

HP Mini User Guide

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Product notice

This user guide describes features that are common to most models. Some features may not be available on your computer.

Safety warning notice

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- ⚠ **WARNING!** To reduce the possibility of heat-related injuries or of overheating the computer, do not place the computer directly on your lap or obstruct the computer air vents. Use the computer only on a hard, flat surface. Do not allow another hard surface, such as an adjoining optional printer, or a soft surface, such as pillows or rugs or clothing, to block airflow. Also, do not allow the AC adapter to contact the skin or a soft surface, such as pillows or rugs or clothing, during operation. The computer and the AC adapter comply with the user-accessible surface temperature limits defined by the International Standard for Safety of Information Technology Equipment (IEC 60950).
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1 Features


Identifying the hardware

Components included with the computer may vary by region and model. The illustrations in this chapter identify the standard features on most computer models.

To see a list of hardware installed in the computer, follow these steps:

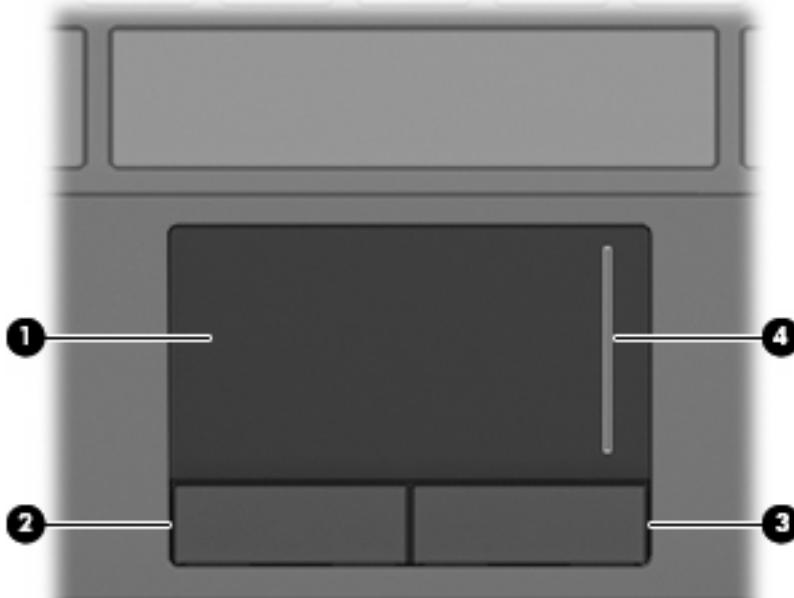
- ▲ Select **Start > Control Panel > System and Security > Device Manager**.

You can also add hardware or modify device configurations using Device Manager.

 **NOTE:** Windows® includes the User Account Control feature to improve the security of your computer. You may be prompted for your permission or password for tasks such as installing applications, running utilities, or changing Windows settings. Refer to Help and Support for more information.

Top components

TouchPad

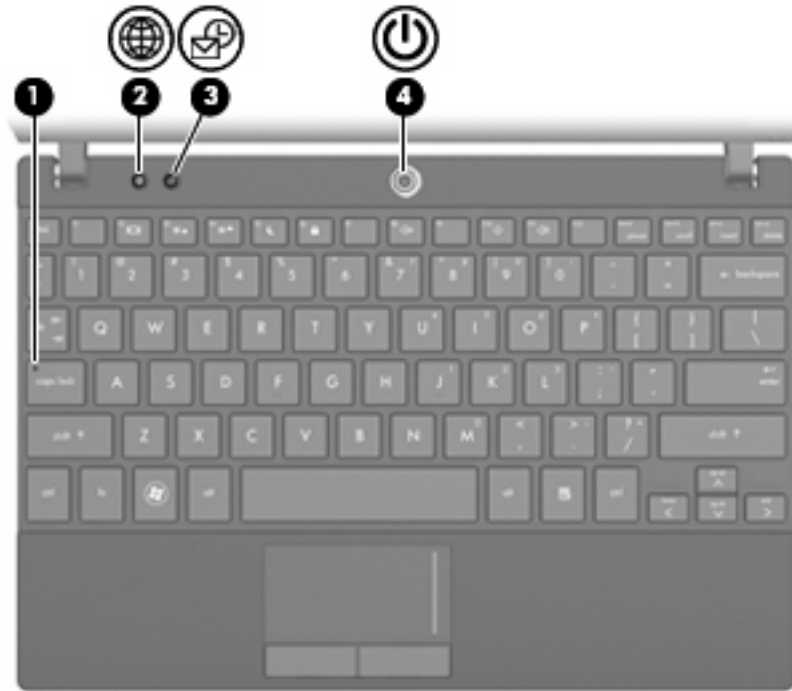


Component	Description
(1) TouchPad*	Moves the pointer and selects or activates items on the screen.

Component	Description
(2) Left TouchPad button*	Functions like the left button on an external mouse.
(3) Right TouchPad button*	Functions like the right button on an external mouse.
(4) TouchPad scroll zone	Scrolls up or down.

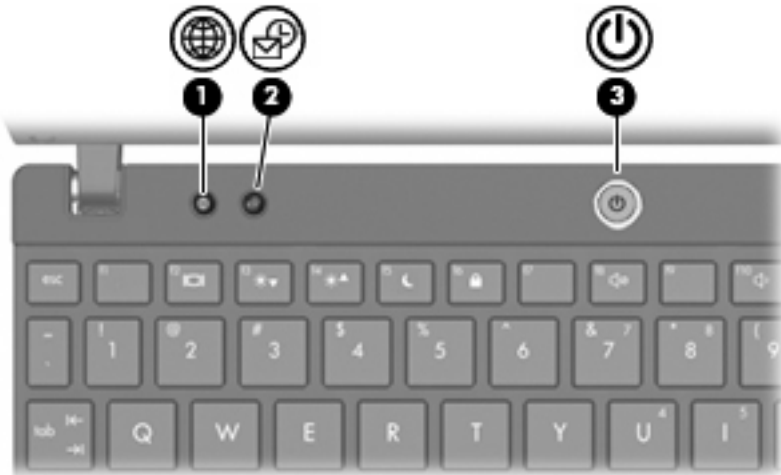
*This table describes factory settings. To view or change pointing device preferences, select **Start > Devices and Printers**. Then, right-click the device representing your computer, and select **Mouse settings**.

Lights



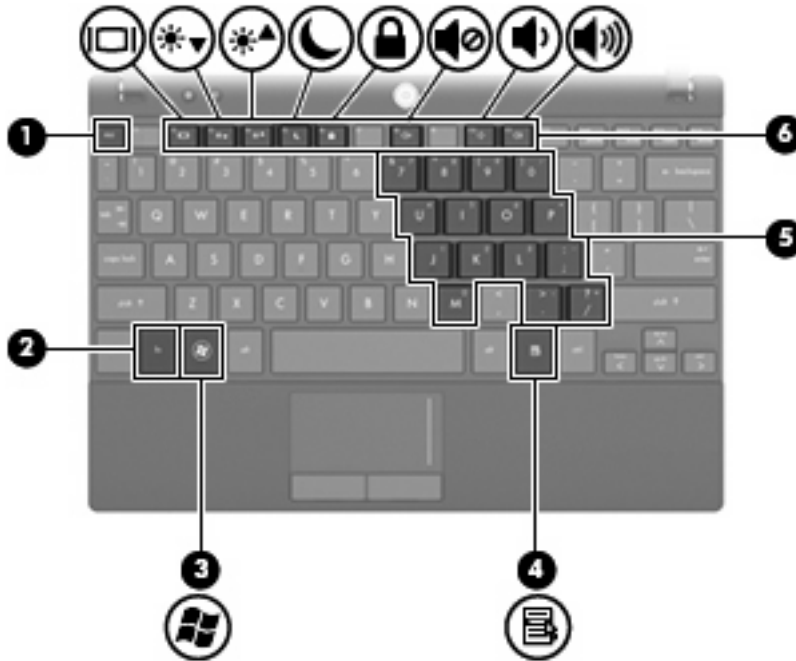
Component	Description
(1) Caps lock light	On: Caps lock is on.
(2) QuickWeb light	On: The Web browser is in use.
(3) QuickLook light	<ul style="list-style-type: none">On: The computer is on.Off: The computer is off or in Sleep or Hibernation.
(4) Power light	<ul style="list-style-type: none">On: The computer is on.Blinking: The computer is in the Sleep state.Off: The computer is off or in Hibernation.

Buttons



Component	Description
(1) QuickWeb button	<ul style="list-style-type: none">When the computer is off, press the button to open HP QuickWeb.When the computer is on, press the button to open the default Web browser.
(2) QuickLook button	<ul style="list-style-type: none">When the computer is off, press the button to open HP QuickLook.When the computer is on, press the button to open Software Setup. <p>NOTE: If Software Setup is not available, the default Web browser opens.</p>
(3) Power button	<ul style="list-style-type: none">When the computer is off, press the button to turn on the computer.When the computer is on, press the button to shut down the computer.When the computer is in the Sleep state, press the button briefly to exit Sleep.When the computer is in Hibernation, press the button briefly to exit Hibernation. <p>If the computer has stopped responding and Windows shutdown procedures are ineffective, press and hold the power button for at least 5 seconds to turn off the computer.</p> <p>To learn more about your power settings, select Start > Control Panel > System and Security > Power Options.</p>

Keys



Component	Description
(1) esc key	Displays system information when pressed in combination with the fn key.
(2) fn key	Displays system information when pressed in combination with the esc key.
(3) Windows logo key	Displays the Windows Start menu.
(4) Windows applications key	Displays a shortcut menu for items beneath the pointer.
(5) Embedded numeric keypad keys	Can be used like the keys on an external numeric keypad.
(6) Function keys	Execute the action represented by the icon on the key.

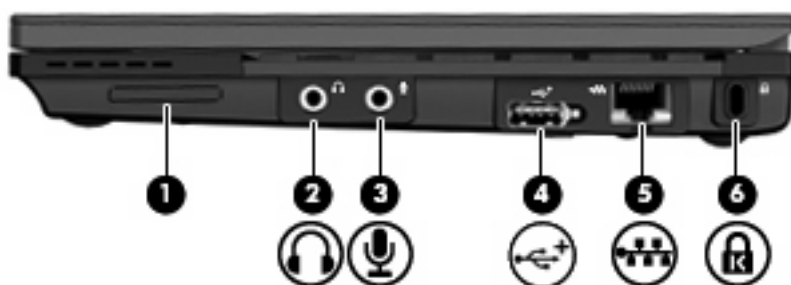
Front components



Component	Description
(1) Drive light	Blinking: The hard drive is being accessed.

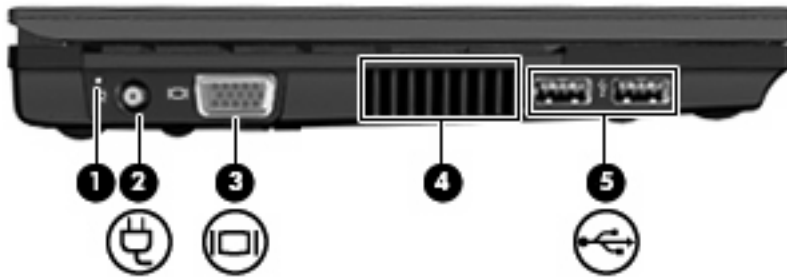
Component	Description
(2) Wireless light	<ul style="list-style-type: none"> Blue: An integrated wireless device, such as a wireless local area network (WLAN) device and/or a Bluetooth® device, is on. Amber: All wireless devices are off. <p>NOTE: The wireless light turns amber when the computer turns on and all wireless devices are off.</p>
(3) Wireless switch	<p>Turns the wireless feature on or off, but does not create a wireless connection.</p> <p>NOTE: To establish a wireless connection, a wireless network must already be set up.</p>
(4) Speakers (2)	Produce sound.

Right-side components



Component	Description
(1) SD Card Reader	<p>Supports the following optional digital card formats:</p> <ul style="list-style-type: none"> MultiMediaCard (MMC) Secure Digital (SD) Memory Card
(2) Audio-out (headphone) jack	<p>Produces sound when connected to optional powered stereo speakers, headphones, ear buds, a headset, or television audio.</p> <p>NOTE: When a device is connected to the headphone jack, the computer speakers are disabled.</p>
(3) Audio-in (microphone) jack	Connects an optional computer headset microphone, stereo array microphone, or monaural microphone.
(4) Powered USB port	Provides power to a USB device, such as an optional external optical drive, if used with a powered USB cable.
(5) RJ-45 (network) jack	Connects a network cable.
(6) Security cable slot	<p>Attaches an optional security cable to the computer.</p> <p>NOTE: The security cable is designed to act as a deterrent, but it may not prevent the computer from being mishandled or stolen.</p>

Left-side components



Component	Description
(1) Battery light	<ul style="list-style-type: none">• Amber: A battery is charging.• Turquoise: A battery is close to full charge capacity.• Blinking amber: A battery that is the only available power source has reached a low battery level. When the battery reaches a critical battery level, the battery light begins blinking rapidly.• Off: If the computer is plugged into an external power source, the light turns off when all batteries in the computer are fully charged. If the computer is not plugged into an external power source, the light stays off until the battery reaches a low battery level.
(2) Power connector	Connects an AC adapter.
(3) External monitor port	Connects an external VGA monitor or projector.
(4) Vent	Enables airflow to cool internal components. NOTE: The computer fan starts up automatically to cool internal components and prevent overheating. It is normal for the internal fan to cycle on and off during routine operation.
(5) USB ports (2)	Connect optional USB devices.

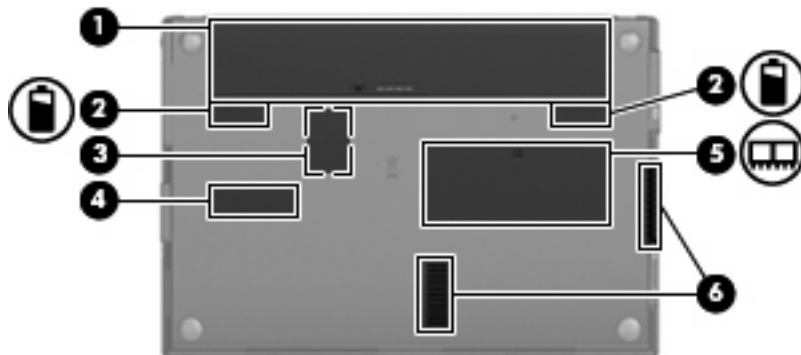
Display components



Component	Description
(1) Webcam light	On: The webcam is in use.
(2) Webcam	Records audio and video and captures still photographs.
(3) Internal microphones (2)	Record sound.

NOTE: If there is a microphone icon next to each microphone opening, your computer has internal microphones.

Bottom components



Component	Description
(1) Battery bay	Holds the battery.
(2) Battery release latches (2)	Release the battery from the battery bay.

Component	Description
(3) SIM slot (select models only)	Contains a wireless subscriber identity module (SIM).
(4) Service tag	Provides the product brand and series name, serial number (s/n), and product number (p/n) of your computer. Have this information available when you contact technical support.
(5) Memory module compartment	Contains the memory module slot.
(6) Vents (2)	Enable airflow to cool internal components.

NOTE: The computer fan starts up automatically to cool internal components and prevent overheating. It is normal for the internal fan to cycle on and off during routine operation.

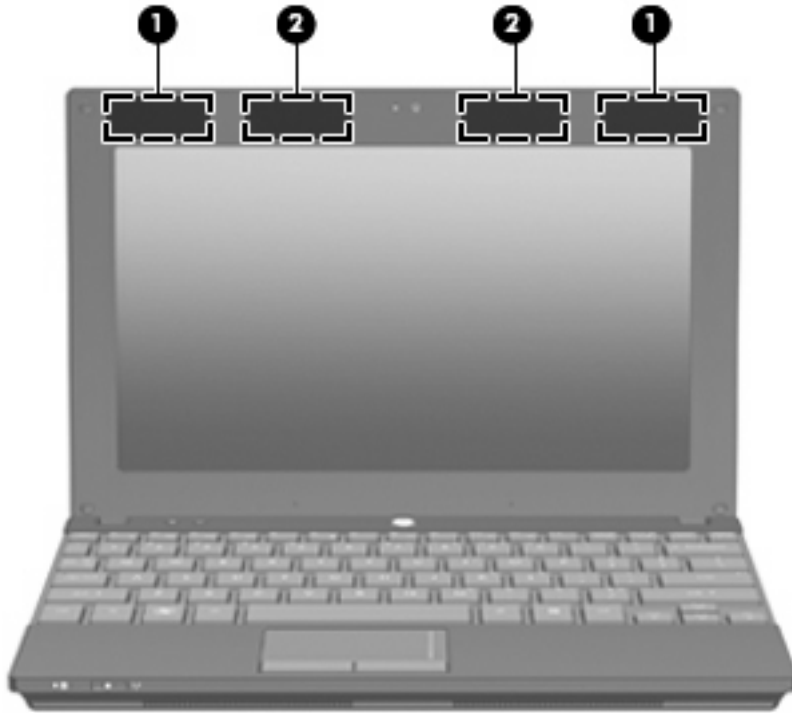
Carrying handle (select models only)

The computer has a carrying handle that is attached to the bottom of the computer. The handle can be extended by rotating it away from the computer as shown in the following illustration.



Wireless antennas (select models only)

On the computer, at least 2 antennas send and receive signals from one or more wireless devices.



Component	Description
(1) WWAN antennas (2)* (select models only)	Send and receive wireless signals to communicate with wireless wide-area networks (WWANs).
(2) WLAN antennas (2)* (select models only)	Send and receive wireless signals to communicate with wireless local area networks (WLANs).

*The antennas are not visible from the outside of the computer. For optimal transmission, keep the areas immediately around the antennas free from obstructions.

To see wireless regulatory notices, refer to the section of the *Regulatory, Safety and Environmental Notices* that applies to your country or region. These notices are located in Help and Support.

Additional hardware components



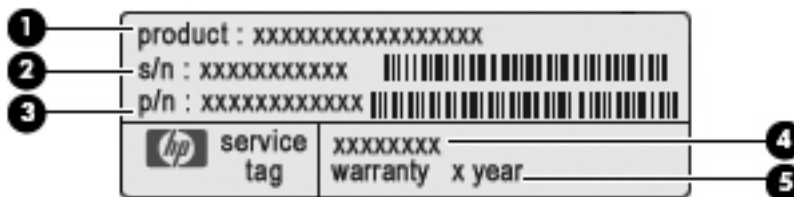
Component	Description
(1) Power cord*	Connects an AC adapter to an AC outlet.
(2) AC adapter	Converts AC power to DC power.
(3) Battery*	Powers the computer when the computer is not plugged into external power.

*Batteries and power cords vary in appearance by region and country.

Identifying the labels

The labels affixed to the computer provide information you may need when you troubleshoot system problems or travel internationally with the computer.

- Service tag—Provides important information including:



- Product Name (1). This is the product name affixed to the front of your computer.
- Serial Number (s/n) (2). This is an alphanumeric identifier that is unique to each product.
- Part Number/Product Number (p/n) (3). This number provides specific information about the product's hardware components. The part number helps a service technician to determine what components and parts are needed.

- Model Description **(4)**. This is the alphanumeric identifier you need to locate documents, drivers, and support for your computer.
- Warranty period **(5)**. This number describes the duration (in years) of the warranty period for this computer.

Have this information available when you contact technical support. The service tag label is affixed to the bottom of the computer.

- Microsoft® Certificate of Authenticity—Contains the Windows Product Key. You may need the Product Key to update or troubleshoot the operating system. This certificate is affixed to the bottom of the computer.
- Regulatory label—Provides regulatory information about the computer. The regulatory label is affixed inside the battery bay.
- Wireless certification label(s) (select models only)—Provide information about optional wireless devices and the approval markings of some of the countries or regions in which the devices have been approved for use. An optional device may be a wireless local area network (WLAN) device, the HP Mobile Broadband Module (select models only), or an optional Bluetooth® device. If your computer model includes one or more wireless devices, one or more certification labels are included with your computer. You may need this information when traveling internationally. Wireless certification labels are affixed to the bottom of the computer.
- SIM (subscriber identity module) label (select models only)—Provides the ICCID (Integrated Circuit Card Identifier) of your SIM. The SIM label is affixed inside the battery bay.
- HP Mobile Broadband Module serial number label (select models only)—Provides the serial number of your HP Mobile Broadband Module. The HP Mobile Broadband Module serial number label is affixed inside the battery bay.

2 Power management

Setting power options

Using power-saving states

The computer has two power-saving states enabled at the factory: Sleep and Hibernation.

When Sleep is initiated, the power light blinks and the screen clears. Your work is saved to memory, letting you exit Sleep faster than exiting Hibernation. If the computer is in the Sleep state for an extended period or if the battery reaches a critical battery level while in the Sleep state, the computer initiates Hibernation.

When Hibernation is initiated, your work is saved to a hibernation file on the hard drive and the computer turns off.

△ **CAUTION:** To prevent possible audio and video degradation, loss of audio or video playback functionality, or loss of information, do not initiate Sleep or Hibernation while reading from or writing to a disc or an external media card.

