



HP Notebook

User Guide

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Product notice

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

To obtain the latest information in this guide, contact support. For U.S. support, go to <http://www.hp.com/go/contactHP>. For worldwide support, go to http://welcome.hp.com/country/us/en/wwcontact_us.html.

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Safety warning notice


 **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 come into contact with 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 Welcome

After you set up and register the computer, it is important to take the following steps:

- **Connect to the Internet**—Set up your wired or wireless network so that you can connect to the Internet. For more information, see [Networking on page 15](#).
- **Get to know your computer**—Learn about your computer features. See [Getting to know your computer on page 3](#) and [Keyboard and pointing devices on page 20](#) for additional information.
- **Find installed software**—Access a list of the software preinstalled on the computer. Select **Computer > More Applications**.



NOTE: For details about using the software included with the computer, select **Computer > Help**. You can also see the software manufacturer's instructions, which may be provided with the software or on the manufacturer's website.

- **Update programs and drivers**—Update your programs and drivers with the latest versions on a regular basis. When your computer is registered, it will automatically be updated with the latest versions. When you register, you can choose to receive automatic notifications when updates become available. The automatic notifications for operating system updates are available for 90 days. For U.S. support, go to <http://www.hp.com/go/contactHP>. For worldwide support, go to http://welcome.hp.com/country/us/en/wwcontact_us.html.

Finding information


The computer comes with several resources to help you perform various tasks.

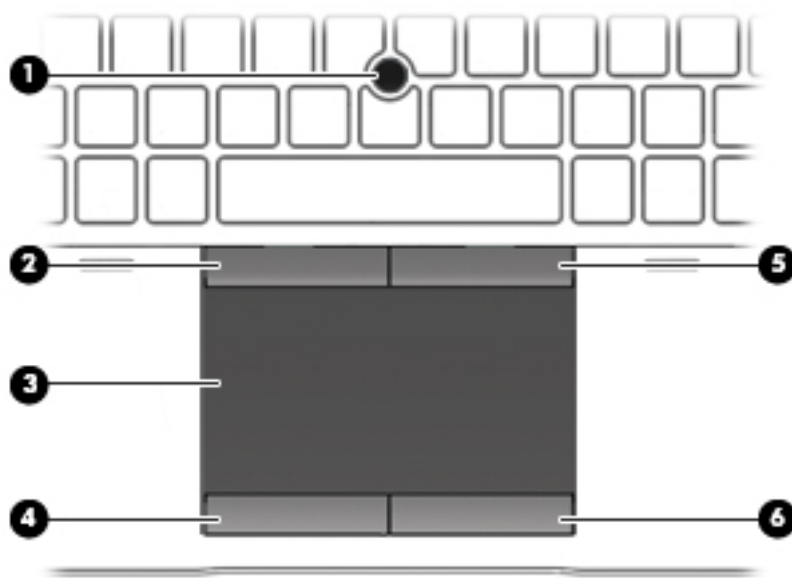
Resources	For information about
<i>Setup Instructions</i> poster	<ul style="list-style-type: none">• Setting up the computer• Identifying computer components
Linux Help To access the Linux Help, select Computer > Help .	<ul style="list-style-type: none">• Computer software• Computer settings• Connecting to the Internet• Computer utilities
<i>Regulatory, Safety, and Environmental Notices</i> To access the notices, double-click the HP Documents icon located on the desktop.	<ul style="list-style-type: none">• Regulatory and safety information• Battery disposal information
<i>Safety & Comfort Guide</i> To access this guide, double-click the HP Documents icon located on the desktop. – or – Go to http://www.hp.com/ergo .	<ul style="list-style-type: none">• Proper workstation setup, posture, health, and work habits• Electrical and mechanical safety information
<i>Worldwide Telephone Numbers</i> booklet This booklet is provided with your computer.	HP support telephone numbers
HP Web site For U.S. support, go to http://www.hp.com/go/contactHP . For worldwide support, go to http://welcome.hp.com/country/us/en/wwcontact_us.html .	<ul style="list-style-type: none">• Support information• Ordering parts and finding additional help• Software, driver, and BIOS updates• Accessories available for the device
<i>Limited Warranty*</i> To access the warranty: Double-click the HP Documents icon located on the desktop. – or – Go to http://www.hp.com/go/orderdocuments .	Warranty information
<p>*You can find the expressly provided HP Limited Warranty applicable to your product located with the user guides on your computer and/or on the CD/DVD provided in the box. In some countries/regions, HP may provide a printed HP Limited Warranty in the box. For some countries/regions where the warranty is not provided in printed format, you may request a printed copy from http://www.hp.com/go/orderdocuments or write to:</p> <ul style="list-style-type: none">• North America: Hewlett-Packard, MS POD, 11311 Chinden Blvd., Boise, ID 83714, USA• Europe, Middle East, Africa: Hewlett-Packard, POD, Via G. Di Vittorio, 9, 20063, Cernusco s/Naviglio (MI), Italy• Asia Pacific: Hewlett-Packard, POD, P.O. Box 200, Alexandra Post Office, Singapore 911507 <p>When you request a printed copy of your warranty, please include your product number, warranty period (found on your service label), name, and postal address.</p> <p>IMPORTANT: Do NOT return your HP product to the addresses above. For U.S. support, go to http://www.hp.com/go/contactHP. For worldwide support, go to http://welcome.hp.com/country/us/en/wwcontact_us.html.</p>	

