Maintenance & Service Guide

HP TouchSmart 9300 Elite All-in-One Business PC

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HP TouchSmart 9300 Elite All-in-One Business PC

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About This Book

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

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

NOTE: Text set off in this manner provides important supplemental information.

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1 Product Features

Figure 1-1 HP TouchSmart 9300 Elite Business PC

NOTE: The wireless keyboard and mouse shown above are optional accessories.

The HP TouchSmart 9300 Elite Business PC offers the following features:

- Integrated All-in-One form factor
- 23-inch diagonal widescreen WLED backlit BrightView LCD
- Multitouch panel
- Swivel pad and VESA mounting bracket under base of stand
- Adjustable reclining stand
- Intel® 2nd Generation Core™ i7, i5, or i3 processor
- Intel H67 chipset
- Genuine Windows 7 Professional Edition operating system
- Integrated Intel HD Graphics, or discrete MXM graphics
- Integrated Gigabit Network Connection (10/100/1000 NIC)

- Optional wireless connectivity:
  - Integrated 802.11 a/b/g/n or b/g/n wireless LAN module
  - Bluetooth® 3.0
- Optional TV Tuner
- Four SODIMM slots with up to 16 GB of DDR3 SDRAM memory and dual channel support
- Up to 1 TB hard drive, or up to 300 GB Solid State Drive
- Optional Slot-load Blu-ray Combo Drive (Blu-ray Reader/DVD Burner) or SuperMulti DVD LightScribe Burner
- 6-in-1 Media Card Reader
- 7 USB ports
- DisplayPort
- Integrated Full HD webcam, dual microphone array, and premium stereo speakers
- Volume control and mute buttons
- Security lock slot and rear port security cover
- Removable panels on the back of the chassis allow administrators to easily and efficiently service the PC
- HP TouchSmart software suite for instant access to calendar, Internet, notes, and multimedia content
- ENERGY STAR® qualified, EPEAT® Gold registered, and offers 90-percent energy-efficient power
- Choice of wired or wireless keyboard and mouse

Front Components

Figure 1-2 Front Components

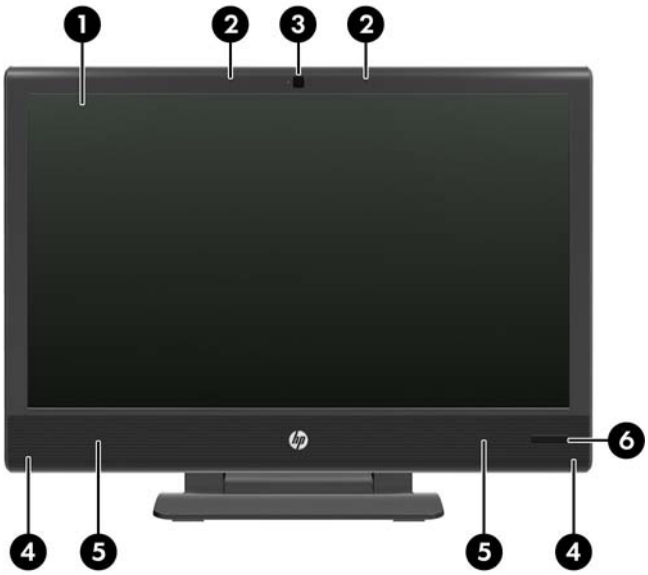


Table 1-1 Front Components

No.	Component	No.	Component
1	58.4 cm (23-inch) diagonal, 16:9 widescreen, touch-enabled, full HD, white LED backlit LCD display	4	Dual wireless antenna
2	Dual microphone array (optional)	5	High-performance stereo speakers
3	Webcam (optional)	6	IR Receiver (select models only)

Side Components

Figure 1-3 Side Components

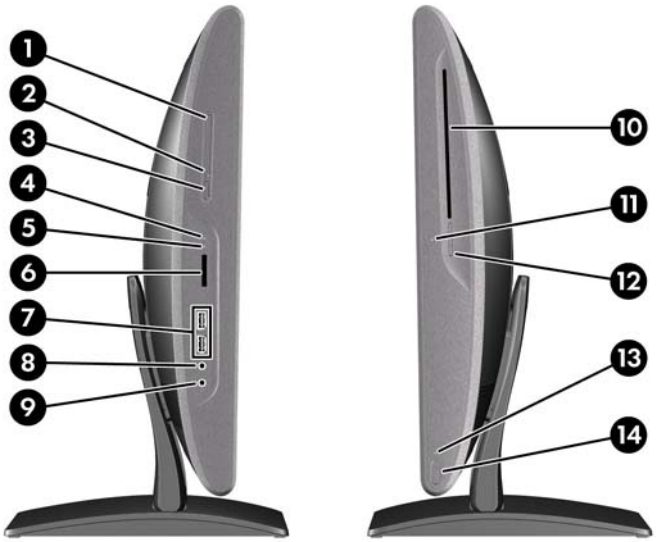


Table 1-2 Side Components

No.	Component	No.	Component
1	Volume up button	8	Microphone/line in jack
2	Volume down button	9	Headphone jack
3	Mute button	10	Slot-load optical drive (optional)
4	Hard drive activity LED	11	Optical drive eject button
5	Media card reader activity LED	12	Optical drive activity LED
6	Media card reader	13	Power LED
7	(2) USB 2.0 ports	14	Power button

Rear Components

Figure 1-4 Rear Components

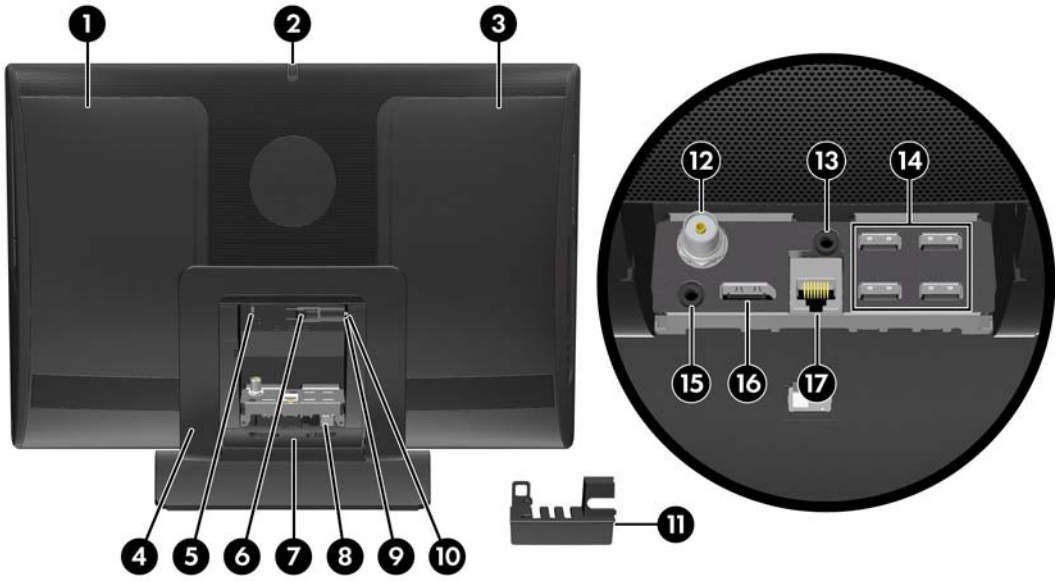


Table 1-3 Rear Components

No.	Component	No.	Component
1	Drive access panel	10	Power indicator light
2	Webcam adjustment wheel	11	Rear port security cover
3	Memory access panel	12	TV coax in (optional)
4	Adjustable reclining stand	13	IR Emitter (Blaster) output (optional)
5	Security lock slot	14	(4) USB 2.0 ports
6	Power connector release latch	15	Audio line out
7	Rear port access door	16	DisplayPort
8	USB port for optional wireless keyboard/mouse receiver	17	RJ-45 Gigabit Ethernet port
9	Power connector		

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.

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

   It is recommended that you install all of the critical updates and service packs.
5. After the updates have been installed, Windows will prompt you to reboot the machine. Be sure to save any files or documents that you may have open before rebooting. Then select **Yes** to reboot the machine.

Installing or Upgrading Device Drivers (Windows systems)

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

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

Obtain the latest support software, including support software for the operating system from http://www.hp.com/support. Select your country and language, select **Download drivers and software (and firmware)**, enter the model number of the computer, and press Enter.

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: • 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
About	Displays copyright notice.
Set Time and Date	Allows you to set system time and date.
Apply Defaults and Exit	Applies the currently selected default settings and clears any established passwords.
Ignore Changes and Exit	Exits Computer Setup without applying or saving any changes.
Save Changes and Exit	Saves changes to system configuration or default settings and exits Computer Setup.

Computer Setup—Storage

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

Table 3-2 Computer Setup—Storage

Option	Description
Device Configuration	Lists all installed BIOS-controlled storage devices. When a device is selected, detailed information and options are displayed. The following options may be presented: **Hard Disk**: Size, model, firmware, serial number, emulation type. Emulation type has the following choices: • None (prevents BIOS data accesses and disables it as a boot device) • Hard Disk (treated as a hard disk) **CD-ROM**: Model, firmware, serial number, connector color. No emulation options available.
Storage Options	**SATA Emulation** Allows you to choose how the SATA controller and devices are accessed by the operating system. There are two supported options: AHCI and IDE. AHCI (default option) - Allows operating systems with AHCI device drivers loaded to take advantage of more advanced features of the SATA controller. IDE - This is the most backwards-compatible setting of the two options. Operating systems usually do not require additional driver support in IDE mode. **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).
DPS Self-Test	Allows you to execute self-tests on ATA hard drives capable of performing the Drive Protection System (DPS) self-tests. **NOTE:** This selection will only appear when at least one drive capable of performing the DPS self-tests is attached to the system.
Boot Order	Allows you to: • Specify the order in which attached devices (such as a USB flash media device, hard drive, optical drive, or network interface card) are checked for a bootable operating system image. Each device on the list may be individually excluded from or included for consideration as a bootable operating system source. • Specify the order of attached hard drives. The first hard drive in the order will have priority in the boot sequence and will be recognized as drive C (if any devices are attached). **NOTE:** MS-DOS drive lettering assignments may not apply after a non-MS-DOS operating system has started. **Shortcut to Temporarily Override Boot Order** To boot **one time** from a device other than the default device specified in Boot Order, restart the 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.

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	Allows you to set and enable a setup (administrator) password. **NOTE:** If the setup password is set, it is required to change Computer Setup options, flash the ROM, and make changes to certain plug and play settings under Windows. See the *Desktop Management Guide* for more information.
Power-On Password	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. **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). See the *Desktop Management Guide* for more information.
Device Security	Allows you to set Device Available/Device Hidden for: • System audio • Network controllers (some models) • SATA0 • SATA1 • SATA2

USB Security	Allows you to enable or disable groups of USB ports or individual USB ports:
	
	• Front USB Ports
	  ◦ USB Port 4
	  ◦ USB Port 5
	• Rear USB Ports
	  ◦ USB Port 0
	  ◦ USB Port 1
	  ◦ USB Port 2
	  ◦ USB Port 3
	• internal USB Ports
	  ◦ USB Port 6
	  ◦ USB Port 8
	  ◦ USB Port 9
	  ◦ USB Port 10

Table 3-3 Computer Setup—Security (continued)

	◦ USB Port 11 ◦ USB Port 13
Slot Security	Allows you to disable or enable any Mini Card slot
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.)
System IDs	Displays: • Product Name • Serial number • 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.) • SKU Number • Family Name • Feature Byte • Build ID • Keyboard locale setting

Table 3-3 Computer Setup—Security (continued)

System Security (some models: these options are hardware dependent)	Data Execution Prevention (some models) (enable/disable) - Helps prevent operating system security breaches. 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. Virtualization Technology (some models) (enable/disable) - Controls the virtualization features of the processor. Changing this setting requires turning the computer off and then back on. Virtualization Technology Directed I/O (some models) (enable/disable) - Controls virtualization DMA remapping features of the chipset. Changing this setting requires turning the computer off and then back on. Trusted Execution Technology (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. To enable this feature you must enable the following features: • Embedded Security Device Support • Virtualization Technology • Virtualization Technology Directed I/O Embedded Security Device Support (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. **NOTE:** To configure the Embedded Security Device, a Setup password must be set. • 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. **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.
	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. • 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. **NOTE:** To enable this option, a Setup password must be set.

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
Hardware Power Management	• 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. • S5 Wake on LAN—Enables or disables remotely waking up the computer from S5 (power is off) power state. Default is disabled. Disabling this feature obtains the lowest power consumption available on the computer during S5. It does not affect the ability of the computer to Wake on LAN from suspend or hibernation, but will prevent it from waking from S5 via the network. It does not affect operation of the network connection while the computer is on. If a network connection is not required, completely disable the network controller (NIC) by using the arrow (left and right) keys to select the **Security** > **Device Security** menu. Set the **Network Controller** option to **Device Hidden**. This prevents the network controller from being used by the operating system and reduces the power used by the computer in S5.
Thermal	Displays the CPU fan speed and 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	Allows you to set: • 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. • After Power Loss (off/on/previous state): Setting this option to: ◦ Off—causes the computer to remain powered off when power is restored. ◦ 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. **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. • 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.
BIOS Power-On	Allows you to set the computer to turn on automatically at a time you specify.
Bus Options	On some models, allows you to enable or disable: • PCI SERR# Generation. • PCI VGA Palette Snooping, which sets the VGA palette snooping bit in PCI configuration space; only needed when more than one graphics controller is installed.
Device Options	Allows you to set: • Num Lock State at Power-On (off/on). Default is on. • Hyper-threading (enable/disable). Default is enabled. • Internal Speaker (some models) (does not affect external speakers). Default is enabled. • NIC PXE Option ROM Download (enable/disable). The BIOS contains an embedded NIC option ROM to allow the unit to boot through the network to a PXE server. This is typically used to download a corporate image to a hard drive. The NIC option ROM takes up memory space below 1MB commonly referred to as DOS Compatibility Hole (DCH) space. This space is limited. This F10 option will allow users to disable the downloading of this embedded NIC option ROM thus giving more DCH space for additional PCI cards which may need option ROM space. The default will be to have the NIC PXE option-ROM-enabled.
Management Devices	The Management Devices menu will only be displayed in the Advanced menu when the BIOS detects multiple management options. This option is for installed NIC cards that support ASF or DASH. Use the Management Devices menu to select if the BIOS management operations will be through the embedded solution or one of the installed NIC cards.

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 XP/Vista/Win 7	32 GB	2 TB
NTFS	ATA	Windows XP/Vista/Win 7	2 TB	2 TB

5 Identifying the Chassis, Routine Care, and Disassembly Preparation

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

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

Chassis Designation

An all-in one form factor is available.

All-in One

Electrostatic Discharge Information

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

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

Generating Static

The following table shows that:

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

	Relative Humidity		
Event	**55%**	**40%**	**10%**
Walking across carpet	7,500 V	15,000 V	35,000 V
Walking across vinyl floor	3,000 V	5,000 V	12,000 V
Motions of bench worker	400 V	800 V	6,000 V
Removing DIPs* from plastic tube	400 V	700 V	2,000 V
Removing DIPs* from vinyl tray	2,000 V	4,000 V	11,500 V
Removing DIPs* from Styrofoam	3,500 V	5,000 V	14,500 V
Removing bubble pack from PCB	7,000 V	20,000 V	26,500 V
Packing PCBs in foam-lined box	5,000 V	11,000 V	21,000 V

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

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 ± 10% resistance in the ground cords. To provide proper ground, a strap must be worn snug against bare skin. The ground cord must be connected and fit snugly into the banana plug connector on the grounding mat or workstation.
- **Heel straps/Toe straps/Boot straps** can be used at standing workstations and are compatible with most types of shoes or boots. On conductive floors or dissipative floor mats, use them on both feet with a maximum of one-megohm ± 10% resistance between the operator and ground.

Static Shielding Protection Levels

Method	Voltage
Antistatic plastic	1,500
Carbon-loaded plastic	7,500
Metallized laminate	15,000

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)
- Flat-bladed screwdriver (may sometimes be used in place of the Torx screwdriver)
- Phillips #2 screwdriver
- Diagnostics software
- HP tamper-resistant T-15 wrench (Smart Cover FailSafe Key, PN 166527-001) or HP tamper-resistant bits (Smart Cover FailSafe Key, PN 166527-002)

Screws

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

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

Cables and Connectors

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

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

Hard Drives

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

- If a drive must be mailed, place the drive in a bubble-pack mailer or other suitable protective packaging and label the package “Fragile: Handle With Care.”
- Do not remove hard drives from the shipping package for storage. Keep hard drives in their protective packaging until they are actually mounted in the CPU.
- Avoid dropping drives from any height onto any surface.
- If you are inserting or removing a hard drive, turn off the computer. Do not remove a hard drive while the computer is on or in standby mode.
- Before handling a drive, ensure that you are discharged of static electricity. While handling a drive, avoid touching the connector. For more information about preventing electrostatic damage, refer to Electrostatic Discharge Information on page 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.

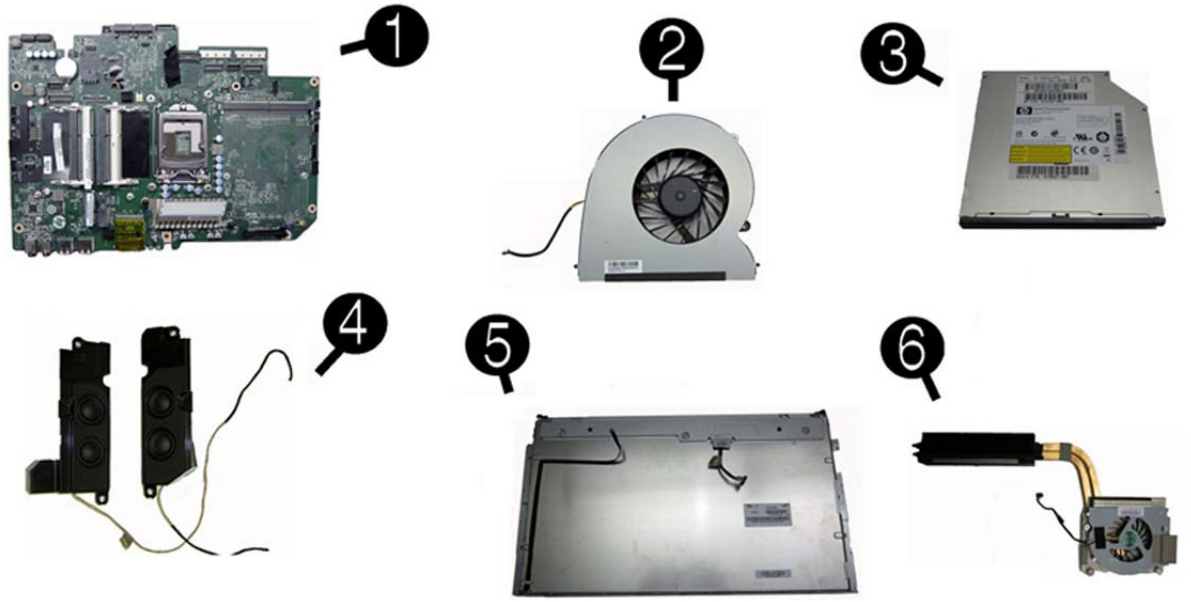
See the appropriate removal and replacement chapter for the chassis you are working on in this guide for instructions on the replacement procedures.

⚠ **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 140ºF (60ºC). 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

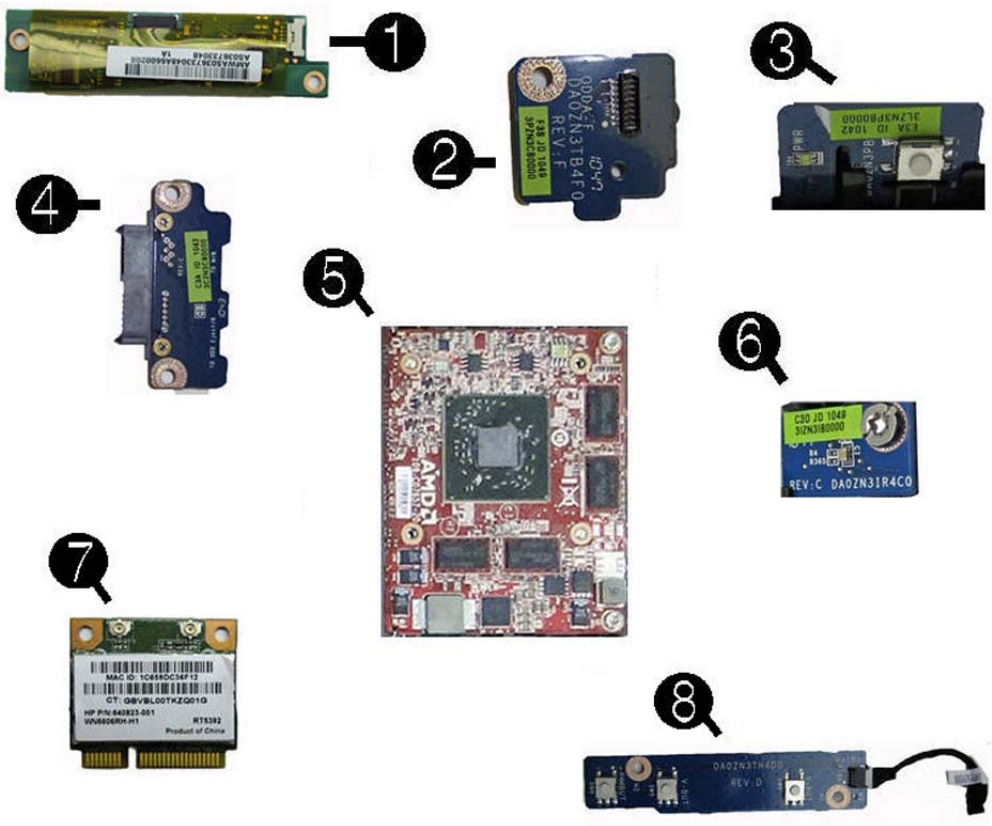


Item	Description	Spare part number
(1)	**System board**	658978-001
(2)	**Fan**	652321-001
(3)	**Optical drive** (does not include bezel)	
	HP SuperMulti DVD Writer Drive	583092-001
	HP Slim Slot Blu-ray Combo Drive	583093-001
(4)	**Speakers**	
	Right speaker	652274-001
	Left speaker	652275-001
(5)	**Display panel, 23-inch**	
	ZBD	658981-001
	non-ZBD	658979-001
(6)	**Fan sink assembly (thermal module)** (includes replacement thermal material)	

Item	Description	Spare part number
	Discrete graphics	658987-001
	UMA graphics	658988-001
	Memory modules (PC3-10600, 1333-MHz; not illustrated)	
	4-GB	646801-001
	2-GB	646800-001
	Processor (includes replacement thermal material; not illustrated)	
	Intel Core i7 processors	
	2600 (3.4-GHz, 8-MB L3 cache)	638632-001
	Intel Core i5 processors	
	2500 (3.3-GHz, 6-MB L3 cache)	638631-001
	2400 (3.1-GHz, 6-MB L3 cache)	638630-001
	2300 (2.8-GHz, 6-MB L3 cache)	654601-001
	Intel Core i3 processors	
	2120 (3.3-GHz, 3-MB L3 cache)	638629-001
	2100 (3.1-GHz, 3-MB L3 cache)	638628-001
	Intel Pentium Dual-Core processors	
	G850 (2.9-GHz, 3-MB L3 cache)	655973-001
	G840 (2.8-GHz, 3-MB L3 cache)	655972-001
	G620 (2.6-GHz, 3-MB L3 cache)	655971-001
	Hard drive (not illustrated)	
	1000-GB	636930-001
	750-GB	639363-001
	500-GB	636929-001
	320-GB	634824-001
	250-GB	636927-001
	160-GB solid-state drive	646809-001
	80-GB solid-state drive	607817-001
	AC adapter (external; not illustrated)	
	230-W	654600-001
	180 W	654599-001
	150 W	651587-001
	Caps (not illustrated)	
	Left side cap, no optical drive	658989-001
	Left side cap, 1394	670181-001

Item	Description	Spare part number
	Right side cap	670182-001
	Keyboard (not illustrated)	
	USB	
	• Brazil	590271-201
	• French Canada	590271-121
	• Latin America	590271-161
	• The United States	590271-001
	USB Enterprise	
	• Brazil	658990-201
	• French Canada	658990-121
	• Latin America	658990-161
	• The United States	658990-001
	Wireless for use in the United States	611376-003
	USB Smartcard	
	• Brazil	631411-204
	• French Canada	631411-124
	• The United States	631411-004
	Washable	
	• United States	613125-001
	• French Canada	613125-121
	USB, mini	
	• United States	611375-003
	• French Canada	611375-123
	USB hub keyboard	
	• United States	631913-001
	Mouse (not illustrated)	
	USB laser	609251-001
	USB, optical, Portia	621416-001
	Washable	619580-001
	Remote controls (not illustrated)	
	For use in North America (English)	642086-001
	For use in the Asia/Pacific and Latin America regions	642181-001

