	621421-001
320-GB	621420-001
250-GB	621419-001

Cables



Item	Description	Spare part number
(1)	Antenna for use with WLAN module (not illustrated)	646806-001
(2)	Webcam cable	665729-001
(3)	Converter to system board	665727-001
(4)	Converter	
	LG panels	665730-001
	Samsung panels	665731-001
	CMI panels	665732-001
(5)	Hard drive	665725-001
(6)	Optical drive	665726-001
(7)	LVDS	665728-001

Misc parts



Item	Description	Spare part number
(1)	Fan	665469-001
(2)	Speakers, left and right	665476-001
(3)	Thermal module (heat sink)	665468-001
	Power supply, 120W, external (not illustrated)	665470-001
	Mouse (USB, optical; not illustrated)	596410-001
	Mouse (wireless; not illustrated)	625685-001
	Hard drive cage hardware kit (includes cage, rubber insert, grommets; not illustrated)	665770-001

Sequential part number listing

Spare part number	Description
595115-001	HP SuperMulti DVD Writer Drive, LightScribe (includes bezel)
596410-001	Mouse, USB, optical
613209-001	Hard drive, 1.5-TB, 7200-rpm
613210-001	Hard drive, 2-TB, 7200-rpm
616608-001	Hard drive, 2-TB, 5400-rpm
621418-001	Hard drive, 1-TB
621419-001	Hard drive, 250-GB
621420-001	Hard drive, 320-GB
621421-001	Hard drive, 500-GB
625685-001	Mouse, wireless
632938-001	Hard drive, 750-GB
634906-001	802.11b/g/n (1x1) WLAN module
638628-001	Intel Core i3 processor, 2100 (3.1-GHz, 3-MB L3 cache)
638629-001	Intel Core i3 processor, 2120 (3.3-GHz, 3-MB L3 cache)
646800-001	Memory module, 2-GB (PC3-10600, 1333-MHz)
646801-001	Memory module, 4-GB (PC3-10600, 1333-MHz)
646806-001	Antenna for use with WLAN modules
647448-001	Memory module, 1-GB (PC3-10600, 1333-MHz)
652272-001	Hard drive, 1.5-TB, 5400-rpm
652279-001	HP WLAN combo 802.11b/g/n + Bluetooth 2.1 card
655970-001	Intel Core i3 processor, 2105 (3.1-GHz, 3-MB L3 cache)
655971-001	Intel Pentium Dual-Core processor, G620 (2.6-GHz, 3-MB L3 cache)
655972-001	Intel Pentium Dual-Core processor, G840 (2.8-GHz, 3-MB L3 cache)
655973-001	Intel Pentium Dual-Core processor, G850 (2.9-GHz, 3-MB L3 cache)
657958-001	HP SuperMulti DVD Writer Drive, non-LightScribe (includes bezel)
657959-001	HP SuperMulti DVD Writer Drive, 8x, non-LightScribe (does not include bezel)
665117-001	Intel Celeron processor, G540 (2.5-GHz, 2-MB L3 cache)
665119-001	Intel Celeron processor, G530 (2.4-GHz, 2-MB L3 cache)
665120-001	Intel Core i3 processor, 2130 (3.4-GHz, 3-MB L3 cache)
665122-001	Intel Pentium Dual-Core processor, G630 (2.7-GHz, 3-MB L3 cache)
665123-001	Intel Pentium Dual-Core processor, G860 (3.0-GHz, 3-MB L3 cache)
665465-001	System board (includes replacement thermal material)

Spare part number	Description
665466-001	Converter
665467-001	Intel Celeron processor, G440 (1.6-GHz, 1-MB L3 cache)
665468-001	Thermal module (heat sink)
665469-001	Fan
665470-001	Power supply, 120W, external
665472-001	Display panel, 20.5-inch, non-ZBD, LG
665473-001	Display panel, 20.5-inch, non-ZBD, Samsung
665474-001	Display panel, 20.5-inch, non-ZBD, CMI
665475-001	Webcam module
665476-001	Speakers, left and right
665477-001	Stand
665478-001	Rear cover
665725-001	Hard drive cable
665726-001	Optical drive cable
665727-001	Converter to system board cable
665728-001	LVDS display cable cable
665729-001	Webcam cable
665730-001	Converter board cable for use with LG panels
665731-001	Converter board cable for use with Samsung panels
665732-001	Converter board cable for use with CMI panels
665769-001	Webcam lens cover
665770-001	Hard drive cage hardware kit
667106-001	Front bezel for use in models with a webcam
667107-001	Front bezel for use in models without a webcam


7 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 computer.

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.

Rear Cover

Description	Spare part number
Rear cover	665478-001

Remove the one main rear cover to access internal components

To remove the rear cover:

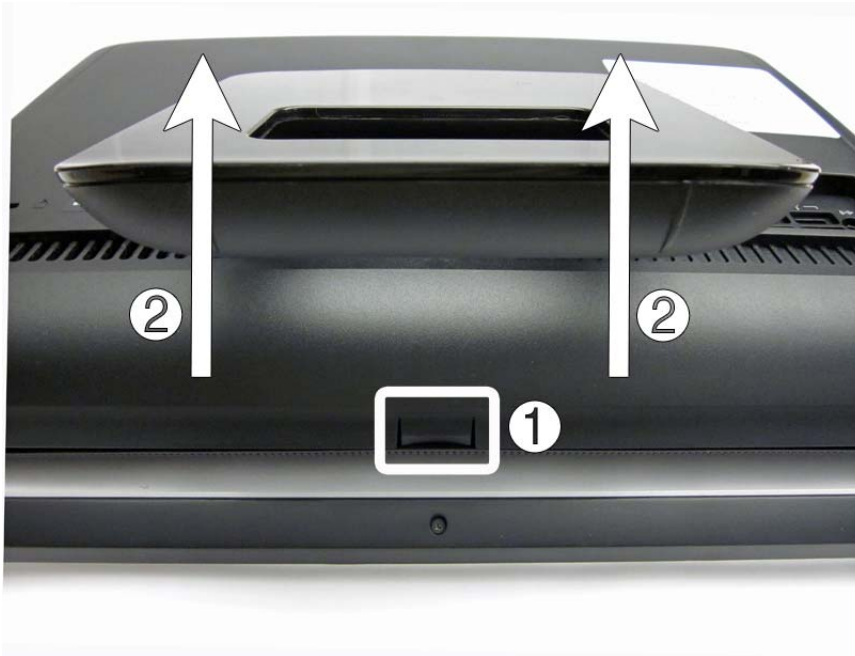
1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 33](#)).
2. Remove the two captive Phillips screws that secure the cover to the computer.

Figure 7-1 Removing the rear cover screws



3. On the bottom of the cover, press the release button (1), and then lift the cover off the computer (2).

Figure 7-2 Removing the rear cover



To replace the rear cover, reverse the removal procedures.

Stand

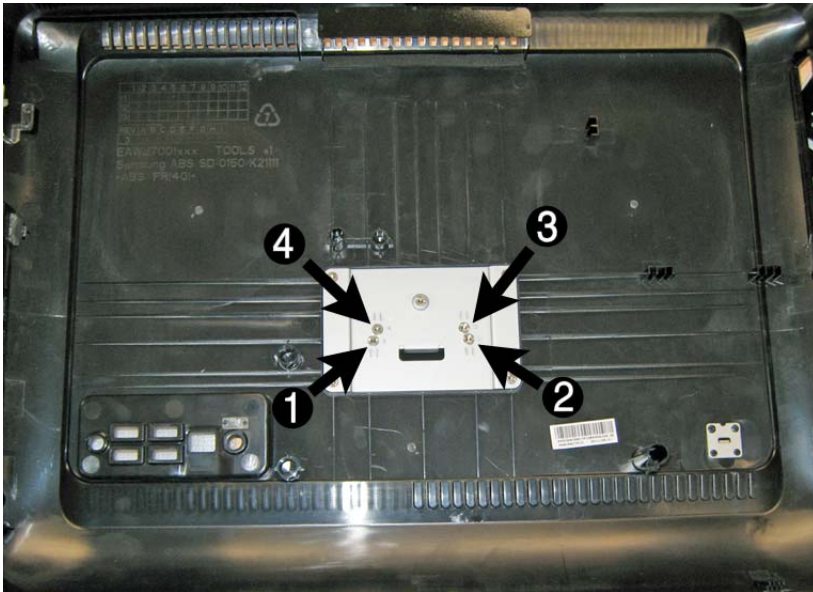
Description	Spare part number
Stand	665477-001

The stand is secured with four screws. Remove the screws from the inside of the rear cover to remove the stand.

To remove the stand:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 33](#)).
2. Remove the rear cover (see [Rear Cover on page 34](#)).
3. From the inside of the rear cover, remove the four screws that secure the stand in the order indicated.

Figure 7-3 Removing the stand screws



4. Lift the stand from the rear cover.

To replace the stand, reverse the removal procedures.

Webcam Module

Description	Spare part number
Webcam module	665729-001

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

Figure 7-4 Webcam module location



To remove the webcam module:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 33](#)).
2. Remove the rear cover (see [Rear Cover on page 34](#)).
3. Remove the two screws **(1)** that secure the webcam module to the computer.

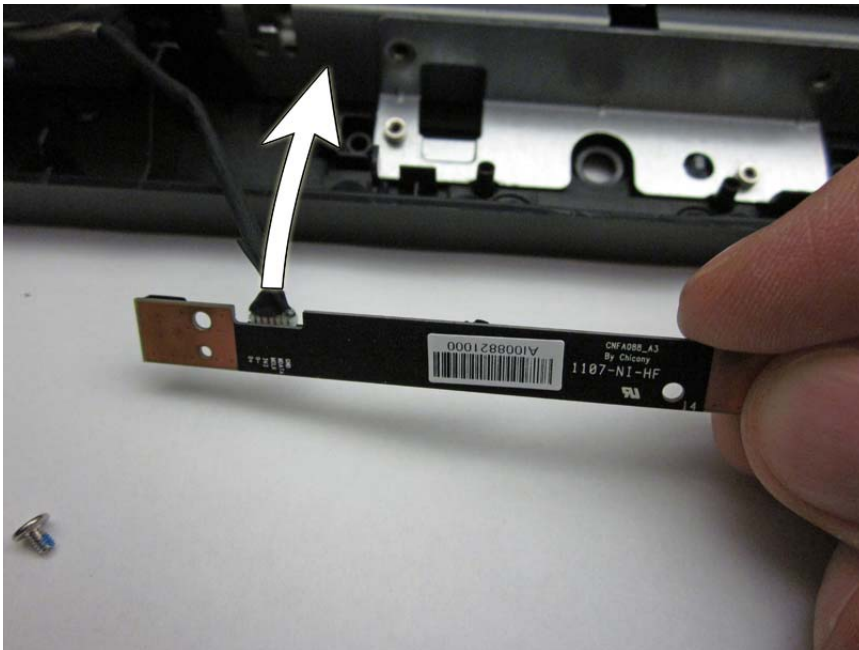
4. Lift the webcam module as much as the cable allows (2).

Figure 7-5 Removing the webcam module



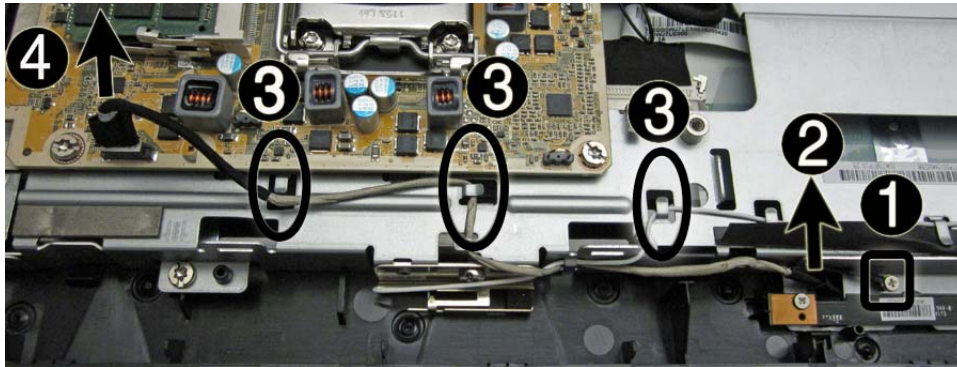
5. Disconnect the cable from the module.