2 Getting to know your computer

Top

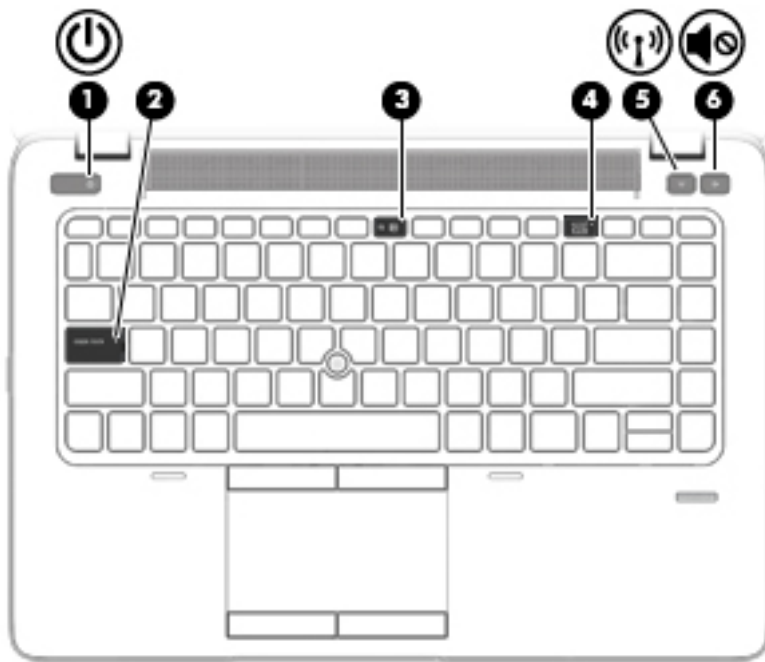
TouchPad




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



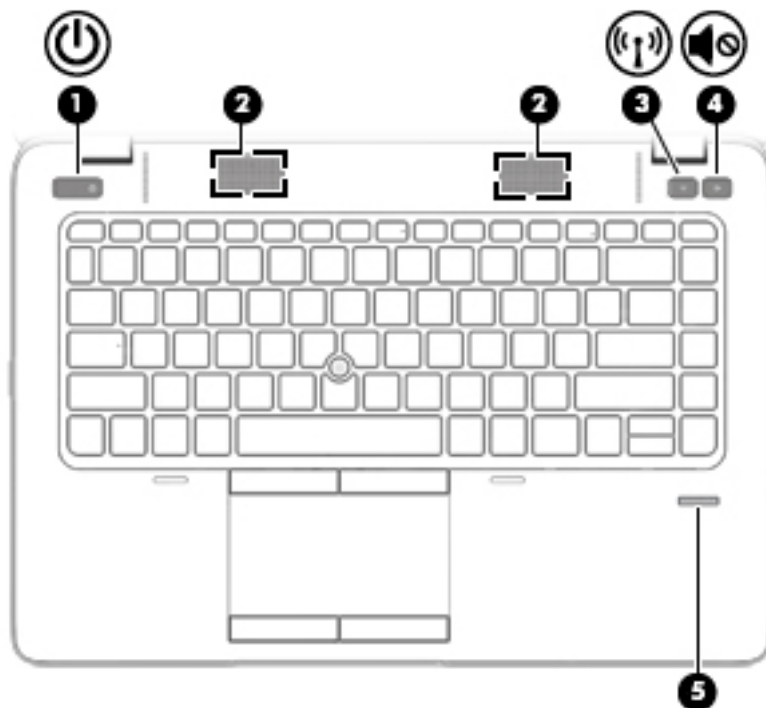
Component		Description
(1)	Pointing stick (select models only)	Moves the pointer and selects or activates items on the screen.
(2)	Left pointing stick button	Functions like the left button on an external mouse.
(3)	TouchPad zone	Moves the pointer and selects or activates items on the screen.
(4)	Left TouchPad button	Functions like the left button on an external mouse.
(5)	Right pointing stick button	Functions like the right button on an external mouse.
(6)	Right TouchPad button	Functions like the right button on an external mouse.



Lights




Component		Description
(1)		Power light <ul style="list-style-type: none">On: The computer is on.Blinking: The computer is in the Suspend state.Off: The computer is off or in Hibernation.
(2)		Caps lock light <ul style="list-style-type: none">On: Caps lock is on.
(3)		Microphone mute light <ul style="list-style-type: none">Amber: microphone sound is off.Off: microphone sound is on.
(4)		Num lock light <ul style="list-style-type: none">On: Num lock is on.
(5)		Wireless light <ul style="list-style-type: none">White: 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.
(6)		Mute light <ul style="list-style-type: none">Amber: Computer sound is off.Off: Computer sound is on.

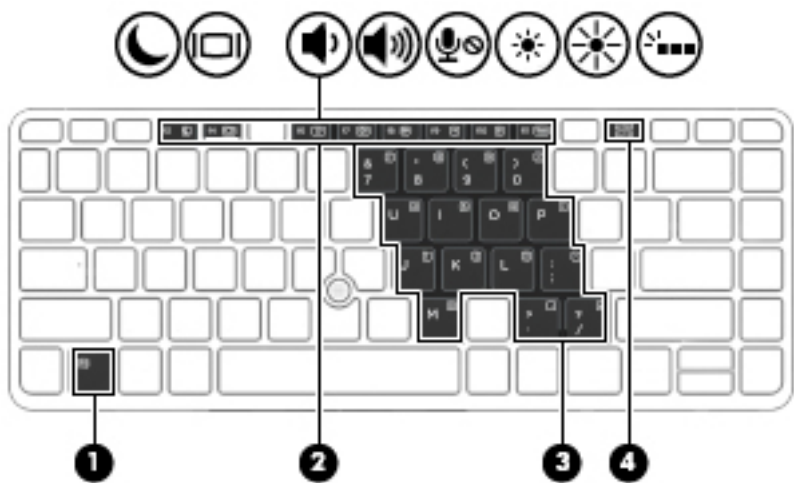
Buttons and fingerprint reader (select models only)



Component	Description
(1)  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 briefly to initiate Suspend. When the computer is in the Suspend state, press the button briefly to exit Suspend. When the computer is in Hibernation, press the button briefly to exit Hibernation. <p>If the computer has stopped responding and operating system 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:</p> <ol style="list-style-type: none"> Select Computer > Control Center. In the left pane, click System, and then click Power Management in the right pane.
(2) Speakers (2)	Produce sound.
(3)  Wireless button	<p>Turns the wireless feature on or off but does not establish a wireless connection.</p> <p>NOTE: A wireless connection may be established if one has been previously configured.</p>

Component		Description
(4)	 Volume mute button	Mutes and restores speaker sound.
(5)	Fingerprint reader (select models only)	Allows a fingerprint logon instead of a password logon.