📝 **NOTE:** You cannot initiate any type of networking connection or perform any computer functions while the computer is in the Sleep state or in Hibernation.

Initiating and exiting Sleep

The system is set at the factory to initiate Sleep after 15 minutes of inactivity when running on battery power and 30 minutes of inactivity when running on external power.

Power settings and timeouts can be changed using Power Options in Windows® Control Panel.

With the computer on, you can initiate Sleep in either of the following ways:

- Press **f5**.
- Click **Start**, click the arrow next to the Shutdown button, and then click **Sleep**.

To exit Sleep:

- ▲ Briefly press the power button.

When the computer exits Sleep, the power light turns on and your work returns to the screen where you stopped working.

📝 **NOTE:** If you have set a password to be required when the computer exits Sleep, you must enter your Windows password before your work will return to the screen.

Initiating and exiting Hibernation

The system is set at the factory to initiate Hibernation after 1080 minutes (18 hours) of inactivity when running on battery power, 1080 minutes (18 hours) of inactivity when running on external power, or when the battery reaches a critical battery level.

Power settings and timeouts can be changed using Power Options in Windows Control Panel.


To initiate Hibernation:

1. Click **Start**, and then click the arrow next to the Shutdown button.
2. Click **Hibernate**.

To exit Hibernation:

- ▲ Briefly press the power button.

The power light turns on and your work returns to the screen where you stopped working.

 **NOTE:** If you have set a password to be required when the computer exits Hibernation, you must enter your Windows password before your work will return to the screen.

Using the battery meter

The battery meter is located in the notification area, at the far right of the taskbar. The battery meter allows you to quickly access power settings, view remaining battery charge, and select a different power plan.

- To display the percentage of remaining battery charge and the current power plan, move the pointer over the battery meter icon.
- To access Power Options, or to change the power plan, click the battery meter icon and select an item from the list.

Different battery meter icons indicate whether the computer is running on battery or external power. The icon also displays a message if the battery has reached a low battery level, critical battery level, or reserve battery level.

To hide or display the battery meter icon:

1. Right-click the **Show hidden icons** icon (the arrow at the left side of the notification area).
2. Click **Customize notification icons**.
3. Under **Behaviors**, select **Show icon and notifications** for the Power icon.
4. Click **OK**.

Using power plans

A power plan is a collection of system settings that manages how the computer uses power. Power plans can help you conserve power or maximize performance.

You can change power plan settings or create your own power plan.

Viewing the current power plan

- ▲ Click the battery meter icon in the notification area, at the far right of the taskbar.

– or –

Select **Start > Control Panel > System and Security > Power Options**.

Selecting a different power plan

- ▲ Click the battery meter icon in the notification area, and then select a power plan from the list.

– or –

Select **Start > Control Panel > System and Security > Power Options**, and then select a power plan from the list.

Customizing power plans

1. Click the battery meter icon in the notification area and then click **More power options**.

– or –


Select **Start > Control Panel > System and Security > Power Options**.

2. Select a power plan, and then click **Change plan settings**.
3. Change the settings as needed.
4. To change additional settings, click **Change advanced power settings** and make your changes.

Setting password protection on wakeup

To set the computer to prompt for a password when the computer exits Sleep or Hibernation, follow these steps:

1. Select **Start > Control Panel > System and Security > Power Options**.
2. In the left pane, click **Require a password on wakeup**.
3. Click **Change Settings that are currently unavailable**.
4. Click **Require a password (recommended)**.

 **NOTE:** If you need to create a user account password or change your current user account password, click **Create or change your user account password**, and then follow the on-screen instructions. If not, go to step 5.

5. Click **Save changes**.

Using external AC power

External AC power is supplied through one of the following devices:

△ **WARNING!** To reduce potential safety issues, use only the AC adapter provided with the computer, a replacement AC adapter provided by HP, or a compatible AC adapter purchased from HP.

- Approved AC adapter
- Optional docking device or expansion product

Connect the computer to external AC power under any of the following conditions:

⚠ **WARNING!** Do not charge the computer battery while you are onboard aircraft.

- When you are charging or calibrating a battery
- When you are installing or modifying system software
- When you are writing information to a CD or DVD

When you connect the computer to external AC power, the following events occur:

- The battery begins to charge.
- If the computer is turned on, the battery meter icon in the notification area changes appearance.

When you disconnect external AC power, the following events occur:

- The computer switches to battery power.
- The display brightness is automatically decreased to save battery life. To increase display brightness, press the **f4** key or reconnect the AC adapter.

Connecting the AC adapter

⚠ **WARNING!** To reduce the risk of electric shock or damage to the equipment:

Plug the power cord into an AC outlet that is easily accessible at all times.

Disconnect power from the computer by unplugging the power cord from the AC outlet (not by unplugging the power cord from the computer).

If provided with a 3-pin attachment plug on the power cord, plug the cord into a grounded (earthed) 3-pin outlet. Do not disable the power cord grounding pin, for example, by attaching a 2-pin adapter. The grounding pin is an important safety feature.

To connect the computer to external AC power:

1. Plug the AC adapter into the power connector **(1)** on the computer.
2. Plug the power cord into the AC adapter **(2)**.
3. Plug the other end of the power cord into an AC outlet **(3)**.



Testing an AC adapter

Test the AC adapter if the computer exhibits any of the following symptoms:

- The computer will not turn on when connected to the AC adapter.
- The display does not turn on when the computer is connected to the AC adapter.
- The power light is off when the computer is connected to the AC adapter.

To test the AC adapter:


1. Remove the battery from the computer.
2. Connect the AC adapter.
3. Turn on the computer.
 - If the power light turns **on**, the AC adapter is functioning properly.
 - If the power light remains **off**, the AC adapter is not functioning and should be replaced.

Contact technical support for information on obtaining a replacement AC power adapter. Select **Start > Help and Support > Get assistance**.


Using battery power

When a charged battery is in the computer and the computer is not plugged into external power, the computer runs on battery power. When the computer is plugged into external AC power, the computer runs on AC power.

If the computer contains a charged battery and is running on external AC power supplied through the AC adapter, the computer switches to battery power if the AC adapter is disconnected from the computer.

 **NOTE:** The display brightness is decreased to save battery life when you disconnect AC power. To increase display brightness, use the **f4** key or reconnect the AC adapter.

You can keep a battery in the computer or in storage, depending on how you work. Keeping the battery in the computer whenever the computer is plugged into AC power charges the battery and also protects your work in case of a power outage. However, a battery in the computer slowly discharges when the computer is off and unplugged from external power.

 **WARNING!** To reduce potential safety issues, use only the battery provided with the computer, a replacement battery provided by HP, or a compatible battery purchased from HP.

Computer battery life varies, depending on power management settings, programs running on the computer, display brightness, external devices connected to the computer, and other factors.

Finding battery information in Help and Support

Help and Support provides the following tools and information:

- Battery Check tool to test battery performance
- Information on calibration, power management, and proper care and storage to maximize battery life
- Information on battery types, specifications, life cycles, and capacity
- ▲ To access battery information:

Select **Start > Help and Support > Learn > Power Plans: Frequently Asked Questions**.

Displaying the remaining battery charge

- ▲ Move the pointer over the battery meter icon in the notification area, at the far right of the taskbar.

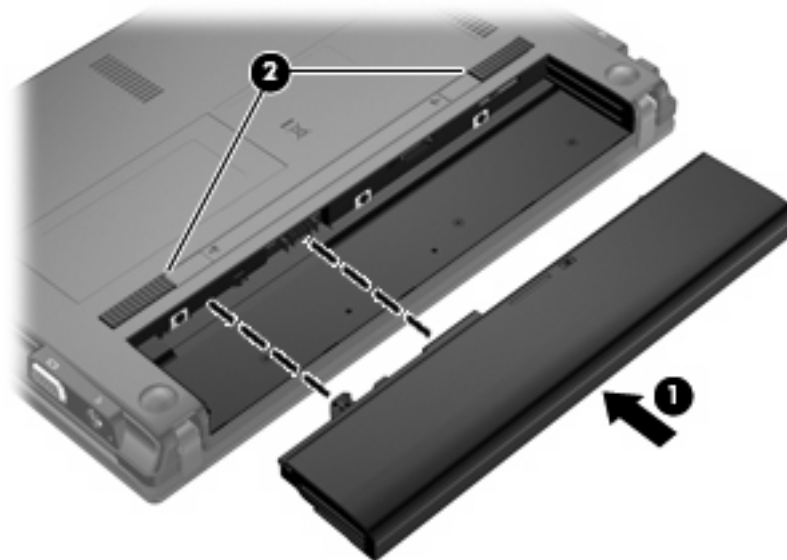
Inserting or removing the battery

△ **CAUTION:** Removing a battery that is the sole power source can cause loss of information. To prevent loss of information, save your work, initiate Hibernation or shut down the computer through Windows before removing the battery.

To insert the battery:

1. Turn the computer upside down on a flat surface.
2. Insert the battery into the battery bay (1) and push in until it is seated.

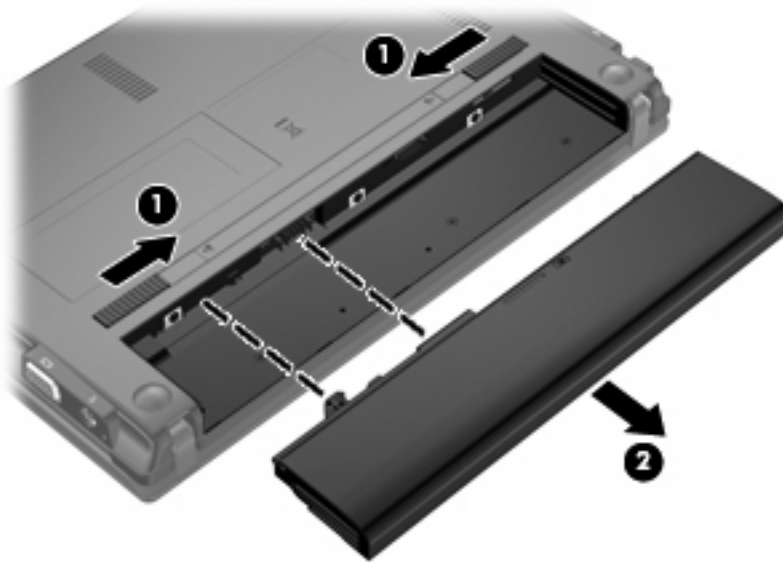
The battery release latches (2) automatically lock the battery into place.



To remove the battery:

1. Turn the computer upside down on a flat surface.
2. Slide the battery release latches (1) to release the battery.

3. Remove the battery **(2)** from the computer.



Charging a battery

⚠ WARNING! Do not charge the computer battery while you are onboard aircraft.

The battery charges whenever the computer is plugged into external power through an AC adapter, an optional power adapter, an optional expansion product, or an optional docking device.

The battery charges whether the computer is off or in use, but it charges faster when the computer is off.

Charging may take longer if a battery is new, has been unused for 2 weeks or more, or is much warmer or cooler than room temperature.

To prolong battery life and optimize the accuracy of battery charge displays, follow these recommendations:

- If you are charging a new battery, charge it fully before turning on the computer.
- Charge the battery until the battery light turns off.

📄 NOTE: If the computer is on while the battery is charging, the battery meter in the notification area may show 100 percent charge before the battery is fully charged.

- Allow the battery to discharge below 5 percent of a full charge through normal use before charging it.
- If the battery has been unused for one month or more, calibrate the battery instead of simply charging it.

The battery light displays charge status:

- On: The battery is charging.
- Blinking: The battery has reached a low battery level or critical battery level and is not charging.
- Off: The battery is fully charged, in use, or not installed.

Maximizing battery discharge time

Battery discharge time varies, depending on the features you use while on battery power. Maximum discharge time gradually shortens as the battery storage capacity naturally degrades.

Tips for maximizing battery discharge time:

- Lower the brightness on the display.
- Select the **Power saver** setting in Power Options.
- Remove the battery from the computer when it is not being used or charged.
- Store the battery in a cool, dry location.

Managing low battery levels

The information in this section describes the alerts and system responses set at the factory. Some low-battery alerts and system responses can be changed using Power Options in Windows Control Panel (**Start > Control Panel > System and Security > Power options**). Preferences set using Power Options do not affect lights.

Identifying low battery levels

When a battery that is the sole power source for the computer reaches a low battery level, the battery light blinks.

If a low battery level is not resolved, the computer enters a critical battery level, and the battery light blinks rapidly.

The computer takes the following actions for a critical battery level:

- If Hibernation is enabled and the computer is on or in the Sleep state, the computer initiates Hibernation.
- If Hibernation is disabled and the computer is on or in the Sleep state, the computer remains briefly in the Sleep state, and then shuts down and loses any unsaved information.

Resolving a low battery level

△ **CAUTION:** To reduce the risk of losing information when the computer reaches a critical battery level and has initiated Hibernation, do not restore power until the power light turns off.

Resolving a low battery level when external power is available

- ▲ Connect one of the following devices:
 - AC adapter
 - Optional expansion product or docking device
 - Optional power adapter

Resolving a low battery level when a charged battery is available

1. Turn off the computer or initiate Hibernation.
2. Remove the discharged battery, and then insert a charged battery.
3. Turn on the computer.

Resolving a low battery level when no power source is available

- ▲ Initiate Hibernation.
– or –
Save your work and shut down the computer.

Resolving a low battery level when the computer cannot exit Hibernation

When the computer lacks sufficient power to exit Hibernation, follow these steps:

1. Insert a charged battery or plug the computer into external power.
2. Exit Hibernation by briefly pressing the power button.

Calibrating a battery

Calibrate a battery under the following conditions:

- When battery charge displays seem inaccurate
- When you observe a significant change in battery run time

Even if a battery is heavily used, it should not need to be calibrated more than once a month. It is also not necessary to calibrate a new battery.

Step 1: Fully charge the battery

△ **WARNING!** Do not charge the computer battery while you are onboard aircraft.

📝 **NOTE:** The battery charges whether the computer is off or in use, but it charges faster when the computer is off.

To fully charge the battery:

1. Insert the battery into the computer.
2. Connect the computer to an AC adapter, optional power adapter, optional expansion product, or optional docking device, and then plug the adapter or device into external power.

The battery light on the computer turns on.

3. Leave the computer plugged into external power until the battery is fully charged.

The battery light on the computer turns off.

Step 2: Disable Hibernation and Sleep

1. Click the battery meter icon in the notification area, and then click **More power options**.

– or –

Select **Start > Control Panel > System and Security > Power Options**.

2. Under the current power plan, click **Change plan settings**.
3. Record the **Turn off the display** and **Put the computer to sleep** settings listed in the **On battery** column so that you can reset them after the calibration.
4. Change the **Turn off the display** and **Put the computer to sleep** settings to **Never**.
5. Click **Change advanced power settings**.
6. Click the plus sign next to **Sleep**, and then click the plus sign next to **Hibernate after**.
7. Record the **On battery** setting under **Hibernate after** so that you can reset it after the calibration.
8. Change the **On battery** setting to **Never**.
9. Click **OK**.
10. Click **Save changes**.

Step 3: Discharge the battery

The computer must remain on while the battery is being discharged. The battery can discharge whether or not you are using the computer, but the battery will discharge faster while you are using it.

- If you plan to leave the computer unattended during the discharge, save your information before beginning the discharge procedure.
- If you use the computer occasionally during the discharge procedure and have set energy-saving timeouts, expect the following performance from the system during the discharge process:
 - The monitor will not turn off automatically.
 - Hard drive speed will not decrease automatically when the computer is idle.
 - System-initiated Hibernation will not occur.

To discharge a battery:

1. Unplug the computer from its external power source, but do *not* turn off the computer.
2. Run the computer on battery power until the battery is discharged. The battery light begins to blink when the battery has discharged to a low battery level. When the battery is discharged, the battery light turns off and the computer shuts down.

Step 4: Fully recharge the battery


To recharge the battery:

1. Plug the computer into external power and maintain external power until the battery is fully recharged. When the battery is recharged, the battery light on the computer turns off.

You can use the computer while the battery is recharging, but the battery will charge faster if the computer is off.

2. If the computer is off, turn it on when the battery is fully charged and the battery light has turned off.

Step 5: Reenable Hibernation and Sleep

 **CAUTION:** Failure to reenable Hibernation after calibration may result in a full battery discharge and information loss if the computer reaches a critical battery level.

1. Click the battery meter icon in the notification area, and then click **More power options**.


– or –

Select **Start > Control Panel > System and Security > Power Options**.

2. Under the current power plan, click **Change plan settings**.
3. Reenter the settings that you recorded for the items in the **On battery** column.

– or –

Click **Restore default settings for this plan**, and then follow the on-screen instructions.

 **NOTE:** If you restore default settings, omit steps 4 through 8.

4. Click **Change advanced power settings**.
5. Click the plus sign next to **Sleep**, and then click the plus sign next to **Hibernate after**.
6. Reenter the setting that you recorded for **On battery**.
7. Click **OK**.
8. Click **Save changes**.

Conserving battery power

- Select the Power saver power plan through Power Options under **System and Security** in Windows Control Panel.
- Turn off wireless and local area network (LAN) connections and exit modem applications when you are not using them.
- Disconnect external devices that are not plugged into an external power source, when you are not using them.
- Stop, disable, or remove any external media cards that you are not using.
- Use the **f3** and **f4** keys to adjust screen brightness as needed.
- If you leave your work, initiate Sleep or Hibernation, or shut down the computer.

- Remove the battery from the computer when it is not being used or charged.
- Purchase another battery to extend overall battery operating time.
- Store the battery in a cool, dry location.

Storing a battery

△ **CAUTION:** To prevent damage to a battery, do not expose it to high temperatures for extended periods of time.

If a computer will be unused and unplugged from external power for more than 2 weeks, remove the battery and store it separately.

To prolong the charge of a stored battery, place it in a cool, dry place.

📄 **NOTE:** A stored battery should be checked every 6 months. If the capacity is less than 50 percent, recharge the battery before returning it to storage.

Calibrate a battery before using it if it has been stored for one month or more.

Disposing of a used battery

△ **WARNING!** To reduce the risk of fire or burns, do not disassemble, crush, or puncture; do not short external contacts; do not dispose of in fire or water.

Refer to the *Regulatory, Safety and Environmental Notices* for battery disposal information.

Replacing the battery

Computer battery life varies, depending on the power management settings, programs running on the computer, display brightness, external devices connected to the computer, and other factors.

Battery Check notifies you to replace the battery when an internal cell is not charging properly, or when the battery storage capacity has reached a “weak” condition. A message refers you to the HP Web site for more information about ordering a replacement battery. If the battery is possibly covered by an HP warranty, instructions include a warranty ID.

📄 **NOTE:** To ensure that you always have battery power when you need it, HP recommends purchasing a new battery when the storage capacity indicator turns green-yellow.

Shutting down the computer

△ **CAUTION:** Unsaved information will be lost when the computer is shut down.


The Shut down command closes all open programs, including the operating system, and then turns off the display and computer.

Shut down the computer under any of the following conditions:

- When you need to replace the battery or access components inside the computer
- When you are connecting an external hardware device that does not connect to a USB port
- When the computer will be unused and disconnected from external power for an extended period

Although you can shut down the computer with the power button, the recommended procedure is to use the Windows Shut down command.

To shut down the computer, follow these steps:

 **NOTE:** If the computer is in the Sleep state or in Hibernation, you must first exit Sleep or Hibernation before shutdown is possible.

1. Save your work and close all open programs.
2. Click **Start**.
3. Click **Shut down**.

If the computer is unresponsive and you are unable to use the preceding shutdown procedures, try the following emergency procedures in the sequence provided:

- Press and hold the power button for at least 5 seconds.
- Disconnect the computer from external power and remove the battery.

3 Wireless and local area network

Using wireless devices (select models only)

Wireless technology transfers data across radio waves instead of wires. Your computer may be equipped with one or more of the following wireless devices:

- **Wireless local area network (WLAN) device**—Connects the computer to wireless local area networks (commonly referred to as Wi-Fi networks, wireless LANs, or WLANs) in corporate offices, your home, and public places such as airports, restaurants, coffee shops, hotels, and universities. In a WLAN, each mobile wireless device communicates with a wireless router or a wireless access point.
- **HP Mobile Broadband Module**—A wireless wide area network (WWAN) device that provides access to information wherever mobile network operator service is available. In a WWAN, each mobile device communicates to a mobile network operator's base station. Mobile network operators install networks of base stations (similar to cell phone towers) throughout large geographic areas, effectively providing coverage across entire states, regions, or even countries.
- **Bluetooth® device**—Creates a personal area network (PAN) to connect to other Bluetooth-enabled devices such as computers, phones, printers, headsets, speakers, and cameras. In a PAN, each device communicates directly with other devices, and devices must be relatively close together—typically within 10 meters (approximately 33 feet) of each other.

Computers with WLAN devices support one or more of the following IEEE industry standards:

- 802.11b, the first popular standard, supports data rates of up to 11 Mbps and operates at a frequency of 2.4 GHz.
- 802.11g supports data rates of up to 54 Mbps and operates at a frequency of 2.4 GHz. An 802.11g WLAN device is backward compatible with 802.11b devices, so they can operate on the same network.
- 802.11a supports data rates of up to 54 Mbps and operates at a frequency of 5 GHz.