Boards



Item	Description	Spare part number
(1)	**Inverter**	658982-001
(2)	**Optical drive eject board**	652312-001
(3)	**Power board**	652305-001
(4)	**Optical drive connector board**	652311-001
(5)	**Graphics card**	
	GFX, 1 GB graphics card	652164-001
	ATI MXM30 Viper 1-GB HD5570 graphics card	628380-001
(6)	**Infrared sensor board**	652307-001
(7)	**WLAN modules**	
	Intel Centrino® Advanced-N 6205 802.11a/b/g/n	652165-001
	802.11b/g/n	654602-001
	HP WLAN combo 802.11b/g/n + Bluetooth 2.1 card	652279-001
(8)	**Volume button board**	652306-001
	G-sensor board (not illustrated)	658983-001
	TV tuner module (not illustrated)	613990-001

Item	Description	Spare part number
	I/O board assembly, with DataPort (not illustrated)	
	Includes IR	670183-001
	Does not include IR	670184-001
	Webcam (not illustrated)	
	Webcam module without DMIC	652277-001
	Webcam module, 2.0 MP, FHD	658985-001
	Webcam lens cover	654598-001
	Webcam wheel cap	658986-001

Cables

Description	Spare part number
IR blaster cable	652276-001
Optical drive transfer cable, 275 mm	652286-001
Optical drive eject cable, 190 mm	652299-001
Sensor2 cable, 100 mm	654301-001
FFC I/O cable, 449 mm	658980-001
G-sensor cable	658984-001
Cable, DisplayPort to HDMI (not illustrated)	617450-001
NTSC cable	670180-001
UMA (Integrated graphics) I/O-DataPort cable	670185-001
MXM (Discrete graphics) I/O-System board cable	670186-001

Sequential part number listing

Spare part number	Description
583092-001	HP SuperMulti DVD Writer Drive
583093-001	HP Slim Slot Blu-ray Combo Drive
590271-001	USB keyboard for use in the United States
590271-121	USB keyboard for use in French Canada
590271-161	USB keyboard for use in Latin America
590271-201	USB keyboard for use in Brazil
607817-001	80-GB solid-state drive
609251-001	Mouse, USB, laser

Spare part number	Description
611375-003	Keyboard, USB, mini, for use in the United States
611375-123	Keyboard, USB, mini, for use in French Canada
613125-001	Keyboard, washable, for use in the United States
613125-121	Keyboard, washable, for use in French Canada
613990-001	HP TV tuner module
617450-001	Cable, DisplayPort to HDMI
619580-001	Mouse, washable
621416-001	Mouse, USB, optical, Portia
628380-001	ATI MXM30 Viper 1-GB HD5570 graphics card
631411-004	Keyboard, USB, Smartcard, for use in the United States
631411-124	Keyboard, USB, Smartcard, for use in French Canada
631411-204	Keyboard, USB, Smartcard, for use in Brazil
631913-001	Keyboard, USB hub
634824-001	Hard drive, 320 GB
636927-001	Hard drive, 250 GB
636929-001	Hard drive, 500 GB
636930-001	Hard drive, 1000 GB
638628-001	Intel Core i3, 2100 processor (3.1-GHz, 3-MB L3 cache)
638629-001	Intel Core i3, 2120 processor (3.3-GHz, 3-MB L3 cache)
638630-001	Intel Core i5, 2400 processor (3.1-GHz, 6-MB L3 cache)
638631-001	Intel Core i5, 2500 processor (3.3-GHz, 6-MB L3 cache)
638632-001	Intel Core i7, 2600 processor (3.4-GHz, 8-MB L3 cache)
639363-001	Hard drive, 750 GB
642086-001	Remote control for use in North America
642181-001	Remote control for use in the Asia/Pacific and Latin America regions
646800-001	2-GB memory module (PC3-10600, 1333-MHz)
646801-001	4-GB memory module (PC3-10600, 1333-MHz)
646809-001	160-GB Solid-state drive
651587-001	AC adapter, 150W (external)
652164-001	GFX, 1 GB graphics card
652165-001	Intel Centrino® Advanced-N 6205 802.11a/b/g/n WLAN card
652274-001	Speaker, right
652275-001	Speaker, left
652276-001	IR blaster cable

Spare part number	Description
652277-001	Webcam module without DMIC
652279-001	HP WLAN combo 802.11b/g/n + Bluetooth 2.1 card
652286-001	Optical drive transfer cable, 275 mm
652299-001	Optical drive eject cable, 190 mm
652305-001	Power board
652306-001	Volume button board
652307-001	Infrared sensor board
652311-001	Optical drive connector board
652312-001	Optical drive eject board
652321-001	Fan
654301-001	Sensor2 cable, 100 mm
654598-001	Webcam lens cover
654599-001	AC adapter, 180W (external)
654600-001	230-W AC adapter
654601-001	Intel Core i5, 2300 processor (2.8-GHz, 6-MB L3 cache)
654602-001	802.11b/g/n WLAN card
655971-001	Intel Pentium Dual-Core, G620 processor (2.6-GHz, 3-MB L3 cache)
655972-001	Intel Pentium Dual-Core, G840 processor (2.8-GHz, 3-MB L3 cache)
655973-001	Intel Pentium Dual-Core, G850 processor (2.9-GHz, 3-MB L3 cache)
658978-001	System board
658979-001	Display panel, 23-inch, non-ZBD
658980-001	FFC I/O cable, 449 mm
658981-001	Display panel, 23-inch, ZBD
658982-001	Inverter
658983-001	G-sensor board
658984-001	G-sensor cable
658985-001	Webcam module, 2.0 MP, FHD
658986-001	Webcam wheel cap
658987-001	Heat sink (thermal module) assembly for use in computers with discrete graphics (includes replacement thermal material)
658988-001	Heat sink (thermal module) assembly for use in computers with UMA graphics (includes replacement thermal material)
658989-001	Left side cap, no optical drive
658990-001	Keyboard, USB Enterprise, for use in the United States

Spare part number	Description
658990-121	Keyboard, USB Enterprise, for use in French Canada
658990-161	Keyboard, USB Enterprise, for use in Latin America
658990-201	Keyboard, USB Enterprise, for use in Brazil
670180-001	NTSC cable
670181-001	Left side cap for use in models with 1394 ports
670182-001	Right side cap
670183-001	I/O board assembly with DataPort and IR
670184-001	I/O board assembly with DataPort, no IR
670185-001	UMA (Integrated graphics) I/O-DataPort cable
670186-001	MXM (Discrete graphics) I/O-System board cable

7 Removal and Replacement Procedures

The following sections provide information about disassembling various components of the All-in-One.

Preparing to disassemble the computer

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

1. Remove all removable media, such as compact discs or USB flash drives, from the computer.
2. Turn off the computer properly through the operating system, then turn off any external devices.
3. Disconnect the power cord from the power outlet and disconnect any external devices.

   CAUTION: Regardless of the power-on state, voltage is always present on the system board as long as the system is plugged into an active AC outlet. You must disconnect the power cord to avoid damage to the internal components of the computer.

4. Disconnect all cables from the ports.
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.

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

WARNING! Beware of sharp edges inside the chassis.

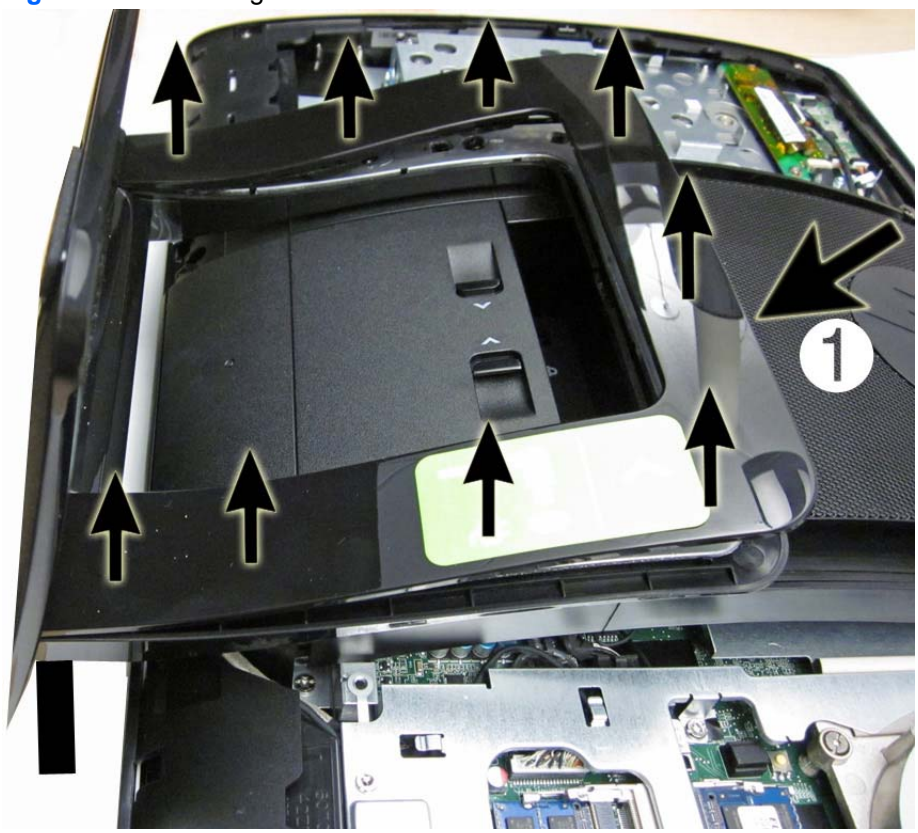
Stand

The stand is secured with four screws. The screws are covered by the plastic piece covering the back of the stand.

To remove the stand:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 34).
2. Insert your finger, or a flathead screwdriver, into the slot on the stand cover **(1)** to pry it off of the computer stand.

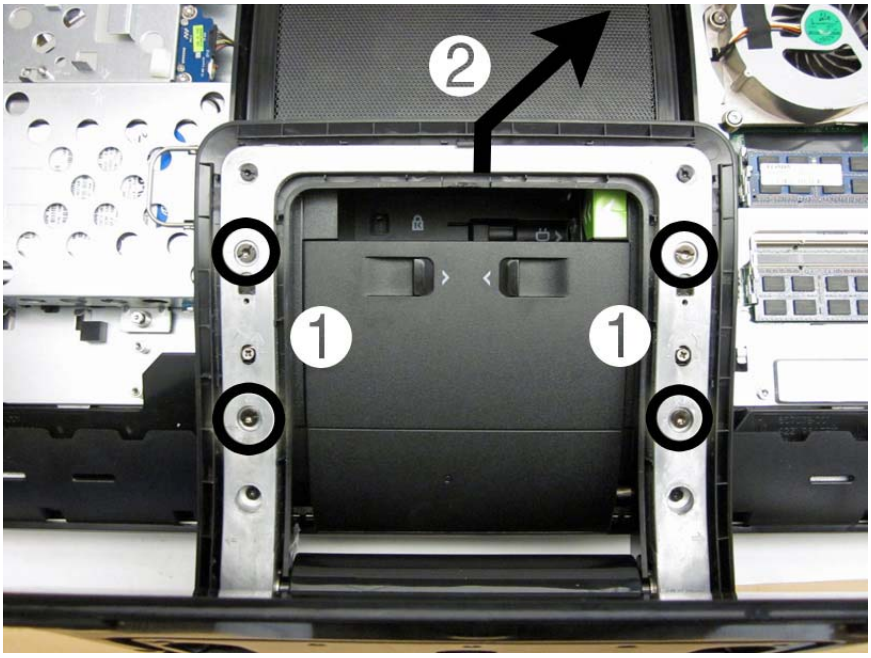
Figure 7-1 Removing the stand cover



3. Remove the four Torx screws **(1)**, slide the stand toward the top of the computer, and then lift the stand off the computer **(2)**.

NOTE: You can use a Torx or a flat-head driver to remove the screws.

Figure 7-2 Removing the stand



To replace the stand, reverse the removal procedures.

Weight (with integrated graphics) without stand: 8.75 kg (19.3 lbs)

Weight (with discrete graphics) without stand: 9.05 kg (20.0 lbs)

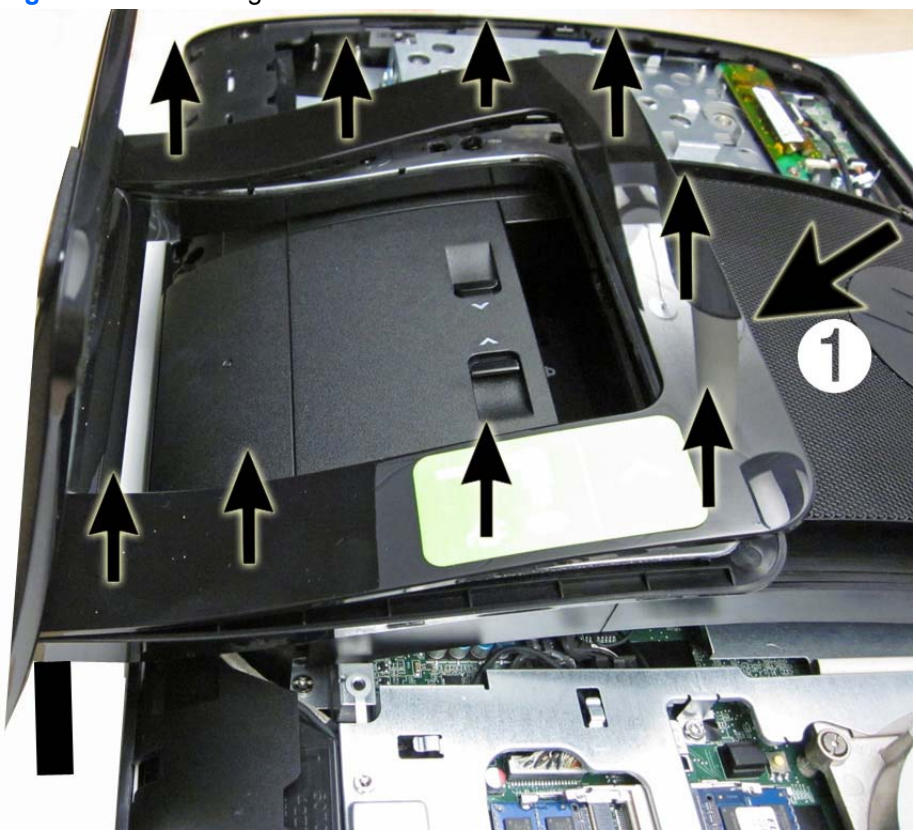
VESA mount

The VESA adapter plate is stored in the bottom of the stand and is mounted in place of the stand.

To install the VESA adapter plate:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 34).
2. Insert your finger, or a flathead screwdriver, into the slot on the stand cover **(1)** to pry it off of the computer stand.

Figure 7-3 Removing the stand cover



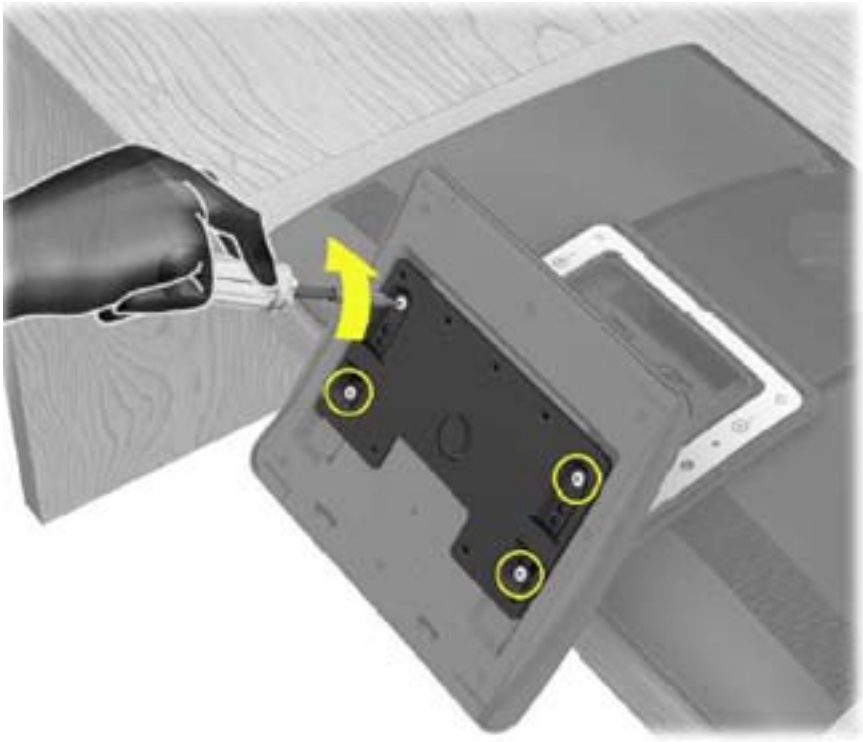
3. Use a Phillips screwdriver to tighten the recessed two brake screws (for the rails) on the computer. It should take about 5–10 turns of the screwdriver to secure the screws. Take care not to overtighten the screws.

NOTE: The tightened brake screws will hold the VESA adapter plate in the locked position, so that the computer does not slide down once it is mounted on a wall. These screws must be tighten before placing the VESA adapter plate on the back of the computer.

Figure 7-4 Tightening the brake screws

4. While the stand is still on the computer, use a Phillips screwdriver to remove the four screws attaching the VESA adapter plate to the bottom of the computer stand. Save the screws.

Figure 7-5 Removing the VESA adapter screws

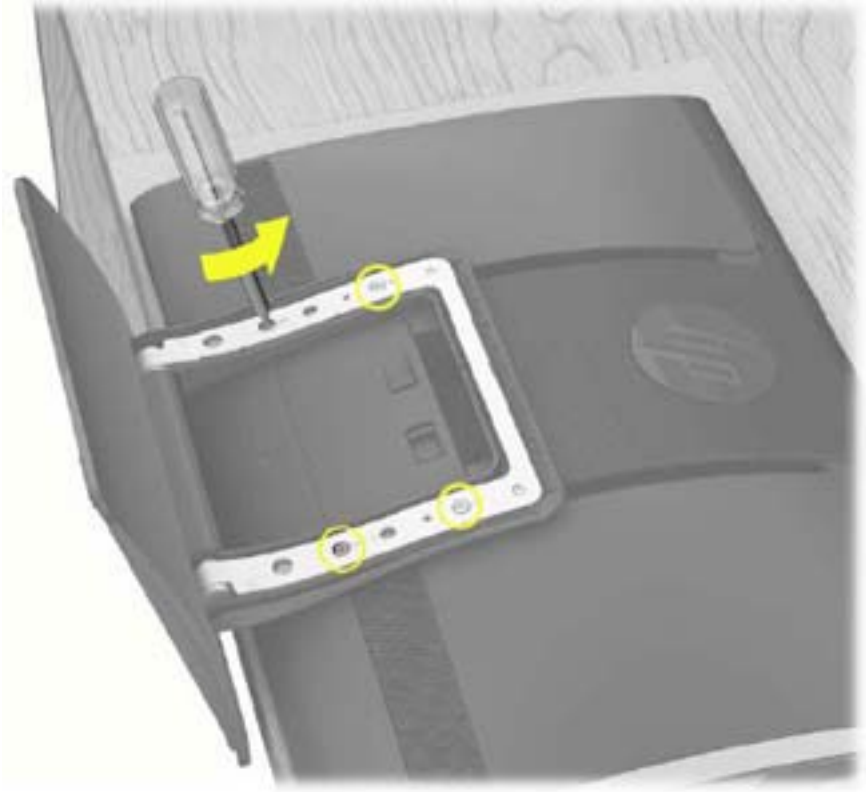


5. Remove the VESA adapter plate from the bottom of the computer stand.

Figure 7-6 Removing the VESA adapter plate

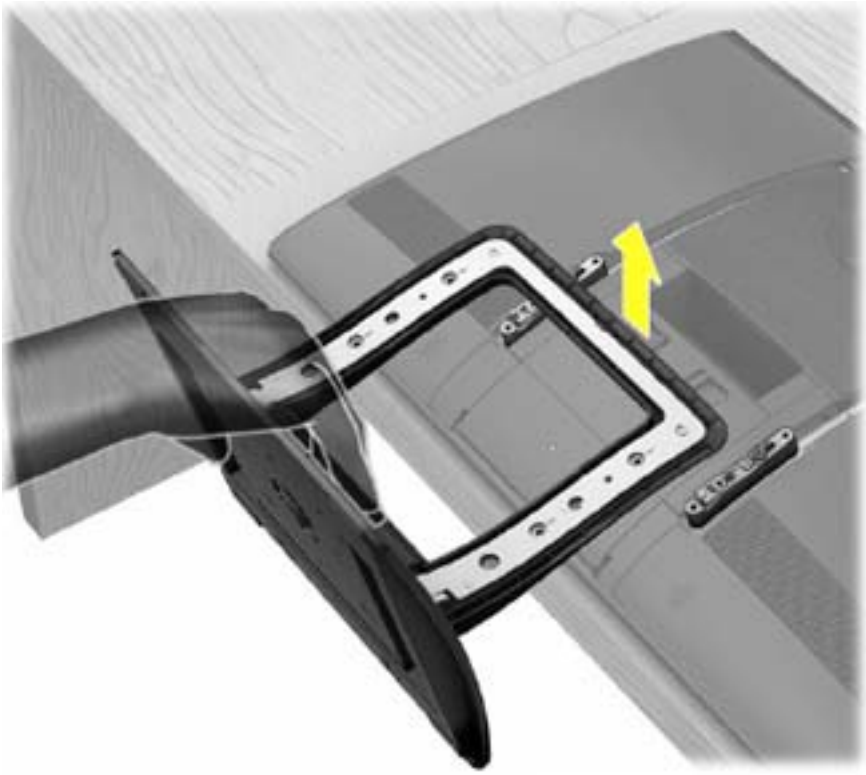
6. Use a flathead screwdriver to remove the four screws attaching the computer stand to the back of the computer.

Figure 7-7 Removing the stand screws



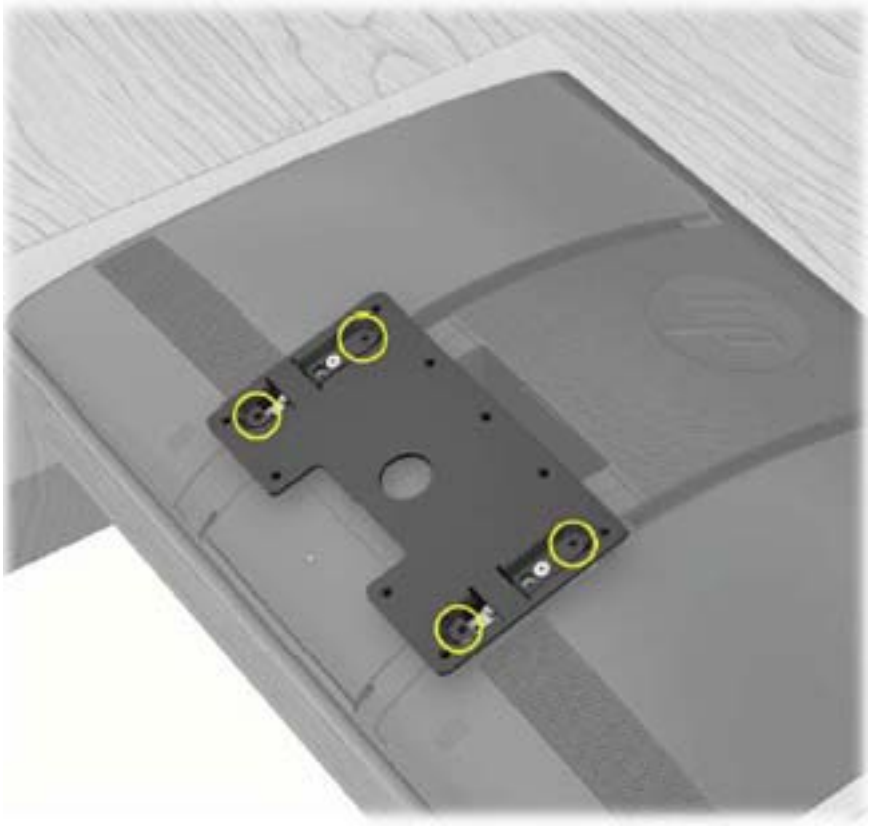
7. Lift the computer stand away from the computer.