Keys



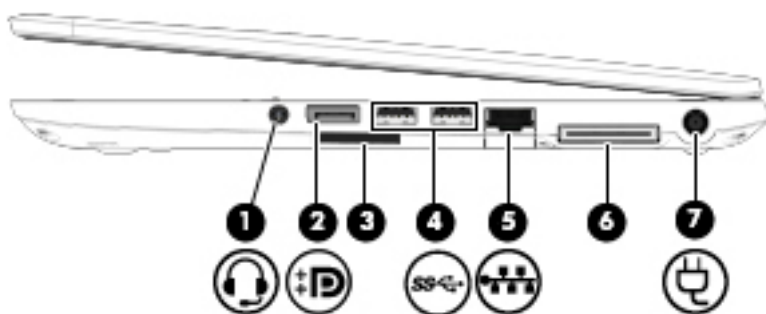
Component		Description
(1)	fn key	Executes frequently used system functions when pressed in combination with a function key.
(2)	Function keys	Execute frequently used system functions when pressed in combination with the fn key.
(3)	Embedded numeric keypad keys	When the keypad is turned on, it can be used like an external numeric keypad. Each key on the keypad performs the function indicated by the icon in the upper-right corner of the key.
(4)	num lk key	Turns the embedded numeric keypad on and off when pressed in combination with the fn key. Alternates between the navigational and numeric functions on the integrated numeric keypad.






Front



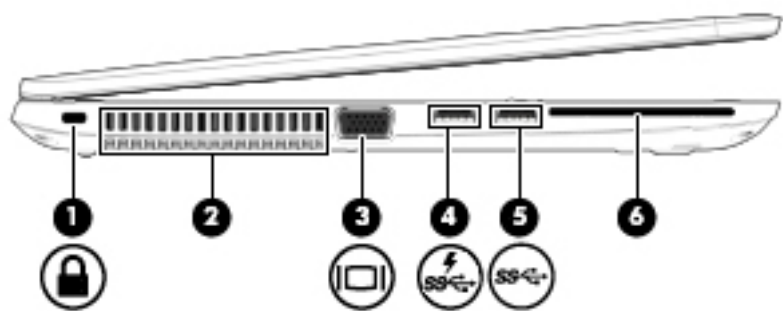
Component		Description
(1)		Wireless light <ul style="list-style-type: none">White: An integrated wireless device, such as a wireless local area network (WLAN) device and/or a Bluetooth® device, is on.Amber: All wireless devices are off.
(2)		Power light <ul style="list-style-type: none">On: The computer is on.Blinking: The computer is in the Suspend state.Off: The computer is off or in Hibernation.
(3)		AC adapter/Battery light <ul style="list-style-type: none">Amber: The computer is connected to external power and the battery is charged from 0 to 90 percent.White: The computer is connected to external power and the battery is charged from 90 to 99 percent.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: The battery is fully charged.
(4)		Hard drive light <ul style="list-style-type: none">Blinking white: The hard drive is being accessed.Amber: HP 3D DriveGuard has temporarily parked the hard drive.





Right



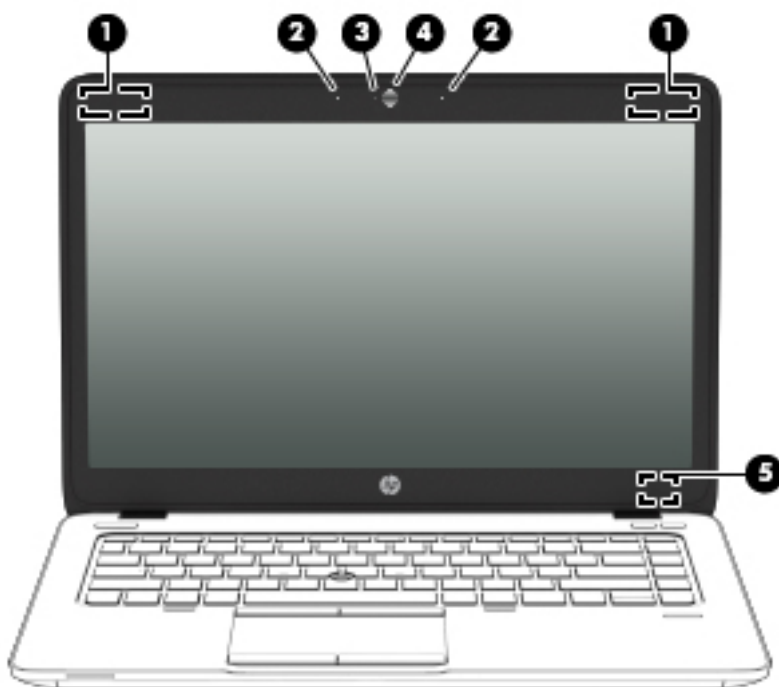
Component	Description
(1)  Audio-out (headphone) jack/Audio-in (microphone) jack	<p>Produces sound when connected to optional powered stereo speakers, headphones, earbuds, a headset, or television audio. Also connects an optional headset microphone.</p> <p>WARNING! To reduce the risk of personal injury, adjust the volume before putting on headphones, earbuds, or a headset. For additional safety information, see the <i>Regulatory, Safety, and Environmental Notices</i>.</p> <p>NOTE: When a device is connected to the jack, the computer speakers are disabled.</p> <p>NOTE: Be sure that the device cable has a 4-conductor connector that supports both audio-out (headphone) and audio-in (microphone).</p>
(2)  DisplayPort	Connects an optional digital display device, such as a high-performance monitor or projector.
(3) Memory card reader	Reads data from and writes data to memory cards such as Secure Digital (SD).
(4)  USB 3.0 ports (2)	<p>Connect optional USB 3.0 devices and provide enhanced USB power performance.</p> <p>NOTE: For details about different types of USB ports, see Using a USB device on page 47.</p>
(5)  RJ-45 (network) jack	Connects a network cable.
(6) Docking connector	Connects an optional docking device.
(7)  Power connector	Connects an AC adapter.