 **NOTE:** 802.11a is not compatible with 802.11b and 802.11g.

- **Wi-Fi CERTIFIED 802.11n** supports data rates of up to 300 Mbps and may operate at 2.4 GHz or 5 GHz, making it backward compatible with 802.11a, b, and g.

For more information on wireless technology, refer to the information and Web site links provided in Help and Support.

Identifying wireless and network icons

Icon	Name	Description
------	------	-------------

	Wireless (connected)	Identifies the location of the wireless light and the wireless switch on the computer.
	Wireless (disconnected)	Indicates that all of the wireless devices are off.
	Wired network (connected)	Indicates that one or more of your network drivers are installed and one or more network devices are connected to the network.
	Network (connected)	Indicates that one or more of your network drivers are installed, one or more network devices are connected to a wireless network, and one or more network devices may be connected to a wired network.
	Network (disabled/disconnected)	Indicates that one or more of your network drivers are installed, no wireless connections are available or all wireless network devices are disabled by the wireless switch or Wireless Assistant, and no network devices are connected to a wired network.
	Wired network (disabled/disconnected)	Indicates that one or more of your network drivers are installed, all network devices or all wireless devices are disabled in Windows® Control Panel, and no network devices are connected to a wired network.
	Network (disconnected)	Indicates that one or more of your network drivers are installed and wireless connections are available, but no network devices are connected to a wired or wireless network.

Using the wireless controls

You can control the wireless devices in your computer using these features:


- Wireless switch
- Operating system controls

Using the wireless switch

The computer has a wireless switch, one or more wireless devices, and one or two wireless lights, depending on the model. All of the wireless devices on your computer are enabled at the factory, so the wireless light is on (blue) when you turn on the computer.


The wireless light indicates the overall power state of your wireless devices, not the status of individual devices. If the wireless light is blue, at least one wireless device is on. If the wireless light is amber, all wireless devices are off.

Because the wireless devices are enabled at the factory, you can use the wireless switch to turn on or turn off the wireless devices simultaneously. Individual wireless devices can be controlled through Computer Setup.

 **NOTE:** If the wireless devices are disabled by Computer Setup, the wireless switch will not work until you reenables your devices.

Using Wireless Assistant software (select models only)

A wireless device can be turned on or off using the Wireless Assistant software. If a wireless device is disabled by Computer Setup, it must be reenabled by Computer Setup before it can be turned on or off using Wireless Assistant.

 **NOTE:** Enabling or turning on a wireless device does not automatically connect the computer to a network or a Bluetooth-enabled device.

To view the state of the wireless devices, click the **Show hidden icons** icon, the arrow at the left of the notification area, and position the cursor over the wireless icon.

If the wireless icon is not displayed in the notification area, complete the following steps to change the Wireless Assistant properties:

1. Select **Start > Control Panel > Hardware and Sound > Windows Mobility Center**.
2. Click the wireless icon in the Wireless Assistant tile, which is located in the bottom row of Windows® Mobility Center.
3. Click **Properties**.
4. Select the check box next to **HP Wireless Assistant icon in notification area**.
5. Click **Apply**.
6. Click **Close**.

For more information, refer to the Wireless Assistant software Help:

1. Open Wireless Assistant by clicking the wireless icon in Windows Mobility Center.
2. Click the **Help** button.

Using HP Connection Manager (select models only)

You can use HP Connection Manager to connect to WWANs using the HP Mobile Broadband device in your computer (select models only).

- ▲ To start Connection Manager, click the **Connection Manager** icon in the notification area, at the far right of the taskbar.

– or –

Select **Start > All Programs > HP > HP Connection Manager**.

For more details about using Connection Manager, refer to the Connection Manager software Help.

Using operating system controls


Some operating systems also offer a way to manage integrated wireless devices and the wireless connection. For example, Windows provides the Network and Sharing Center that allows you to set up a connection or network, connect to a network, manage wireless networks, and diagnose and repair network problem.

To access the Network and Sharing Center, select **Start > Control Panel >Network and Internet> Network and Sharing Center**.


For more information, refer to Windows Help and Support. Select **Start > Help and Support**.

Using a WLAN

With a WLAN device, you can access a wireless local area network (WLAN), which is composed of other computers and accessories that are linked by a wireless router or a wireless access point.

 **NOTE:** The terms *wireless router* and *wireless access point* are often used interchangeably.

- A large-scale WLAN, such as a corporate or public WLAN, typically uses wireless access points that can accommodate a large number of computers and accessories and can separate critical network functions.
- A home or small office WLAN typically uses a wireless router, which allows several wireless and wired computers to share an Internet connection, a printer, and files without requiring additional pieces of hardware or software.

 **NOTE:** To use the WLAN device in your computer, you must connect to a WLAN infrastructure (provided through a service provider or a public or corporate network).

Setting up a WLAN

To set up a WLAN and connect to the Internet, you need the following equipment:

- A broadband modem (either DSL or cable) **(1)** and high-speed Internet service purchased from an Internet service provider (ISP)
- A wireless router (purchased separately) **(2)**
- The wireless computer **(3)**

The illustration below shows an example of a wireless network installation that is connected to the Internet.



As your network grows, additional wireless and wired computers can be connected to the network to access the Internet.

For help in setting up your WLAN, refer to the information provided by your router manufacturer or your ISP.

Protecting your WLAN

Because the WLAN standard was designed with only limited security capabilities—basically to foil casual eavesdropping rather than more powerful forms of attack—it is essential to understand that WLANs are vulnerable to well-known and well-documented security weaknesses.

WLANs in public areas, or “hotspots,” like coffee shops and airports may not provide any security. New technologies are being developed by wireless manufacturers and hotspot service providers that make the public environment more secure and anonymous. If you are concerned about the security of your computer in a hotspot, limit your network activities to noncritical e-mail and basic Internet surfing.

When you set up a WLAN or access an existing WLAN, always enable security features to protect your network from unauthorized access. The common security levels are Wi-Fi Protected Access (WPA) and Wired Equivalent Privacy (WEP). Because wireless radio signals travel outside the network, other WLAN devices can pick up unprotected signals and either connect to your network (uninvited) or capture information being sent across it. However, you can take precautions to protect your WLAN:

- **Use a wireless transmitter with built-in security**

Many wireless base stations, gateways, and routers provide built-in security features such as wireless security protocols and firewalls. With the correct wireless transmitter, you can protect your network from the most common wireless security risks.

- **Work behind a firewall**

A firewall is a barrier that checks both data and requests for data that are sent to your network and then discards any suspicious items. Firewalls are available in many varieties, both software and hardware. Some networks use a combination of both types.

- **Use wireless encryption**

A variety of sophisticated encryption protocols is available for your WLAN. Find the solution that works best for your network security:

- **Wired Equivalent Privacy (WEP)** is a wireless security protocol that uses a WEP key to encode or encrypt all network data before it is transmitted. Usually, you can allow the network to assign the WEP key. Alternatively, you can set up your own key, generate a different key, or choose other advanced options. Without the correct key, others will not be able to use the WLAN.
- **WPA (Wi-Fi Protected Access)**, like WEP, uses security settings to encrypt and decrypt data that is transmitted over the network. However, instead of using one static security key for encryptions as WEP does, WPA uses *temporal key integrity protocol* (TKIP) to dynamically generate a new key for every packet. It also generates different sets of keys for each computer on the network.

Connecting to a WLAN


To connect to the WLAN, follow these steps:

1. Be sure that the WLAN device is on. If it is on, the wireless light is on. If the wireless light is amber, slide the wireless switch.

 **NOTE:** On some models, the wireless light is amber when all wireless devices are off.


2. Click the network icon in the notification area, at the far right of the taskbar.
3. Select your WLAN from the list, and then type the network security key, if required.

If the network is a security-enabled WLAN, you are prompted to enter a network security key, which is a security code. Type the code, and then click **OK** to complete the connection.

 **NOTE:** If no WLANs are listed, you are out of range of a wireless router or access point.

NOTE: If you do not see the network you want to connect to, click **Open Network and Sharing Center**, and then click **Set up a new connection or network**. A list of options is displayed. You can choose to manually search for and connect to a network, or to create a new network connection.

After the connection is made, place the mouse pointer over the network icon in the notification area, at the far right of the taskbar, to verify the name and status of the connection.

 **NOTE:** The functional range (how far your wireless signals travel) depends on WLAN implementation, router manufacturer, and interference from other electronic devices or structural barriers such as walls and floors.

More information about using a WLAN is available through the following resources:

- Information from your ISP and the manufacturer's instructions included with your wireless router and other WLAN equipment
- Information and Web site links provided in Help and Support

For a list of public WLANs near you, contact your ISP or search the Web. Web sites that list public WLANs include Cisco Internet Mobile Office Wireless Locations, Hotspotlist, and Geektools. Check with each public WLAN location for cost and connection requirements.

For additional information on connecting your computer to a corporate WLAN, contact your network administrator or IT department.

Roaming to another network

When you move your computer within range of another WLAN, Windows attempts to connect to that network. If the attempt is successful, your computer is automatically connected to the new network. If Windows does not recognize the new network, follow the same procedure you used initially to connect to your WLAN.

Using HP Mobile Broadband (select models only)

HP Mobile Broadband enables your computer to use wireless wide area networks (WWANs) to access the Internet from more places and over larger areas than it can by using WLANs. Using HP Mobile Broadband requires a network service provider (called a *mobile network operator*), which in most cases is a mobile phone network operator. Coverage for HP Mobile Broadband is similar to mobile phone voice coverage.

When used with mobile network operator service, HP Mobile Broadband gives you the freedom to stay connected to the Internet, send e-mail, or connect to your corporate network whether you are on the road or outside the range of Wi-Fi hotspots.

HP supports the following technologies:

- HSPA (High Speed Packet Access), which provides access to networks based on the Global System for Mobile Communications (GSM) telecommunications standard.
- EV-DO (Evolution Data Optimized), which provides access to networks based on the code division multiple access (CDMA) telecommunications standard.

You may need the HP Mobile Broadband Module serial number to activate mobile broadband service. The serial number is printed on a label inside the battery bay of your computer.

Some mobile network operators require the use of a subscriber identity module (SIM). A SIM contains basic information about you, such as a PIN (personal identification number), as well as network information. Some computers include a SIM that is preinstalled in the battery bay. If the SIM is not preinstalled, it may be provided in the HP Mobile Broadband information provided with your computer or the mobile network operator may provide it separately from the computer.

For information on inserting and removing the SIM, refer to the “Inserting a SIM” and “Removing a SIM” sections in this chapter.

For information on HP Mobile Broadband and how to activate service with a preferred mobile network operator, refer to the HP Mobile Broadband information included with your computer. For additional information, see the HP Web site at <http://www.hp.com/go/mobilebroadband> (US only).

Inserting a SIM

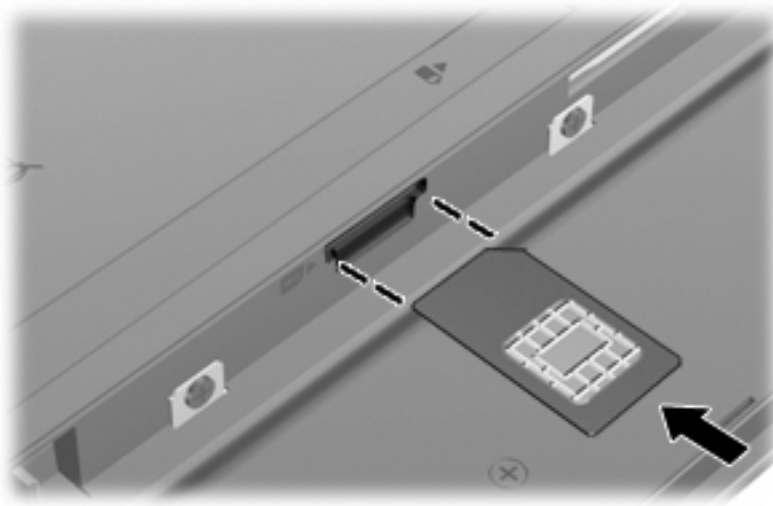
- △ **CAUTION:** When inserting a SIM, position the card with the slanted corner as shown in the illustration. If a SIM is inserted backwards or upside down, the battery may not snap into place properly and could damage the SIM and the SIM connector.

To prevent damage to the connectors, use minimal force when inserting a SIM.


To insert a SIM:

1. Shut down the computer. If you are not sure whether the computer is off or in Hibernation, turn the computer on by pressing the power button. Then shut down the computer through the operating system.
2. Close the display.
3. Disconnect all external devices connected to the computer.
4. Unplug the power cord from the AC outlet.
5. Turn the computer upside down on a flat surface.

6. Remove the battery.
7. Insert the SIM into the SIM slot, and gently push the SIM into the slot until it is firmly seated.



8. Replace the battery.

 **NOTE:** HP Mobile Broadband will be disabled if the battery is not replaced.

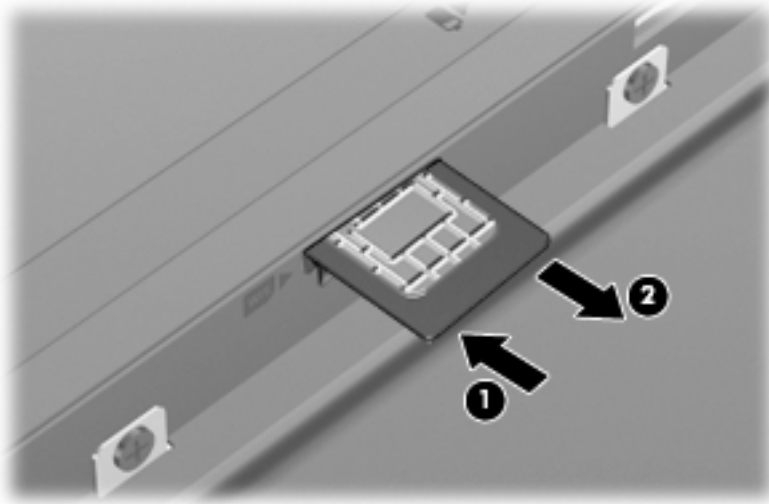
9. Turn the computer right-side up, and then reconnect external power and external devices.
10. Turn on the computer.

Removing a SIM

To remove a SIM:

1. Shut down the computer. If you are not sure whether the computer is off or in Hibernation, turn the computer on by pressing the power button. Then shut down the computer through the operating system.
2. Close the display.
3. Disconnect all external devices connected to the computer.
4. Unplug the power cord from the AC outlet.
5. Turn the computer upside down on a flat surface.
6. Remove the battery.

7. Press in on the SIM (1), and then remove it from the slot (2).



8. Replace the battery.
9. Turn the computer right-side up, and then reconnect external power and external devices.
10. Turn on the computer.

Using Bluetooth wireless devices (select models only)

A Bluetooth device provides short-range wireless communications that replace the physical cable connections that traditionally link electronic devices such as the following:

- Computers (desktop, notebook, PDA)
- Phones (cellular, cordless, smart phone)
- Imaging devices (printer, camera)
- Audio devices (headset, speakers)

Bluetooth devices provide peer-to-peer capability that allows you to set up a personal area network (PAN) of Bluetooth devices. For information on configuring and using Bluetooth devices, refer to the Bluetooth software Help.

Bluetooth and Internet Connection Sharing (ICS)


HP does **not** recommend setting up one computer with Bluetooth as a host and using it as a gateway through which other computers may connect to the Internet. When two or more computers are connected using Bluetooth, and Internet Connection Sharing (ICS) is enabled on one of the computers, the other computers may not be able to connect to the Internet using the Bluetooth network.

The strength of Bluetooth is in synchronizing information transfers between your computer and wireless devices including cellular phones, printers, cameras, and PDAs. The inability to consistently connect two or more computers to share the Internet through Bluetooth is a limitation of Bluetooth and the Windows operating system.

Troubleshooting wireless connection problems

Some possible causes for wireless connection problems include the following:

- Network configuration (SSID or security) has been changed.
- Wireless device is not installed correctly or has been disabled.
- Wireless device or router hardware has failed.
- Wireless device encountered interference from other devices.


 **NOTE:** Wireless networking devices are included with select computer models only. If wireless networking is not listed in the feature list on the side of the original computer package, you may add wireless networking capability to the computer by purchasing a wireless networking device.

Before working your way through the sequence of possible solutions to your network connection problem, be sure that device drivers are installed for all wireless devices.

Use the procedures in this chapter to diagnose and repair a computer that does not connect to the network you want to use.

Cannot create a WLAN connection

If you have a problem connecting to a WLAN, confirm that the integrated WLAN device is properly installed on your computer:

 **NOTE:** Windows includes the User Account Control feature to improve the security of your computer. You may be prompted for your permission or password for tasks such as installing software, running utilities, or changing Windows settings. Refer to [Windows Help and Support](#) for more information.

1. Select **Start > Control Panel > System and Security**.
2. In the **System** area, click **Device Manager**.
3. Click the arrow next to **Network adapters** to expand the list to show all adapters.
4. Identify the WLAN device from the Network adapters list. The listing for a WLAN device may include the term *wireless*, *wireless LAN*, *WLAN*, *Wi-Fi*, or *802.11*.

If no WLAN device is listed, either your computer does not have an integrated WLAN device, or the driver for the WLAN device is not properly installed.

For more information on troubleshooting WLANs, refer to the Web site links provided in Help and Support.

Cannot connect to a preferred network

Windows can automatically repair a corrupted WLAN connection:

- If there is a network icon in the notification area, at the far right of the taskbar, right-click the icon, and then click **Troubleshoot problems**.

Windows resets your network device and attempts to reconnect to one of the preferred networks.


- If there is no network status icon in the notification area, follow these steps:
 1. Select **Start > Control Panel > Network and Internet > Network and Sharing Center**.
 2. Click **Troubleshoot problems** and select the network you wish to repair.

Network icon is not displayed

If the network icon is not displayed in the notification area after you configure the WLAN, the software driver is either missing or corrupted. A Windows “Device not Found” error message may also be displayed. The driver must be reinstalled.

To get the latest version of the WLAN device software for your computer, follow these steps:

1. Open your Web browser and go to <http://www.hp.com/support>.
2. Select your country or region.
3. Click the option for software and driver downloads, and then type your computer model number in the search box.
4. Press **enter**, and then follow the on-screen instructions.

 **NOTE:** If the WLAN device you are using was purchased separately, consult the manufacturer's Web site for the latest software.

Current network security codes are unavailable

If you are prompted for a network key or a name (SSID) when connecting to a WLAN, the network is protected by security. You must have the current codes to make a connection on a secure network. The SSID and network key are alphanumeric codes that you enter into your computer to identify your computer to the network.

- For a network connected to your personal wireless router, review the router user guide for instructions on setting up the same codes on both the router and the WLAN device.
- For a private network, such as a network in an office or at a public Internet chat room, contact the network administrator to obtain the codes, and then enter the codes when prompted to do so.

Some networks change the SSID or network keys used in their routers or access points on a regular basis to improve security. You must change the corresponding code in your computer accordingly.


If you are provided with new wireless network keys and SSID for a network, and if you have previously connected to that network, follow the steps below to connect to the network:

1. Select **Start > Control Panel > Network and Internet > Network and Sharing Center**.

2. Click **Manage wireless networks** in the left panel.

A list showing the available WLANs is displayed. If you are in a hotspot where several WLANs are active, several will be displayed.

3. Select the network in the list, right-click the network, and then click **Properties**.

 **NOTE:** If the network you want is not listed, check with the network administrator to be sure that the router or access point is operating.

4. Click the **Security** tab, and then enter the correct wireless encryption data into the **Network security key** field.

5. Click **OK** to save these settings.

WLAN connection is very weak

If the connection is very weak, or if your computer cannot make a connection to a WLAN, minimize interference from other devices, as follows:

- Move your computer closer to the wireless router or access point.
- Temporarily disconnect other wireless devices such as a microwave, cordless phone, or cellular phone to be sure that they are not interfering.

If the connection does not improve, try forcing the device to reestablish all connection values:

1. Select **Start > Control Panel > Network and Internet > Network and Sharing Center**.

2. Click **Manage wireless networks** in the left panel.

A list showing the available WLANs is displayed. If you are in a hotspot where several WLANs are active, several will be displayed.

3. Click a network, and then click **Remove**.

Cannot connect to the wireless router

If you are trying to connect to the wireless router and are unsuccessful, reset the wireless router by removing power from the router for 10 to 15 seconds.

If the computer still cannot make a connection to a WLAN, restart the wireless router. For details, refer to the router manufacturer's instructions.

Connecting to a local area network (LAN)

Connecting to a local area network (LAN) requires an 8-pin, RJ-45 network cable (not included). If the network cable contains noise suppression circuitry (1), which prevents interference from TV and radio reception, orient the circuitry end of the cable (2) toward the computer.



To connect the network cable:

1. Plug the network cable into the network jack (1) on the computer.
2. Plug the other end of the cable into a network wall jack (2).




⚠ WARNING! To reduce the risk of electric shock, fire, or damage to the equipment, do not plug a modem or telephone cable into the RJ-45 (network) jack.

