



# Maintenance and Service Guide

HP Compaq Pro 4300 Small Form Factor  
Business PC

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**HP Compaq Pro 4300 Small Form Factor Business PC**

First Edition (July 2012)

Document Part Number: 701466-001

## About This Book

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 **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

## Standard Configuration Features

The HP Compaq Small Form Factor features may vary depending on the model. For a complete listing of the hardware and software installed in the computer, run the diagnostic utility (included on some computer models only).

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 **NOTE:** The Small Form Factor computer can also be used in a tower orientation. For more information, see [Using the Small Form Factor Computer in a Tower Orientation on page 85](#) in this guide.

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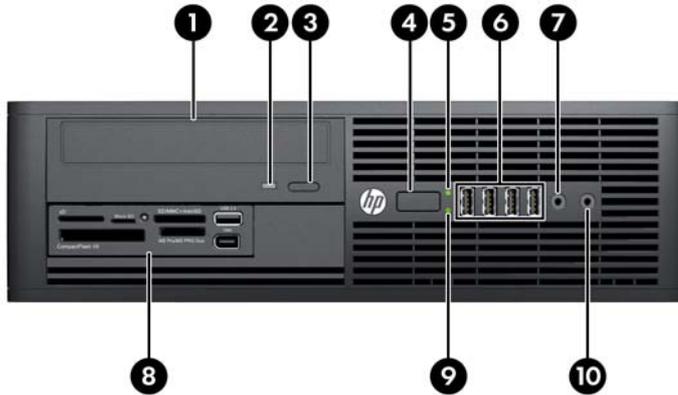
**Figure 1-1** Small Form Factor Configuration



# Front Panel Components

Drive configuration may vary by model. Some models have a bezel blank covering one or more drive bays.

**Figure 1-2** Front Panel Components



**Table 1-1** Front Panel Components

1	5.25-inch Optical Drive	6	USB (Universal Serial Bus) Ports
2	Optical Drive Activity Light	7	Microphone Connector
3	Optical Drive Eject Button	8	3.5-inch Media Card Reader (optional)
4	Dual-State Power Button	9	Hard Drive Activity Light
5	Power On Light	10	Headphone Connector

**NOTE:** The Power On Light is normally green when the power is on. If it is flashing red, there is a problem with the computer and it is displaying a diagnostic code.

# Rear Panel Components

Figure 1-3 Rear Panel Components

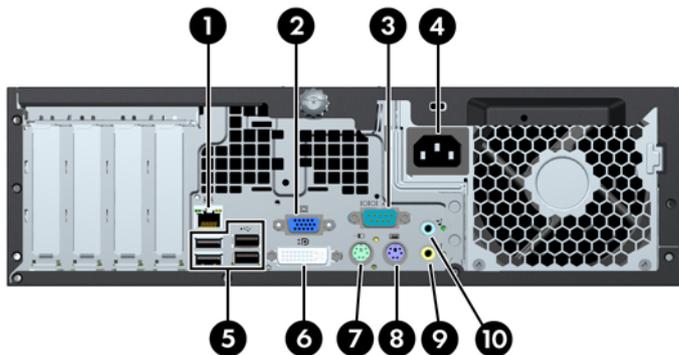


Table 1-2 Rear Panel Components

1		RJ-45 Network Connector	6		DVI-D Connector
2		VGA Monitor Connector	7		PS/2 Mouse Connector (green)
3		Serial Connector	8		PS/2 Keyboard Connector (purple)
4		Power Cord Connector	9		Line-Out Connector for powered audio devices (green)
5		Universal Serial Bus (USB)	10		Line-In Audio Connector (blue)

**NOTE:** An optional second serial port and an optional parallel port are available from HP.

The monitor connectors on the system board are inactive when a graphics card is installed in the computer.

If a graphics card is installed into one of the system board slots, the connectors on the graphics card and the system board may be used at the same time. Some settings may need to be changed in Computer Setup to use both connectors.

## Serial Number Location

Each computer has a unique serial number and product ID number in the location shown below. Keep these numbers available for use when contacting customer service for assistance.

**Figure 1-4** Serial Number and Product ID Location



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## 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.

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### Installing the Windows 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.

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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**.

## Customizing the Monitor Display (Windows systems)

If you wish, you can select or change the monitor model, refresh rates, screen resolution, color settings, font sizes, and power management settings. To do so, right-click on the Windows Desktop, then click **Personalize** in Windows Vista and Windows 7 or **Properties** in Windows XP to change display settings. For more information, refer to the online documentation provided with the graphics controller utility or the documentation that came with your monitor.

## Launching Windows XP from Windows 7

Windows XP Mode for Windows 7 allows you to install and launch Windows XP applications from the Windows 7 taskbar. This feature is available on some computer models only.

To set up from a pre-installed Windows 7 desktop, click **Start > Windows Virtual PC > Virtual Windows XP** and follow the instructions on the screen.

## 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

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## 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.
- 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.
- 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).

## Using Computer Setup (F10) Utilities

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

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

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

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3. Press **F10** to enter Computer Setup.
4. A choice of five headings appears in the Computer Setup Utilities menu: File, Storage, Security, Power, and Advanced.
5. Use the arrow (left and right) keys to select the appropriate heading. Use the arrow (up and down) keys to select the option you want, then press **Enter**. To return to the Computer Setup Utilities menu, press **Esc**.
6. To apply and save changes, select **File > Save Changes and Exit**.
  - If you have made changes that you do not want applied, select **Ignore Changes and Exit**.
  - To reset to factory settings, select **Apply Defaults and Exit**. This option will restore the original factory system defaults.

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 **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.

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## Computer Setup—File



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

**Table 3-1 Computer Setup—File**

Option	Description
<b>System Information</b>	Lists: <ul style="list-style-type: none"><li>• Product name</li><li>• SKU number (some models)</li><li>• Processor type/speed/stepping</li><li>• Cache size (L1/L2/L3)</li><li>• Installed memory size/speed, number of channels (single or dual) (if applicable)</li><li>• Integrated MAC address for embedded, enabled NIC (if applicable)</li><li>• System BIOS (includes family name and version)</li><li>• Chassis serial number</li><li>• Asset tag</li></ul>
<b>About</b>	Displays copyright notice.
<b>Set Time and Date</b>	Allows you to set system time and date.
<b>Apply Defaults and Exit</b>	Applies the currently selected default settings and clears any established passwords.
<b>Ignore Changes and Exit</b>	Exits Computer Setup without applying or saving any changes.
<b>Save Changes and Exit</b>	Saves changes to system configuration or default settings and exits Computer Setup.

# Computer Setup—Storage



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

**Table 3-2 Computer Setup—Storage**

Option	Description
<b>Device Configuration</b>	<p>Lists all installed BIOS-controlled storage devices.</p> <p>When a device is selected, detailed information and options are displayed. The following options may be presented:</p> <p><b>Hard Disk:</b> Size, model, firmware, and serial number.</p> <p><b>USB:</b> Model and size.</p> <p><b>CD-ROM:</b> Model, firmware, and serial number.</p> <p><b>Diskette:</b> Model. Only displays when a USB diskette drive is connected to the computer.</p>
<b>Storage Options</b>	<p><b>SATA Emulation</b></p> <p>Allows you to choose how the SATA controller and devices are accessed by the operating system. There are two supported options: AHCI and IDE.</p> <p>AHCI (default option) - Allows operating systems with AHCI device drivers loaded to take advantage of more advanced features of the SATA controller.</p> <p>IDE - This is the most backwards-compatible setting of the two options. Operating systems usually do not require additional driver support in IDE mode.</p> <p><b>NOTE:</b> The AHCI device driver must be installed prior to attempting to boot from an AHCI volume. If you attempt to boot from an AHCI volume without the required device driver installed, the system will crash (blue screen).</p>
<b>DPS Self-Test</b>	<p>Allows you to execute self-tests on ATA hard drives capable of performing the Drive Protection System (DPS) self-tests.</p> <p><b>NOTE:</b> This selection will only appear when at least one drive capable of performing the DPS self-tests is attached to the system.</p>
<b>Boot Order</b>	<p>Allows you to:</p> <ul style="list-style-type: none"><li>Specify the order in which UEFI boot sources and legacy boot sources (such as a USB flash media device, hard drive, optical drive, or network interface card) are checked for a bootable operating system image. Each device on the list may be individually excluded from or included for consideration as a bootable operating system source.</li><li>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).</li></ul> <p>Press <b>F5</b> to disable a device. Press <b>Enter</b> to select a device. Press the arrow keys to drag a selected device.</p> <p><b>NOTE:</b> MS-DOS drive lettering assignments may not apply after a non-MS-DOS operating system has started.</p> <p><b>Shortcut to Temporarily Override Boot Order</b></p> <p>To boot <b>one time</b> from a device other than the default device specified in Boot Order, restart the computer and press <b>F9</b> 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 <b>Enter</b>. The computer then boots from the selected non-default device for this one time.</p>

## Computer Setup—Security



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

**Table 3-3 Computer Setup—Security**

Option	Description
<b>Setup Password</b>	Allows you to set and enable a setup (administrator) password.  <b>NOTE:</b> 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.
<b>Power-On Password</b>	Allows you to set and enable a power-on password. The power-on password prompt appears after a power cycle or reboot. If the user does not enter the correct power-on password, the unit will not boot.
<b>Device Security</b>	Allows you to set Device Available/Device Hidden for: <ul style="list-style-type: none"><li>• System Audio</li><li>• Network Controller (some models)</li><li>• SATA0</li><li>• SATA1</li></ul>
<b>USB Security</b>	Allows you to enable or disable groups of USB ports or individual USB ports. Default is device available. <ul style="list-style-type: none"><li>• Front USB Ports<ul style="list-style-type: none"><li>◦ USB Port 0</li><li>◦ USB Port 1</li><li>◦ USB Port 4</li><li>◦ USB Port 5</li></ul></li><li>• Rear USB Ports<ul style="list-style-type: none"><li>◦ USB Port 8</li><li>◦ USB Port 9</li><li>◦ USB Port 10</li><li>◦ USB Port 11</li></ul></li><li>• internal USB Ports<ul style="list-style-type: none"><li>◦ USB Port 2</li><li>◦ USB Port 3</li></ul></li></ul>
<b>Slot Security</b>	Allows you to disable or enable the PCI or PCI Express slot. Default is enable.
<b>Network Boot</b>	Enables/disables the computer's ability to boot from an operating system installed on a network server. (Feature available on NIC models only; the network controller must be either a PCI Express expansion card or embedded on the system board.) Default is enable.

**Table 3-3 Computer Setup—Security (continued)**

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<b>System IDs</b>	Displays the following: <ul style="list-style-type: none"><li>• Product name</li><li>• Serial number</li><li>• 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.)</li><li>• SKU number</li><li>• Family name</li><li>• Asset tag (18-byte identifier). A property identification number assigned by the company to the computer.</li><li>• Feature byte</li><li>• Build ID</li><li>• Keyboard locale setting (for example, English or German)</li></ul>
<b>System Security</b> (some models: these options are hardware dependent)	Data Execution Prevention (some models) (enable/disable) - Helps prevent operating system security breaches. Default is enabled.  Virtualization Technology (VTx/VTd) (some models) (enable/disable) - Controls the virtualization features of the processor and virtualization DMA remapping features of the chipset. Changing this setting requires turning the computer off and then back on. Default is disabled.

---

## Computer Setup—Power



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

**Table 3-4 Computer Setup—Power**

Option	Description
<b>Hardware Power Management</b>	<ul style="list-style-type: none"><li>• SATA Power Management—Enables or disables the SATA bus and/or device power management. Default is enabled.</li><li>• S4/S5 Wake On LAN—Wake on LAN (WOL) is normally used to turn on and shutdown systems remotely. This option wakes the system from S4 (hibernate)/S5 (off) power state when a Wake on LAN packet is received and follows normal boot order. Default is disabled.</li></ul>
<b>Thermal</b>	Displays the system fan speed (RPMs).

## Computer Setup—Advanced



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

**Table 3-5 Computer Setup—Advanced**

Option	Heading
<b>Power-On Options</b>	<p>Allows you to set:</p> <ul style="list-style-type: none"><li>• 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.</li><li>• After Power Loss (off/on/previous state): Setting this option to:<ul style="list-style-type: none"><li>◦ Off—causes the computer to remain powered off when power is restored.</li><li>◦ On—causes the computer to power on automatically as soon as power is restored.</li><li>◦ Previous state—causes the computer to power on automatically as soon as power is restored, if it was on when power was lost.</li></ul></li></ul> <p><b>NOTE:</b> If you turn off power to the computer using the switch on a power strip, you will not be able to use the suspend/sleep feature or the Remote Management features.</p> <ul style="list-style-type: none"><li>• POST Delay (None, 5, 10 15, 20, or 60 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 <b>F10</b> to enter Computer (F10) Setup.</li></ul>
<b>BIOS Power-On</b>	Allows you to set the computer to turn on automatically at a time you specify.
<b>Onboard Devices</b>	Allows you to set resources for or disable Legacy devices.

**Table 3-5 Computer Setup—Advanced (continued)**

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<b>Bus Options</b>	<p>On some models, allows you to enable or disable:</p> <ul style="list-style-type: none"><li>• PCI SERR# Generation. Default is enable.</li><li>• PCI VGA Palette Snooping, which sets the VGA palette snooping bit in PCI configuration space; only needed when more than one graphics controller is installed. Default is disable.</li></ul>
<b>Device Options</b>	<p>Allows you to set:</p> <ul style="list-style-type: none"><li>• Num Lock State at Power-On (off/on). Default is on.</li><li>• Parallel Port Mode (EPP+ECP, Output-only, Bi-directional).</li><li>• Multi-Processor (enable/disable). Use this option to disable multi-processor support under the OS. Default is enabled.</li><li>• Hyper-threading (Enable/disable). Provides processor parallelization such that the operating system treats one processor as two. Default is enable.</li><li>• NIC Option ROM Download (enable/disable). The BIOS contains an embedded NIC option ROM to allow the unit to boot through the network to a PXE server. This is typically used to download a corporate image to a hard drive. The NIC option ROM takes up memory space below 1 MB commonly referred to as DOS Compatibility Hole (DCH) space. This space is limited. This F10 option will allow users to disable the downloading of this embedded NIC option ROM thus giving more DCH space for additional PCI cards which may need option ROM space. Default is-enable.</li><li>• Processor Frequency Multiplier. Accessible using <b>CTRL+A</b>. The frequency multiplier adapts the external frequency of the computer to the internal frequency of the processor. This setting lets you overclock your computer.</li></ul>

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# 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.

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## SATA Hard Drives

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

## SATA Hard Drive Cables

### SATA Data Cable

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

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

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

The SATA data cable is a thin, 7-pin cable designed to transmit data for only a single drive.

## SMART ATA Drives

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

## Hard Drive Capacities

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

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

Drive/Partition Capacity Limits				
			Maximum Size	
File System	Controller Type	Operating System	Partition	Drive
FAT 32	ATA	Windows XP/Windows Vista/Windows 7	32 GB	2 TB
NTFS	ATA	Windows XP/Windows Vista/Windows 7	2 TB	2 TB

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# 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 Designations

### Small Form Factor (SFF)

Figure 5-1 Small Form Factor chassis



# Electrostatic Discharge Information

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

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

## Generating Static

The following table shows that:

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

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

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

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

## Preventing Electrostatic Damage to Equipment

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

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

- Always be properly grounded when touching a sensitive component or assembly.
- Avoid contact with pins, leads, or circuitry.
- Place reusable electrostatic-sensitive parts from assemblies in protective packaging or conductive foam.

## Personal Grounding Methods and Equipment

Use the following equipment to prevent static electricity damage to equipment:

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

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

## Grounding the Work Area

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

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

## Recommended Materials and Equipment

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

- Antistatic tape
- Antistatic smocks, aprons, or sleeve protectors

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

## Operating Guidelines

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

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

- Never cover the ventilation slots on the monitor with any type of material.
- Install or enable power management functions of the operating system or other software, including sleep states.

## Routine Care

### General Cleaning Safety Precautions

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

### Cleaning the Computer Case

Follow all safety precautions in [General Cleaning Safety Precautions on page 23](#) before cleaning the computer.

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

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

### Cleaning the Keyboard

Follow all safety precautions in [General Cleaning Safety Precautions on page 23](#) before cleaning the keyboard.

To clean the tops of the keys or the keyboard body, follow the procedures described in [Cleaning the Computer Case on page 23](#).

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

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**⚠ CAUTION:** Use safety glasses equipped with side shields before attempting to clean debris from under the keys.

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- 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.

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**⚠ 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.

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- Cleaning under a key may be done with a swab moistened with isopropyl alcohol and squeezed out. Be careful not to wipe away lubricants necessary for proper key functions. Use tweezers to remove any fibers or dirt in confined areas. Allow the parts to air dry before reassembly.

## Cleaning the Monitor

- Wipe the monitor screen with a clean cloth moistened with water or with a towelette designed for cleaning monitors. Do not use sprays or aerosols directly on the screen; the liquid may seep into the housing and damage a component. Never use solvents or flammable liquids on the monitor.
- To clean the monitor body follow the procedures in [Cleaning the Computer Case on page 23](#).

## Cleaning the Mouse

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

- Clean the mouse ball by first removing the retaining plate and the ball from the housing. Pull out any debris from the ball socket and wipe the ball with a clean, dry cloth before reassembly.
- To clean the mouse body, follow the procedures in [Cleaning the Computer Case on page 23](#).

## Service Considerations

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

### Power Supply Fan

The power supply fan is a variable-speed fan based on the temperature in the power supply.

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**⚠ CAUTION:** The cooling fan is always on when the computer is in the “On” mode. The cooling fan is off when the computer is in “Standby,” “Suspend,” or “Off” modes.

---

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

---

## Tools and Software Requirements

To service the computer, you need the following:

- Torx T-15 screwdriver (HP screwdriver with bits, PN 161946-001)
- Torx T-15 screwdriver with small diameter shank (for certain front bezel removal)
- Flat-bladed screwdriver (may sometimes be used in place of the Torx screwdriver)
- Phillips #2 screwdriver
- Diagnostics software
- HP tamper-resistant T-15 wrench (Smart Cover FailSafe Key, PN 166527-001) or HP tamper-resistant bits (Smart Cover FailSafe Key, PN 166527-002)

## Screws

The screws used in the 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.

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

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

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## 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.

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**⚠ 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.

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## Hard Drives

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

- If a drive must be mailed, place the drive in a bubble-pack mailer or other suitable protective packaging and label the package “Fragile: Handle With Care.”
- Do not remove hard drives from the shipping package for storage. Keep hard drives in their protective packaging until they are actually mounted in the CPU.
- Avoid dropping drives from any height onto any surface.
- If you are inserting or removing a hard drive, turn off the computer. Do not remove a hard drive while the computer is on or in standby mode.

- Before handling a drive, ensure that you are discharged of static electricity. While handling a drive, avoid touching the connector. For more information about preventing electrostatic damage, refer to [Electrostatic Discharge Information on page 20](#)
- Do not use excessive force when inserting a drive.
- Avoid exposing a hard drive to liquids, temperature extremes, or products that have magnetic fields such as monitors or speakers.

## Lithium Coin Cell Battery

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

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

---

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

 **NOTE:** Batteries, battery packs, and accumulators should not be disposed of together with the general household waste. In order to forward them to recycling or proper disposal, please use the public collection system or return them to HP, their authorized partners, or their agents.

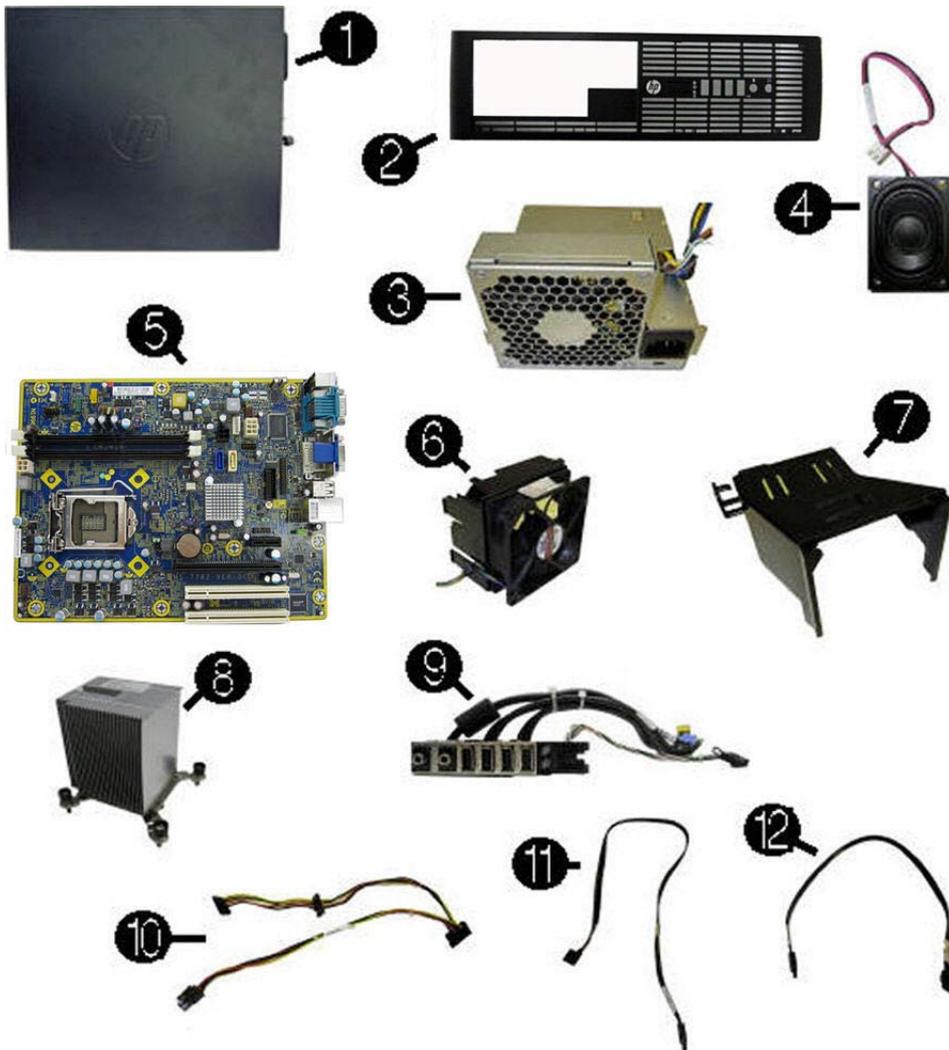
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# 6 Illustrated parts catalog

This chapter provides parts information for the chassis.