Figure 7-6 Removing the webcam module



6. If you need to remove the webcam cable, remove the system board cover (see [System Board Cover on page 49](#)), remove the cable eyelet screw (1), disconnect the cable from the webcam module (2), and remove the cable from the routing path (3), and then disconnect the cable from the system board (4).

Figure 7-7 Removing the webcam cable



To install a webcam module or cable, reverse the removal procedures.

Converter Board

Description	Spare part number
Converter board	665466-001

The converter board is located on the left side of the computer (viewed from behind). It is secured with two screws and has two connectors.

When replacing a converter board or display panel, make sure the jumper on the converter board is set correctly for the display panel.

CAUTION: Failure to properly set the converter board jumpers can result in damage to the converter board.

Determining panel manufacturer

Remove the rear cover to determine the panel manufacturer by looking at the cable that connects from the panel to the converter board as follows:

- (1) FFC cable = LG panel
- (2) Wired cable = Samsung panel

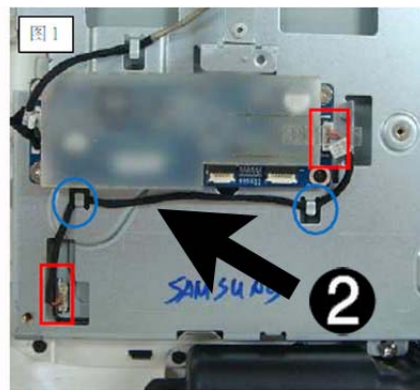
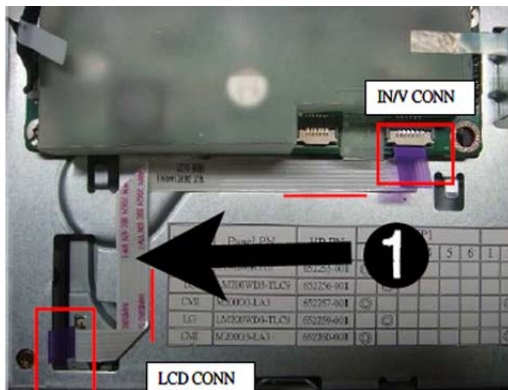
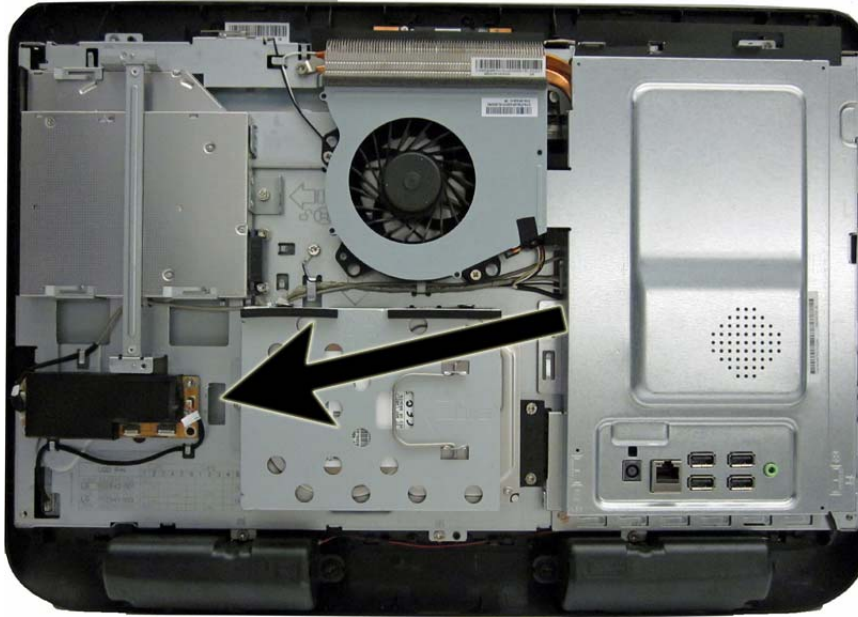



Figure 7-8 Converter board location



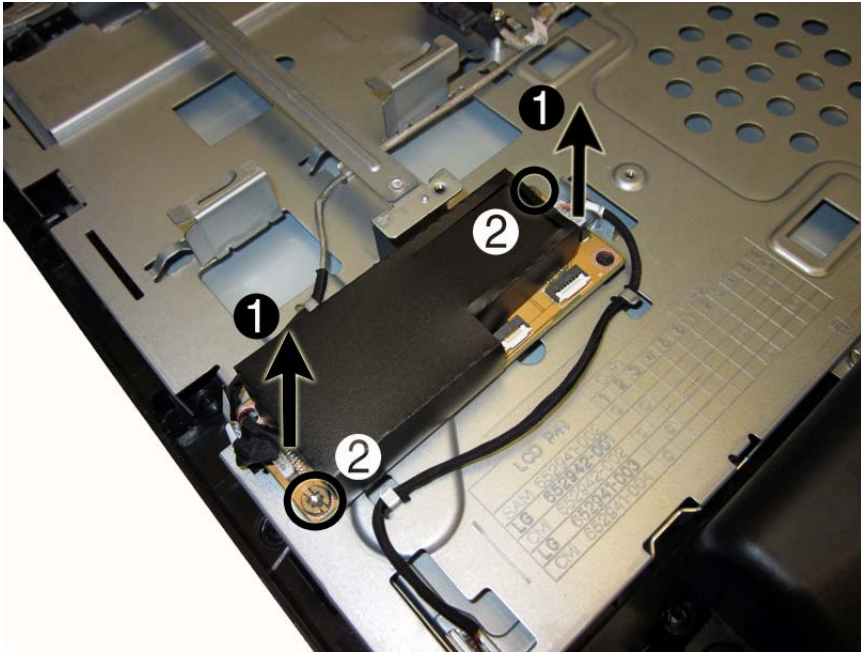
To remove the converter board:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 33](#)).
2. Remove the rear cover (see [Rear Cover on page 34](#)).
3. 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.

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

Figure 7-9 Removing the converter board

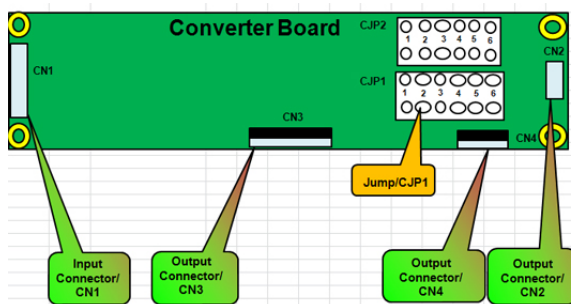


5. Lift the converter board from the computer.

To install the converter board, reverse the removal procedures.

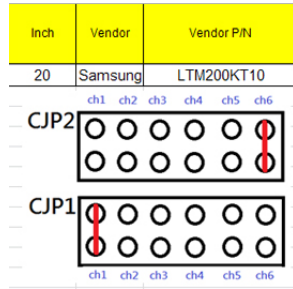
The correct converter board jumper settings are stamped into the sheet metal on the computer next to the converter board. Be sure to set the jumpers for the installed display panel.

You must position the jumper on the converter board based on the display panel installed. Place the jumper on the header on the converter board as follows:



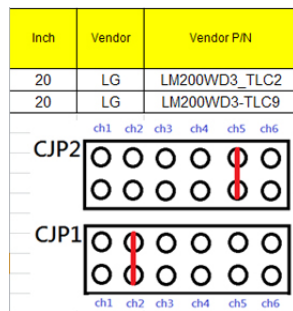
- LG panel:
 - CJP2: pin 6

- CJP1: pin 1



- Samsung panel:

- CJP2: pin 5
- CJP1: pin 2

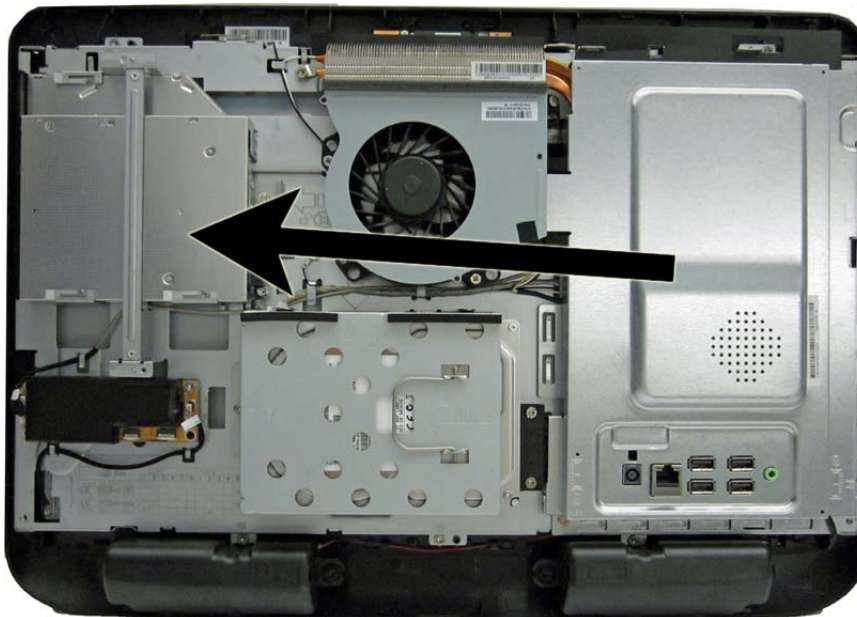


Optical Drive

Description	Spare part number
HP SuperMulti DVD Writer Drive, LightScribe (includes bezel)	595115-001
HP SuperMulti DVD Writer Drive, non-LightScribe (includes bezel)	657958-001

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

Figure 7-10 Optical drive location



To remove the optical drive:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 33](#)).
2. Remove the rear cover (see [Rear Cover on page 34](#)).
3. Loosen the captive Phillips screw **(1)** that secures the drive to the computer.

4. Push the drive out of the computer (2) to disconnect the drive from the connector, and then remove the drive from the computer.

Figure 7-11 Removing the optical drive



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

Figure 7-12 Removing the optical drive bracket



6. If you need to remove the bezel from the optical drive, pull the right side of the bezel away from the front of the drive, and then rotate it away to remove it. Make note of the tabs that hold the bezel in place.

Figure 7-13 Removing the optical drive bracket



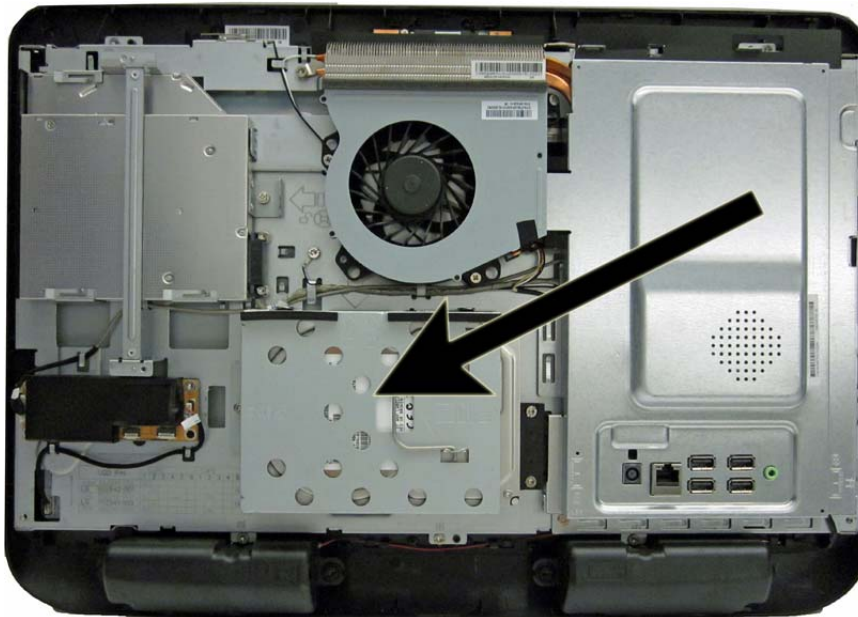
To install an optical drive, reverse the removal procedures.

