Maintenance & Service Guide

HP Compaq 6000 Pro All-in-One 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

The HP Compaq 6000 Pro All-In One Business PC offers the following features:

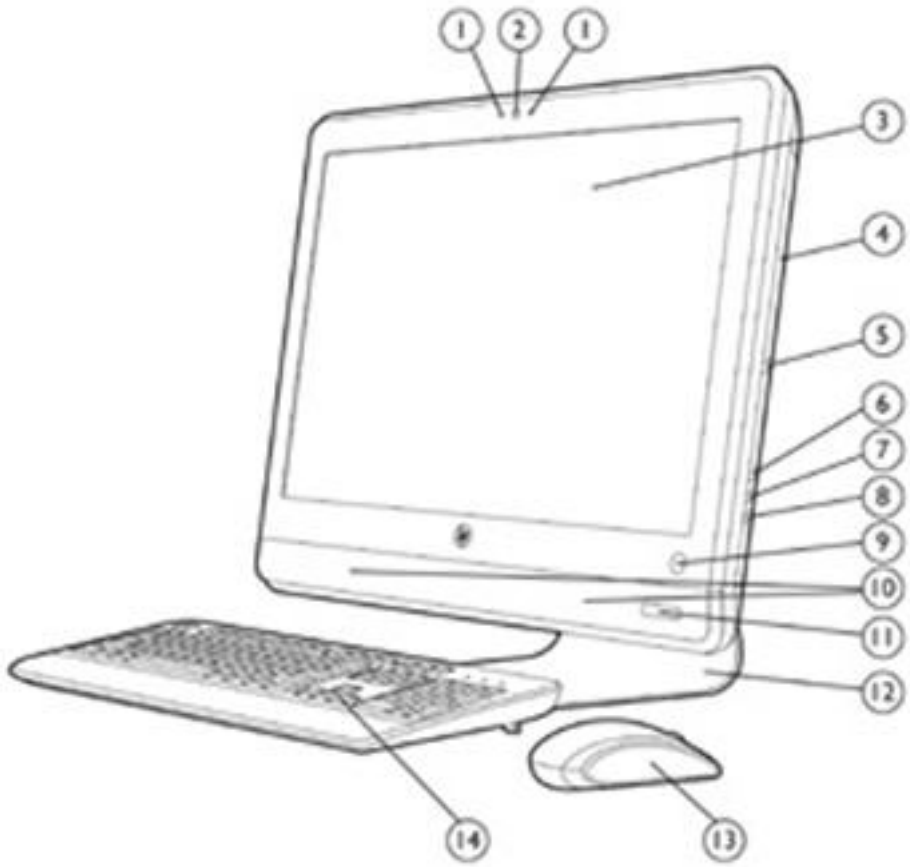
- Intel® Core™ 2 Duo processors
- Windows® 7 Professional 32- or 64-bit operating system
- Up to 8 gigabytes (GB) of DDR3 memory
- Hard drives up to 1 terabyte
- Optional 80-GB solid-state drive
- 21.5-inch diagonal widescreen Full HD WLED anti-glare display (1080p)
- Bluetooth® wireless solutions
- 16x Max SuperMulti optical drive and slim-tray DVD burner with Lightscribe
- 7 USB ports
- IEEE 1394 Firewire® port
- 6-in-1 memory card reader
- Integrated Intel Graphics Media Accelerator 4500 HD, or optional NVIDIA GeForce GT230 discrete graphics
- Optional TV tuner
- PS/2 ports for the mouse and keyboard
- Removable panels on the back of the chassis allow administrators to easily and efficiently service the PC
- Adjustable tilt and swivel stand
- Intel Q43 Express chipset
- Optional wireless connectivity:
  - 802.11 b/g/n wireless LAN module
  - Bluetooth® 2.1
- Intel Standard Manageability

- Face Recognition for HP ProtectTools software with auto-login capabilities
- TPM 1.2-compliant embedded security chip
- VESA-compliant mounting solutions
- HD webcam
- Dual-array microphone
- Premium stereo speakers
- HP SkyRoom full version for professional quality visual collaboration built on HP Video and Image processing engines for hi-fi audio, hi-def video, and hi-performance 3D application sharing

NOTE: SkyRoom is shipped only on computers with Dual Core Processors, at least 2 GB of memory, a selectable Windows operating system, and the selectable webcam/mic AV.

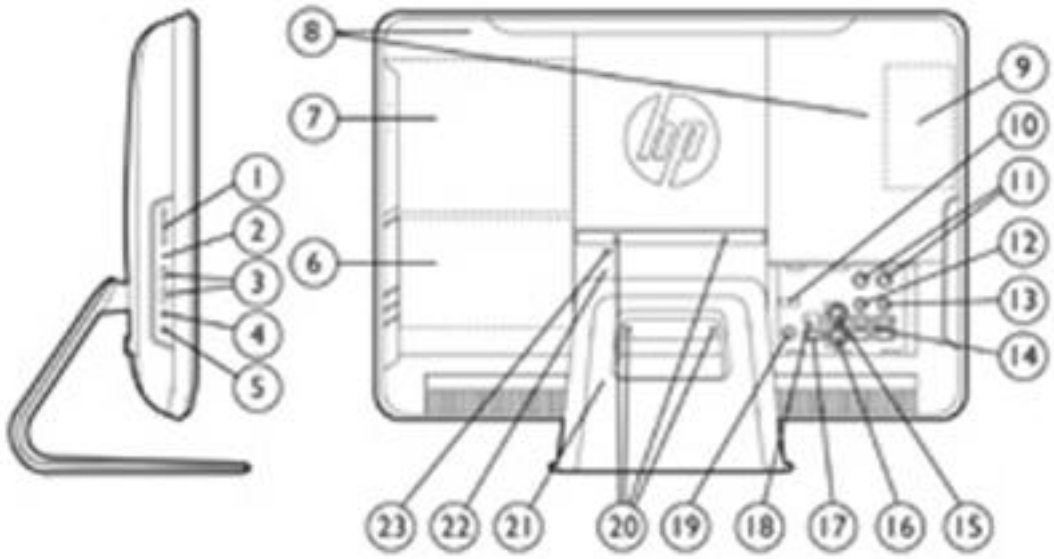
- Microsoft® Office Communicator certified
- ENERGY STAR® qualified, EPEAT® Gold registered, and offers 89-percent energy-efficient power
- HP Power Assistant software
- HP MediaSmart software for photos, music, video, DVD, webcam, and TV tuner
- Choice of wired or wireless keyboard and mouse

Front Components



Component		Component	
(1)	Dual microphone array	**(8)**	Drive activity LED
(2)	Webcam (optional)	**(9)**	Power button and LED
(3)	21.5-inch diagonal 16:9 widescreen LED-backlit full HD LCD display	**(10)**	High-performance stereo speakers
(4)	Tray-load optical drive (optional)	**(11)**	IR Receiver and LED (select models only)
(5)	Optical drive eject button	**(12)**	Adjustable tilt and swivel stand
(6)	Brightness increase button	**(13)**	HP low-profile keyboard* with numeric keypad
(7)	Brightness decrease button	**(14)**	HP optical mouse*
*Wired or optional wireless			

Rear and Side Components



Component		Component	
(1)	HP 6-in-1 Media Card Reader	**(13)**	Stereo audio line out
(2)	IEEE 1394 port	**(14)**	(4) USB 2.0 ports
(3)	(2) USB 2.0 ports	**(15)**	PS/2 mouse port
(4)	Headphone jack	**(16)**	PS/2 keyboard port
(5)	Microphone/line in jack	**(17)**	USB 2.0 port (used for optional wireless keyboard/mouse transmitter/receiver)
(6)	Hard drive access	**(18)**	RJ-45 Gigabit Ethernet port
(7)	Optical drive access	**(19)**	Power connector with LED indicator
(8)	Removable access panels	**(20)**	VESA-compliant mounting holes (4)
(9)	Memory access	**(21)**	Adjustable tilt and swivel stand
(10)	DisplayPort	**(22)**	Access cover panel
(11)	TV tuner coax jacks (optional)	**(23)**	Lock slot
(12)	IR Emitter (Blaster) output (optional)		

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 Vista and 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.

   In Windows XP, you will be directed to the **Microsoft Windows Update Web site**. If you see one or more pop-up windows that ask you to install a program from http://www.microsoft.com, click **Yes** to install the program. Follow the instructions on the Microsoft Web site to scan for updates and install critical updates and service packs.

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

Installing or Upgrading Device Drivers (Windows systems)

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

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

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

Accessing Disk Image (ISO) Files

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

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

Protecting the Software

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

3 Computer Setup (F10) Utility

Computer Setup (F10) Utilities

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

- Change factory default settings.
- Set the system date and time.
- Set, view, change, or verify the system configuration, including settings for processor, graphics, memory, audio, storage, communications, and input devices.
- Modify the boot order of bootable devices such as hard drives, optical drives, or USB flash media devices.
- Enable Quick Boot, which is faster than Full Boot but does not run all of the diagnostic tests run during a Full Boot. You can set the system to:
  - ☐ always Quick Boot (default);
  - ☐ periodically Full Boot (from every 1 to 30 days); or
  - ☐ always Full Boot.
- Select Post Messages Enabled or Disabled to change the display status of Power-On Self-Test (POST) messages. Post Messages Disabled suppresses most POST messages, such as memory count, product name, and other non-error text messages. If a POST error occurs, the error is displayed regardless of the mode selected. To manually switch to Post Messages Enabled during POST, press any key (except F1 through F12).
- Establish an Ownership Tag, the text of which is displayed each time the system is turned on or restarted.
- Enter the Asset Tag or property identification number assigned by the company to this computer.
- Enable the power-on password prompt during system restarts (warm boots) as well as during power-on.
- Establish a setup password that controls access to the Computer Setup (F10) Utility and the settings described in this section.
- Secure integrated I/O functionality, including USB, audio, or embedded NIC, so that they cannot be used until they are unsecured.
- Enable or disable removable media boot ability.

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

Using Computer Setup (F10) Utilities

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

1. Turn on or restart the computer. If you are in Microsoft Windows, click **Start** > **Shut Down** > **Restart**.
2. As soon as the computer is turned on, press F10 before the computer boots to the operating system to enter Computer Setup. Press Enter to bypass the title screen, if necessary.

   NOTE: If you do not press F10 at the appropriate time, you must restart the computer and again press F10 before the computer boots to the operating system to access the utility.
3. Select your language from the list and press Enter.
4. A choice of five headings appears in the Computer Setup Utilities menu: File, Storage, Security, Power, and Advanced.
5. Use the arrow (left and right) keys to select the appropriate heading. Use the arrow (up and down) keys to select the option you want, then press Enter. To return to the Computer Setup Utilities menu, press Esc.
6. To apply and save changes, select **File** > **Save Changes and Exit**.
   - If you have made changes that you do not want applied, select **Ignore Changes and Exit**.
   - To reset to factory settings or previously saved default settings (some models), select **Apply Defaults and Exit**. This option will restore the original factory system defaults.

△ **CAUTION:** Do NOT turn the 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.

Table 3-1 Computer Setup (F10) Utility

Heading	Table
File	Table 3-2 Computer Setup—File on page 10
Storage	Table 3-3 Computer Setup—Storage on page 11
Security	Table 3-4 Computer Setup—Security on page 13
Power	Table 3-5 Computer Setup—Power on page 17
Advanced	Table 3-6 Computer Setup—Advanced on page 18

Computer Setup—File

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

Table 3-2 Computer Setup—File

Option	Description
System Information	Lists: • Product name • SKU number (some models) • Processor type/speed/stepping • Installed memory size/speed, number of channels (single or dual) (if applicable) • Integrated MAC address for embedded, enabled NIC (if applicable) • System BIOS (includes family name and version) • Chassis serial number • Asset tracking number • ME firmware version • Management mode
About	Displays copyright notice.
Set Time and Date	Allows you to set system time and date.
Flash System ROM	Allows you to update the system ROM with a BIOS image file located on a USB flash media device or CD-ROM.
Replicated Setup	**Save to Removable Media** Saves system configuration, including CMOS, to a USB flash media device or a diskette-like device (a storage device set to emulate a diskette drive). **Restore from Removable Media** Restores system configuration from a a USB flash media device or a diskette-like device.
Default Setup	**Save Current Settings as Default** Saves the current system configuration settings as the default. **Restore Factory Settings as Default** Restores the factory system configuration settings as the default.
Apply Defaults and Exit	Applies the currently selected default settings and clears any established passwords.
Ignore Changes and Exit	Exits Computer Setup without applying or saving any changes.
Save Changes and Exit	Saves changes to system configuration or default settings and exits Computer Setup.