## Spare parts

### Computer major components



<b>Item</b>	<b>Description</b>	<b>Spare part number</b>
(1)	<b>Access panel</b>	636924-001
(2)	<b>Front bezel</b>	636920-001
(3)	<b>Power supply</b>	
	240W, 85% efficiency	613663-001
	240W, high voltage protection	613664-001
	240W	613763-001
(4)	<b>Speaker, internal</b>	636925-001
(5)	<b>System board</b> (includes replacement thermal material)	676358-001
(6)	<b>Chassis fan</b>	636922-001
(7)	<b>Baffle</b>	636921-001
(8)	<b>Heat sink (includes replacement thermal material)</b>	636919-001
(9)	<b>Front I/O and power switch assembly</b>	636926-001
	<b>Cables</b>	
(10)	<b>SATA power cable</b>	636923-001
(11)	<b>SATA cable, 1 straight end, 1 angled end</b> (25 inch; 365 mm)	638814-001
(12)	<b>SATA cable, 2 straight ends</b> 19-inch; 483 mm)	638813-001
	<b>SATA USB 3.0 SuperSpeed power extension cable, 20 in</b>	663214-001
	<b>SATA power extension cable, 20 in</b>	633756-001
	<b>HP DisplayPort cable</b>	487562-001
	<b>Adapter, DMS-59 to dual VGA</b>	463023-001
	<b>Adapter, DisplayPort (DP) to DVI</b>	662723-001
	<b>Adapter, DVI to VGA</b>	657401-001
	<b>Adapter, DisplayPort (DP) to HDMI</b>	617450-001
	<b>Adapter, DisplayPort (DP) to VGA</b>	603250-001
	<b>Memory modules</b> (PC3-12800, 1666-MHz)	
	8-MB	689375-001
	4-GB	671613-001
	2-GB	671612-001
	<b>Hard drives</b>	
	1-TB	636930-001
	500-GB	636929-001
	250-GB	636927-001
	256-GB Solid-state drive (SSD), SATA 6.0	661842-001
	120-GB Solid-state drive (SSD), SATA 2.0	661841-001

Item	Description	Spare part number
<b>Optical drives</b>		
	6X BD-Writer SuperMulti drive	656792-001
	16X DVD±RW SuperMulti drive	660408-001
	16X DVD-ROM drive	682550-001
<b>Expansion cards</b>		
	ATI Radeon HD7450, 1-GB PCIe x16 graphics card, includes adapter	682411-001
	ATI Radeon HD6350, 512-MB PCIe x16 graphics card	637995-001
	AMD FirePro 2270 PCIe x16 graphics card, 512-MB	637213-001
	nVidia Quadro NVS310 PCIe x16 graphics card	680653-001
	nVidia Quadro NVS300 PCIe x16 graphics card	632486-001
	HP FireWire / IEEE 1394a PCIe x1 Card	637591-001
	USB 3.0 SuperSpeed PCI-3 x1 card, includes 2 external Type A ports and 2 internal ports	663213-001
	USB 3.0 SuperSpeed PCI-3 x1 card, includes 2 external Type A ports	608151-001
	HP WLAN 802.11 g/n 1x2 PCIe NIC	538048-001
	Intel PRO/1000CT2 NIC, includes bracket	635523-001
<b>Keyboard</b>		
<b>NOTE:</b> For a list of supported countries and associated dash numbers, see <a href="#">Sequential part number listing on page 30</a> .		
	HP PS/2	537745-xxx
	HP USB	537746-xxx
	USB SmartCard	631411-xxx
	Wireless	674314-xxx
	Washable	613125-xxx
<b>Processors</b> (include replacement thermal material)		
	• Intel Core i7 3770s processor, 3.1 GHz	689370-001
	• Intel Core i5 3570 processor, 3.4 GHz	688162-001
	• Intel Core i5 3570s processor, 3.1 GHz	695079-001
	• Intel Core i5 3475s processor, 2.9 GHz	695078-001
	• Intel Core i5 3470s processor, 2.9 GHz	695077-001
	• Intel Core i3 2130 processor, 3.4 GHz	665120-001
	• Intel Core i3 2120 processor, 3.3 GHz	638629-001
	• Intel Pentium Dual-Core G870 processor, 3.1 GHz	691936-001
	• Intel Pentium Dual-Core G860 processor, 3.0 GHz	665123-001
	• Intel Pentium Dual-Core G640 processor, 2.8 GHz	691935-001

Item	Description	Spare part number
	<ul style="list-style-type: none"> <li>Intel Celeron G550 processor, 2.6 GHz</li> </ul>	691934-001
	<ul style="list-style-type: none"> <li>Intel Celeron G540 processor, 2.5 GHz</li> </ul>	665119-001
	<ul style="list-style-type: none"> <li>Intel Celeron G460 processor, 1.8 GHz</li> </ul>	682410-001
	<b>Mouse</b>	
	Wireless	674317-001
	USB, optical, black	537749-001
	USB, laser, black	570580-001
	Washable	619580-001
	<b>Wireless keyboard/mouse transceiver</b>	674319-001
	<b>Bezel blank, 5.25-inch</b>	570838-001
	<b>Antenna</b> for use with WLAN module 538048-001	583345-001
	<b>Hard drive grommet</b>	450712-001
	<b>Hard drive adapter, 2.5 inch</b>	586721-001
	<b>Printer port kit</b>	638817-001
	<b>Serial port kit</b>	638815-001
	<b>Card reader, 22-in-1</b>	636166-001
	<b>USB speakers, external</b>	636917-001
	<b>USB webcam</b>	674317-001
	<b>Rubber Feet Kit</b>	583654-001
	<b>Chassis stand</b>	688952-001
	<b>HP Business Digital Headset</b>	642738-001
	<b>Hard drive conversion bracket</b>	397117-001
	<b>Screw Kit</b>	393956-001

## Sequential part number listing

Spare part number	Description
393956-001	Screw Kit
397117-001	Hard drive conversion bracket
450712-001	Hard drive grommet
463023-001	Adapter, DMS-59 to dual VGA
487562-001	HP DisplayPort cable
508987-001	Clamp Lock Kit, includes universal cable (plate not included)
537745-001	Keyboard, PS/2, the United States

<b>Spare part number</b>	<b>Description</b>
537745-031	Keyboard, PS/2, the United Kingdom
537745-041	Keyboard, PS/2, Germany
537745-051	Keyboard, PS/2, France
537745-061	Keyboard, PS/2, Italy
537745-071	Keyboard, PS/2, Spain
537745-081	Keyboard, PS/2, Denmark
537745-091	Keyboard, PS/2, Norway
537745-101	Keyboard, PS/2, Sweden
537745-111	Keyboard, PS/2, Switzerland
537745-121	Keyboard, PS/2, French Canada
537745-131	Keyboard, PS/2, Portugal
537745-141	Keyboard, PS/2, Turkey
537745-151	Keyboard, PS/2, Greece
537745-161	Keyboard, PS/2, Latin America
537745-171	Keyboard, PS/2, Saudi Arabia
537745-181	Keyboard, PS/2, Belgium
537745-201	Keyboard, PS/2, Brazil
537745-211	Keyboard, PS/2, Hungary
537745-221	Keyboard, PS/2, the Czech Republic
537745-231	Keyboard, PS/2, Slovakia
537745-241	Keyboard, PS/2, Poland
537745-251	Keyboard, PS/2, Russia
537745-261	Keyboard, PS/2, Bulgaria
537745-281	Keyboard, PS/2, Belarus
537745-331	Keyboard, PS/2, the Netherlands
537745-351	Keyboard, PS/2, Finland
537745-541	Keyboard, PS/2, Turkey F
537745-AA1	Keyboard, PS/2, Simplified Chinese
537745-AB1	Keyboard, PS/2, Taiwan
537745-AC1	Keyboard, PS/2, Hong Kong
537745-B31	Keyboard, PS/2, International English
537745-B41	Keyboard, PS/2, BHCSY
537745-BB1	Keyboard, PS/2, Israel
537745-BL1	Keyboard, PS/2, BHCSY

<b>Spare part number</b>	<b>Description</b>
537745-CA1	Keyboard, PS/2, Estonia
537745-DD1	Keyboard, PS/2, Iceland
537745-DE1	Keyboard, PS/2, Arab
537745-DF1	Keyboard, PS/2, Kazakstan
537745-KD1	Keyboard, PS/2, South Korea
537745-L31	Keyboard, PS/2, International
537746-001	Keyboard, USB, the United States
537746-031	Keyboard, USB, the United Kingdom
537746-041	Keyboard, USB, Germany
537746-051	Keyboard, USB, France
537746-061	Keyboard, USB, Italy
537746-071	Keyboard, USB, Spain
537746-081	Keyboard, USB, Denmark
537746-091	Keyboard, USB, Norway
537746-101	Keyboard, USB, Sweden
537746-111	Keyboard, USB, Switzerland
537746-121	Keyboard, USB, French Canada
537746-131	Keyboard, USB, Portugal
537746-141	Keyboard, USB, Turkey
537746-151	Keyboard, USB, Greece
537746-161	Keyboard, USB, Latin America
537746-171	Keyboard, USB, Saudi Arabia
537746-181	Keyboard, USB, Belgium
537746-201	Keyboard, USB, Brazil
537746-211	Keyboard, USB, Hungary
537746-221	Keyboard, USB, the Czech Republic
537746-231	Keyboard, USB, Slovakia
537746-241	Keyboard, USB, Poland
537746-251	Keyboard, USB, Russia
537746-281	Keyboard, USB, Belarus
537746-331	Keyboard, USB, the Netherlands
537746-351	Keyboard, USB, Finland
537746-541	Keyboard, USB, Turkey F
537746-AA1	Keyboard, USB, Simplified Chinese

<b>Spare part number</b>	<b>Description</b>
537746-AB1	Keyboard, USB, Taiwan
537746-AC2	Keyboard, USB, Hong Kong
537746-B31	Keyboard, USB, International English
537746-BB1	Keyboard, USB, Israel
537746-BL1	Keyboard, USB, BHCSY
537746-CA1	Keyboard, USB, Estonia
537746-DD1	Keyboard, USB, Iceland
537746-DE1	Keyboard, USB, Arab
537745-DF1	Keyboard, USB, Kazakstan
537746-KD1	Keyboard, USB, South Korea
537746-L31	Keyboard, USB, International
537749-001	Mouse, USB, optical, black
538048-001	HP WLAN 802.11 g/n 1x2 PCIe NIC
570580-001	Mouse, USB
570838-001	Bezel blank, 5.25-inch
583654-001	Rubber Feet Kit
603250-001	Adapter, DisplayPort (DP) to VGA
608151-001	USB 3.0 SuperSpeed PCI-3 x1 card, includes 2 external Type A ports
613125-121	Keyboard, washable, French Canada
613125-001	Keyboard, washable, the United States
613663-001	Power supply, 240W, 85% efficiency
613664-001	Power supply, 240W, High Voltage protection
613763-001	Power supply, 240 W
617450-001	Adapter, DisplayPort (DP) to HDMI
619580-001	Mouse, washable
631411-004	Keyboard, SmartCard, the United States
631411-034	Keyboard, SmartCard, the United Kingdom
631411-044	Keyboard, USB, SmartCard, Germany
631411-054	Keyboard, USB, SmartCard, France
631411-064	Keyboard, USB, SmartCard, Italy
631411-074	Keyboard, USB, SmartCard, Spain
631411-084	Keyboard, USB, SmartCard, Denmark
631411-094	Keyboard, USB, SmartCard, Norway
631411-104	Keyboard, USB, SmartCard, Sweden

<b>Spare part number</b>	<b>Description</b>
631411-114	Keyboard, USB, SmartCard, Switzerland
631411-124	Keyboard, USB, SmartCard, French Canada
631411-134	Keyboard, USB, SmartCard, Portugal
631411-144	Keyboard, USB, SmartCard, Turkey
631411-154	Keyboard, USB, SmartCard, Greece
631411-164	Keyboard, USB, SmartCard, Latin America
631411-174	Keyboard, USB, SmartCard, Saudi Arabia
631411-184	Keyboard, USB, SmartCard, Belgium
631411-204	Keyboard, USB, SmartCard, Brazil
631411-214	Keyboard, USB, SmartCard, Hungary
631411-224	Keyboard, USB, SmartCard, the Czech Republic
631411-234	Keyboard, USB, SmartCard, Slovakia
631411-244	Keyboard, USB, SmartCard, Poland
631411-254	Keyboard, USB, SmartCard, Russia
631411-264	Keyboard, USB, SmartCard, Bulgaria
631411-274	Keyboard, USB, SmartCard, Romania
631411-284	Keyboard, USB, SmartCard, Thailand
631411-334	Keyboard, USB, SmartCard, the Netherlands
631411-554	Keyboard, USB, SmartCard, Turkey F
631411-AA4	Keyboard, USB, SmartCard, Simplified Chinese
631411-AB4	Keyboard, USB, SmartCard, Taiwan
631411-B44	Keyboard, USB, SmartCard, International English
631411-BB4	Keyboard, USB, SmartCard, Israel
631411-BL4	Keyboard, USB, SmartCard, BHCSY
631411-CA4	Keyboard, USB, SmartCard, Estonia
631411-DD4	Keyboard, USB, SmartCard, Iceland
631411-DE4	Keyboard, USB, SmartCard, Arab
631411-DF4	Keyboard, USB, SmartCard, Kazakstan
631411-KD4	Keyboard, USB, SmartCard, South Korea
631411-L34	Keyboard, USB, SmartCard, International
632486-001	nVidia Quadro NVS300 PCIe x16 graphics card
635523-001	Intel PRO/1000CT2 NIC, includes bracket
636166-001	Card reader, 22-in-1
636917-001	USB speakers, external

<b>Spare part number</b>	<b>Description</b>
636919-001	Heat sink (includes replacement thermal material)
636920-001	Front bezel
636921-001	Baffle
636922-001	Chassis fan
636923-001	SATA power cable
636924-001	Access panel
636925-001	Speaker, internal
636926-001	Front I/O and power switch assembly
636927-001	250-GB hard drive
636929-001	500-GB hard drive
636930-001	1-TB hard drive
637213-001	AMD FirePro 2270 PCIe x16 graphics card, 512-MB
637591-001	HP FireWire / IEEE 1394a PCIe x1 Card
637995-001	ATI HD6350, 512-MB PCIe x16 graphics card
638629-001	Intel Core i3 2120 processor, 3.3 GHz
638813-001	SATA cable, 2 straight ends (19 inch (483 mm))
638814-001	SATA cable, 1 straight end, 1 angled end (25 inch; 635 mm)
638815-001	Serial port
638817-001	Printer port
642738-001	HP Business Digital Headset
656792-001	6X BD-Writer SuperMulti drive
657401-001	Adapter, DVI to VGA
660408-001	16X DVD±RW SuperMulti drive
661841-001	120 GB Solid-state drive (SSD), SATA 2.0
661842-001	256 GB Solid-state drive (SSD), SATA 6.0
662723-001	Adapter, DisplayPort (DP) to DVI
663213-001	USB 3.0 SuperSpeed PCI-3 x1 card, includes 2 external Type A ports and 2 internal ports
663214-001	SATA USB 3.0 SuperSpeed power extension cable, 20 in
665119-001	Intel Celeron G540 processor, 2.5 GHz
665120-001	Intel Core i3 2130 processor, 3.4 GHz
665123-001	Intel Pentium Dual-Core G860 processor, 3.0 GHz
671612-001	Memory module, 2-GB, PC3 12800, 1666-MHz
671613-001	Memory module, 4-GB, PC3 12800, 1666-MHz
674314-001	Keyboard, wireless, for use in the United States

<b>Spare part number</b>	<b>Description</b>
682411-001	ATI Radeon HD7450 PCIe x16 graphics card, 1 GB (includes adapter)
695080-001	Front bezel
674314-121	Keyboard, wireless, for use in French Canada
674317-001	Mouse, wireless
674319-001	Wireless keyboard/mouse transceiver
676358-001	System board (standard) (includes replacement thermal material)
680653-001	nVidia Quadro NVS310 PCIe x16 graphics card
682410-001	Intel Celeron G460 processor, 1.8 GHz
682550-001	16X DVD-ROM drive
688162-001	Intel Core i5 3570 processor, 3.4 GHz
688952-001	Chassis stand
689370-001	Intel Core i7 3770s processor, 3.1 GHz
689375-001	Memory module, 8-GB, PC3 12800, 1666-MHz
691934-001	Intel Celeron G550 processor, 2.6 GHz
691935-001	Intel Pentium Dual-Core G640 processor, 2.8 GHz
691936-001	Intel Pentium Dual-Core G870 processor, 3.1 GHz
695077-001	Intel Core i5 3470s processor, 2.9 GHz
695078-001	Intel Core i5 3475s processor, 2.9 GHz
695079-001	Intel Core i5 3570s processor, 3.1 GHz
695080-001	Front bezel

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# 7 Removal and Replacement Procedures

## Small Form Factor (SFF) Chassis

Adherence to the procedures and precautions described in this chapter is essential for proper service. After completing all necessary removal and replacement procedures, run the Diagnostics utility to verify that all components operate properly.

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

---

### Serial Number Location

Each computer has a unique serial number and product ID number in the location shown below. Keep these numbers available for use when contacting customer service for assistance.

**Figure 7-1** Serial Number and Product ID Location



### Preparation for Disassembly

See [Identifying the Chassis, Routine Care, and Disassembly Preparation on page 19](#) for initial safety procedures.

1. Remove/disengage any security devices that prohibit opening the computer ([Installing a Security Lock on page 86](#)).
2. Close any open software applications.

3. Exit the operating system.
4. Remove any compact disc or media card from the computer.
5. Turn off the computer and any peripheral devices that are connected to it.

---

 **CAUTION:** Turn off the computer before disconnecting any cables.

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

---

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

---

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

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

---

# Computer Access Panel

Description	Spare part number
Access panel	636924-001

1. Prepare the computer for disassembly ([Preparation for Disassembly on page 37](#)).
2. If the computer is on a stand, remove the computer from the stand.
3. Loosen the captive thumbscrew (1), then lift the access panel off the computer (2).

**Figure 7-2** Removing the Access Panel



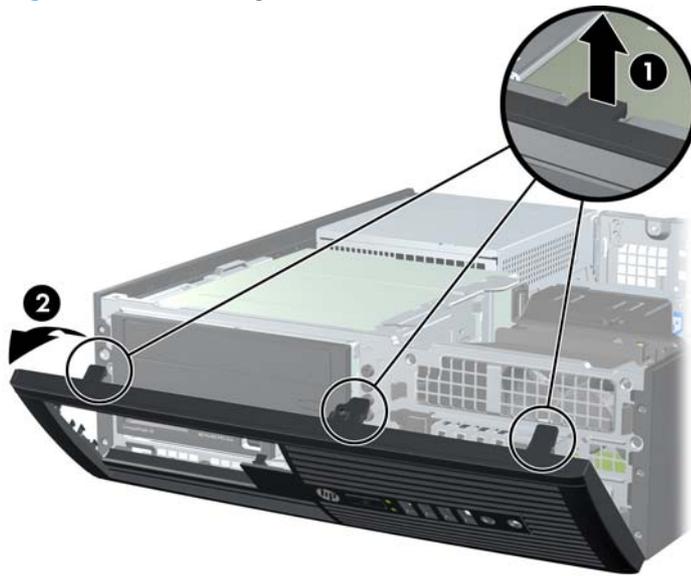
To install the access panel, reverse the removal procedure.

# Front Bezel

Description	Spare part number
Front bezel	695080-001

1. Prepare the computer for disassembly ([Preparation for Disassembly on page 37](#)).
2. Remove the access panel ([Computer Access Panel on page 39](#)).
3. Lift up the three tabs on the side of the bezel (1), then rotate the bezel off the chassis (2).

**Figure 7-3** Removing the Front Bezel



To install the front bezel, reverse the removal procedure.

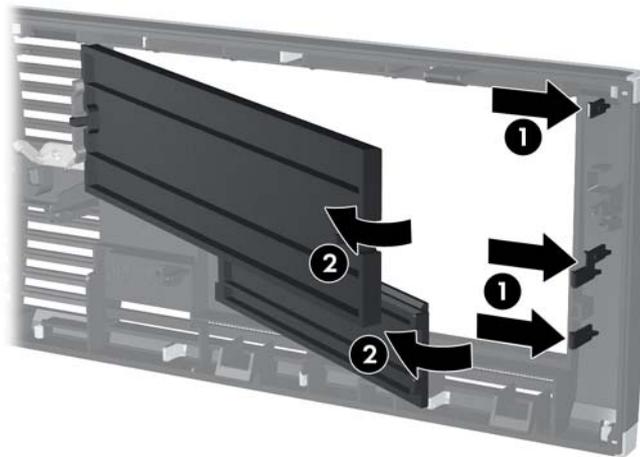
# Bezel Blanks

Description	Spare part number
5.25-inch bezel blank	570838-001

On some models, there are bezel blanks covering the 3.5-inch and 5.25-inch external drive bays that need to be removed before installing a drive. To remove a bezel blank:

1. Remove the access panel ([Computer Access Panel on page 39](#)).
2. Remove the front bezel ([Front Bezel on page 40](#)).
3. To remove a bezel blank, push the two retaining tabs that hold the bezel blank in place towards the outer right edge of the bezel (1) and slide the bezel blank back and to the right to remove it (2).

**Figure 7-4** Removing a Bezel Blank

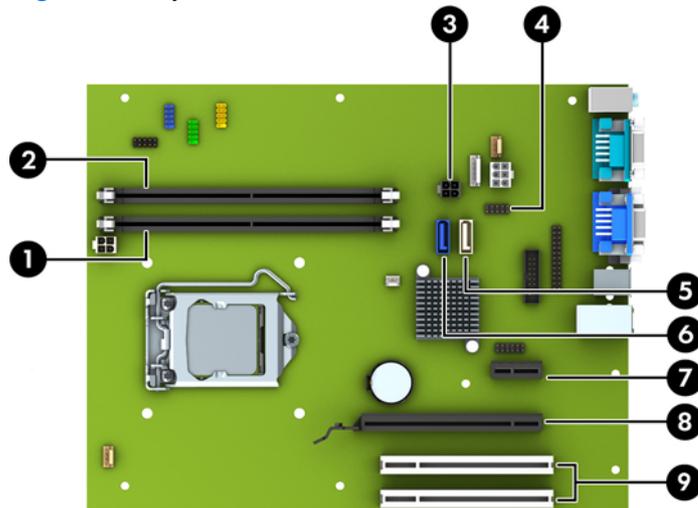


4. Replace the front bezel.

# System Board Connections

Refer to the following illustration and table to identify the system board connectors.

**Figure 7-5** System Board Connections



**Table 7-1** System Board Connections

No.	System Board Connector	System Board Label	Color	Component
1	DIMM (Channel A)	XMM3	black	Memory Module
2	DIMM (Channel B)	XMM1	black	Memory Module
3	Power	SATAPWR1	black	SATA Drives
4	Media Card Reader	MEDIA1	black	Media Card Reader
5	SATA	SATA1	white	Optical Drive
6	SATA	SATA0	dark blue	Hard Drive
7	PCI Express x1	X1PCIEXP1	black	Expansion Card
8	PCI Express x16	X16PCIEXP	black	Expansion Card
9	PCI (2)	PCI1 and PCI2	white	Expansion Card

# Installing Additional Memory

Description	Spare part number
8-GB, PC3-12800	689375-001
4-GB, PC3-12800	671613-001
2-GB, PC3-12800	671612-001

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

## DIMMs

The memory sockets on the system board can be populated with up to two industry-standard DIMMs. These memory sockets are populated with at least one preinstalled DIMM. To achieve the maximum memory support, you can populate the system board with up to 8 GB of memory configured in a high-performing dual channel mode.

## DDR3-SDRAM DIMMs

For proper system operation, the DDR3-SDRAM DIMMs must be:

- industry-standard 240-pin
- unbuffered non-ECC PC3-12800 DDR3-1600 MHz-compliant
- 1.5 volt DDR3-SDRAM DIMMs

The DDR3-SDRAM DIMMs must also:

- support CAS latency 11 DDR3 1600 MHz (11-11-11 timing)
- contain the mandatory JEDEC SPD information

In addition, the computer supports:

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



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

## Populating DIMM Sockets

There are two DIMM sockets on the system board: XMM1 and XMM3 with one socket per Channel. XMM3 operates in memory channel A. XMM1 operates in memory Channel B.