Hard Drive

Description	Spare part number
2-TB, 7200-rpm	613210-001
2-TB, 5400-rpm	616608-001
1.5-TB, 7200-rpm	613209-001
1.5-TB, 5400-rpm	652272-001
1-TB	621418-001
750-GB	632938-001
500-GB	621421-001
320-GB	621420-001
250-GB	621419-001

The hard drive is located in the middle of the computer. The drive is secured with one captive screw and is housed in a removable cage.

Figure 7-14 Hard drive location




1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 33](#)).
2. Loosen the captive Phillips screw (1) that secures the drive to the computer .

3. Grasp the handle on top of the hard drive cage (2), slide the cage toward the edge of the computer (3), then lift the cage out of the computer.

Figure 7-15 Removing the hard drive cage assembly

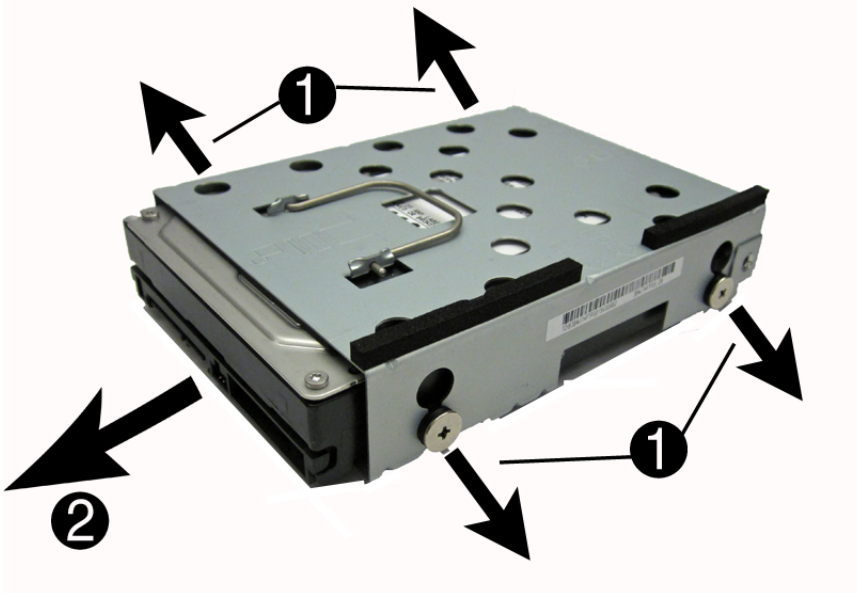


4. Remove the 4 mounting screws (1) that secure the hard drive to the hard drive cage. Do not remove the rubber grommets behind each screw. They must stay attached to the cage when installing a new hard drive.

 **NOTE:** Make sure the grommets are not broken or missing before reassembling the computer.

5. Slide the hard drive out of the cage (2).

Figure 7-16 Removing the hard drive from the cage

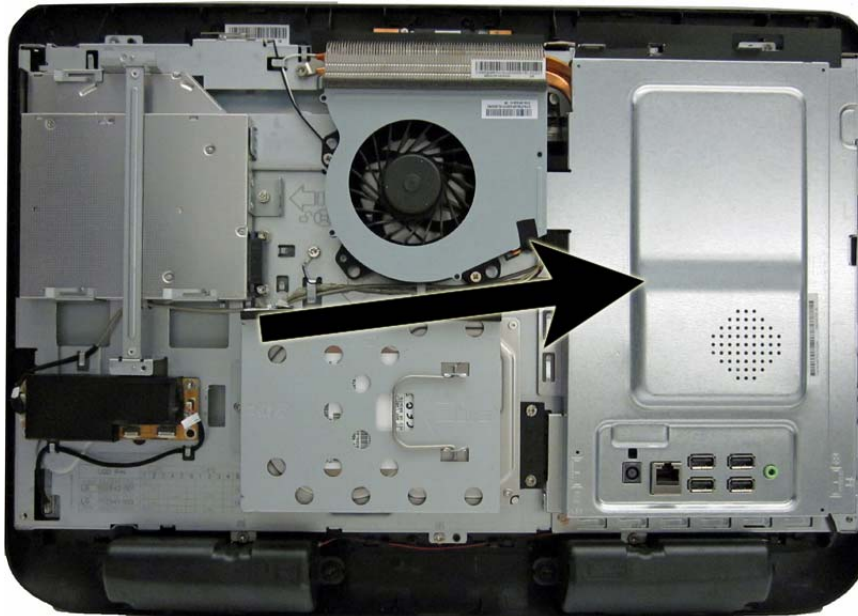


To replace the hard drive, reverse the removal procedures.

System Board Cover

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

Figure 7-17 System board cover location

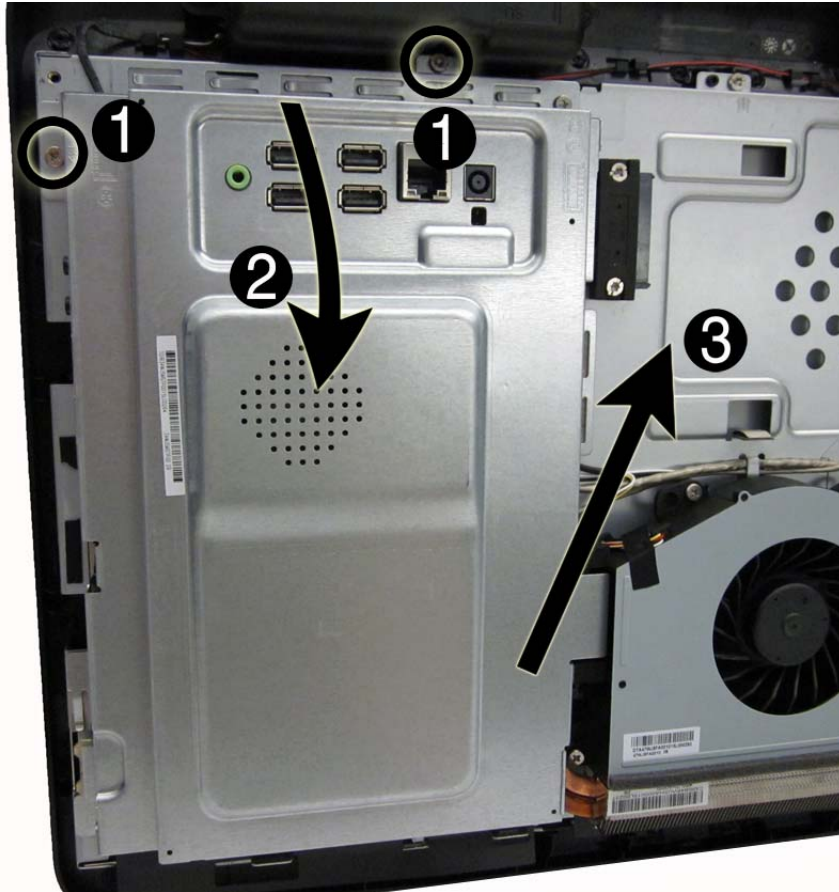


To remove the system board cover:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 33](#)).
2. Remove the rear cover (see [Rear Cover on page 34](#)).
3. Remove the two screws **(1)** that secure the cover to the computer.

4. Lift the connector side of the cover up to a 45-degree angle (2), and then lift the cover off the computer (3).

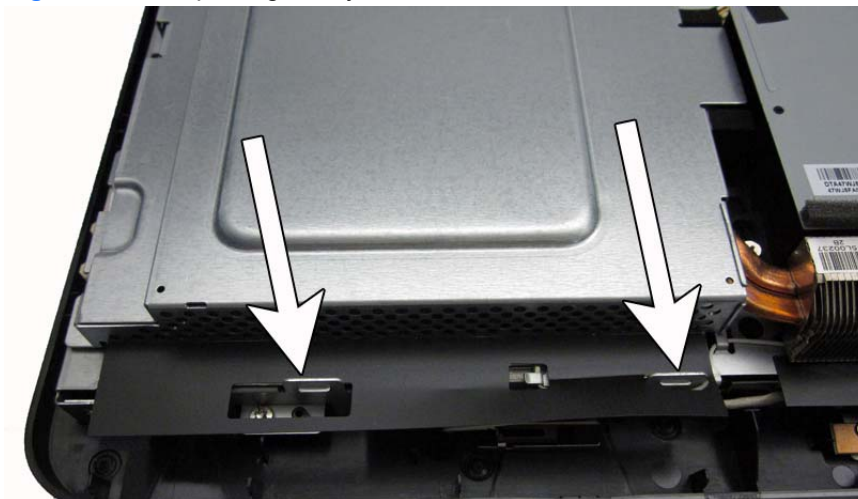
Figure 7-18 Removing the system board cover



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

When replacing the cover, note the tabs that fit into slots in the computer on the side opposite the screws.

Figure 7-19 Replacing the system board cover

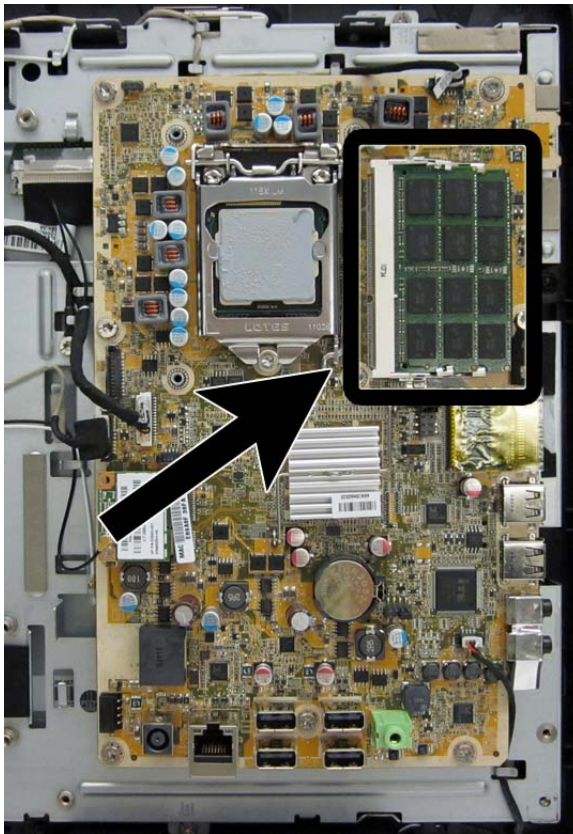


Memory

Description	Spare part number
4 GB	646801-001
2 GB	646800-001
1 GB	647448-001

You must remove the system board cover to access the memory modules. The computer has two memory slots.

Figure 7-20 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:

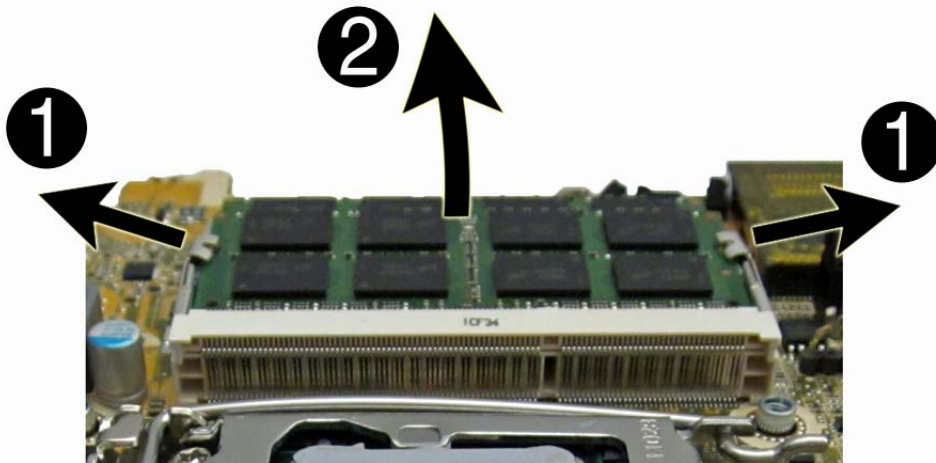
- 512-Mbit, 1-Gbit, and 2-Gbit non-ECC memory technologies
- single-sided and double-sided SODIMMS
- SODIMMs constructed with x8 and x16 devices; SODIMMs constructed with x4 SDRAM are not supported

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

To remove a memory module:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 33](#)).
2. Remove the rear cover (see [Rear Cover on page 34](#)).
3. Remove the system board cover (see [System Board Cover on page 49](#)).
4. To remove a memory module, press outward on the two latches on each side of the SODIMM (1), allow the module to lift up to about a 45-degree angle, and then pull the SODIMM out of the socket (2).