Computer Setup—Storage

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

Table 3-3 Computer Setup—Storage

Option	Description
Device Configuration	Lists all installed BIOS-controlled storage devices. When a device is selected, detailed information and options are displayed. The following options may be presented: **Hard Disk**: Size, model, firmware, serial number, connector color, SMART, 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) Translation Mode *(ATA disks only)* Lets you select the translation mode to be used for the device. This enables the BIOS to access disks partitioned and formatted on other systems and may be necessary for users of older versions of UNIX (e.g., SCO UNIX version 3.2). Options are Automatic, Bit-Shift, LBA Assisted, User, and Off. User mode allows you to specify the parameters (logical cylinders, heads, and sectors per track) used by the BIOS to translate disk I/O requests (from the operating system or an application) into terms the hard drive can accept. Logical cylinders may not exceed 1024. The number of heads may not exceed 256. The number of sectors per track may not exceed 63. These fields are only visible and changeable when the drive translation mode is set to User. **CAUTION:** Ordinarily, the translation mode selected automatically by the BIOS should not be changed. If the selected translation mode is not compatible with the translation mode that was active when the disk was partitioned and formatted, the data on the disk will be inaccessible. **CD-ROM**: Model, firmware, serial number, connector color. No emulation options available. **Default Values** *(ATA disks only)* SATA Defaults Translation Mode *(ATA disks only)* Lets you select the translation mode to be used for the device. This enables the BIOS to access disks partitioned and formatted on other systems and may be necessary for users of older versions of UNIX (e.g., SCO UNIX version 3.2). Options are Automatic, Bit-Shift, LBA Assisted, User, and Off. User mode allows you to specify the parameters (logical cylinders, heads, and sectors per track) used by the BIOS to translate disk I/O requests (from the operating system or an application) into terms the hard drive can accept. Logical cylinders may not exceed 1024. The number of heads may not exceed 256. The number of sectors per track may not exceed 63. These fields are only visible and changeable when the drive translation mode is set to User. **CAUTION:** Ordinarily, the translation mode selected automatically by the BIOS should not be changed. If the selected translation mode is not compatible with the translation mode that was active when the disk was partitioned and formatted, the data on the disk will be inaccessible.

Table 3-3 Computer Setup—Storage (continued)

Storage Options	**Removable Media Boot** Enables/disables ability to boot the system from removable media. **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 3-4 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.
Password Options (This selection appears only if a power-on password or setup password is set.)	Allows you to enable/disable: • Lock Legacy Resources (appears if a setup password is set) • Network Server Mode (appears if a power-on password is set) • Password Prompt on Warm Boot (Ctrl+Alt+Delete) (appears if a power-on password is set) • Setup Browse Mode (appears if a setup password is set) allows viewing, but not changing, the F10 Setup options without entering setup password. • Stringent Password (appears if a setup password is set), which when enabled bypasses the onboard password jumper to disable the power-on password. • Password prompt on F9, F11, & F12 (allows access to menus without entering setup password) 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) • Embedded security device (some models) • SATA0 • SATA1 • 1394 and Media Reader

Table 3-4 Computer Setup—Security (continued)

USB Security	Allows you to enable or disable groups of USB ports or individual USB ports: • Front USB Ports ◦ USB Port 11 ◦ USB Port 12 • Rear USB Ports ◦ USB Port 1 ◦ USB Port 3 ◦ USB Port 8 ◦ USB Port 9 ◦ USB Port 10 • Accessory USB Ports ◦ USB Port 2 ◦ USB Port 4 ◦ USB Port 6 ◦ USB Port 7
Slot Security	Allows you to disable or enable any PCI Express x16 or x1 slot
Network Service 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	Allows you to set: • Asset tag (18-byte identifier), a property identification number assigned by the company to the computer. • Ownership tag (80-byte identifier) displayed during POST. • Chassis serial number or Universal Unique Identifier (UUID) number. The UUID can only be updated if the current chassis serial number is invalid. (These ID numbers are normally set in the factory and are used to uniquely identify the system.) • Keyboard locale setting (for example, English or German) for System ID entry.
DriveLock Security	Allows you to assign or modify a master or user password for hard drives. When this feature is enabled, the user is prompted to provide one of the DriveLock passwords during POST. If neither is successfully entered, the hard drive will remain inaccessible until one of the passwords is successfully provided during a subsequent cold-boot sequence. **NOTE:** This selection will only appear when at least one drive that supports the DriveLock feature is attached to the system. You may need to power cycle the system to manage DriveLock-enabled drives. See the *Desktop Management Guide* for more information.

Table 3-4 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. Button Retask Password Protection (disable/enable) - Controls whether or not the Setup password must be provided to WMI methods used to re-task the function of the side panel buttons. Power Button (enable/disable) - Allows you to disable or enable the power button. Consumer IR Power Button (enable/disable) - Controls whether or not the BIOS will respond to Remote Control power button presses. This does not affect the Remote Control power button operation in Windows. Optical Drive Eject Button (enable/disable) - Allows you to disable or enable the optical drive eject button. Disabling the eject button does not disable software control of the eject function inside Windows.

Table 3-4 Computer Setup—Security (continued)

Master Boot Record Security	(Enable/Disable) Protects the master boot record from viruses or other corruption. Saves a copy of the current master boot record and allows you to restore the saved copy.
Setup Security Level	Provides a method to allow end-users limited access to change specified setup options, without having to know the Setup Password. This feature allows the administrator the flexibility to protect changes to essential setup options, while allowing the user to view system settings and configure nonessential options. The administrator specifies access rights to individual setup options on a case-by-case basis via the Setup Security Level menu. By default, all setup options are assigned Setup Password, indicating the user must enter the correct Setup Password during POST to make changes to any of the options. The administrator may set individual items to None, indicating the user can make changes to the specified options when setup has been accessed with invalid passwords. The choice, None, is replaced by Power-On Password if a Power-On Password is enabled. **NOTE:** Setup Browse Mode must be set to Enable in order for the user to enter Setup without knowing the setup password.

Computer Setup—Power

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

Table 3-5 Computer Setup—Power

Option	Description
OS Power Management	• Runtime Power Management— Enable/Disable. Allows certain operating systems to reduce processor voltage and frequency when the current software load does not require the full capabilities of the processor. • Idle Power Savings—Extended/Normal. Allows certain operating systems to decrease the processors power consumption when the processor is idle. • ACPI S3 Hard Disk Reset—Enabling this causes the BIOS to ensure hard disks are ready to accept commands after resuming from S3 before returning control to the operating system. • ACPI S3 PS2 Mouse Wakeup—Enables or disables waking from S3 due to any PS2 mouse activity or a button click only. • USB Wake on Device Insertion (some models)—Allows system to wake from Standby on USB device insertion. • Unique Sleep State Blink Rates—Enable/Disable. This feature is designed to provide a visual indication of what sleep state the system is in. Each sleep state has a unique blink pattern. ◦ S0 = Solid green LED. ◦ S3 = 3 blinks at 1Hz (50% duty cycle) followed by a pause of 2 seconds (green LED) — repeated cycles of 3 blinks and a pause. ◦ S4 = 4 blinks at 1Hz (50% duty cycle) followed by a pause of 2 seconds (green LED) — repeated cycles of 4 blinks and a pause. ◦ S5 = LED is off. **NOTE:** If this feature is disabled, S4 and S5 both have the LED off. S3 uses 1 blink per second.
Hardware Power Management	SATA Power Management—Enables or disables the SATA bus and/or device power management. 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.
Thermal	Fan idle mode—This bar graph controls the minimum permitted fan speed. **NOTE:** This setting only changes the minimum fan speed. The fans are still automatically controlled.

Computer Setup—Advanced

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

Table 3-6 Computer Setup—Advanced

Option	Heading
Power-On Options	Allows you to set: • POST mode (QuickBoot, Clear Memory, FullBoot, or FullBoot Every x Days). ◦ QuickBoot = Do not clear memory or perform a memory test. ◦ FullBoot = Memory test (count) on cold boot. Clears memory on all boots.

Table 3-6 Computer Setup—Advanced (continued)

- Clear Memory = No memory count on cold boot. Clears memory on all boots.
- FullBoot Every x Days = Memory count on 1st cold boot on or after the xth day. No more memory counts until 1st cold boot on or after x days. Clears memory on all boots.

- POST messages (enable/disable). Suppresses most POST messages, such as memory count, product name, and other non-error text messages. If a POST error occurs, the error is displayed regardless of the mode selected.
- F9 prompt (hidden/displayed). Enabling this feature will display the text **F9 = Boot Menu** during POST. Disabling this feature prevents the text from being displayed. However, pressing F9 will still access the Shortcut Boot [Order] Menu screen. See **Storage** > **Boot Order** for more information.
- F10 prompt (hidden/displayed). Enabling this feature will display the text **F10 = Setup** during POST. Disabling this feature prevents the text from being displayed. However, pressing F10 will still access the Setup screen.
- F11 prompt (hidden/displayed). Setting this feature to displayed will display the text **F11 = Recovery** during POST. Hiding the feature prevents the text from being displayed. However, pressing F11 will still attempt to boot to the HP Backup and Recovery partition. See Factory Recovery Boot Support for more information.
- F12 prompt (hidden/displayed). Enabling this feature will display the text **F12 = Network** during POST. Disabling this feature prevents the text from being displayed. However, pressing F12 will still force the system to attempt booting from the network.
- Factory Recovery Boot Support (enable/disable). Enabling this feature will cause an additional prompt, **F11 = Recovery**, to be displayed during POST on systems with HP Backup and Recovery software installed and configured with a recovery partition on the boot hard drive. Pressing F11 causes the system to boot to the recovery partition and launch HP Backup and Recovery. The **F11 = Recovery** prompt can be hidden with the F11 prompt (hidden/displayed) option (see above).
- Option ROM Prompt (enable/disable). Enabling this feature will cause the system to display a message before loading option ROMs. (This feature is supported on some models only.)
- Remote Wakeup Boot Source (remote server/local hard drive).
- After Power Loss (off/on/previous state): Setting this option to:
  - 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.
- Bypass F1 Prompt on Configuration Changes (Enable/Disable). Allows you to set the computer not to confirm when changes were made.

Table 3-6 Computer Setup—Advanced (continued)

Execute Memory Test (some models)	Restarts the computer and executes the POST memory test/logging.
BIOS Power-On	Allows you to set the computer to turn on automatically at a time you specify.
PCI Devices	• Lists currently installed PCI devices and their IRQ settings. • Allows you to reconfigure IRQ settings for these devices or to disable them entirely. These settings have no effect under an ACPI-based operating system.
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). • S5 Wake on LAN (enable/disable). ◦ To disable Wake on LAN during the off state (S5), use the arrow (left and right) keys to select the **Advanced** > **Device Options** menu and set the **S5 Wake on LAN** feature to **Disable**. This obtains the lowest power consumption available on the 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. • Multi-Processor (enable/disable). This option may be used to disable multi-processor support under the OS. • Internal Speaker (some models) (does not affect external speakers). • NIC Option ROM Download (PXE, Disable, iSCSI). 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.

Table 3-6 Computer Setup—Advanced (continued)

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.
Management Operations	Allows you to set: • MEBx Setup Prompt (enable/disable). Enabling this feature displays the **CTRL+P** prompt during POST. Disabling this feature prevents the prompt from being displayed. However, pressing Ctrl+P still accesses the utility used to configure manageability settings. The **CTRL+P** function activates the MEBx Setup menu. If the Setup Password is configured, the user will be prompted to correctly enter it before being allowed to enter the MEBx Setup. It the password is entered incorrectly three times, the MEBx Setup will not be activated. • Unprovision AMT on next boot. Allows reset of AMT settings. • SOL Terminal Emulation Mode. Selects between VT100 and ANSI SOL terminal emulation. SOL terminal emulation mode is only activated during remote AMT redirection operations. The emulation options allow administrators to select which mode works best with their console. • SOL Local Keyboard (enable/disable). Disable or enable client keyboard during SOL sessions. Some remote remediation may involve having the local client boot a remote image provided by an administrator. This option determines if the BIOS will keep the local keyboard enabled or disabled for possible local client interaction. If the local keyboard is disabled, all keyboard input is only accepted from the remote source.