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

- The system will operate in single channel mode if the DIMM sockets are populated in one channel only.
- The system will operate in a higher-performing dual channel mode if the total memory capacity of the DIMM in Channel A is equal to the total memory capacity of the DIMM in Channel B.
- The system will operate in flex mode if the total memory capacity of the DIMM in Channel A is not equal to the total memory capacity of the DIMM in Channel B. In flex mode, the channel populated with the least amount of memory describes the total amount of memory assigned to dual channel and the remainder is assigned to single channel. If one channel will have more memory than the other, the larger amount should be assigned to Channel A.
- In any mode, the maximum operational speed is determined by the slowest DIMM in the system.

## Installing DIMMs

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**⚠ CAUTION:** You must disconnect the power cord and wait approximately 30 seconds for the power to drain before adding or removing memory modules. Regardless of the power-on state, voltage is always supplied to the memory modules as long as the computer is plugged into an active AC outlet. Adding or removing memory modules while voltage is present may cause irreparable damage to the memory modules or system board.

The memory module sockets have gold-plated metal contacts. When upgrading the memory, it is important to use memory modules with gold-plated metal contacts to prevent corrosion and/or oxidation resulting from having incompatible metals in contact with each other.

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

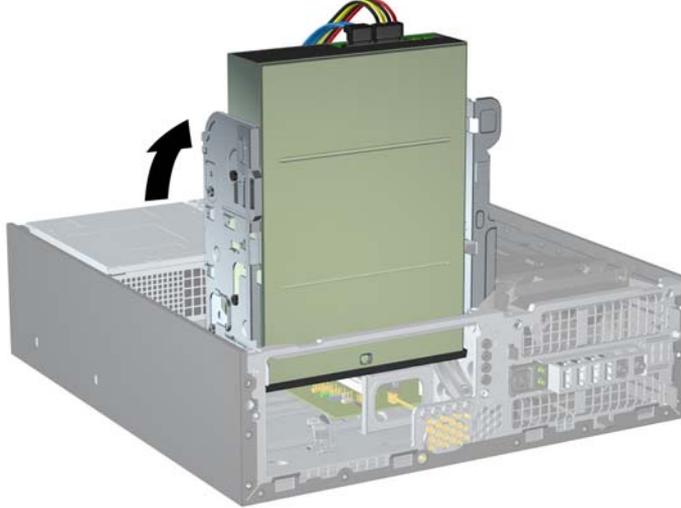
When handling a memory module, be careful not to touch any of the contacts. Doing so may damage the module.

---

1. Prepare the computer for disassembly ([Preparation for Disassembly on page 37](#)).
2. Remove the access panel ([Computer Access Panel on page 39](#)).

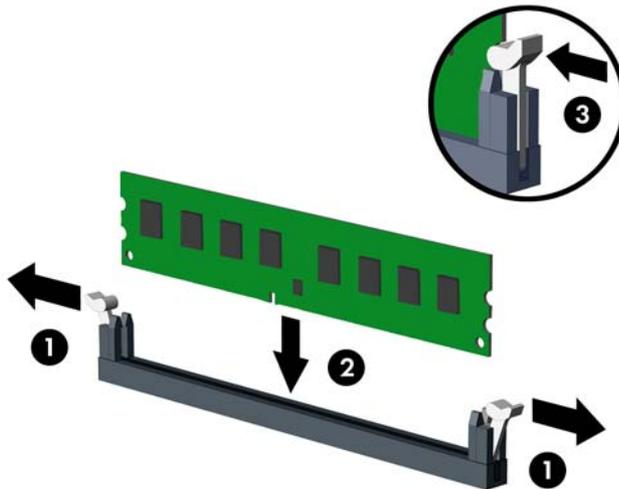
3. Rotate up the drive bay housing to access the memory module sockets on the system board.

**Figure 7-6** Rotating the Drive Cage Up



4. Open both latches of the memory module socket (1), and insert the memory module into the socket (2).

**Figure 7-7** Installing a DIMM



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

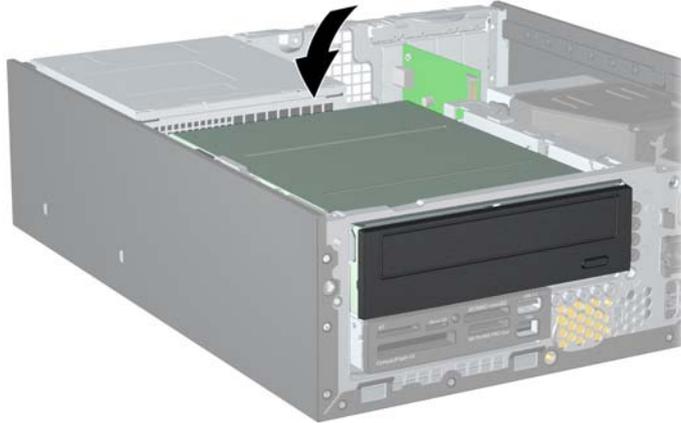
A DIMM must occupy the black XMM1 socket.

For maximum performance, populate the sockets so that the memory capacity is equal between Channel A and Channel B. Refer to [Populating DIMM Sockets on page 44](#) for more information.

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

6. Rotate the drive cage back down to its normal position.

**Figure 7-8** Rotating the Drive Cage Down



7. Replace the access panel.
8. If the computer was on a stand, replace the stand.
9. Reconnect the power cord and turn on the computer.
10. Lock any security devices that were disengaged when the access panel was removed.

The computer should automatically recognize the additional memory the next time you turn on the computer.

## Removing or Installing an Expansion Card

Description	Spare part number
ATI HD6350, 512-MB PCIe x16 graphics card	637995-001
nVidia Quadro NVS310 PCIe x16 graphics card	680653-001
nVidia Quadro NVS300 PCIe x16 graphics card	632486-001
ATI Radeon HD7450 PCIe x16 graphics card, 1 GB (includes adapter)	682411-001
AMD FirePro 2270 PCIe x16 graphics card, 512-MB	637213-001
USB 3.0 SuperSpeed PCI-3 x1 card, includes 2 external Type A ports and 2 internal ports	663213-001
USB 3.0 SuperSpeed PCI-3 x1 card, includes 2 external Type A ports	608151-001
HP WLAN 802.11 g/n 1x2 PCIe NIC	538048-001
Intel PRO/1000CT2 NIC, includes bracket	635523-001
HP FireWire / IEEE 1394a PCIe x1 Card	637591-001
Printer port	638817-001
Serial port, full height	638815-001

The computer has two PCI expansion slots, one PCI Express x1 expansion slot, and one PCI Express x16 expansion slot.

---

 **NOTE:** The PCI and PCI Express slots support only low profile cards.

 **NOTE:** You can install a PCI Express x1, x4, x8, or x16 expansion card in the PCI Express x16 slot.

---

To install an expansion card:

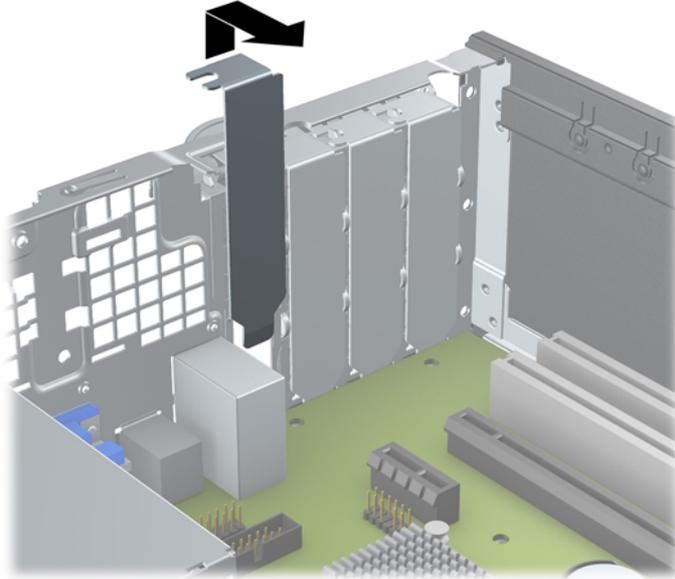
1. Prepare the computer for disassembly ([Preparation for Disassembly on page 37](#)).
2. Remove the access panel ([Computer Access Panel on page 39](#)).
3. Locate the correct vacant expansion socket on the system board and the corresponding expansion slot on the back of the computer chassis.
4. Release the slot cover retention latch that secures the slot covers by lifting the green tab on the latch and rotating the latch to the open position.

**Figure 7-9** Opening the Expansion Slot Retainer



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

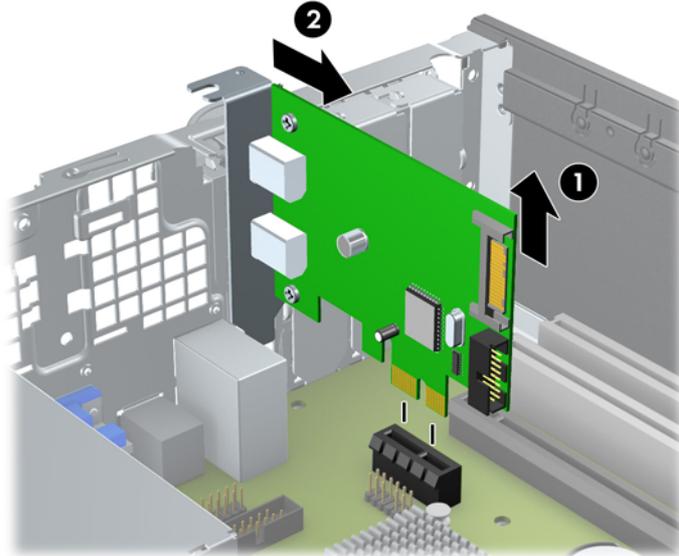
**Figure 7-10** Removing an Expansion Slot Cover



- b. If you are removing a standard PCI card or PCI Express x1 card, hold the card at each end, and carefully rock it back and forth until the connectors pull free from the socket. Pull the expansion card straight up from the socket **(1)** then away from the inside of the chassis to release it from the chassis frame **(2)**. Be sure not to scrape the card against the other components.

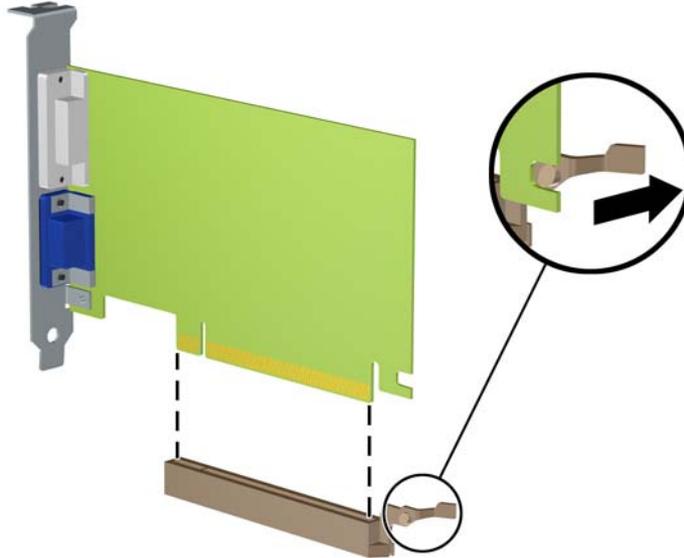
 **NOTE:** Before removing an installed expansion card, disconnect any cables that may be attached to the expansion card.

**Figure 7-11** Removing a PCI Express x1 Expansion Card



- c. If you are removing a PCI Express x16 card, pull the retention arm on the back of the expansion socket away from the card and carefully rock the card back and forth until the connectors pull free from the socket. Pull the expansion card straight up from the socket then away from the inside of the chassis to release it from the chassis frame. Be sure not to scrape the card against the other components.

**Figure 7-12** Removing a PCI Express x16 Expansion Card



6. Store the removed card in anti-static packaging.
7. If you are not installing a new expansion card, install an expansion slot cover to close the open slot.

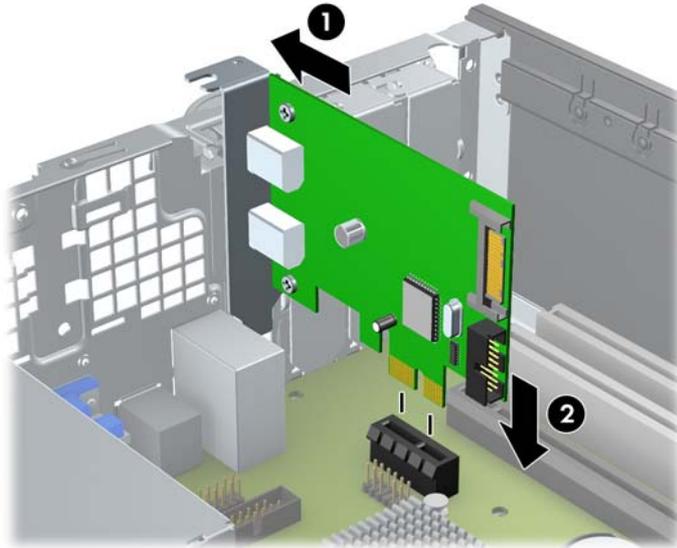
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**CAUTION:** After removing an expansion card, you must replace it with a new card or expansion slot cover for proper cooling of internal components during operation.

---

8. To install a new expansion card, hold the card just above the expansion socket on the system board then move the card toward the rear of the chassis (1) so that the bracket on the card is aligned with the open slot on the rear of the chassis. Press the card straight down into the expansion socket on the system board (2).

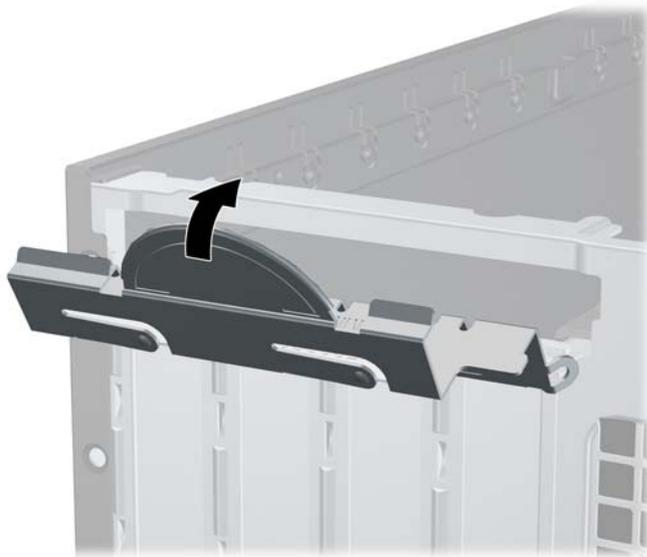
**Figure 7-13** Installing an Expansion Card



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

9. Rotate the slot cover retention latch back in place to secure the expansion card.

**Figure 7-14** Closing the Expansion Slot Retainer



10. Connect external cables to the installed card, if needed. Connect internal cables to the system board, if needed.
11. Replace the access panel.
12. If the computer was on a stand, replace the stand.

13. Reconnect the power cord and turn on the computer.
14. Lock any security devices that were disengaged when the access panel was removed.
15. Reconfigure the computer, if necessary.

# Cable Management

The Small Form Factor chassis is a very compact computer and proper routing of the internal cables is critical to the operation of the computer. Follow good cable management practices when working inside the computer.

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

When removing the power supply power cables from the connector on the system board, always follow these steps:

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

---

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

---

## Drives

Description	Spare part number
<b>Optical drives:</b>	
6X BD-Writer SuperMulti drive	656792-001
16X DVD±RW SuperMulti drive	660408-001
16X DVD-ROM drive	682550-001
<b>Hard drives:</b>	
1 TB hard drive	636930-001
500 GB hard drive	636929-001
250 GB hard drive	636927-001
256 GB Solid-state drive (SSD), SATA 6.0	661842-001
120 GB Solid-state drive (SSD), SATA 2.0	661841-001
<b>Drive cables:</b>	
SATA cable, 2 straight ends (19 inch, 483 mm)	638813-001
SATA cable, 1 straight end, 1 angled end (25-inch (635 mm)	638814-001
SATA power cable	636923-001

A Torx T-15 screwdriver is needed to remove and install the guide screws on a drive.

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

## Drive Positions

Figure 7-15 Drive Positions

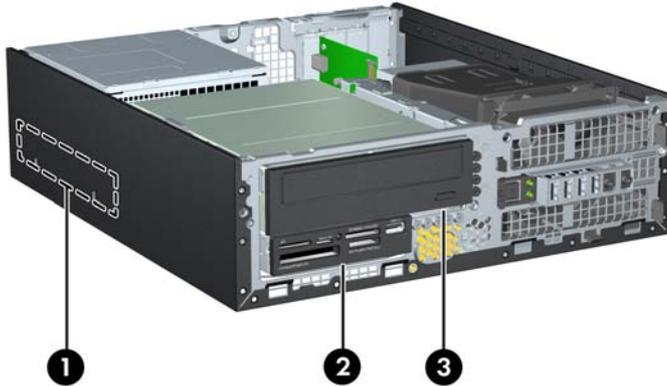


Table 7-2 Drive Positions

1	3.5-inch internal hard drive bay
2	3.5-inch internal drive bay for optional drives (media card reader shown)
3	5.25-inch internal drive bay for optional drives (optical drive shown)

**NOTE:** The drive configuration on your computer may be different than the drive configuration shown above.

To verify the type, size, and capacity of the storage devices installed in the computer, run Computer Setup.

## Installing and Removing Drives

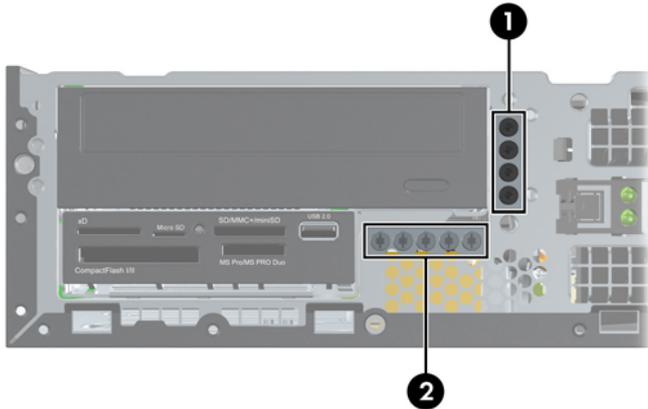
When installing additional drives, follow these guidelines:

 **NOTE:** Refer to [System Board Connections on page 42](#) for an illustration of the system board drive connectors.

- The primary Serial ATA (SATA) hard drive must be connected to the dark blue primary SATA connector on the system board labeled SATA0.
- Connect a SATA optical drive to the white SATA connector on the system board labeled SATA1.
- Connect a media card reader USB cable to the USB connector on the system board labeled MEDIA1.
- The power cable for the SATA drives is a three-headed cable that is plugged into the system board with the first connector routed to the rear of the hard drive, the second connector routed to the rear of the 3.5" drive, and the third connector routed to the rear of the 5.25" optical drive.
- The system does not support Parallel ATA (PATA) optical drives or PATA hard drives.
- You must install mounting screws to ensure the drive will line up correctly in the drive cage and lock in place. HP has provided extra mounting screws for the internal drive bays (five 6-32 standard screws and four M3 metric screws), installed in the front of the chassis, under the front bezel. The 6-32 standard screws are required for a secondary hard drive (not supported). All other drives (except the primary hard drive) use M3 metric screws. The HP-supplied metric screws are black and the HP-supplied standard screws are silver.

 **NOTE:** If you are replacing the primary hard drive, you must remove the four silver and blue 6-32 isolation mounting screws from the old hard drive and install them in the new hard drive.

**Figure 7-16** Extra Mounting Screw Locations



**Table 7-3** Extra Mounting Screws

No.	Mounting Screw	Device
1	Black M3 Metric Screws	All Drives (except hard drives)
2	Silver 6-32 Standard Screws	Secondary Hard Drive (in systems supporting two hard drives)

There are a total of five extra silver 6-32 standard screws. Four are used as mounting screws for a secondary hard drive (not supported). The fifth is used for bezel security (see [Front Bezel Security on page 88](#) for more information).

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

If you are inserting or removing a drive, shut down the operating system properly, turn off the computer, and unplug the power cord. Do not remove a 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.

Handle a drive carefully; do not drop it.

Do not use excessive force when inserting a drive.

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

If a drive must be mailed, place the drive in a bubble-pack mailer or other protective packaging and label the package "Fragile: Handle With Care."

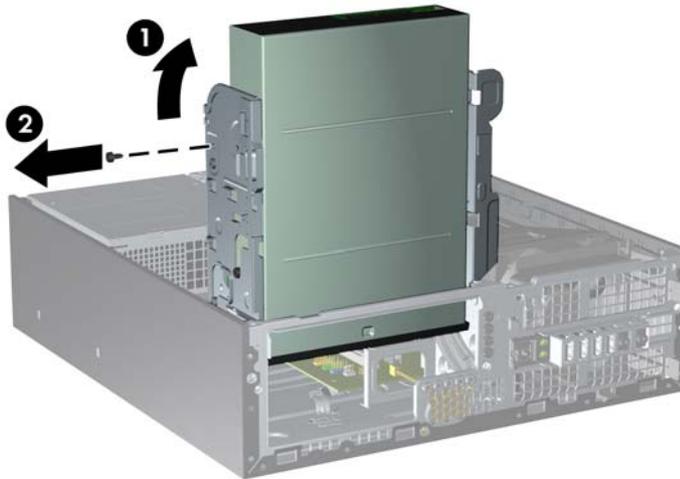
## Removing an Internal 5.25-inch Drive

**⚠ CAUTION:** All removable media should be taken out of a drive before removing the drive from the computer.

To remove a 5.25-inch internal drive:

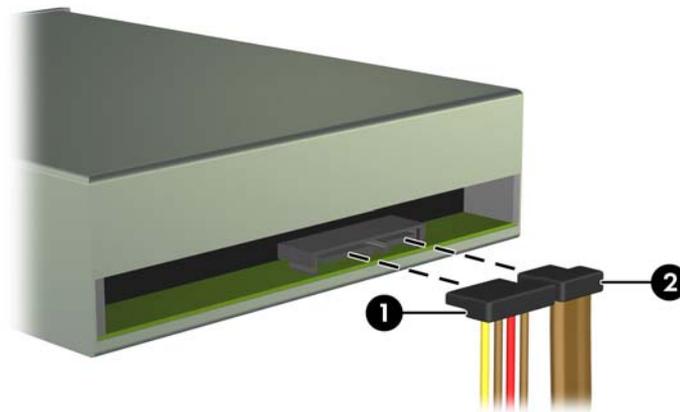
1. Prepare the computer for disassembly ([Preparation for Disassembly on page 37](#)).
2. Remove the access panel ([Computer Access Panel on page 39](#)).
3. Rotate the drive cage to its upright position (1) and remove the mounting screw on the back left side of the drive (2).

**Figure 7-17** Removing the Drive Mounting Screw



4. Press and hold down the latch to disconnect the power cable (1) and data cable (2) from the rear of the optical drive.