4 Multimedia

Multimedia features

Your computer includes multimedia features that allow you to listen to music, watch movies, and view pictures. Your computer may include the following multimedia components:

- Integrated speakers for listening to music
- Integrated microphones for recording your own audio
- Integrated webcam that allows you to capture and share video
- Preinstalled multimedia software that allows you to play and manage your music, movies, and pictures
- Function keys that provide fast access to volume control

 **NOTE:** Your computer may not include all of the components listed.

The following sections explain how to identify and use the multimedia components included with your computer.

Identifying your multimedia components

The following illustration and table describe the multimedia features of the computer.



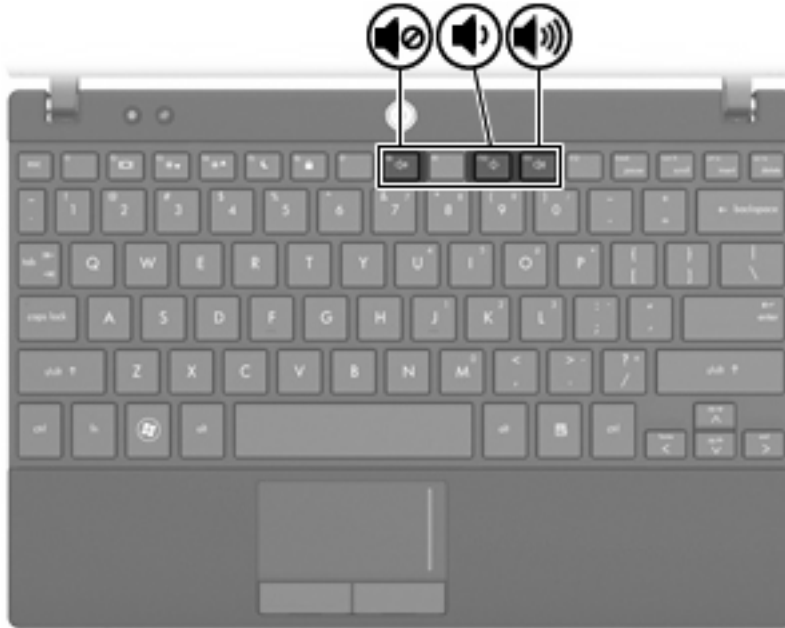
Component	Description
(1) Webcam light	On: The webcam is in use.
(2) Webcam	Records audio and video and captures still photographs.
(3) Internal microphones (2)	Record sound.
(4) Audio-in (microphone) jack	Connects an optional computer headset microphone, stereo array microphone, or monaural microphone.
(5) Audio-out (headphone) jack	Produces sound when connected to optional powered stereo speakers, headphones, ear buds, or a headset.
	WARNING! To reduce the risk of personal injury, adjust the volume before putting on headphones, earbuds, or a headset. For additional safety information, refer to the <i>Regulatory, Safety and Environmental Notices</i> .
	NOTE: When a device is connected to the headphone jack, the computer speakers are disabled.
(6) Speakers (2)	Produce sound.

Adjusting the volume

You can adjust the volume using the following controls:

- Computer volume function keys—Either the **f8**, **f10**, or **f11** key:
 - To mute or restore volume, press **f8**.
 - To decrease volume, press **f10**.

- To increase volume, press **f11**.



- Windows® volume control:
 - a. Click the **Speakers** icon in the notification area, at the far right of the taskbar.
 - b. Increase or decrease the volume by moving the slider up or down. Click the **Mute Speakers** icon to mute the volume.– or –
 - a. Right-click the **Speakers** icon in the notification area, and then click **Open Volume Mixer**.
 - b. Increase or decrease the volume by moving the slider up or down. You can also mute the volume by clicking the **Mute Speakers** icon.If the Speakers icon is not displayed in the notification area, follow these steps to add it:
 - a. Right-click the **Show hidden icons** icon (the arrow at the left side of the notification area).
 - b. Click **Customize notification icons**.
 - c. Under **Behaviors**, select the **Show icon and notifications** for the volume icon.
 - d. Click **OK**.
- Program volume control:


Volume can also be adjusted within some programs.

Multimedia software

Your computer includes preinstalled multimedia software that allows you to play music and view pictures. The following sections provide details about preinstalled multimedia software and installing multimedia software from a disc.

Using multimedia software

1. Select **Start > All Programs**, and then open the multimedia program you want to use. For example, if you want to use Windows Media Player to play an audio CD, click **Windows Media Player**.

 **NOTE:** Some programs may be located in subfolders.

2. Insert the media disc, such as an audio CD, into the optical drive.
3. Follow the instructions on the screen.

– or –

1. Insert the media disc, such as an audio CD, into the optical drive.


An AutoPlay dialog box opens.

2. Click a multimedia task from the list of tasks.


Using preinstalled multimedia software

To locate preinstalled multimedia software:


- ▲ Select **Start > All Programs**, and then open the multimedia program you want to use.

 **NOTE:** Some programs may be located in subfolders.

Installing multimedia software from a disc

 **NOTE:** To install multimedia software from a disc, you must have an external optical drive connected to the computer. The computer provides one powered USB port on the right side of the computer. This port provides power to the external optical drive when used with a powered USB cable. An external optical drive connected to another USB port on the computer must be connected to AC power.

1. Insert the disc into a connected external optical drive.
2. When the installation wizard opens, follow the on-screen instructions.
3. Restart the computer if prompted to do so.


 **NOTE:** For details about using software included with the computer, refer to the software manufacturer's instructions, which may be provided with the software, on disc, or on the manufacturer's Web site.

Audio

Your computer enables you to use a variety of audio features:


- Play music using your computer speakers and/or connected external speakers
- Record sound using the internal microphones or connect an external microphone
- Download music from the Internet
- Create multimedia presentations using audio and images
- Transmit sound and images with instant messaging programs
- Stream radio programs (select models only) or receive FM radio signals
- Create or “burn” audio CDs using an external optical drive

Connecting external audio devices

 **WARNING!** To reduce the risk of personal injury, adjust the volume before putting on headphones, earbuds, or a headset. For additional safety information, refer to the *Regulatory, Safety and Environmental Notices*.

To connect external devices such as external speakers, headphone, or a microphone, refer to the information provided with the device. For best results, remember the following tips:

- Be sure that the device cable is securely connected to the correct jack on your computer. (Cable connectors are normally color-coded to match the corresponding jacks on the computer.)
- Be sure to install any drivers required by the external device.

 **NOTE:** A driver is a required program that acts like a translator between the device and the programs that use the device.

Checking your audio functions


To check the system sound on your computer, follow these steps:

1. Select **Start > Control Panel**.
2. Click **Hardware and Sound**.
3. Click **Sound**.
4. When the Sound window opens, click the **Sounds** tab. Under **Program Events**, select any sound event, such as a beep or alarm, and click the **Test** button.

You should hear sound through the speakers or through connected headphones.

To check the record functions of the computer, follow these steps:

1. Select **Start > All Programs > Accessories > Sound Recorder**.
2. Click **Start Recording** and speak into the microphone. Save the file to the desktop.
3. Open Windows Media Player and play back the sound.

 **NOTE:** For best results when recording, speak directly into the microphone and record sound in a setting free of background noise.

- ▲ To confirm or change the audio settings on your computer, select **Start > Control Panel > Hardware and Sound > Sound**.

Video

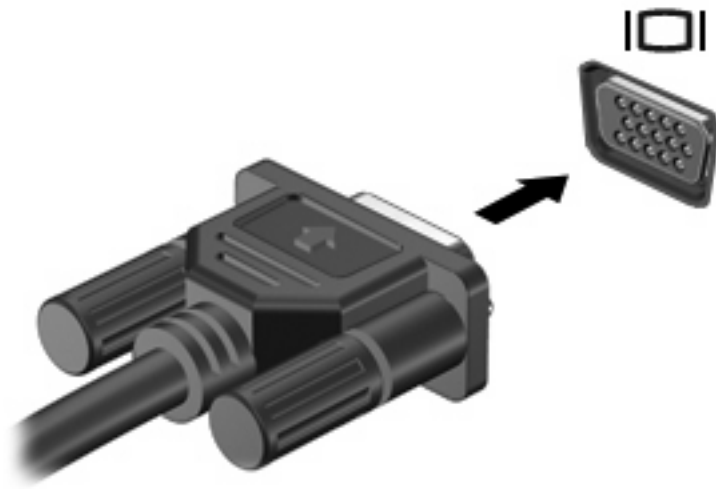
Your computer enables you to use a variety of video features:


- Play games over the Internet
- Edit pictures and video to create presentations
- Connect external video devices

Connecting an external monitor or projector

The external monitor port connects an external display device such as an external monitor or a projector to the computer.

- ▲ To connect a display device, connect the device cable to the external monitor port.




 **NOTE:** If a properly connected external display device does not display an image, press **f2** to transfer the image to the device. Repeatedly pressing **f2** alternates the screen image between the computer display and the device.

Webcam

Your computer model includes an integrated webcam, located at the top of the display. The webcam can be used with a variety of software for the following functions:


- Capturing video
- Streaming video with instant message software
- Taking still photos

 **NOTE:** Be sure that you have installed software that is designed for use with the integrated webcam.

NOTE: For information about using software designed for use with the integrated webcam, refer to the online Help for that software.

For optimum performance, observe the following guidelines while using the integrated webcam:

- Be sure that you have the latest version of an instant message program before attempting a video conversation.
- The webcam may not work properly across some network firewalls.

 **NOTE:** If you are having trouble viewing or sending multimedia files to someone on another LAN or outside your network firewall, temporarily disable the firewall, perform the task you want to perform, and then reenable the firewall. To permanently resolve the problem, reconfigure the firewall as necessary, and adjust the policies and settings of other intrusion detection systems. For additional information, contact your network administrator or IT department.

- Whenever possible, place bright light sources behind the webcam and out of the picture area.

Adjusting webcam properties

You can adjust webcam properties using the Properties dialog box, which is accessible from various programs that use the integrated webcam, usually from a configuration, settings, or properties menu:


- **Brightness**—Controls the amount of light that is incorporated into the image. A higher brightness setting creates a brighter image; a lower brightness setting creates a darker image.
- **Contrast**—Controls the difference between lighter and darker areas on the image. A higher contrast setting intensifies the image; a lower contrast setting maintains more of the original information's dynamic range but leads to a flatter image.
- **Hue**—Controls the aspect of color that distinguishes it from another color (what makes a color red, green, or blue). Hue is distinct from saturation, which measures the intensity of the hue.
- **Saturation**—Controls the strength of color in the final image. A higher saturation setting creates a bolder image; a lower saturation setting creates a more subtle image.
- **Sharpness**—Controls the definition of edges in an image. A higher sharpness setting creates a more defined image; a lower sharpness setting creates a softer image.
- **Gamma**—Controls the contrast affecting the mid-level grays or midtones of an image. Adjusting the gamma of an image allows you to change the brightness values of the middle range of gray tones without dramatically altering the shadows and highlights. A lower gamma setting makes grays look black, and makes dark colors even darker.

- **Backlight Compensation**—Compensates in cases where a subject with a large amount of background light would otherwise be obscured by blooming or silhouetting.
- **NightMode**—Compensates for low-light conditions.
- **Zoom (select models only)**—Adjusts the zoom percentage for taking photos or recording videos.
- **Horizontal or vertical**—Rotates the image horizontally or vertically.
- **50Hz or 60Hz**—Adjusts the shutter speed to achieve a video recording that does not flicker.

Customizable preset profiles for multiple lighting conditions compensate for the following lighting conditions: incandescent, fluorescent, halogen, sunny, cloudy, night.

5 Security

Protecting the computer

 **NOTE:** Security solutions are designed to act as deterrents. These deterrents may not prevent a product from being mishandled or stolen.

NOTE: In some countries or regions, the computer supports CompuTrace, which is an online-security-based tracking and recovery service. If the computer is stolen, CompuTrace can track the computer if the unauthorized user accesses the Internet. You must purchase the software and subscribe to the service in order to use CompuTrace. For information about ordering the CompuTrace software, see the HP Web site at <http://www.hpshopping.com>.

Security features provided with your computer can protect the computer, personal information, and data from a variety of risks. The way you use your computer will determine which security features you need to use.

The Windows operating system offers certain security features. Additional security features are listed in the following table. Most of these additional security features can be configured in the Computer Setup utility.

To protect against	Use this security feature
Unauthorized use of the computer	Power-on authentication using passwords or smart cards
Unauthorized access to Computer Setup (f10)	BIOS administrator password in Computer Setup*
Unauthorized access to the contents of a hard drive	DriveLock password in Computer Setup*
Unauthorized startup from an optical drive, diskette drive, or internal network adapter	Boot options feature in Computer Setup*
Unauthorized access to data	<ul style="list-style-type: none">• Firewall software• Windows updates
Unauthorized access to Computer Setup settings and other system identification information	BIOS administrator password in Computer Setup*
Unauthorized removal of the computer	Security cable slot (used with an optional security cable)

*Computer Setup is a preinstalled, ROM-based utility that can be used even when the operating system is not working or will not load. You can use either a pointing device (TouchPad, pointing stick, or USB mouse) or the keyboard to navigate and make selections in Computer Setup.

Using passwords

A password is a group of characters that you choose to secure your computer information. Several types of passwords can be set, depending on how you want to control access to your information. Passwords can be set in Windows or in the non-Windows Computer Setup utility that is preinstalled on the computer.

- △ **CAUTION:** To prevent being locked out of the computer, record each password you set. Because most passwords are not displayed as they are set, changed, or deleted, it is essential to record each password immediately and store it in a secure place.

You can use the same password for a Computer Setup feature and for a Windows security feature. You can also use the same password for more than one Computer Setup feature.

Use the following guidelines when setting a password in Computer Setup:

- A password can be any combination of up to 8 letters and numbers and is case sensitive.
- A password set in Computer Setup must be entered at a Computer Setup prompt. A password set in Windows must be entered at a Windows prompt.

Use the following tips for creating and saving passwords:

- When creating passwords, follow requirements set by the program.
- Write down your passwords and store them in a secure place away from the computer.
- Do not store passwords in a file on the computer.
- Do not use your name or other personal information that could be easily discovered by an outsider.

The following sections list Windows and Computer Setup passwords and describe their functions. For additional information about Windows passwords, such as screen-saver passwords, select **Start > Help and Support**.

Setting passwords in Windows

Windows passwords	Function
Administrator password*	Protects access to a Windows administrator-level account.
User password*	Protects access to a Windows user account.

*For information about setting a Windows administrator password or a Windows user password, select **Start > Help and Support**.

Setting passwords in Computer Setup

Computer Setup passwords	Function
BIOS administrator password	Protects access to Computer Setup.

Computer Setup passwords	Function
DriveLock master password	Protects access to the internal hard drive that is protected by DriveLock. It is also used to remove DriveLock protection. This password is set under DriveLock Passwords during the enable process.
DriveLock user password	Protects access to the internal hard drive that is protected by DriveLock, and is set under DriveLock Passwords during the enable process.

BIOS administrator password

The BIOS administrator password protects the configuration settings and system identification information in Computer Setup. After this password is set, it must be entered to access Computer Setup and to make changes using Computer Setup.

Note the following characteristics of the BIOS administrator password:

- It is not interchangeable with a Windows administrator password, although both passwords can be identical.
- It is not displayed as it is set, entered, changed, or deleted.
- It must be set and entered with the same keys. For example, a BIOS administrator password set with keyboard number keys will not be recognized if you enter it thereafter with embedded numeric keypad number keys.
- It can include any combination of up to 32 letters and numbers and is not case sensitive.

Managing a BIOS administrator password

A setup password is set, changed, and deleted in Computer Setup.

To manage, set, change, or delete this password, follow these steps:

1. Open Computer Setup by turning on or restarting the computer, and then pressing **esc** while the “Press the ESC key for Startup Menu” message is displayed in the lower-left corner of the screen.
2. Press **f10** to enter BIOS Setup.
3. Use the arrow keys to select **Security > Setup Password**, and then press **enter**.
 - To set a BIOS administrator password, type your password in the **New password** and **Verify new password** fields, and then press **f10**.
 - To change a setup password, type your current password in the **Old password** field, type a new password in the **New password** and **Verify new password** fields, and then press **f10**.
 - To delete a BIOS administrator password, type your current password in the **Old password** field, and then press **f10**.
4. To save your preferences, use the arrow keys to select **File > Save changes and exit**. Then follow the instructions on the screen.

Your preferences go into effect when the computer restarts.

Entering a BIOS administrator password

At the **BIOS administrator password** prompt, type your password (using the same kind of keys you used to set the password), and then press **enter**. After 3 unsuccessful attempts to enter the BIOS administrator password, you must restart the computer and try again.

Using Computer Setup DriveLock

△ **CAUTION:** To prevent the DriveLock-protected hard drive from becoming permanently unusable, record the DriveLock user password and the DriveLock master password in a safe place away from your computer. If you forget both DriveLock passwords, the hard drive will be permanently locked and can no longer be used.

DriveLock protection prevents unauthorized access to the contents of a hard drive. DriveLock can be applied only to the internal hard drive(s) of the computer. After DriveLock protection is applied to a drive, a password must be entered to access the drive. The drive must be inserted into the computer, not into an optional docking device or external MultiBay, in order for it to be accessed by the DriveLock passwords.

To apply DriveLock protection to an internal hard drive, a user password and a master password must be set in Computer Setup. Note the following considerations about using DriveLock protection:

- After DriveLock protection is applied to a hard drive, the hard drive can be accessed only by entering either the user password or the master password.
- The owner of the user password should be the day-to-day user of the protected hard drive. The owner of the master password may be either a system administrator or the day-to-day user.
- The user password and the master password can be identical.
- You can delete a user password or master password only by removing DriveLock protection from the drive. DriveLock protection can be removed from the drive only with the master password.

Setting a DriveLock password

To access the DriveLock settings in Computer Setup, follow these steps:

1. Open Computer Setup by turning on or restarting the computer, and then pressing **esc** while the “Press the ESC key for Startup Menu” message is displayed in the lower-left corner of the screen.
2. Press **f10** to enter BIOS Setup.
3. Use the arrow keys to select **Security > DriveLock passwords**, and then press **enter**.
4. Select the location of the hard drive you want to protect, and then press **f10**.
5. Use the arrow keys to select **Enable** in the **Protection** field, and then press **f10**.
6. Read the warning. To continue, press **f10**.
7. Type your user password in the **New password** and **Verify new password** fields, and then press **f10**.
8. Type your master password in the **New password** and **Verify new password** fields, and then press **f10**.
9. To confirm DriveLock protection on the drive you have selected, type `DriveLock` in the confirmation field, and then press **f10**.
10. To exit DriveLock settings, use the arrow keys to select **Esc**.
11. To save your preferences, use the arrow keys to select **File > Save changes and exit**. Then follow the instructions on the screen.

Your preferences go into effect when the computer restarts.

Entering a DriveLock password

Be sure that the hard drive is inserted into the computer (not into an optional docking device or external MultiBay).

At the **DriveLock Password** prompt, type your user or master password (using the same kind of keys you used to set the password), and then press [enter](#).

After 2 incorrect attempts to enter the password, you must shut down the computer and try again.

Changing a DriveLock password

To access the DriveLock settings in Computer Setup, follow these steps:

1. Open Computer Setup by turning on or restarting the computer, and then pressing **esc** while the “Press the ESC key for Startup Menu” message is displayed in the lower-left corner of the screen.
2. Press **f10** to enter BIOS Setup.
3. Use the arrow keys to select **Security > DriveLock passwords**, and then press **enter**.
4. Use the arrow keys to select the location of the internal hard drive, and then press **f10**.
5. Use the arrow keys to select the field for the password you want to change. Type your current password in the **Old password** field, and then type the new password in the **New password** field and in the **Verify new password** field. Then press **f10**.
6. To save your preferences, use the arrow keys to select **File > Save changes and exit**. Then follow the instructions on the screen.

Your preferences go into effect when the computer restarts.

Removing DriveLock protection

To access the DriveLock settings in Computer Setup, follow these steps:

1. Open Computer Setup by turning on or restarting the computer, and then pressing **esc** while the “Press the ESC key for Startup Menu” message is displayed in the lower-left corner of the screen.
2. Press **f10** to enter BIOS Setup.
3. Use the arrow keys to select **Security > DriveLock passwords**, and then press **enter**.
4. Use the arrow keys to select the location of the internal hard drive, and then press **f10**.
5. Use the arrow keys to select **Disable** in the **Protection** field, and then press **f10**.
6. Type your master password in the **Old password** field. Then press **f10**.
7. To save your preferences, use the arrow keys to select **File > Save changes and exit**. Then follow the instructions on the screen.

Your preferences go into effect when the computer restarts.

Using Computer Setup security features

Securing system devices

From the Boot options menu or the Port options menu in Computer Setup, you can disable or enable system devices.

To disable or reenable system devices in Computer Setup, follow these steps:

1. Open Computer Setup by turning on or restarting the computer, and then pressing **esc** while the “Press the ESC key for Startup Menu” message is displayed in the lower-left corner of the screen.
2. Press **f10** to enter BIOS Setup.
3. Use the arrow keys to select **System Configuration > Boot options** or **System Configuration > Port options**. Then press **enter** and use the arrow keys to select the options you want.
4. To confirm your preferences, press **f10**.
5. To save your preferences, use the arrow keys to select **File > Save changes and exit**. Then follow the instructions on the screen.