Left



Component		Description
(1)		Security cable slot Attaches an optional security cable to the computer. NOTE: The security cable is designed to act as a deterrent, but it may not prevent the computer from being mishandled or stolen.
(2)		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.
(3)		External VGA monitor port Connects an external VGA monitor or projector.
(4)		USB 3.0 charging port Connects optional USB 3.0 devices and provides enhanced USB power performance. The USB charging port can also charge select models of cell phones and MP3 players, even when the computer is off. NOTE: For details about different types of USB ports, see Using a USB device on page 47 .
(5)		USB 3.0 ports (2) Connect optional USB 3.0 devices and provide enhanced USB power performance. NOTE: For details about different types of USB ports, see Using a USB device on page 47 .
(6)		Smart card reader (select models only) Supports optional smart cards.


Display

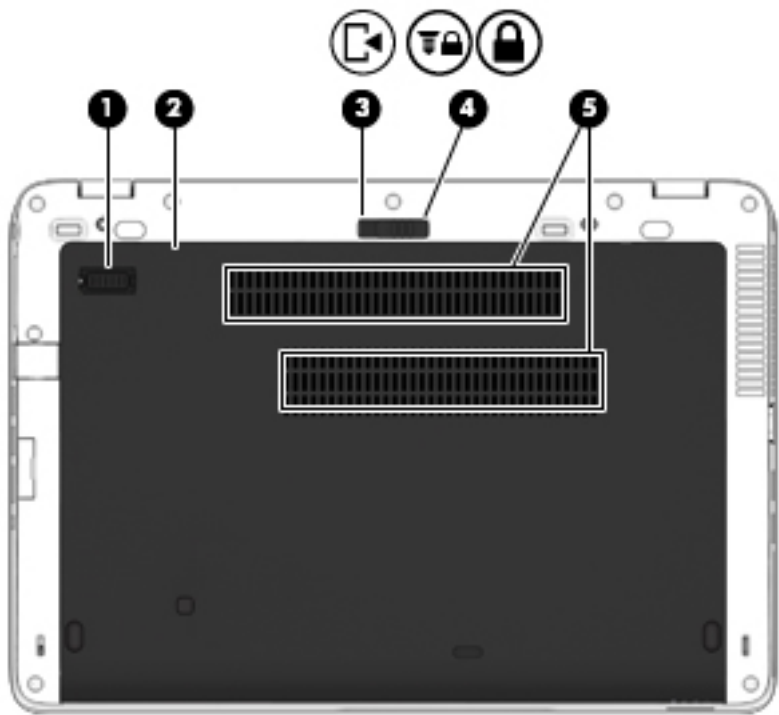



Component		Description
(1)	WLAN antennas (2)*	Send and receive wireless signals to communicate with wireless local area networks (WLAN).
(2)	Internal microphones (2)	Record sound.
(3)	Webcam light (select models only)	On: The webcam is in use.
(4)	Webcam (select models only)	Records video and captures still photographs. For information on using the webcam, access HP Support Assistant. To access HP Support Assistant on the Start screen, select the HP Support Assistant app.
(5)	Internal display switch	Turns off the display or initiates Suspend if the display is closed while the power is on. NOTE: The display switch is not visible on the outside of the computer.


*The antennas are not visible on the outside of the computer. For optimal transmission, keep the areas immediately around the antennas free from obstructions. To see wireless regulatory notices, see the section of the *Regulatory, Safety, and Environmental Notices* that applies to your country or region.

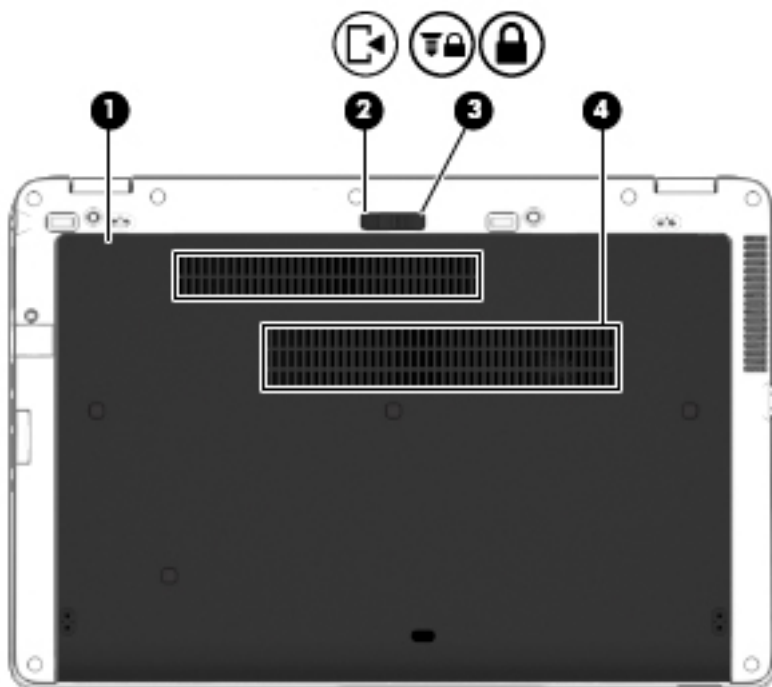
Bottom


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




Component		Description
(1)	Accessory battery connector	Connects an optional accessory battery.
(2)	Service door	Provides access to the hard drive bay, the wireless LAN (WLAN) module slot, the WWAN module slot, and the memory module slots. CAUTION: To prevent an unresponsive system, replace the wireless module only with a wireless module authorized for use in the computer by the governmental agency that regulates wireless devices in your country or region. If you replace the module and then receive a warning message, remove the module to restore computer functionality, and then contact support through HP Support Assistant. To access HP Support Assistant on the Start screen, select the HP Support Assistant app.
(3)	 Service door release latch	Releases the service door on the computer.