Recovering the Configuration Settings

This method of recovery requires that you first perform the **Save to Removable Media** command with the Computer Setup (F10) Utility before **Restore** is needed. (See Save to Removable Media on page 10 in the Computer Setup—File table.)

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

To restore the configuration, insert the USB flash media device or other storage media emulating a diskette with the saved configuration and perform the **Restore from Removable Media** command with the Computer Setup (F10) Utility. (See Restore from Removable Media on page 10 in the Computer Setup—File table.)

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 2000/XP/Vista	32 GB	2 TB
NTFS	ATA	Windows 2000/XP/Vista	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 28 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 28 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 28.

When cleaning debris from under the keys, review all rules in General Cleaning Safety Precautions on page 28 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 28.

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 28.

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 25
- 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**	607818-001
(2)	**Heat sink assembly (thermal module)** (includes replacement thermal material)	
	MXM graphic interface	625255-001
	UMA graphic interface	625256-001
	Memory modules (PC3-10600, 1333-MHz; not illustrated)	
	4-GB	593896-001
	2-GB	593895-001
(3)	**Graphics card**	

Item	Description	Spare part number
	G210, 512 MB	621426-001
	HD5570, 1 GB	628380-001
(4)	**TV tuner module**	
	For use in the United States	613990-001
	For use in the Asia-Pacific region	621424-001
	For use in Hong Kong and China	621423-001
(5)	**Webcam module**	625254-001
(6)	**Processor** (includes replacement thermal material)	
	Intel Core2 Duo processors	
	• E8600 (3.33-GHz, 6-MB L2 cache, 1333-MHz Front-side bus (FSB))	497732-001
	• E8500 (3.16-GHz, 6-MB L2 cache, 1333-MHz FSB)	466170-001
	• E8400 (3.00-GHz, 6-MB L2 cache, 1333-MHz FSB)	466169-001
	• E7600 (3.06-GHz, 3-MB L2 cache, 1066-MHz FSB)	573954-001
	• E7500 (2.93-GHz, 3-MB L2 cache, 1066-MHz FSB)	531988-001
	Intel Pentium processors	
	• E6700 (3.20-GHz, 2-MB L2 cache, 1066-MHz FSB)	418950-001
	• E6600 (3.06-GHz, 2-MB L2 cache, 1066-MHz FSB)	602070-001
	• E6500 (2.93-GHz, 2-MB L2 cache, 1066-MHz FSB)	586748-001
	• E5500 (2.80-GHz, 2-MB L2 cache, 800-MHz FSB)	613035-001
	• E5400 (2.70-GHz, 2-MB L2 cache, 800-MHz FSB)	586743-001
	Intel Celeron processor	
	• E3300 (2.50-GHz, 1-MB L2 cache, 800-MHz FSB)	585886-001
	AC adapter (external; not illustrated)	
	180 W	618020-001
	150 W	618019-001
(7)	**WLAN module (802.11b/g/n)**	593897-001
(8)	**Hard drive**	
	1000-GB	621418-001
	500-GB	621421-001
	320-GB	621420-001
	250-GB	621419-001
	80-GB solid-state drive	607817-001

Item	Description	Spare part number
	Keyboard (not illustrated)	
	USB	
	• Brazil	590271-201
	• International English	590271-L31
	• Latin America	590271-161
	PS/2	
	• Brazil	611374-203
	• International English	611374-L33
	• Latin America	611374-163
	Wireless for use in the United States	611376-003
	USB Smartcard for use in the United States	613463-003
	Washable for use in the United States	613125-001
	USB, mini for use in the United States	611375-003
	Mouse (not illustrated)	
	PS/2 optical	609250-001
	USB, laser, jack black	570580-001
	USB, optical, carbon	444740-001
	USB, optical, Portia	621416-001
	Wireless, includes dongle	621417-001
	Washable	619580-001
(9)	**Optical drive** (do not include bezel)	
	8X DVD±RW SuperMulti DL Drive with LightScribe	619238-001
	4X DVD±RW SuperMulti DL Drive with LightScribe	619239-001
	8X DVD±RW SuperMulti DL Drive with LightScribe, HF	615944-001
(10)	**Bluetooth module**	617047-001
	Cable, DisplayPort to HDMI	617450-001

Mass storage devices

Item	Description	Spare part number
(1)	**Optical drives**	
	8X DVD±RW SuperMulti DL Drive with LightScribe	619238-001
	4X DVD±RW SuperMulti DL Drive with LightScribe	619239-001
	8X DVD±RW SuperMulti DL Drive with LightScribe, HF	615944-001
(2)	**Hard drive**	
	1000-GB	621418-001
	500-GB	621421-001
	320-GB	621420-001
	250-GB	621419-001
	80-GB solid-state drive	607817-001

Sequential part number listing

Spare part number	Description
418950-001	Intel Core2 Duo E6700 processor (3.20-GHz, 2-MB L2 cache, 1066-MHz FSB)
444740-001	Mouse, USB, optical, carbon
466169-001	Intel Core2 Duo E8400 processor (3.00-GHz, 6-MB L2 cache, 1333-MHz FSB)
466170-001	Intel Core2 Duo E8500 processor (3.16-GHz, 6-MB L2 cache, 1333-MHz FSB)
497732-001	Intel Core2 Duo E8600 processor (3.33-GHz, 6-MB L2 cache, 1333-MHz FSB)
531988-001	Intel Core2 Duo E7500 processor (2.93-GHz, 3-MB L2 cache, 1066-MHz FSB)
570580-001	Mouse, USB, laser, jack black
573954-001	Intel Core2 Duo E7600 processor (3.06-GHz, 3-MB L2 cache, 1066-MHz FSB)
585886-001	Intel Core2 Duo E3300 processor (2.50-GHz, 1-MB L2 cache, 800-MHz FSB)
586743-001	Intel Core2 Duo E5400 processor (2.70-GHz, 2-MB L2 cache, 800-MHz FSB)
586748-001	Intel Core2 Duo E6500 processor (2.93-GHz, 2-MB L2 cache, 1066-MHz FSB)
590271-161	USB keyboard for use in Latin America
590271-201	USB keyboard for use in Brazil
590271-L31	USB keyboard for use with International English
593895-001	2-GB memory module (PC3-10600, 1333-MHz)
593896-001	4-GB memory module (PC3-10600, 1333-MHz)
593897-001	WLAN module (802.11b/g/n)
602070-001	Intel Core2 Duo E6600 processor (3.06-GHz, 2-MB L2 cache, 1066-MHz FSB)
607817-001	80-GB solid-state drive
607818-001	System board
609250-001	Mouse, PS/2, optical
611374-163	Keyboard, PS/2, for use in Latin America
611374-203	Keyboard, PS/2, for use in Brazil
611374-L33	Keyboard, PS/2, for use with International English
611375-003	Keyboard, USB, mini, for use in the United States
611376-003	Keyboard, wireless, for use in the United States
613035-001	Intel Core2 Duo E5500 processor (2.80-GHz, 2-MB L2 cache, 800-MHz FSB)
613125-001	Keyboard, washable, for use in the United States
613463-003	Keyboard, USB, Smartcard, for use in the United States
613990-001	HP TV tuner module

Spare part number	Description
615944-001	8X DVD±RW SuperMulti DL Drive with LightScribe, HF
617047-001	Bluetooth module
617450-001	Cable, DisplayPort to HDMI
618019-001	AC adapter, 150W (external)
618020-001	AC adapter, 180W (external)
619238-001	8X DVD±RW SuperMulti DL Drive with LightScribe
619239-001	4X DVD±RW SuperMulti DL Drive with LightScribe
619580-001	Mouse, washable
621416-001	Mouse, USB, optical, Portia
621417-001	Mouse, wireless, includes dongle
621418-001	Hard drive, 1000 GB
621419-001	Hard drive, 250 GB
621420-001	Hard drive, 320 GB
621421-001	Hard drive, 500 GB
621423-001	TV tuner module for use in Hong Kong and China
621424-001	TV tuner module for use in the Asia-Pacific region
621426-001	Graphics card (512 MB)
625254-001	Webcam module
625255-001	Heat sink assembly, MXM graphic interface (thermal module) (includes replacement thermal material)
625256-001	Heat sink assembly, UMA graphic interface (thermal module) (includes replacement thermal material)
628380-001	Graphics card, HD5570, 1 GB

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

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

Preparing to Disassemble the Computer

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

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

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

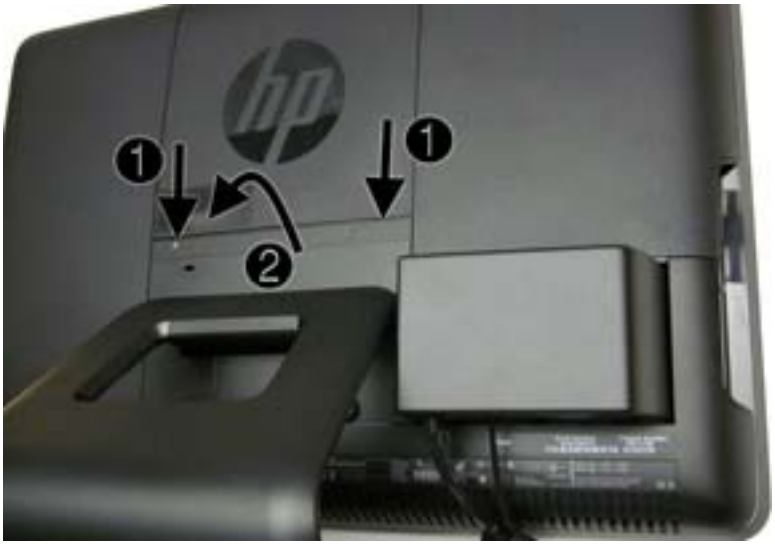
Small Rear Cover

The small rear cover is located above the stand. You must remove it to remove the drive cover.

To remove the small rear cover:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 38).
2. At the slots in the top of the cover **(1)**, pry the cover loose, and then lift it off the computer **(2)**.

Figure 7-1 Removing the small rear cover



To replace the cover, reverse the removal procedures.

Port Cover

The port cover is located on the rear, bottom of the back of the computer. You must remove it to access the I/O panel on the back of the computer.

To remove the port cover:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 38).
2. Remove the small rear cover (see Small Rear Cover on page 39).
3. Pull the port cover off the computer.

Figure 7-2 Removing the port cover

To replace the port cover, reverse the removal procedures.

Stand

The stand is secured with four screws.

To remove the stand:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 38).
2. Remove the small rear cover (see Small Rear Cover on page 39).
3. Remove the port cover (see Port Cover on page 40).
4. In the order indicated by the numbers stamped into the stand bracket, remove the four Phillips screws **(1)** that secure the stand to the computer.
5. Slide the stand up (toward the logo) about 1 inch (2.5 cm) **(2)**, tilt the stand base upward, and then slide it back (away from the logo) **(3)** to lift it out of the computer.

Figure 7-3 Removing the stand

To replace the stand, reverse the removal procedures.

Optical Drive

Description	Spare part number
8X DVD±RW SuperMulti DL Drive with LightScribe	619238-001
4X DVD±RW SuperMulti DL Drive with LightScribe	619239-001
8X DVD±RW SuperMulti DL Drive with LightScribe, HF	615944-001

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.

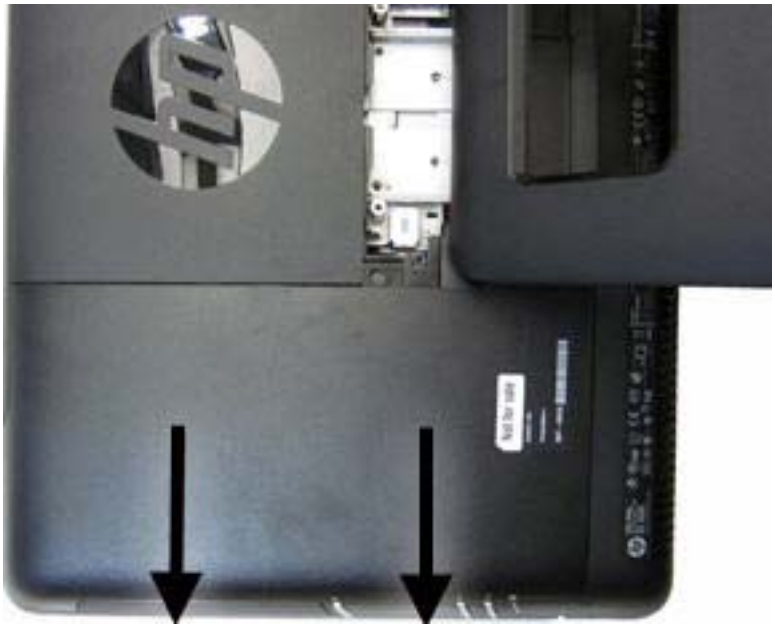
Figure 7-4 Optical drive location

To remove the optical drive:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 38).
2. Remove the small rear cover (see Small Rear Cover on page 39).
3. Remove the port cover (see Port Cover on page 40).