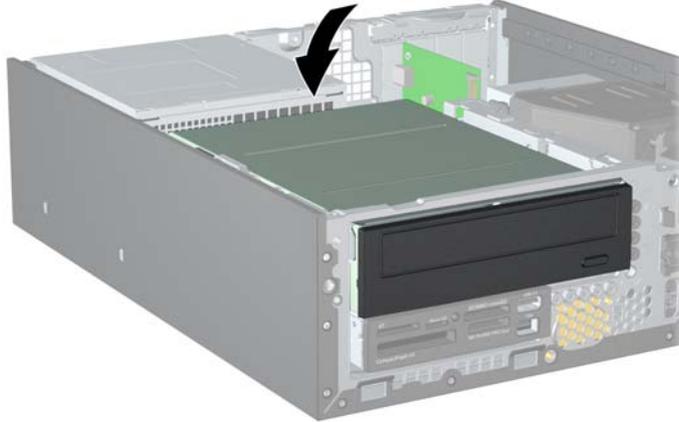
**Figure 7-18** Disconnecting the Power and Data Cables



5. Rotate the drive cage back down to its normal position.

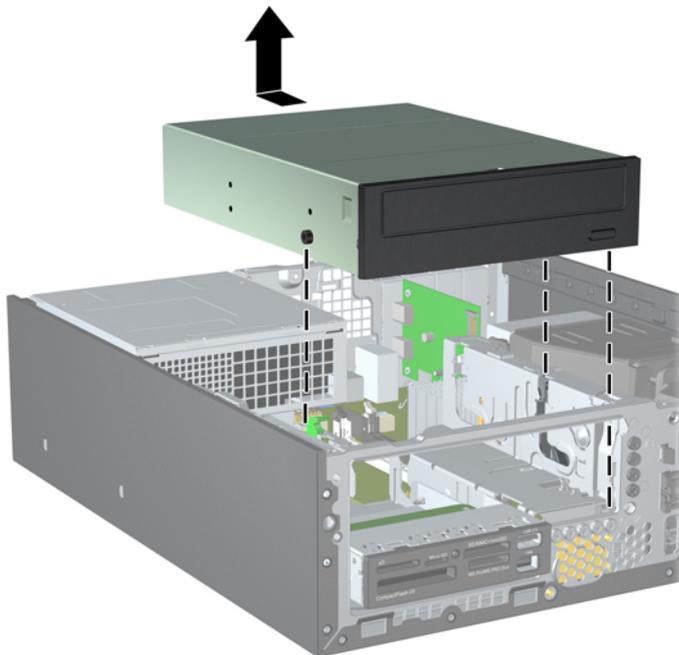
**CAUTION:** Be careful not to pinch any cables or wires when rotating the drive cage down.

**Figure 7-19** Rotating the Drive Cage Down



6. Slide the drive back until it stops, then lift it up and out of the drive cage.

**Figure 7-20** Removing the 5.25-inch Drive



**NOTE:** When replacing a drive, transfer the four mounting screws from the old drive to the new one.

## Installing an Optical Drive into the 5.25-inch Drive Bay

To install an optional 5.25-inch optical drive:

1. Prepare the computer for disassembly ([Preparation for Disassembly on page 37](#)).
2. Remove the access panel ([Computer Access Panel on page 39](#)).
3. If you are installing a drive in a bay covered by a bezel blank, remove the front bezel then remove the bezel blank. See [Bezel Blanks on page 41](#) for more information.
4. Install three M3 metric mounting screws in the lower holes on each side of the drive: two on the right side and one on the front left side. HP has provided extra M3 metric mounting screws on the front of the chassis, under the front bezel. The M3 metric mounting screws are black. Refer to [Installing and Removing Drives on page 55](#) for an illustration of the extra M3 metric mounting screws location.

**CAUTION:** Use only 5-mm long screws as mounting screws. Longer screws can damage the internal components of the drive.

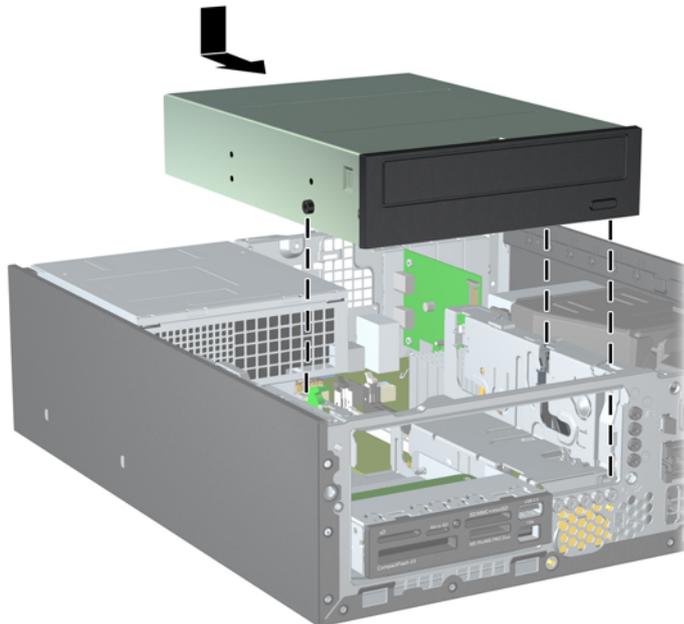
**NOTE:** When replacing the drive, transfer the three M3 metric mounting screws from the old drive to the new one.

**Figure 7-21** Installing Mounting Screws in the Optical Drive



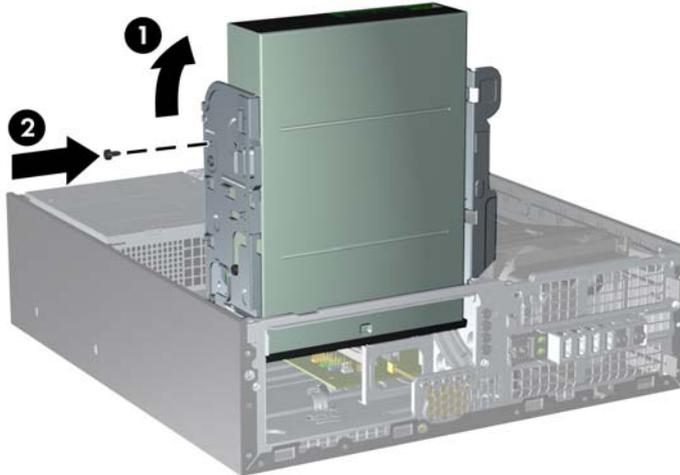
5. Position the mounting screws on the drive into the J-slots in the drive bay. Then slide the drive toward the front of the computer until it stops.

**Figure 7-22** Installing the Optical Drive



6. Rotate the drive cage to its upright position (1) and install an M3 mounting screw in the back left side of the drive (2) to secure the drive to the drive cage.

**Figure 7-23** Securing the Drive in the Drive Cage



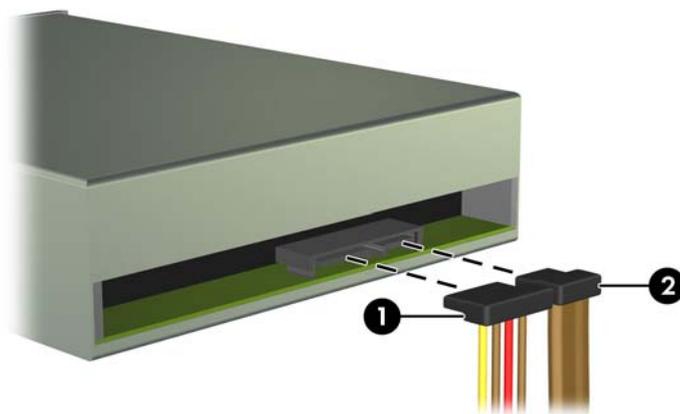
7. Connect the SATA data cable to the white system board connector labeled SATA1 if it is not already connected.
8. Route the data cable through the cable guides.

**CAUTION:** There are two cable guides that keep the data cable from being pinched by the drive cage when raising or lowering it. One is located on the bottom side of the drive cage. The other is located on the chassis frame under the drive cage. Ensure that the data cable is routed through these guides before connecting it to the optical drive.

9. Connect the power cable (1) and data cable (2) to the rear of the optical drive.

**NOTE:** The power cable for the optical drive is a three-headed cable that is routed from the system board to the hard drive, then to the rear of the optical drive.

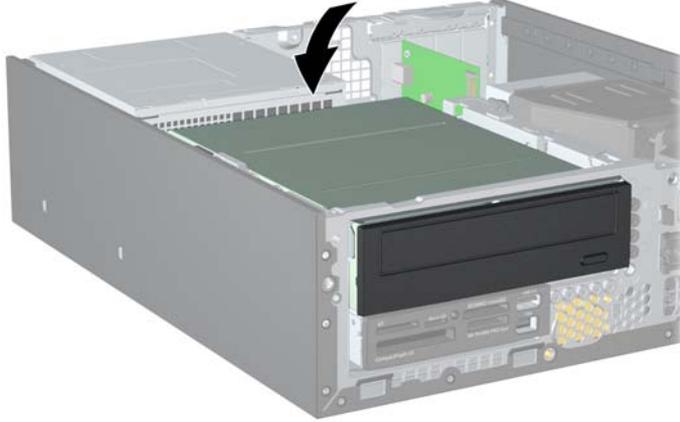
**Figure 7-24** Connecting the Power and Data Cables



10. Rotate the drive cage back down to its normal position.

**CAUTION:** Be careful not to pinch any cables or wires when rotating the drive cage down.

**Figure 7-25** Rotating the Drive Cage Down



11. Replace the access panel.
12. If the computer was on a stand, replace the stand.
13. Reconnect the power cord and turn on the computer.
14. Lock any security devices that were disengaged when the access panel was removed.

The system automatically recognizes the drive and reconfigures the computer.

## Removing an Internal 3.5-inch Drive

**CAUTION:** All removable media should be taken out of a drive before removing the drive from the computer.

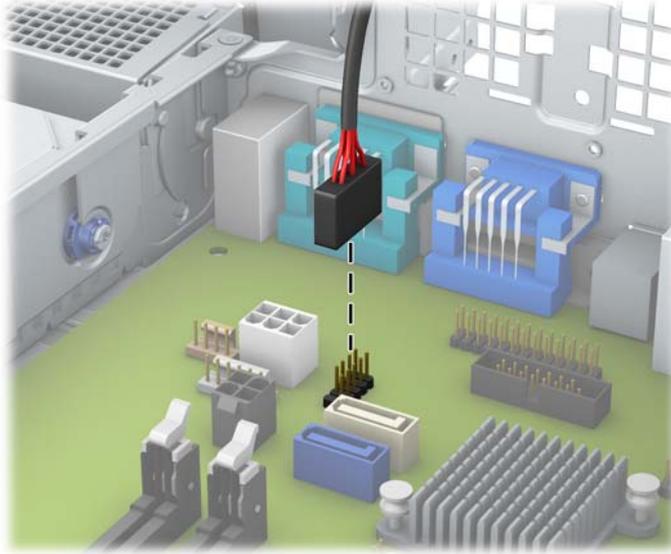
The 3.5-inch drive is located underneath the 5.25-inch drive. You must remove the internal 5.25-inch drive before removing the internal 3.5-inch drive.

1. Follow the procedure in [Removing an Internal 5.25-inch Drive on page 57](#) to remove the 5.25-inch drive and access the 3.5-inch drive.

**CAUTION:** Ensure that the computer is turned off and that the power cord is disconnected from the electrical outlet before proceeding.

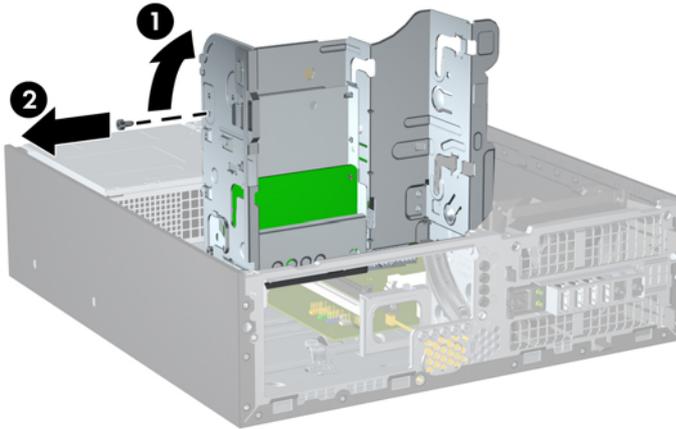
2. If you are removing a media card reader, disconnect the USB cable from the system board.

**Figure 7-26** Disconnecting the Media Card Reader USB Cable



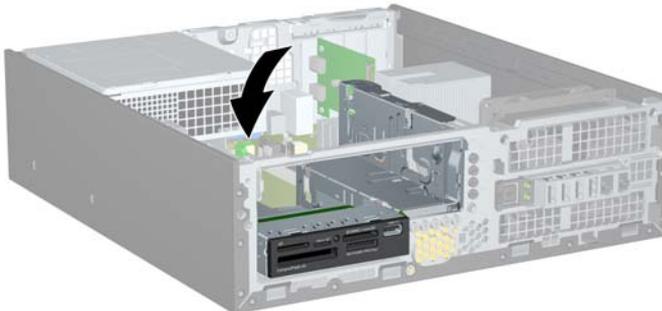
3. Rotate the drive cage to its upright position (1) and remove the mounting screw on the back left side of the drive (2).

**Figure 7-27** Removing the Drive Mounting Screw



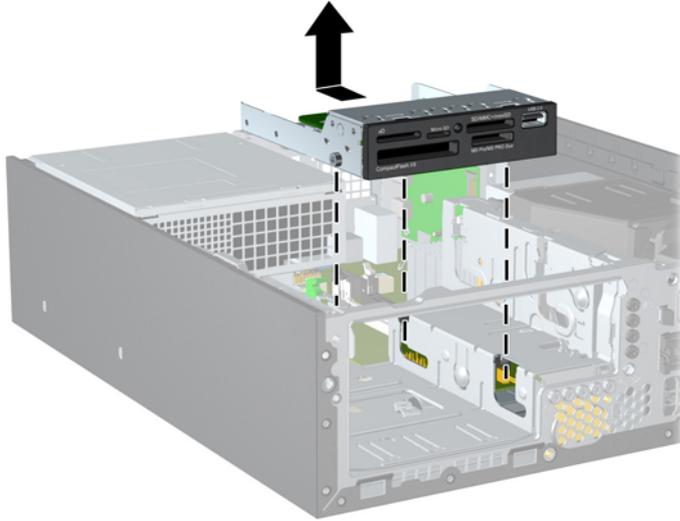
4. Rotate the drive cage back down to its normal position.

**Figure 7-28** Rotating the Drive Cage Down



- Slide the drive back until it stops, then lift it up and out of the drive cage.

**Figure 7-29** Removing a 3.5-inch Drive (Media Card Reader Shown)



 **NOTE:** When replacing a 3.5-inch drive, transfer the four mounting screws from the old drive to the new one.

## Installing a Drive into the 3.5-inch Internal Drive Bay

The 3.5-inch bay is located underneath the 5.25-inch drive. To install a drive into the 3.5-inch bay:

- Follow the procedure in [Removing an Internal 5.25-inch Drive on page 57](#) to remove the 5.25-inch drive and access the 3.5-inch drive bay.

 **CAUTION:** Ensure that the computer is turned off and that the power cord is disconnected from the electrical outlet before proceeding.

- If you are installing a drive in a bay covered by a bezel blank, remove the front bezel then remove the bezel blank. See [Bezel Blanks on page 41](#) for more information.
- Install three M3 metric mounting screws in the lower holes on each side of the drive: two on the right side and one on the front left side. HP has provided extra M3 metric mounting screws on the front of the chassis, under the front bezel. The M3 metric mounting screws are black. Refer to [Installing and Removing Drives on page 55](#) for an illustration of the extra M3 metric mounting screws location.

 **CAUTION:** Use only 5-mm long screws as mounting screws. Longer screws can damage the internal components of the drive.

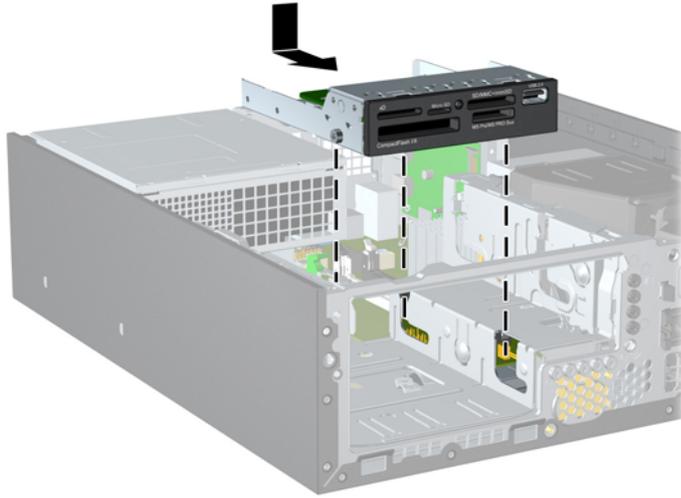
 **NOTE:** When replacing the drive, transfer the three M3 metric mounting screws from the old drive to the new one.

**Figure 7-30** Installing Mounting Screws in the Media Card Reader



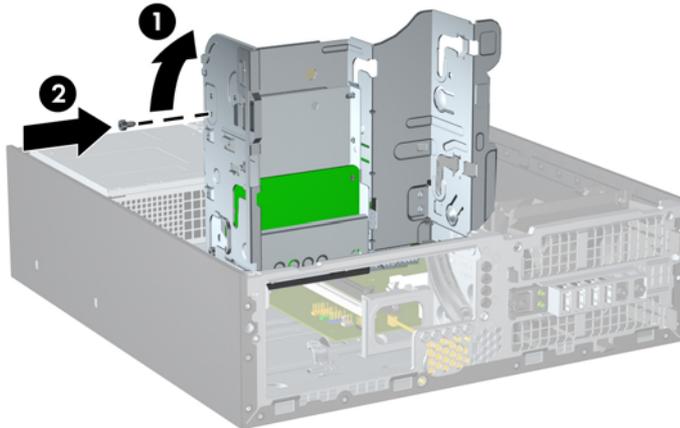
4. Position the mounting screws on the drive into the J-slots in the drive bay. Then slide the drive toward the front of the computer until it stops.

**Figure 7-31** Installing a Drive into the 3.5-inch Drive Bay (Media Card Reader Shown)



5. Rotate the drive cage to its upright position (1) and install an M3 mounting screw in the back left side of the drive (2) to secure the drive to the drive cage.

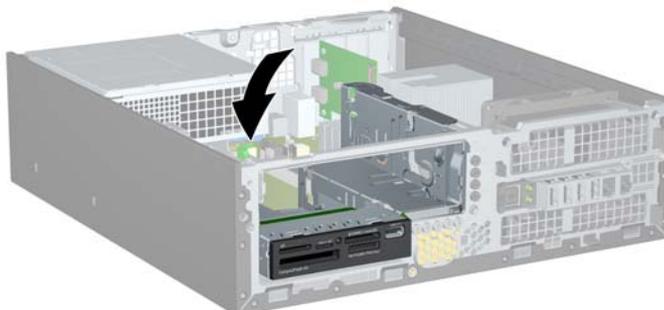
**Figure 7-32** Securing the Drive in the Drive Cage



6. Rotate the drive cage back down to its normal position.

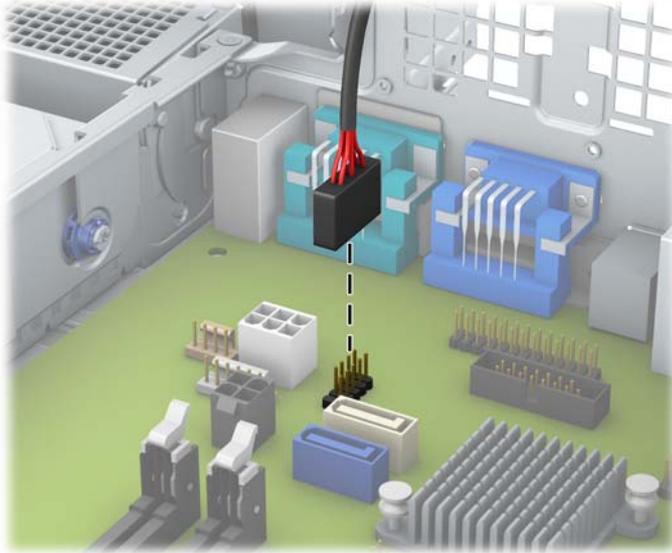
**CAUTION:** Be careful not to pinch any cables or wires when rotating the drive cage down.

**Figure 7-33** Rotating the Drive Cage Down



7. If installing a media card reader, connect the USB cable from the media card reader to the USB connector on the system board labeled MEDIA1.

**Figure 7-34** Connecting the Media Card Reader USB Cable



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 **NOTE:** Refer to [System Board Connections on page 42](#) for an illustration of the system board drive connectors.

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8. Replace the 5.25-inch drive.
9. Replace the access panel.
10. If the computer was on a stand, replace the stand.
11. Reconnect the power cord and turn on the computer.
12. Lock any security devices that were disengaged when the access panel was removed.

The system automatically recognizes the drive and reconfigures the computer.

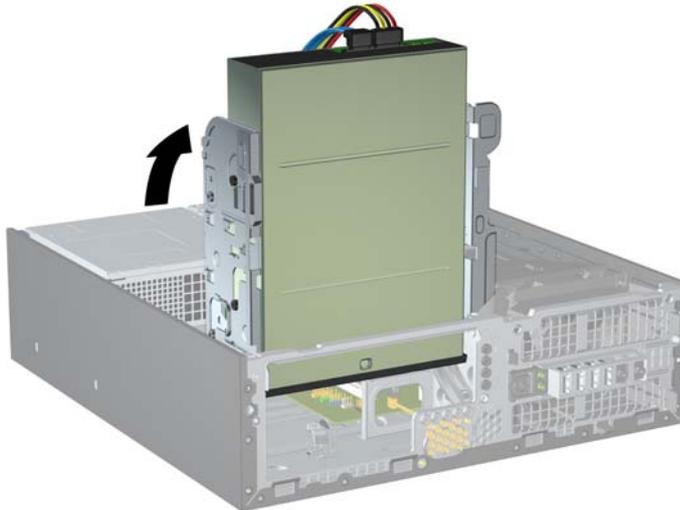
## Removing and Replacing the Primary 3.5-inch Internal SATA Hard Drive

 **NOTE:** Before you remove the old hard drive, be sure to back up the data from the old hard drive so that you can transfer the data to the new hard drive.

The preinstalled 3.5-inch hard drive is located under the power supply. To remove and replace the hard drive:

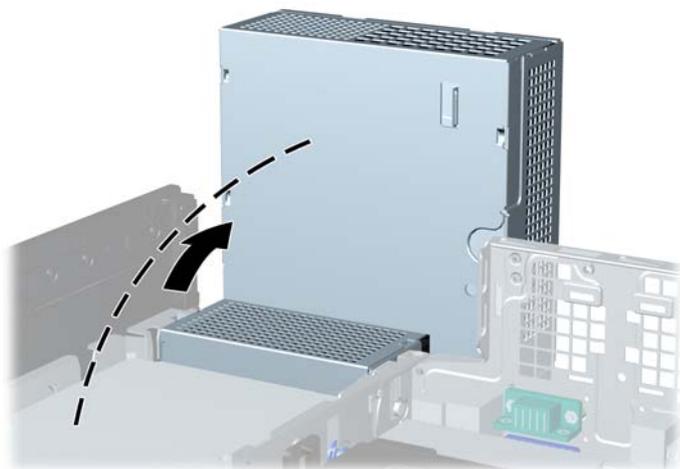
1. Prepare the computer for disassembly ([Preparation for Disassembly on page 37](#)).
2. Remove the access panel ([Computer Access Panel on page 39](#)).
3. Rotate the drive cage for internal drives to its upright position.