Your preferences go into effect when the computer restarts.


Viewing Computer Setup System Information

The System Information feature in Computer Setup provides 2 types of system information:

- Identification information about the computer model.
- Specification information for the processor, cache and memory size, and system ROM.

To view this general system information, follow these steps:

1. Open Computer Setup by turning on or restarting the computer, and then pressing **esc** while the “Press the ESC key for Startup Menu” message is displayed in the lower-left corner of the screen.
2. Press **f10** to enter BIOS Setup.
3. Use the arrow keys to select **File > System Information**, and then press **enter**.

 **NOTE:** To prevent unauthorized access to this information, you must create a BIOS administrator password in Computer Setup.

Using antivirus software

When you use the computer to access e-mail, a network, or the Internet, you expose the computer to computer viruses. Computer viruses can disable the operating system, applications, or utilities, or cause them to function abnormally.


Antivirus software can detect most viruses, destroy them, and in most cases, repair any damage they have caused. To provide ongoing protection against newly discovered viruses, antivirus software must be updated.

For more information about computer viruses, type `viruses` in the Search box in Help and Support.

Using firewall software

When you use the computer to access e-mail, a network, or the Internet, unauthorized persons may be able to gain access to information about you, the computer, and your personal files. Use the firewall software preinstalled on the computer to protect your privacy.

Firewall features include information on logging and reporting, and automatic alarms to monitor all incoming and outgoing traffic. Refer to the firewall documentation or contact your firewall manufacturer for more information.

 **NOTE:** Under some circumstances a firewall can block access to Internet games, interfere with printer or file sharing on a network, or block authorized e-mail attachments. To temporarily solve the problem, disable the firewall, perform the task that you want to perform, and then reenable the firewall. To permanently resolve the problem, reconfigure the firewall.


Installing critical updates

△ **CAUTION:** To protect the computer from security breaches and computer viruses, install the online critical updates from Microsoft as soon as you receive an alert.

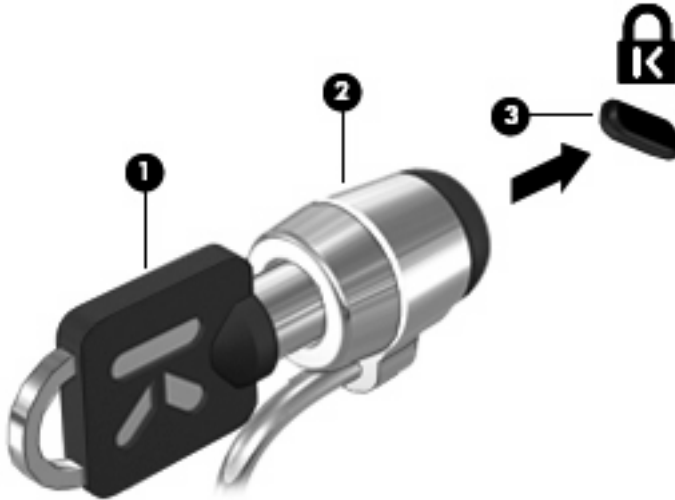
Updates to the operating system and other software may have become available *after* the computer was shipped. To be sure that all available updates are installed on the computer, observe these guidelines:

- Run Windows Update monthly to install the latest software from Microsoft.
- Obtain updates, as they are released, from the Microsoft Web site and through the updates link in Help and Support.

Installing a security cable

 **NOTE:** The security cable is designed to act as a deterrent, but it may not prevent the computer from being mishandled or stolen.

1. Loop the security cable around a secured object.
2. Insert the key (1) into the cable lock (2).
3. Insert the cable lock into the security cable slot on the computer (3), and then lock the cable lock with the key.



6 External devices

Using a USB device

Universal Serial Bus (USB) is a hardware interface that can be used to connect an optional external device, such as a USB keyboard, mouse, drive, printer, scanner, or hub.

Some USB devices may require additional support software, which is usually included with the device. For more information about device-specific software, refer to the manufacturer's instructions.

The computer has 3 USB ports that support USB 1.0, USB 1.1, and USB 2.0 devices. The 2 USB ports on the left side of the computer are standard USB ports. The USB port on the right side of the computer is a powered USB port. A powered USB port provides power to an external device if used with a powered USB cable. A USB hub provides additional USB ports that can be used with the computer.

Connecting a USB device

△ **CAUTION:** To prevent damage to a USB connector, use minimal force to connect a USB device.

▲ To connect a USB device to the computer, connect the USB cable for the device to the USB port.



You will hear a sound when the device has been detected.

📄 **NOTE:** The first time you connect a USB device, a message is displayed in the notification area to let you know the device is recognized by the computer.


Removing a USB device

△ **CAUTION:** To prevent loss of information or an unresponsive system, use the following procedure to safely remove a USB device.


CAUTION: To prevent damage to a USB connector, do not pull on the cable to remove the USB device.

To remove a USB device:

1. Click the **Safely Remove Hardware and Eject Media** icon in the notification area, at the far right of the taskbar.

 **NOTE:** To display the Safely Remove Hardware and Eject Media icon, click the **Show hidden icons** icon (the arrow at the left side of the notification area).

2. Click the name of the device in the list.

 **NOTE:** You are prompted that it is safe to remove the hardware device.

3. Remove the device.

Using USB legacy support

USB legacy support (enabled by default) permits the following actions:

- Using a USB keyboard, mouse, or hub connected to a USB port on the computer during startup or in an MS-DOS-based program or utility
- Starting or restarting from an optional external MultiBay or an optional USB bootable device

USB legacy support is enabled at the factory. To disable or enable USB legacy support:

1. Open Computer Setup by turning on or restarting the computer, and then pressing **esc** while the “Press the ESC key for Startup Menu” message is displayed in the lower-left corner of the screen.
2. Press **f10** to enter BIOS Setup.
3. Use the arrow keys to select **System Configuration > Device configurations**, and then press **enter**.
4. Use the arrow keys to enable or disable USB legacy support, and then press **f10**.
5. To save your preferences and exit Computer Setup, use the arrow keys to select **File > Save changes and exit**. Then follow the instructions on the screen.

Your preferences go into effect when the computer restarts.


Using external drives

Removable external drives expand your options for storing and accessing information. A USB mouse can also be connected to the system using the ports on an optional docking device or expansion product.


USB drives include the following types:

- 1.44-megabyte diskette drive
- Hard drive module (a hard drive with an adapter attached)
- DVD-ROM Drive
- DVD/CD-RW Combo Drive
- DVD±RW/R and CD-RW Combo Drive
- MultiBay device

Using optional external devices

 **NOTE:** For more information about required software and drivers, or to learn which computer port to use, refer to the manufacturer's instructions.

To connect an external device to the computer:

 **CAUTION:** To reduce the risk of damage to the equipment when connecting a powered device, be sure that the device is turned off and the AC power cord is unplugged.

1. Connect the device to the computer.
2. If you are connecting a powered device, plug the device power cord into a grounded AC outlet.
3. Turn on the device.

To disconnect an unpowered external device, turn off the device, and then disconnect it from the computer. To disconnect a powered external device, turn off the device, disconnect it from the computer, and then unplug the AC power cord.

Using an optional external MultiBay

An external MultiBay connects to a USB port on the computer and enables you to use MultiBay and MultiBay II devices. The computer provides one powered USB port on the right side of the computer. This port provides power to the external MultiBay when used with a powered USB cable. An external MultiBay connected to another USB port on the computer must be connected to AC power.

For more information about the external MultiBay, refer to the user guide that is included with the device.

Using an optional external optical drive (select models only)

An external optical drive connects to a USB port on the computer and enables you to use optical discs (CDs and DVDs). The computer provides one powered USB port on the right side of the computer. This port provides power to the external optical drive when used with a powered USB cable. An external optical drive connected to another USB port on the computer must be connected to AC power.

An external optical drive, such as a DVD-ROM drive, supports optical discs (CDs and DVDs). These discs store or transport information and play music and movies. DVDs have a higher storage capacity than CDs.

All optical drives can read from optical discs and some drives can also write to optical discs as described in the following table.

Optical drive type	Read from CD and DVD-ROM media	Write to CD-R/RW media	Write to DVD (includes DVD+R DL, DVD±RW/R, and DVD-RAM media)	Write label to LightScribe CD or DVD
DVD-ROM Drive	Yes	No	No	No
DVD/CD-RW Combo Drive	Yes	Yes	No	No
DVD±RW/CD-RW Combo Drive	Yes	Yes	Yes	No

NOTE: Some of the optical drives listed may not be supported by your computer. The listed drives are not necessarily all of the supported optical drives.

△ **CAUTION:** To prevent possible audio and video degradation, or loss of audio or video playback functionality, do not initiate Sleep or Hibernation while reading from or writing to a CD or DVD.

To prevent loss of information, do not initiate Sleep or Hibernation when writing to a CD or DVD.

If Sleep or Hibernation is initiated during playback of a disc, you may experience the following behaviors:

- Your playback may be interrupted.
- You may see a warning message asking if you want to continue. If this message is displayed, click **No**.
- You may need to restart the CD or DVD to resume audio and video playback.

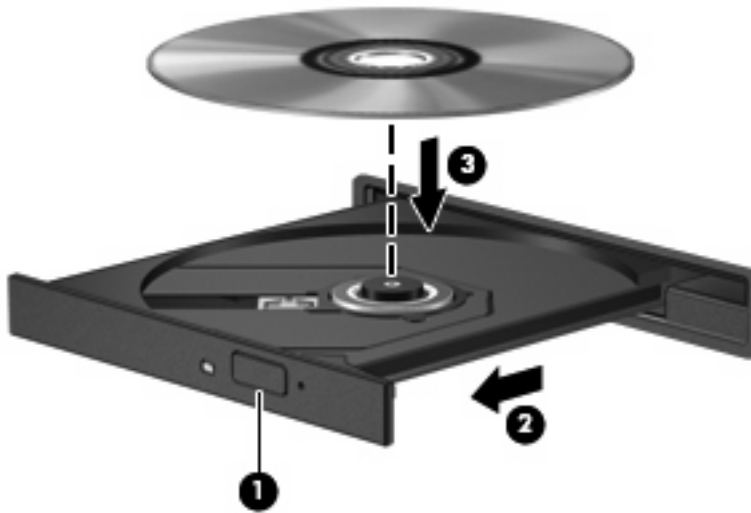
Inserting an optical disc (CD or DVD)

1. Turn on the computer.
2. Press the release button **(1)** on the drive bezel to release the disc tray.
3. Pull out the tray **(2)**.
4. Hold the disc by the edges to avoid touching the flat surfaces and position the disc label-side up over the tray spindle.



NOTE: If the tray is not fully accessible, tilt the disc carefully to position it over the spindle.

5. Gently press the disc (3) down onto the tray spindle until the disc snaps into place.




6. Close the disc tray.

Removing an optical disc (CD or DVD)

There are 2 ways to remove a disc, depending on whether the disc tray opens normally or not.

When the disc tray opens

1. Press the release button (1) on the drive bezel to release the disc tray, and then gently pull out the tray (2) until it stops.
2. Remove the disc (3) from the tray by gently pressing down on the spindle while lifting the outer edges of the disc. Hold the disc by the edges and avoid touching the flat surfaces.


 **NOTE:** If the tray is not fully accessible, tilt the disc carefully as you remove it.

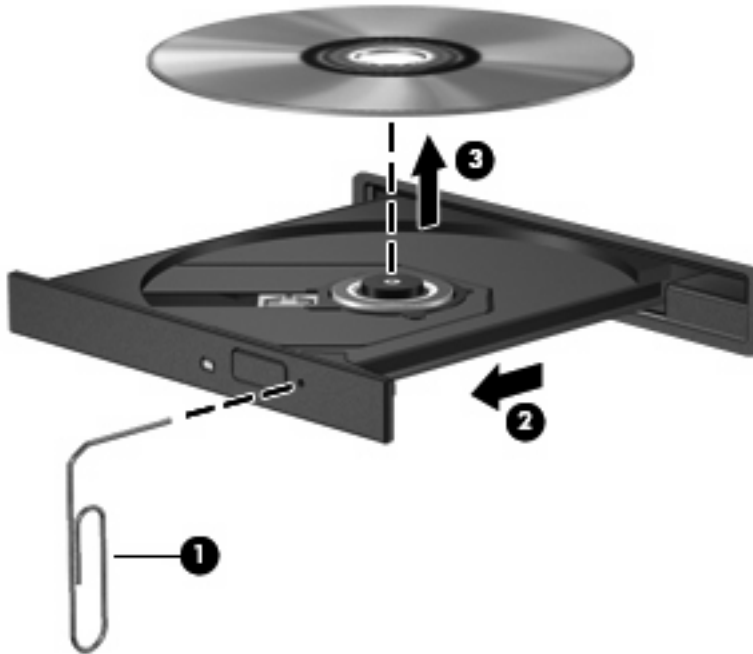


3. Close the disc tray and place the disc in a protective case.

When the disc tray does not open

1. Insert the end of a paper clip (1) into the release access in the front bezel of the drive.
2. Press in gently on the paper clip until the tray is released, and then pull out the tray (2) until it stops.
3. Remove the disc (3) from the tray by gently pressing down on the spindle while lifting the outer edges of the disc. Hold the disc by the edges and avoid touching the flat surfaces.

 **NOTE:** If the tray is not fully accessible, tilt the disc carefully as you remove it.



4. Close the disc tray and place the disc in a protective case.

Observing the copyright warning

It is a criminal offense, under applicable copyright laws, to make unauthorized copies of copyright-protected material, including computer programs, films, broadcasts, and sound recordings. Do not use this computer for such purposes.

7 External media cards

Using SD Card Reader cards

Optional digital cards provide secure data storage and convenient data sharing. These cards are often used with digital media–equipped cameras and PDAs as well as with other computers.

The SD Card Reader supports the following formats:

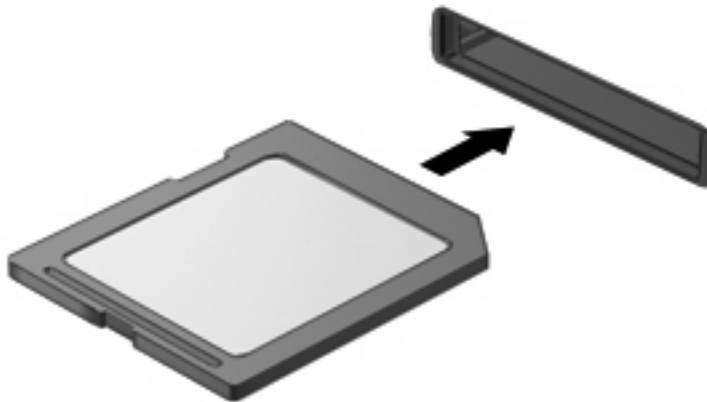
- MultiMediaCard (MMC)
- Secure Digital (SD) Memory Card

Inserting a digital card

△ **CAUTION:** To avoid damaging the digital card or the computer, do not insert any type of adapter into the SD Card Reader.

CAUTION: To prevent damage to the digital card connectors, use minimal force to insert a digital card.

1. Hold the digital card label-side up, with the connectors facing the computer.
2. Insert the card into the SD Card Reader, and then push in on the card until it is firmly seated.



You will hear a sound when the device has been detected, and a menu of available options may be displayed.

Removing a digital card


△ **CAUTION:** To prevent loss of data or an unresponsive system, stop a digital card before removing it.

Save your information and close all programs associated with the digital card.


 **NOTE:** To stop a data transfer, click **Cancel** in the operating system Copying window.

To remove a digital card:

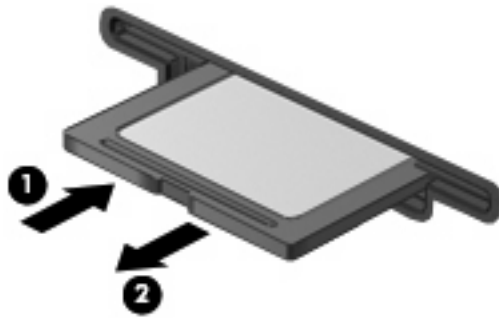
1. Click the **Safely Remove Hardware and Eject Media** icon in the notification area, at the far right of the taskbar.

 **NOTE:** To display the Safely Remove Hardware and Eject Media icon, click the **Show hidden icons** icon (the arrow at the left side of the notification area).

2. Click the name of the digital card in the list.

 **NOTE:** You are prompted that it is safe to remove the hardware device.

3. To eject the digital card, press in on the card (**1**), and then remove it from the slot (**2**).



8 Pointing devices and keyboard

Using pointing devices


Setting pointing device preferences

Use Mouse Properties in Windows® to customize settings for pointing devices, such as button configuration, click speed, and pointer options.

To access Mouse Properties, select **Start > Devices and Printers**. Then, right-click the device representing your computer, and select **Mouse settings**.

Using the TouchPad

To move the pointer, slide your finger across the TouchPad surface in the direction you want the pointer to go. Use the TouchPad buttons like the corresponding buttons on an external mouse. To scroll up and down using the TouchPad vertical scroll zone, slide your finger up or down over the lines.


 **NOTE:** If you are using the TouchPad to move the pointer, you must lift your finger off the TouchPad before moving it to the scroll zone. Simply sliding your finger from the TouchPad to the scroll zone will not activate the scrolling function.

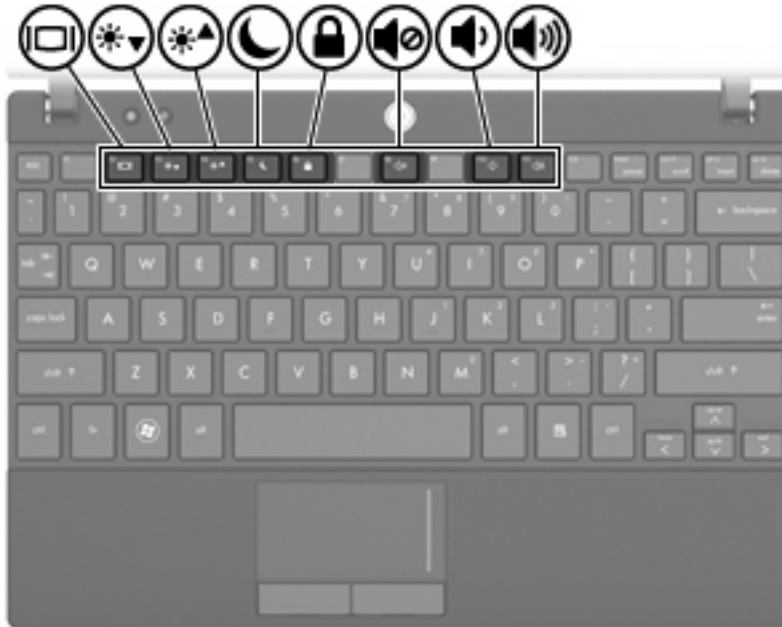
Connecting an external mouse

You can connect an external USB mouse to the computer using one of the USB ports on the computer. A USB mouse can also be connected to the system using the ports on an optional docking device or expansion product.

Using the keyboard function keys

The icons on the function keys **f2** through **f6** and **f8**, **f10**, and **f11** keys represent the action performed when a function key is pressed. The following table and sections describe the function keys.

 **NOTE:** Your computer may look slightly different from the illustration in this section.



Function	Key
Alternate between computer display and external display.	f2
Decrease screen brightness.	f3
Increase screen brightness.	f4
Initiate Sleep.	f5
Initiate QuickLock.	f6
Mute or restore computer sound.	f8
Decrease computer sound.	f10
Increase computer sound.	f11

Switching the screen image

Press **f2** to switch the screen image among display devices connected to the system. For example, if a monitor is connected to the computer, pressing **f2** alternates the screen image from computer display to monitor display to simultaneous display on both the computer and the monitor.

Most external monitors receive video information from the computer using the external VGA video standard. The **f2** key can also alternate images among other devices receiving video information from the computer.

The following video transmission types, with examples of devices that use them, are supported by the **f2** key:

- LCD (computer display)
- External VGA (most external monitors)

Decreasing screen brightness

Press **f3** to decrease screen brightness. Hold down the key to decrease the brightness level incrementally.

Increasing screen brightness

Press **f4** to increase screen brightness. Hold down the key to increase the brightness level incrementally.

Initiating Sleep

△ **CAUTION:** To reduce the risk of information loss, save your work before initiating Sleep.

Press **f5** to initiate Sleep.

When Sleep is initiated, your information is stored in system memory, the screen is cleared, and power is conserved. While the computer is in the Sleep state, the power light blinks.

The computer must be on before you can initiate Sleep.


To exit Sleep, briefly press the power button or press any key on the keyboard.

The function of the **f5** key can be changed. For example, you can set the **f5** key to initiate Hibernation instead of Sleep.

Initiating QuickLock

Press **f6** to initiate the QuickLock security feature.

QuickLock protects your information by displaying the operating system Log On window. While the Log On window is displayed, the computer cannot be accessed until a password is entered.