Component	Description
(4) 	Service door release lock Locks the service door.
(5) 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.




Component	Description
(1) Service door	Provides access to the hard drive bay, the wireless LAN (WLAN) module slot, the WWAN module slot, and the memory module slots. CAUTION: To prevent an unresponsive system, replace the wireless module only with a wireless module authorized for use in the computer by the governmental agency that regulates wireless devices in your country or region. If you replace the module and then receive a warning message, remove the module to restore computer functionality, and then contact support through HP Support Assistant. To access HP Support Assistant on the Start screen, select the HP Support Assistant app.
(2) 	Service door release latch Releases the service door on the computer.

Component			Description
(3)		Service door release lock	Locks the service door.
(4)		Vents (3)	<p>Enable airflow to cool internal components.</p> <p>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.</p>

3 Networking


Your computer may support one or both of the following types of Internet access:

- Wireless—For mobile Internet access, you can use a wireless connection. See [Connecting to an existing WLAN on page 16](#) or [Setting up a new WLAN on page 17](#).
- Wired—You can access the Internet by connecting to a wired network. For information on connecting to a wired network, see [Connecting to a wired network on page 19](#).




 **NOTE:** Internet hardware and software features vary depending on computer model and your location.

Using an Internet service provider (ISP)

Before you can connect to the Internet, you must establish an ISP account. Contact a local ISP to purchase Internet service and a modem. The ISP can help set up the modem, install a network cable to connect your wireless computer to the modem, and test the Internet service.

 **NOTE:** Your ISP will give you a user ID and password to access the Internet. Record this information and store it in a safe place.

Identifying wireless and network status icons

Icon	Name	Description
	Wireless (connected)	Indicates that one or more wireless devices are on.
	Network Connection (connected)	Indicates that the wired network is connected and active. If both wired and wireless connections are active, the operating system uses the wired connection because it is faster.
	Network Connection (disconnected)	Indicates that wired and wireless networks are not connected.

Creating a wireless connection

Your computer may be equipped with one or more of the following wireless devices:

- Wireless local area network (WLAN) device
- Bluetooth® device

Turning wireless devices on and off

Using the wireless button

Use the wireless button to turn both the wireless network controller and the Bluetooth controller off or on simultaneously. They can be controlled individually through Control Center or Computer Setup.



NOTE: See [Getting to know your computer on page 3](#) for information on identifying the type and location of the wireless button on your computer.

Using the operating system controls

To enable or disable a wireless or wired network device:

1. Right-click the **Network Connection** icon in the notification area, at the far right of the taskbar.
2. To enable or disable one of the following devices, select or clear one of the following options:
 - **Enable Networking** (all network devices)
 - **Enable Wireless**

Using a WLAN

A wireless connection connects the computer to Wi-Fi networks, or WLANs. A WLAN is composed of other computers and accessories that are linked by a wireless router or a wireless access point.



NOTE: When creating a wireless connection or allowing access to users in a network, you are prompted for the root password.

Connecting to an existing WLAN

1. Be sure that the WLAN device is on.



NOTE: See [Getting to know your computer on page 3](#) for information on identifying the location of the wireless button and wireless light on your computer.

2. Click the **Network Connection** icon in the notification area, at the far right of the taskbar.
Available wireless networks are listed under **Wireless Networks**.
3. Click the desired wireless network.

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



NOTE: To connect to a network that is not automatically detected, click the **Network Connection** icon and select **Connect to Hidden Wireless Network**. Enter the ESSID information, and set encryption parameters.



NOTE: If no WLANs are listed, and your network is not hidden, you are out of range of a wireless router or access point.

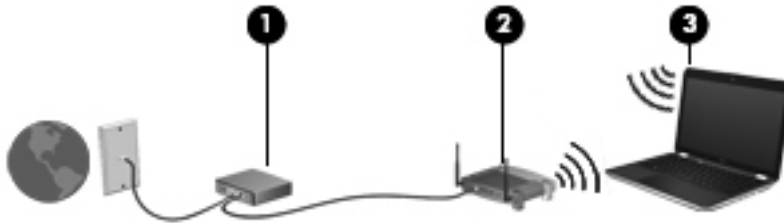
If you do not see the network you want to connect to, right-click the **Network Connection** icon in the notification area, at the far right of the taskbar, and click **Edit Connections**.


Setting up a new WLAN


Required 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.



 **NOTE:** Some cable modems include a built-in router. Check with your ISP to see if you need a separate router.

 **NOTE:** When setting up a wireless connection, be sure that your computer and wireless router are synchronized. To synchronize your computer and wireless router, turn your computer and wireless router off and then back on.

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, see the information provided by your router manufacturer or your ISP.

Protecting your WLAN

When you set up a WLAN or access an existing WLAN, always enable security features to protect your network from unauthorized access. WLANs in public areas (hotspots) like coffee shops and airports may not provide any security. If you are concerned about the security of your computer in a hotspot, limit your network activities to e-mail that is not confidential and basic Internet surfing.

Wireless radio signals travel outside the network, so other WLAN devices can pick up unprotected signals. You can use the following precautions to protect your WLAN:

- **Use a firewall**—Checks both data and requests for data that are sent to your network, and discards any suspicious items. Firewalls are available in both software and hardware. Some networks use a combination of both types.
- **Wireless encryption**—Your computer supports three encryption protocols:
 - Wi-Fi Protected Access (WPA)
 - Wi-Fi Protected Access II (WPA2)
 - Wired Equivalent Privacy (WEP)



NOTE: HP recommends that you select WPA2, which is the most advanced of the three encryption protocols. The use of WEP encryption is not recommended, because it can be overcome with little effort.