**Figure 7-35** Rotating the Drive Cage Up



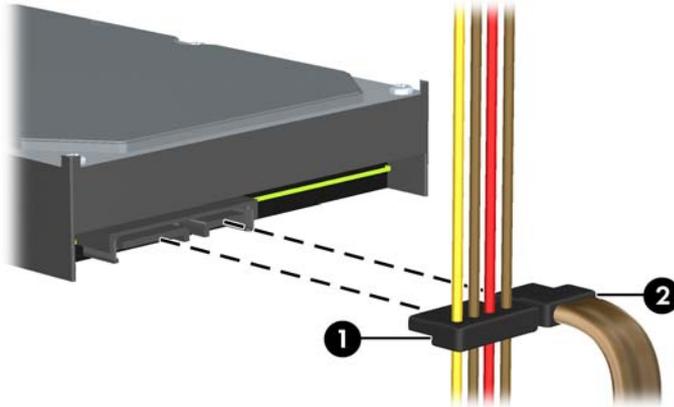
4. Rotate the power supply to its upright position. The hard drive is located beneath the power supply.

**Figure 7-36** Raising the Power Supply



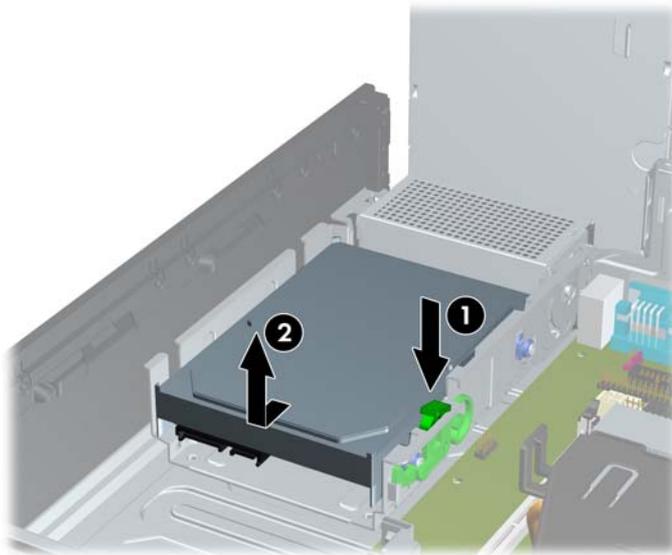
5. Press and hold down the latch to disconnect the power cable (1) and data cable (2) from the back of the hard drive.

**Figure 7-37** Disconnecting the Hard Drive Power Cable and Data Cable



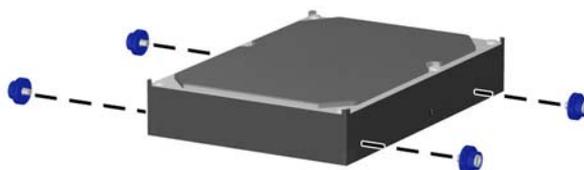
6. Press down on the green release latch next to the hard drive (1). While holding the latch down, slide the drive forward until it stops, then lift the drive up and out of the bay (2).

**Figure 7-38** Removing the Hard Drive



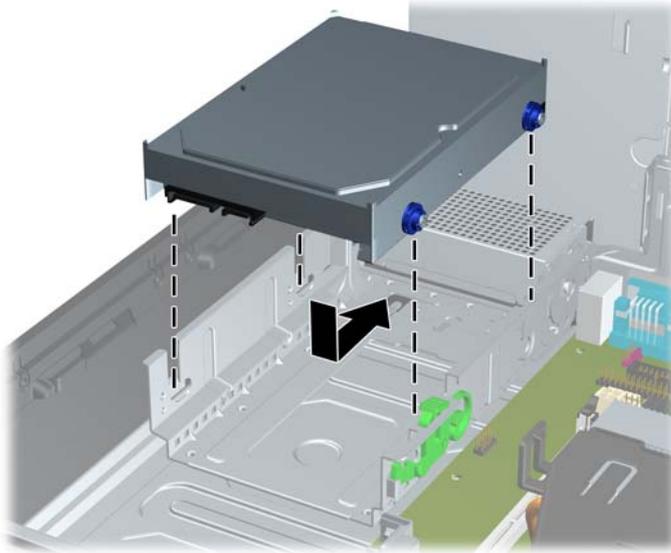
7. To install a hard drive, you must transfer the silver and blue isolation mounting screws from the old hard drive to the new hard drive.

**Figure 7-39** Installing Hard Drive Mounting Screws



8. Align the mounting screws with the slots on the chassis drive cage, press the hard drive down into the bay, then slide it back until it stops and locks in place.

**Figure 7-40** Installing the Hard Drive



9. Connect the power and data cables to the back of the hard drive.

 **NOTE:** When replacing the primary hard drive, be sure to route the SATA and power cables through the cable guide on the bottom of the chassis frame behind the hard drive.

The data cable must be connected to the dark blue connector labeled SATA0 on the system board to avoid any hard drive performance problems.

10. Rotate the drive cage for internal drives and the power supply down to their normal positions.
11. Replace the access panel.
12. If the computer was on a stand, replace the stand.
13. Reconnect the power cord and turn on the computer.
14. Lock any security devices that were disengaged when the access panel was removed.

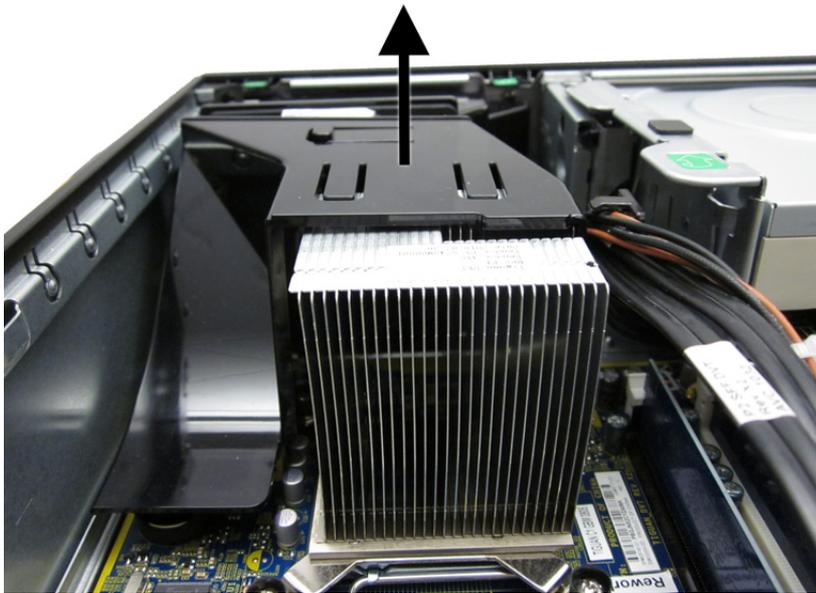
# Baffle

Description	Spare part number
Baffle	636921-001

The baffle sits between the front fan and the heat sink.

1. Prepare the computer for disassembly ([Preparation for Disassembly on page 37](#)).
2. Remove the access panel ([Computer Access Panel on page 39](#)).
3. Remove the cables from the holder on the side of the baffle.
4. Lift the baffle straight up out of the chassis.

**Figure 7-41** Removing the baffle



To install the baffle, reverse the removal procedure.

# Front Fan Assembly

Description	Spare part number
Front fan assembly	636922-001

The front fan assembly is attached to the front of the chassis.

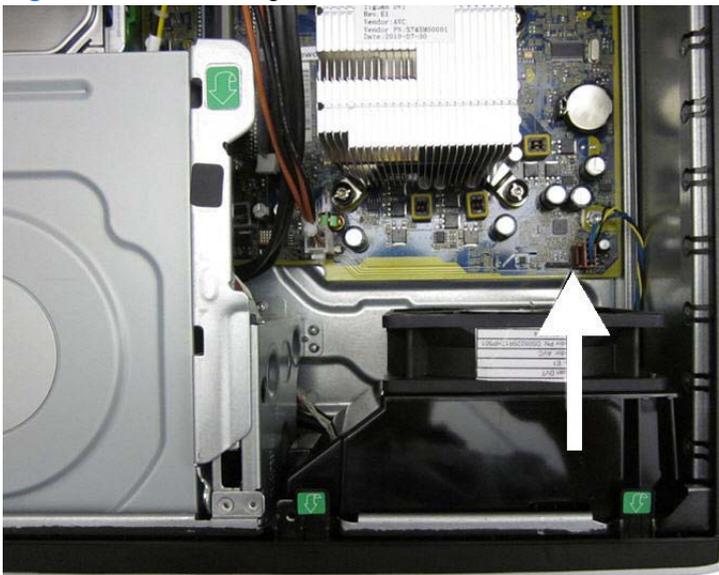
1. Prepare the computer for disassembly ([Preparation for Disassembly on page 37](#)).
2. Remove the access panel ([Computer Access Panel on page 39](#)).
3. Remove the front bezel ([Front Bezel on page 40](#)).
4. Remove the baffle ([Baffle on page 69](#)).
5. Disconnect the fan cable from the red/brown system board connector labeled CHFAN.
6. Press the two tabs (left, bottom) that secure the fan assembly to the chassis front.

**Figure 7-42** Front fan tab locations



7. Pull the assembly toward the rear of the unit, and then lift it out of the chassis.

**Figure 7-43** Removing the front fan



To install the front fan, reverse the removal procedure. Be sure to orient the air flow into the unit.

# Front I/O, Power Switch Assembly

Description	Spare part number
Front I/O and power switch assembly	636926-001

The front I/O and power switch/LEDs are one assembly, attached to the front of the chassis. Push the assembly into the chassis to remove.

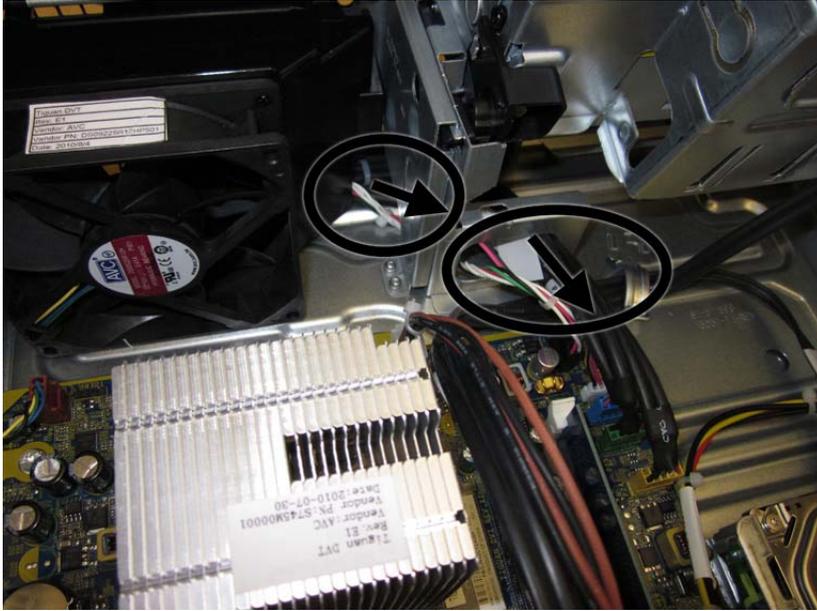
1. Prepare the computer for disassembly ([Preparation for Disassembly on page 37](#)).
2. Remove the access panel ([Computer Access Panel on page 39](#)).
3. Remove the front bezel ([Front Bezel on page 40](#)).
4. Remove the chassis fan ([Front Fan Assembly on page 70](#)).
5. Rotate the drive cage to its upright position.
6. Disconnect the four cables from the system board as follows:
  - Yellow connector labeled FRONT USB1
  - Green connector labeled FRONT USB2
  - Blue connector labeled FRONT AUD
  - Black connector labeled PB/LED
7. Remove the screw that secures the assembly to the front of the chassis.

**Figure 7-44** Removing the front I/O, power switch/LED assembly screw



8. Route the cables through the slots beneath the drive cage, pull the assembly (right side first) into the chassis, and then remove the assembly from the computer.

**Figure 7-45** Routing the cables and removing the power switch assembly



To install the front I/O and power switch assembly, reverse the removal procedure.

 **NOTE:** Be sure to correctly route the cables beneath the drive cage when reinstalling the assembly. Proper cable routing prevents damage to the cables and allows the drive cage to close properly.

## Speaker

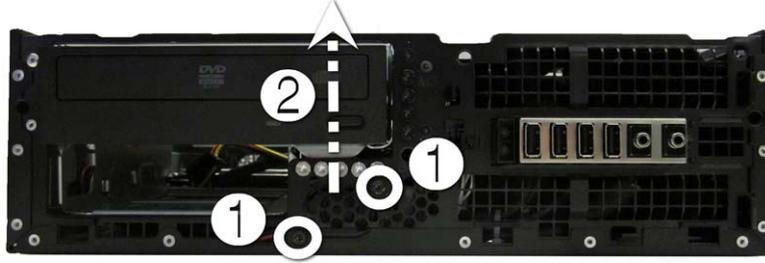
Description	Spare part number
Speaker	636925-001

The speaker is attached to the front of the chassis under the rotating drive cage.

1. Prepare the computer for disassembly ([Preparation for Disassembly on page 37](#)).
2. Remove the access panel ([Computer Access Panel on page 39](#)).
3. Remove the front bezel ([Front Bezel on page 40](#)).
4. Rotate the drive cage to its upright position.
5. Disconnect the speaker wire from the white system board labeled SPKR
6. Remove the two screws that secure the speaker to the chassis **(1)**.

7. Lift the speaker from the inside of the chassis to remove it (2).

**Figure 7-46** Removing the speaker



To install the speaker, reverse the removal procedures.

## Heat sink

Description	Spare part number
Heat sink	636919-001

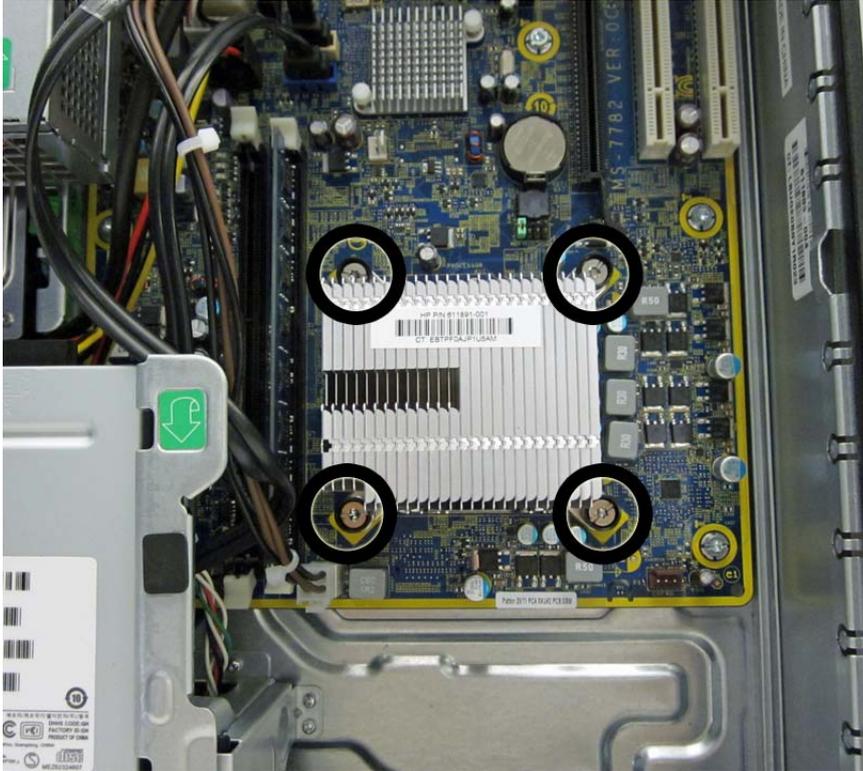
The heat sink is secured atop the processor with four captive Torx screws. The heat sink does not include a fan.

1. Prepare the computer for disassembly ([Preparation for Disassembly on page 37](#)).
2. Remove the access panel ([Computer Access Panel on page 39](#)).
3. Remove the baffle ([Baffle on page 69](#)).
4. Remove the chassis fan ([Front Fan Assembly on page 70](#)).

5. Loosen the four captive screws that secure the heat sink to the system board tray.

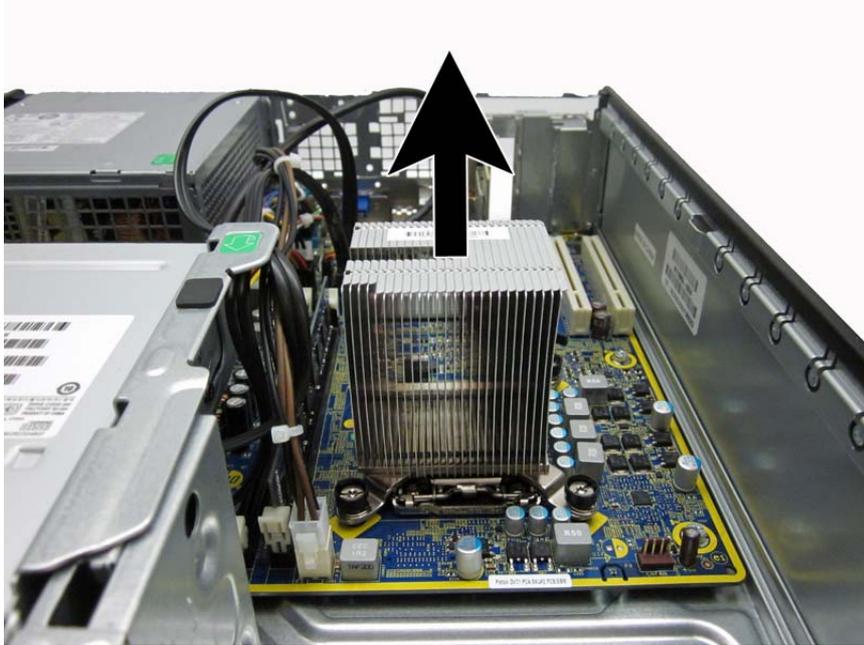
**⚠ CAUTION:** Heat sink retaining screws should be removed in diagonally opposite pairs (as in an X) to even the downward forces on the processor. This is especially important as the pins on the socket are very fragile and any damage to them may require replacing the system board.

**Figure 7-47** Removing the heat sink screws



6. Lift the heat sink from atop the processor and set it on its side to keep from contaminating the work area with thermal grease.

**Figure 7-48** Removing the heat sink



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

**CAUTION:** Heat sink retaining screws should be tightened in diagonally opposite pairs (as in an X) to evenly seat the heat sink on the processor to avoid damage that could require replacing the system board.

Failure to install the baffle may cause the computer to overheat.

# Processor

Description	Spare part number
Intel Core i7 3770s processor, 3.1 GHz	689370-001
Intel Core i5 3570 processor, 3.4 GHz	688162-001
Intel Core i5 3570s processor, 3.1 GHz	695079-001
Intel Core i5 3475s processor, 2.9 GHz	695078-001
Intel Core i5 3470s processor, 2.9 GHz	695077-001
Intel Core i3 2130 processor, 3.4 GHz	665120-001
Intel Core i3 2120 processor, 3.3 GHz	638629-001
Intel Pentium Dual-Core G870 processor, 3.1 GHz	691936-001
Intel Pentium Dual-Core G860 processor, 3.0 GHz	665123-001
Intel Pentium Dual-Core G640 processor, 2.8 GHz	691935-001
Intel Celeron G550 processor, 2.6 GHz	691934-001
Intel Celeron G540 processor, 2.5 GHz	665119-001
Intel Celeron G460 processor, 1.8 GHz	682410-001

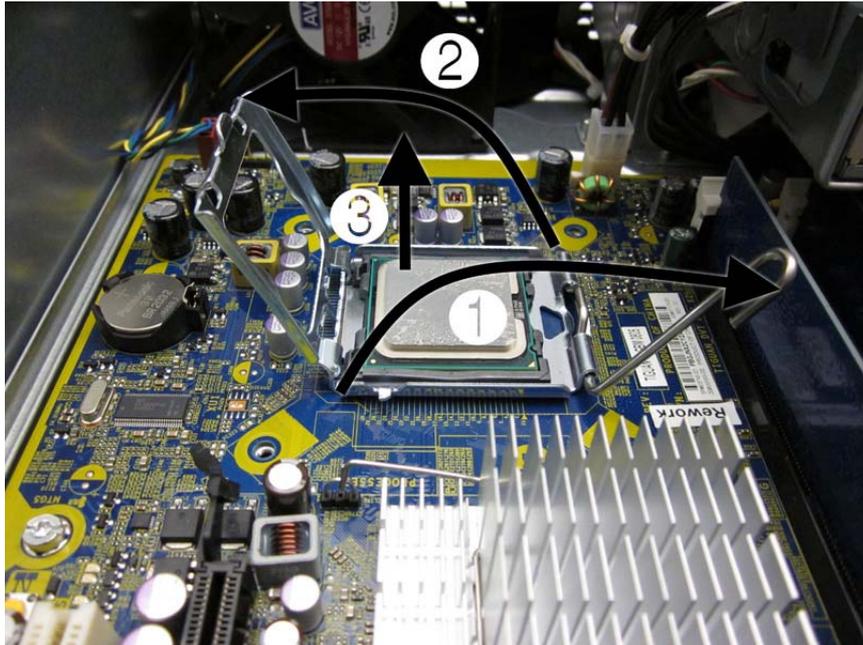
1. Prepare the computer for disassembly ([Preparation for Disassembly on page 37](#)).
2. Remove the access panel ([Computer Access Panel on page 39](#)).
3. Remove the baffle ([Baffle on page 69](#)).
4. Remove the heat sink ([Heat sink on page 73](#)).
5. Rotate the locking lever to its full open position **(1)**.
6. Raise and rotate the microprocessor retainer to its fully open position **(2)**.

7. Carefully lift the processor from the socket (3).

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

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

**Figure 7-49** Removing the processor



To install a new processor:

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

**CAUTION:** Before reinstalling the heat sink you must clean the top of the processor and the bottom of the heat sink with an alcohol pad supplied in the spares kit. After the alcohol has evaporated, apply thermal grease to the top of the processor from the syringe supplied in the spares kit.

4. Apply the thermal grease provided in the spares kit to the top of the processor and install the heat sink atop the processor.
5. Go to step 7.

6. 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.
7. Secure the heat sink to the system board and system board tray with the four captive screws and attach the heat sink control cable to the system board.

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

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

## Power Supply

Description	Spare part number
Power supply, 240W, 85% efficiency	613663-001
Power supply, 240W, High voltage protection	613664-001
Power supply, 240W	613763-001

**WARNING!** To reduce potential safety issues, only the power supply provided with the computer, a replacement power supply provided by HP, or a power supply purchased as an accessory from HP should be used with the computer.