Figure 7-8 Removing the stand



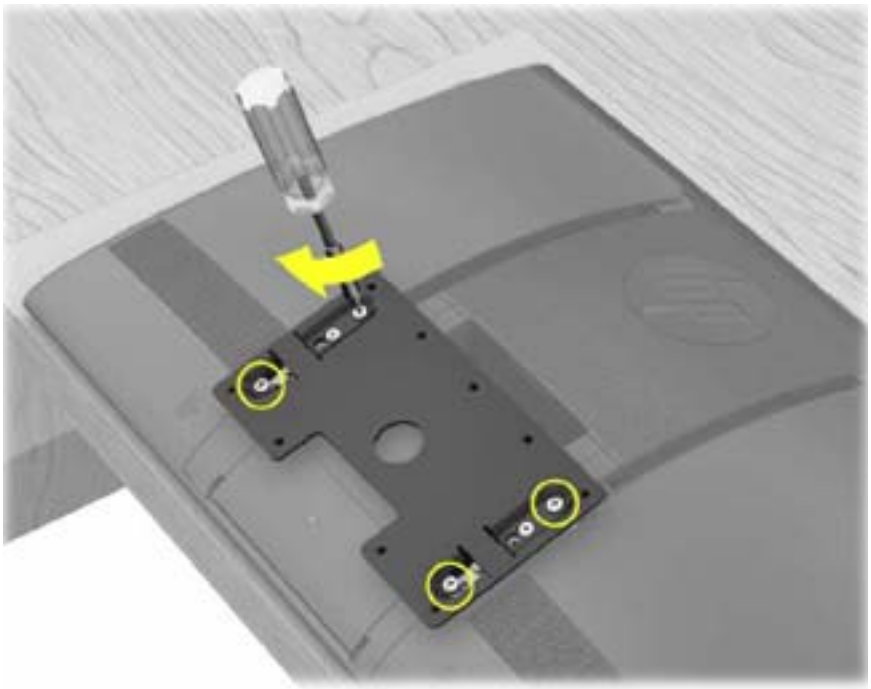
8. Place the VESA adapter plate over the rails on the back of the computer, matching the cutouts on the each side of the plate with the screw holes and the hooks on the rails.

Figure 7-9 Placing the VESA adapter plate on the computer



9. Attach the VESA adapter plate to the back of the computer, using a Phillips screwdriver to tighten the four screws.

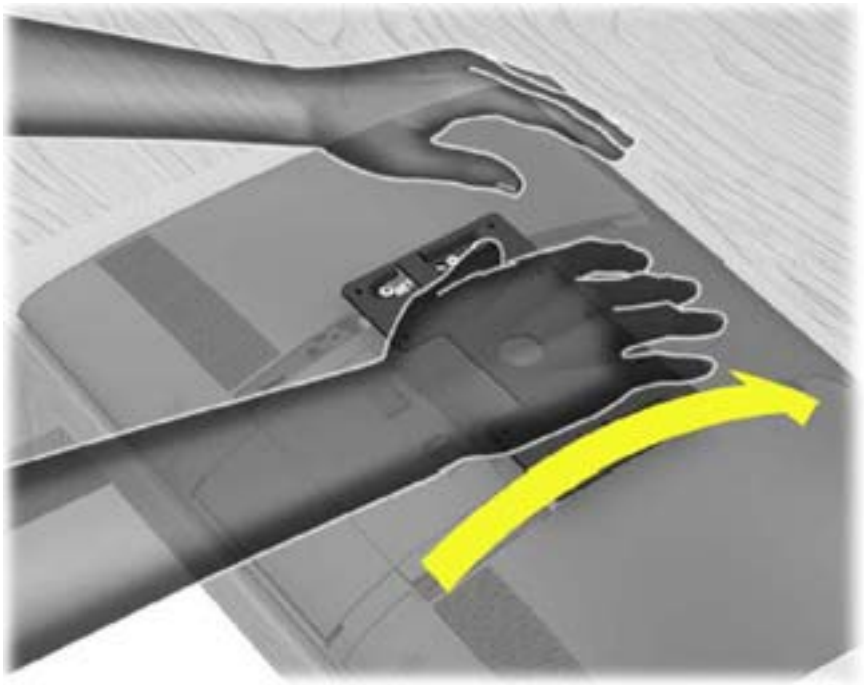
Figure 7-10 Securing the VESA adapter plate



10. Slide the VESA adapter plate upward until it locks into place. You will hear a click when the VESA adapter plate is locked in place.

NOTE: If you do not hear the click or the plate does not lock in place, it means the two brake screws were not sufficiently tightened when the computer stand was removed. Unscrew the four screws on the VESA adapter plate and remove it, then retighten the two brake screws (see step 4 in previous section). Replace the VESA adapter plate by installing and tightening the four screws, then slide the plate up until it locks in place.

Figure 7-11 Locking the VESA adapter plate in place



11. Attach the wall-mounting hardware (purchased separately) to the VESA adapter plate, according to the manufacturer's instructions, using either the 100 mm x 100 mm screw holes or the 100 mm x 200 mm screw holes.

Figure 7-12 100 mm x 100 mm holes

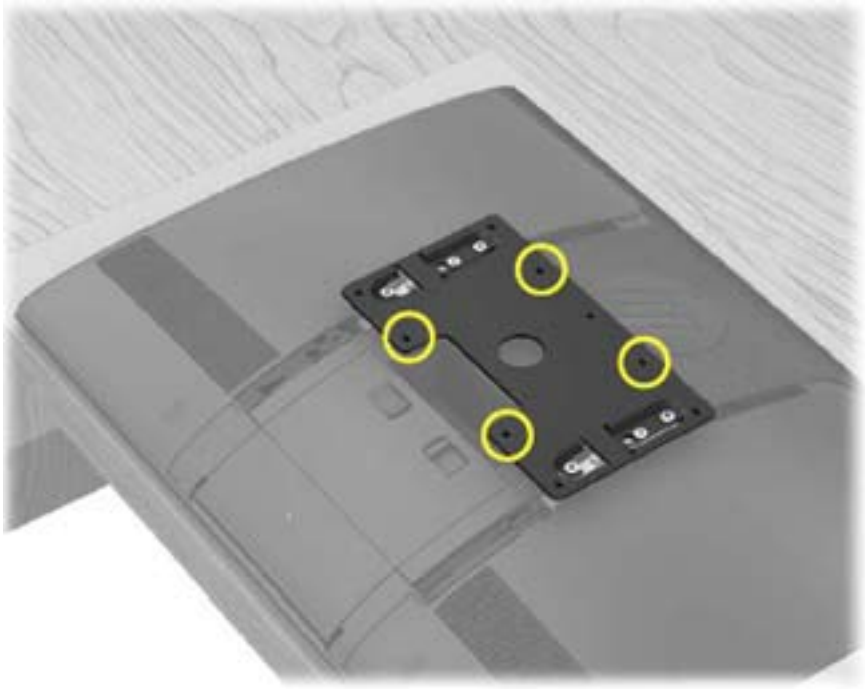
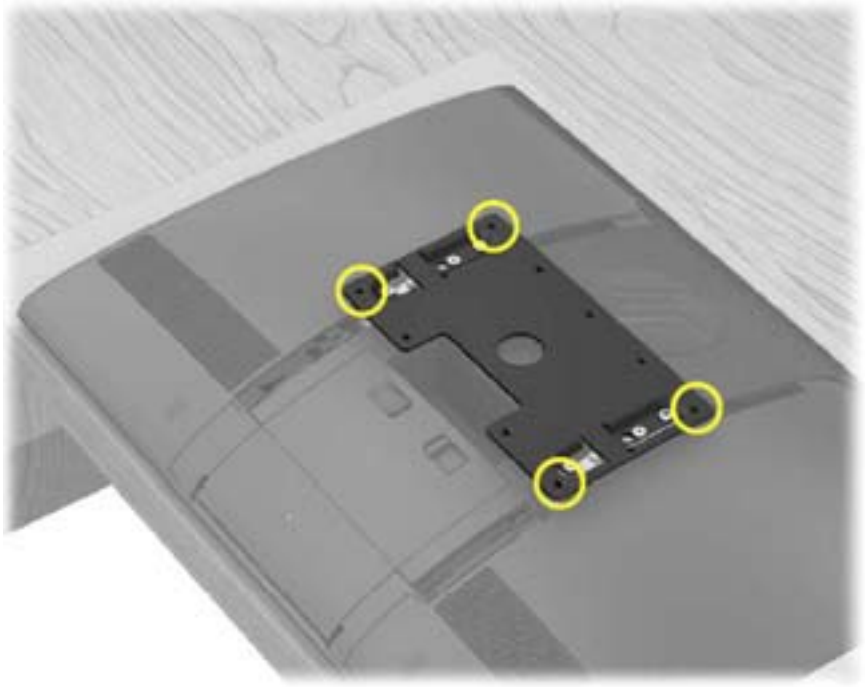


Figure 7-13 100 mm x 200 mm holes



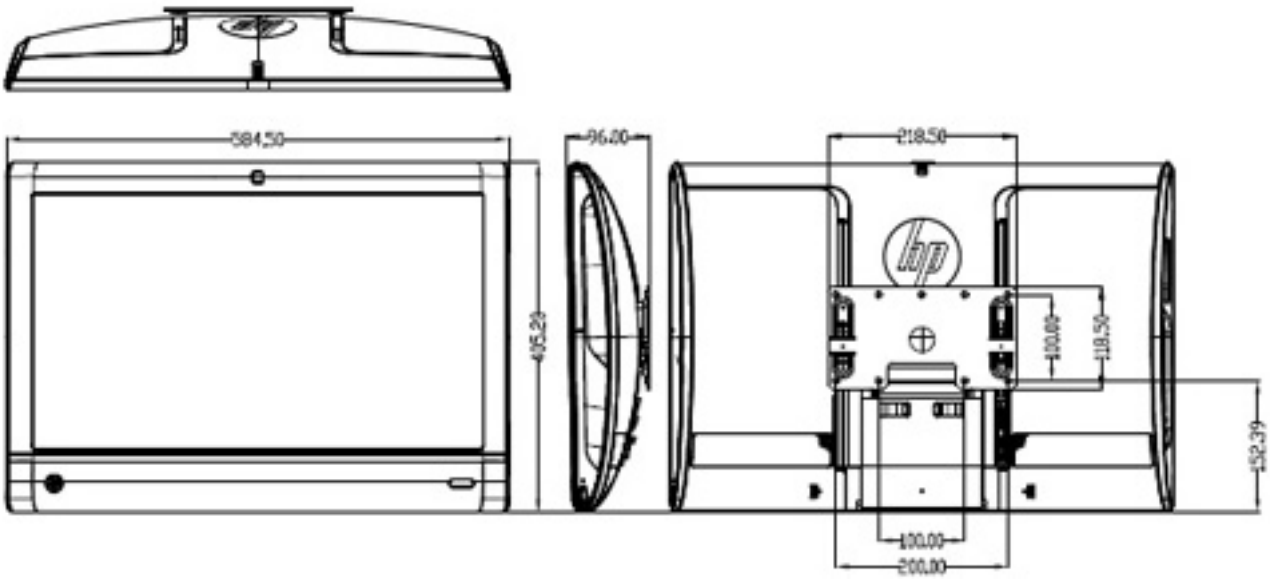
NOTE: The computer can be mounted in either landscape or portrait orientation. If mounted in portrait orientation make sure the CD/DVD drive is at the top. For landscape orientation, keep the same orientation as when the computer is on the stand.

NOTE: If the computer stand is ever replaced on the computer, the VESA adapter plate must be replaced on the bottom of the computer stand in order to properly support the computer.

Note the following information about the computer without the stand but with the VESA adapter installed.

The measurements in the illustration are in mm.

Figure 7-14 Computer dimensions without stand



Weight (with integrated graphics) without stand: 8.75 kg (19.3 lbs)

Weight (with discrete graphics) without stand: 9.05 kg (20.0 lbs)

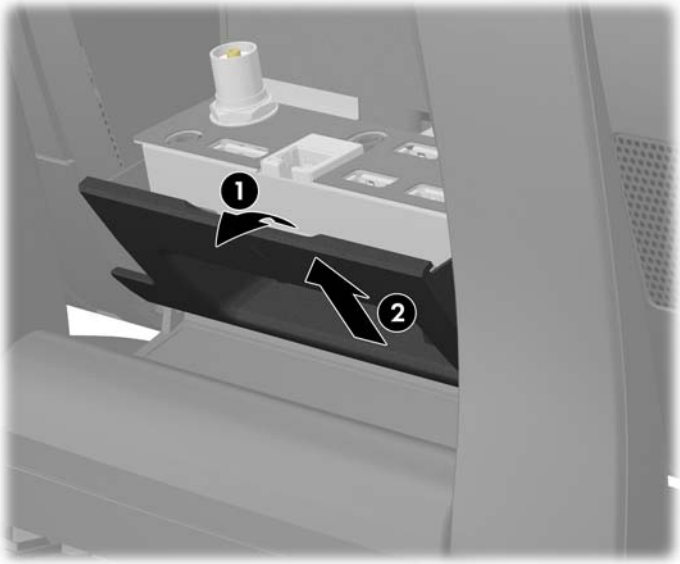
Rear panels

The rear panels are located above the stand. You must remove them to access internal components. Although the following procedure shows only removing one panel, the procedure is the same for both panels.

To remove the rear panels:

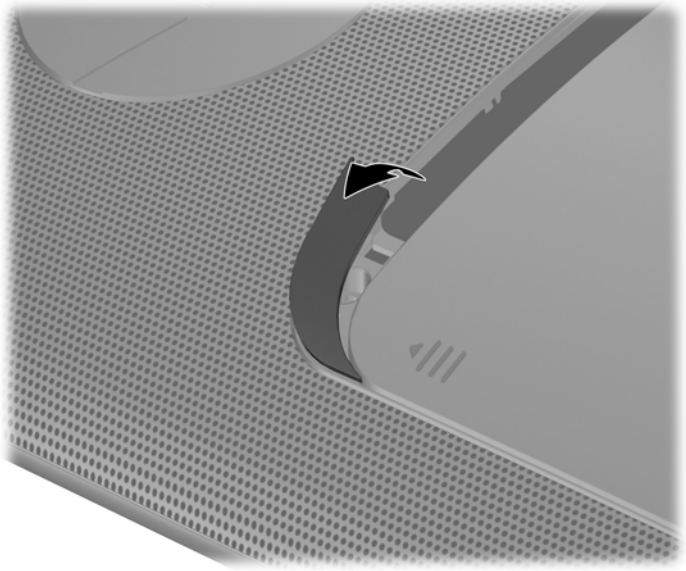
1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 34).
2. Remove the small center panel below the rear ports by pulling out the top of the panel **(1)** then lifting the panel off the computer **(2)**.

Figure 7-15 Removing the center panel



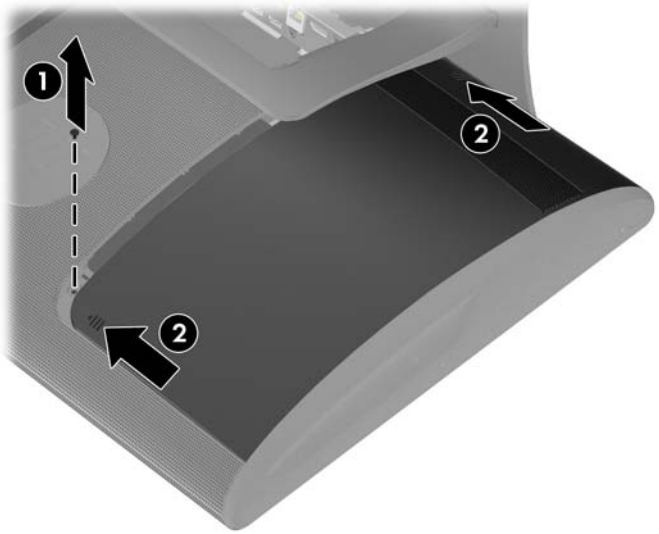
3. Before removing the rear panel, you must remove the small cover plate that hides the screw used to secure the panel to the chassis. Lift up on the bottom of the cover plate located next to the upper inside corner of the rear panel and lift the cover plate off the rear of the computer.

Figure 7-16 Removing the rear panel screw cover plate



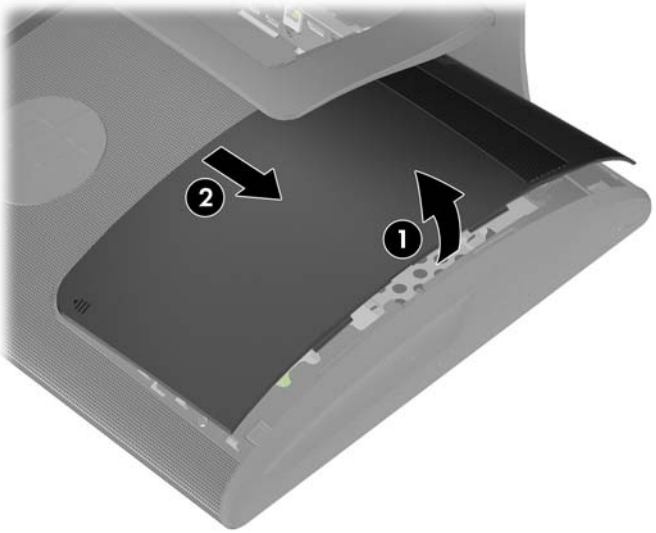
4. Remove the screw beneath the cover plate **(1)** and slide the rear panel toward the center of the computer until it stops (approximately 5 mm or 1/5 inch) **(2)**. Use the raised grip areas on the top and bottom inside corners of the panel to slide it toward the center of the computer.

Figure 7-17 Releasing the rear panel



5. Lift up the outside edge of the panel approximately 2.5 cm (1 inch) **(1)** and slide the panel toward the outside edge of the computer **(2)** to remove it.

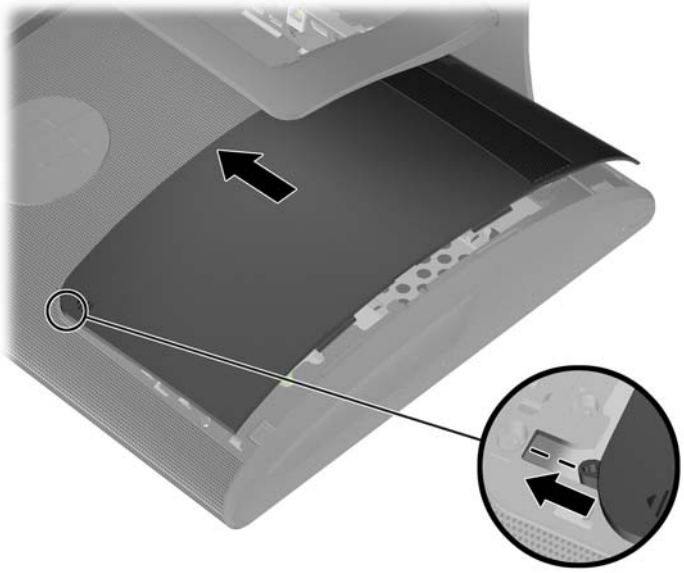
Figure 7-18 Removing the rear panel



To replace the rear panels, reverse the removal procedures.

NOTE: When replacing a drive access panel, hold the panel at a slight angle with the inside edge of the panel lower than the outside edge, then slide the screw hole tab on the top inside corner of the panel into the slot on the rear of the computer.

Figure 7-19 Replacing the drive access panel

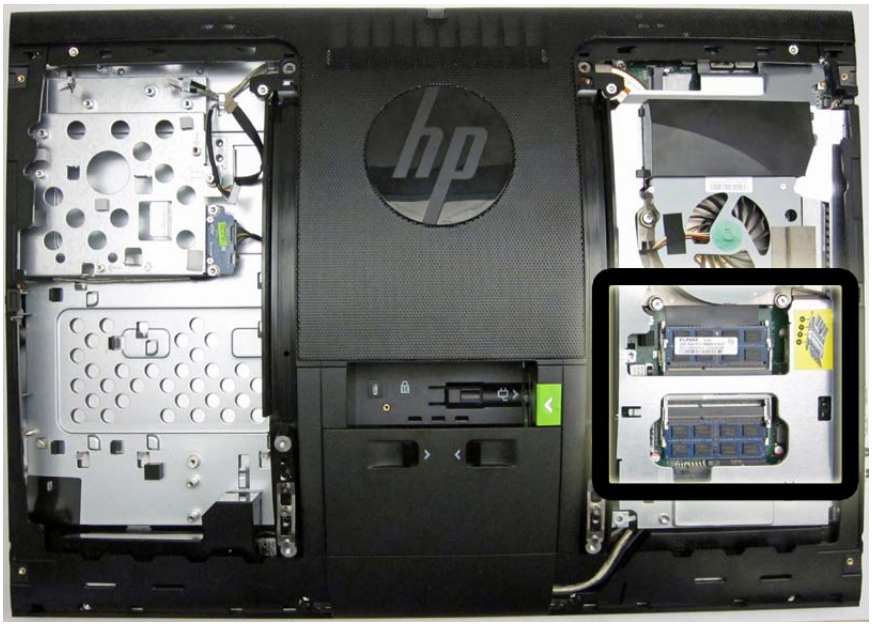


Installing memory

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

The memory modules are located under the rear cover on the right side of the computer (when viewed from behind).

Figure 7-20 Memory location



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

DDR3-SDRAM SODIMMs

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.

Populating SODIMM sockets

The memory sockets on the system board can be populated with up to four 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 16 GB of memory.

There are four SODIMM sockets on the system board, with two sockets per channel. The sockets are labeled DIMM1, DIMM2, DIMM3, and DIMM4. Sockets DIMM1 and DIMM2 operate in memory channel A. Sockets DIMM3 and DIMM4 operate in memory channel B.

Figure 7-21 SODIMM socket locations

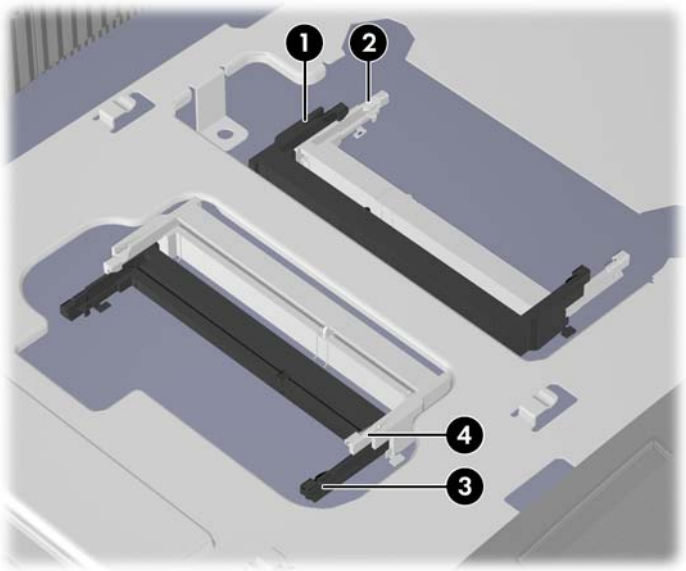


Table 7-1 SODIMM socket locations

Item	Description	Socket Color
1	DIMM1 socket, Channel A (populate first)	black
2	DIMM2 socket, Channel A (populate third)	white
3	DIMM3 socket, Channel B (populate second)	black
4	DIMM4 socket, Channel B (populate fourth)	white
NOTE: A SODIMM must occupy the black DIMM1 socket. Otherwise, the system will display a POST error message indicating that a memory module is installed in the wrong socket		

The system will automatically operate in single channel mode, dual channel mode, or flex mode, depending on how the SODIMMs are installed.

- The system will operate in single channel mode if the SODIMM sockets are populated in one channel only.
- The system will operate in a higher-performing dual channel mode if the total memory capacity of the SODIMMs in Channel A is equal to the total memory capacity of the SODIMMs in Channel B. The technology and device width can vary between the channels. For example, if Channel A is populated with two 1 GB SODIMMs and Channel B is populated with one 2 GB SODIMM, the system will operate in dual channel mode.
- The system will operate in flex mode if the total memory capacity of the SODIMMs in Channel A is not equal to the total memory capacity of the SODIMMs in Channel B. In flex mode, the channel populated with the least amount of memory describes the total amount of memory assigned to dual channel and the remainder is assigned to single channel. For optimal speed, the channels should be balanced so that the largest amount of memory is spread between the two channels. If one channel will have more memory than the other, the larger amount should be assigned to Channel A. For example, if you are populating the sockets with one 2 GB SODIMM, and three 1 GB SODIMMs, Channel A should be populated with the 2 GB SODIMM and one 1 GB SODIMM, and Channel B should be populated with the other two 1 GB SODIMMs. With this configuration, 4 GB will run as dual channel and 1 GB will run as single channel.

Installing SODIMMS

When facing the rear of the computer, there are four memory sockets located behind the large access panel on the right. You must remove this panel to remove or install memory.

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

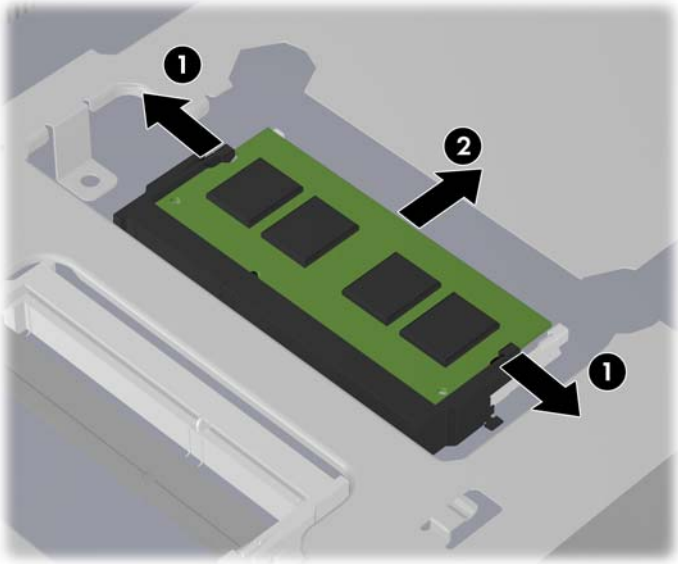
When handling a memory module, be careful not to touch any of the contacts. Doing so may damage the module.