4. Slide the drive cover off the computer.

Figure 7-5 Removing the drive cover



5. Move the screw **(1)** that secures the drive to the computer.

6. Insert a tool into the slot **(2)** to push the drive out of the bay, and then slide the drive out of the computer **(3)**.

Figure 7-6 Removing the optical drive

To install an optical drive, reverse the removal procedures.

Hard Drive

Description	Spare part number
1000-GB	621418-001
500-GB	621421-001
320-GB	621420-001
250-GB	621419-001
80-GB solid-state drive	607817-001

The hard drive is located under the drive cover 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.

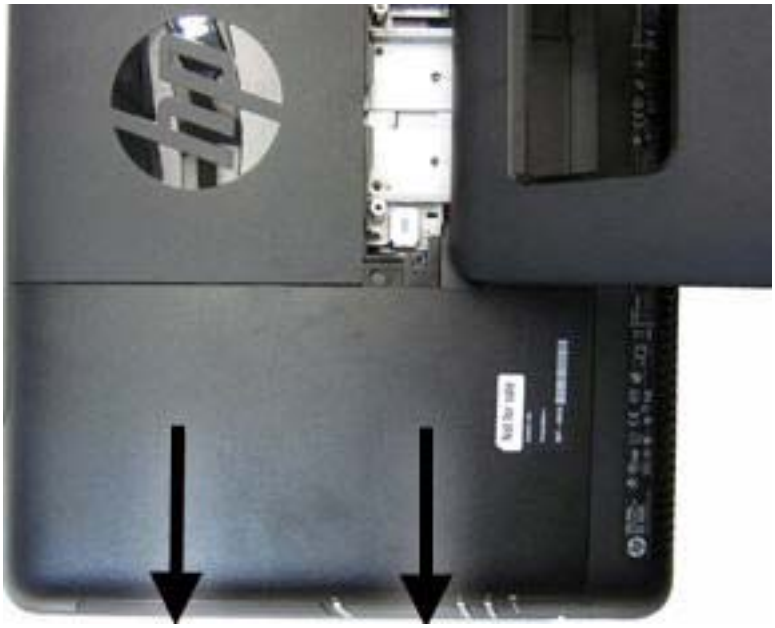
Figure 7-7 Hard drive location

To remove the hard drive:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 38).
2. Remove the small rear cover (see Small Rear Cover on page 39).
3. Remove the port cover (see Port Cover on page 40).

4. Slide the drive cover off the computer.

Figure 7-8 Removing the drive cover



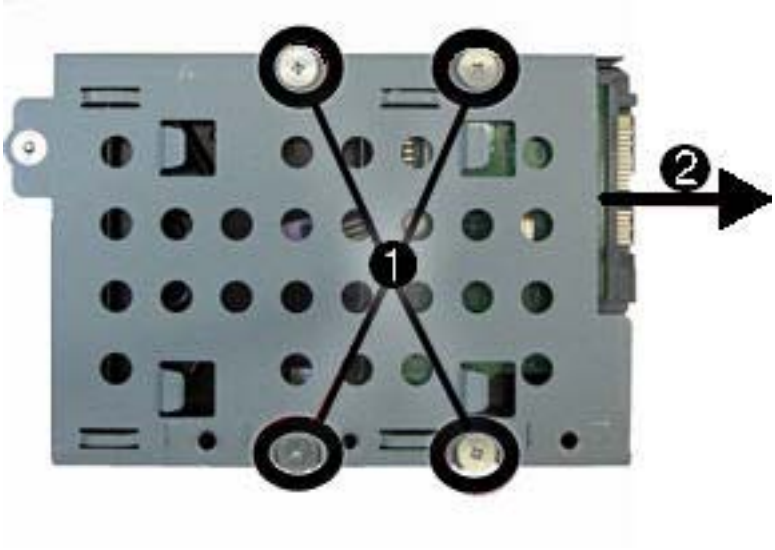
5. Loosen the captive screw **(1)** that secures the drive to the computer.

6. Using the drive cage handle **(2)**, slide the cage away from the computer, and then lift the drive out of the computer **(3)**.

Figure 7-9 Removing the hard drive

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

Figure 7-10 Removing the hard drive from the hard drive cage



To replace the hard drive, reverse the removal procedures.

Memory

Description	Spare part number
4 GB	593896-001
2 GB	593895-001

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

Figure 7-11 Memory location

To remove a memory module:

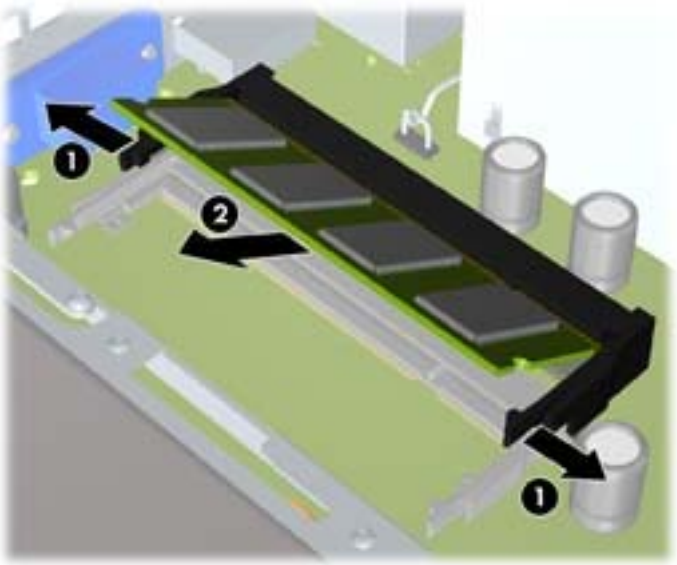
1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 38).
2. Remove the small rear cover (see Small Rear Cover on page 39).
3. Remove the port cover (see Port Cover on page 40).

4. Slide the memory cover off the computer.

Figure 7-12 Removing the memory cover

5. Open both latches of the memory module socket **(1)**, and remove the memory module from the socket **(2)**.

Figure 7-13 Removing the memory module



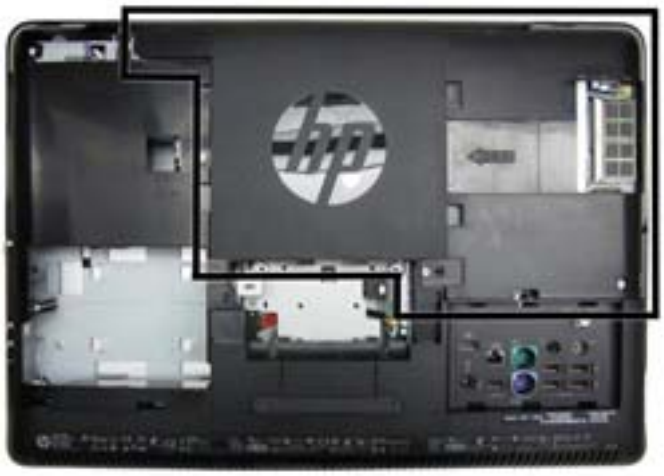
NOTE: If you are removing both cards, you must remove the upper one before removing the lower one.

To install a memory module, reverse the removal procedures.

Upper Rear Panel

The upper rear panel is secured with three screws. Removing it allows access to the fans, heat sink, processor, and optional TV tuner.

Figure 7-14 Upper rear panel location



To remove the upper rear panel:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 38).
2. Remove the small rear cover (see Small Rear Cover on page 39).
3. Remove the port cover (see Port Cover on page 40).
4. Remove the stand (see Stand on page 41).
5. Remove the drive cover (see Optical Drive on page 42).
6. Remove the memory cover (see Memory on page 47).

7. Remove the three screws that secure the panel to the computer.

Figure 7-15 Removing the upper rear panel

8. Lift the panel from the computer.

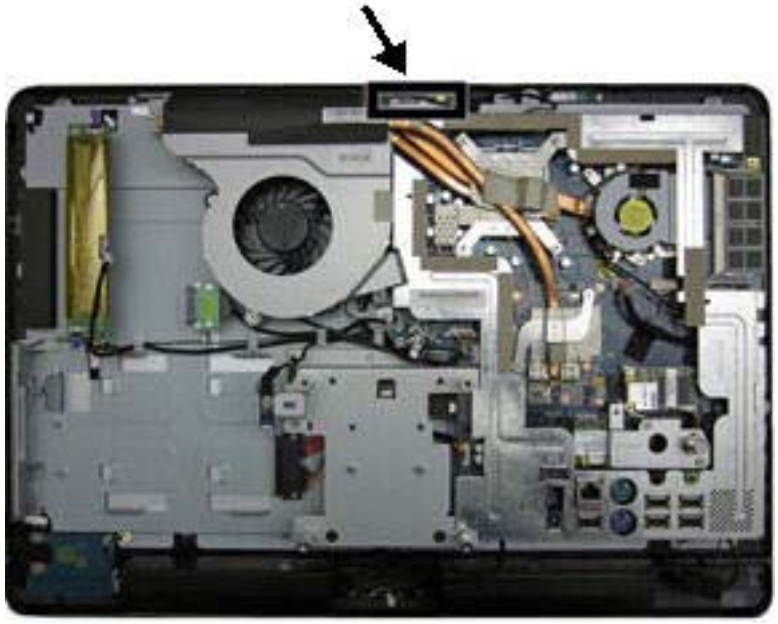
To replace the panel, reverse the removal procedures.

Webcam Module

Description	Spare part number
Webcam module	625254-001

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

Figure 7-16 Webcam module location



To remove the webcam module:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 38).
2. Remove the small rear cover (see Small Rear Cover on page 39).
3. Remove the port cover (see Port Cover on page 40).
4. Remove the stand (see Stand on page 41).
5. Remove the drive cover (see Optical Drive on page 42).
6. Remove the memory cover (see Memory on page 47).
7. Remove the rear panel (see Upper Rear Panel on page 49).

8. Remove the two screws that secure the webcam module to the computer.

NOTE: Make note of grounding wire placement for proper installation later.

Figure 7-17 Removing the webcam module

9. Lift the webcam module as much as the cable allows, and then disconnect the cable from the module.

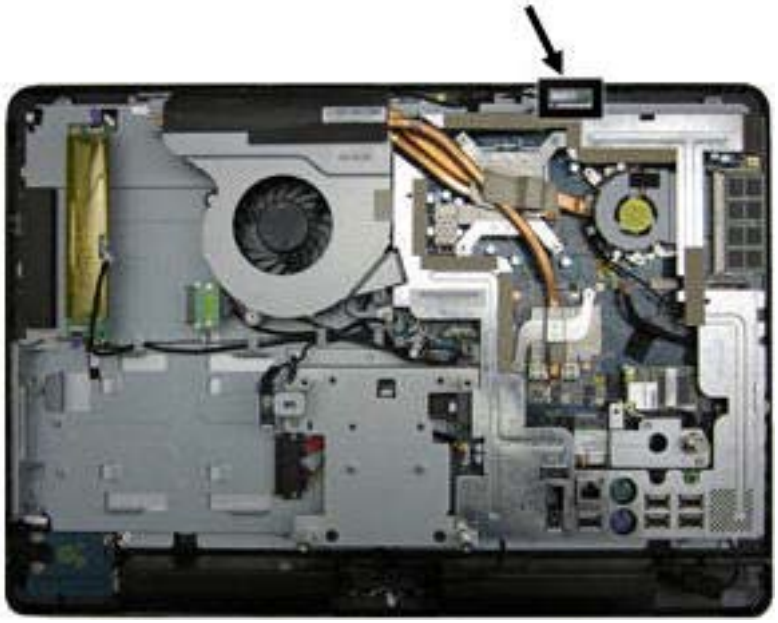
To install a webcam module, reverse the removal procedures.