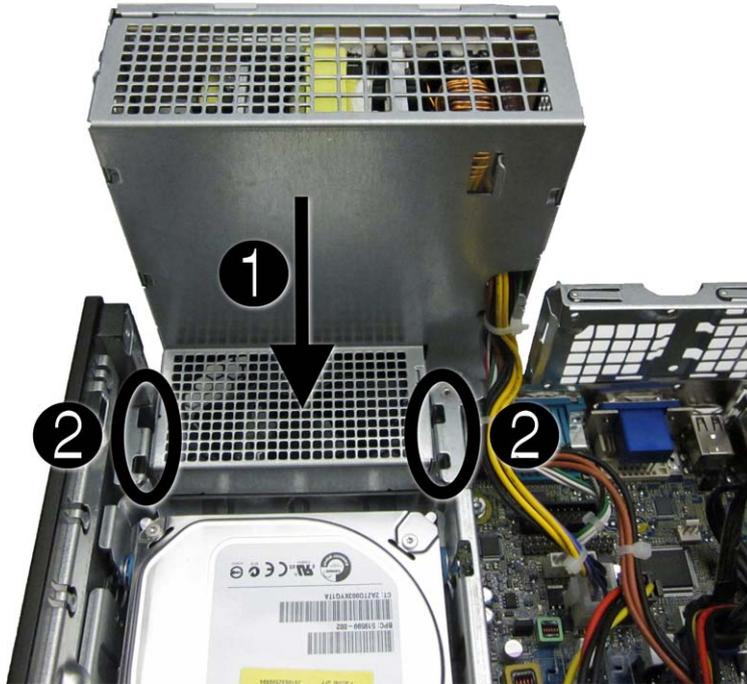
The rotating power supply is located at the rear of the chassis. It is held in place by a bracket – no screws are used.

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

1. Prepare the computer for disassembly ([Preparation for Disassembly on page 37](#)).
2. Remove the access panel ([Computer Access Panel on page 39](#)).
3. Rotate the drive cage up and disconnect the power cables from all of the drives.
4. Disconnect the power cables from the system board connectors labeled PWRCPU, PWR, and PWRCMD.
5. Rotate the power supply to its full upright position.
6. Release the power supply cables from the cable retaining clip under the drive cage.

7. Pull the power supply forward (1) until the posts (2) on the power supply move forward in the power supply bracket, and then lift the power supply straight up and out of the chassis.

**Figure 7-50** Removing the power supply



Use the following table to determine the correct power supply/system board connections.

**Table 7-4** Power supply cable – system board connector

Power supply connector label	System board connector
P1	PWR
P2	PWRCMD
P3	PWRCPU

To install the power supply, reverse the removal procedure.

**CAUTION:** When installing the power supply cables, make sure they are properly positioned so they are not cut by the drive cage and are not pinched by the rotating power supply.

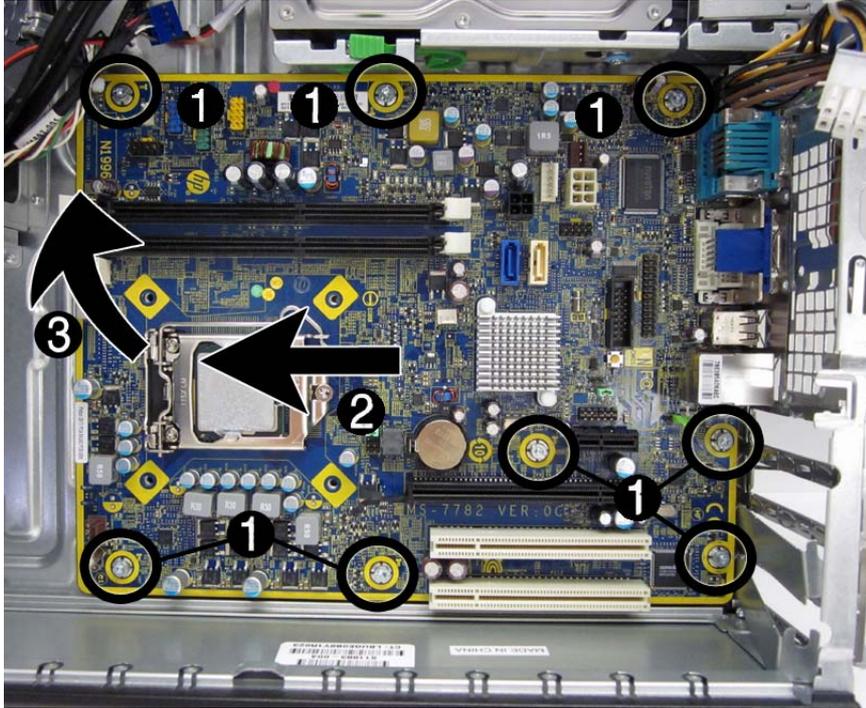
# System Board

Description	Spare part number
System board – standard (includes thermal material)	676358-001

1. Prepare the computer for disassembly ([Preparation for Disassembly on page 37](#)).
2. Remove the access panel ([Computer Access Panel on page 39](#)).
3. When replacing the system board, make sure the following components are removed from the defective system board and installed on the replacement system board:
  - Memory modules (see [Installing Additional Memory on page 43](#))
  - Expansion cards ([Removing or Installing an Expansion Card on page 46](#))
  - Heat sink ([Heat sink on page 73](#))
  - Processor ([Processor on page 76](#))
4. Remove the baffle from the chassis ([Baffle on page 69](#)).
5. Remove the fan from the chassis ([Front Fan Assembly on page 70](#)).
6. Rotate the drive cage to its upright position.
7. Rotate the power supply to its full upright position.
8. Disconnect all data and power cables from the system board.
9. Disconnect the balance of the cables from the system board.
10. Remove the eight screws **(1)** that secure the system board to the chassis.

11. Slide the system board toward the front of the chassis (2), and then lift the rear of the system board up and out of the chassis (3).

**Figure 7-51** Removing the system board



To install the system board, reverse the removal procedure.

 **NOTE:** When replacing the system board, you must also change the chassis serial number in the BIOS.

 **CAUTION:** Before reinstalling the heat sink you must clean the top of the processor and the bottom of the heat sink with an alcohol pad supplied in the spares kit. After the alcohol has evaporated, apply thermal grease to the top of the processor from the syringe supplied in the spares kit.

**CAUTION:** When reconnecting the cables it is important that they be positioned so they do not interfere with the rotation of the drive cage or power supply.

# Battery

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

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

 **WARNING!** This computer contains an internal lithium manganese dioxide battery. There is a risk of fire and burns if the battery is not handled properly. To reduce the risk of personal injury:

Do not attempt to recharge the battery.

Do not expose to temperatures higher than 140°F (60°C).

Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.

Replace the battery only with the HP spare designated for this product.

 **CAUTION:** Before replacing the battery, it is important to back up the computer CMOS settings. When the battery is removed or replaced, the CMOS settings will be cleared. Refer to [Computer Setup \(F10\) Utility on page 8](#) for information on backing up the CMOS settings.

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

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

- 
1. Prepare the computer for disassembly ([Preparation for Disassembly on page 37](#)).
  2. Remove the access panel ([Computer Access Panel on page 39](#)).

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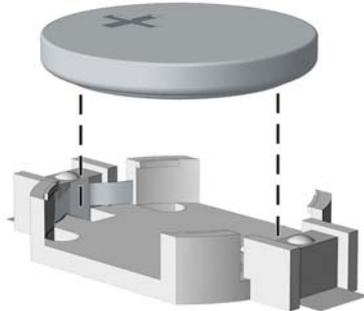
 **NOTE:** It may be necessary to remove an expansion card to gain access to the battery.

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

## Type 1 Battery Holder

1. Lift the battery out of its holder.

**Figure 7-52** Removing the battery from a type 1 holder

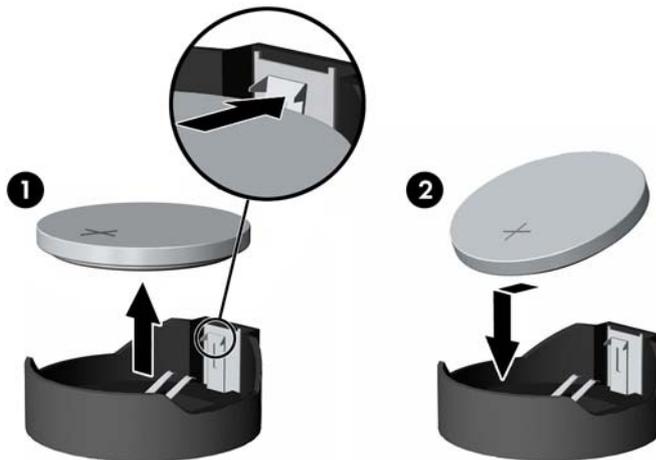


2. Slide the replacement battery into position, positive side up.
3. The battery holder automatically secures the battery in the proper position.
4. Replace the computer access panel.
5. Plug in the computer and turn on power to the computer.
6. Reset the date and time, your passwords, and any special system setups, using Computer Setup. Refer to [Computer Setup \(F10\) Utility on page 8](#).

## Type 2 Battery Holder

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

**Figure 7-53** Removing the battery from a type 2 holder

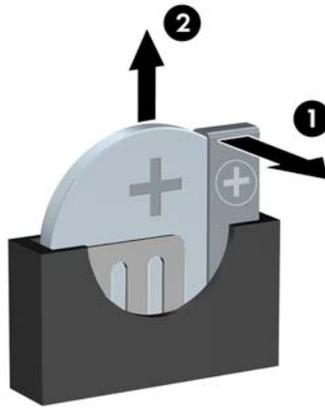


3. Replace the computer access panel.
4. Plug in the computer and turn on power to the computer.
5. Reset the date and time, your passwords, and any special system setups, using Computer Setup. Refer to [Computer Setup \(F10\) Utility on page 8](#).

## Type 3 Battery Holder

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

**Figure 7-54** Removing the battery from a type 3 holder



3. Replace the computer access panel.
4. Plug in the computer and turn on power to the computer.
5. Reset the date and time, your passwords, and any special system setups, using Computer Setup. Refer to [Computer Setup \(F10\) Utility on page 8](#).

# Using the Small Form Factor Computer in a Tower Orientation

The Small Form Factor computer can be used in a tower orientation. The HP logo plate on the front bezel is adjustable for either desktop or tower orientation.

1. Prepare the computer for disassembly ([Preparation for Disassembly on page 37](#)).
2. Orient the computer so that its right side is facing down and place the computer in the optional stand.

**Figure 7-55** Changing from Desktop to Tower Orientation



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 **NOTE:** To stabilize the computer in a tower orientation, HP recommends the use of the optional tower stand.

---

3. Lock any security devices that were disengaged when the access panel was removed.

---

 **NOTE:** Ensure at least 10.2 centimeters (4 inches) of space on all sides of the computer remains clear and free of obstructions.

---

## Installing a Security Lock

The security locks displayed below and on the following pages can be used to secure the computer.

### HP/Kensington MicroSaver Security Cable Lock

**Figure 7-56** Installing a Cable Lock



## Padlock

Figure 7-57 Installing a Padlock



## Front Bezel Security

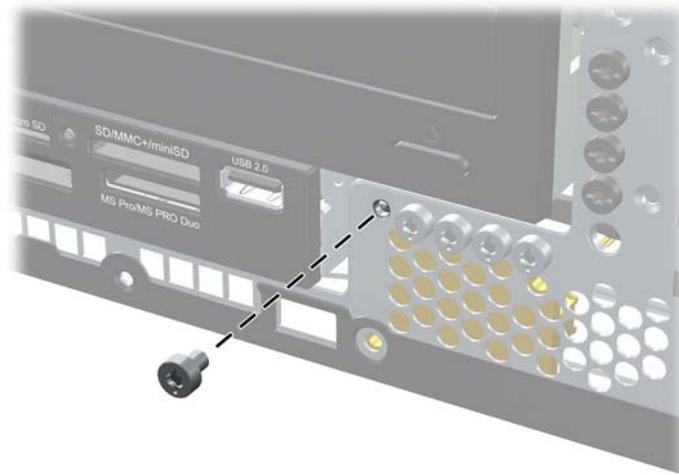
The front bezel can be locked in place by installing a security screw provided by HP. To install the security screw:

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

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

5. If the computer is on a stand, remove the computer from the stand.
6. Remove the access panel and front bezel.
7. Remove one of the five silver 6-32 standard screws located on the front of the chassis behind the bezel.

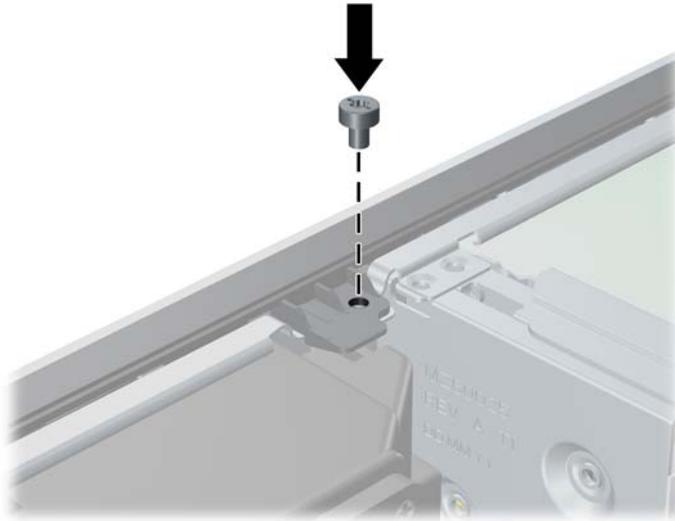
**Figure 7-58** Retrieving the Front Bezel Security Screw



8. Replace the front bezel.

9. Install the security screw next to the middle front bezel release tab to secure the front bezel in place.

**Figure 7-59** Installing the Front Bezel Security Screw



10. Replace the access panel.
11. If the computer was on a stand, replace the stand.
12. Reconnect the power cord and turn on the computer.
13. Lock any security devices that were disengaged when the access panel was removed.

---

# A 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<sup>2</sup> 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.

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 **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<sup>2</sup> 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<sup>2</sup> conductor size. Wall plug must be a two-pole grounding type with a Japanese Industrial Standard C8303 (7A, 125V) configuration.

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## B POST Error Messages

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

POST Message Disabled suppresses most system messages during POST, such as memory count and non-error text messages. If a POST error occurs, the screen will display the error message. To manually switch to the POST Messages Enabled mode during POST, press any key (except **F10**, **F11**, or **F12**). The default mode is POST Message Disabled.

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

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.



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

---

# POST Numeric Codes and Text Messages

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



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

**Table B-1** Numeric Codes and Text Messages

Control panel message	Description	Recommended action
ERROR: No boot disk has been detected or the disk has failed.	The computer cannot read the boot sector of the boot disk.	<ol style="list-style-type: none"><li>1. Check drive data and power cables.</li><li>2. Use F10 Setup to make sure the first boot device is set to drive C or the primary hard drive.</li><li>3. The drive has failed due to mechanical or virus corruption. Replace the drive.</li></ol>
Keyboard Error	Keyboard failure.	<ol style="list-style-type: none"><li>1. Reconnect keyboard with computer turned off.</li><li>2. Check connector for bent or missing pins.</li><li>3. Ensure that none of the keys are depressed.</li><li>4. Replace keyboard.</li><li>5. Replace the system board.</li></ol>
511-CPU Fan not Detected	CPU fan is not connected or may have malfunctioned.	<ol style="list-style-type: none"><li>1. Reseat CPU fan.</li><li>2. Reseat fan cable.</li><li>3. Replace CPU fan.</li></ol>
1720-SMART Hard Drive Detects Imminent Failure	Hard drive is about to fail. (Some hard drives have a hard drive firmware patch that will fix an erroneous error message.)	<ol style="list-style-type: none"><li>1. Determine if hard drive is giving correct error message. Enter Computer Setup and run the Drive Protection System test under <b>Storage &gt; DPS Self-test</b>.</li><li>2. Apply hard drive firmware patch if applicable. (Available at <a href="http://www.hp.com/support">http://www.hp.com/support</a>.)</li><li>3. Back up contents and replace hard drive.</li></ol>
Unsupported CPU	Recently installed processor is not supported by the system.	Install a processor supported by your system.
Time & Date Not Set	Invalid time or date in configuration memory.  RTC (real-time clock) battery may need to be replaced.  CMOS jumper may not be properly installed.	Reset the date and time under Control Panel (Computer Setup can also be used). If the problem persists, replace the RTC battery.  Check for proper placement of the CMOS jumper if applicable.

# Interpreting POST Diagnostic Front Panel LEDs and Audible Codes

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

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

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

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

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

**Table B-2 Diagnostic Front Panel LEDs and Audible Codes**

Activity	Blinks	Possible Cause	Recommended Action
Red Power LED flashes two times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	2	Processor thermal protection activated:  A fan may be blocked or not turning.  OR  The heat sink/fan assembly is not properly attached to the processor.	<ol style="list-style-type: none"><li>1. Ensure that the computer air vents are not blocked and the processor cooling fan is running.</li><li>2. Open hood, press power button, and see if the processor fan spins. If the processor fan is not spinning, make sure the fan's cable is plugged onto the system board header.</li><li>3. If fan is plugged in, but is not spinning, then replace heat sink/fan assembly.</li><li>4. Contact an authorized reseller or service provider.</li></ol>
Red Power LED flashes three times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	3	Processor not installed (not an indicator of bad processor).	<ol style="list-style-type: none"><li>1. Check to see that the processor is present.</li><li>2. Reseat the processor.</li></ol>

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

Activity	Blinks	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).  OR  The incorrect external power supply adapter is being used on the USDT.	<ol style="list-style-type: none"> <li>1. Open the hood and ensure the 4 or 6-wire power supply cable is seated into the connector on the system board.</li> <li>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.</li> <li>3. Replace the power supply.</li> <li>4. Replace the system board.</li> </ol> <p>OR</p> <p>The USDT power supply adapter must be at 135W and use the Smart ID technology before the system will power up. Replace the power supply adapter with the HP-supplied USDT power supply adapter.</p>
Red Power LED flashes five times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	5	Pre-video memory error.	<p><b>CAUTION:</b> To avoid damage to the DIMMs or the system board, you must unplug the computer power cord before attempting to reseat, install, or remove a DIMM module.</p> <ol style="list-style-type: none"> <li>1. Reseat DIMMs.</li> <li>2. Replace DIMMs one at a time to isolate the faulty module.</li> <li>3. Replace third-party memory with HP memory.</li> <li>4. Replace the system board.</li> </ol>
Red Power LED flashes six times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	6	Pre-video graphics error.	<p>For systems with a graphics card:</p> <ol style="list-style-type: none"> <li>1. Reseat the graphics card.</li> <li>2. Replace the graphics card.</li> <li>3. Replace the system board.</li> </ol> <p>For systems with integrated graphics, replace the system board.</p>
Red Power LED flashes eight times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	8	Invalid ROM based on bad checksum.	<ol style="list-style-type: none"> <li>1. Reflash the system ROM with the latest BIOS image.</li> <li>2. Replace the system board.</li> </ol>

---

# C Troubleshooting Without Diagnostics

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

 **NOTE:** For information on specific error messages that may appear on the screen during Power-On Self-Test (POST) at startup, refer to [POST Error Messages on page 92](#).

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## Safety and Comfort

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

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## Before You Call for Technical Support

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

- Run the HP diagnostic tool.
- Run the hard drive self-test in Computer Setup. Refer to the *Computer Setup (F10) Utility Guide* for more information.
- Check the Power LED on the front of the computer to see if it is flashing red. The flashing lights are error codes that will help you diagnose the problem. Refer to [POST Error Messages on page 92](#) for more information.
- If the screen is blank, plug the monitor into a different video port on the computer if one is available. Or, replace the monitor with a monitor that you know is functioning properly.
- If you are working on a network, plug another computer with a different cable into the network connection. There may be a problem with the network plug or cable.
- If you recently added new hardware, remove the hardware and see if the computer functions properly.
- If you recently installed new software, uninstall the software and see if the computer functions properly.

- Boot the computer to the Safe Mode to see if it will boot without all of the drivers loaded. When booting the operating system, use “Last Known Configuration.”
- Refer to the comprehensive online technical support at <http://www.hp.com/support>.
- Refer to [Helpful Hints on page 97](#) in this guide.

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

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

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

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

---

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

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

---

## Helpful Hints

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

- Check that the computer and monitor are plugged into a working electrical outlet.
- Check that the voltage select switch (some models) is set to the appropriate voltage for your region (115V or 230V).
- Check that the computer is turned on and the green power light is on.
- Check that the monitor is turned on and the green monitor light is on.
- Check the Power LED on the front of the computer to see if it is flashing red. The flashing lights are error codes that will help you diagnose the problem. Refer to [POST Error Messages on page 92](#) for more information.
- Turn up the brightness and contrast controls of the monitor if the monitor is dim.

- Press and hold any key. If the system beeps, then the keyboard should be operating correctly.
- Check all cable connections for loose connections or incorrect connections.
- Wake the computer by pressing any key on the keyboard or pressing the power button. If the system remains in suspend mode, shut down the computer by pressing and holding the power button for at least four seconds then press the power button again to restart the computer. If the system will not shut down, unplug the power cord, wait a few seconds, then plug it in again. The computer will restart if it is set to power on automatically as soon as power is restored in Computer Setup. If it does not restart, press the power button to start the computer.
- Reconfigure the computer after installing a non-plug and play expansion board or other option. See [Solving Hardware Installation Problems on page 121](#) for instructions.
- Be sure that all the needed device drivers have been installed. For example, if you are using a printer, you need a driver for that model printer.
- Remove all bootable media (diskette, CD, or USB device) from the system before turning it on.
- If you have installed an operating system other than the factory-installed operating system, check to be sure that it is supported on the system.
- If the system has multiple video sources (embedded, PCI, or PCI-Express adapters) installed (embedded video on some models only) and a single monitor, the monitor must be plugged into the monitor connector on the source selected as the primary VGA adapter. During boot, the other monitor connectors are disabled and if the monitor is connected into these ports, the monitor will not function. You can select which source will be the default VGA source in Computer Setup.

---

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

---

# Solving General Problems

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

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

**Table C-1 Solving General Problems**

<b>Computer appears locked up and will not turn off when the power button is pressed.</b>	
<b>Cause</b>	<b>Solution</b>
Software control of the power switch is not functional.	<ol style="list-style-type: none"><li>1. Press and hold the power button for at least four seconds until the computer turns off.</li><li>2. Disconnect the power cord from the electrical outlet.</li></ol>

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

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

<b>Cursor will not move using the <b>arrow</b> keys on the keypad.</b>	
<b>Cause</b>	<b>Solution</b>
The <b>Num Lock</b> key may be on.	Press the <b>Num Lock</b> key. The Num Lock light should not be on if you want to use the <b>arrow</b> keys. The <b>Num Lock</b> key can be disabled (or enabled) in Computer Setup.

**There is no sound or sound volume is too low.**

<b>Cause</b>	<b>Solution</b>
System volume may be set low or muted.	<ol style="list-style-type: none"><li>1. Check the F10 BIOS settings to make sure the internal system speaker is not muted (this setting does not affect the external speakers).</li><li>2. Make sure the external speakers are properly connected and powered on and that the speakers' volume control is set correctly.</li><li>3. Use the system volume control available in the operating system to make sure the speakers are not muted or to increase the volume.</li></ol>

**Cannot remove computer cover or access panel.**

<b>Cause</b>	<b>Solution</b>
Smart Cover Lock, featured on some computers, is locked.	Unlock the Smart Cover Lock using Computer Setup.  The Smart Cover FailSafe Key, a device for manually disabling the Smart Cover Lock, is available from HP. You will need the FailSafe Key in case of forgotten password, power loss, or computer malfunction. Order PN 166527-001 for the wrench-style key or PN 166527-002 for the screwdriver bit key.