To remove or install memory modules:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 34).
2. Remove the right rear panel (see Rear panels on page 47).

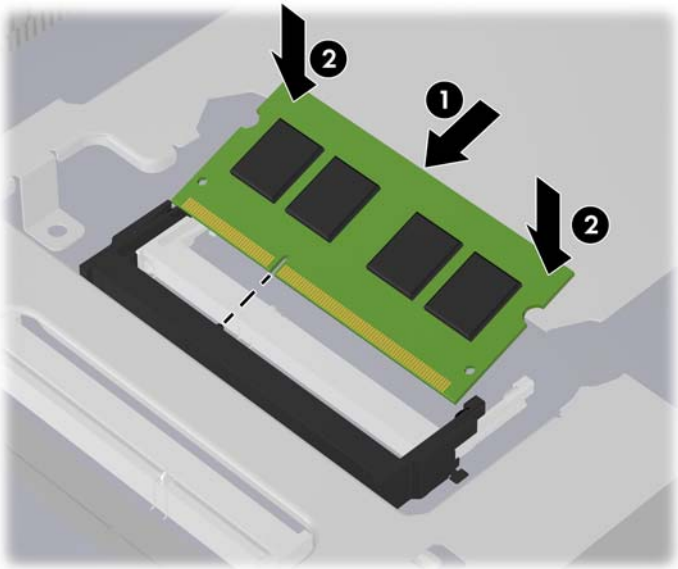
3. To remove a SODIMM, press outward on the two latches on each side of the SODIMM **(1)** then pull the SODIMM out of the socket **(2)**.

Figure 7-22 Removing a memory module



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

Figure 7-23 Installing a memory module



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

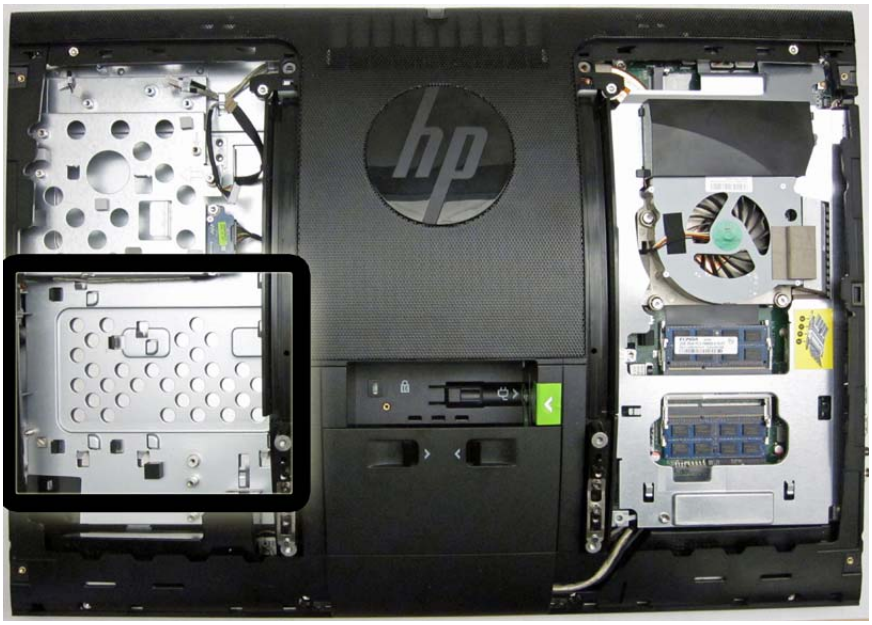
5. Reconnect and reconfigure the computer. The computer automatically recognizes the additional memory when you turn on the computer.

Hard drive

Description	Spare part number
1000-GB	636930-001
750-GB	639363-001
500-GB	636939-001
320-GB	634824-001
250-GB	636927-001
160-GB solid-state drive	646809-001
80-GB solid-state drive	607817-001

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

Figure 7-24 Hard drive location

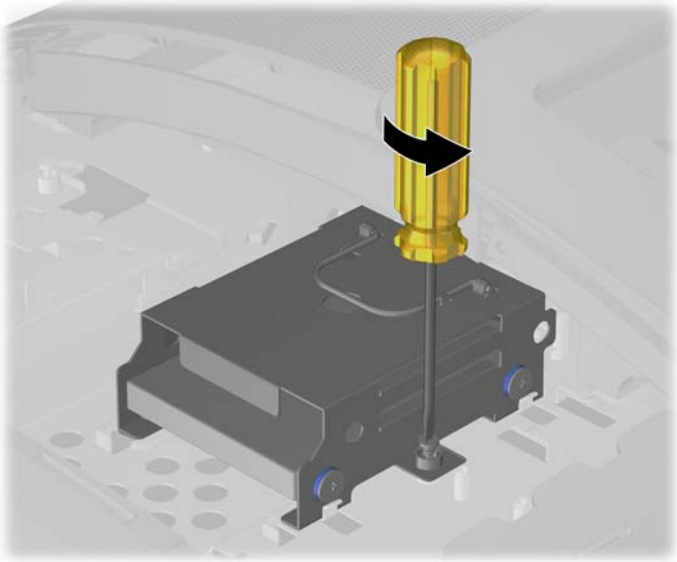


To replace the hard drive:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 34).
2. Remove the left rear panel (see Rear panels on page 47).

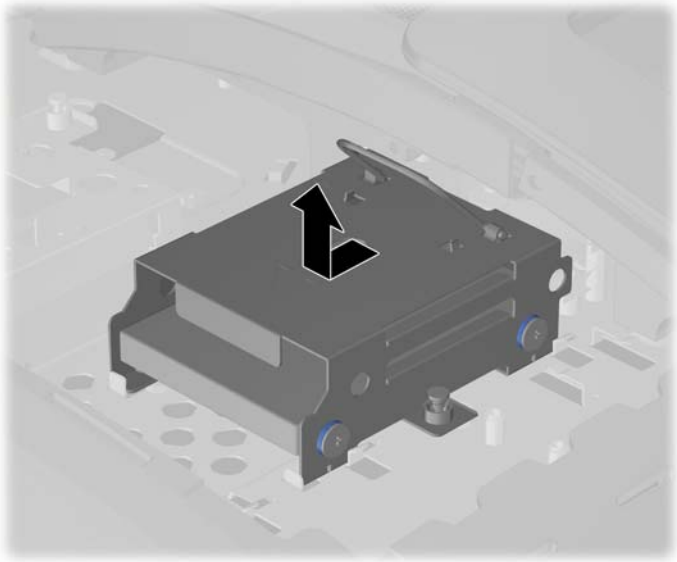
3. Loosen the captive screw on the side of the hard drive cage that secures the cage to the computer.

Figure 7-25 Loosening the hard drive cage screw



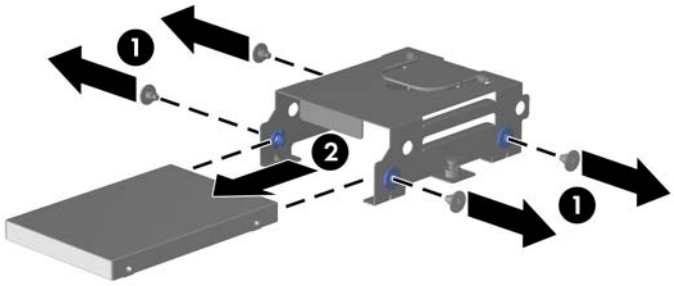
4. Grasp the handle on top of the hard drive cage and slide the cage toward the outer edge of the computer, then lift the cage out of the computer.

Figure 7-26 Removing the hard drive cage



5. To remove the hard drive from the hard drive cage, remove the four screws on the sides of the cage that secure the drive to the cage **(1)**, and then slide the drive out of the cage **(2)**.

Figure 7-27 Removing the hard drive from the cage



6. Reconnect and reconfigure the computer.

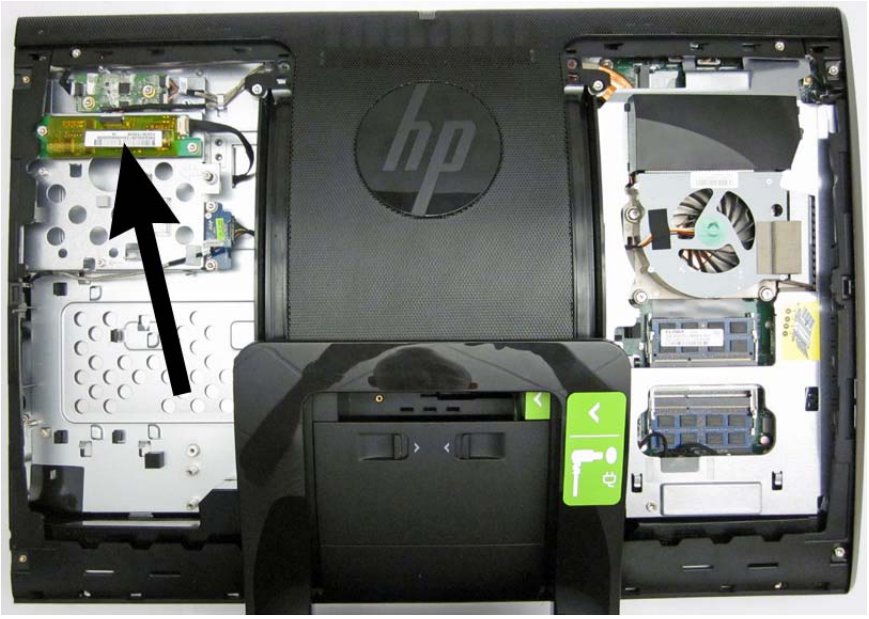
To install a hard drive, reverse the removal procedures.

Inverter board

Description	Spare part number
Inverter board	658982-001

The inverter board is located on the left side of the computer on top of the optical drive cage. It is secured with two screws and has two connectors.

Figure 7-28 Inverter board location



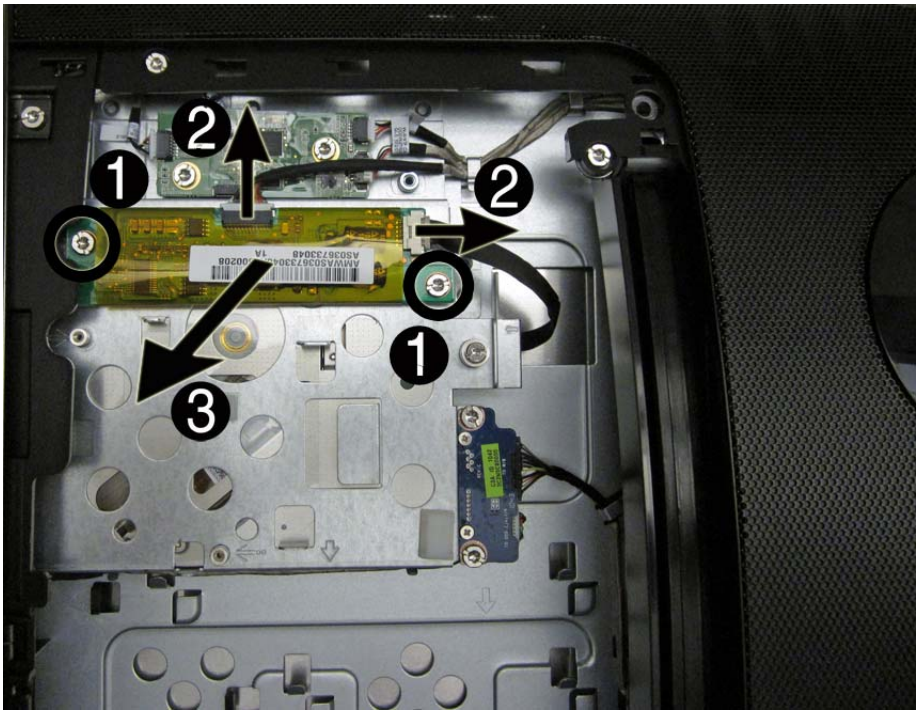
To remove the inverter board:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 34).
2. Remove the left rear panel (see Rear panels on page 47).
3. Remove the two screws **(1)** that secure the board to the computer.
4. Disconnect the two cables from the board **(2)**.

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

5. Remove the inverter board from the computer **(3)**.

Figure 7-29 Removing the Inverter board



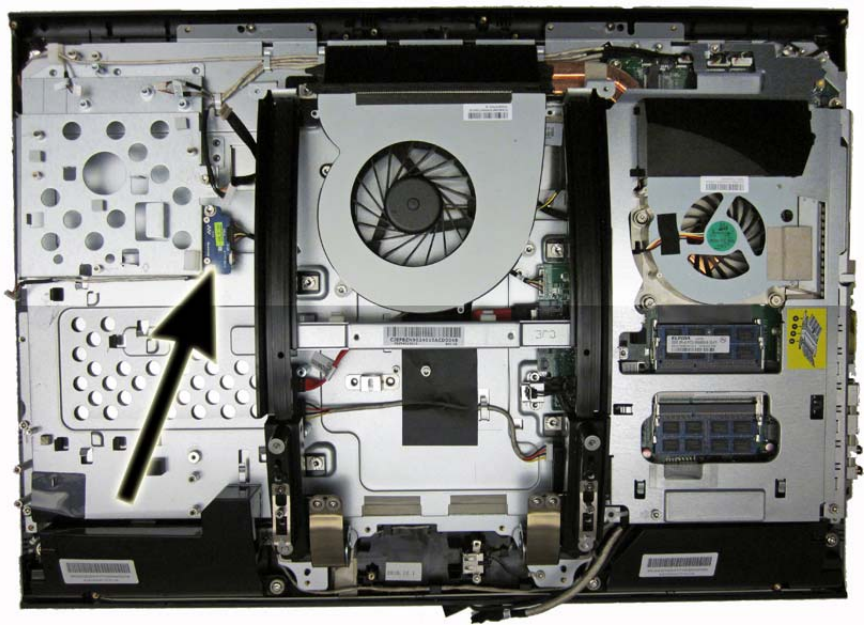
To install the inverter board, reverse the removal procedures.

Optical drive connector board

Description	Spare part number
Optical drive connector board	652311-001
Optical drive transfer cable, 275 mm	652286-001

The optical drive connector board is located on the left side of the computer (when viewed from behind). It is secured by two screws and has two connectors – one to the system board, one to the optical drive eject board.

Figure 7-30 Optical drive connector board location



To remove the optical drive connector board:

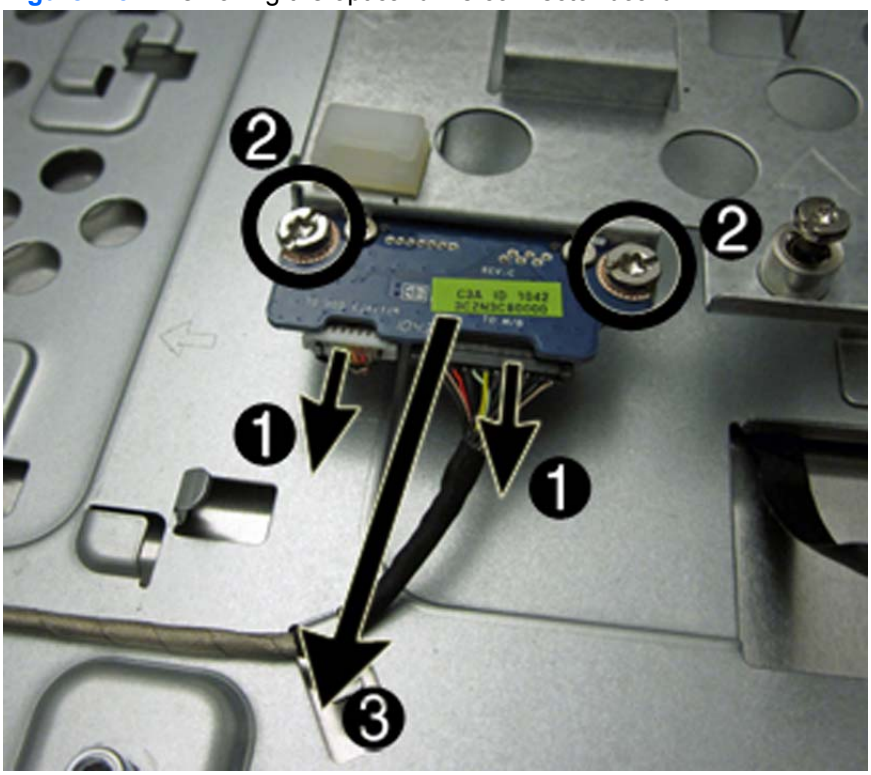
1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 34).
2. Remove the left rear panel (see Rear panels on page 47).
3. Disconnect the two cables **(1)** from the board.

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

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

5. Pull the board away from the optical drive bracket, and then remove it from the computer **(3)**.

Figure 7-31 Removing the optical drive connector board



6. Remove the board from the computer.

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

Left cap

Description	Spare part number
Left side cap, no optical drive	658989-001
Left side cap, 1394	670181-001

The left cap is located on the left side of the computer. You must remove it to remove the optical drive, optical drive eject board, rear logo cover, and main rear frame.

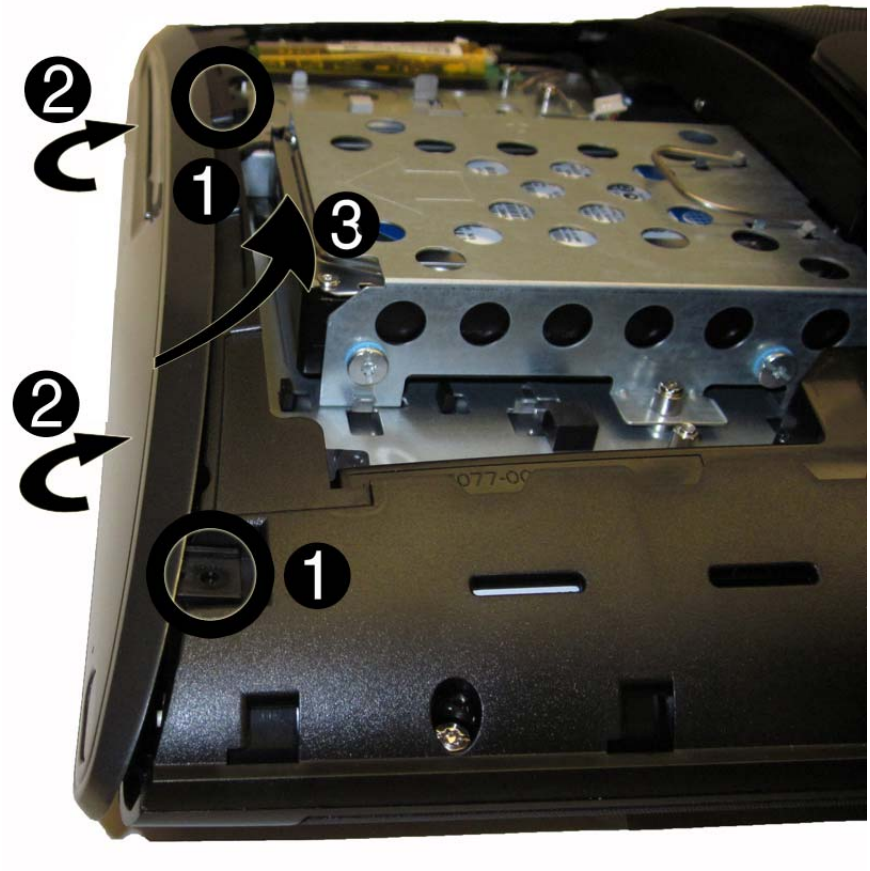
Figure 7-32 Left cap location

To remove the left cap:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 34).
2. Remove the left rear panel (see Rear panels on page 47).
3. Move the two screws **(1)** that secure the cap to the computer.

4. Rotate the cap to disengage it from the computer **(2)**, and then remove it **(3)**.

Figure 7-33 Removing the left side cap



To install an left cap, reverse the removal procedures.

Optical drive

Description	Spare part number
HP SuperMulti DVD Writer Drive	583092-001
HP Slim Slot Blu-ray Combo Drive	583093-001

The optical drive is located under the drive cover on the left side of the computer (when viewed from behind). It is secured with one screw. You must remove the left side cap to remove the optical drive.

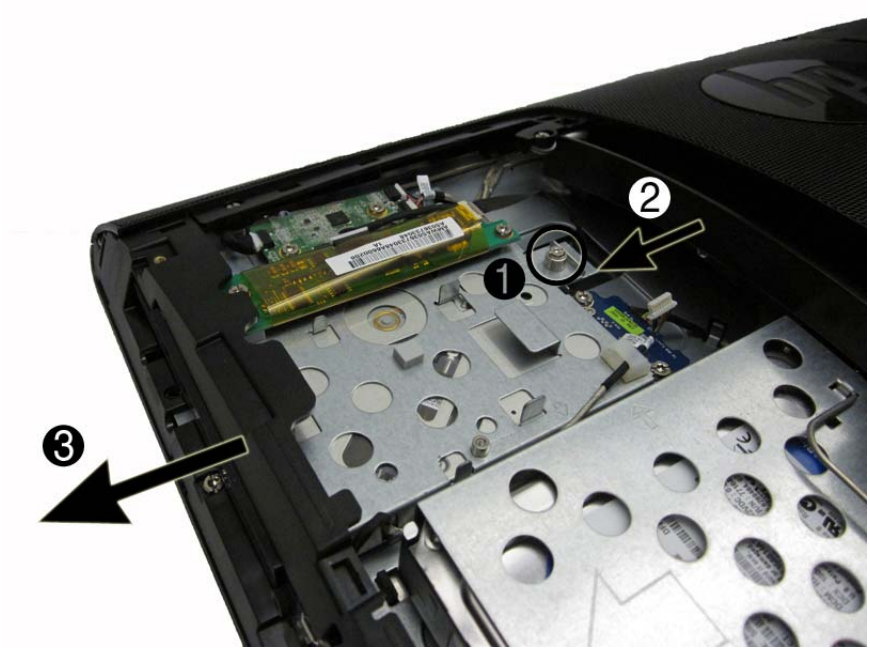
Figure 7-34 Optical drive location

To remove the optical drive:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 34).
2. Remove the left rear panel (see Rear panels on page 47).
3. Remove the left cap (see Left cap on page 61).

4. Loosen the captive screw **(1)** that secures the drive to the computer, and then push on the drive bracket **(2)** to slide the drive out of the computer **(3)**.

Figure 7-35 Removing the optical drive



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

Figure 7-36 Removing the optical drive bracket

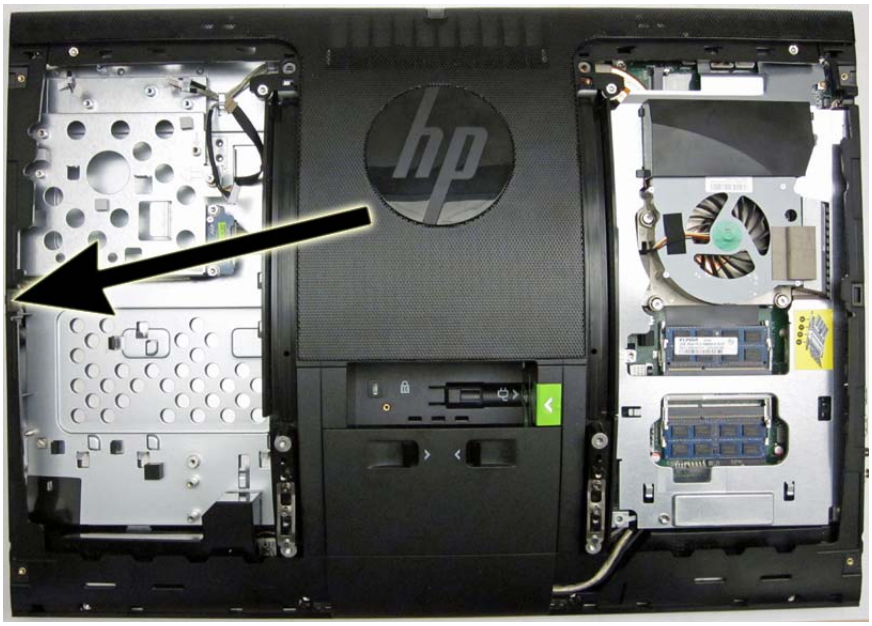
To install an optical drive, reverse the removal procedures.

Optical drive eject board

Description	Spare part number
Optical drive eject board	652312-001
Optical drive eject cable, 190 mm	652299-001

The optical drive eject board is located under the left side cap. It is secured with one screw and has one connector.