Bluetooth Module

Description	Spare part number
Bluetooth module	617047-001

The Bluetooth module is located at the top of the computer to the right of the webcam module. The Bluetooth module is secured in a plastic holder and has one cable.

Figure 7-18 Bluetooth module location



To remove the Bluetooth module:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 38).
2. Remove the small rear cover (see Small Rear Cover on page 39).
3. Remove the port cover (see Port Cover on page 40).
4. Remove the stand (see Stand on page 41).
5. Remove the drive cover (see Optical Drive on page 42).
6. Remove the memory cover (see Memory on page 47).
7. Remove the rear panel (see Upper Rear Panel on page 49).
8. Remove the screw **(1)** that secures the Bluetooth module to the computer.
9. Lift the plastic lever on the holder **(2)**, and the slide the Bluetooth module from the holder **(3)**.

10. Lift the Bluetooth module as much as the cable allows, remove the tape from the connector on the module **(4)**, and then unplug the cable from the module.

Figure 7-19 Removing the Bluetooth module

To install a Bluetooth module, reverse the removal procedures.

Small Fan

The small fan is located on the right side of the computer near the memory modules.

To remove the small fan:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 38).
2. Remove the small rear cover (see Small Rear Cover on page 39).
3. Remove the port cover (see Port Cover on page 40).
4. Remove the stand (see Stand on page 41).
5. Remove the drive cover (see Optical Drive on page 42).
6. Remove the memory cover (see Memory on page 47).
7. Remove the rear panel (see Upper Rear Panel on page 49).
8. Disconnect the fan cable from the system board connector.

NOTE: You may need to lift the insulating tape of gain access to the connector.

9. Loosen the three captive screws that secure the fan to the computer.

Figure 7-20 Removing the small fan

10. Lift the fan from the computer.

To install the small fan, reverse the removal procedures.

Heat Sink (Thermal Module)

Description	Spare part number
Heat sink (thermal module), MXM graphics	625255-001
Heat sink (thermal module), UMA graphics	625256-001

The heat sink is secured with nine screws. You do not have to remove the large fan to remove the heat sink. You have to remove the small fan to remove the heat sink.

To remove the heat sink:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 38).
2. Remove the small rear cover (see Small Rear Cover on page 39).
3. Remove the port cover (see Port Cover on page 40).
4. Remove the stand (see Stand on page 41).
5. Remove the drive cover (see Optical Drive on page 42).
6. Remove the memory cover (see Memory on page 47).
7. Remove the upper rear panel (see Upper Rear Panel on page 49).
8. Remove the small fan (see Small Fan on page 55).
9. Remove the screw at the top of the heat sink **(1)**.
10. In the order indicated by the numbers stamped into the heat sink, remove the six screws **(2)** that secure the heat sink to the system board.
11. Loosen the two captive screws **(3)** that secure the heat sink to the system board.

Figure 7-21 Removing the heat sink

12. Lift the heat sink off the system board.

To replace the heat sink, reverse the removal procedures.

Processor

Description	Spare part number
Intel Core2 Duo processors (include replacement thermal material)	
E8600, 6-MB cache, 3.33 GHz	497732-001
E8500, 6-MB cache, 3.16 GHz	466170-001
E8400, 6-MB cache, 3.00 GHz	466169-001
E7600, 3-MB cache, 3.06 GHz	573954-001
E7500, 3-MB cache, 2.93 GHz	531988-001
Intel Pentium processors (include replacement thermal material)	
E6700, 2-MB cache, 3.20 GHz	418950-001
E6600, 2-MB cache, 3.06 GHz	602070-001
E6500, 2-MB cache, 2.93 GHz	586748-001
E5500, 2-MB cache, 2.80 GHz	613035-001
E5400, 2-MB cache, 2.70 GHz	586743-001
Intel Celeron processor (include replacement thermal material)	
E3300, 1-MB cache, 2.50 GHz	585886-001

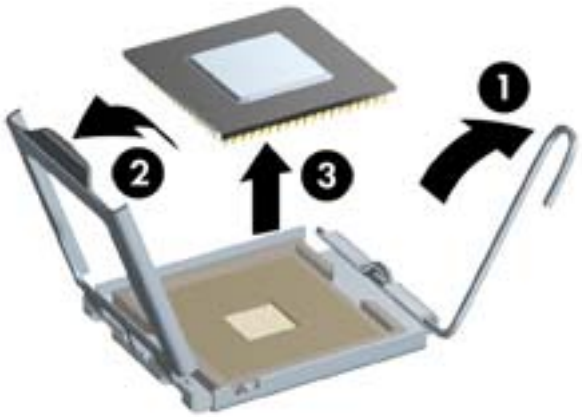
To remove the processor:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 38).
2. Remove the small rear cover (see Small Rear Cover on page 39).
3. Remove the port cover (see Port Cover on page 40).
4. Remove the stand (see Stand on page 41).
5. Remove the drive cover (see Optical Drive on page 42).
6. Remove the memory cover (see Memory on page 47).
7. Remove the upper rear panel (see Upper Rear Panel on page 49).
8. Remove the heat sink (see Heat Sink (Thermal Module) on page 56).
9. Rotate the locking lever to its full open position **(1)**.
10. Lift the processor cover **(2)**.

11. 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.



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.

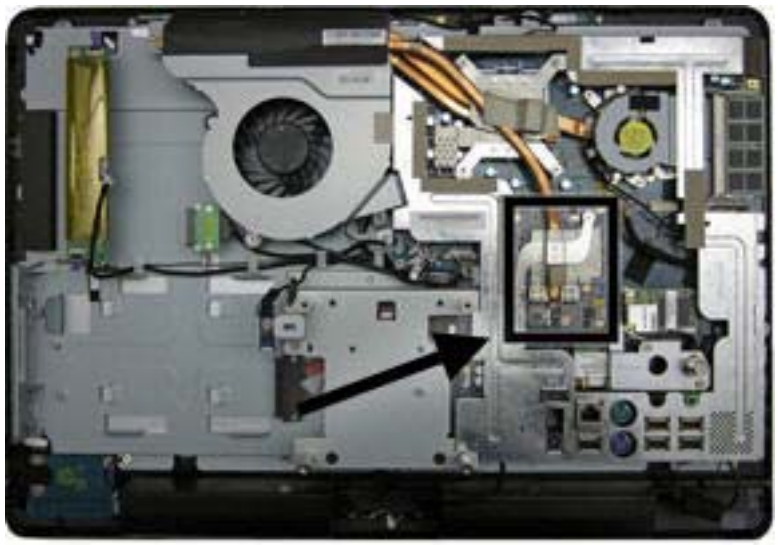
   If using a new heat sink, go to step 5.
3. If reusing the existing heat sink, clean the bottom of the heat sink with the alcohol pad provided in the spares kit.
4. Apply the thermal material provided in the spares kit to the top of the processor and install the heat sink atop the processor.
5. If using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

Graphics Board

Description	Spare part number
Graphics card, G210, 512 MB	621426-001
Graphics card, HD5570, 1 GB	628380-001

The graphics board is located under the bottom part of the heat sink. You must remove the heat sink to remove the graphics board. The board is secured with two screws.

Figure 7-22 Graphics board location

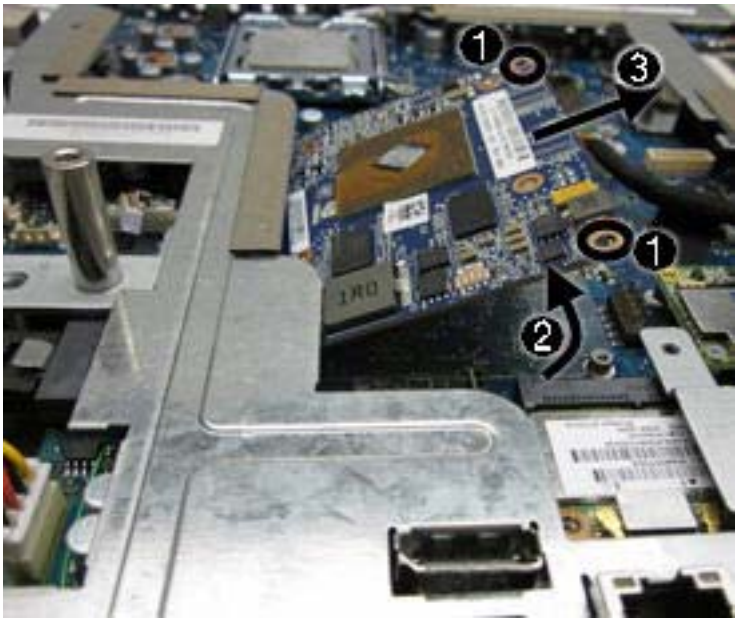


To remove the graphics board:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 38).
2. Remove the small rear cover (see Small Rear Cover on page 39).
3. Remove the port cover (see Port Cover on page 40).
4. Remove the stand (see Stand on page 41).
5. Remove the drive cover (see Optical Drive on page 42).
6. Remove the memory cover (see Memory on page 47).
7. Remove the upper rear panel (see Upper Rear Panel on page 49).
8. Remove the small fan (see Small Fan on page 55).
9. Remove the heat sink (see Heat Sink (Thermal Module) on page 56).
10. Remove two small 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 7-23 Removing the graphics board



To install the graphics board, reverse the removal procedures.

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

I/O Panel

The I/O panel is secured with two screws.

Figure 7-24 I/O panel location

To remove the I/O panel:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 38).
2. Remove the small rear cover (see Small Rear Cover on page 39).
3. Remove the port cover (see Port Cover on page 40).
4. Remove the stand (see Stand on page 41).
5. Remove the drive cover (see Optical Drive on page 42).
6. Remove the memory cover (see Memory on page 47).
7. Remove the upper rear panel (see Upper Rear Panel on page 49).
8. Remove the two screws **(1)** that secure the panel to the computer.

9. Lift the panel from the computer **(2)**.

Figure 7-25 Removing the I/O panel

10. Remove the panel from the computer.

To replace the panel, reverse the removal procedures.

TV Tuner Module

Description	Spare part number
HP TV tuner	613990-001
TV tuner module for use in the Asia-Pacific region	621424-001
TV tuner module for use in Hong Kong and the People's Republic of China	621423-001

The TV tuner module is located on the right side of the computer just above the I/O panel. The module is secured with one screw and has one antenna.

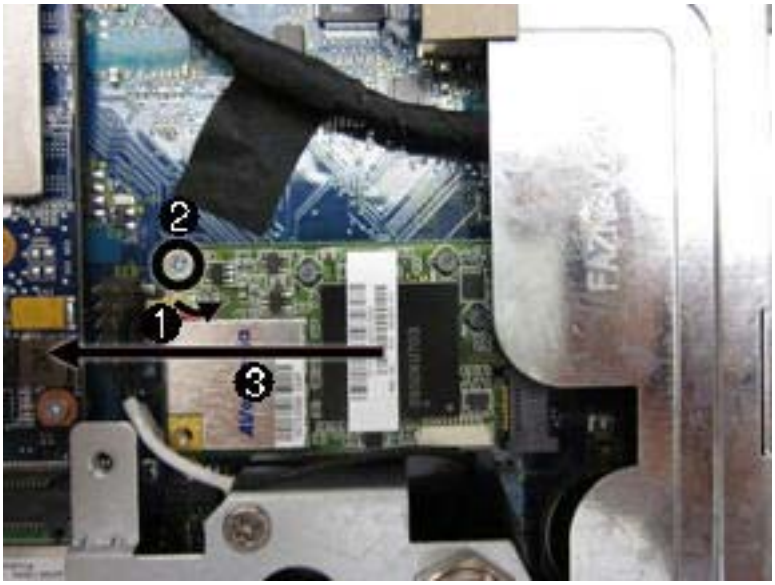
Figure 7-26 TV tuner location

To remove the TV tuner module:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 38).
2. Remove the small rear cover (see Small Rear Cover on page 39).
3. Remove the port cover (see Port Cover on page 40).
4. Remove the stand (see Stand on page 41).
5. Remove the drive cover (see Optical Drive on page 42).
6. Remove the memory cover (see Memory on page 47).
7. Remove the upper rear panel (see Upper Rear Panel on page 49).
8. Disconnect the antenna cable from the module **(1)**.
9. Remove the screw **(2)** that secures the module to the computer.