**Poor performance is experienced.**

<b>Cause</b>	<b>Solution</b>
Processor is hot.	<ol style="list-style-type: none"><li>1. Make sure airflow to the computer is not blocked. Leave a 10.2-cm (4-inch) clearance on all vented sides of the computer and above the monitor to permit the required airflow.</li><li>2. Make sure fans are connected and working properly (some fans only operate when needed).</li><li>3. Make sure the processor heat sink is installed properly.</li></ol>
Hard drive is full.	Transfer data from the hard drive to create more space on the hard drive.
Low on memory.	Add more memory.
Hard drive fragmented.	Defragment hard drive.
Program previously accessed did not release reserved memory back to the system.	Restart the computer.
Virus resident on the hard drive.	Run virus protection program.

**Table C-1 Solving General Problems (continued)**

**Poor performance is experienced.**

<b>Cause</b>	<b>Solution</b>
Too many applications running.	<ol style="list-style-type: none"><li>1. Close unnecessary applications to free up memory.</li><li>2. Add more memory. Some applications run in the background and can be closed by right-clicking on their corresponding icons in the task tray. To prevent these applications from launching at startup, go to <b>Start &gt; Run</b> (Windows XP), <b>Start &gt; Accessories &gt; Run</b> (Windows Vista), or click on the Windows 7 start icon in the bottom left corner of the screen (Windows 7) and type <code>msconfig</code>. On the <b>Startup</b> tab of the System Configuration Utility, clear applications that you do not want to launch automatically.</li></ol>
Some software applications, especially games, are stressful on the graphics subsystem	<ol style="list-style-type: none"><li>1. Lower the display resolution for the current application or consult the documentation that came with the application for suggestions on how to improve performance by adjusting parameters in the application.</li><li>2. Add more memory.</li><li>3. Upgrade the graphics solution.</li></ol>
Cause unknown.	Restart the computer.

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

<b>Cause</b>	<b>Solution</b>
Processor thermal protection activated: A fan may be blocked or not turning. OR The heat sink is not properly attached to the processor.	<ol style="list-style-type: none"><li>1. Ensure that the computer air vents are not blocked and the processor cooling fan is running.</li><li>2. Open hood, press power button, and see if the processor fan spins. If the processor fan is not spinning, make sure the fan's cable is plugged onto the system board header.</li><li>3. If fan is plugged in, but is not spinning, then replace the heat sink/fan assembly.</li><li>4. Contact an authorized reseller or service provider.</li></ol>

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

<b>Cause</b>	<b>Solution</b>
System unable to power on.	<p data-bbox="849 268 1449 331">Press and hold the power button for less than 4 seconds. If the hard drive LED turns green, then:</p> <ol data-bbox="849 352 1449 590" style="list-style-type: none"><li data-bbox="849 352 1449 457">1. Check that the voltage selector, located on the rear of the power supply on some models, is set to the appropriate voltage. Proper voltage setting depends on your region.</li><li data-bbox="849 478 1449 541">2. Remove the expansion cards one at a time until the 5V_aux light on the system board turns on.</li><li data-bbox="849 562 1449 590">3. Replace the system board.</li></ol> <p data-bbox="849 611 1449 642">OR</p> <p data-bbox="849 663 1449 726">Press and hold the power button for less than 4 seconds. If the hard drive LED does not turn on green then:</p> <ol data-bbox="849 747 1449 1152" style="list-style-type: none"><li data-bbox="849 747 1449 774">1. Check that the unit is plugged into a working AC outlet.</li><li data-bbox="849 795 1449 858">2. Open hood and check that the power button harness is properly connected to the system board.</li><li data-bbox="849 879 1449 942">3. Check that both power supply cables are properly connected to the system board.</li><li data-bbox="849 963 1449 1047">4. Check to see if the 5V_aux light on the system board is turned on. If it is turned on, then replace the power button harness.</li><li data-bbox="849 1068 1449 1131">5. If the 5V_aux light on the system board is off, then replace the power supply.</li><li data-bbox="849 1152 1449 1180">6. Replace the system board.</li></ol>

# Solving Power Problems

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

**Table C-2 Solving Power Problems**

**Power supply shuts down intermittently.**

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

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

Cause	Solution
Processor thermal protection activated: A fan may be blocked or not turning. OR The heat sink is not properly attached to the processor.	<ol style="list-style-type: none"><li>1. Ensure that the computer air vents are not blocked and the processor cooling fan is running.</li><li>2. Open hood, press power button, and see if the processor fan spins. If the processor fan is not spinning, make sure the fan's cable is plugged onto the system board header.</li><li>3. If fan is plugged in, but is not spinning, then replace the heat sink/fan assembly.</li><li>4. Contact an authorized reseller or service provider.</li></ol>

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

Cause	Solution
Power failure (power supply is overloaded).	<ol style="list-style-type: none"><li>1. Check that the voltage selector, located on the rear of the power supply (some models), is set to the appropriate voltage. Proper voltage setting depends on your region.</li><li>2. Open the hood and ensure the 4- or 6-wire power supply cable is seated into the connector on the system board.</li><li>3. Check if a device is causing the problem by removing ALL attached devices (such as hard, diskette, or optical drives, and expansion cards). Power on the system. If the system enters the POST, then power off and replace one device at a time and repeat this procedure until failure occurs. Replace the device that is causing the failure. Continue adding devices one at a time to ensure all devices are functioning properly.</li><li>4. Replace the power supply.</li><li>5. Replace the system board.</li></ol>
The incorrect external power supply adapter is being used on the USDT.	The USDT power supply adapter must be at 135W and use the Smart ID technology before the system will power up. Replace the power supply adapter with the HP-supplied USDT power supply adapter.

# Solving Hard Drive Problems

**Table C-3 Solving Hard Drive Problems**

<b>Hard drive error occurs.</b>	
<b>Cause</b>	<b>Solution</b>
Hard disk has bad sectors or has failed.	<ol style="list-style-type: none"><li>1. In Microsoft Windows XP, right-click <b>Start</b>, click <b>Explore</b>, and select a drive. Select <b>File &gt; Properties &gt; Tools</b>. Under <b>Error-checking</b>, click <b>Check Now</b>.  In Microsoft Windows Vista and Windows 7, right-click <b>Start</b>, click <b>Explore</b>, and right-click on a drive. Select <b>Properties</b> then select the <b>Tools</b> tab. Under <b>Error-checking</b> click <b>Check Now</b>.</li><li>2. Use a utility to locate and block usage of bad sectors. If necessary, reformat the hard disk.</li></ol>
<b>Disk transaction problem.</b>	
<b>Cause</b>	<b>Solution</b>
Either the directory structure is bad or there is a problem with a file.	In Microsoft Windows XP, right-click <b>Start</b> , click <b>Explore</b> , and select a drive. Select <b>File &gt; Properties &gt; Tools</b> . Under <b>Error-checking</b> , click <b>Check Now</b> .  In Microsoft Windows Vista and Windows 7, right-click <b>Start</b> , click <b>Explore</b> , and right-click on a drive. Select <b>Properties</b> then select the <b>Tools</b> tab. Under <b>Error-checking</b> click <b>Check Now</b> .
<b>Drive not found (identified).</b>	
<b>Cause</b>	<b>Solution</b>
Cable could be loose.	Check cable connections.
The system may not have automatically recognized a newly installed device.	See reconfiguration directions in the <a href="#">Solving Hardware Installation Problems on page 121</a> section. If the system still does not recognize the new device, check to see if the device is listed within Computer Setup. If it is listed, the probable cause is a driver problem. If it is not listed, the probable cause is a hardware problem.  If this is a newly installed drive, run the Computer Setup utility and try adding a POST delay under <b>Advanced &gt; Power-On</b> .
The device is attached to a SATA port that has been hidden in Computer Setup.	Run the Computer Setup utility and ensure <b>Device Available</b> is selected for the device's SATA port in <b>Security &gt; Device Security</b> .
Drive responds slowly immediately after power-up.	Run Computer Setup and increase the POST Delay in <b>Advanced &gt; Power-On Options</b> .

### Nonsystem disk/NTLDR missing message.

Cause	Solution
The system is trying to start from a diskette that is not bootable.	Remove the diskette from the diskette drive.
The system is trying to start from the hard drive but the hard drive may have been damaged.	<ol style="list-style-type: none"><li>1. Insert a bootable diskette into the diskette drive and restart the computer.</li><li>2. Check the hard drive format using fdisk: If NTFS formatting, use a third party reader to evaluate the drive. If FAT32 formatting, the hard drive cannot be accessed.</li></ol>
System files missing or not properly installed.	<ol style="list-style-type: none"><li>1. Insert a bootable diskette into the diskette drive and restart the computer.</li><li>2. Check the hard drive format using Fdisk: If NTFS formatting, use a third party reader to evaluate the drive. If FAT32 formatting, the hard drive cannot be accessed.</li><li>3. Install system files for the appropriate operating system.</li></ol>
Hard drive boot has been disabled in Computer Setup.	Run the Computer Setup utility and enable the hard drive entry in the <b>Storage &gt; Boot Order</b> list.
Bootable hard drive is not attached as first in a multi-hard drive configuration.	If attempting to boot from a hard drive, ensure it is attached to the system board connector labeled P60 SATA 0.
Bootable hard drive's controller is not listed first in the Boot Order.	Run the Computer Setup utility and select <b>Storage &gt; Boot Order</b> and ensure the bootable hard drive's controller is listed immediately under the <b>Hard Drive</b> entry.

### Computer will not boot from hard drive.

Cause	Solution
The device is attached to a SATA port that has been hidden in Computer Setup.	Run the Computer Setup utility and ensure <b>Device Available</b> is selected for the device's SATA port in <b>Security &gt; Device Security</b> .
Boot order is not correct.	Run the Computer Setup utility and change boot sequence in <b>Storage &gt; Boot Order</b> .
Hard Drive's "Emulation Type" is set to "None."	Run the Computer Setup utility and change the "Emulation Type" to "Hard Disk" in the device's details under <b>Storage &gt; Device Configuration</b> .
Hard drive is damaged.	Observe if the front panel Power LED is blinking RED and if any beeps are heard. See <a href="#">POST Error Messages on page 92</a> to determine possible causes for the blinking red and beep codes.  See the Worldwide Limited Warranty for terms and conditions.

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**Computer seems to be locked up.**

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

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**The removable hard drive has no power to the hard drive enclosure.**

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

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**The removable hard drive is not recognized by the computer.**

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

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

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

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# Solving Media Card Reader Problems

**Table C-4 Solving Media Card Reader Problems**

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

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

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

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

**Can not write to the media card.**

<b>Cause</b>	<b>Solution</b>
The media card is a read-only memory (ROM) card.	Check the manufacturer's documentation included with your card to see if it is writable. Refer to the previous section for a list of compatible cards.
Media card is locked. Locking the media card is a safety feature that prevents writing to and deleting from an SD/Memory Stick/PRO card.	If using an SD card, make sure that the lock tab located on the right of the SD card is not in the locked position. If using a Memory Stick/PRO card, make sure that the lock tab located on the bottom of the Memory Stick/PRO card is not in the locked position.

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

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

**Do not know how to remove a media card correctly.**

<b>Cause</b>	<b>Solution</b>
The computer's software is used to safely eject the card.	Open <b>My Computer</b> (Windows XP), <b>Computer</b> (Windows Vista), or <b>Devices and Printers</b> (Windows 7), right-click on the corresponding drive icon, and select <b>Eject</b> . Then pull the card out of the slot.  <b>NOTE:</b> Never remove the card when the green LED is flashing

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

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

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

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

# Solving Display Problems

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

**Table C-5 Solving Display Problems**

Cause	Solution
Monitor is not turned on and the monitor light is not on.	Turn on the monitor and check that the monitor light is on.
Bad monitor.	Try a different monitor.
The cable connections are not correct.	Check the cable connection from the monitor to the computer and to the electrical outlet.
You may have a screen blanking utility installed or energy saver features are enabled.	Press any key or click the mouse button and, if set, type your password.
System ROM is corrupted; system is running in Boot Block Emergency Recovery Mode (indicated by eight beeps).	Reflash the system ROM with the latest BIOS image.
You are using a fixed-sync monitor and it will not sync at the resolution chosen.	Be sure that the monitor can accept the same horizontal scan rate as the resolution chosen.
Computer is in <b>standby</b> mode.	Press the power button to resume from <b>standby</b> mode.
	<b>CAUTION:</b> When attempting to resume from <b>standby</b> mode, do not hold down the power button for more than four seconds. Otherwise, the computer will shut down and you will lose any unsaved data.
Monitor cable is plugged into the wrong connector.	If the computer system has both an integrated graphics connector and an add-in graphics card connector, plug the monitor cable into the graphics card connector on the back of the computer.
Monitor settings in the computer are not compatible with the monitor.	<ol style="list-style-type: none"><li data-bbox="858 1203 1436 1434">1. In Windows XP Control Panel, double-click the <b>Display</b> icon and select the <b>Settings</b> tab.  In Windows Vista Control Panel, under <b>Appearance and Personalization</b>, select <b>Adjust screen resolution</b>.  In Windows 7, right click in an empty space on the desktop and select <b>Screen Resolution</b>.</li><li data-bbox="858 1455 1436 1497">2. Reset the resolution.</li></ol>
Monitor is configured to use an input that is not active.	Use the monitor's on-screen menu controls to select the input that is being driven by the system. Refer to the monitor's user documentation for more information on the on-screen controls and settings.

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

Cause	Solution
On systems with Intel integrated graphics, the integrated graphics cannot be enabled after installing a PCI Express x16.	The integrated graphics can be enabled in Computer Setup if a PCI or PCI Express x1 graphics card is installed, but it cannot be enabled if there is a graphics card in the PCI Express x16 slot.

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

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

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

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

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

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

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

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

### Dim characters.

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

### Blurry video or requested resolution cannot be set.

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

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

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

### Image is not centered.

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

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

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

**“Out of Range” displays on screen.**

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

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

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

**Clicking noise coming from inside a CRT monitor.**

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

**High pitched noise coming from inside a flat panel monitor.**

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

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

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

**Certain typed symbols do not appear correct.**

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

# Solving Audio Problems

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

**Table C-6 Solving Audio Problems**

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

<b>Sound does not come out of the speaker or headphones.</b>	
<b>Cause</b>	<b>Solution</b>
Software volume control is turned down or muted.	Double-click the <b>Speaker</b> icon on the taskbar, then make sure that <b>Mute</b> is not selected and use the volume slider to adjust the volume.
Audio is hidden in Computer Setup.	Enable the audio in Computer Setup: <b>Security &gt; Device Security &gt; System Audio</b> .
The external speakers are not turned on.	Turn on the external speakers.
The audio device may be connected to the wrong jack.	Ensure that the device is connected to the correct jack on the computer. The speakers should be plugged into the rear line-out jack and the headphones should be plugged into the front headphone jack.
External speakers plugged into the wrong audio jack on a recently installed sound card.	See the sound card documentation for proper speaker connection.
Digital CD audio is not enabled.	Enable digital CD audio. In the Device Manager, right-click on the CD/DVD device and select <b>Properties</b> . Make sure <b>Enable digital CD audio for this CD-ROM device</b> is checked.
Headphones or devices connected to the line-out connector mute the internal speaker.	Turn on and use headphones or external speakers, if connected, or disconnect headphones or external speakers.

**Table C-6 Solving Audio Problems (continued)**

**Sound does not come out of the speaker or headphones.**

<b>Cause</b>	<b>Solution</b>
Computer is in <b>standby</b> mode.	Press the power button to resume from <b>standby</b> mode.  <b>CAUTION:</b> When attempting to resume from <b>standby</b> mode, do not hold down the power button for more than four seconds. Otherwise, the computer will shut down and you will lose any unsaved data.
Internal speaker is disabled in Computer Setup.	Enable the internal speaker in Computer Setup. Select <b>Advanced &gt; Device Options &gt; Internal Speaker</b> .
The application is set to use a different audio device than speakers.	Some graphics cards support audio over the DisplayPort connection, so multiple audio devices may be listed in Device Manager. Make sure the correct device is being used.
Some applications can select which audio output device is used.	Make sure the application has selected the correct audio device.
The operating system controls may be set to use a different audio device as the default output device than what is expected.	Set the operating system to use the correct audio device.

**Sound from headphones is not clear or muffled.**

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

**Computer appears to be locked up while recording audio.**

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

**Line-in jack is not functioning properly.**

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

**There is no sound or sound volume is too low.**

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

## Solving Printer Problems

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

**Table C-7 Solving Printer Problems**

**Printer will not print.**

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

**Printer will not turn on.**

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

**Printer prints garbled information.**

<b>Cause</b>	<b>Solution</b>
The correct printer driver for the application is not installed.	Install the correct printer driver for the application.

**Table C-7 Solving Printer Problems (continued)**

**Printer prints garbled information.**

<b>Cause</b>	<b>Solution</b>
The cables may not be connected properly.	Reconnect all cables.
Printer memory may be overloaded.	Reset the printer by turning it off for one minute, then turn it back on.

**Printer is offline.**

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

# Solving Keyboard and Mouse Problems

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

**Table C-8 Solving Keyboard Problems**

**Keyboard commands and typing are not recognized by the computer.**

Cause	Solution
Keyboard connector is not properly connected.	<ol style="list-style-type: none"><li>1. On the Windows XP Desktop, click <b>Start &gt; Shut Down</b>.  On the Windows Vista or Windows 7 desktop, click <b>Start</b>, click the arrow on the lower right corner of the Start menu, then select <b>Shut Down</b>.</li><li>2. After the shutdown is complete, reconnect the keyboard to the back of the computer and restart the computer.</li></ol>
Program in use has stopped responding to commands.	Shut down your computer using the mouse and then restart the computer.
Keyboard needs repairs.	See the Worldwide Limited Warranty for terms and conditions.
Computer is in <b>standby</b> mode.	Press the power button to resume from <b>standby</b> mode.  <b>CAUTION:</b> When attempting to resume from <b>standby</b> mode, do not hold down the power button for more than four seconds. Otherwise, the computer will shut down and you will lose any unsaved data.

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

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

**Table C-9 Solving Mouse Problems**

**Mouse does not respond to movement or is too slow.**

Cause	Solution
Mouse connector is not properly plugged into the back of the computer.	Shut down the computer using the keyboard. <ol style="list-style-type: none"><li>1. Press the <b>Ctrl</b> and <b>Esc</b> keys at the same time (or press the <b>Windows logo</b> key) to display the <b>Start</b> menu.</li><li>2. Use the arrow keys to select <b>Shut Down</b> and then press the <b>Enter</b> key.</li><li>3. After the shutdown is complete, plug the mouse connector into the back of the computer (or the keyboard) and restart.</li></ol>

**Table C-9 Solving Mouse Problems (continued)**

**Mouse does not respond to movement or is too slow.**

<b>Cause</b>	<b>Solution</b>
Program in use has stopped responding to commands.	Shut down the computer using the keyboard then restart the computer.
Mouse may need cleaning.	Remove the roller ball cover on the mouse and clean the internal components.
Mouse may need repair.	See the Worldwide Limited Warranty for terms and conditions.
Computer is in <b>standby</b> mode.	Press the power button to resume from <b>standby</b> mode.  <b>CAUTION:</b> When attempting to resume from <b>standby</b> mode, do not hold down the power button for more than four seconds. Otherwise, the computer will shut down and you will lose any unsaved data.

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

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

# Solving Hardware Installation Problems

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

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

**Table C-10 Solving Hardware Installation Problems**

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

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

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

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

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

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

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

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

# Solving Network Problems

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

**Table C-11 Solving Network Problems**

Cause	Solution
Wake-on-LAN feature is not functioning.	
S5 Maximum Power Saving feature is enabled.	Disable the S5 Maximum Power Saving option in Computer Setup. Select <b>Power &gt; Hardware Power Management &gt; S5 Maximum Power Saving</b> .
Wake-on-LAN is not enabled.	<p>To enable Wake-on-LAN in Windows XP:</p> <ol style="list-style-type: none"><li>1. Select <b>Start &gt; Control Panel</b>.</li><li>2. Double-click <b>Network Connections</b>.</li><li>3. Double-click <b>Local Area Connection</b>.</li><li>4. Click <b>Properties</b>.</li><li>5. Click <b>Configure</b>.</li><li>6. Click the <b>Power Management</b> tab, then select the check box to <b>Allow this device to bring the computer out of standby</b>.</li></ol> <p>To enable Wake-on-LAN in Windows Vista:</p> <ol style="list-style-type: none"><li>1. Select <b>Start &gt; Control Panel</b>.</li><li>2. Under <b>Network and Internet</b>, select <b>View network status and tasks</b>.</li><li>3. In the <b>Tasks</b> list, select <b>Manage network connections</b>.</li><li>4. Double-click <b>Local Area Connection</b>.</li><li>5. Click the <b>Properties</b> button.</li><li>6. Click the <b>Configure</b> button.</li><li>7. Click the <b>Power Management</b> tab, then select the check box to <b>Allow this device to wake the computer</b>.</li></ol> <p>To enable Wake-on-LAN in Windows 7:</p> <ol style="list-style-type: none"><li>1. Select <b>Start &gt; Control Panel</b>.</li><li>2. Under <b>Network and Sharing Center</b>, click <b>Change adapter settings</b>.</li><li>3. Right-click the network connection you want to enable WOL on and click <b>Properties</b>.</li><li>4. Click <b>Configure</b>.</li><li>5. Select <b>Allow this device to wake the computer</b>.</li><li>6. Click <b>OK</b>.</li></ol>

### Network driver does not detect network controller.

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

### Network status link light never flashes.

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

Cause	Solution
No active network is detected.	Check cabling and network equipment for proper connection.
Network controller is not set up properly.	Check for the device status within Windows, such as Device Manager for driver load and the Network Connections applet within Windows for link status.
Network controller is disabled.	<ol style="list-style-type: none"><li>1. Run Computer Setup and enable network controller.</li><li>2. Enable the network controller in the operating system via Device Manager.</li></ol>
Network driver is not properly loaded.	Reinstall network drivers.
System cannot autosense the network.	Disable auto-sensing capabilities and force the system into the correct operating mode.

### Diagnostics reports a failure.

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

---

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

---

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

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

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

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**Network controller stops working without apparent cause.**

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

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**New network card will not boot.**

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

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**Cannot connect to network server when attempting Remote System Installation.**

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

---

#### System setup utility reports unprogrammed EEPROM.

Cause	Solution
Unprogrammed EEPROM.	Contact an authorized service provider.

## Solving Memory Problems

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

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

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

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

**Table C-12 Solving Memory Problems**

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

Cause	Solution
A memory module is not installed in the XMM1 (or DIMM1) socket.	Ensure that a memory module is installed in the black XMM1 (or DIMM1) socket on the system board. This socket must be populated with a memory module.
Memory module is not the correct type or speed grade for the system or the new memory module is not seated properly.	Replace module with the correct industry-standard device for the computer. On some models, ECC and non-ECC memory modules cannot be mixed.