Figure 7-37 Optical drive eject board location

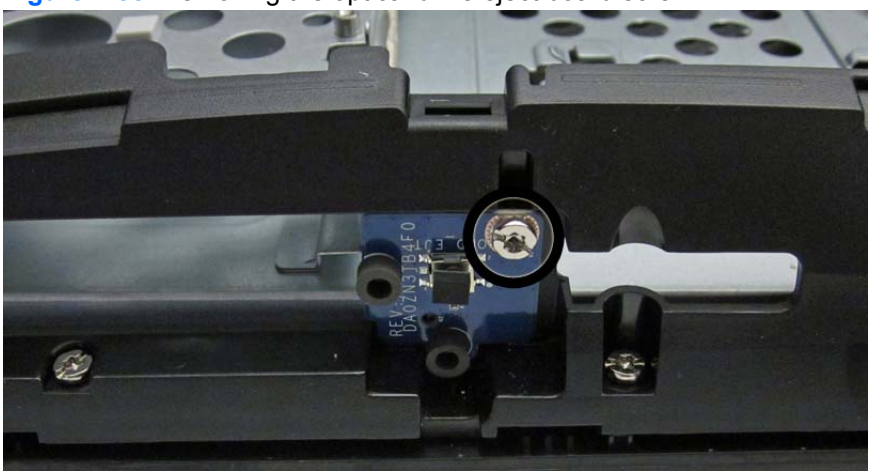


To remove the optical drive eject board:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 34).
2. Remove the left rear panel (see Rear panels on page 47).
3. Remove the left side cap (see Optical drive on page 63).

4. From the outside of the computer, remove the screw that secures the board to the computer.

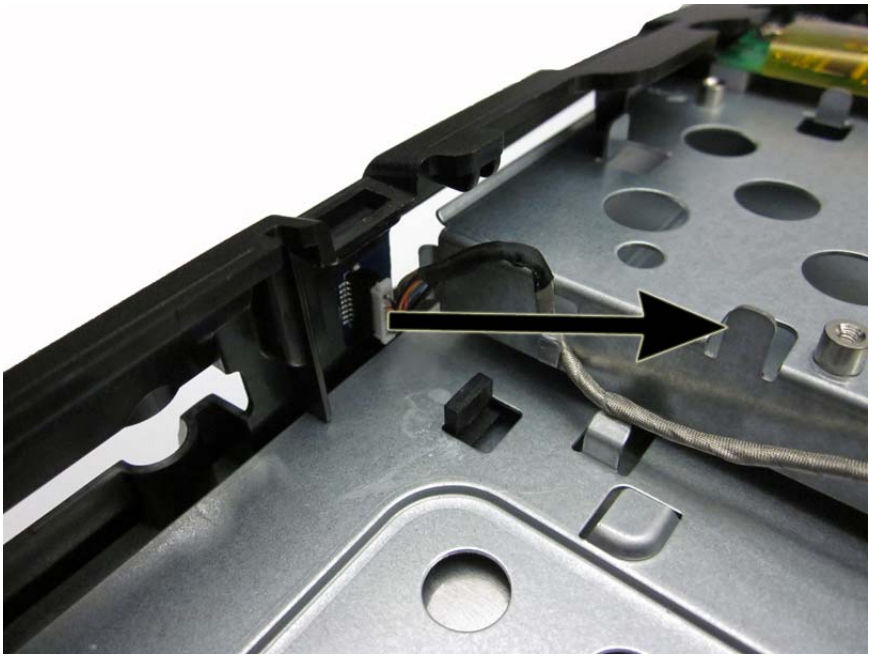
Figure 7-38 Removing the optical drive eject board screw



5. From the inside of the computer, disconnect the cable from the board.

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

Figure 7-39 Disconnecting the optical drive eject board cable



6. Remove the board from the computer.

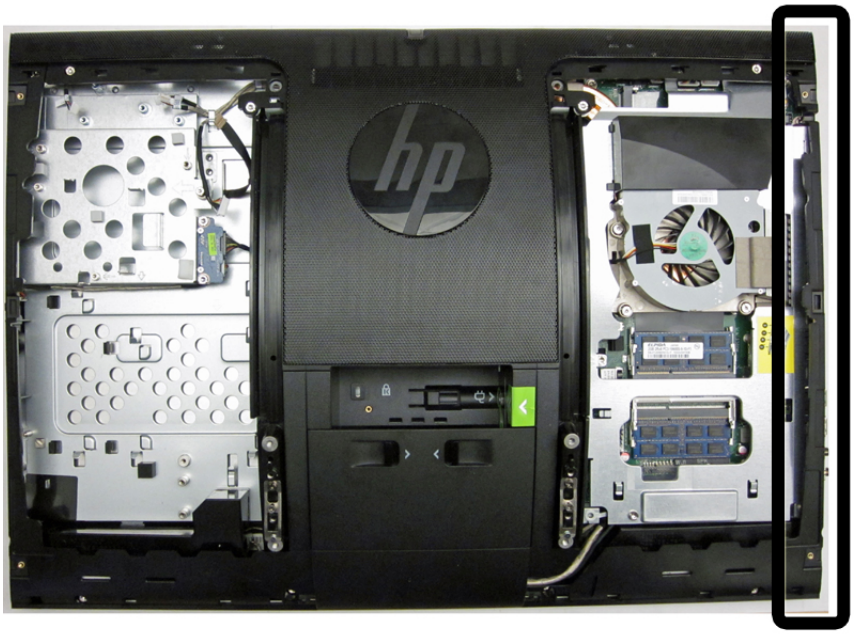
To install the optical drive eject board, reverse the removal procedures.

Right cap

Description	Spare part number
Right cap	670182-001

The right cap is located along the right side of the computer (when viewed from behind). It is secured with two screws, and it houses the volume board. You do not have to remove the volume board when removing the cap if you disconnect the volume board cable from the system board.

Figure 7-40 Right cap location

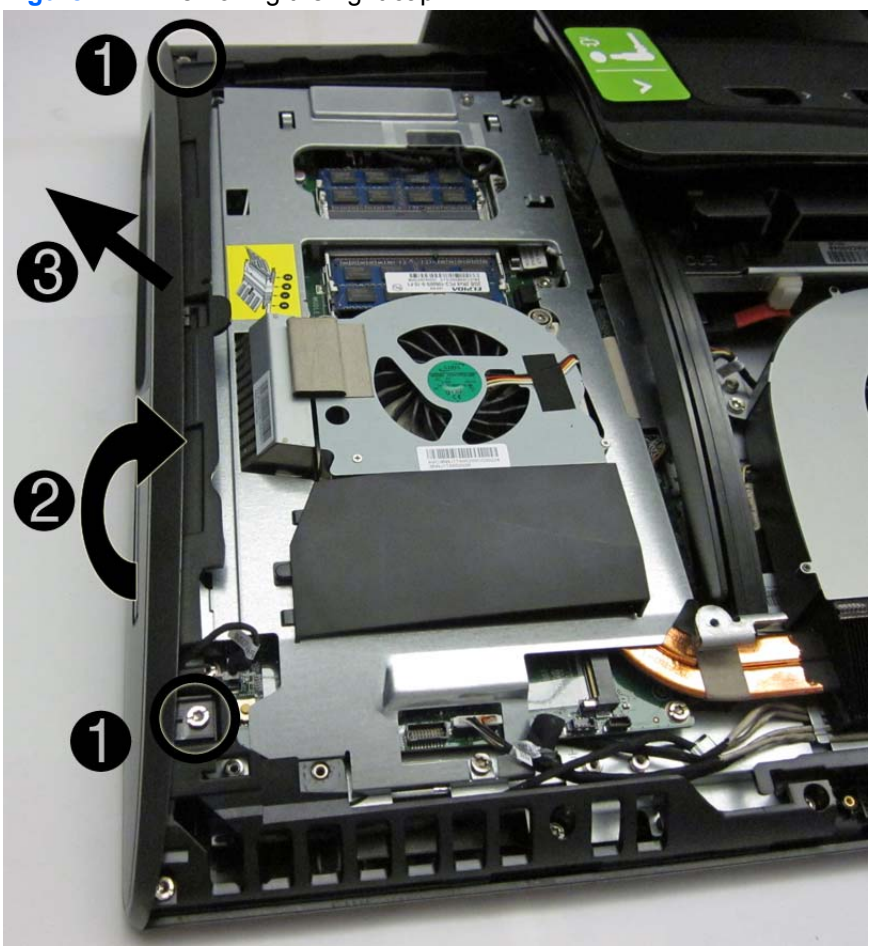


To remove the right cap:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 34).
2. Remove the right rear panel (see Rear panels on page 47).
3. Move the two screws **(1)** that secure the right side cap to the computer.

4. Rotate the cap to disengage it from the computer **(2)**, and then remove it far enough to gain access to the volume board cable connector **(3)**.

Figure 7-41 Removing the right cap



5. Disconnect the volume board cable from the system board.

Figure 7-42 Disconnecting the volume board cable

6. Remove the cap from the computer.

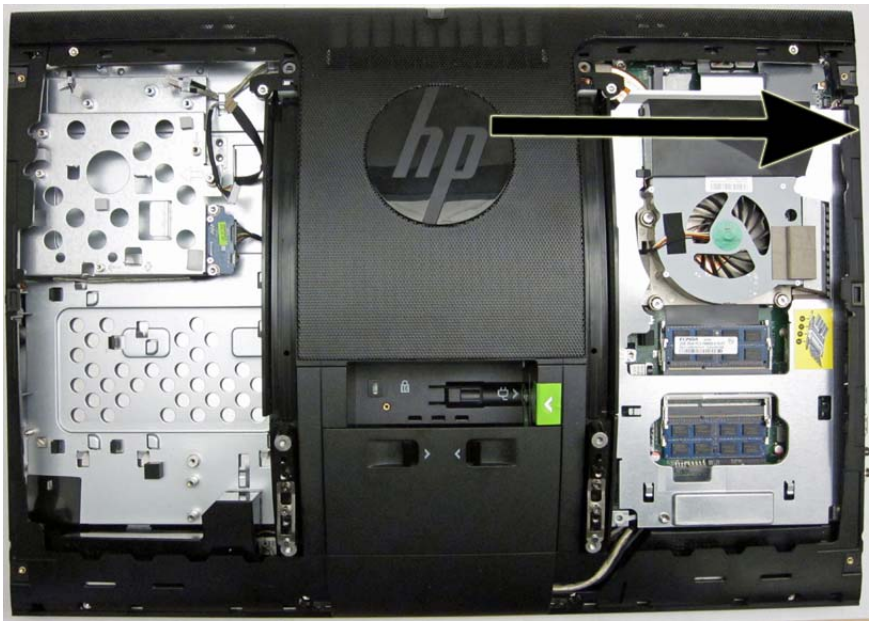
To install the right cap, reverse the removal procedures.

Volume button board

Description	Spare part number
Volume button board	652306-001

The volume button board is located in the right side cap. It is secured with two screws and has one connector.

Figure 7-43 Volume button board location

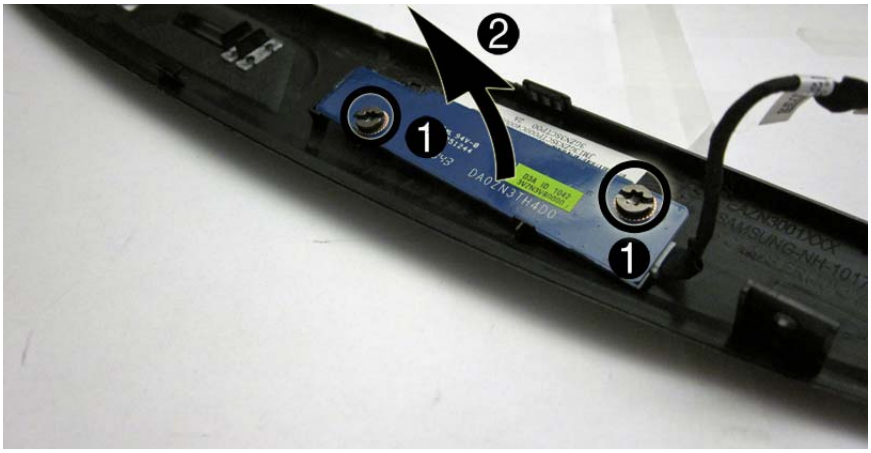


To remove the volume board:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 34).
2. Remove the right rear panel (see Rear panels on page 47).
3. Remove the right cap (see Right cap on page 67).
4. Remove the two screws **(1)** that secure the board to the right cap.

5. Lift the board from the cap **(2)**.

Figure 7-44 Removing the volume button board



To install the volume button board, reverse the removal procedures.

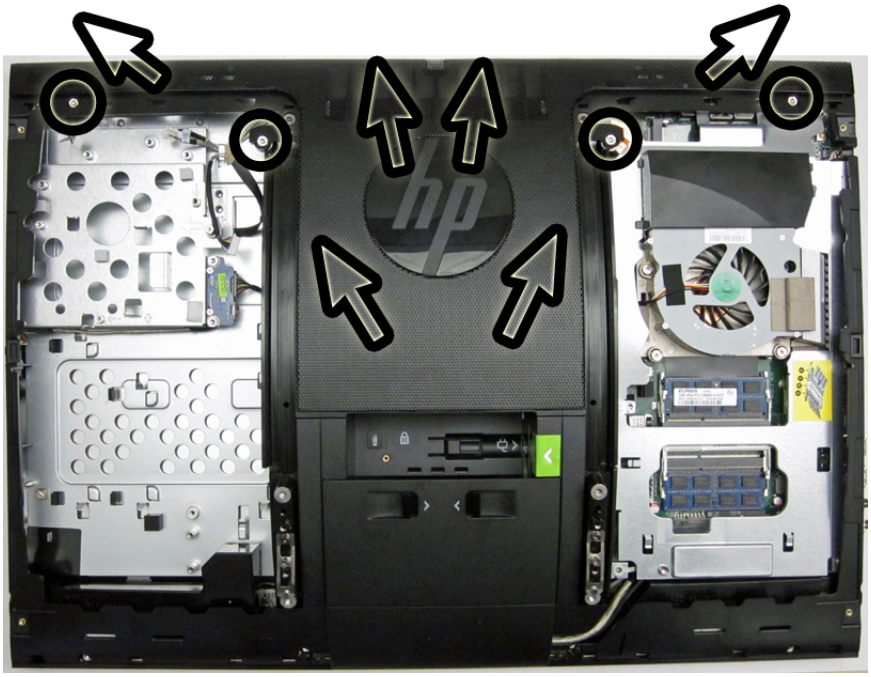
Rear logo cover

The rear logo cover is secured with four screws.

To remove the rear logo cover:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 34).
2. Remove the left and right rear panels (see Rear panels on page 47).
3. Remove the 4 screws that secure the cover to the computer.
4. Pry the cover up to disengage it from the computer, and then pull it toward the top and off the computer. You may experience significant resistance under the HP logo.

Figure 7-45 Removing the rear logo cover



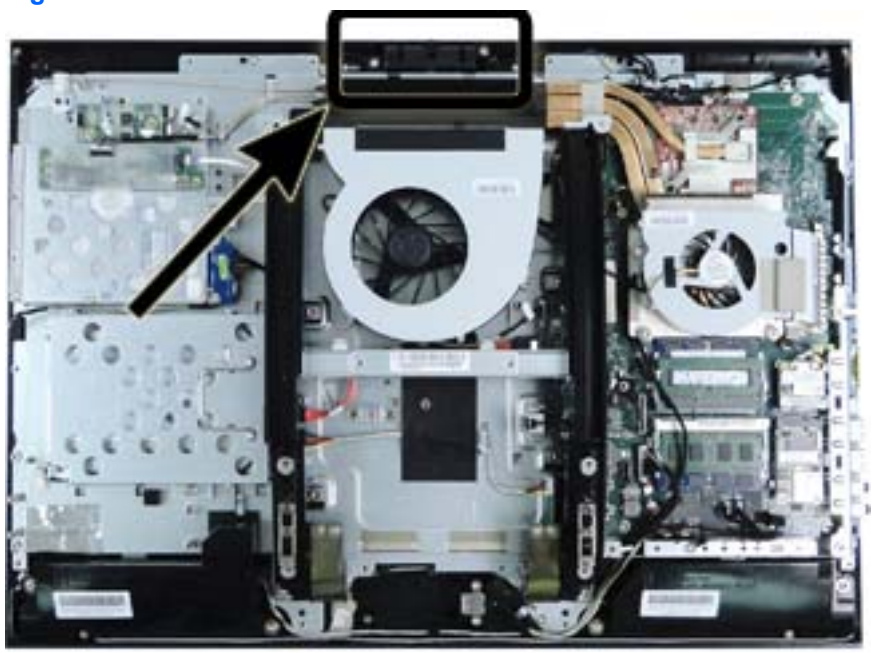
To replace the rear logo cover, reverse the removal procedures.

Webcam module

Description	Spare part number
Webcam module without DMIC	652277-001
Webcam module, 2.0 MP, FHD	658985-001
Webcam lens cover	654598-001
Webcam wheel cap	658986-001

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

Figure 7-46 Webcam module location

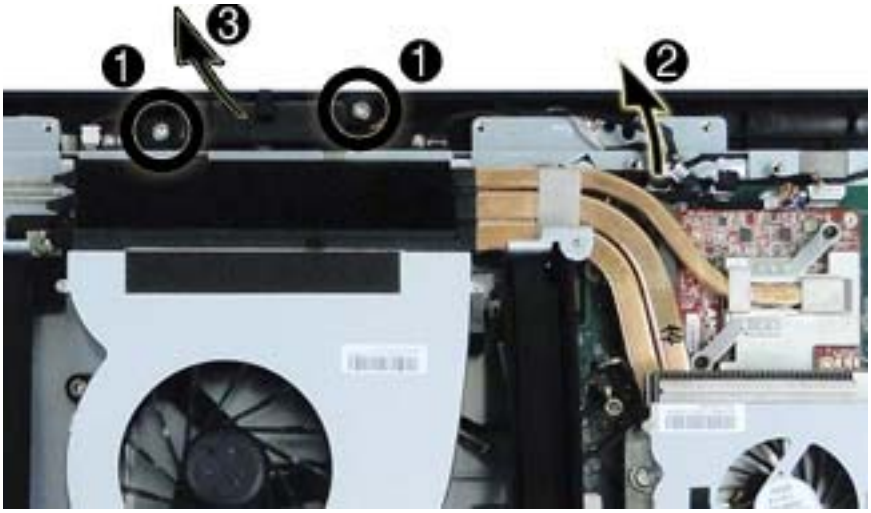


To remove the webcam module:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 34).
2. Remove the left and right rear panels (see Rear panels on page 47).
3. Remove the rear logo cover (see Rear logo cover on page 72).
4. Remove the two screws **(1)** that secure the webcam module to the computer.
5. Disconnect the cable from the system board **(2)**.

6. Remove the module from the computer **(3)**.

Figure 7-47 Removing the webcam module



To install a webcam module, reverse the removal procedures.

Main rear frame

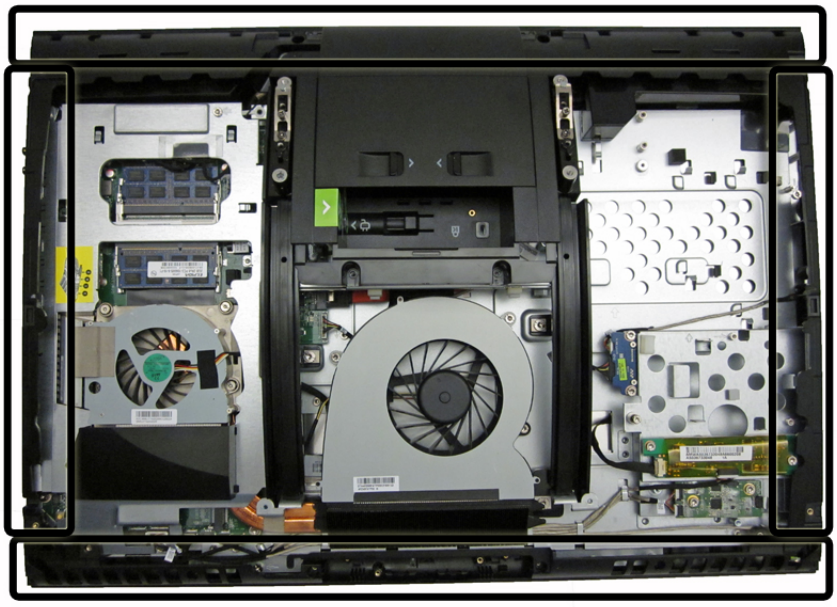
The main rear frame is secured with 15 screws. To remove it, you must first remove the rear logo cover, which is held on with four screws.

To remove the main rear frame:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 34).
2. Remove the stand (see Stand on page 35).
3. Remove the left and right rear panels (see Rear panels on page 47).
4. Remove the left cap (see Left cap on page 61).
5. Remove the right cap (see Right cap on page 67).
6. Remove the rear logo cover (see Rear logo cover on page 72).
7. Remove the 15 screws that secure the frame to the computer, as follows:
   - Top: 6 screws
   - Bottom: 4 screws
   - Left: 3 screws
   - Right: 2 screws

NOTE: Be sure to mark the locations of the rear frame screws as you remove them. If you also remove the display panel, it is difficult to determine which screws are used for which component if you do not have them marked.

Figure 7-48 Removing the main rear frame



8. Lift the frame from the computer.

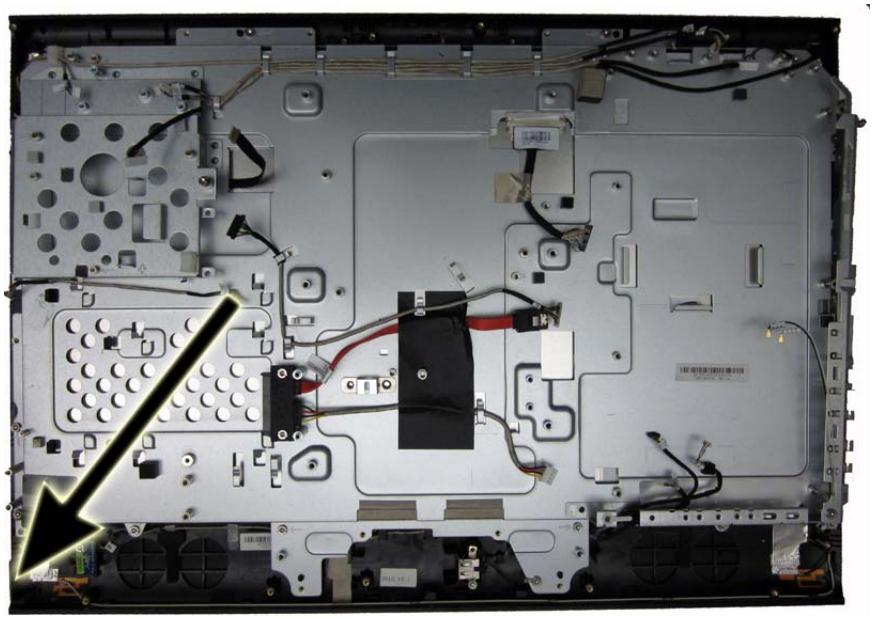
To replace the main rear frame, reverse the removal procedures.

Power button board

Description	Spare part number
Power button board	652305-001

The power button board is located under the left side cap near the bottom of the computer. It is secured with one screw and has one connector.

Figure 7-49 Power button board location



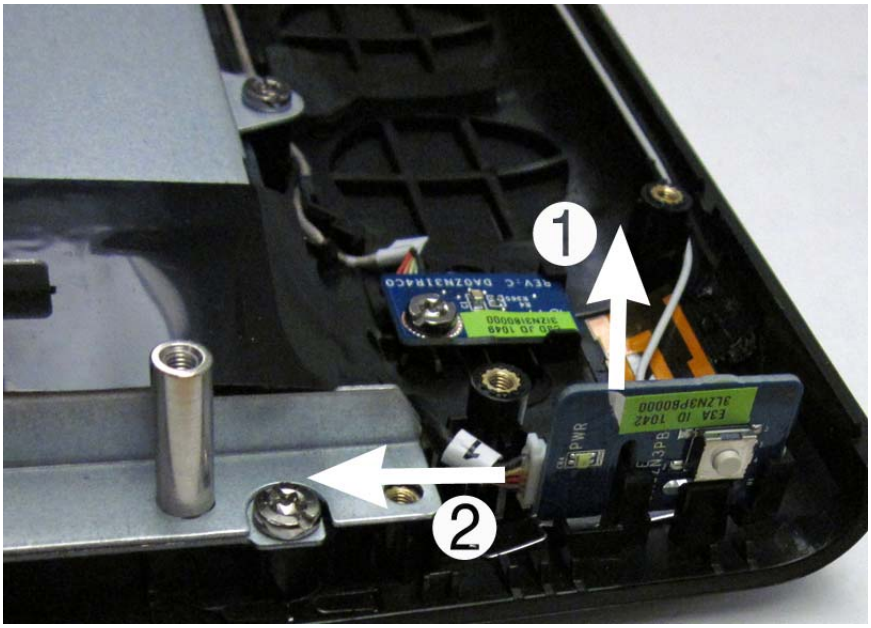
To remove the power button board:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 34).
2. Remove the stand (see Stand on page 35).
3. Remove the right and left rear panels (see Rear panels on page 47).
4. Remove the left cap (see Left cap on page 61).
5. Remove the right cap (see Right cap on page 67).
6. Remove the rear logo cover (see Rear logo cover on page 72).
7. Remove the rear main frame (see Main rear frame on page 75).
8. Lift the left side of the board first, and then pull the board out of the holder enough to access the connector **(1)**.