Figure 7-21 Removing a memory module



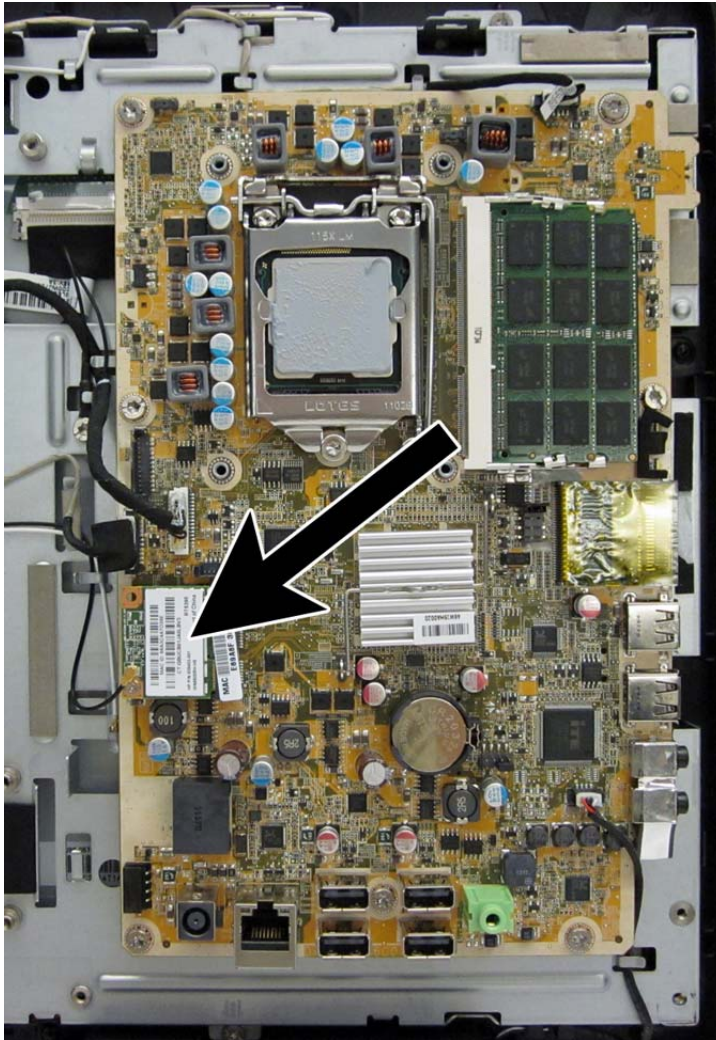
The computer automatically recognizes the additional memory when you turn on the computer.

WLAN Module

Description	Spare part number
HP WLAN combo 802.11b/g/n + Bluetooth 2.1 card	652279-001
802.11b/g/n (1x1) WLAN module	634906-001

The WLAN module is secured with one screw and has one connected antenna.

Figure 7-22 WLAN module location

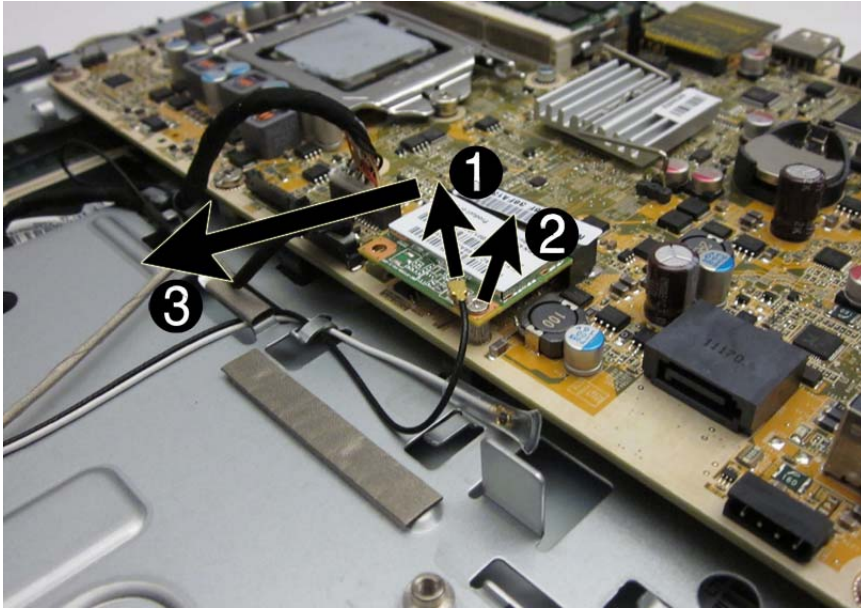



To remove the WLAN module:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 33](#)).
2. Remove the rear cover (see [Rear Cover on page 34](#)).
3. Remove the system board cover (see [System Board Cover on page 49](#)).
4. Disconnect the antenna cable from the module (1).

5. Remove screw (2) that secures the module to the computer.
6. Lift the module to a 45-degree angle, and then pull it away to remove it from the socket (3)

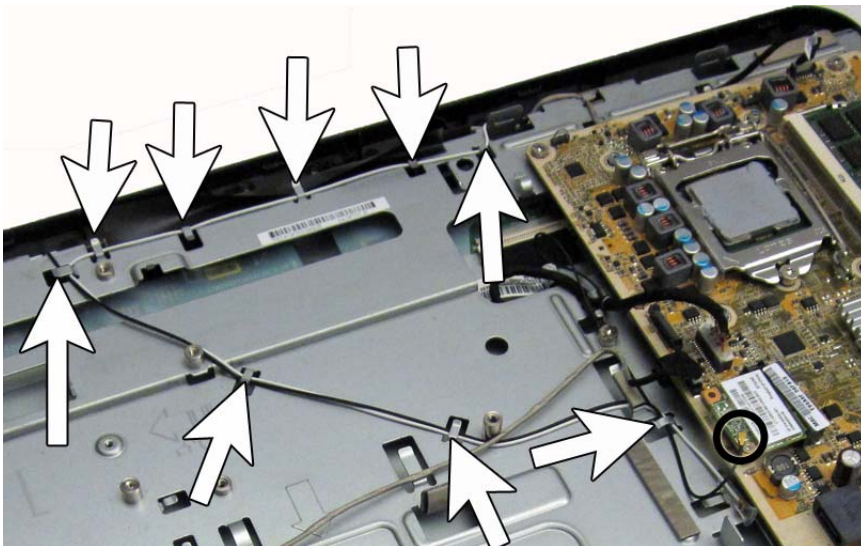
Figure 7-23 Removing the WLAN module



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

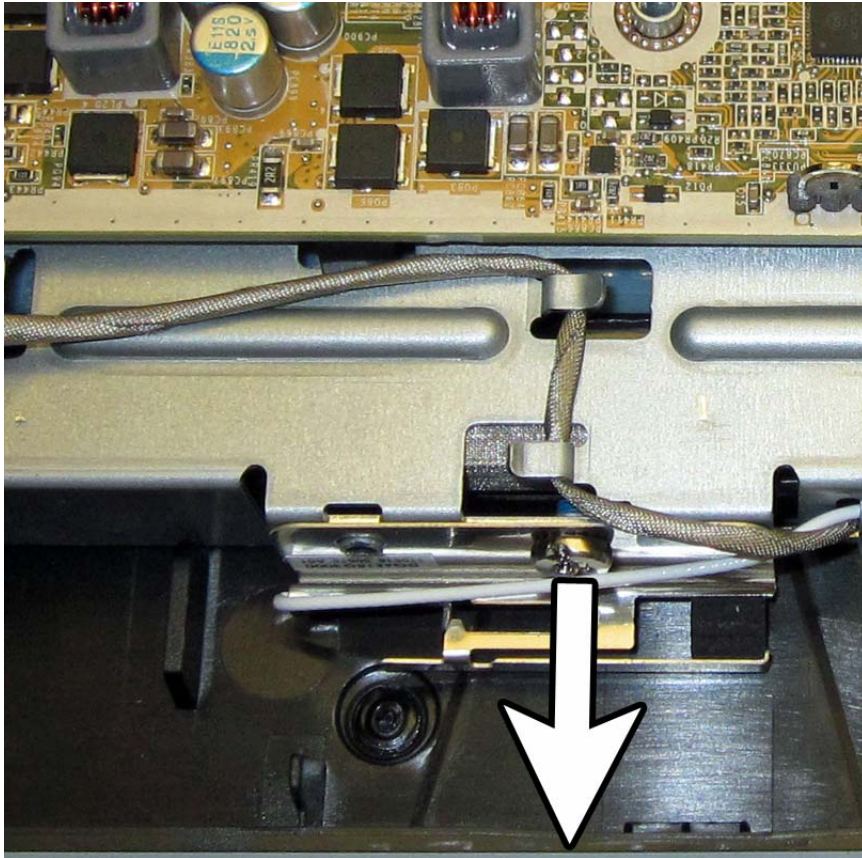
7. If you need to replace the WLAN antennas, remove them from the routing path built into the computer.

Figure 7-24 Removing the WLAN antennas from the routing path



8. Remove the screw that secures each antenna (only one shown in the following image) to the computer, and then remove the antennas from the computer.

Figure 7-25 Removing the WLAN antennas



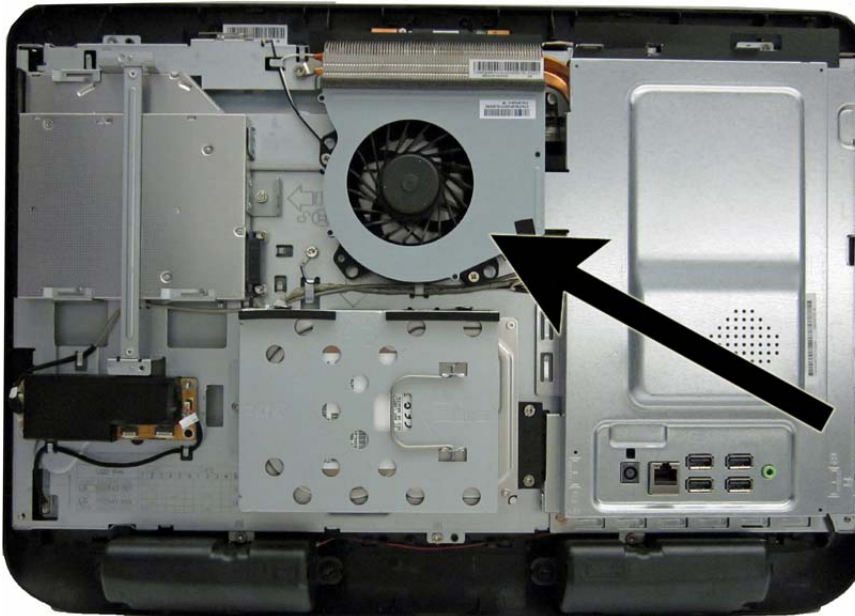
To install the WLAN module or antennas, reverse the removal procedures.

Fan

Description	Spare part number
Fan	665469-001

The fan is located in the middle of the computer. It is secured with three screws.