 **NOTE:** Before you can use QuickLock, you must set a password.

To use QuickLock, press **f6** to display the Log On window and lock the computer. Then follow the instructions on the screen to enter your password and access the computer.

Muting speaker sound

Press **f8** to mute speaker sound. Press the key again to restore speaker sound.

Decreasing speaker sound

Press **f10** to decrease speaker sound. Hold down the key to decrease speaker sound incrementally.

Increasing speaker sound

Press **f11** to increase speaker sound. Hold down the key to increase speaker sound incrementally.

Configuring the function key operation


To configure the function key operation to require the use of the **fn** key (**fn** + function key), follow these steps:

1. Open Computer Setup by turning on or restarting the computer, and then pressing **esc** while the “Press the ESC key for Startup Menu” message is displayed in the lower-left corner of the screen.
2. Press **f10** to enter BIOS Setup.
3. Select the **System Configuration** menu.
4. Select the **Device Configurations** menu.
5. Select **Fn Key Switch**, and then select **Enable**.
6. Press **f10** to accept the changes you have made.
7. To save your preferences and exit Computer Setup, use the arrow keys to select **File > Save changes and exit**. Then follow the instructions on the screen.

Your preferences go into effect when the computer restarts.

Using the touch screen (select models only)


Some computer models allow you to use your fingers to perform certain actions on the touch screen.

 **NOTE:** The instructions in this section are based on factory settings. To modify settings for recognized clicks and flicks, select **Start > Control Panel > Hardware and Sound > Pen and Touch**.

NOTE: All movements may not be supported in all programs.


Tapping (or clicking)

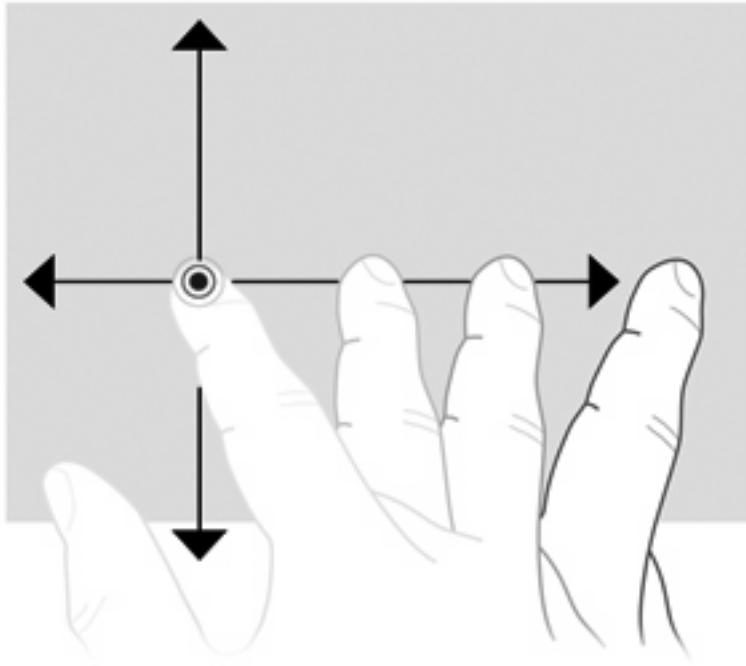
Tap or double-tap an item on the screen as you would click or double-click using a TouchPad or an external mouse. Tap and hold an item to see the context menu as you would use the right TouchPad button.

 **NOTE:** You must tap and hold your finger until a circle appears around the area you are touching, and then the context menu is displayed.

Flicking

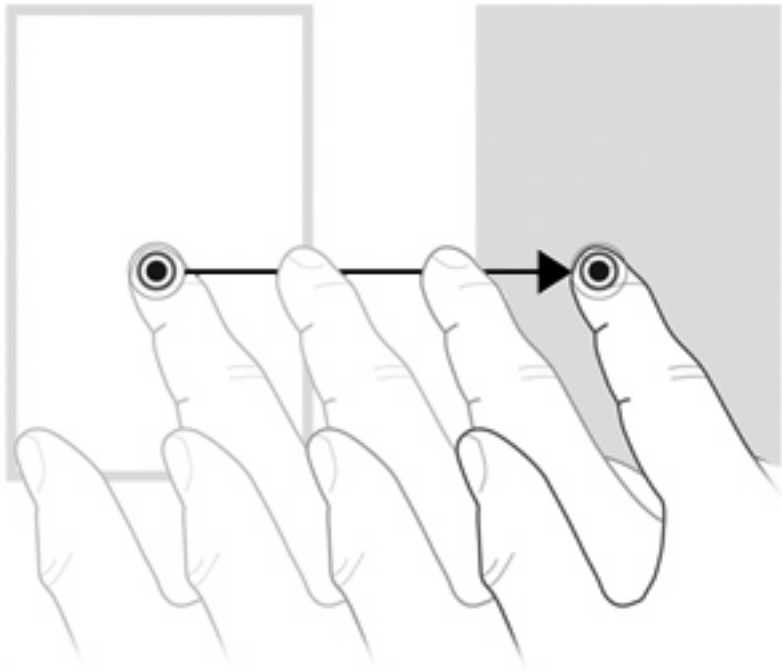
Touch the screen in a light, quick flicking motion up, down, left, or right to navigate through screens or quickly scroll through documents.

 **NOTE:** For the flicking movement to work, a scrollbar must be visible in the active window.




Dragging

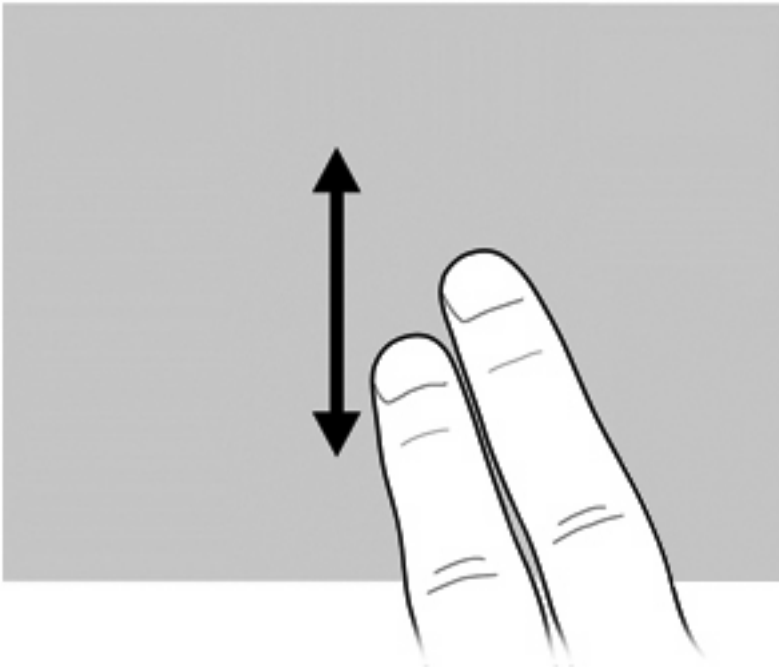
Press your finger on an item on the screen, and then move your finger to drag an item to a new location. You can also use this motion to slowly scroll through documents.



Scrolling

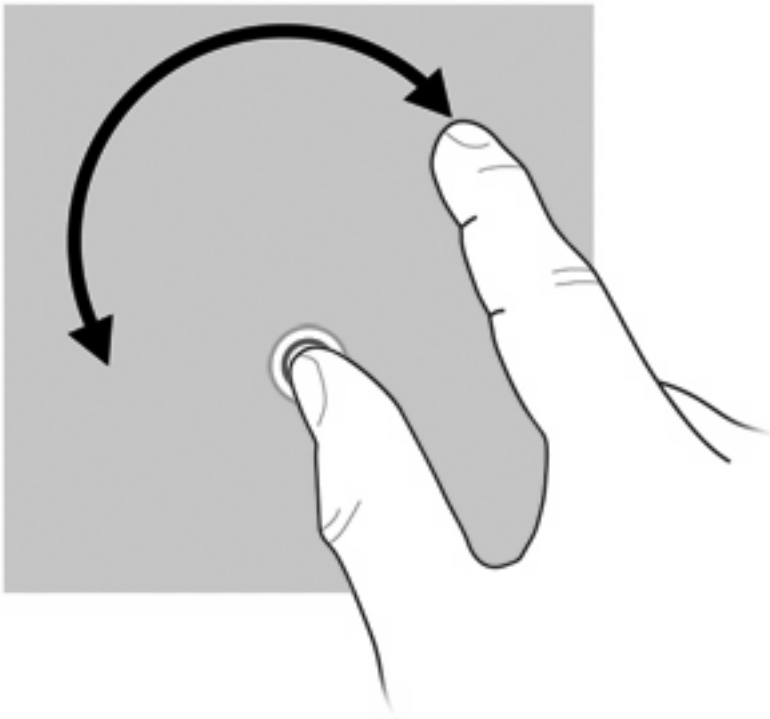
Scrolling is useful for moving up or down on a page or image. To scroll, place two fingers on the screen, and then drag them across the screen in an up, down, left, or right motion.

 **NOTE:** Scrolling speed is controlled by finger speed.



Rotating

Rotating allows you rotate items such as photos and pages. To rotate, anchor your thumb on the screen, and then move your forefinger in a semicircular motion around your thumb.

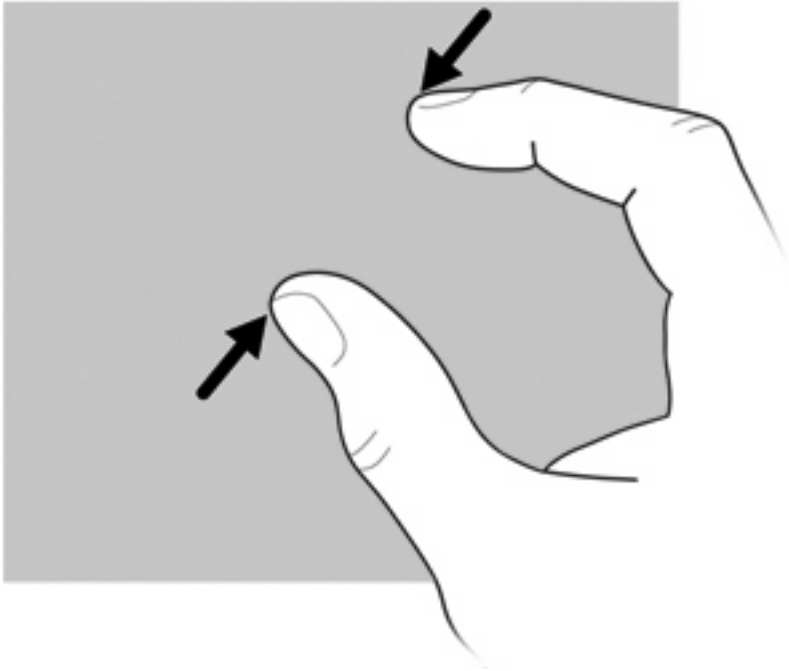


Pinching

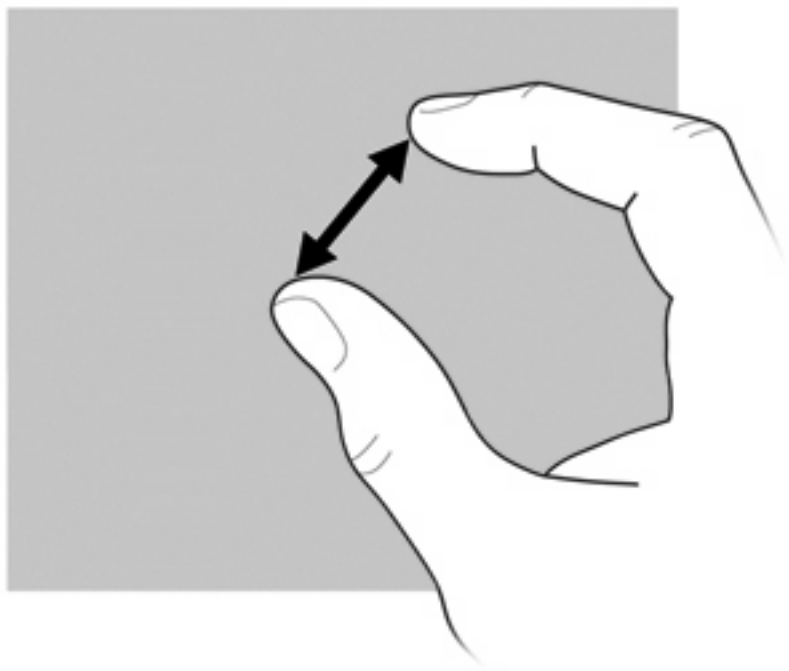
Pinching allows you to zoom in or out on items such as PDFs, images, and photos.

To pinch:

- Zoom out by holding two fingers apart on the screen, and then pull the fingers together to decrease an object's size.



- Zoom in by holding two fingers together on the screen, and then pull the fingers apart to increase an object's size.



Setting touch screen preferences

- ▲ To set touch screen preferences for visual feedback, select **Start > Control Panel > Hardware and Sound > Pen and Touch**. These preferences are specific to the touch screen and the computer.
- ▲ To set touch screen preferences for left-handed or right-handed users, select **Start > Control Panel > Hardware and Sound > Tablet PC Settings > Other** tab. These preferences are specific to the touch screen and the computer.
- ▲ To set pointing device preferences such as pointer speed, click speed, and mouse trails, select **Start > Devices and Printers**. Then, right-click the device representing your computer, and select **Mouse settings**. These preferences apply to any pointing device in the system.

To change or test click settings:

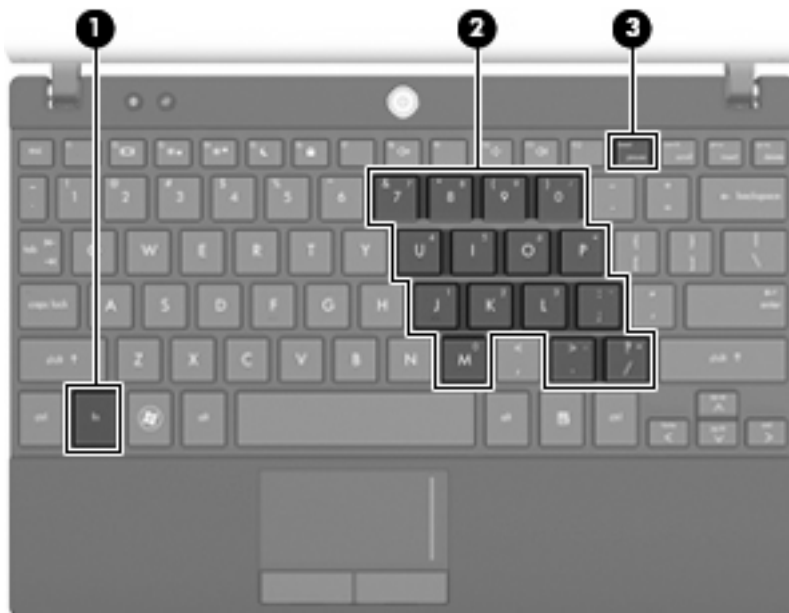
1. Select **Start > Control Panel > Hardware and Sound > Pen and Touch > Pen Options** tab.
2. Under **Pen Actions**, select the action, and then click **Settings**.
3. After making any changes or testing the settings, click **OK**.

To change or create flick assignments:

1. Select **Start > Control Panel > Hardware and Sound > Pen and Touch > Flicks** tab.
2. Click **Navigational flicks and editing flicks**, and then click **Customize**.
3. Follow the on-screen instructions to change or create a flick assignment.
4. Click **OK**.

Using keypads

The computer has an embedded numeric keypad and also supports an optional external numeric keypad or an optional external keyboard that includes a numeric keypad.




Component	Description
(1) <code>fn</code> key	Alternates the functions of the keys on the embedded numeric keypad when pressed in combination with a keypad key or the <code>shift</code> key.
(2) Embedded numeric keypad	Can be used like the keys on an external numeric keypad.
(3) <code>num lk</code> key	Enables the embedded numeric keypad.

Using the embedded numeric keypad

The 15 keys of the embedded numeric keypad can be used like the keys on an external keypad. When the embedded numeric keypad is turned on, each key on the keypad performs the function indicated by the icon in the upper-right corner of the key.

Enabling and disabling the embedded numeric keypad

Press `fn+num lk` to enable the embedded numeric keypad. Press `fn+num lk` again to return the keys to their standard keyboard functions.

 **NOTE:** The embedded numeric keypad will not function while an external keyboard or numeric keypad is connected to the computer, an optional docking device, or an optional expansion product

Switching key functions on the embedded numeric keypad

You can temporarily alternate the functions of keys on the embedded numeric keypad between their standard keyboard functions and their keypad functions by using the `fn` key or the `fn+shift` key combination.

- To change the function of a keypad key to keypad functions while the keypad is off, press and hold the `fn` key while pressing the keypad key.
- To use the keypad keys temporarily as standard keys while the keypad is on:
 - Press and hold the `fn` key to type in lowercase.
 - Press and hold `fn+shift` to type in uppercase.

Using an optional external numeric keypad

Keys on most external numeric keypads function differently according to whether num lock is on or off. (Num lock is turned off at the factory.) For example:

- When num lock is on, most keypad keys type numbers.
- When num lock is off, most keypad keys function like the arrow, page up, or page down keys.

When num lock on an external keypad is turned on, the num lock light on the computer is turned on. When num lock on an external keypad is turned off, the num lock light on the computer is turned off.


To turn num lock on or off on an external keypad as you work:

- ▲ Press the `num lk` key on the external keypad, not on the computer.

Using HP QuickLook

QuickLook allows you to save calendar, contact, inbox, and task information from Microsoft Outlook to the hard drive of your computer. Then, when the computer is off, you can press the QuickLook button on your computer to view this information.

Use QuickLook to manage contact information, calendar events, e-mail information, and tasks without restarting your computer.

 **NOTE:** QuickLook does not support the sleep state or Hibernation in Windows.

NOTE: For more information about setting up and using QuickLook, refer to the QuickLook software Help.

Cleaning the TouchPad and keyboard

Dirt and grease on the TouchPad can cause the pointer to jump around on the screen. To avoid this, clean the TouchPad with a damp cloth, and wash your hands frequently when using the computer.

⚠ **WARNING!** To reduce the risk of electric shock or damage to internal components, do not use a vacuum cleaner attachment to clean the keyboard. A vacuum cleaner can deposit household debris on the keyboard surface.

Clean the keyboard regularly to prevent keys from sticking and to remove dust, lint, and particles that can become trapped beneath the keys. A can of compressed air with a straw extension can be used to blow air around and under the keys to loosen and remove debris.




9 Drives

Identifying installed drives

To view the drives installed on the computer, select **Start > Computer**.

On models with a secondary hard drive (drive D), the optical drive becomes drive E. The next drive added to the system, such as a new USB drive, will be assigned the next available drive letter.

 **NOTE:** Windows includes the User Account Control feature to improve the security of your computer. You may be prompted for your permission or password for tasks such as installing applications, running utilities, or changing Windows settings. Refer to Help and Support for more information.

Handling drives

Drives are fragile computer components that must be handled with care. Refer to the following cautions before handling drives. Additional cautions are included with the procedures to which they apply.

△ **CAUTION:** To reduce the risk of damage to the computer, damage to a drive, or loss of information, observe these precautions:

Before you move a computer that is connected to an external hard drive, initiate Sleep and allow the screen to clear, or properly disconnect the external hard drive.

Before handling a drive, discharge static electricity by touching the unpainted metal surface of the drive.

Do not touch the connector pins on a removable drive or on the computer.

Handle a drive carefully; do not drop a drive or place items on it.

Before removing or inserting a drive, shut down the computer. If you are unsure whether the computer is off, in Sleep, or in Hibernation, turn the computer on and then shut it down through the operating system.

Do not use excessive force when inserting a drive into a drive bay.

Do not type on the keyboard or move the computer while the optical drive is writing to a disc. The write process is sensitive to vibration.

When the battery is the only source of power, be sure that the battery is sufficiently charged before writing to media.

Avoid exposing a drive to temperature or humidity extremes.

Avoid exposing a drive to liquids. Do not spray the drive with cleaning products.

Remove media from a drive before removing the drive from the drive bay, or traveling with, shipping, or storing a drive.

If a drive must be mailed, place the drive in a bubble-pack mailer or other suitable protective packaging and label the package "FRAGILE."

Avoid exposing a drive to magnetic fields. Security devices with magnetic fields include airport walk-through devices and security wands. The airport security devices that check carry-on luggage, such as conveyor belts, use X-rays instead of magnetism and will not damage a drive.

Improving hard drive performance

Using Disk Defragmenter


As you use the computer, files on the hard drive become fragmented. Disk Defragmenter consolidates the fragmented files and folders on the hard drive so that the system can run more efficiently.

After you start Disk Defragmenter, it works without supervision. Depending on the size of your hard drive and the number of fragmented files, Disk Defragmenter may take more than an hour to complete. You may want to set it to run during the night or another time when you do not need access to your computer.

HP recommends defragmenting your hard drive at least once a month. You may set Disk Defragmenter to run on a monthly schedule, but you can defragment your computer manually at any time.