9. Disconnect the cable from the board **(2)**, and then remove the board from the computer.

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

Figure 7-50 Removing the power button board



To install the power button board, reverse the removal procedures.

System board shield

The system board shield sits above the system board. It is secured with three screws.

To remove the system board shield:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 34).
2. Remove the stand (see Stand on page 35).
3. Remove the right and left rear panels (see Rear panels on page 47).
4. Remove the left cap (see Left cap on page 61).
5. Remove the right cap (see Right cap on page 67).
6. Remove the rear logo cover (see Rear logo cover on page 72).
7. Remove the rear main frame (see Main rear frame on page 75).
8. Remove the three screws that secure the shield to the computer **(1)**.
9. Disconnect the cable from the CONVER DB CONN system board connector **(2)**.

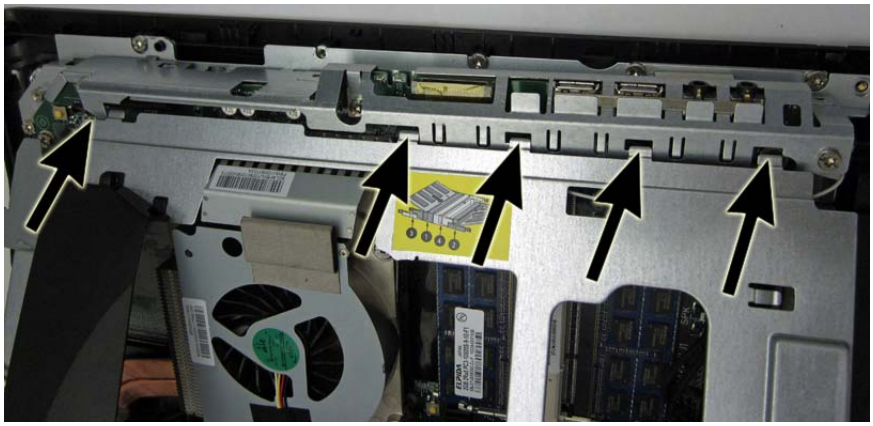
10. Lift the left side of the shield first **(3)**, and then pull the shield up and off the system board.

Figure 7-51 Removing the system board shield

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

When replacing the shield, make sure to place the five tabs on the right side of the shield into their slots in the computer before placing the shield atop the system board.

Figure 7-52 Replacing the system board shield

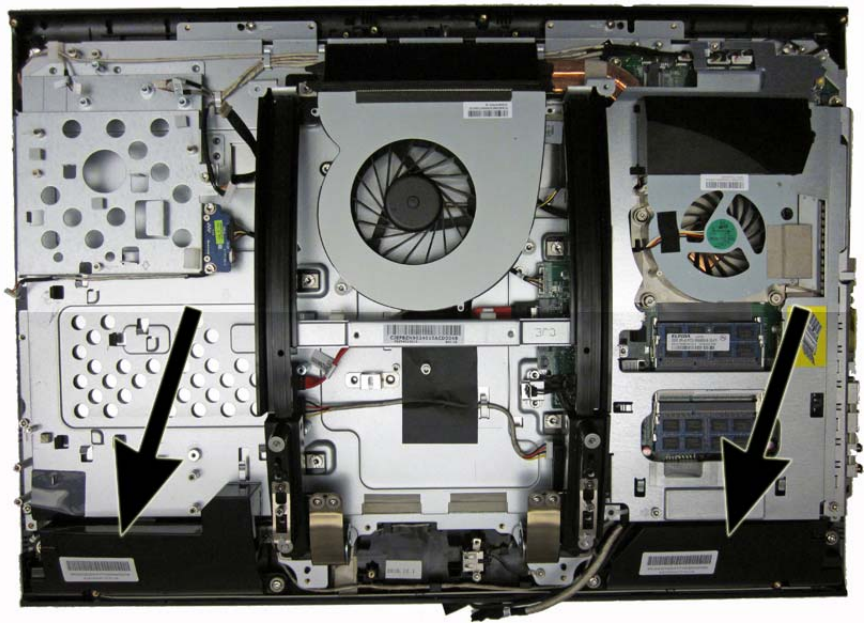


Speakers

Description	Spare part number
Right speaker	652274-001
Left speaker	652275-001

The speakers are located at the bottom of the computer. Two separate speakers are each secured by two screws.

Figure 7-53 Speaker location



To remove the speakers:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 34).
2. Remove the stand (see Stand on page 35).
3. Remove the right and left rear panels (see Rear panels on page 47).
4. Remove the left cap (see Left cap on page 61).
5. Remove the right cap (see Right cap on page 67).
6. Remove the rear logo cover (see Rear logo cover on page 72).
7. Remove the rear main frame (see Main rear frame on page 75).
8. Remove the system board shield (see System board shield on page 77).
9. Disconnect the speaker cables from the system board connectors **(1)**.
10. Remove the speaker cables from their routing paths.
11. Remove two screws **(2)** that secure each speaker to the computer.

12. Lift the speakers straight up and out of the computer **(3)**.

Figure 7-54 Removing the speakers

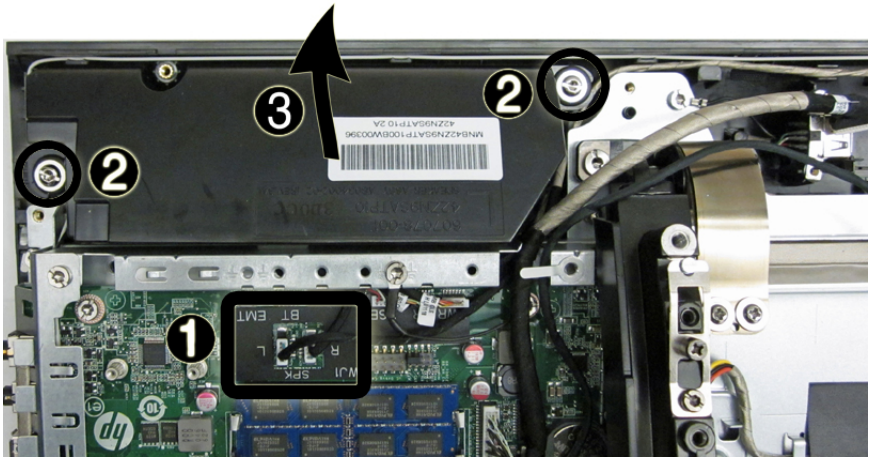
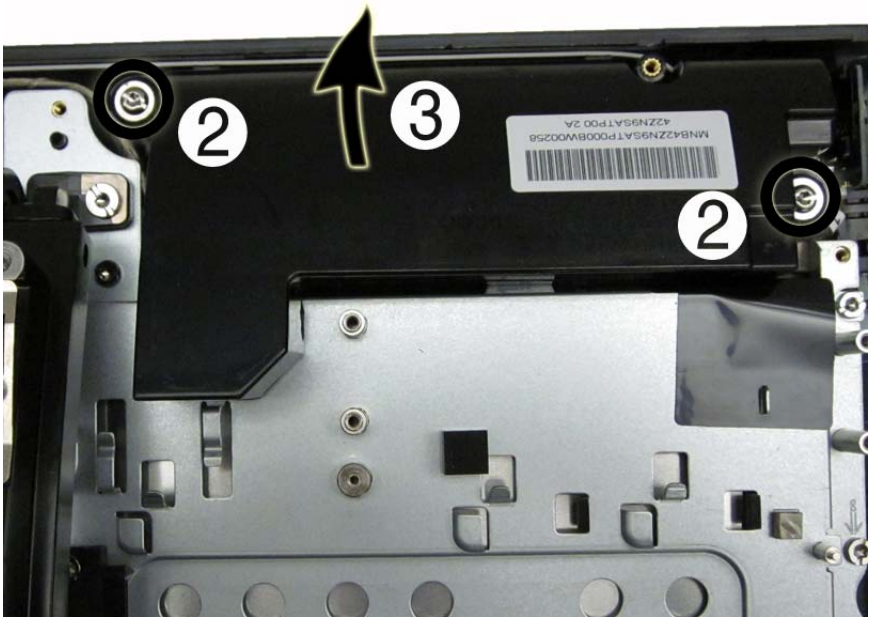


Figure 7-55 Removing the speakers



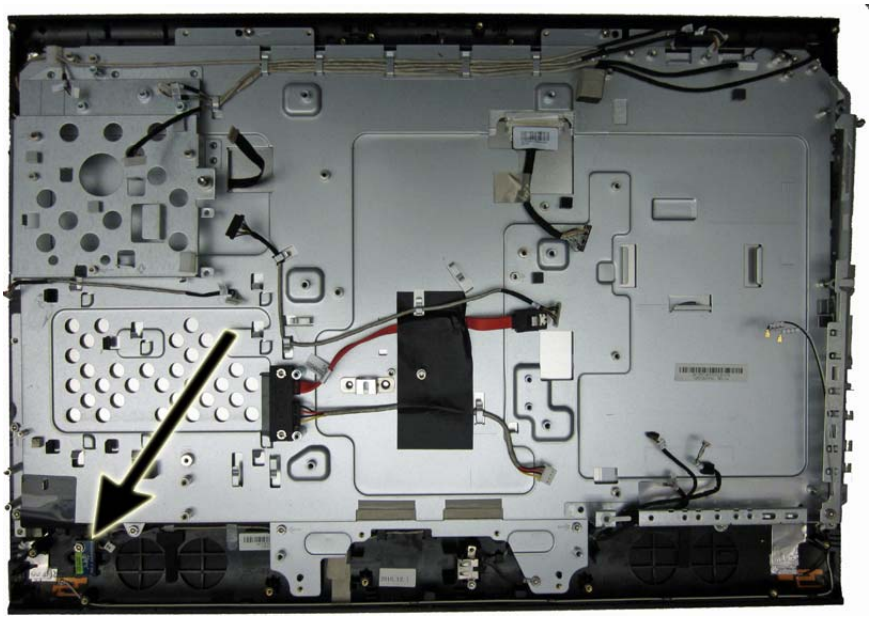
To install the speakers, reverse the removal procedures.

Infrared sensor board

Description	Spare part number
Infrared sensor board	652307-001

The infrared board is located on the bottom left side of the computer, under the left speaker. It is secured with one screw and has one connector.

Figure 7-56 Infrared board location



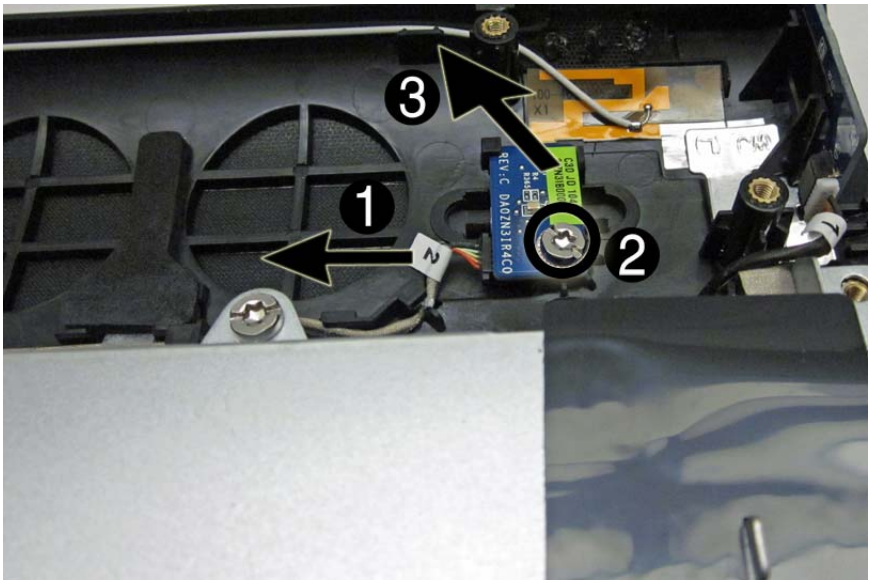
To remove the infrared board:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 34).
2. Remove the stand (see Stand on page 35).
3. Remove the right and left rear panels (see Rear panels on page 47).
4. Remove the left cap (see Left cap on page 61).
5. Remove the right cap (see Right cap on page 67).
6. Remove the rear logo cover (see Rear logo cover on page 72).
7. Remove the rear main frame (see Main rear frame on page 75).
8. Remove the speakers (see Speakers on page 79).
9. Disconnect the cable from the board **(1)** and remove the screw **(2)** that secures the board to the computer.

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

10. Lift the board from the computer **(3)**.

Figure 7-57 Removing the infrared board



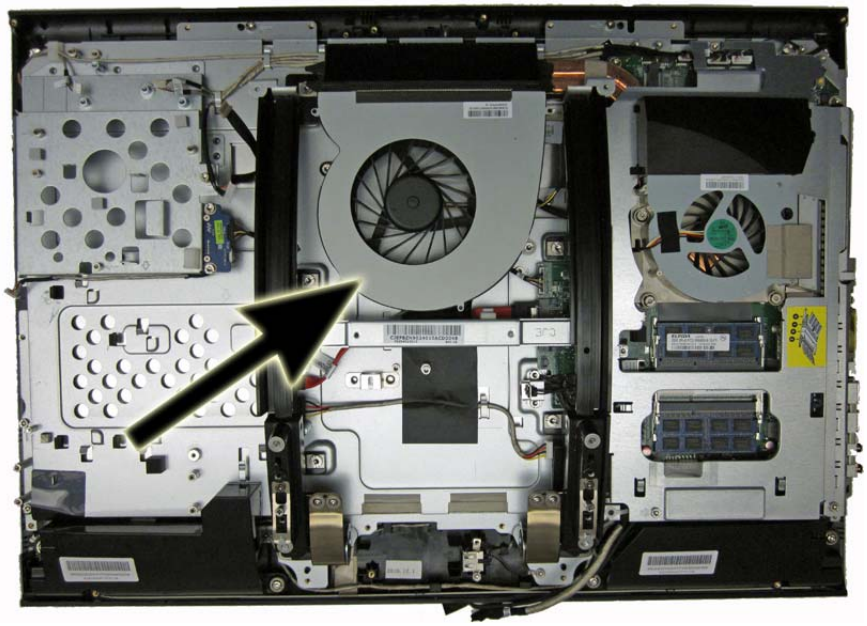
To install the infrared board, reverse the removal procedures.

Fan

Description	Spare part number
Fan	652321-001

The fan is located near the top of the computer. It is secured with three screws. You do not have to remove the heat sink to remove it.

Figure 7-58 Fan location

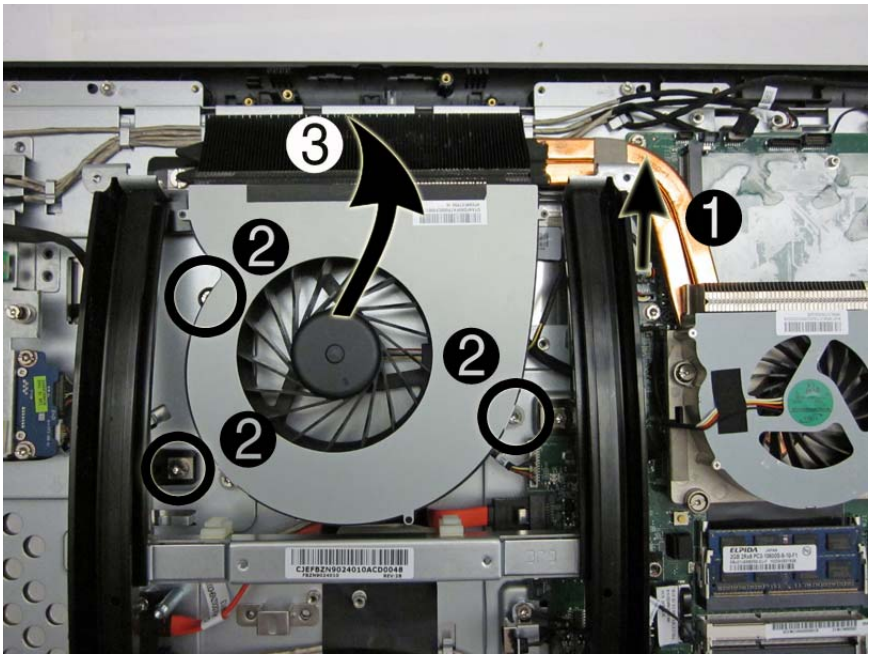


To remove the fan:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 34).
2. Remove the stand (see Stand on page 35).
3. Remove the right and left rear panels (see Rear panels on page 47).
4. Remove the left cap (see Left cap on page 61).
5. Remove the right cap (see Right cap on page 67).
6. Remove the rear logo cover (see Rear logo cover on page 72).
7. Remove the rear main frame (see Main rear frame on page 75).
8. Remove the system board shield (see System board shield on page 77).
9. Disconnect the fan cable from the system board connector **(1)**.
10. Remove the three screws that secure the fan to the computer **(2)**.

11. Lift the fan from the computer **(3)**.

Figure 7-59 Removing the fan



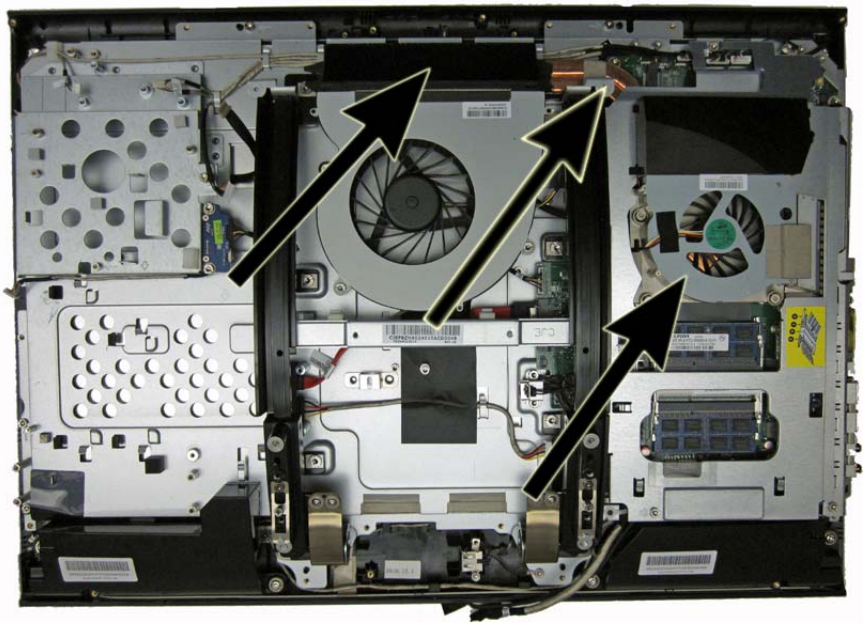
To install the fan, reverse the removal procedures.

Fan sink (Thermal module)

Description	Spare part number
Fan sink (thermal module) for use in computers with discrete graphics	658987-001
Fan sink (thermal module) for use in computers with UMA graphics	658988-001

The fan sink is secured with four screws. You do not have to remove the chassis fan to remove the it.

Figure 7-60 Fan location

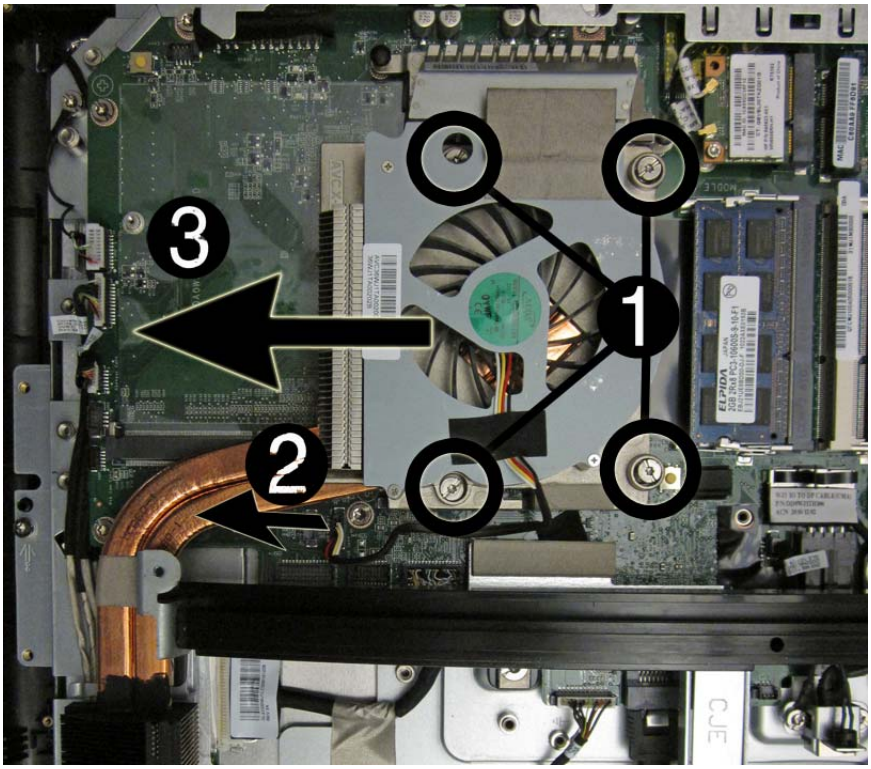


To remove the fan sink:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 34).
2. Remove the stand (see Stand on page 35).
3. Remove the right and left rear panels (see Rear panels on page 47).
4. Remove the left cap (see Left cap on page 61).
5. Remove the right cap (see Right cap on page 67).
6. Remove the rear logo cover (see Rear logo cover on page 72).
7. Remove the rear main frame (see Main rear frame on page 75).
8. Remove the system board shield (see System board shield on page 77).
9. In the order indicated by the numbers stamped into the heat sink, remove the four screws **(1)** that secure the fan sink to the system board.
10. Disconnect the fan cable from the system board **(2)**.

11. Slide the fan sink toward the top of the computer **(3)**, and then lift it off the system board .

Figure 7-61 Removing the fan sink



To replace the fan sink, reverse the removal procedures.