Figure 7-26 Fan location

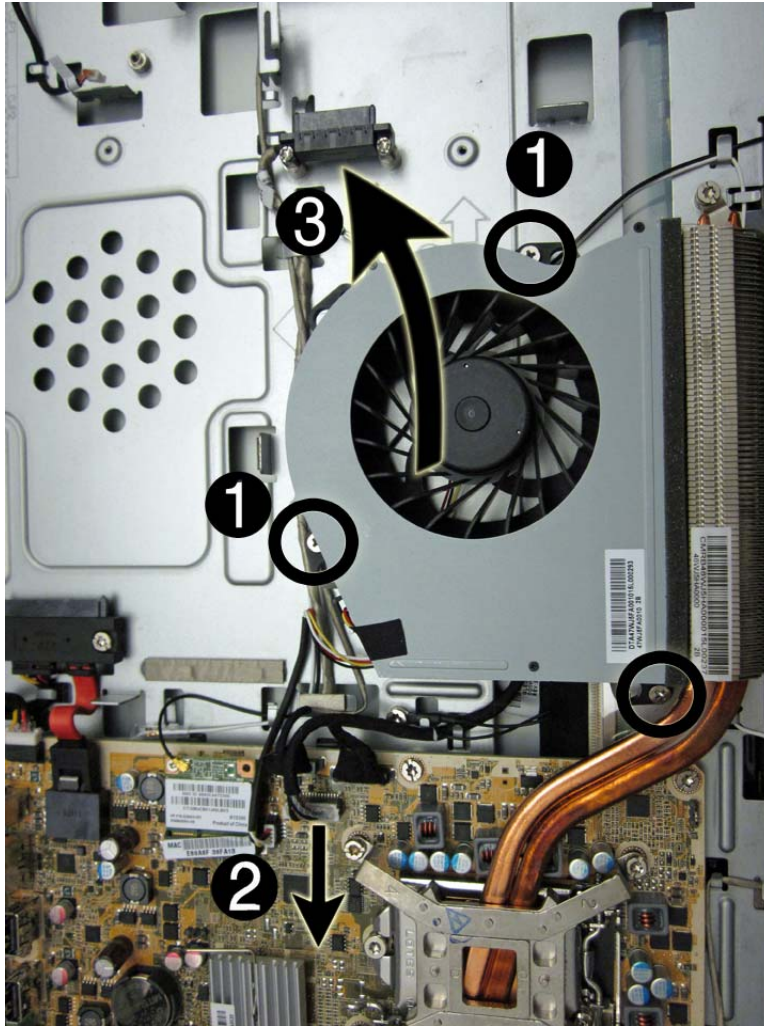


To remove the fan:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 33](#)).
2. Remove the rear cover (see [Rear Cover on page 34](#)).
3. Remove the system board cover (see [System Board Cover on page 49](#)).
4. Remove the three screws **(1)** that secure the fan to the computer.
5. Disconnect the fan cable **(2)** from the system board connector.

6. Remove the fan from the computer (3).

Figure 7-27 Removing the fan assembly



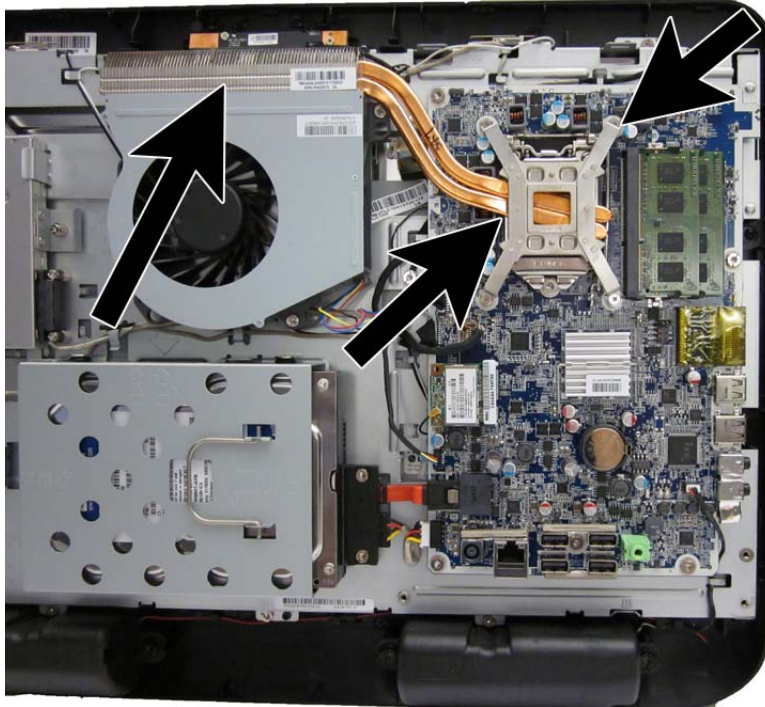
To install the fan, reverse the removal procedures.

Heat Sink (Thermal Module)

Description	Spare part number
Heat sink (thermal module)	665468-001

The heat sink is located at the top of the computer. It is mostly covered by the system board cover. It is secured with four captive screws near the processor and one non-captive screw on the opposite side near the fan.

Figure 7-28 Heat sink location

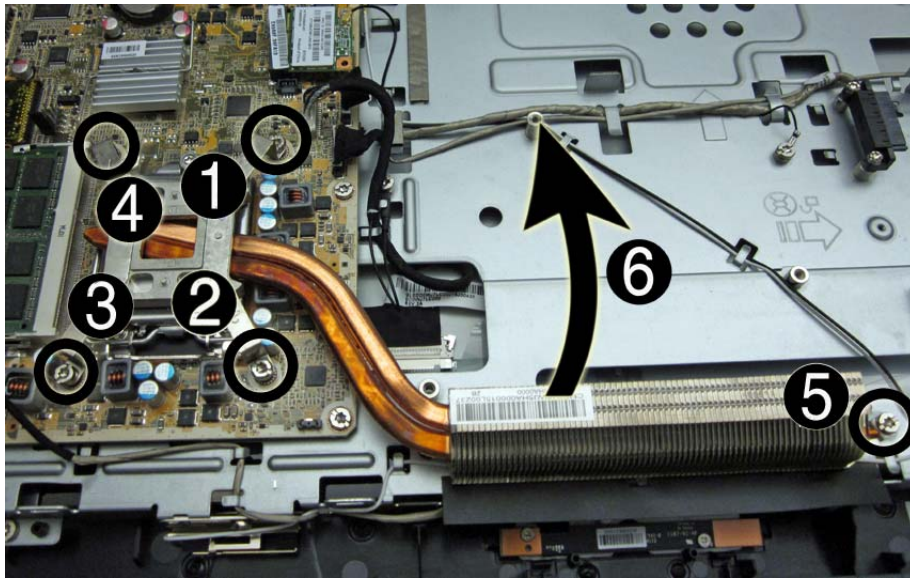


To remove the heat sink:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 33](#)).
2. Remove the rear cover (see [Rear Cover on page 34](#)).
3. Remove the system board cover (see [System Board Cover on page 49](#)).
4. In the order indicated, loosen the four captive Torx screws **(1) – (4)** that secure the heat sink to the system board.
5. Remove the non-captive Torx screw from the top of the heat sink **(5)**.

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

Figure 7-29 Removing the heat sink



To install a heat sink, reverse the removal procedures.

Processor

Description	Spare part number
Intel Core i3 processors	
2130 (3.4 GHz, 3-MB L3 cache)	665120-001
2120 (3.3 GHz, 3-MB L3 cache)	638629-001
2105 (3.1 GHz, 3-MB L3 cache)	655970-001
2100 (3.1 GHz, 3-MB L3 cache)	638628-001
Intel Pentium Dual-Core processors	
G860 (3.0-GHz, 3-MB L3 cache)	665123-001
G850 (2.9-GHz, 3-MB L3 cache)	655973-001
G840 (2.8-GHz, 3-MB L3 cache)	655972-001
G630 (2.7-GHz, 3-MB L3 cache)	665122-001
G620 (2.6-GHz, 3-MB L3 cache)	655971-001
Intel Celeron processors	
G540 (2.5-GHz, 2-MB L3 cache)	665119-001
G530 (2.4-GHz, 2-MB L3 cache)	665117-001
G440 (1.6-GHz, 2-MB L3 cache)	665467-001

To remove the processor:

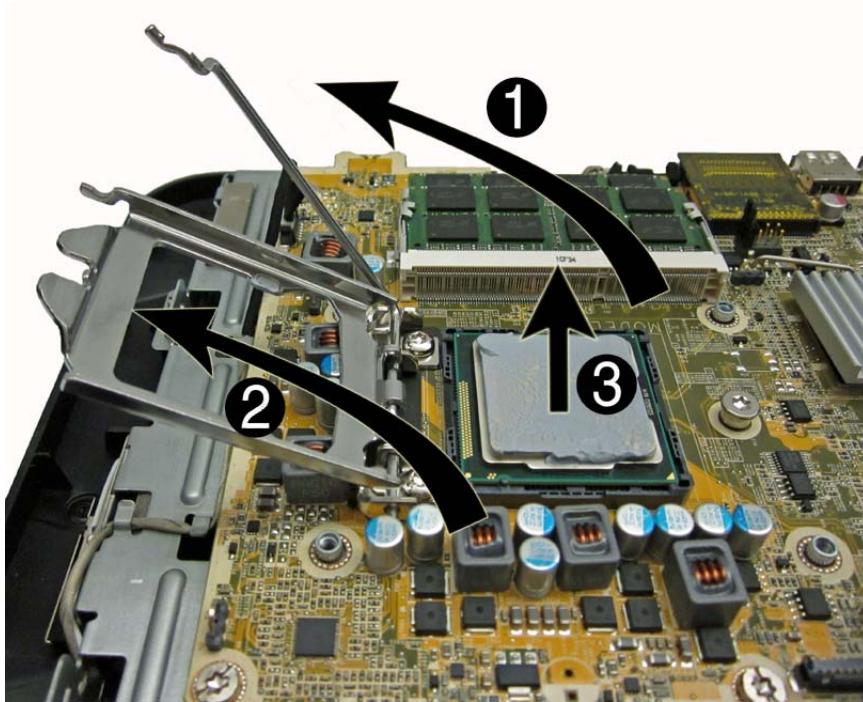
1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 33](#)).
2. Remove the rear cover (see [Rear Cover on page 34](#)).
3. Remove the system board cover (see [System Board Cover on page 49](#)).
4. Remove the heat sink (see [Heat Sink \(Thermal Module\) on page 58](#)).
5. Rotate the locking lever to its full open position **(1)**
6. Raise and rotate the microprocessor retainer to its full open position **(2)**.

- 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.

CAUTION: The heat sink must be installed within 24 hours of installing the processor to prevent damage to the processor's solder connections.

Figure 7-30 Removing the processor



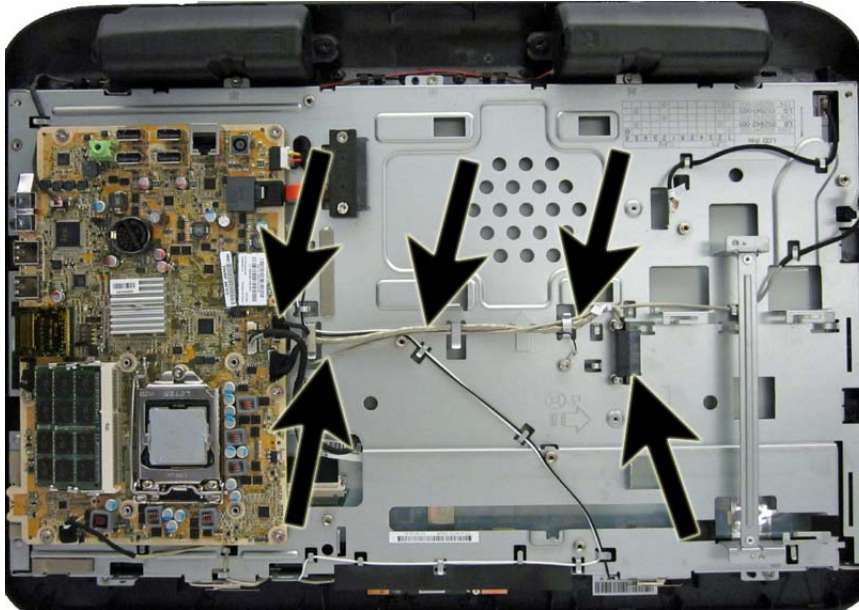
To install a processor, reverse the removal procedures.

Optical Drive Cables and Connector

Description	Spare part number
Optical drive connector cable	665726-001

The optical drive connector is secured with two screws, and one eyelet screw secures the cable to the computer. The connector has two cables that connect to the system board.