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

Figure 7-27 Removing the TV tuner module



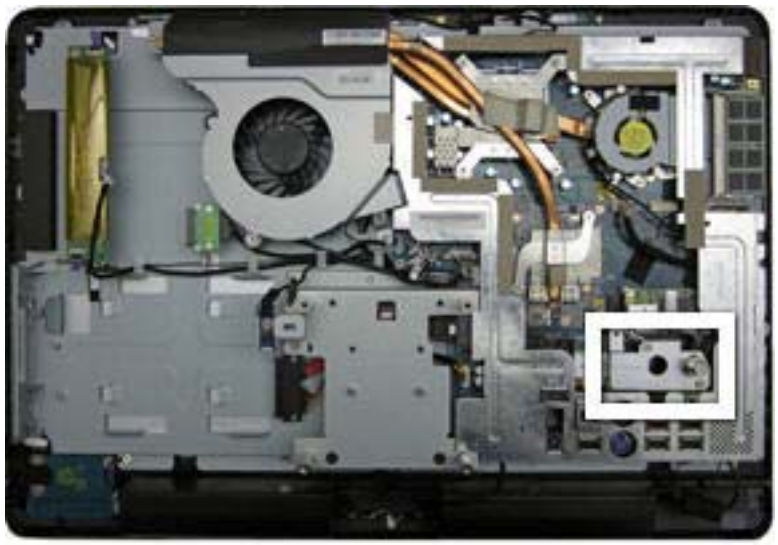
To install a TV tuner module, reverse the removal procedures.

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

Cable Connector

The cable connector is located toward the bottom, right side of the computer. It is secured with two screws and had one antenna cable that also connects to the TV tuner module.

Figure 7-28 Cable connector location

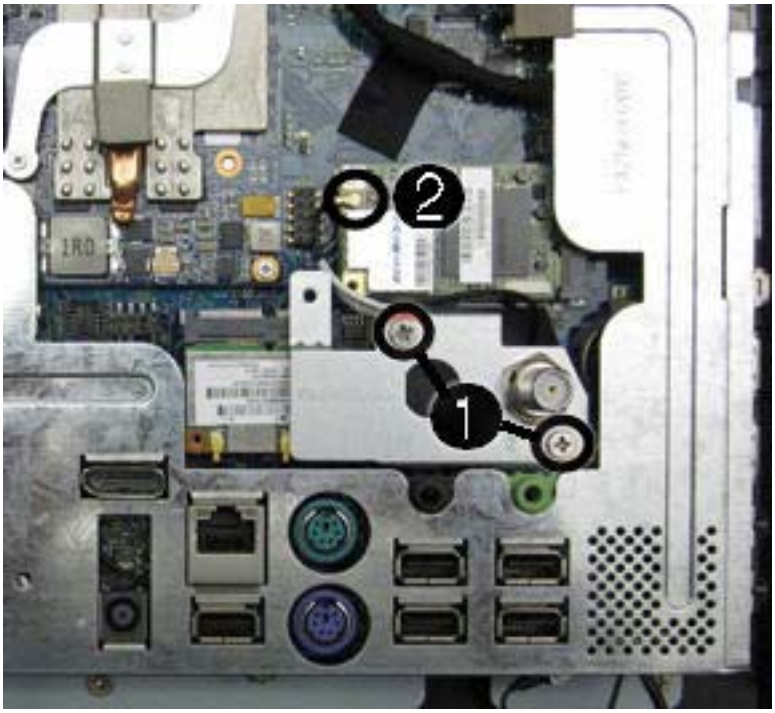


To remove the cable connector:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 38).
2. Remove the small rear cover (see Small Rear Cover on page 39).
3. Remove the port cover (see Port Cover on page 40).
4. Remove the stand (see Stand on page 41).
5. Remove the drive cover (see Optical Drive on page 42).
6. Remove the memory cover (see Memory on page 47).
7. Remove the upper rear panel (see Upper Rear Panel on page 49).
8. Remove the I/O panel (see I/O Panel on page 61).
9. Remove the two screws **(1)** that secure the connector to the computer.
10. Disconnect the antenna cable from the TV tuner module **(2)**.

11. Lift the cable connector from the computer.

Figure 7-29 Removing the cable connector



To install the cable connector, reverse the removal procedures.

WLAN Module

Description	Spare part number
WLAN module (802.11b/g/n)	593897-001

The WLAN module is located on the lower right side of the computer. The module is secured with one screw and has two connected antennas.

Figure 7-30 WLAN module location

To remove the WLAN module:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 38).
2. Remove the small rear cover (see Small Rear Cover on page 39).
3. Remove the port cover (see Port Cover on page 40).
4. Remove the stand (see Stand on page 41).
5. Remove the drive cover (see Optical Drive on page 42).
6. Remove the memory cover (see Memory on page 47).
7. Remove the upper rear panel (see Upper Rear Panel on page 49).
8. Remove the I/O panel (see I/O Panel on page 61).
9. Remove the cable connector (see Cable Connector on page 65).
10. Disconnect the two antenna cables from the module **(1)**.
11. Remove the screw **(2)** that secures the module to the computer.

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

Figure 7-31 Removing the WLAN module

To install the WLAN module, reverse the removal procedures.

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

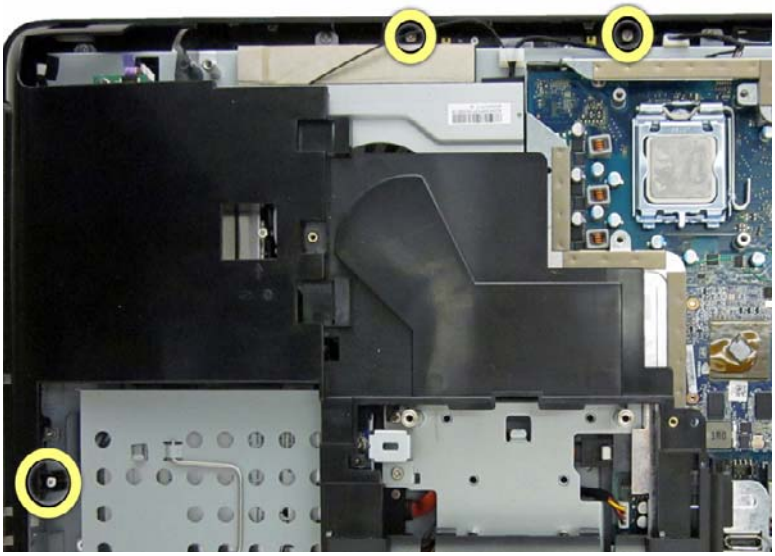
Outer/Left Rear Panel

The outer/left rear panel is secured with two screws. You must pry it off at the seams around the edges of the computer.

To remove the outer/left rear panel:

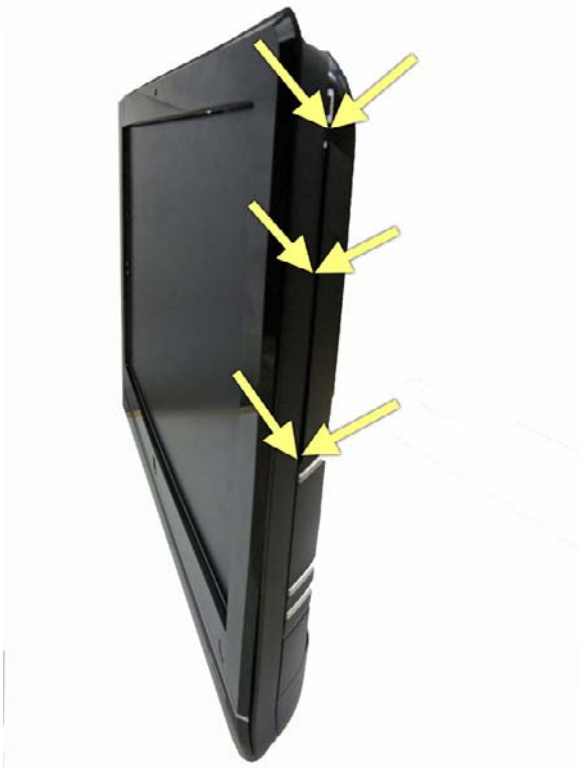
1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 38).
2. Remove the small rear cover (see Small Rear Cover on page 39).
3. Remove the port cover (see Port Cover on page 40).
4. Remove the stand (see Stand on page 41).
5. Remove the drive cover (see Optical Drive on page 42).
6. Remove the memory cover (see Memory on page 47).
7. Remove the upper rear panel (see Upper Rear Panel on page 49).
8. Remove the I/O panel (see I/O Panel on page 61).
9. Remove the three screws that secure the panel to the computer.

Figure 7-32 Removing the outer/left rear panel screws



10. Using a wedge-type tool, insert the tool in the seams on the sides of the computer and work your way around, loosening the tabs that secure the front of the computer to the rear.

Figure 7-33 Removing the outer/left rear panel



11. Remove the panel from the computer.

To replace the panel, reverse the removal procedures.

Display Control Board

The display control board is mounted on its side on the left side of the computer. It is secured with two screws and has one connector.

Figure 7-34 Display control board location

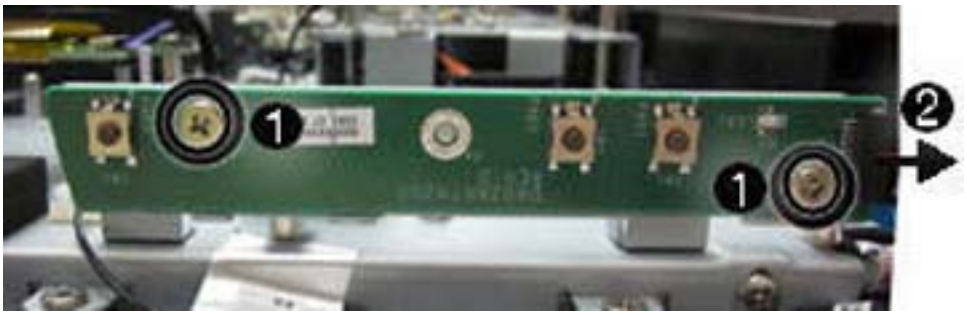
To remove the display control board:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 38).
2. Remove the small rear cover (see Small Rear Cover on page 39).
3. Remove the port cover (see Port Cover on page 40).
4. Remove the stand (see Stand on page 41).
5. Remove the drive cover (see Optical Drive on page 42).
6. Remove the memory cover (see Memory on page 47).
7. Remove the upper rear panel (see Upper Rear Panel on page 49).
8. Remove the I/O panel (see I/O Panel on page 61).
9. Remove the outer/left panel (see Outer/Left Rear Panel on page 69).
10. Remove the two screws that secure the board to the computer **(1)**.

11. Disconnect the cable from the board **(2)**.

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

Figure 7-35 Removing the display control board



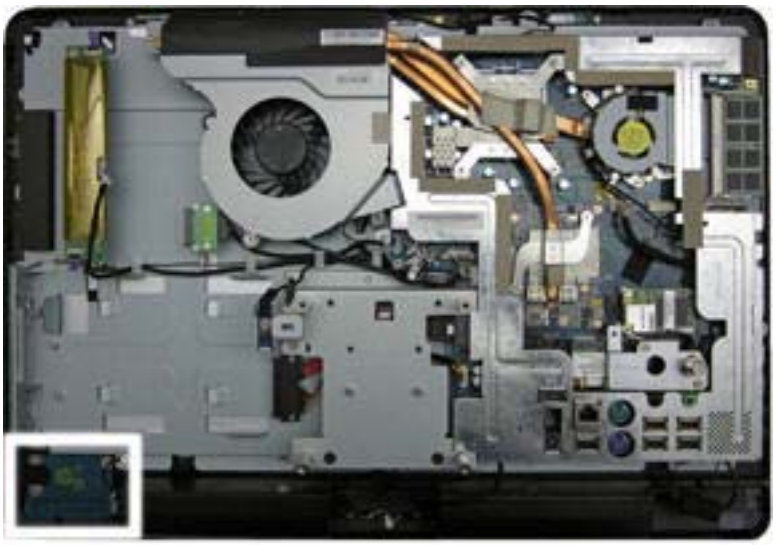
12. Remove the board from the computer.

To install the display control board, reverse the removal procedures.

Power Button Board

The power button board is located on the bottom left side of the computer. It is secured with three screws and has two connectors.