- Wi-Fi Protected Access (WPA) and Wi-Fi Protected Access II (WPA2) use security standards to encrypt and decrypt data transmitted over the network. Both WPA and WPA2 dynamically generate a new key for every packet, and they also generate a different set of keys for each computer on the network. To accomplish this:
 - WPA uses Advanced Encryption Standard (AES) and Temporal Key Integrity Protocol (TKIP).
 - WPA2 uses Cipher Block Chaining Message Authentication Code Protocol (CCMP), which is a new AES protocol.
- Wired Equivalent Privacy (WEP) encrypts data with a WEP key before it is transmitted. Without the correct key, others will not be able to use the WLAN.

Roaming to another network

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

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
- Phones
- Audio devices

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

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, see the Bluetooth software Help.

Connecting to a wired network

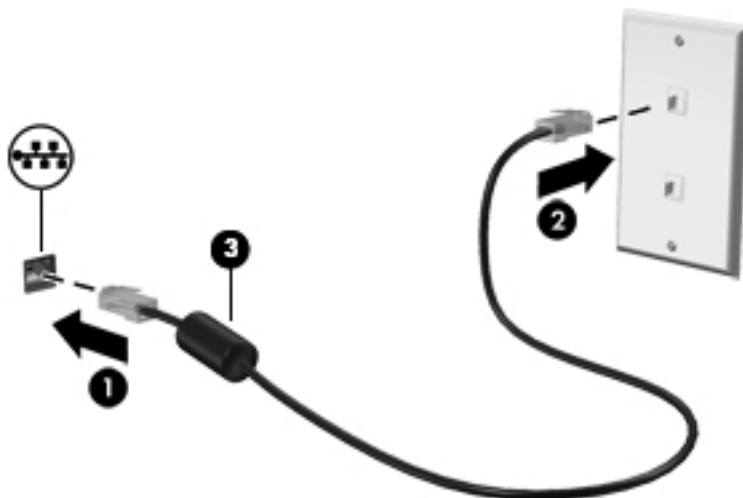
Connecting to a local area network (LAN) (select models only)

Connecting to a local area network (LAN) requires an 8-pin, RJ-45 network cable (purchased separately). 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)** or a router (not illustrated).



⚠ 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 Keyboard and pointing devices

Using the keyboard

Identifying the hot keys









A hot key is a combination of the **fn** key and either the **esc** key or one of the function keys.



NOTE: For more information on hot key locations, see [Getting to know your computer on page 3](#).

To use a hot key:


- ▲ Briefly press the **fn** key, and then briefly press the second key of the hot key combination.

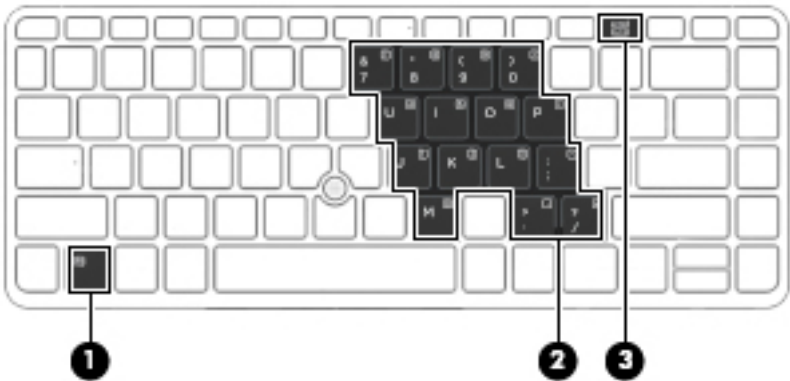
hot key combination	Description
 fn+f3	Initiates Sleep, which saves your information in system memory. The display and other system components turn off and power is conserved. To exit Sleep, briefly press the power button. CAUTION: To reduce the risk of information loss, save your work before initiating Sleep.
 fn+f4	Switches the screen image among display devices connected to the system. For example, if a monitor is connected to the computer, fn+f4 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 fn+f4 hot key can also alternate images among other devices that are receiving video information from the computer.
 fn+f6	Decreases speaker volume.
 fn+f7	Increases speaker volume.
 fn+f8	Mutes the microphone.
 fn+f9	Decreases the screen brightness level.
 fn+f10	Increases the screen brightness level.
 fn+f11	Turns the keyboard backlight on and off. NOTE: The keyboard backlight is turned on at the factory. To extend battery life, turn off the keyboard backlight.

Using keypads

The computer includes an embedded numeric keypad (or an integrated numeric keypad). The computer also supports an optional external numeric keypad or an optional external keyboard that includes a numeric keypad.

Using the embedded numeric keypad


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



Component		Description
(1)	fn key	<p>Turns the embedded numeric keypad on and off when pressed in combination with the num lk key.</p> <p>NOTE: The embedded numeric keypad will not function while an external keyboard or numeric keypad is connected to the computer.</p>
(2)	Embedded numeric keypad	<p>When the keypad is turned on, it can be used like an external numeric keypad.</p> <p>Each key on the keypad performs the function indicated by the icon in the upper-right corner of the key.</p>
(3)	num lk key	<p>Turns the embedded numeric keypad on and off when pressed in combination with the fn key.</p> <p>NOTE: The keypad function that is active when the computer is turned off is reinstated when the computer is turned back on.</p>

Turning the embedded numeric keypad on and off

Press **fn+num lk** to turn on the embedded numeric keypad. Press **fn+num lk** again to turn off the keypad.

 **NOTE:** The embedded numeric keypad is turned off while an external keyboard or numeric keypad is connected to the computer.