To run Disk Defragmenter:

1. Select **Start > All Programs > Accessories > System Tools > Disk Defragmenter**.
2. Click **Defragment disk**.

 **NOTE:** Windows includes the User Account Control feature to improve the security of your computer. You may be prompted for your permission or password for tasks such as installing software, running utilities, or changing Windows settings. Refer to Help and Support for more information.

For additional information, access the Disk Defragmenter software Help.

Using Disk Cleanup

Disk Cleanup searches the hard drive for unnecessary files that you can safely delete to free up disk space and help the computer to run more efficiently.

To run Disk Cleanup:


1. Select **Start > All Programs > Accessories > System Tools > Disk Cleanup**.
2. Follow the on-screen instructions.

Using HP 3D DriveGuard (select models only)

HP 3D DriveGuard protects the hard drive by parking the drive and halting I/O requests under either of the following conditions:

- You drop the computer.
- You move the computer with the display closed while the computer is running on battery power.

A short time after the end of one of these events, HP 3D DriveGuard returns the hard drive to normal operation.

 **NOTE:** Hard drives that are in an optional docking device or are connected to a USB port are not protected by HP 3D DriveGuard.

For more information, refer to the HP 3D DriveGuard software Help.


Identifying HP 3D DriveGuard status

The drive light on the computer changes to an amber color to show that the drive is parked. To determine whether drives are currently protected or whether a drive is parked, use Mobility Center:

- If the software is enabled, a green check mark is superimposed over the hard drive icon.
- If the software is disabled, a red X is superimposed over the hard drive icon.
- If the drives are parked, a yellow moon is superimposed over the hard drive icon.

If HP 3D DriveGuard has parked the drive, the computer will behave in the following ways:

- The computer will not shut down.
- The computer will not initiate Sleep or Hibernation, except as described in the following Note.

 **NOTE:** If the computer is running on battery power and reaches a critical battery level, HP 3D DriveGuard allows the computer to initiate Hibernation.


- The computer will not activate battery alarms set on the Alarms tab in Power Options properties.

Before you move the computer, HP recommends that you either shut it down or initiate Sleep or Hibernation.

Using HP 3D DriveGuard software

The HP 3D DriveGuard software enables you to perform the following tasks:

- Enable and disable HP 3D DriveGuard.

 **NOTE:** Permission to enable or disable HP 3D DriveGuard is dependent on certain user privileges. Members of an Administrator group can change privileges for non-Administrator users.

- Determine whether a drive in the system is supported.

To open the software and change settings, follow these steps:

1. In Mobility Center, click the hard drive icon to open the HP 3D DriveGuard window.
– or –

Select **Start > Control Panel > Hardware and Sound > HP 3D DriveGuard**.

 **NOTE:** If prompted by User Account Control, click **Yes**.

2. Click the appropriate button to change settings.
3. Click **OK**.

Replacing a hard drive

△ **CAUTION:** To prevent information loss or an unresponsive system:

Shut down the computer before removing the hard drive from the hard drive bay. Do not remove the hard drive while the computer is on, in the Sleep state, or in Hibernation.

If you are not sure whether the computer is off or in Hibernation, turn the computer on by briefly pressing the power button. Then shut down the computer through the operating system.

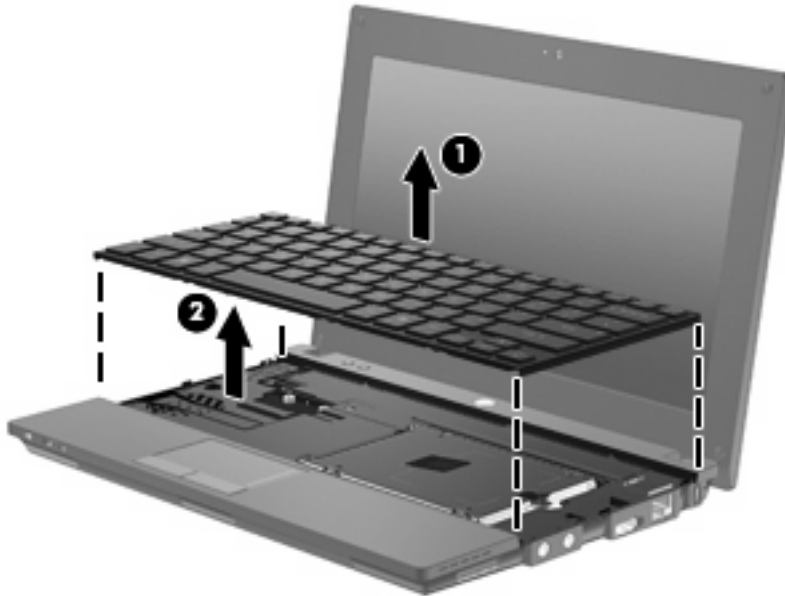
To remove a hard drive:

1. Save your work.
2. Shut down the computer and close the display.
3. Disconnect all external hardware devices connected to the computer.
4. Unplug the power cord from the AC outlet.
5. Turn the computer upside down on a flat surface.
6. Remove the battery from the computer.
7. Remove the 3 screws from the back edge of the computer.

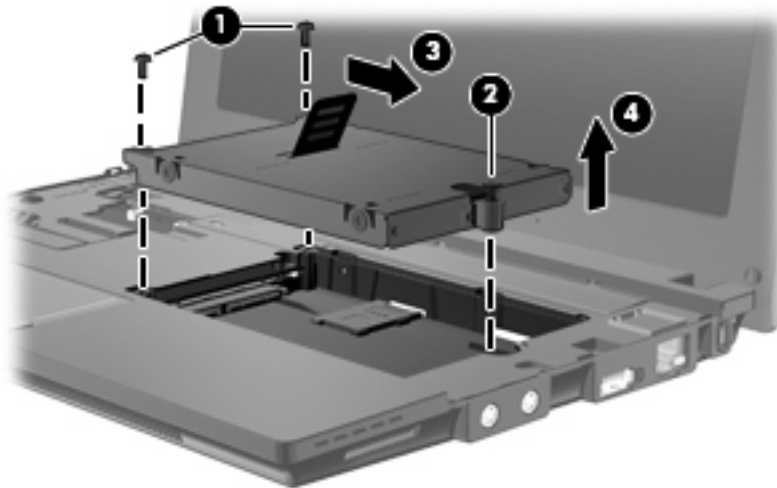


8. Turn the computer display-side up, with the front toward you, and open the display.

9. Lift the top edge of the keyboard up **(1)** and remove the keyboard from the computer **(2)** to expose the hard drive.



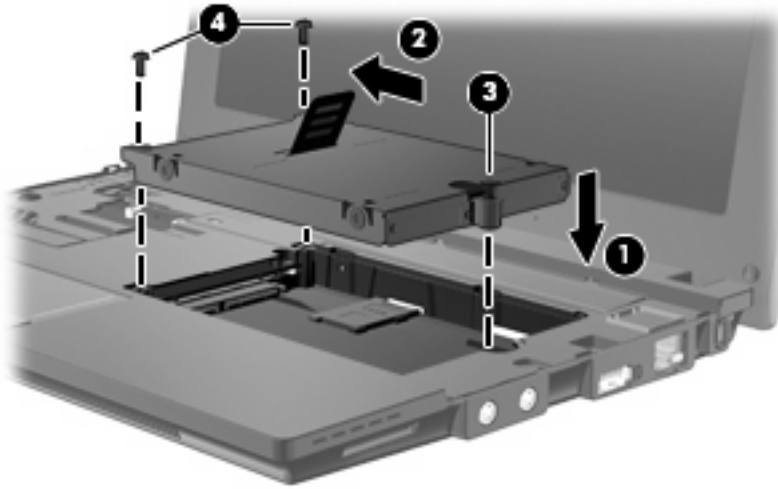
10. Remove the two hard drive screws **(1)**.
11. Loosen the captive hard drive screw **(2)**.
12. Pull the hard drive tab **(3)** to the right to disconnect the hard drive, and then lift the hard drive out of the hard drive bay **(4)**.



To install a hard drive:

1. Insert the hard drive into the hard drive bay **(1)**.
2. Pull the hard drive tab **(2)** to the left to connect the hard drive.
3. Tighten the captive hard drive screw **(3)**.

4. Replace the hard drive screws (4).



5. Insert the front edge of the keyboard into the keyboard tray (1), and then press the keyboard into place (2).



6. Close the computer display and turn the computer upside down on a flat surface.

7. Replace the 3 screws on the back edge of the computer.



8. Replace the battery.
9. Turn the computer right-side up, and then reconnect external power and external devices.
10. Turn on the computer.

10 Memory modules

The computer has one memory module compartment, which is located on the bottom of the computer. The memory capacity of the computer can be upgraded by replacing the existing memory module in the memory module slot.

- △ **WARNING!** To reduce the risk of electric shock and damage to the equipment, unplug the power cord and remove all batteries before installing a memory module.
- △ **CAUTION:** Electrostatic discharge (ESD) can damage electronic components. Before beginning any procedure, be sure that you are discharged of static electricity by touching a grounded metal object.

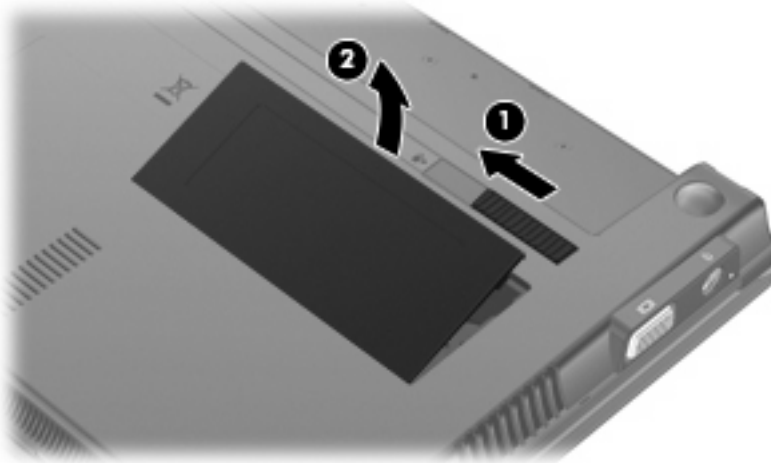
To add or replace a memory module:

1. Save your work.
2. Shut down the computer and close the display.

If you are not sure whether the computer is off or in Hibernation, turn the computer on by briefly pressing the power button. Then shut down the computer through the operating system.

3. Disconnect all external devices connected to the computer.
4. Unplug the power cord from the AC outlet.
5. Turn the computer upside down on a flat surface.
6. Slide the battery latch **(1)** to release the battery from the computer.
7. Remove the battery from the computer.
8. Slide the battery latch again, and the memory module compartment cover pops open.

9. Remove the memory module compartment cover (2).



10. Remove the existing memory module:

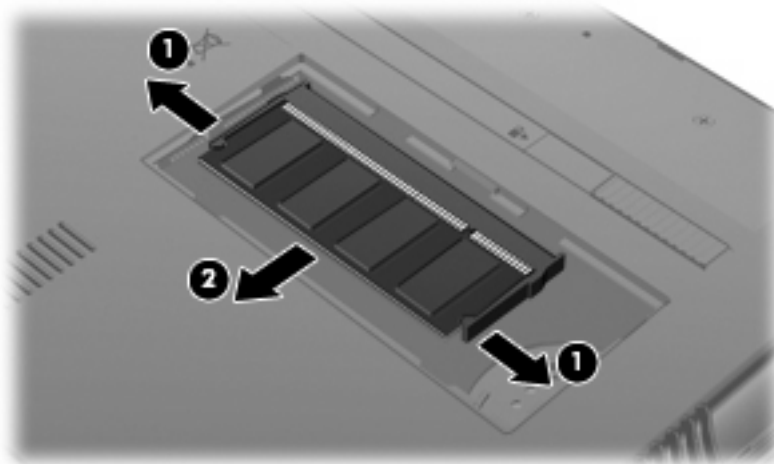
- a. Pull away the retention clips (1) on each side of the memory module.

The memory module tilts up.

△ **CAUTION:** To prevent damage to the memory module, hold the memory module by the edges only. Do not touch the components on the memory module.

- b. Grasp the edge of the memory module (2), and gently pull the module out of the memory module slot.

To protect a memory module after removal, place it in an electrostatic-safe container.



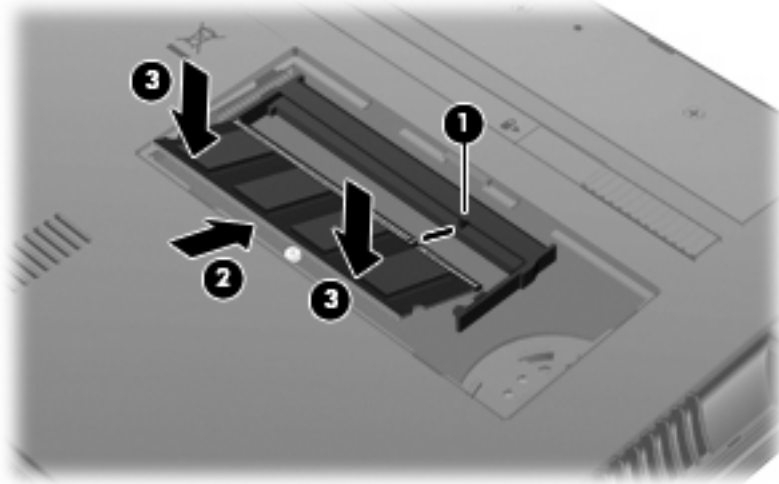
11. Insert a new memory module:

△ **CAUTION:** To prevent damage to the memory module, hold the memory module by the edges only. Do not touch the components on the memory module.

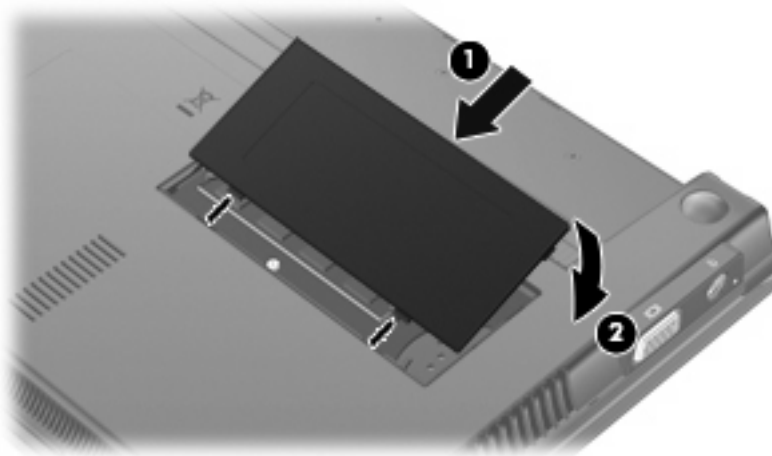
- a. Align the notched edge (1) of the memory module with the tab in the memory module slot.
- b. With the memory module at a 45-degree angle from the surface of the memory module compartment, press the module (2) into the memory module slot until it is seated.

△ **CAUTION:** To prevent damage to the memory module, do not bend the memory module.

- c. Gently press the memory module (3) down, applying pressure to the left and right edges of the memory module, until the retention clips snap into place.



12. Insert the tabs of the memory module compartment cover (1) into the notches of the compartment.
13. Press the cover down until it snaps into place (2).



14. Replace the battery.
15. Turn the computer right-side up, and then reconnect external power and external devices.
16. Turn on the computer.

11 Software updates

Updating software

Updated versions of the software provided with your computer are available either through the HP Assistant utility or on the HP Web site.

HP Assistant automatically checks for updates from HP. The utility runs at a specified interval and provides a list of support alerts, such as security enhancements, and optional software and driver updates.

You can manually check for updates at any time by selecting **Start > Help and Support > Maintain** and following the on-screen instructions.

Most software on the HP Web site is packaged in compressed files called *SoftPaqs*. Some BIOS updates may be packaged in compressed files called *ROMPaqs*.

Some download packages contain a file named *Readme.txt*, which contains information regarding installing and troubleshooting the file. (*Readme.txt* files included with *ROMPaqs* are provided in English only.)

You can also access software updates by obtaining the *Support Software* disc (purchased separately). This disc includes device drivers, BIOS updates, and utilities.

To purchase the current *Support Software* disc or a subscription that provides both the current version and future versions of the disc, follow these steps:

1. Open your Web browser, and go to <http://www.hp.com/support>.
2. Select your country or region.
3. Click the option for software and driver downloads, and then type your computer model number in the product box.
4. Press **enter**.
5. Follow the on-screen instructions.


To update the software using a *Support Software* disc, follow these steps:

1. Insert the *Support Software* disc into the optical drive.
2. Follow the on-screen instructions.

To update the software using the HP Web site, follow these steps:

1. Identify your computer model, product category, and series or family. Prepare for a system BIOS update by identifying the BIOS version currently installed on the computer. For details, refer to the "Determining the BIOS version" section.

If your computer is connected to a network, consult the network administrator before installing any software updates, especially system BIOS updates.

 **NOTE:** The computer system BIOS is stored on the system ROM. The BIOS initializes the operating system, determines how the computer will interact with the hardware devices, and provides for data transfer among hardware devices, including the time and date.

NOTE: Windows® includes the User Account Control feature to improve the security of your computer. You may be prompted for your permission or password for tasks such as installing software, running utilities, or changing Windows settings. Refer to Help and Support for more information.

2. Open your Web browser, and go to <http://www.hp.com/support>.
3. Select your country or region.
4. Click the option for software and driver downloads, and then type your computer model number in the product box.
5. Press **enter**.
6. Follow the on-screen instructions.

Updating the BIOS

To update the BIOS, first determine what BIOS version you currently have, and then download and install the new BIOS.

Determining the BIOS version

BIOS version information (also known as *ROM date* and *System BIOS*) can be displayed by pressing **fn+esc** (if you are already in Windows) or by using Computer Setup.

To use Computer Setup for displaying BIOS information, follow these steps:

1. Open Computer Setup by turning on or restarting the computer, and then pressing **esc** while the "Press the ESC key for Startup Menu" message is displayed in the lower-left corner of the screen.
2. Press **f10** to enter BIOS Setup.
3. Use a pointing device or the arrow keys to select **File > System Information**.
4. Press **esc** to return to the **File** menu.
5. Click **Exit** in the lower-left corner of the screen, and follow the on-screen instructions.

– or –

Use the arrow keys to select **File > Ignore changes and exit**, and then press **enter**.

Downloading a BIOS update


- △ **CAUTION:** To prevent damage to the computer or an unsuccessful installation, download and install a BIOS update only when the computer is connected to reliable external power using the AC adapter. Do not download or install a BIOS update while the computer is running on battery power, docked in an optional docking device, or connected to an optional power source. During the download and installation, follow these instructions:

Do not disconnect power from the computer by unplugging the power cord from the AC outlet.


Do not shut down the computer or initiate Sleep or Hibernation.

Do not insert, remove, connect, or disconnect any device, cable, or cord.

To download a BIOS update:

-  **NOTE:** BIOS updates are posted as needed. A newer BIOS update may not be available for your computer. It is recommended that you check the HP Web site periodically for BIOS updates.
1. Open your Web browser, go to <http://www.hp.com/support>, and then select your country or region.
 2. Click the option for software and driver downloads, type your computer model number in the product box, and then press **enter**.
 3. Click your specific product from the models listed.
 4. Click your operating system.
 5. Follow the on-screen instructions to access the BIOS update you want to download. Make a note of the download date, name, or other identifier. You may need this information to locate the update later, after it has been downloaded to your hard drive.
 6. At the download area, perform these steps:
 - a. Identify the BIOS update that is newer than the BIOS version currently installed on your computer.
 - b. Follow the instructions on the screen to download your selection to the hard drive.


Make a note of the path to the location on your hard drive where the BIOS update will be downloaded. You will need to access this path when you are ready to install the update.

-  **NOTE:** If you connect your computer to a network, consult the network administrator before installing any software updates, especially system BIOS updates.
-


BIOS installation procedures vary. Follow any instructions that are displayed on the screen after the download is complete. If no instructions are displayed, follow these steps:

1. Open Windows Explorer by selecting **Start > Computer**.
2. Double-click your hard drive designation. The hard drive designation is typically Local Disk (C:).
3. Using the hard drive path you recorded earlier, open the folder on your hard drive that contains the update.
4. Double-click the file that has an .exe extension (for example, *filename.exe*).

The BIOS installation begins.

 **NOTE:** Windows® includes the User Account Control feature to improve the security of your computer. You may be prompted for your permission or password for tasks such as installing software, running utilities, or changing Windows settings. Refer to Help and Support for more information.

5. Complete the installation by following the instructions on the screen.

 **NOTE:** After a message on the screen reports a successful installation, you may delete the downloaded file from your hard drive.

Updating programs and drivers

1. Open your Web browser, go to <http://www.hp.com/support>, and then select your country or region.
2. Click the option for software and driver downloads, type your computer model number in the product box, and then press **enter**.

– or –

If you want a specific SoftPaq, type the SoftPaq number in the **Search** box, at the top-right corner of the screen. Then press **enter**, and follow the instructions provided. Proceed to step 6.

3. Click your specific product from the models listed.
4. Click your operating system.
5. When the list of updates is displayed, click an update to open a window containing additional information.
6. Click **Download**.
7. Click **Run** to install the updated software without downloading the file.