Processor

Description	Spare part number
Intel Core i7 processor	
2600 (3.4-GHz, 8-MB L3 cache)	638632-001
Intel Core i5 processors	
2500 (3.3-GHz, 6-MB L3 cache)	638631-001
2400 (3.1-GHz, 6-MB L3 cache)	638630-001
2300 (2.8-GHz, 6-MB L3 cache)	654601-001
Intel Core i3 processors	
2120 (3.3-GHz, 3-MB L3 cache)	638629-001
2100 (3.1-GHz, 3-MB L3 cache)	638628-001
Intel Pentium Dual-Core processors	
G850 (2.9-GHz, 3-MB L3 cache)	655973-001
G840 (2.8-GHz, 3-MB L3 cache)	655972-001
G620 (2.6-GHz, 3-MB L3 cache)	655971-001

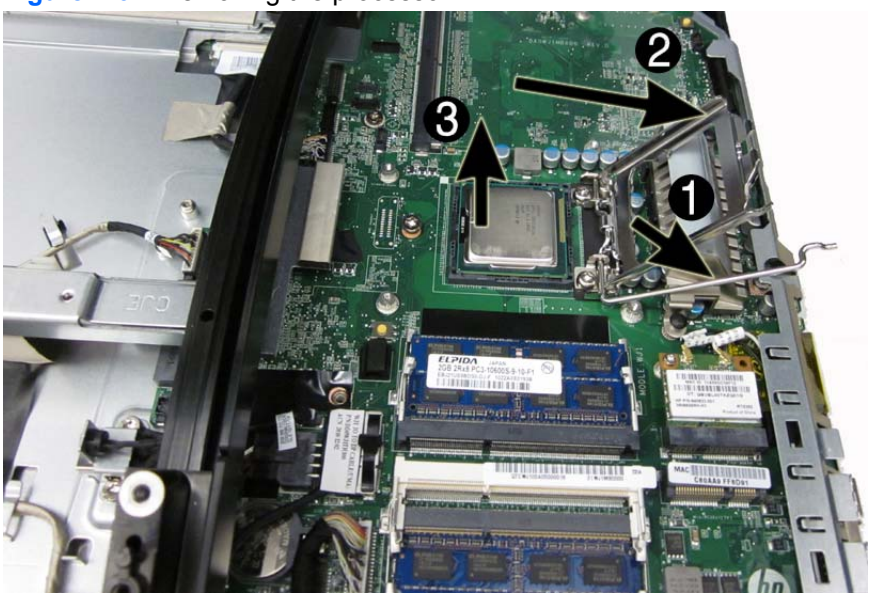
To remove the processor:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 34).
2. Remove the stand (see Stand on page 35).
3. Remove the right and left rear panels (see Rear panels on page 47).
4. Remove the left cap (see Left cap on page 61).
5. Remove the right cap (see Right cap on page 67).
6. Remove the rear logo cover (see Rear logo cover on page 72).
7. Remove the rear main frame (see Main rear frame on page 75).
8. Remove the system board shield (see System board shield on page 77).
9. Remove the fan sink (see Fan sink (Thermal module) on page 85).
10. Rotate the locking lever to its full open position **(1)**.
11. Lift the processor cover **(2)**.
12. 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 7-62 Removing the processor



To install a new processor:

1. Place the processor in its socket and close the retainer.
2. Secure the locking lever.

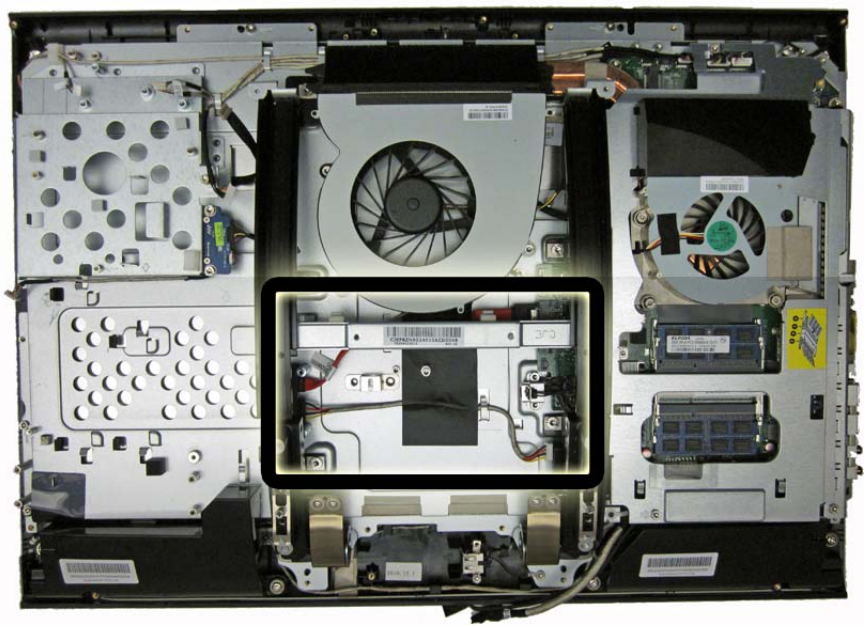
   If reusing the existing heat sink, go to step 3.

   If using a new heat sink, go to step 5.
3. If reusing the existing heat sink, clean the bottom of the heat sink with the alcohol pad provided in the spares kit.
4. Apply the thermal material provided in the spares kit to the top of the processor and install the heat sink atop the processor.
5. If using a new heat sink, remove the protective covering from the bottom of the heat sink and place it in position atop the processor.

Hard drive connector

The hard drive connector is located near the middle of the computer. You must remove the stand bracket get to the connector's screws. It is secured with two screws and has two connectors. The cables are taped to the computer.

Figure 7-63 Hard drive connector location

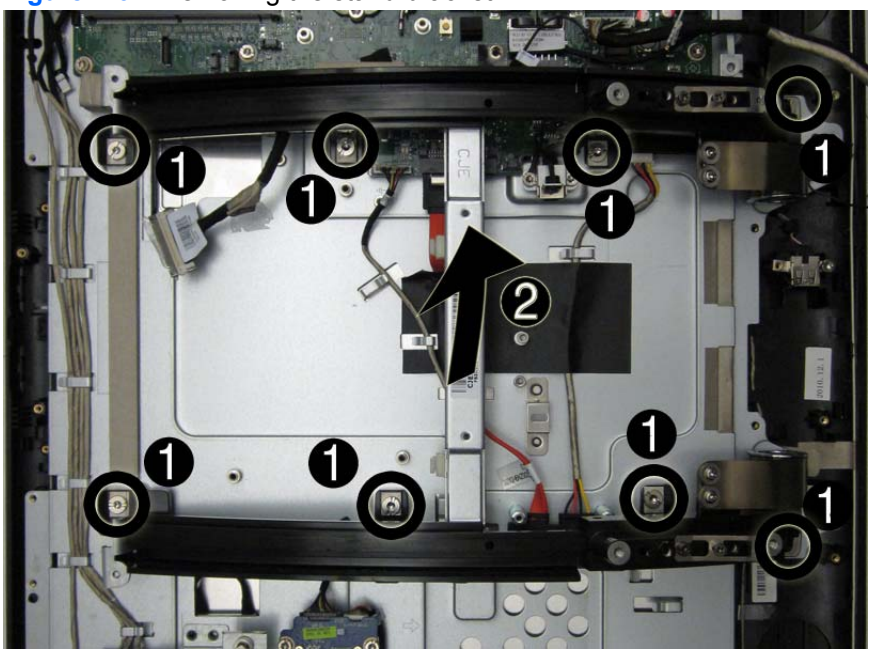


To remove the hard drive connector:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 34).
2. Remove the stand (see Stand on page 35).
3. Remove the right and left rear panels (see Rear panels on page 47).
4. Remove the left cap (see Left cap on page 61).
5. Remove the right cap (see Right cap on page 67).
6. Remove the rear logo cover (see Rear logo cover on page 72).
7. Remove the rear main frame (see Main rear frame on page 75).

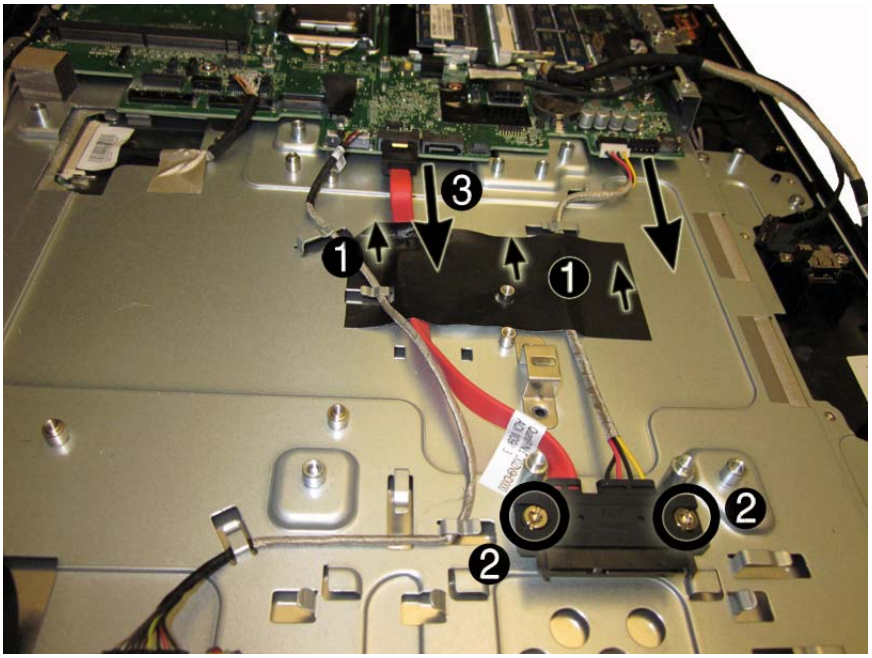
8. Remove the stand bracket by removing the eight screws **(1)** that secure the bracket to the computer, and then lifting the bracket off the computer **(2)**.

Figure 7-64 Removing the stand bracket



9. Remove the tape **(1)** that secures the cables to the computer.
10. Remove two screws **(2)** that secure the hard drive connector to the computer.
11. Disconnect the cables from the system board **(3)**.

Figure 7-65 Removing the hard drive connector



12. Remove the hard drive connector from the computer.

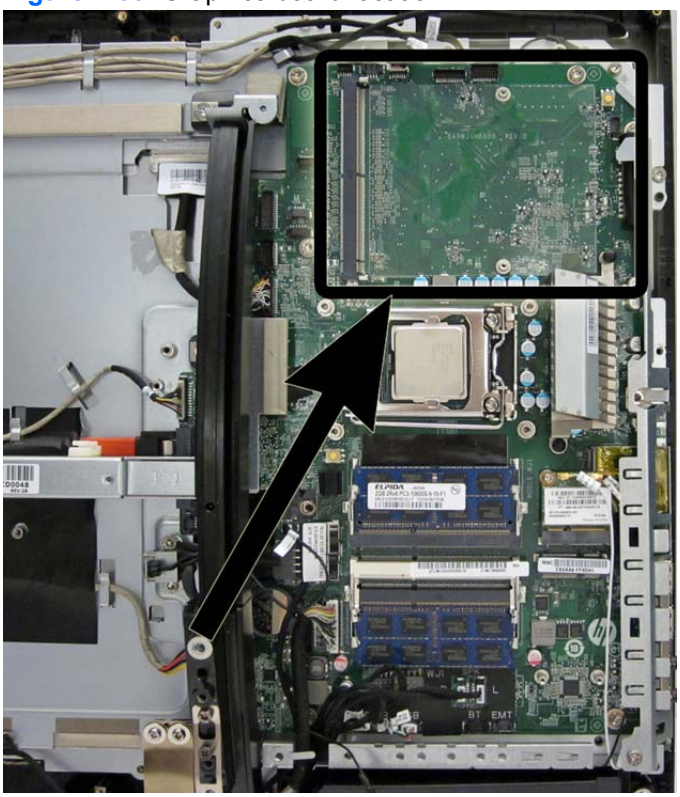
To install the hard drive connector, reverse the removal procedures.

Graphics board

Description	Spare part number
GFX, 1 GB graphics card	652164-001
ATI MXM30 Viper 1-GB HD5570 graphics card	628380-001

The graphics board is located near the top of the system board under the fan sink. You must remove the fan sink to remove the graphics board. The board is secured with two screws.

Figure 7-66 Graphics board location

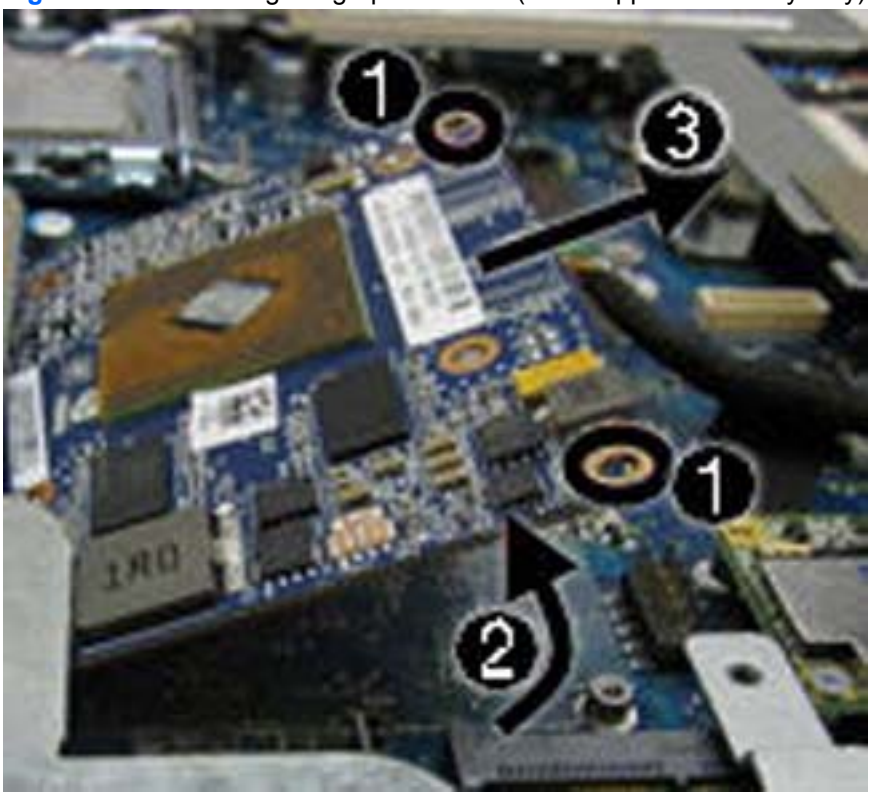


To remove the graphics board:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 34).
2. Remove the stand (see Stand on page 35).
3. Remove the right and left rear panels (see Rear panels on page 47).
4. Remove the left cap (see Left cap on page 61).
5. Remove the right cap (see Right cap on page 67).
6. Remove the rear logo cover (see Rear logo cover on page 72).
7. Remove the rear main frame (see Main rear frame on page 75).

8. Remove the system board shield (see System board shield on page 77).
9. Remove the fan sink (see Fan sink (Thermal module) on page 85).
10. Remove two screws **(1)** that secure the board to the computer.
11. Rotate the outer side of the board upward **(2)**, and then remove it at an angle **(3)**.

Figure 7-67 Removing the graphics board (board appearance may vary)



To install the graphics board, reverse the removal procedures.

NOTE: Graphics boards are designed with a notch to prevent incorrect insertion.

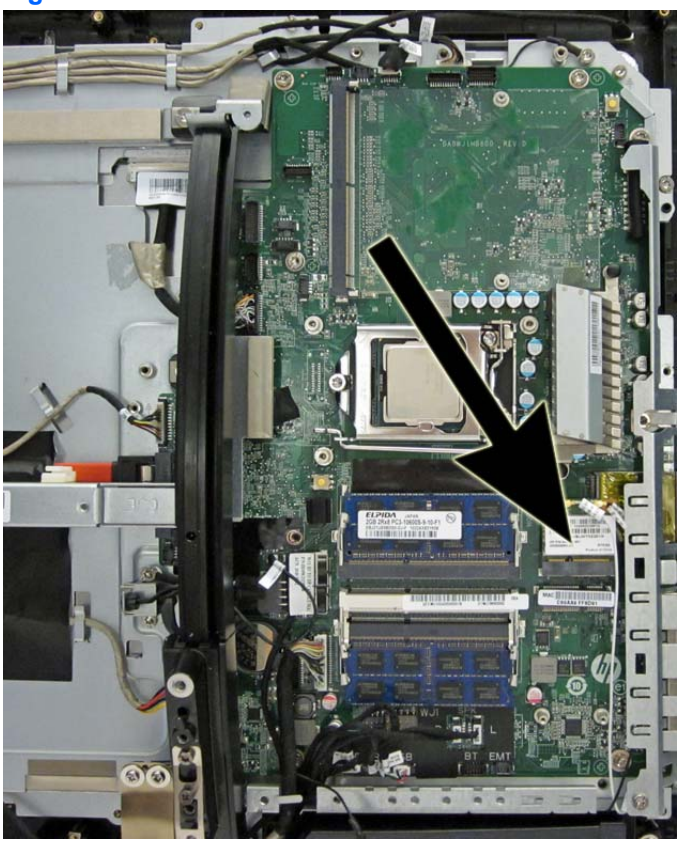
WLAN module and TV tuner module

The procedures for removing the WLAN module and the TV tuner module are very similar. The modules install into different slots located next to each other. This section shows removing the WLAN module, but you can use the same basic procedure to remove the TV tuner module. The number of antennas connected to the module may vary.

Description	Spare part number
Intel Centrino® Advanced-N 6205 802.11a/b/g/n	652165-001
HP WLAN combo 802.11b/g/n + Bluetooth 2.1 card	652279-001
802.11b/g/n	654602-001
HP TV tuner	613990-001

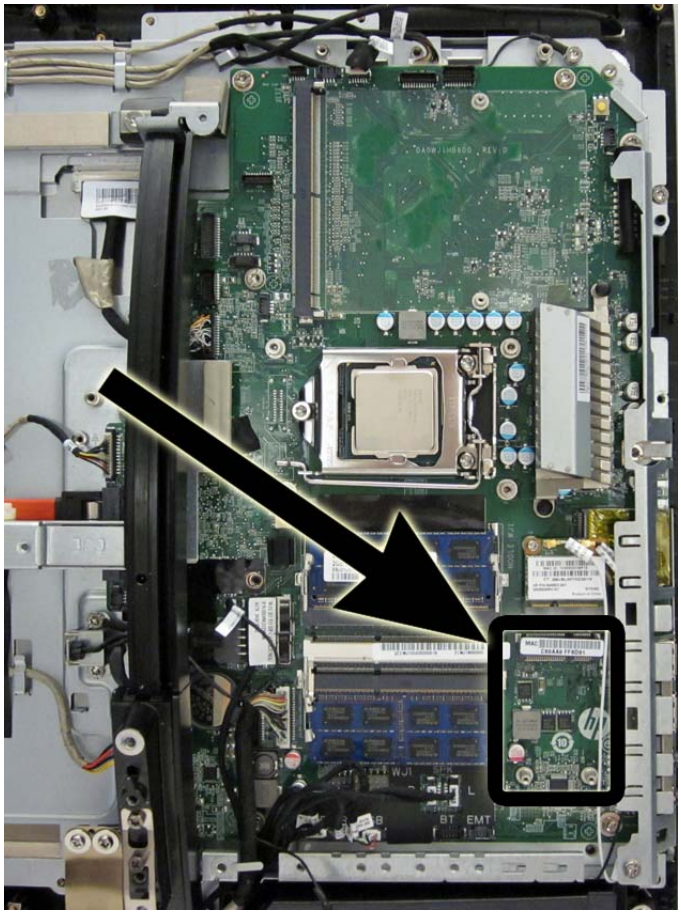
The WLAN module is located near the middle of the system board. The module is secured with two screws and has two connected antennas.

Figure 7-68 WLAN module location



The TV tuner module is located toward the bottom of the system board near the memory sockets. The module is secured with two screws and has one antenna.

Figure 7-69 TV tuner location

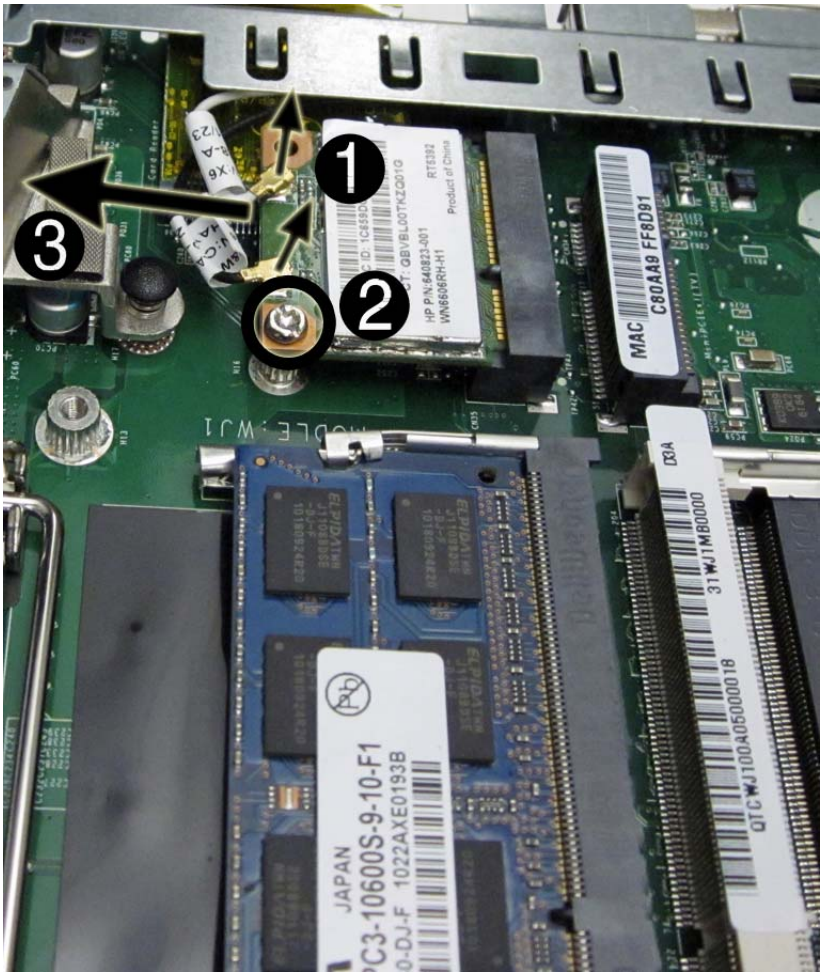


To remove the WLAN module:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 34).
2. Remove the stand (see Stand on page 35).
3. Remove the right and left rear panels (see Rear panels on page 47).
4. Remove the left cap (see Left cap on page 61).
5. Remove the right cap (see Right cap on page 67).
6. Remove the rear logo cover (see Rear logo cover on page 72).
7. Remove the rear main frame (see Main rear frame on page 75).
8. Remove the system board shield (see System board shield on page 77).
9. Disconnect the antenna cables from the module **(1)**. The number of antenna cables may vary.
10. Remove the screw **(2)** that secures the module to the computer.

11. Lift the module to a 45-degree angle, and then remove it from the system board **(3)**.

Figure 7-70 Removing the WLAN module



To install the WLAN module or TV tuner module, reverse the removal procedures.

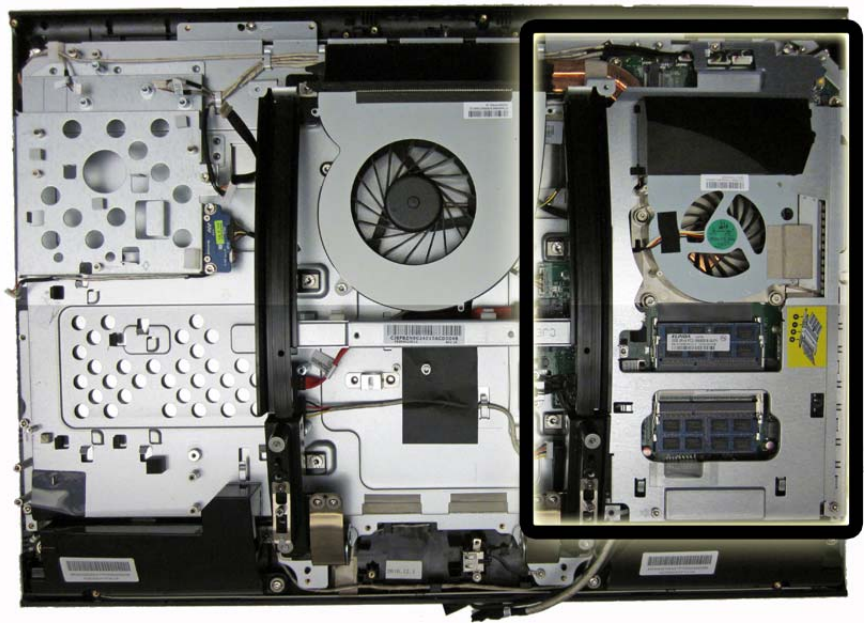
NOTE: WLAN modules and TV tuner modules are designed with a notch to prevent incorrect insertion.

System board

Description	Spare part number
System board	658978-001

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

Figure 7-71 System board location

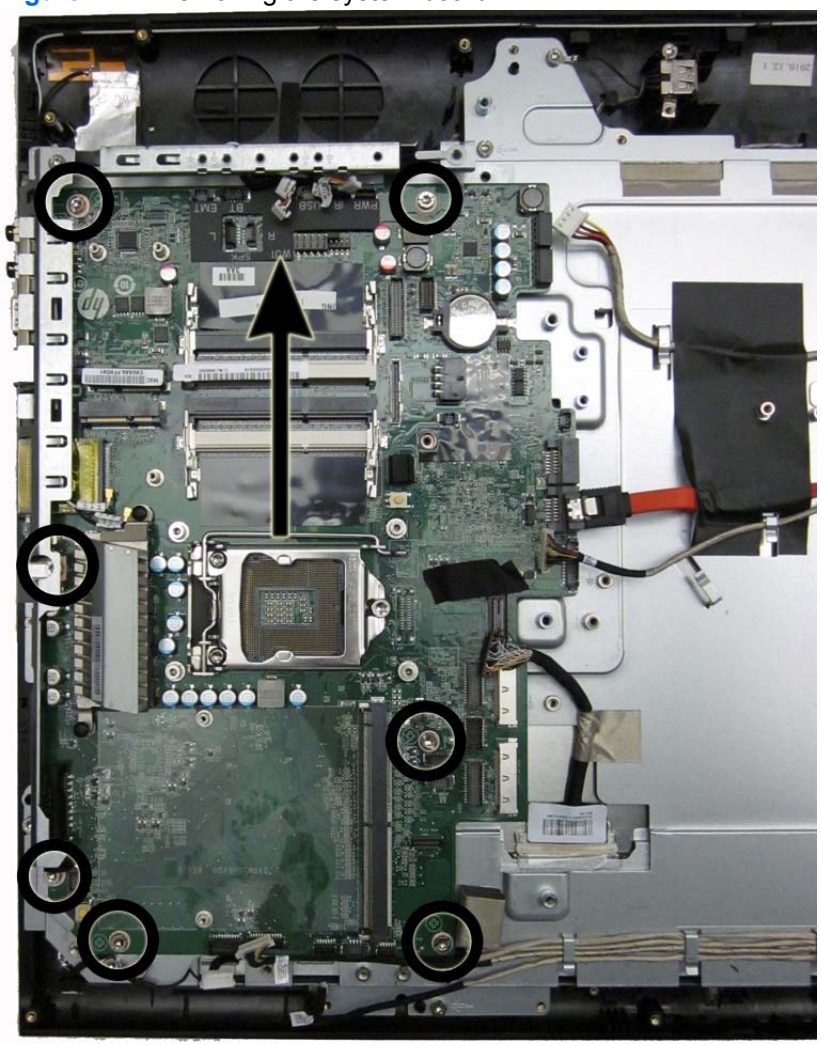


To remove the system board:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 34).
2. Remove the stand (see Stand on page 35).
3. Remove the right and left rear panels (see Rear panels on page 47).
4. Remove the left cap (see Left cap on page 61).
5. Remove the right cap (see Right cap on page 67).
6. Remove the rear logo cover (see Rear logo cover on page 72).
7. Remove the rear main frame (see Main rear frame on page 75).
8. Remove the system board shield (see System board shield on page 77).
9. Remove the fan (see Fan on page 83).
10. Remove the fan sink (see Fan sink (Thermal module) on page 85).
11. Remove the WLAN module and/or TV tuner module (see WLAN module and TV tuner module on page 93).
12. Remove the graphics board (see Graphics board on page 91).