Figure 7-31 Optical drive cable location



To remove the optical drive connector:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 33](#)).
2. Remove the rear cover (see [Rear Cover on page 34](#)).
3. Remove the optical drive (see [Optical Drive on page 44](#)).
4. Remove the system board cover (see [System Board Cover on page 49](#)).
5. Remove two screws **(1)** that secure the optical drive connector to the computer.
6. Remove eyelet screw **(2)** that secures the optical drive cable to the computer.
7. Remove cable from the metal tabs **(3)** built into the computer.

8. Disconnect the optical drive power and data cables (4) from the system board.


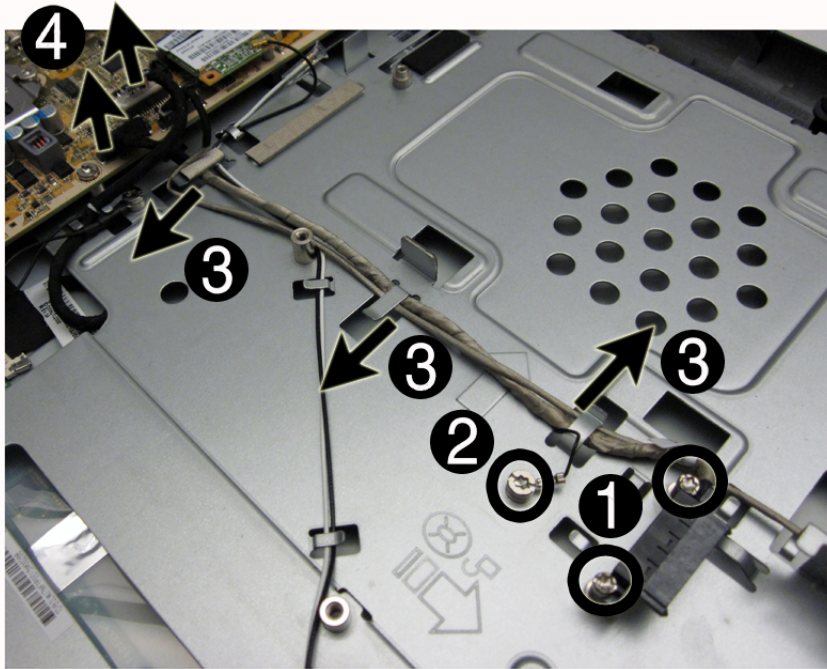
 **NOTE:** Be careful not to damage the cables when disconnecting them from the board. Do not pull on the wires.

Figure 7-32 Removing the optical drive connector



9. Remove the connector from the computer.

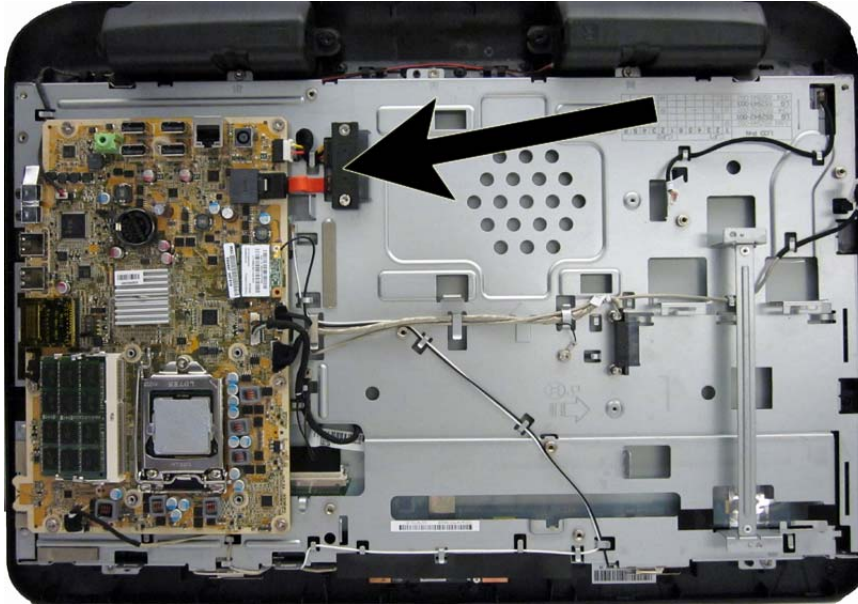
To install the optical drive connector, reverse the removal procedures.

Hard Drive Cables and Connector

Description	Spare part number
Hard drive connector cable	665725-001

The hard drive connector is secured with two screws and has two cables that connect to the system board.

Figure 7-33 Hard drive cable location



To remove the hard drive connector:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 33](#)).
2. Remove the rear cover (see [Rear Cover on page 34](#)).
3. Remove the hard drive (see [Hard Drive on page 47](#)).
4. Remove the system board cover (see [System Board Cover on page 49](#)).
5. Remove two screws **(1)** that secure the hard drive connector to the computer.

6. Disconnect the hard drive power and data cables (2) from the system board.


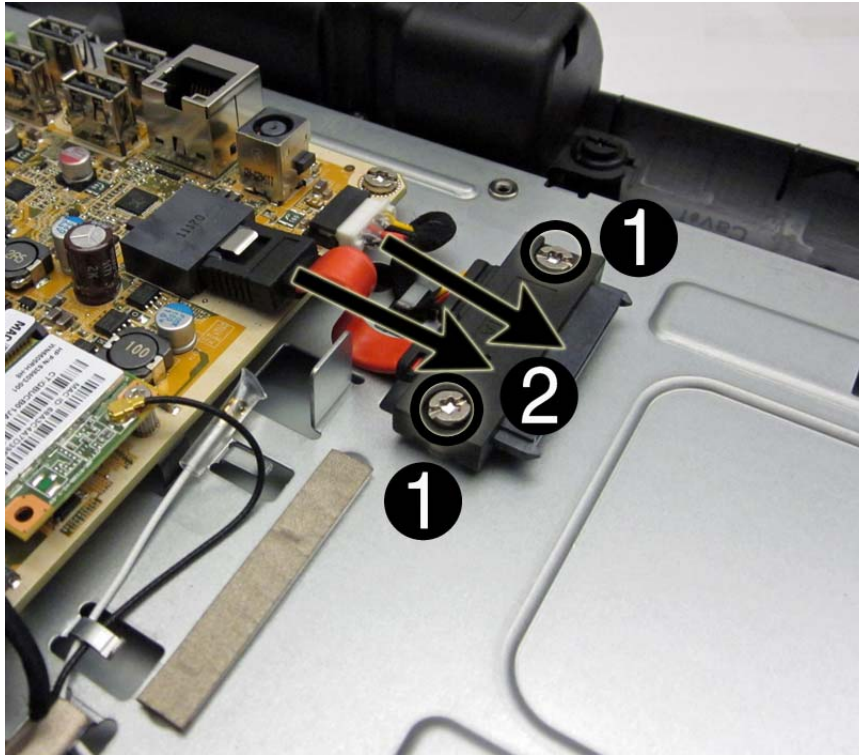
 **NOTE:** Be careful not to damage the cable when disconnecting it from the board. Do not pull on the wires.

Figure 7-34 Removing the hard drive connector



7. Remove the connector from the computer.

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

Speakers

Description	Spare part number
Speakers	665476-001

The speakers are located at the bottom of the computer. Two separate speakers are each secured by two screws. The speaker cables combine into one connector to the system board.

Figure 7-35 Speaker location

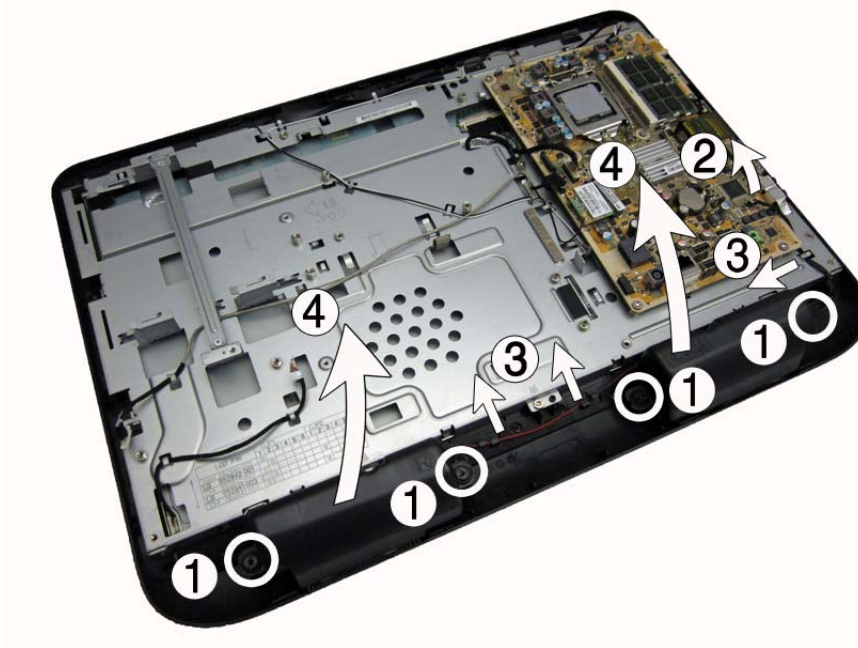


To remove the speakers:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 33](#)).
2. Remove the rear cover (see [Rear Cover on page 34](#)).
3. Remove the system board cover (see [System Board Cover on page 49](#)).
4. Remove four screws (two per speaker) **(1)** that secure the speakers to the computer.
5. Disconnect the speaker cable **(2)** from the system board.

6. Remove the cables from the routing path built into the computer (3), and then lift the speakers from the computer (4).

Figure 7-36 Removing the speakers



To install the speakers, reverse the removal procedures.

System Board

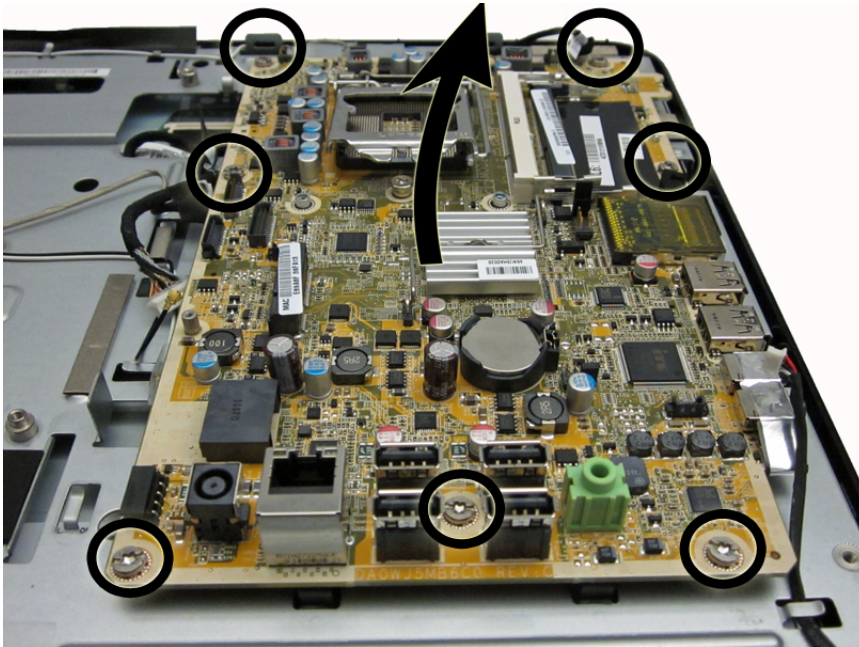
Description	Spare part number
System board (includes replacement thermal material)	665465-001

The system board is secured with seven screws and is located under the system board cover.

To remove the system board:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 33](#)).
2. Remove the rear cover (see [Rear Cover on page 34](#)).
3. Remove the system board cover (see [System Board Cover on page 49](#)).
4. Remove the heat sink (see [Heat Sink \(Thermal Module\) on page 58](#)).
5. Remove the processor (see [Processor on page 60](#)).
6. Remove the memory modules (see [Memory on page 51](#)).
7. Remove the WLAN module (see [WLAN Module on page 53](#)).
8. Disconnect all cables from the system board, noting their location for reinstallation.
9. Remove the seven torx screws (circled in image) that secure the system board to the computer.
10. Lift the system board straight up and out of the computer.