Figure 7-36 Power button board location



To remove the power button board:

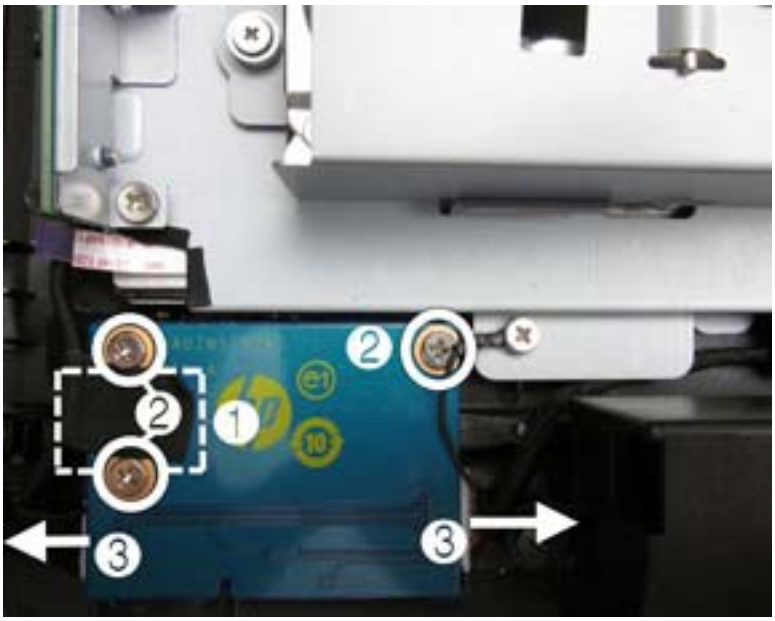
1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 38).
2. Remove the small rear cover (see Small Rear Cover on page 39).
3. Remove the port cover (see Port Cover on page 40).
4. Remove the stand (see Stand on page 41).
5. Remove the drive cover (see Optical Drive on page 42).
6. Remove the memory cover (see Memory on page 47).
7. Remove the upper rear panel (see Upper Rear Panel on page 49).
8. Remove the I/O panel (see I/O Panel on page 61).
9. Remove the outer/left panel (see Outer/Left Rear Panel on page 69).
10. Remove the tape **(1)** and three screws **(2)** that secure the board to the computer.

NOTE: Note the location of the grounding cables for proper replacement.

11. Lift the board as far as the cables allow, and then disconnect the two cables from the board **(3)**.

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

Figure 7-37 Removing the power button board



12. Remove the board from the computer.

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

Inverter Board

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

Figure 7-38 Inverter board location

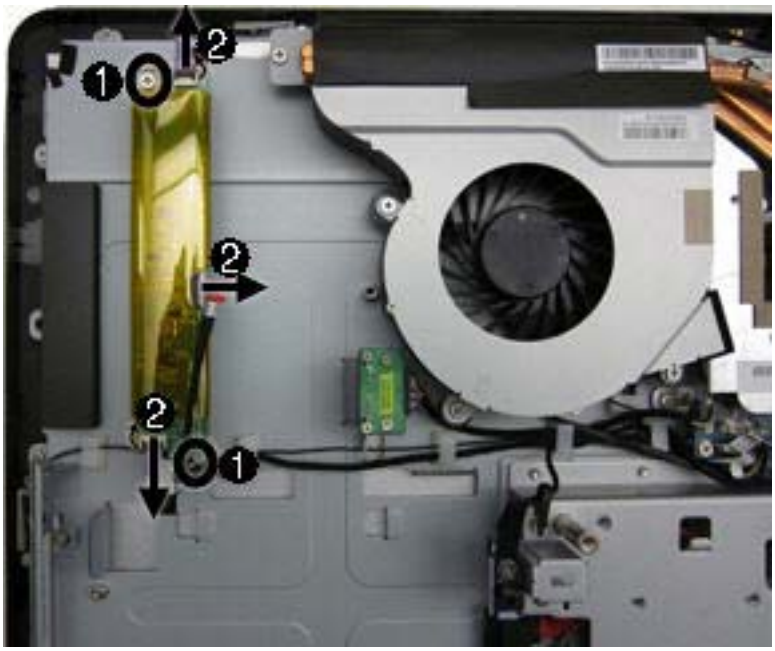
To remove the inverter board:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 38).
2. Remove the small rear cover (see Small Rear Cover on page 39).
3. Remove the port cover (see Port Cover on page 40).
4. Remove the stand (see Stand on page 41).
5. Remove the drive cover (see Optical Drive on page 42).
6. Remove the memory cover (see Memory on page 47).
7. Remove the upper rear panel (see Upper Rear Panel on page 49).
8. Remove the I/O panel (see I/O Panel on page 61).
9. Remove the outer/left panel (see Outer/Left Rear Panel on page 69).
10. Remove the two screws **(1)** that secure the board to the computer.

11. Disconnect the three 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.

Figure 7-39 Removing the inverter board



12. Remove the inverter board from the computer.

To install the inverter board, reverse the removal procedures.

Optical Drive Connector Board

The optical drive connector board is located near the bottom left side of the fan sink. It is secured by two screws and has one connector.

Figure 7-40 Optical drive connector board location

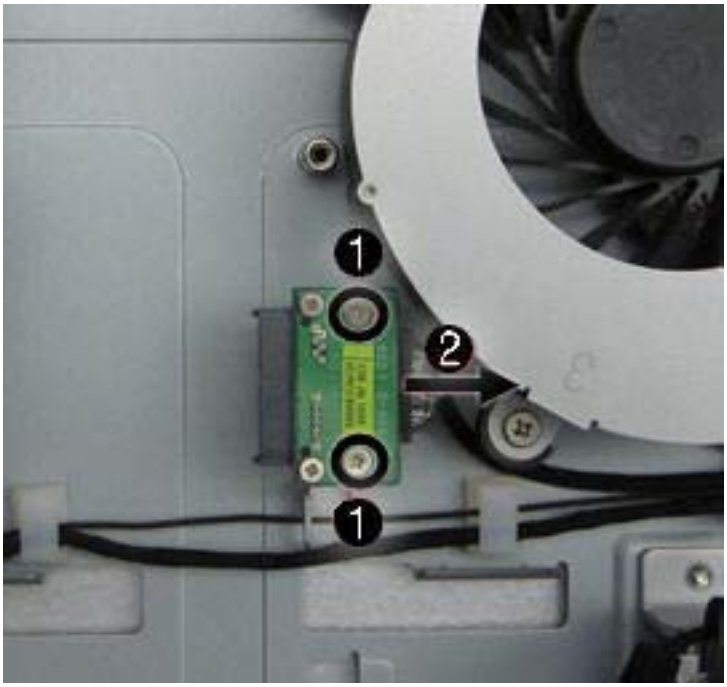
To remove the optical drive connector board:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 38).
2. Remove the small rear cover (see Small Rear Cover on page 39).
3. Remove the port cover (see Port Cover on page 40).
4. Remove the stand (see Stand on page 41).
5. Remove the drive cover (see Optical Drive on page 42).
6. Remove the memory cover (see Memory on page 47).
7. Remove the upper rear panel (see Upper Rear Panel on page 49).
8. Remove the I/O panel (see I/O Panel on page 61).
9. Remove the outer/left panel (see Outer/Left Rear Panel on page 69).
10. Remove two screws **(1)** that secure the board to the computer.

11. Lift the board to gain easier access to the connector, and then disconnect the cable from the board **(2)**.

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

Figure 7-41 Removing the optical drive connector board



12. Remove the board from the computer.

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

Hood Sensor

The hood sensor is located just below the fan sink. It is secured with one screw and has one connector.

Figure 7-42 Hood sensor location

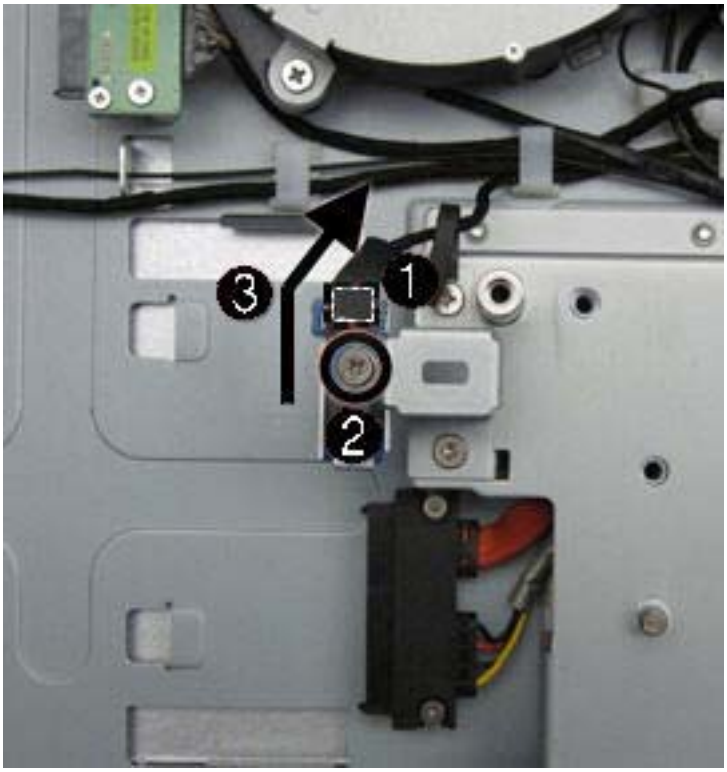
To remove the hood sensor:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 38).
2. Remove the small rear cover (see Small Rear Cover on page 39).
3. Remove the port cover (see Port Cover on page 40).
4. Remove the stand (see Stand on page 41).
5. Remove the drive cover (see Optical Drive on page 42).
6. Remove the memory cover (see Memory on page 47).
7. Remove the upper rear panel (see Upper Rear Panel on page 49).
8. Remove the I/O panel (see I/O Panel on page 61).
9. Remove the outer/left panel (see Outer/Left Rear Panel on page 69).
10. Remove the tape **(1)** and screw **(2)** that secure the board to the computer.

11. Lift the connector end of the hood sensor, slide the sensor at an angle toward the large fan to remove it from the tab in the holder, and then remove the sensor from the computer **(3)**.

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

Figure 7-43 Removing the hood sensor



To install the hood sensor, reverse the removal procedures.

Hard Drive Connector

The hard drive connector is located near the middle of the computer, below the fan. It is secured with two screws and has two connectors. The cables are routed under the metal casing to the system board connectors.

Figure 7-44 Hard drive connector location

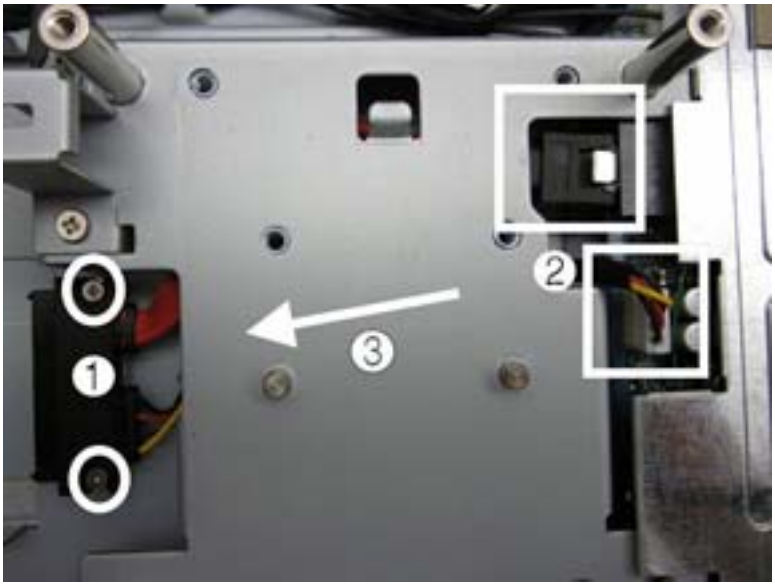
To remove the hard drive connector:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 38).
2. Remove the small rear cover (see Small Rear Cover on page 39).
3. Remove the port cover (see Port Cover on page 40).
4. Remove the stand (see Stand on page 41).
5. Remove the drive cover (see Optical Drive on page 42).
6. Remove the memory cover (see Memory on page 47).
7. Remove the upper rear panel (see Upper Rear Panel on page 49).
8. Remove the I/O panel (see I/O Panel on page 61).
9. Remove the outer/left panel (see Outer/Left Rear Panel on page 69).
10. Remove two screws **(1)** that secure the hard drive connector to the computer.
11. Disconnect the cables from the system board **(2)**.

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

12. Remove the tape that secures the power cable to the computer, and then pull the cables through the metal casing **(3)**.