– or –

Click **Save** to save the file to your computer. When prompted, select a storage location on your hard drive.

After the file is downloaded, navigate to the folder where the file was stored, and double-click the file to install the update.

8. If prompted to do so, restart your computer after the installation is complete.


Using SoftPaq Download Manager

HP SoftPaq Download Manager (SDM) provides quick access to SoftPaq information for HP computers without having to specify a SoftPaq number. The software works by reading and downloading a published database file containing computer model and SoftPaq information.

Using this tool, you can easily search for SoftPaqs by computer model, and then download, unpack, and install the SoftPaqs. The program allows you to perform the following tasks:

- Search for, download, and install SoftPaq updates for your computer.
- View available and downloaded SoftPaqs for your computer.
- Create configuration files and specify search parameters for multiple configurations to help you manage SoftPaqs for multiple computers with various configurations.

SoftPaq Download Manager is available on the HP Web site. To use SoftPaq Download Manager to download SoftPaqs, you must first download and install the program. Go to the HP Web site: <http://www.hp.com/go/sdm>, and follow the instructions to download and install SoftPaq Download Manager.

 **NOTE:** To download SoftPaq Download Manager or obtain more information about using it, see the HP Web site: <http://www.hp.com/go/sdm>

- ▲ To start SoftPaq Download Manager, select **Start > All Programs > HP > HP SoftPaq Download Manager**

For more information, refer to the HP SoftPaq Download Manager software Help.


HP SSM (System Software Manager)

HP SSM (System Software Manager) lets you remotely update system-level software on multiple systems simultaneously. When executed on a client computer, SSM detects versions of both hardware and software, and then updates designated software from a central repository, known as a file store. Driver versions that are supported by SSM are denoted with a special icon on the HP driver download Web site and on the *Support Software* CD. To download the SSM utility or to obtain more information on SSM, see the HP Web site at <http://www.hp.com/go/ssm> (English only).


12 MultiBoot

About the boot device order

As the computer starts, the system attempts to boot from enabled boot devices. The MultiBoot utility, which is enabled at the factory, controls the order in which the system selects a boot device. Boot devices can include optical drives, diskette drives, a network interface card (NIC), hard drives, and USB devices. Boot devices contain bootable media or files that the computer needs to start and operate properly.

 **NOTE:** Some boot devices must be enabled in Computer Setup before they can be included in the boot order.

The factory setting is for the computer to select the boot device by searching enabled boot devices and drive bay locations in the following order:

 **NOTE:** Some of the boot devices and drive bay locations listed may not be supported on your computer.

- Notebook hard drive
- USB diskette drive
- USB CD-ROM drive
- USB hard drive
- Notebook Ethernet
- Secure Digital (SD) Memory Card


You can change the order in which the computer searches for a boot device by changing the boot order in Computer Setup. You can also press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen, and then press **f9**. Pressing **f9** displays a menu that shows the current boot devices and allows you to select a boot device. Or, you can use MultiBoot Express to set the computer to prompt you for a boot location each time the computer turns on or restarts.

Enabling boot devices in Computer Setup

The computer will boot to a USB device or a NIC device only if the device has first been enabled in Computer Setup.

To start Computer Setup and enable a USB device or a NIC device as a boot device, follow these steps:

1. Turn on or restart the computer, and then press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
2. Press **f10** to enter BIOS Setup.
3. To enable bootable media in USB drives or in drives inserted into an optional docking device (select models only), use a pointing device or the arrow keys to select **System Configuration > Device Configurations**. Confirm that **Enabled** is selected next to **USB legacy support**.

 **NOTE:** The USB Port option must be enabled in order to use USB legacy support. It is enabled at the factory. If the port becomes disabled, reenable it by selecting **System Configuration > Port Options**, and then clicking **Enabled** next to **USB Port**.

– or –


To enable a NIC device, select **System Configuration > Boot Options**, and then click **Enabled** next to **PXE Internal NIC boot**.

4. To save your changes and exit Computer Setup, click **Save** in the lower-left corner of the screen, and then follow the on-screen instructions.

– or –

Use the arrow keys to select **File > Save Changes and Exit**, and then press **enter**.

Your changes go into effect when the computer restarts.

 **NOTE:** To connect a NIC to a Preboot eXecution Environment (PXE) or Remote Program Load (RPL) server without using MultiBoot, press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen, and then quickly press **f12**.

Considering boot order changes

Before changing the boot order, note the following considerations:

- When the computer restarts after the boot order has been changed, the computer attempts to start using the new boot order.
- If there is more than one type of boot device, the computer attempts to boot using the first of each type of boot device (except for optical devices). For example, if the computer is connected to an optional docking device (select models only) that contains a hard drive, this hard drive will be shown in the boot order as a USB hard drive. If the system attempts to boot from this USB hard drive and fails, it will not attempt to boot to the hard drive in the hard drive bay. Instead, it will try to boot to the next type of device in the boot order. However, if there are 2 optical devices, and the first optical device does not boot (either because it does not contain media or the media is not a boot disc), the system will try to boot to the second optical device.
- Changing the boot order also changes the logical drive designations. For example, if you start up from a CD-ROM drive with a disc formatted as drive C, that CD-ROM drive becomes drive C and the hard drive in the hard drive bay becomes drive D.
- The computer will boot from a NIC device only if the device has been enabled in the Built-In Device Options menu of Computer Setup and if booting from the device has been enabled in the Boot Options menu of Computer Setup. Booting from a NIC does not affect logical drive designations because no drive letter is associated with the NIC.
- Drives in an optional docking device (select models only) are treated like external USB devices in the boot order.

Choosing MultiBoot preferences


You can use MultiBoot in the following ways:

- To set a new boot order that the computer uses each time it is turned on, by changing the boot order in Computer Setup.
- To dynamically choose the boot device, by pressing **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen, and then pressing **f9** to enter the Boot Device Options menu.
- To use MultiBoot Express to set variable boot orders. This feature prompts you for a boot device each time the computer is turned on or restarted.

Setting a new boot order in Computer Setup

To start Computer Setup and set a boot device order that the computer uses each time it is turned on or restarted, follow these steps:

1. Turn on or restart the computer, and then press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
2. Press **f10** to enter BIOS Setup.
3. Use a pointing device or the arrow keys to select **System Configuration > Boot Options**. Confirm that **Enabled** is selected next to **MultiBoot**.

 **NOTE:** MultiBoot is enabled at the factory.

4. Use a pointing device or the arrow keys to select a device in the list.
5. To move the device up in the boot order, use a pointing device to click the plus sign (+), or press the **+** key.
– or –
To move the device down in the boot order, use a pointing device to click the minus sign (-), or press the **-** key.
6. To save your changes and exit Computer Setup, click **Save** in the lower-left corner of the screen, and then follow the on-screen instructions.

– or –

Use the arrow keys to select **File > Save changes and exit**, and then press **enter**.

Your changes go into effect when the computer restarts.

Dynamically choosing a boot device

To dynamically choose a boot device for the current startup sequence, follow these steps:

1. Open the Select Boot Device menu by turning on or restarting the computer, and then pressing **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
2. Press **f9**.
3. Use a pointing device or the arrow keys to select a boot device, and then press **enter**.

Your changes go into effect immediately.

Setting a MultiBoot Express prompt

To start Computer Setup and set the computer to display the MultiBoot startup location menu each time the computer is started or restarted, follow these steps:

1. Turn on or restart the computer, and then press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
2. Press **f10** to enter BIOS Setup.
3. Use a pointing device or the arrow keys to select **System Configuration > Boot Options**, and then press **enter**.
4. In the **Express Boot Popup Delay (Sec)** field, enter the length of time in seconds that you want the computer to display the startup location menu before it defaults to the current MultiBoot setting. (When 0 is selected, the Express Boot startup location menu is not displayed).
5. To save your changes and exit Computer Setup, click **Save** in the lower-left corner of the screen, and then follow the on-screen instructions.

– or –

Use the arrow keys to select **File > Save Changes and Exit**, and then press **enter**.

Your changes go into effect when the computer restarts.

Entering MultiBoot Express preferences

When the Express Boot menu displays during startup, you have the following choices:

- To specify a boot device from the Express Boot menu, select your preference within the allotted time, and then press **enter**.
- To prevent the computer from defaulting to the current MultiBoot setting, press any key before the allotted time expires. The computer will not start until you select a boot device and press **enter**.
- To allow the computer to start according to the current MultiBoot settings, wait for the allotted time to expire.


13 Computer Setup

To view the drives installed on the computer, select **Start > Computer**.

On models with a secondary hard drive (drive D), the optical drive becomes drive E. The next drive added to the system, such as a new USB drive, will be assigned the next available drive letter.

Starting Computer Setup

Computer Setup is a preinstalled, ROM-based utility that can be used even when the operating system is not working or will not load.

 **NOTE:** Some of the Computer Setup menu items listed in this guide may not be supported by your computer.

NOTE: An external keyboard connected by USB can be used with Computer Setup only if USB legacy support is enabled.

To start Computer Setup, follow these steps:

1. Turn on or restart the computer.
2. Before your operating system opens and while the “Press the ESC key for Startup Menu” message is displayed in the lower-left corner of the screen, press **esc**.
3. Press **f10** to enter BIOS Setup.


Using Computer Setup

Navigating and selecting in Computer Setup

The information and settings in Computer Setup are accessed from the File, Security, Diagnostics, and System Configuration menus.

To navigate and select in Computer Setup, follow these steps:

1. Turn on or restart the computer, and then press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
 - To select a menu or a menu item, use the tab key and the keyboard arrow keys and then press **enter**, or use a pointing device to click the item.
 - To scroll up and down, click the up arrow or the down arrow in the upper-right corner of the screen, or use the up arrow key or the down arrow key.
 - To close open dialog boxes and return to the main Computer Setup screen, press **esc**, and then follow the on-screen instructions.

 **NOTE:** You can use either a pointing device (TouchPad, pointing stick, or USB mouse) or the keyboard to navigate and make selections in Computer Setup.

2. Press **f10** to enter BIOS Setup.
3. Select the **File, Security, Diagnostics,** or **System Configuration** menu.
4. To exit Computer Setup, choose one of the following methods:
 - To exit Computer Setup without saving your changes, click the **Exit** icon in the lower-left corner of the screen, and then follow the on-screen instructions.
– or –
use the tab key and the arrow keys to select **File > Ignore changes and exit**, and then press **enter**.
 - To save your preferences and exit Computer Setup menus, click the **Save** icon in the lower-left corner of the screen, and then follow the instructions on the screen.
– or –
Use the tab key and the arrow keys to select **File > Save changes and exit** and then press **enter**.


Your changes go into effect when the computer restarts.

Restoring factory settings in Computer Setup

To return all settings in Computer Setup to the values that were set at the factory, follow these steps:


1. Open Computer Setup by turning on or restarting the computer, and then pressing **esc** while the “Press the ESC key for Startup Menu” message is displayed in the lower-left corner of the screen.
2. Press **f10** to enter BIOS Setup.
3. Use the arrow keys to select **File > Restore defaults**, and then press **enter**.
4. When the confirmation dialog box opens, press **f10**.
5. To save your preferences and exit Computer Setup, use the arrow keys to select **File > Save changes and exit**. Then follow the instructions on the screen.

Your preferences go into effect when the computer restarts.

 **NOTE:** Your password settings and security settings are not changed when you restore the factory settings.

Computer Setup menus


The menu tables in this section provide an overview of the Computer Setup options.

 **NOTE:** Some of the Computer Setup menu items listed in this chapter may not be supported by your computer.

File menu

Select	To do this
System information	<ul style="list-style-type: none">• View identification information for the computer.• View specification information for the processor, cache and memory size, and system ROM.
Set system date and time	Change date and time <ul style="list-style-type: none">• Set date: MM:DD:YYYY• Set time: HH:MM
System Diagnostics	<ul style="list-style-type: none">• F1: System information• F2: Start-up test• F3: Run-in test• F4: Hard disk test
Restore defaults	Replace the configuration settings in Computer Setup with the original factory settings. (Password settings and security settings are not changed when you restore the factory settings.)
Reset BIOS security to factory default	Restore the BIOS security settings to the factory default.
Ignore changes and exit	Cancel any changes entered during the current session. Then exit and restart the computer.
Save changes and exit	Save any changes entered during the current session. Then exit and restart the computer. Your changes go into effect when the computer restarts.


Security menu

 **NOTE:** Some of the menu items listed in this section may not be supported by your computer.

Select	To do this
Administrator Tools	
BIOS administrator password	Enter, change, or delete a BIOS administrator password.
User Management (requires a BIOS administrator password)	

Select	To do this
Create New BIOS User Account password	<ul style="list-style-type: none"> Select from a list of BIOS users. Select from a list of ProtectTools users.
Password Policy (requires a BIOS administrator password)	Revise password policy criteria.
HP SpareKey	Enable/disable HP SpareKey (enabled by default).
Always Prompt for HP SpareKey Enrollment	Enable/disable HP SpareKey enrollment (enabled by default).
User Tools	
Change Password	Enter, change, or delete a BIOS administrator password.
HP SpareKey Enrollment	Enroll or reset HP SpareKey, which is a set of security questions and answers used if you forget your password.
Disk Sanitizer	<p>Run Disk Sanitizer to destroy all existing data on the primary hard drive. The following options are available:</p> <ul style="list-style-type: none"> Fast: Runs the Disk Sanitizer erase cycle once. Optimum: Runs the Disk Sanitizer erase cycle 3 times. Custom: Allows you to select the desired number of Disk Sanitizer erase cycles from a list. Last Pass: Displays Disk Sanitizer Completion Report <p>CAUTION: If you run Disk Sanitizer, the data on the primary hard drive is destroyed permanently.</p>
System IDs	Enter a user-defined computer asset tracking number and ownership tag.

System Configuration menu

 **NOTE:** Some of the listed System Configuration options may not be supported by your computer.

Select	To do this
Language	Change the Computer Setup language.
Boot options	<ul style="list-style-type: none"> Set a Startup Menu delay in seconds. Set the MultiBoot Express Boot Popup delay in seconds. Enable/disable Custom Logo (disabled by default). Enable/display Display Diagnostic URL. Enable/disable SD card boot. Enable/disable floppy boot. Enable/disable PXE Internal NIC boot.

Select	To do this
	<ul style="list-style-type: none"> • Set the UEFI boot order: Windows Boot Manager. • Set the legacy boot order: <ul style="list-style-type: none"> ◦ 1st boot device: Notebook hard drive ◦ 2nd boot device: USB floppy ◦ 3rd boot device: USB CD-ROM ◦ 4th boot device: USB hard drive ◦ 5th boot device: Notebook Ethernet ◦ 6th boot device: SD card
Device configurations	<ul style="list-style-type: none"> • Enable Fn Key Switch • Enable/disable USB legacy support. When enabled, USB legacy support allows the following: <ul style="list-style-type: none"> ◦ Use of a USB keyboard in Computer Setup even when your operating system is not running. ◦ Startup from bootable USB devices, including a hard drive, diskette drive, or optical drive connected by a USB port to the computer. • Enable/disable fan always on while connected to an AC outlet. • Enable/disable Data Execution Prevention (select models only). When enabled, the processor can disable some virus code execution, which helps to improve computer security. • Enable/disable LAN power saving mode. • Set the SATA (Serial Advanced Technology Attachment) device mode. The following options are available: <ul style="list-style-type: none"> ◦ AHCI (Advanced Host Controller Interface) ◦ IDE (Integrated Drive Electronics) • Enable/disable HP QuickLook. • Enable/disable HP QuickLook preboot authentication on HP QuickLook boot. • Enable/disable HP QuickWeb. • Enable/disable HP QuickWeb: Write Protect (disabled by default). • Enable/disable Intel® HT Technology. • Enable/disable Wake on USB (disabled by default). • Enable/disable Numlock state at boot: Off /On (disabled by default).
Built-in device options	<ul style="list-style-type: none"> • Enable/disable the wireless switch state. • Enable/disable embedded WLAN device radio.


Select	To do this
	<ul style="list-style-type: none"> • Enable/disable Network Interface Controller (NIC). • Enable/disable LAN/WLAN Switching (disabled by default). • Set the wake on LAN state. <ul style="list-style-type: none"> ◦ Disabled ◦ Boot to Network ◦ Follow Boot Order • Enable/disable the integrated camera (webcam). • Enable/disable Power Monitor Circuit. • Enable/disable the audio device. • Enable/disable the microphone. • Enable/disable the internal speakers.
Port options	Enable/disable USB port.
Set Security Level	Change, view, or hide security levels for all BIOS menu items.
Restore Security Defaults	Restore the default security settings.

14 Backing up and recovering

To protect your information, use Windows® Backup and Restore to back up individual files and folders, back up your entire hard drive (select models only), create system repair discs (select models only), or create system restore points. In case of system failure, you can use the backup files to restore the contents of your computer.

Windows Backup and Restore provides the following options:

- Creating a system repair disc (select models only)
- Backing up individual files and folders
- Creating a system image (select models only)
- Scheduling automatic backups (select models only)
- Creating system restore points
- Recovering individual files
- Restoring the computer to a previous state
- Recovering information using recovery tools

 **NOTE:** For detailed instructions, perform a search for these topics in Help and Support.

NOTE: In case of system instability, HP recommends that you print the recovery procedures and save them for later use.

Backing up

Recovery after a system failure is as complete as your most current backup. You should create system repair discs (select models only) and your initial backup immediately after software setup. As you add new software and data files, you should continue to back up your system on a regular basis to maintain a reasonably current backup. The system repair discs (select models only) are used to start up (boot) the computer and repair the operating system in case of system instability or failure. Your initial and subsequent backups allow you to restore your data and settings if a failure occurs.

You can back up your information to an optional external hard drive, a network drive, or discs.

Note the following when backing up:

- Store personal files in the Documents library, and back it up regularly.
- Back up templates that are stored in their associated programs.
- Save customized settings that appear in a window, toolbar, or menu bar by taking a screen shot of your settings. The screen shot can be a time-saver if you have to reset your preferences.

To create a screen shot:

1. Display the screen you want to save.
2. Copy the screen image:

To copy only the active window, press **alt+fn+prt sc**.


To copy the entire screen, press **fn+prt sc**.

3. Open a word-processing document, and then select **Edit > Paste**.

The screen image is added to the document.


4. Save the document.

- When backing up to discs, use any of the following types of discs (purchased separately): CD-R, CD-RW, DVD+R, DVD+R DL, DVD-R, DVD-R DL, or DVD±RW. The discs you use will depend on the type of optical drive installed in your computer.

 **NOTE:** DVDs and DVDs with double-layer (DL) support store more information than CDs, so using them for backup reduces the number of recovery discs required.


- When backing up to discs, number each disc before inserting it into the optical drive of the computer.

To create a backup using Backup and Restore, follow these steps:

 **NOTE:** Be sure that the computer is connected to AC power before you start the backup process.

NOTE: The backup process may take over an hour, depending on file size and the speed of the computer.


1. Select **Start > All Programs > Maintenance > Backup and Restore**.
2. Follow the on-screen instructions to set up your backup, create a system image (select models only), or create a system repair disc (select models only).


 **NOTE:** Windows® includes the User Account Control feature to improve the security of your computer. You may be prompted for your permission or password for tasks such as installing software, running utilities, or changing Windows settings. Refer to Help and Support for more information.

Recovering


In case of system failure or instability, the computer provides the following tools to recover your files:

- Windows recovery tools: You can use Windows Backup and Restore to recover information you have previously backed up. You can also use Windows Startup Repair to fix problems that might prevent Windows from starting correctly.
- **f11** recovery tools: You can use **f11** recovery tools to recover your original hard drive image. The image includes the Windows operating system and software programs installed at the factory.


 **NOTE:** If you are unable to boot (start up) your computer and you cannot use the system repair discs you previously created (select models only), you must purchase a Windows 7 operating system DVD to reboot the computer and repair the operating system.

 **CAUTION:** Using **f11** completely erases hard drive contents and reformats the hard drive. All files you have created and any software installed on the computer are permanently removed. The **f11** recovery tool reinstalls the operating system and HP programs and drivers that were installed at the factory. Software not installed at the factory must be reinstalled. Personal files must be restored from a backup.

1. If possible, back up all personal files.
2. If possible, check for the presence of the HP Recovery partition. select **Start**, right-click **Computer**, click **Manage**, and then click **Disk Management**.

 **NOTE:** If the HP Recovery partition is not listed, you must recover your operating system and programs using the *Windows 7 Operating System* DVD and the *Driver Recovery* disc (both purchased separately). For additional information, contact technical support by selecting **Start > Help and Support > Contact support**.

3. If the HP Recovery partition is listed, restart the computer, and then press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
4. Press **f11** while the “Press **f11** for recovery” message is displayed on the screen.
5. Follow the on-screen instructions.

 **NOTE:** Windows 7 provides additional recovery tools through the operating system. For additional information, go to Help and Support.

NOTE: If you are unable to boot (start up) your computer, you must purchase a *Windows 7 Operating System* DVD to reboot the computer and repair the operating system. For additional information, contact technical support by selecting **Start > Help and Support > Contact support**.

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