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:

- To use the navigational function of a keypad key while the keypad is off, press and hold the **fn** key while pressing the keypad key.
- To use the standard function of a keypad key 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 the TouchPad

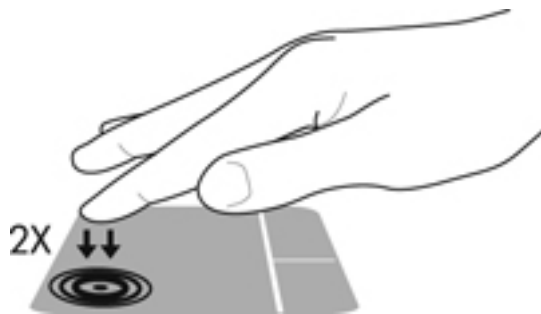
To move the pointer, slide one finger across the TouchPad in the direction you want the pointer to go. Use the left and right TouchPad buttons like the buttons on an external mouse.



NOTE: In addition to the pointing devices included with your computer, you can use an external USB mouse (purchased separately) by connecting it to one of the USB ports on the computer.


Turning the TouchPad off and on

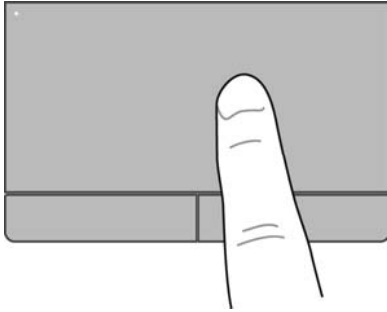
To turn the TouchPad off and on, quickly double-tap the TouchPad on/off button.



Navigating

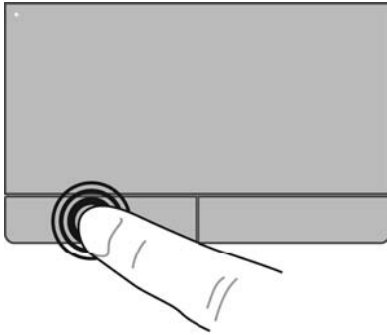
To move the pointer, slide one finger across the TouchPad in the direction you want the pointer to go. To scroll up and down using the TouchPad vertical scroll zone, slide your finger up or down on the TouchPad.

 **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 does not activate the scrolling function.




Selecting

Use the left and right TouchPad buttons like the corresponding buttons on an external mouse.




Using TouchPad gestures


The TouchPad supports a variety of gestures. To use TouchPad gestures, place two fingers on the TouchPad at the same time.

 **NOTE:** TouchPad gestures are not supported in all programs.

To view information about each gesture:

1. Select **Computer > More Applications**.
2. In the left pane, click **System**, and then click the **TouchPad** icon  in the right pane.
3. On the **Device Settings** tab, click the device, and then click **Settings**.
4. Click the gesture to view information about its features.

To turn the gestures on and off:

1. Select **Computer > More Applications**.
2. In the left pane, click **System**, and then click the **TouchPad** icon  in the right pane.
3. On the **Device Settings** tab, click the device, and then click **Settings**.
4. Select the check box next to the gesture that you want to turn on or off.
5. Click **Apply**, and then click **OK**.

Tapping

To make an on-screen selection, point to an item on the screen and then tap.

- Tap one finger on the TouchPad zone to make a selection. Double-tap an item to open it.



NOTE: Press and hold on the TouchPad to open a help screen that provides information about the selected item.

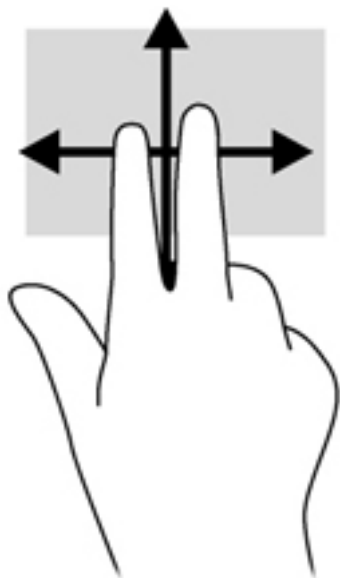


Scrolling

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



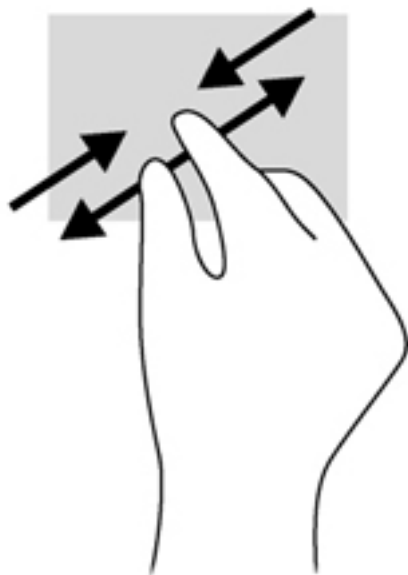
NOTE: Scrolling speed is controlled by finger speed.



Pinching/Zooming

Pinching and zooming allow you to zoom out or in on images or text.

- Zoom in by placing two fingers together on the TouchPad zone and then moving your fingers apart.
- Zoom out by placing two fingers apart on the TouchPad zone and then moving your fingers together.



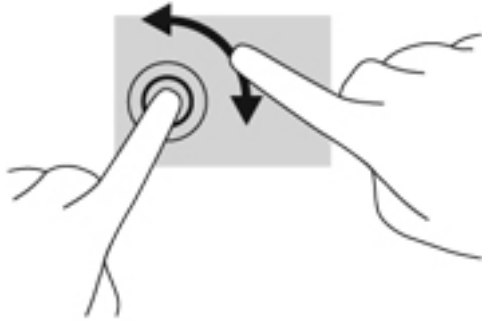
Rotating (select models only)

Rotating allows you to turn items such as photos.

- Point to an object and then anchor the forefinger of your left hand in the TouchPad zone. Using your right hand, slide your forefinger in a sweeping motion from 12 o'clock to 3 o'clock. To reverse the rotation, move your forefinger from 3 o'clock to 12 o'clock.



NOTE: Rotate is intended for specific apps where you can manipulate an object or image. It may not be functional for all apps.