Figure 7-37 Removing the system board



To install the system board, reverse the removal procedures.

Front Bezel

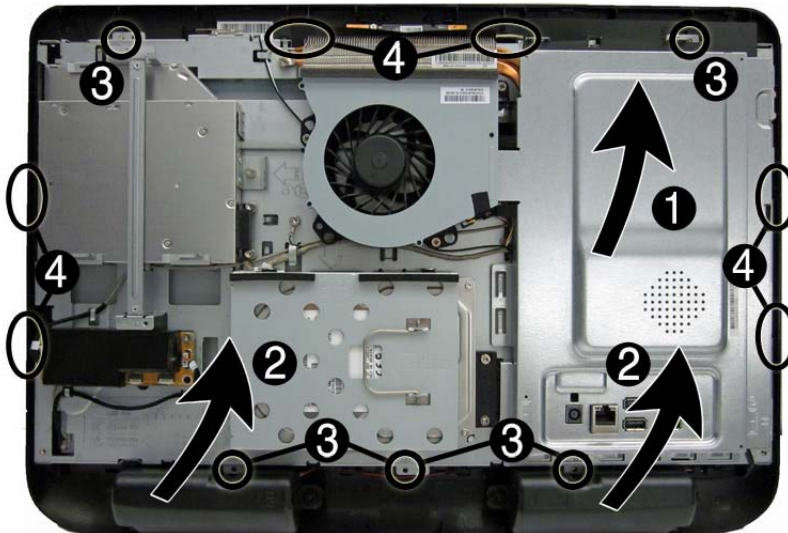
Description	Spare part number
Front bezel for use in models with a webcam	667106-001
Front bezel for use in models without a webcam	667107-001

The front bezel is located on the front of the computer and is secured to the display panel bracket with five screws. You can remove the bezel without removing most of the main computer components, which the following procedure demonstrates.

To remove the front bezel while removing the minimal number of components:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 33](#)).
2. Remove the rear cover (see [Rear Cover on page 34](#)).
3. Remove the system board cover (1) (see [System Board Cover on page 49](#)).
4. Remove the speakers (2) (see [Speakers on page 66](#)).
5. Remove the 5 screws (3) that secure the bezel to the computer.
6. Lift the 6 tabs that secure the bezel to the computer (5).

Figure 7-38 Removing the front bezel



7. Lift the computer from the bezel.

To install the front bezel, reverse the removal procedures.

Display Panel

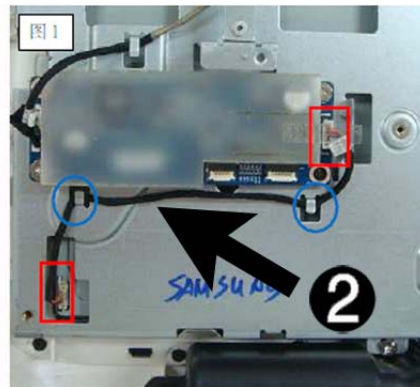
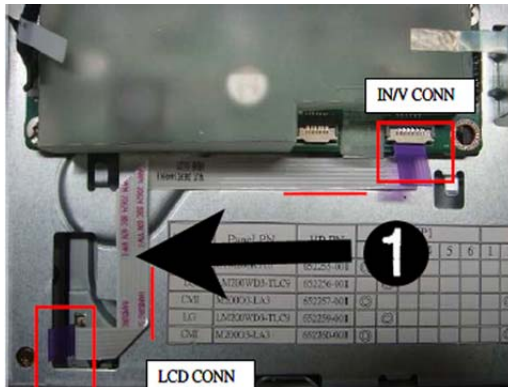
Description	Spare part number
Display panel, 20.5-inch, non-ZBD, CMI	665474-001
Display panel, 20.5-inch, non-ZBD, Samsung	665473-001
Display panel, 20.5-inch, non-ZBD, LG	665472-001

The display panel is secured to the display bracket with four screws. The location of the screws depends upon the display panel manufacturer. Some are on top and bottom, some are on each side. This procedure continues the previous section that shows how to remove the bezel while removing a minimum number of components.

Determining panel manufacturer

Remove the rear cover to determine the panel manufacturer by looking at the cable that connects from the panel to the converter board as follows:

- (1) FFC cable = LG panel
- (2) Wired cable = Samsung panel



To remove the display panel:

1. Prepare the computer for disassembly (see [Preparing to Disassemble the Computer on page 33](#)).
2. Remove the rear cover (see [Rear Cover on page 34](#)).
3. Remove the system board cover (see [System Board Cover on page 49](#)).
4. Remove the front bezel (see [Front Bezel on page 69](#)).

5. Remove the two screws that secure the display panel to the bracket.


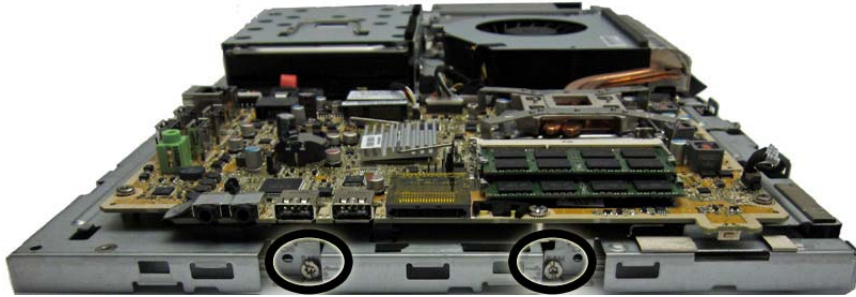
 **NOTE:** The following images show screws on the sides of the display panel. Some panels have screws on the top and bottom, not on the sides.

Figure 7-39 Removing the display panel screws



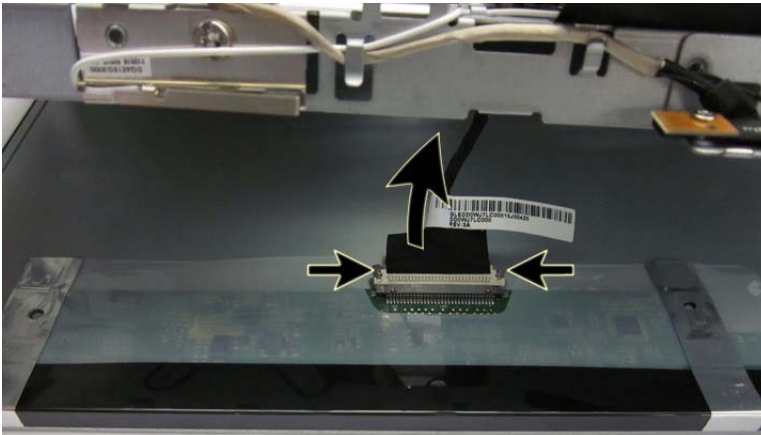
6. Remove the two screws that secure the display panel to the bracket, and then disconnect the converter board cable from the display panel.

Figure 7-40 Removing the display panel screws and converter cable



7. Disconnect the display cable from the display panel.

Figure 7-41 Disconnecting the display cable



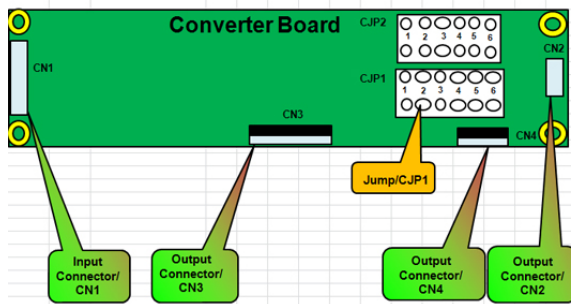
8. Lift the bracket assembly off the display panel.

To install a display panel, reverse the removal procedures.

When replacing a display panel, make sure the converter board jumpers are set properly for the newly installed panel.

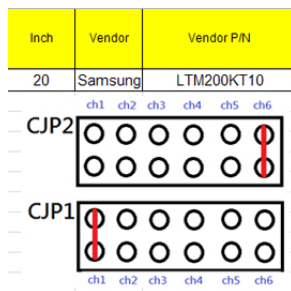
Converter board jumper settings

Position the jumper on the converter board based on the display panel installed. Place the jumper on the header on the converter board as follows:



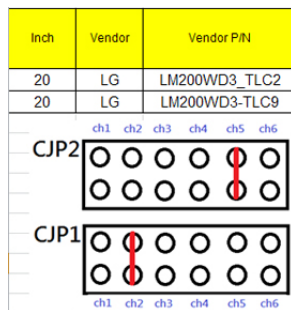
- Samsung panel:

- CJP2: pin 6
- CJP1: pin 1



- LG panel:

- CJP2: pin 5
- CJP1: pin 2




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

When replacing the display panel, flash the EDID (Extended display identification data) to the system board as follows:

1. Copy the **WJ5EDID** folder to a DOS bootable USB flash drive.
2. Copy the Autoexec.bat file from the **WJ5EDID** folder to the flash drive.
3. Plug the flash drive into the computer.
4. Select to boot from the flash drive.
5. Type the display manufacturer (LG or SAMSUNG) when prompted on-screen.


The tool writes the EDID.

 **CAUTION:** Failure to properly set the converter board jumpers can result in damage to the converter board.

A 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.

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.

Before You Call for Technical Support

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


- Run the HP diagnostic tool.
- Run the hard drive self-test in Computer Setup.
- Check the Power LED on the front of the computer to see if it is flashing red. The flashing lights are error codes that will help you diagnose the problem. Refer to Appendix A, [POST Error Messages on page 113](#) for more information.
- If the screen is blank, plug the monitor into a different video port on the computer if one is available. Or, replace the monitor with a monitor that you know is functioning properly.
- If you are working on a network, plug another computer with a different cable into the network connection. There may be a problem with the network plug or cable.
- If you recently added new hardware, remove the hardware and see if the computer functions properly.
- If you recently installed new software, uninstall the software and see if the computer functions properly.
- Boot the computer to the Safe Mode to see if it will boot without all of the drivers loaded. When booting the operating system, use “Last Known Configuration.”
- Refer to the comprehensive online technical support at <http://www.hp.com/support>.
- Refer to [Helpful Hints on page 75](#) in this guide.


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

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

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

- Be in front of your computer when you call.
- Write down the computer serial number, product ID number, and monitor serial number before calling.
- Spend time troubleshooting the problem with the service technician.
- Remove any hardware that was recently added to your system.
- Remove any software that was recently installed.
- Restore the system from the Recovery Disc Set that you created or restore the system to its original factory condition in HP Backup and Recovery Manager.

 **CAUTION:** Restoring the system will erase all data on the hard drive. Be sure to back up all data files before running the restore process.

 **NOTE:** For sales information and warranty upgrades (Care Packs), call your local authorized service provider or dealer.


Helpful Hints

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

- Check that the computer and monitor are plugged into a working electrical outlet.
- Check that the voltage select switch (some models) is set to the appropriate voltage for your region (115V or 230V).
- Check that the computer is turned on and the green power light is on.
- Check that the monitor is turned on and the green monitor light is on.
- Check the Power LED on the front of the computer to see if it is flashing red. The flashing lights are error codes that will help you diagnose the problem. Refer to Appendix A, [POST Error Messages on page 113](#) for more information.
- Turn up the brightness and contrast controls of the monitor if the monitor is dim.
- Press and hold any key. If the system beeps, then the keyboard should be operating correctly.
- Check all cable connections for loose connections or incorrect connections.
- Wake the computer by pressing any key on the keyboard or pressing the power button. If the system remains in suspend mode, shut down the computer by pressing and holding the power

button for at least four seconds then press the power button again to restart the computer. If the system will not shut down, unplug the power cord, wait a few seconds, then plug it in again. The computer will restart if it is set to power on automatically as soon as power is restored in Computer Setup. If it does not restart, press the power button to start the computer.

- Reconfigure the computer after installing a non-plug and play expansion board or other option. See [Solving Hardware Installation Problems on page 98](#) for instructions.
- Be sure that all the needed device drivers have been installed. For example, if you are using a printer, you need a driver for that model printer.
- Remove all bootable media (diskette, CD, or USB device) from the system before turning it on.
- If you have installed an operating system other than the factory-installed operating system, check to be sure that it is supported on the system.
- If the system has multiple video sources (embedded, PCI, or PCI-Express adapters) installed (embedded video on some models only) and a single monitor, the monitor must be plugged into the monitor connector on the source selected as the primary VGA adapter. During boot, the other monitor connectors are disabled and if the monitor is connected into these ports, the monitor will not function. You can select which source will be the default VGA source in Computer Setup.