13. Disconnect all cables from the system board, noting their location for reinstallation.
14. Remove the seven screws (circled in image) that secure the system board to the computer.
15. Lift the system board straight up and out of the computer.

Figure 7-72 Removing the system board



To install the system board, reverse the removal procedures.

Display panel

Description	Spare part number
Display panel, 23-inch, ZBD	658981-001
Display, 23-inch, non-ZBD	658979-001

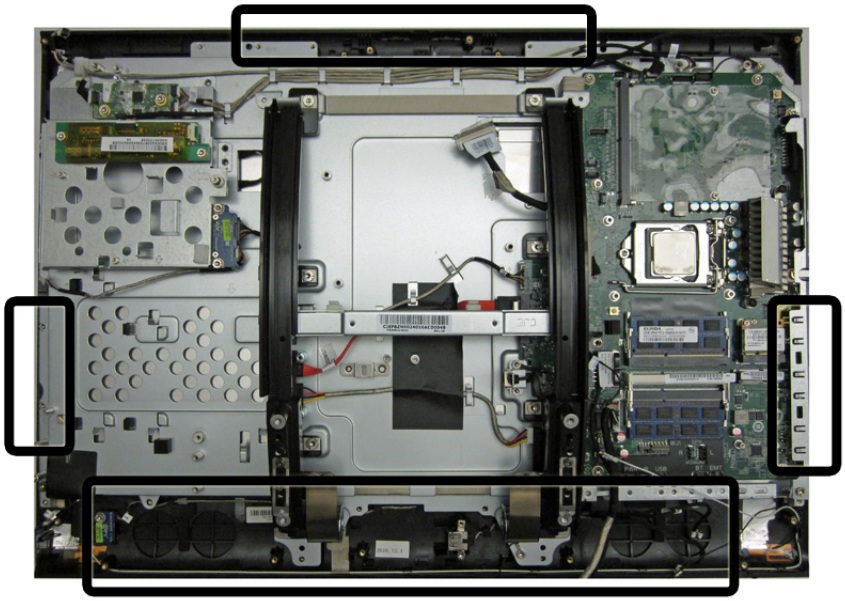
The display panel is secured to the frame with 10 screws. The panel is secured to the front bezel with 6 screws.

To remove the display panel:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 34).
2. Remove the stand (see Stand on page 35).
3. Remove the right and left rear panels (see Rear panels on page 47).
4. Remove the left cap (see Left cap on page 61).
5. Remove the right cap (see Right cap on page 67).
6. Remove the rear logo cover (see Rear logo cover on page 72).
7. Remove the rear main frame (see Main rear frame on page 75).
8. Remove the system board shield (see System board shield on page 77).
9. Remove the fan (see Fan on page 83).
10. Remove the fan sink (see Fan sink (Thermal module) on page 85).
11. Remove the graphics board (see Graphics board on page 91).
12. Remove the WLAN module and/or TV tuner module (see WLAN module and TV tuner module on page 93).
13. Remove the system board (see System board on page 96).
14. Remove the 10 screws that secure the display panel to the computer. The number of screws per side is as follows:
    - Top: 2 screws
    - Bottom: 6 screws

- Left: 1 screw
- Right: 1 screw

Figure 7-73 Separating the display panel from the frame



15. Separate the display panel from the computer.
16. Remove the six screws that secure the display panel to the front bezel (3 screws per side).

Figure 7-74 Separating the display panel from the front bezel

17. Lift the display panel from the front bezel.

To install a display panel, reverse the removal procedures.

G-sensor board

Description	Spare part number
G-sensor board	658983-001
G-sensor cable	658984-001

The G-sensor board is mounted on the touchscreen glass. It senses when you tap on the glass, and it wakes the system if in standby mode. It is attached to the glass with adhesive.

Figure 7-75 G-sensor board location

To remove the G-sensor board:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 34).
2. Remove the stand (see Stand on page 35).
3. Remove the right and left rear panels (see Rear panels on page 47).
4. Remove the left cap (see Left cap on page 61).
5. Remove the right cap (see Right cap on page 67).
6. Remove the rear logo cover (see Rear logo cover on page 72).
7. Remove the rear main frame (see Main rear frame on page 75).
8. Remove the system board shield (see System board shield on page 77).
9. Remove the fan (see Fan on page 83).
10. Remove the fan sink (see Fan sink (Thermal module) on page 85).
11. Remove the graphics board (see Graphics board on page 91).
12. Remove the WLAN module and TV tuner module (see WLAN module and TV tuner module on page 93).
13. Remove the system board (see System board on page 96).
14. Remove the display (see Display panel on page 98).

15. Pry the board from the display.

Figure 7-76 Removing the G-sensor board

To install the G-sensor board, reverse the removal procedures.

A 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 A-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.	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.	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.	1. If a PCI expansion card was recently added, remove it to see if the problem remains. 2. In Computer Setup, set **Advanced** > **Device Options** > **NIC PXE Option ROM Download** to **DISABLE** to prevent PXE option ROM for the internal NIC from being downloaded during POST to free more memory for an expansion card's option ROM. Internal PXE option ROM is used for booting from the NIC to a PXE server.
162-System Options Not Set	Configuration incorrect. RTC (real-time clock) battery may need to be replaced.	Run Computer Setup and check the configuration in **Advanced** > **Device Options**. Reset the date and time under **Control Panel**. If the problem persists, replace the RTC battery. See the *Hardware Reference Guide* for instructions on installing a new battery, or contact an authorized dealer or reseller for RTC battery replacement.
163-Time & Date Not Set	Invalid time or date in configuration memory. RTC (real-time clock) battery may need to be replaced.	Reset the date and time under **Control Panel** (Computer Setup can also be used). If the problem persists, replace the RTC battery. See the *Hardware Reference Guide* for instructions on installing a new battery, or contact an authorized dealer or reseller for RTC battery replacement.

Table A-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.	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.	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.	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.	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.	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.	1. Reconnect keyboard with computer turned off. 2. Replace the system board.

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

Control panel message	Description	Recommended action
304-Keyboard or System Unit Error	Keyboard failure.	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.	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.	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.	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.)	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.	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 A-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.	Make sure the system meets the HP enclosure guidelines as listed in the QuickSpecs, including the following: 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.	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.	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 A-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.	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.	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.	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.	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.	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 A-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.	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.	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.	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.	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.	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 A-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.	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 A-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.	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).	1. Check to see that the processor is present. 2. Reseat the processor.

Table A-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).	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.	**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. 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.	For systems with a graphics card: 1. Reseat the graphics card. 2. Replace the graphics card. 3. Replace the system board. For systems with integrated graphics, replace the system board.
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.	1. Reflash the system ROM with the latest BIOS image. 2. Replace the system board.

Table A-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.	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.	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.	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.	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. OR Press and hold the power button for less than 4 seconds. If the hard drive LED does not turn on green then: 1. Check that the unit is plugged into a working AC outlet. 2. Open hood and check that the power button harness is properly connected to the system board. 3. Check that both power supply cables are properly connected to the system board. 4. 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. It the problem persists, replace the power supply.

B Troubleshooting Without Diagnostics

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

NOTE: For information on specific error messages that may appear on the screen during Power-On Self-Test (POST) at startup, refer to Appendix A, POST Error Messages on page 102.

Safety and Comfort

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

Solving General Problems

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

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

Table B-1 Solving General Problems

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

Cause	Solution
Software control of the power switch is not functional.	1. Press and hold the power button for at least four seconds until the computer turns off. 2. Disconnect the power cord from the electrical outlet.

Computer will not respond to USB keyboard or mouse.

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

Computer date and time display is incorrect.

Cause	Solution
RTC (real-time clock) battery may need to be replaced. **NOTE:** Connecting the computer to a live AC outlet prolongs the life of the RTC battery.	First, reset the date and time under **Control Panel** (Computer Setup can also be used to update the RTC date and time). If the problem persists, replace the RTC battery. See the Removal and Replacement section for instructions on installing a new battery, or contact an authorized dealer or reseller for RTC battery replacement.

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

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

There is no sound or sound volume is too low.

Cause	Solution
System volume may be set low or muted.	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.	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.	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 Windows 7) and type `msconfig`. 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	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.	1. Ensure that the computer air vents are not blocked and the processor cooling fan is running. 2. Open hood, press power button, and see if the processor fan spins. If the processor fan is not spinning, make sure the fan's cable is plugged onto the system board header. 3. If fan is plugged in, but is not spinning, then replace the heat sink/fan assembly.

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

Cause	Solution
System unable to power on.	Press and hold the power button for less than 4 seconds. If the hard drive LED turns green, then: 1. Check that the voltage selector, located on the rear of the power supply on some models, is set to the appropriate voltage. Proper voltage setting depends on your region. 2. Replace the system board. OR Press and hold the power button for less than 4 seconds. If the hard drive LED does not turn on green then: 1. Check that the unit is plugged into a working AC outlet. 2. Open computer and check that the power button board cable is properly connected to the system board. 3. Check that power supply cables are properly connected to the system board. 4. Check to see if the 5V_aux light on the system board is turned on. If it is turned on, then replace the power button board. 5. If the 5V_aux light on the system board is off, then replace the power supply. 6. Replace the system board.

Solving Power Problems

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

Table B-2 Solving Power Problems

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

Cause	Solution
Processor thermal protection activated: A fan may be blocked or not turning. OR The heat sink is not properly attached to the processor.	1. Ensure that the computer air vents are not blocked and the processor cooling fan is running. 2. Open hood, press power button, and see if the processor fan spins. If the processor fan is not spinning, make sure the fan's cable is plugged onto the system board header. 3. If fan is plugged in, but is not spinning, then replace the heat sink/fan assembly.

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

Cause	Solution
Power failure (power supply is overloaded).	1. Check if a device is causing the problem by removing ALL attached devices (such as hard, diskette, or optical drives, and expansion cards). Power on the system. If the system enters the POST, then power off and replace one device at a time and repeat this procedure until failure occurs. Replace the device that is causing the failure. Continue adding devices one at a time to ensure all devices are functioning properly. 2. Replace the power supply. 3. Replace the system board.

Solving Diskette Problems

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

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

NOTE: You may need to reconfigure the computer when you add or remove hardware, such as an additional diskette drive. See Solving Hardware Installation Problems on page 134 for instructions.

Table B-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. 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 B-3 Solving Diskette Problems (continued)

Diskette drive cannot write to a diskette.

Cause	Solution
Not enough space is left on the diskette.	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.	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**. **NOTE:** Both steps should be used as the **Removable Media Boot** function in Computer Setup overrides the **Boot Order** enable command.
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 B-4 Solving Hard Drive Problems

Hard drive error occurs.

Cause	Solution
Hard disk has bad sectors or has failed.	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.	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**.

Drive not found (identified).

Cause	Solution
Cable could be loose.	Check cable connections.
The system may not have automatically recognized a newly installed device.	See reconfiguration directions in the Solving Hardware Installation Problems on page 134 section. If the system still does not recognize the new device, check to see if the device is listed within Computer Setup. If it is listed, the probable cause is a driver problem. If it is not listed, the probable cause is a hardware problem. If this is a newly installed drive, run the Computer Setup utility and try adding a POST delay under **Advanced** > **Power-On**.
The device is attached to a SATA port that has been hidden in Computer Setup.	Run the Computer Setup utility and ensure **Device Available** is selected for the device's SATA port in **Security** > **Device Security**.
Drive responds slowly immediately after power-up.	Run Computer Setup and increase the POST Delay in **Advanced** > **Power-On Options**.

Nonsystem disk/NTLDR missing message.

Cause	Solution
The system is trying to start from a diskette that is not bootable.	Remove the diskette from the diskette drive.
The system is trying to start from the hard drive but the hard drive may have been damaged.	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.	1. Insert a bootable diskette into the diskette drive and restart the computer. 2. Check the hard drive format using Fdisk: If NFTFS 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 102 to determine possible causes for the blinking red and beep codes. See the Worldwide Limited Warranty for terms and conditions.

Computer seems to be locked up.

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

The removable hard drive is not recognized by the computer.

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

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

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

Solving Media Card Reader Problems

Table B-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 B-6 Solving Display Problems

Blank screen (no video).

Cause	Solution
You may have a screen blanking utility installed or energy saver features are enabled.	Press any key or click the mouse button and, if set, type your password.
System ROM is corrupted; system is running in Boot Block Emergency Recovery Mode (indicated by eight beeps).	Reflash the system ROM with the latest BIOS image.
Computer is in **standby** mode.	Press the power button to resume from **standby** mode. **CAUTION:** When attempting to resume from **standby** mode, do not hold down the power button for more than four seconds. Otherwise, the computer will shut down and you will lose any unsaved data.

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

Cause	Solution
Pre-video memory error.	1. Reseat DIMMs. Power on the system. 2. Replace DIMMs one at a time to isolate the faulty module. 3. Replace third-party memory with HP memory. 4. Replace the system board.

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

Cause	Solution
Pre-video graphics error.	For systems with a graphics card: 1. Reseat the graphics card. Power on the system. 2. Replace the graphics card. 3. Replace the system board. For systems with integrated graphics, replace the system board.

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

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

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

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

Dim characters.

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

Blurry video or requested resolution cannot be set.

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

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

Cause	Solution
The monitor connections may be incomplete or the monitor may be incorrectly adjusted.	1. In a two-monitor system or if another monitor is in close proximity, be sure the monitors are not interfering with each other's electromagnetic field by moving them apart. 2. Fluorescent lights or fans may be too close to the monitor.
Monitor needs to be degaussed.	Degauss the monitor. Refer to the documentation that came with the monitor for instructions.

Image is not centered.

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

“Out of Range” displays on screen.

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

High pitched noise coming from inside monitor.

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

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

Cause	Solution
Monitor’s internal digital conversion circuits may be unable to correctly interpret the output synchronization of the graphics card.	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.	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 B-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: 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 B-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 B-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.	1. Install the correct printer driver for the application. 2. Try printing using the MS-DOS command: `DIR C:\ > [printer port]` where `[printer port]` is the address of the printer being used. If the printer works, reload the printer driver.
If you are on a network, you may not have made the connection to the printer.	Make the proper network connections to the printer.
Printer may have failed.	Run printer self-test.

Printer will not turn on.

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 B-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 B-9 Solving Keyboard Problems

Keyboard commands and typing are not recognized by the computer.

Cause	Solution
Keyboard connector is not properly connected.	1. 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**. 2. After the shutdown is complete, reconnect the keyboard to the back of the computer and restart the computer.
Program in use has stopped responding to commands.	Shut down your computer using the mouse and then restart the computer.
Keyboard needs repairs.	See the Worldwide Limited Warranty for terms and conditions.
Computer is in **standby** mode.	Press the power button to resume from **standby** mode. **CAUTION:** When attempting to resume from **standby** mode, do not hold down the power button for more than four seconds. Otherwise, the computer will shut down and you will lose any unsaved data.

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

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

Table B-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. 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 B-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.	1. Review the documentation that came with the system to determine if you are using the correct memory modules and to verify the proper installation. **NOTE:** DIMM1 or XMM1 must always be installed. DIMM1 must be installed before DIMM2, and DIMM3 must be installed before DIMM4. 2. Observe the beeps and LED lights on the front of the computer. Beeps and flashing LEDs are codes for specific problems. 3. If you still cannot resolve the issue, contact Customer Support.

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

Cause	Solution
Memory is installed incorrectly or is bad.	**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. 1. Reseat DIMMs. Power on the system. 2. Replace DIMMs one at a time to isolate the faulty module. **NOTE:** DIMM1 or XMM1 must always be installed. DIMM1 must be installed before DIMM2, and DIMM3 must be installed before DIMM4 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.	For systems with a graphics card: 1. Reseat the graphics card. Power on the system. 2. Replace the graphics card. 3. Replace the system board. For systems with integrated graphics, replace the system board.

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.	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 B-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**.

Table B-12 Solving Network Problems (continued)

Wake-on-LAN feature is not functioning.

Cause	Solution
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.	To enable Wake-on-LAN in Windows XP: 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**. To enable Wake-on-LAN in Windows Vista: 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**. To enable Wake-on-LAN in Windows 7: 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.	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.	1. Run Computer Setup and enable network controller. 2. Enable the network controller in the operating system via Device Manager.
Network driver is not properly loaded.	Reinstall network drivers.
System cannot autosense the network.	Disable auto-sensing capabilities and force the system into the correct operating mode.

Diagnostics reports a failure.

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

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

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

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

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

Network controller stops working without apparent cause.

Cause	Solution
The files containing the network drivers are corrupted.	Reinstall the network drivers, using the Recovery Disc Set created from the hard drive's Recovery Partition.
The cable is not securely connected.	Ensure that the cable is securely attached to the network connector and that the other end of the cable is securely attached to the correct device.
The network controller is defective.	Contact an authorized service provider.

New network card will not boot.

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

Cannot connect to network server when attempting Remote System Installation.

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

System setup utility reports unprogrammed EEPROM.

Cause	Solution
Unprogrammed EEPROM.	Contact an authorized service provider.

Solving Memory Problems

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

⚠ **CAUTION:** Power may still be supplied to the DIMMs when the computer is turned off (depending on the Management Engine (ME) settings). To avoid damage to the DIMMs or the system board, you must unplug the computer power cord before attempting to reseat, install, or remove a DIMM module.

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

Table B-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.	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 B-14 Solving Processor Problems

Poor performance is experienced.

Cause	Solution
Processor is hot.	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.	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.	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 B-15 Solving CD-ROM and DVD Problems

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

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

Drive not found (identified).

Cause	Solution
Cable could be loose.	Check cable connections.
The system may not have automatically recognized a newly installed device.	See reconfiguration directions in the Solving Hardware Installation Problems on page 134 section. If the system still does not recognize the new device, check to see if the device is listed within Computer Setup. If it is listed, the probable cause is a driver problem. If it is not listed, the probable cause is a hardware problem. If this is a newly installed drive, run the Computer Setup utility and try adding a POST delay under **Advanced** > **Power-On Options**.
The device is attached to a SATA port that has been hidden in Computer Setup.	Run the Computer Setup utility and ensure **Device Available** is selected for the device's SATA port in **Security** > **Device Security**.
Drive responds slowly immediately after power-up.	Run Computer Setup and increase the POST Delay in **Advanced** > **Power-On Options**.

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

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

Movie will not play in the DVD drive.

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

Cannot eject compact disc (tray-load unit).

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

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

Cause	Solution
Media has been inserted upside down.	Re-insert the media with the label facing up.
The DVD-ROM drive takes longer to start because it has to determine the type of media played, such as audio or video.	Wait at least 30 seconds to let the DVD-ROM drive determine the type of media being played. If the disc still does not start, read the other solutions listed for this topic.
CD or DVD disc is dirty.	Clean CD or DVD with a CD cleaning kit, available from most computer stores.
Windows does not detect the CD-ROM or DVD-ROM drive.	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.	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 B-16 Solving USB Flash Drive Problems

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

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

USB flash drive not found (identified).

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

System will not boot from USB flash drive.

Cause	Solution
Boot order is not correct.	Run the Computer Setup utility and change boot sequence in **Storage** > **Boot Order**.
Removable Media Boot is disabled in the Computer Setup utility.	Run the Computer Setup utility and enable booting to removable media in **Storage** > **Storage Options**. Ensure USB is enabled in **Storage** > **Boot Order**.

The computer boots to DOS after making a bootable flash drive.

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

Solving Internet Access Problems

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

Table B-17 Solving Internet Access Problems

Unable to connect to the Internet.

Cause	Solution
Internet Service Provider (ISP) account is not set up properly.	Verify Internet settings or contact your ISP for assistance.
Modem is not set up properly.	Reconnect the modem. Verify the connections are correct using the quick setup documentation.
Web browser is not set up properly.	Verify that the Web browser is installed and set up to work with your ISP.
Cable/DSL modem is not plugged in.	Plug in cable/DSL modem. You should see a “power” LED light on the front of the cable/DSL modem.
Cable/DSL service is not available or has been interrupted due to bad weather.	Try connecting to the Internet at a later time or contact your ISP. (If the cable/DSL service is connected, the “cable” LED light on the front of the cable/DSL modem will be on.)
The CAT5 UTP cable is disconnected.	Connect the CAT5 UTP cable between the cable modem and the computers’s RJ-45 connector. (If the connection is good, the “PC” LED light on the front of the cable/DSL modem will be on.)

Table B-17 Solving Internet Access Problems (continued)

Unable to connect to the Internet.

Cause	Solution
IP address is not configured properly.	Contact your ISP for the correct IP address.
Cookies are corrupted. (A “cookie” is a small piece of information that a Web server can store temporarily with the Web browser. This is useful for having the browser remember some specific information that the Web server can later retrieve.)	**Windows 7** 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. **Windows Vista** 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. **Windows XP** 1. Select **Start** > **Control Panel**. 2. Double-click **Internet Options**. 3. On the **General** tab, click the **Delete Cookies** button.

Cannot automatically launch Internet programs.

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

Internet takes too long to download Web sites.

Cause	Solution
Modem is not set up properly.	Verify that the modem is connected and communicating properly. **Windows 7** 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. **Windows XP** 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. **Windows Vista** 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 B-18 Solving Software Problems

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

Cause	Solution
POST error has occurred.	Observe the beeps and LED lights on the front of the computer. See Appendix A, POST Error Messages on page 102 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.

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.

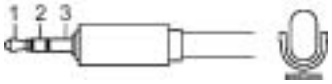
Ethernet BNC

Connector and Icon	Pin	Signal
	1	Data
	2	Ground

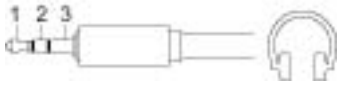
USB

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

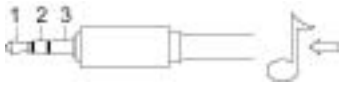
Microphone

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

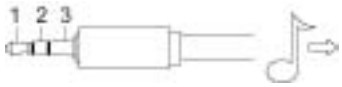
Headphone

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 mm_2 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, 0.75mm_2 conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country where it will be used.
2. The flexible cord must be Type 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 mm_2 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

Dimensions (with stand)		
Height	17.7 in	45.0 cm
Width	23.0 in	58.5 cm
Depth	4.1 in	10.0 cm
Dimensions (without stand)		
Height	16.0 in	40.5 cm
Width	23.0 in	58.5 cm
Depth	3.8 in	9.6 cm
Approximate Weight (with stand)		
Integrated graphics	26.0 lb	11.8 kg
Discrete graphics	26.7 lb	12.1 kg
Approximate Weight (without stand)		
Integrated graphics	19.2 lb	8.7 kg
Discrete graphics	20.0 lb	9.1 kg
Temperature Range		
Operating	41° to 95°F	5° to 35°C
Nonoperating	-22° to 149°F	-30° to 66°C
Relative Humidity (noncondensing)		
Operating	15-80% at 79°F	15-80% at 26°C
Maximum Altitude (unpressurized)		
Operating	0 - 6,562 ft	0 - 2000 m
Nonoperating	0 - 15,000 ft	4,572 m

Table E-1 Specifications (continued)

Power Supply		
Rated Voltage Range	100-240 V	100-240 V
Rated Line Frequency	50-60 Hz	50-60 Hz
Max Operating Power		
Integrated graphics	< 230 W	< 230 W
Discrete graphics	<180 W	<180 W
Average Operating Power	Integrated graphics: 58 W	Integrated graphics: 58 W
	Discrete graphics: 66 W	Discrete graphics: 66 W
Display		
Resolution	1920 x 1080 resolution (16:9), Full HD (1080p)	
Contrast ratio	1000:1	
Image brightness	250 nits typical	
Vertical viewing angle	178 degrees	
Horizontal viewing angle	178 degrees	

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