#### Out of memory error.

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

#### Memory count during POST is wrong.

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

**Insufficient memory error during operation.**

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

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

<b>Cause</b>	<b>Solution</b>
Memory is installed incorrectly or is bad.	<ol style="list-style-type: none"><li>1. Reseat DIMMs. Power on the system.</li><li>2. Replace DIMMs one at a time to isolate the faulty module.</li><li>3. Replace third-party memory with HP memory.</li><li>4. Replace the system board.</li></ol>

# Solving Processor Problems

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

**Table C-13 Solving Processor Problems**

**Poor performance is experienced.**

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

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

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

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

Cause	Solution
The current processor does not support a feature previously enabled on this system.	<ol style="list-style-type: none"><li>1. Install a TXT capable processor.</li><li>2. Disable TXT in the Computer Setup (F10) utility.</li><li>3. Reinstall the original processor.</li></ol>

# Solving CD-ROM and DVD Problems

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

**Table C-14 Solving CD-ROM and DVD Problems**

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

<b>Drive not found (identified).</b>	
<b>Cause</b>	<b>Solution</b>
Cable could be loose.	Check cable connections.
The system may not have automatically recognized a newly installed device.	See reconfiguration directions in the <a href="#">Solving Hardware Installation Problems on page 121</a> section. If the system still does not recognize the new device, check to see if the device is listed within Computer Setup. If it is listed, the probable cause is a driver problem. If it is not listed, the probable cause is a hardware problem.  If this is a newly installed drive, run the Computer Setup utility and try adding a POST delay under <b>Advanced &gt; Power-On Options</b> .
The device is attached to a SATA port that has been hidden in Computer Setup.	Run the Computer Setup utility and ensure <b>Device Available</b> is selected for the device's SATA port in <b>Security &gt; Device Security</b> .
Drive responds slowly immediately after power-up.	Run Computer Setup and increase the POST Delay in <b>Advanced &gt; Power-On Options</b> .

<b>CD-ROM or DVD devices are not detected or driver is not loaded.</b>	
<b>Cause</b>	<b>Solution</b>
Drive is not connected properly or not properly configured.	See the documentation that came with the optional device.

**Movie will not play in the DVD drive.**

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

**Cannot eject compact disc (tray-load unit).**

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

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

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

**Recording or copying CDs is difficult or impossible.**

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

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

<b>Cause</b>	<b>Solution</b>
The system is searching for the drive during boot because the drive cable is still attached to the system board.	Disconnect the drive cable from the system board.

## Solving USB Flash Drive Problems

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

**Table C-15 Solving USB Flash Drive Problems**

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

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

**USB flash drive not found (identified).**

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

**System will not boot from USB flash drive.**

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

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

<b>Cause</b>	<b>Solution</b>
Flash drive is bootable.	Install the flash drive only after the operating system boots.

# Solving Front Panel Component Problems

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

**Table C-16 Solving Front Panel Component Problems**

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

Cause	Solution
Device is not properly connected.	<ol style="list-style-type: none"><li>1. Turn off the computer.</li><li>2. Reconnect the device to the front of the computer and restart the computer.</li></ol>
The device does not have power.	If the USB device requires AC power, be sure one end is connected to the device and one end is connected to a live outlet.
The correct device driver is not installed.	<ol style="list-style-type: none"><li>1. Install the correct driver for the device.</li><li>2. You might need to reboot the computer.</li></ol>
The cable from the device to the computer does not work.	<ol style="list-style-type: none"><li>1. If possible, replace the cable.</li><li>2. Restart the computer.</li></ol>
The device is not working.	<ol style="list-style-type: none"><li>1. Replace the device.</li><li>2. Restart the computer.</li></ol>
USB ports on the computer are disabled in Computer Setup.	Run the Computer Setup utility and ensure that <b>Device available</b> is selected for appropriate USB ports under <b>Security &gt; Device Security</b> .

# Solving Internet Access Problems

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

**Table C-17 Solving Internet Access Problems**

<b>Unable to connect to the Internet.</b>	
<b>Cause</b>	<b>Solution</b>
Internet Service Provider (ISP) account is not set up properly.	Verify Internet settings or contact your ISP for assistance.
Modem is not set up properly.	Reconnect the modem. Verify the connections are correct using the quick setup documentation.
Web browser is not set up properly.	Verify that the Web browser is installed and set up to work with your ISP.
Cable/DSL modem is not plugged in.	Plug in cable/DSL modem. You should see a "power" LED light on the front of the cable/DSL modem.
Cable/DSL service is not available or has been interrupted due to bad weather.	Try connecting to the Internet at a later time or contact your ISP. (If the cable/DSL service is connected, the "cable" LED light on the front of the cable/DSL modem will be on.)
The CAT5 UTP cable is disconnected.	Connect the CAT5 UTP cable between the cable modem and the computer's RJ-45 connector. (If the connection is good, the "PC" LED light on the front of the cable/DSL modem will be on.)
IP address is not configured properly.	Contact your ISP for the correct IP address.
Cookies are corrupted. (A "cookie" is a small piece of information that a Web server can store temporarily with the Web browser. This is useful for having the browser remember some specific information that the Web server can later retrieve.)	<p><b>Windows Vista</b></p> <ol style="list-style-type: none"><li>1. Select <b>Start &gt; Control Panel</b>.</li><li>2. Click <b>Network and Internet</b>.</li><li>3. Click <b>Internet Options</b>.</li><li>4. In the <b>Browsing history</b> section on the <b>General</b> tab, click the <b>Delete</b> button.</li><li>5. Click the <b>Delete cookies</b> button.</li></ol> <p><b>Windows XP</b></p> <ol style="list-style-type: none"><li>1. Select <b>Start &gt; Control Panel</b>.</li><li>2. Double-click <b>Internet Options</b>.</li><li>3. On the <b>General</b> tab, click the <b>Delete Cookies</b> button.</li></ol> <p><b>Windows 7</b></p> <ol style="list-style-type: none"><li>1. Select <b>Start &gt; Control Panel</b>.</li><li>2. Click <b>Internet Options</b>.</li><li>3. In the <b>Browsing history</b> section on the <b>General</b> tab, click the <b>Delete</b> button.</li><li>4. Click the <b>Delete cookies</b> button.</li></ol>

**Cannot automatically launch Internet programs.**

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**Cause**

**Solution**

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

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## Internet takes too long to download Web sites.

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Cause	Solution
Modem is not set up properly.	<p data-bbox="861 279 1469 331">Verify that the modem is connected and communicating properly.</p> <p data-bbox="861 352 1469 380"><b>Windows XP</b></p> <ol data-bbox="861 405 1469 863" style="list-style-type: none"><li data-bbox="861 405 1469 432">1. Select <b>Start &gt; Control Panel</b>.</li><li data-bbox="861 457 1469 485">2. Double-click <b>System</b>.</li><li data-bbox="861 510 1469 537">3. Click the <b>Hardware</b> tab.</li><li data-bbox="861 562 1469 615">4. In the <b>Device Manager</b> area, click the <b>Device Manager</b> button.</li><li data-bbox="861 640 1469 667">5. Double-click <b>Modems</b>.</li><li data-bbox="861 693 1469 745">6. Double-click <b>Agere Systems PCI-SV92PP Soft Modem</b>.</li><li data-bbox="861 770 1469 798">7. On the <b>General</b> tab, click <b>Diagnostics</b>.</li><li data-bbox="861 823 1469 863">8. Click <b>Query Modem</b>. A “Success” response indicates the modem is connected and working properly.</li></ol> <p data-bbox="861 888 1469 915"><b>Windows Vista</b></p> <ol data-bbox="861 940 1469 1367" style="list-style-type: none"><li data-bbox="861 940 1469 968">1. Select <b>Start &gt; Control Panel</b>.</li><li data-bbox="861 993 1469 1020">2. Click on <b>System and Maintenance</b>.</li><li data-bbox="861 1045 1469 1073">3. Click on <b>System</b>.</li><li data-bbox="861 1098 1469 1125">4. In the <b>Tasks</b> list, select <b>Device Manager</b>.</li><li data-bbox="861 1150 1469 1178">5. Double-click <b>Modems</b>.</li><li data-bbox="861 1203 1469 1255">6. Double-click <b>Agere Systems PCI-SV92PP Soft Modem</b>.</li><li data-bbox="861 1281 1469 1308">7. On the <b>General</b> tab, click <b>Diagnostics</b>.</li><li data-bbox="861 1333 1469 1367">8. Click <b>Query Modem</b>. A “Success” response indicates the modem is connected and working properly.</li></ol> <p data-bbox="861 1392 1469 1419"><b>Windows 7</b></p> <ol data-bbox="861 1444 1469 1812" style="list-style-type: none"><li data-bbox="861 1444 1469 1472">1. Select <b>Start &gt; Control Panel</b>.</li><li data-bbox="861 1497 1469 1524">2. Click on <b>System</b>.</li><li data-bbox="861 1549 1469 1577">3. In the <b>Tasks</b> list, select <b>Device Manager</b>.</li><li data-bbox="861 1602 1469 1629">4. Double-click <b>Modems</b>.</li><li data-bbox="861 1654 1469 1707">5. Double-click <b>Agere Systems PCI-SV92PP Soft Modem</b>.</li><li data-bbox="861 1732 1469 1759">6. On the <b>General</b> tab, click <b>Diagnostics</b>.</li><li data-bbox="861 1785 1469 1812">7. Click <b>Query Modem</b>. A “Success” response indicates the modem is connected and working properly.</li></ol>

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# Solving Software Problems

Most software problems occur as a result of the following:

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

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

**Table C-18 Solving Software Problems**

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

Cause	Solution
POST error has occurred.	Observe the beeps and LED lights on the front of the computer. See <a href="#">POST Error Messages on page 92</a> to determine possible causes.  See the Restore Kit or the Worldwide Limited Warranty for terms and conditions.

**Computer will not continue after HP logo screen has appeared.**

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

**“Illegal Operation has Occurred” error message is displayed.**

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

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# D Password Security and Resetting CMOS

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

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

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

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

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

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## Resetting the Password Jumper

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

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

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

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

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

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3. Remove the computer cover or access panel.
4. Locate the header and jumper.

---

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

---

5. Remove the jumper from pins 1 and 2. Place the jumper on either pin 1 or 2, but not both, so that it does not get lost.
6. Replace the access panel.
7. Reconnect the external equipment.
8. Plug in the computer and turn on power. Allow the operating system to start. This clears the current passwords and disables the password features.
9. To establish new passwords, repeat steps 1 through 4, replace the password jumper on pins 1 and 2, then repeat steps 6 through 8. Establish the new passwords in Computer Setup.

# Clearing and Resetting the CMOS

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

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

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

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

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

3. Remove the computer cover or access panel.

**⚠ CAUTION:** Pushing the CMOS button will reset CMOS values to factory defaults. It is important to back up the computer CMOS settings before resetting them in case they are needed later. Back up is easily done through Computer Setup.

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

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

**Figure D-1** CMOS button



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

5. Replace the computer cover or access panel.

6. Reconnect the external devices.
7. Plug in the computer and turn on power.



---

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

---

---

## E Drive Protection System (DPS)

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

When these systems are built, each installed hard drive is tested using DPS, and a permanent record of key information is written onto the drive. Each time DPS is run, test results are written to the hard drive. Your service provider can use this information to help diagnose conditions that caused you to run the DPS software.

Running DPS will not affect any programs or data stored on the hard drive. The test resides in the hard drive firmware and can be executed even if the computer will not boot to an operating system. The time required to execute the test depends on the manufacturer and size of the hard drive; in most cases, the test will take approximately two minutes per gigabyte.

Use DPS when you suspect a hard drive problem. If the computer reports a SMART Hard Drive Detect Imminent Failure message, there is no need to run DPS; instead, back up the information on the hard drive and contact a service provider for a replacement hard drive.

# Accessing DPS Through Computer Setup

When the computer does not power on properly you should use Computer Setup to access the DPS program. To access DPS, perform the following steps:

1. Turn on or restart the computer.
2. When the F10 Setup message appears in the lower-right corner of the screen, press the **F10** key.

---

 **NOTE:** If you do not press the **F10** key while the message is displayed, you must turn the computer off, then on again, to access the utility.

---

A choice of five headings appears in the Computer Setup Utilities menu: **File**, **Storage**, **Security**, **Power**, and **Advanced**.

3. Select **Storage** > **DPS Self-Test**.

The screen will display the list of DPS-capable hard drives that are installed on the computer.

---

 **NOTE:** If no DPS-capable hard drives are installed, the **DPS Self-Test** option will not appear on the screen.

---

4. Select the hard drive to be tested and follow the screen prompts to complete the testing process.

When the test has been completed, one of three messages will be displayed:

- Test Succeeded. Completion Code 0.
- Test Aborted. Completion Code 1 or 2.
- Test Failed. Drive Replacement Recommended. Completion Code 3 through 14.

If the test failed, the completion code should be recorded and reported to your service provider for help in diagnosing the computer problem.

---

# F System Recovery

System Recovery completely erases and reformats the hard disk drive, deleting all data files you have created, and then reinstalls the operating system, programs, and drivers. However, you must reinstall any software that was not installed on the computer at the factory. This includes software that came on media included in the computer accessory box, and any software programs you installed after purchase.

---

 **NOTE:** Always use the System Restore procedure before you use the System Recovery program.

 **NOTE:** Some features might not be available on systems that are shipped without a version of Microsoft Windows.

---

You must choose one of the following methods to perform a System Recovery:

- Recovery Image — Run the System Recovery from a recovery image stored on your hard disk drive. The recovery image is a file that contains a copy of the original factory-shipped software. To perform a System Recovery from a recovery image, see [System Recovery from the Windows 7 Start Menu on page 144](#).

---

 **NOTE:** The recovery image uses a portion of the hard disk drive that cannot be used for data storage.

---

- Recovery Media — Run the System Recovery from recovery media, that you created from files stored on your hard disk drive, or purchased separately. To create recovery media, see [Recovery media on page 146](#).

## System Recovery options

You should attempt a System Recovery in the following order:

1. Through the hard disk drive, from the Windows 7 Start menu.
2. Through the hard disk drive, by pressing the F11 key on the keyboard during system startup.
3. Through recovery media that you create.
4. Through recovery discs purchased from HP Support. To purchase recovery discs, visit [www.hp.com/support](http://www.hp.com/support).

### System Recovery from the Windows 7 Start Menu

---

 **CAUTION:** System Recovery deletes all data and programs you created or installed. Back up any important data to a removable disc or USB flash drive.

---

If the computer is working and Windows 7 is responding, use these steps to perform a System Recovery.

1. Turn off the computer.
2. Disconnect all peripheral devices from the computer except the keyboard and mouse.
3. Turn on the computer.
4. Tap the **Start** button, tap **All Programs**, tap **Recovery Manager**, and then tap **Recovery Manager**. If prompted, tap **Yes** to allow the program to continue.
5. Under **I need help immediately**, tap **System Recovery**.
6. Tap **Yes**, and then tap **Next**. Your computer restarts.

---

 **NOTE:** If your system does not detect a recovery partition, it prompts you to insert recovery media. Insert the disc, or USB flash drive, tap **Yes**, and then tap **Next** to restart the computer and run Recovery Manager from the recovery disc, or the recovery USB flash drive. If using discs, insert the next system-recovery disc when prompted.

---

7. When the computer restarts, you will see the Recovery Manager welcome screen again. Under **I need help immediately**, tap **System Recovery**. If you are prompted to back up your files, and you have not done so, tap **Back up your files first (recommended)**, and then tap **Next**. Otherwise, tap **Recover without backing up your files**, and then tap **Next**.
8. System Recovery begins. After System Recovery is complete, tap **Finish** to restart the computer.
9. Complete the registration process, and wait until you see the desktop.
10. Turn off the computer, reconnect all peripheral devices, and turn the computer back on.

### System Recovery at system startup

---

 **CAUTION:** System Recovery deletes all data and programs you created or installed. Back up any important data to a removable disc.

---

If Windows 7 is not responding, but the computer is working, follow these steps to perform a System Recovery.

1. Turn off the computer. If necessary, press and hold the Power button until the computer turns off.
2. Disconnect all peripheral devices from the computer, except the keyboard and mouse.
3. Press the Power button to turn on the computer.
4. As soon as you see the initial company logo screen appear, repeatedly press the F11 key on your keyboard until the Windows is Loading Files... message appears on the screen.
5. Under **I need help immediately**, tap **System Recovery**.
6. If you are prompted to back up your files, and you have not done so, tap **Back up your files first (recommended)**, and then tap **Next**. Otherwise, tap **Recover without backing up your files**, and then tap **Next**.
7. System Recovery begins. After System Recovery is complete, tap **Finish** to restart the computer.
8. Complete the registration process, and wait until you see the desktop.
9. Turn off the computer, reconnect all peripheral devices, and turn the computer back on.

## System Recovery from recovery media

 **CAUTION:** System Recovery deletes all data and programs you created or installed. Back up any important data to a removable disc, or USB flash drive.

To create recovery media, see [Recovery media on page 146](#).

To perform a System Recovery using recovery media:

1. If the computer is working, create a backup DVD, or backup USB flash drive, containing all the data files you want to save, and then remove the backup media from the computer.
2. Insert recovery disc #1 into the DVD drive tray, and close the tray; or if using a recovery USB flash drive, insert it into a USB port.
3. If the computer works, tap the **Start** button, and then tap **Shut Down**. Or, if the computer is not responding, press and hold the Power button for approximately 5 seconds, or until the computer turns off.
4. Disconnect all peripheral devices from the computer except the keyboard and mouse.
5. Press the Power button to turn on the computer. If you are using a recovery DVD, the computer will automatically run Recovery Manager from the disc. Skip to step 7.
6. If you are running System Recovery from a USB flash drive, press the **Esc** key as the computer is powering on to bring up the boot menu. Use the arrow keys to select the USB device and press **Enter** to boot from that device.
7. If the Recovery Manager asks if you want to run System Recovery from Media or Hard Drive, select **Media**. On the Welcome screen, under **I need help immediately**, tap **Factory Reset**.

8. If you are prompted to back up your files, and you have not done so, tap **Back up your files first (recommended)**, and then tap **Next**. Otherwise, tap **Recover without backing up your files**, and then tap **Next**.
9. If you are prompted to insert the next recovery disc, do so.
10. When the Recovery Manager is finished, remove all recovery discs, or the recovery USB flash drive, from the system.
11. Tap **Finish** to restart the computer.

## Recovery media

You should create a set of recovery discs, or a recovery USB flash drive, from the recovery image stored on your hard disk drive. This image contains the operating system and software program files that were originally installed on your computer at the factory. You can create only one set of recovery discs, or one recovery USB flash drive, for your computer; the recovery discs, or the recovery drive, can be used only with this computer. Store the recovery discs, or the recovery USB flash drive, in a safe place.



---

**NOTE:** Some features might not be available on systems that are shipped without a version of Microsoft Windows.

---

## Choosing recovery media

- To create recovery discs, your computer must have a DVD writer, and you must use only high-quality blank DVD+R or DVD-R discs.



---

**NOTE:** You cannot use CDs or DVD+RW, DVD-RW, DVD+RW DL, DVD-RW DL, DVD+R DL, or DVD-R DL discs to create recovery discs.

---

- You have the option of creating a recovery USB flash drive instead, using a high-quality blank USB drive.
- If you are creating recovery discs, be sure to use high-quality discs. It is normal for discs to be rejected if they are not defect-free. You will be prompted to insert a new blank disc to try again.
- The number of discs in the recovery-disc set depends on your computer model (typically 3–6 DVD discs). The Recovery Media Creation program tells you the specific number of blank discs needed to make the set. If you are using a USB flash drive, the program will tell you the size of the drive required to store all the data (minimum of 8 GB).



---

**NOTE:** The process of creating recovery discs, or a recovery USB drive, takes some time to verify that the information written on the disc, or USB flash drive, is correct. You can quit the process at any time. The next time you run the program, it resumes where it left off.

---

## Creating recovery media

To create recovery discs:

1. Close all open programs.
2. Tap the **Start** button, tap **All Programs**, tap **Recovery Manager**, and then tap **Recovery Media Creation**. If prompted, tap **Yes** to allow the program to continue.

3. Tap **Create recovery media using blank DVD(s)**, and then tap **Next**.
4. Follow the on-screen instructions. Label each disc as you make it (for example, Recovery 1, Recovery 2).

To create a recovery USB flash drive:

1. Close all open programs.
2. Insert the USB flash drive into a USB port on the computer.
3. Tap the **Start** button, tap **All Programs**, tap **Recovery Manager**, and then tap **Recovery Media Creation**.
4. Tap **Create recovery media with a USB flash drive**, and then tap **Next**.
5. Select the USB flash drive from the list of media. The program will let you know how much storage is required to create the recovery drive. If the USB flash drive does not have enough storage capacity (8 GB is the minimum), it will be grayed out on the screen. Tap **Next**.



---

**NOTE:** Recovery Media Creation formats the flash drive and deletes all on files on it.

---

6. Follow the on-screen instructions. Make sure to label the USB flash drive and store it in a secure place.



---

**NOTE:** Do not use media cards for creating recovery media. The system may not be able to boot up from a media card and you may not be able to run system recovery.

---

# G Specifications

**Table G-1 Specifications**

<b>Desktop Dimensions</b> (in the desktop position)		
Height	3.95 in	10.0 cm
Width	13.3 in	33.8 cm
Depth	14.9 in	37.8 cm
<b>Approximate Weight</b>	16.72 lb	7.6 kg
<b>Weight Supported</b> (maximum distributed load in desktop position)	77 lb	35 kg
<b>Temperature Range</b>		
Operating	50° to 95°F	10° to 35°C
Nonoperating	-22° to 140°F	-30° to 60°C
<p><b>NOTE:</b> Operating temperature is derated 1.0° C per 300 m (1000 ft) to 3000 m (10,000 ft) above sea level; no direct sustained sunlight. Maximum rate of change is 10° C/Hr. The upper limit may be limited by the type and number of options installed.</p>		
<b>Relative Humidity (noncondensing)</b>		
Operating	10-90%	10-90%
Nonoperating (38.7°C max wet bulb)	5-95%	5-95%
<b>Maximum Altitude (unpressurized)</b>		
Operating	10,000 ft	3048 m
Nonoperating	30,000 ft	9144 m
<b>Heat Dissipation</b>		
Max STD PS	1063 BTU/hr	268 kg-cal/hr
Typical STD PS idle	198 BTU/hr	50 kg-cal/hr
Max EPA 87/89/85% @ 20/50/100% load PS	941 BTU/hr	237 kg-cal/hr
Typical EPA 87/89/85% @ 20/50/100% load PS idle	150 BTU/hr	38 kg-cal/hr

**Table G-1 Specifications (continued)**

<b>Power Supply</b>	115V	230V
Power Output	240W	240W
Rated Input Current (maximum) <sup>1</sup>	4A @ 100 VAC	2A @ 230 VAC
Rated Line Frequency	50/60 Hz	50/60 Hz
Operating Line Frequency Range	47-63 Hz	47-63 Hz
Max Allowable Leakage Current	275 $\mu$ A	275 $\mu$ A
Power Supply Fan	92mm variable speed	92mm variable speed

<sup>1</sup> This system utilizes an active power factor corrected power supply. This allows the system to pass the CE mark requirements for use in the countries of the European Union. The active power factor corrected power supply also has the added benefit of not requiring an input voltage range select switch.

---

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