Figure 7-45 Removing the hard drive connector



13. Remove the hard drive connector from the computer.

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

Fan

The fan is located near the top of the computer. It is secured with three screws.

Figure 7-46 Fan location

To remove the fan:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 38).
2. Remove the small rear cover (see Small Rear Cover on page 39).
3. Remove the port cover (see Port Cover on page 40).
4. Remove the stand (see Stand on page 41).
5. Remove the drive cover (see Optical Drive on page 42).
6. Remove the memory cover (see Memory on page 47).
7. Remove the upper rear panel (see Upper Rear Panel on page 49).
8. Remove the I/O panel (see I/O Panel on page 61).
9. Remove the outer/left panel (see Outer/Left Rear Panel on page 69).
10. Disconnect the fan cable from the system board connector.

11. Remove the three screws that secure the fan to the computer.

Figure 7-47 Removing the fan

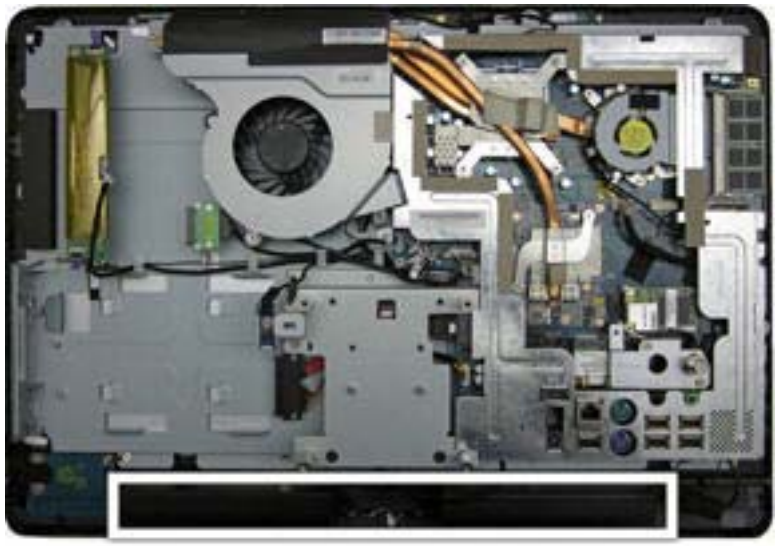
12. Lift the fan from the computer.

To install the fan, reverse the removal procedures.

Speakers

The speakers are located at the bottom of the computer. Two separate speakers are each secured by two screws. The left speaker connects to the right speaker, and the right speaker connects to the system board.

Figure 7-48 Speaker location



To remove the speakers:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 38).
2. Remove the small rear cover (see Small Rear Cover on page 39).
3. Remove the port cover (see Port Cover on page 40).
4. Remove the stand (see Stand on page 41).
5. Remove the drive cover (see Optical Drive on page 42).
6. Remove the memory cover (see Memory on page 47).
7. Remove the upper rear panel (see Upper Rear Panel on page 49).
8. Remove the I/O panel (see I/O Panel on page 61).
9. Remove the outer/left panel (see Outer/Left Rear Panel on page 69).
10. Remove two screws that secure each speaker to the computer.

NOTE: Make note of grounding wire placement for proper installation later.

Figure 7-49 Removing the speakers

11. Remove the tape that secures the speaker wires to the computer.
12. Disconnect the speaker cable from the system board connector.

NOTE: The speakers can be disconnected from each other. The right speaker connects to the system board.

To install the speakers, reverse the removal procedures.

System Board Shield

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

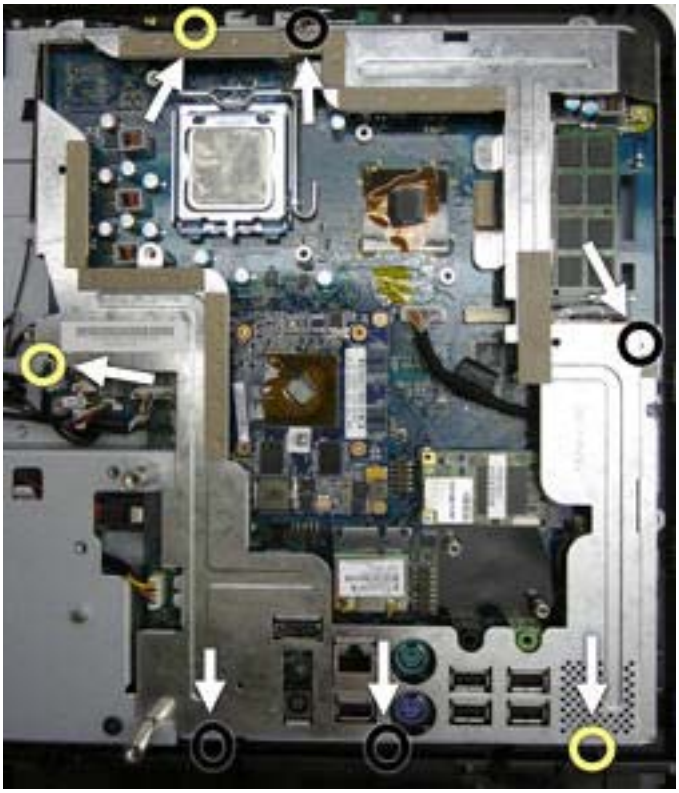
To remove the system board shield:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 38).
2. Remove the small rear cover (see Small Rear Cover on page 39).
3. Remove the port cover (see Port Cover on page 40).
4. Remove the stand (see Stand on page 41).
5. Remove the drive cover (see Optical Drive on page 42).
6. Remove the memory cover (see Memory on page 47).
7. Remove the upper rear panel (see Upper Rear Panel on page 49).
8. Remove the I/O panel (see I/O Panel on page 61).
9. Remove the outer/left panel (see Outer/Left Rear Panel on page 69).
10. Remove the small fan (see Small Fan on page 55).
11. Remove the fan (see Fan on page 83).

12. Remove the seven screws that secure the shield to the computer.

NOTE: Ground cables for the inverter, speaker, and webcam module (circled in yellow in the image) are secured by system board shield screws. If you previously removed these components, these screws have already been removed.

Figure 7-50 Removing the system board shield



13. Lift the shield from the computer.

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

System Board

Description	Spare part number
System board	607818-001

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

Figure 7-51 System board location

To remove the system board:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 38).
2. Remove the small rear cover (see Small Rear Cover on page 39).
3. Remove the port cover (see Port Cover on page 40).
4. Remove the stand (see Stand on page 41).
5. Remove the drive cover (see Optical Drive on page 42).
6. Remove the memory cover (see Memory on page 47).
7. Remove the upper rear panel (see Upper Rear Panel on page 49).
8. Remove the TV tuner module (see TV Tuner Module on page 63).
9. Remove the small fan (see Small Fan on page 55).
10. Remove the heat sink (see Heat Sink (Thermal Module) on page 56).
11. Remove the I/O panel (see I/O Panel on page 61).
12. Remove the cable connector (see Cable Connector on page 65).

13. Remove the outer/left panel (see Outer/Left Rear Panel on page 69).
14. Remove the WLAN module (see WLAN Module on page 67).
15. Remove the fan (see Fan on page 83).
16. Remove the graphics board (see Graphics Board on page 59).
17. Remove the system board shield (see System Board Shield on page 86).
18. Disconnect all cables from the system board, noting their location for reinstallation.
19. Remove the nine screws (circled in image) that secure the system board to the computer.
20. Lift the right side of the system board enough so the board clears the posts (shown with arrows in image), and then remove the system board by lifting up to the right and out of the computer.

Figure 7-52 Removing the system board

To install the system board, reverse the removal procedures.

Display Panel

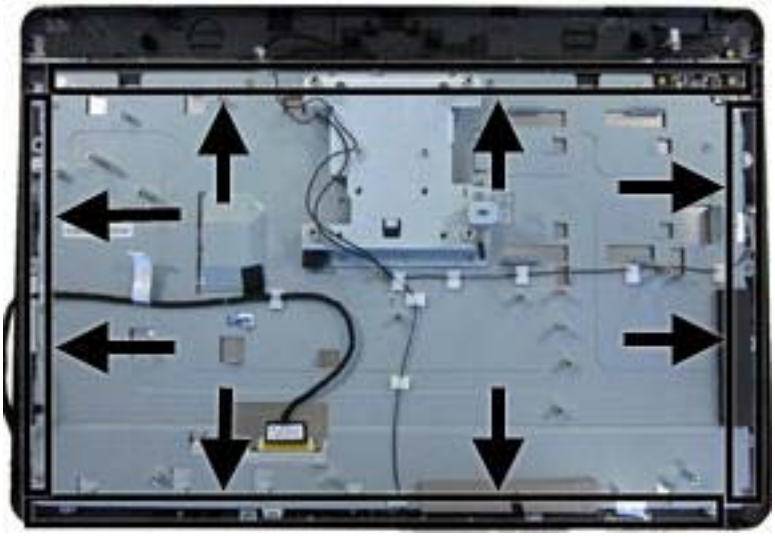
The display panel is secured with 14 screws.

To remove the display panel:

1. Prepare the computer for disassembly (see Preparing to Disassemble the Computer on page 38).
2. Remove the small rear cover (see Small Rear Cover on page 39).
3. Remove the port cover (see Port Cover on page 40).
4. Remove the stand (see Stand on page 41).
5. Remove the drive cover (see Optical Drive on page 42).
6. Remove the memory cover (see Memory on page 47).
7. Remove the upper rear panel (see Upper Rear Panel on page 49).
8. Remove the TV tuner module (see TV Tuner Module on page 63).
9. Remove the small fan (see Small Fan on page 55).
10. Remove the heat sink (see Heat Sink (Thermal Module) on page 56).
11. Remove the I/O panel (see I/O Panel on page 61).
12. Remove the cable connector (see Cable Connector on page 65).
13. Remove the outer/left panel (see Outer/Left Rear Panel on page 69).
14. Remove the WLAN module (see WLAN Module on page 67).
15. Remove the fan (see Fan on page 83).
16. Remove the graphics board (see Graphics Board on page 59).
17. Remove the system board shield (see System Board Shield on page 86).
18. Remove the system board (see System Board on page 88).
19. Remove the 15 screws that secure the display panel. The number of screws per side is as follows:
    - Top: 4 screws
    - Bottom: 5 screws
    - Left: 3 screws
    - Right: 3 screws

20. Lift the display panel from the computer.

Figure 7-53 Removing the display panel



To install a display panel, 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.

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

Control panel message	Description	Recommended action
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.
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.

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

Control panel message	Description	Recommended action
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.
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

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

Control panel message	Description	Recommended action
1720-SMART Hard Drive Detects Imminent Failure	Hard drive is about to fail. (Some hard drives have a hard drive firmware patch that will fix an erroneous error message.)	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.
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.

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

Control panel message	Description	Recommended action
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.
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.

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

Control panel message	Description	Recommended action
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.
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.

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

Control panel message	Description	Recommended action
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.
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.

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

Activity	Beeps	Possible Cause	Recommended Action
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.
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.

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

Activity	Beeps	Possible Cause	Recommended Action
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 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.

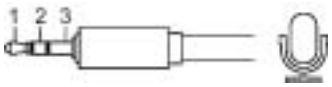
Ethernet BNC

Connector and Icon	Pin	Signal
	1	Data
	2	Ground

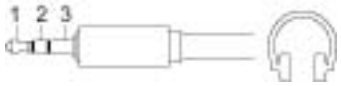
USB

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

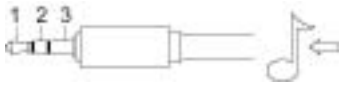
Microphone

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

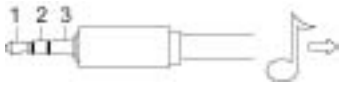
Headphone

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

C 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.

D Specifications

All-in One Models

Table D-1 Specifications

Desktop Dimensions		
Height	16.9 in	42.9 cm
Width	21.5 in	54.6 cm
Depth	2.6 in	6.6 cm
Approximate Weight	18.2 lb	8.25 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
Power Supply		
Rated Voltage Range	100-240 V	100-240 V
Rated Line Frequency	50-60 Hz	50-60 Hz
Max Operating Power	<180 W	<180 W
Idle Operating Power	Integrated graphics: 58 W	Integrated graphics: 58 W
	Discrete graphics: 66 W	Discrete graphics: 66 W

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