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

Solving General Problems

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

⚠ WARNING! When the 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 A-1 Solving General Problems

Cause	Solution
Computer appears locked up and will not turn off when the power button is pressed.	
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.	
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.	
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.	
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 > Run (Windows XP) or Start > All Programs > Accessories > Run (Windows Vista and 7) 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.4. Contact an authorized reseller or service provider.

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. Remove the expansion cards one at a time until the 5V_aux light on the system board turns on.3. Replace the system board. <p>OR</p> <p>Press and hold the power button for less than 4 seconds. If the hard drive LED does not turn on green then:</p> <ol style="list-style-type: none">1. Check that the unit is plugged into a working AC outlet.2. Open hood and check that the power button harness is properly connected to the system board.3. Check that both power supply cables are properly connected to the system board.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.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 A-2 Solving Power Problems

Power supply shuts down intermittently.

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

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.4. Contact an authorized reseller or service provider.

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 that the voltage selector, located on the rear of the power supply (some models), is set to the appropriate voltage. Proper voltage setting depends on your region.2. Open the hood and ensure the 4- or 6-wire power supply cable is seated into the connector on the system board.3. Check if a device is causing the problem by removing ALL attached devices (such as hard, diskette, or optical drives, and expansion cards). Power on the system. If the system enters the POST, then power off and replace one device at a time and repeat this procedure until failure occurs. Replace the device that is causing the failure. Continue adding devices one at a time to ensure all devices are functioning properly.4. Replace the power supply.5. Replace the system board.

Solving Diskette Problems

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

 **NOTE:** 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 98](#) for instructions.

Table A-3 Solving Diskette Problems

Diskette drive light stays on.	
Cause	Solution
Diskette is damaged.	In Microsoft Windows XP, right-click Start , click Explore , and select a drive. Select File > Properties > Tools . Under Error-checking click Check Now . In Microsoft Windows Vista and Windows 7, 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 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.

Table A-3 Solving Diskette Problems (continued)

Diskette drive cannot write to a diskette.

Cause	Solution
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.	In Microsoft Windows XP, right-click Start , click Explore , and select a drive. Select File > Properties > Tools . Under Error-checking , click Check Now . In Microsoft Windows Vista or Windows 7, 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.
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 A-4 Solving Hard Drive Problems

Hard drive error occurs.

Cause	Solution
Hard disk has bad sectors or has failed.	<ol style="list-style-type: none">1. In Microsoft Windows XP, right-click Start, click Explore, and select a drive. Select File > Properties > Tools. Under Error-checking, click Check Now. In Microsoft Windows Vista or Windows 7, 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.	<p>In Microsoft Windows XP, right-click Start, click Explore, and select a drive. Select File > Properties > Tools. Under Error-checking, click Check Now.</p> <p>In Microsoft Windows Vista or Windows 7, right-click Start, click Explore, and right-click on a drive. Select Properties then select the Tools tab. Under Error-checking click Check Now.</p>

Drive not found (identified).

Cause	Solution
Cable could be loose.	Check cable connections.
The system may not have automatically recognized a newly installed device.	<p>See reconfiguration directions in the Solving Hardware Installation Problems on page 98 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.</p> <p>If this is a newly installed drive, run the Computer Setup utility and try adding a POST delay under Advanced > Power-On.</p>
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 NTFFS 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 113 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 has no power to the hard drive enclosure.

Cause	Solution
The lock on the enclosure is not turned to the "ON" position.	Insert the key and turn the lock clockwise 90 degrees. The green LED on the front of the enclosure should be on.
Power cable from the computer power supply to the enclosure frame is not properly connected.	Check the power supply to make sure it is properly connected to the rear of the enclosure frame.

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 A-5 Solving Media Card Reader Problems

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

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

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 My Computer (Windows XP) or Computer (Windows Vista/Windows 7), 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 A-6 Solving Display Problems

Blank screen (no video).	
Cause	Solution
Monitor is not turned on and the monitor light is not on.	Turn on the monitor and check that the monitor light is on.
Bad monitor.	Try a different monitor.
The cable connections are not correct.	Check the cable connection from the monitor to the computer and to the electrical outlet.
You may have a screen blanking utility installed or energy saver features are enabled.	Press any key or click the mouse button and, if set, type your password.
System ROM is corrupted; system is running in Boot Block Emergency Recovery Mode (indicated by eight beeps).	Reflash the system ROM with the latest BIOS image.
You are using a fixed-sync monitor and it will not sync at the resolution chosen.	Be sure that the monitor can accept the same horizontal scan rate as the resolution chosen.
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.
Monitor cable is plugged into the wrong connector.	Systems may have a monitor connection on both the motherboard or an add-in card. Try moving the monitor connection to a different connector on the back of the computer
Monitor settings in the computer are not compatible with the monitor.	<ol style="list-style-type: none">1. In Windows XP Control Panel, double-click the Display icon and select the Settings tab. In Windows Vista or Windows 7 Control Panel, under Appearance and Personalization, select Adjust screen resolution.2. Use the sliding control to reset the resolution.
Monitor is configured to use an input that is not active.	Use the monitor's on-screen menu controls to select the input that is being driven by the system. Refer to the monitor's user documentation for more information on the on-screen controls and settings.

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

Blank screen and the power LED flashes Red seven times, once every second, followed by a two second pause, and the 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. Be sure the monitor cable is securely connected to the computer.2. In a two-monitor system or if another monitor is in close proximity, be sure the monitors are not interfering with each other's electromagnetic field by moving them apart.3. Fluorescent lights or fans may be too close to the monitor.
Monitor needs to be degaussed.	Degauss the monitor. Refer to the documentation that came with the monitor for instructions.

Image is not centered.

Cause	Solution
Position may need adjustment.	Press the 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.

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

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

"Out of Range" displays on screen.

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

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

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

Clicking noise coming from inside a CRT monitor.

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

High pitched noise coming from inside a flat panel monitor.

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

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

Cause	Solution
Flat panel monitor's internal digital conversion circuits may be unable to correctly interpret the output synchronization of the graphics card.	<ol style="list-style-type: none">1. Select the monitor's Auto-Adjustment option in the monitor's on-screen display menu.2. Manually synchronize the Clock and Clock Phase on-screen display functions. To download a SoftPaq 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 A-7 Solving Audio Problems

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

Sound does not come out of the speaker or headphones.	
Cause	Solution
Software volume control is turned down 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.

Table A-7 Solving Audio Problems (continued)

Sound does not come out of the speaker or headphones.

Cause	Solution
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.
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 A-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.

Table A-8 Solving Printer Problems (continued)

Printer prints garbled information.

Cause	Solution
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 A-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">On the Windows XP Desktop, click Start > Shut Down. On the Windows Vista or Windows 7 Desktop, click Start, click the arrow on the lower right corner of the Start menu, then select Shut Down.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 A-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.
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 A-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.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.</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 A-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.	<p>To enable Wake-on-LAN in Windows XP:</p> <ol style="list-style-type: none">1. Select Start > Control Panel.2. Double-click Network Connections.3. Double-click Local Area Connection.4. Click Properties.5. Click Configure.6. Click the Power Management tab, then select the check box to Allow this device to bring the computer out of standby. <p>To enable Wake-on-LAN in Windows Vista:</p> <ol style="list-style-type: none">1. Select Start > Control Panel.2. Under Network and Internet, select View network status and tasks.3. In the Tasks list, select Manage network connections.4. Double-click Local Area Connection.5. Click the Properties button.6. Click the Configure button.7. Click the Power Management tab, then select the check box to Allow this device to wake the computer. <p>To enable Wake-on-LAN in Windows 7:</p> <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.


 **NOTE:** The memory count will be affected by configurations with the Management Engine (ME) enabled. The ME uses 8MB of system memory in single channel mode or 16MB of memory in dual-channel mode to download, decompress, and execute the ME firmware for Out-of-Band (OOB), third-party data storage, and other management functions.

Table A-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 A-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 A-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.	<p>See reconfiguration directions in the Solving Hardware Installation Problems on page 98 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.</p> <p>If this is a newly installed drive, run the Computer Setup utility and try adding a POST delay under Advanced > Power-On Options.</p>
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 A-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 Front Panel Component Problems

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

Table A-17 Solving Front Panel Component Problems

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

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

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 A-18 Solving Internet Access Problems

Unable to connect to the Internet.

Cause	Solution
Internet Service Provider (ISP) account is not set up properly.	Verify Internet settings or contact your ISP for assistance.
Modem is not set up properly.	Reconnect the modem. Verify the connections are correct using the quick setup documentation.
Web browser is not set up properly.	Verify that the Web browser is installed and set up to work with your ISP.
Cable/DSL modem is not plugged in.	Plug in cable/DSL modem. You should see a "power" LED light on the front of the cable/DSL modem.

Table A-18 Solving Internet Access Problems (continued)

Unable to connect to the Internet.	
Cause	Solution
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.)
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.)	<p>Windows 7</p> <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. <p>Windows Vista</p> <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. Click the Delete cookies button. <p>Windows XP</p> <ol style="list-style-type: none">1. Select Start > Control Panel.2. Double-click Internet Options.3. On the General tab, click the Delete Cookies button.
Cannot automatically launch Internet programs.	
Cause	Solution
You must log on to your ISP before some programs will start.	Log on to your ISP and launch the desired program.

Internet takes too long to download Web sites.

Cause	Solution
Modem is not set up properly.	<p>Verify that the modem is connected and communicating properly.</p> <p>Windows 7</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. <p>Windows XP</p> <ol style="list-style-type: none">1. Select Start > Control Panel.2. Double-click System.3. Click the Hardware tab.4. In the Device Manager area, click the Device Manager button.5. Double-click Modems.6. Double-click Agere Systems PCI-SV92PP Soft Modem.7. On the General tab, click Diagnostics.8. Click Query Modem. A "Success" response indicates the modem is connected and working properly. <p>Windows Vista</p> <ol style="list-style-type: none">1. Select Start > Control Panel.2. Click on System and Maintenance.3. Click on System.4. In the Tasks list, select Device Manager.5. Double-click Modems.6. Double-click Agere Systems PCI-SV92PP Soft Modem.7. On the General tab, click Diagnostics.8. 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 A-19 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 113 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.

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

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.


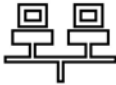
Table B-2 Diagnostic Front Panel LEDs and Audible Codes (continued)

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.

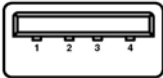

C Connector Pin Assignments

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

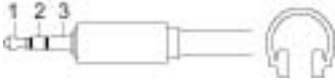
USB

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

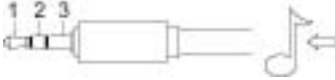
Microphone

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

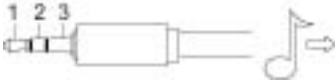
Headphone

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

D 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.

E Specifications

All-in One Models

Table E-1 Specifications

Desktop Dimensions		
Width	8.66 in	22.0 cm
Height	20.0 in	50.8 cm
Depth	16.02 in	40.7 cm
Approximate Weight		
	20.55 lb	9.32 kg
Display		
Resolution	20-inch diagonal widescreen HD+ (900p) WLED anti-glare display	20-inch diagonal widescreen HD+ (900p) WLED anti-glare display
Contrast ratio	1600 x 900 resolution (16:9)	1600 x 900 resolution (16:9)
Image brightness	1000:1 typical	1000:1 typical
Refresh rate	250 nits typical	250 nits typical
Viewing angle (typical)	5 ms	5 ms
	Up to 160° horizontal/160° vertical (10:1 minimum contract ratio)	Up to 160° horizontal/160° vertical (10:1 minimum contract ratio)
Temperature Range		
Operating	41° to 95°F	5° 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 - 7,500 ft	0 - 2,286 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
Power Supply		
	120 W, 18.5V/6.5A	120 W, 18.5V/6.5A

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