Setting pointing device preferences

To customize settings for button configuration, click speed, pointer options, and so on:

1. Select **Computer > Control Center**.
2. In the left pane, click **Hardware**, and then click **Mouse** in the right pane.

Using the pointing stick (select models only)

Press the pointing stick in the direction you want to move the pointer on the screen. Use the left and right pointing stick buttons as you would the left and right buttons on an external mouse.

5 Multimedia

Your computer includes the following:

- Integrated speakers
- Integrated microphones
- Integrated webcam
- Preinstalled multimedia software
- Multimedia buttons or keys

Using the audio features


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


- Play music.
- Record sound.
- Download music from the Internet.
- Create multimedia presentations.
- Transmit sound and images with instant messaging programs.
- Stream radio programs.
- Create (burn) audio CDs using the installed optical drive (select models only) or on an external optical drive (purchased separately).


Adjusting the volume

You can adjust the volume using the following:

- Volume buttons
- Volume hot keys
- Volume keys

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

 **NOTE:** Volume can also be controlled through the operating system and some programs.

 **NOTE:** See [Buttons and fingerprint reader \(select models only\) on page 5](#) and [Identifying the hot keys on page 20](#) for information on what type of volume controls your computer has.

Checking your audio functions

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

1. Select **Computer > Control Center**.
2. In the left pane, click **Hardware**, and then click **Sound** in the right pane.
3. Click the **Sound Effects** tab, and then select one of the sound options under **Choose an alert sound** to test each sound.

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

1. Select **Computer > Control Center**.
2. In the left pane, click **Hardware**, and then click **Sound** in the right pane.
3. Click the **Input** tab, and then select **Microphone** or **Line-in** in the drop-down menu next to **Connector**.
4. Adjust the input volume by moving the **Input volume** slider to the desired setting.



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, right-click the **Sound** icon in the notification area, at the far right of the taskbar.

Using the webcam (select models only)

Some computers include an integrated webcam, located at the top of the display. With the preinstalled software, Cheese, you can use the webcam to take a photo or record a video. You can preview and save the photo or video recording.

The webcam software enables you to experiment with the following features:

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



NOTE: For details about using your webcam, click the Help menu in the Cheese software.

Using video devices


Your computer has the following external video ports:

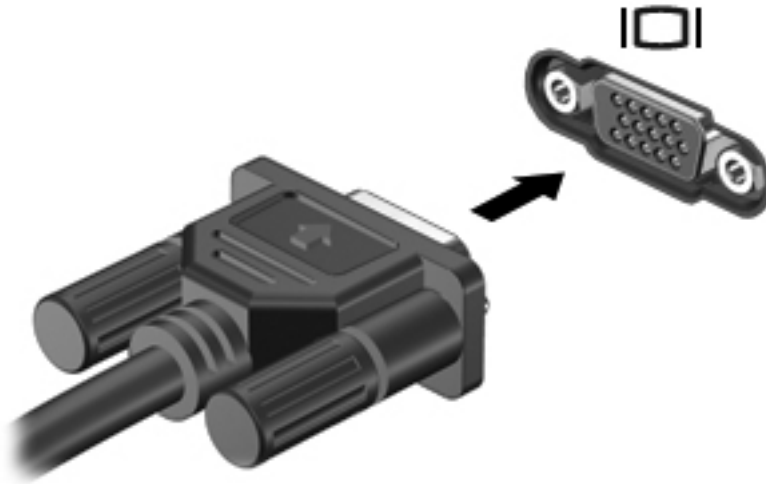
- VGA
- DisplayPort

VGA

The external monitor port, or VGA port, is an analog display interface that connects an external VGA display device such as an external VGA monitor or a VGA projector to the computer.


- ▲ To connect a VGA display device, connect the device cable to the external monitor port.
Press **fn+f4** to switch the image between the display devices connected to the computer.

 **NOTE:** Pressing **fn+f4** allows you to switch between settings. You can toggle between a laptop panel, an external display in combination with the laptop panel, or one of the external monitors. You also can attach external monitors to both the DisplayPort and the VGA ports, but only one external display can be active at a time.



If your external monitor is not detected after pressing **fn+f4**, follow these steps:

1. Click the **Gnome Display Applet** icon in the notification area, at the far right of the taskbar.
2. Select **Configure Display Settings**.
3. Click **Detect Monitors**.
4. Click the **On** radio button to the right of the display layout. If the default monitor is not detected, set the resolution and the refresh rate using your external monitor specifications. Change the rotation if desired. If the display requires mirroring, click the **Mirror Screens** check box.

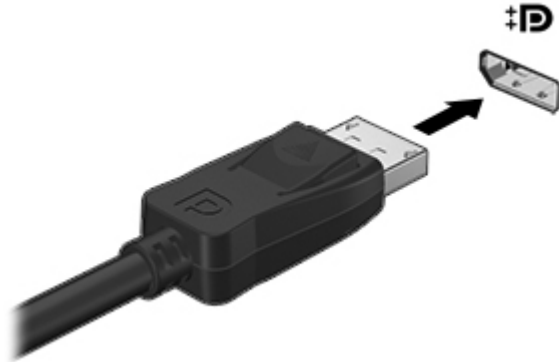
 **NOTE:** Click **Default** to change the external monitor to landscape mode.


5. Click **Apply**.
6. Click **Close**.

DisplayPort

The DisplayPort connects a compatible digital display device such as a high-performance monitor or projector. The DisplayPort delivers higher performance than the VGA external monitor port and improves digital connectivity.

1. To connect a digital display device, connect the device cable to the DisplayPort.




 **NOTE:** To remove the device cable, press down on the connector latch to disconnect it from the computer.

2. Connect the other end of the cable to the video device.
3. Press **fn+f4** to switch the image between the display devices connected to the computer.
 - **PC screen only:** View the screen image on the computer only.
 - **Duplicate:** View the screen image simultaneously on both the computer and external device.
 - **Extend:** View the screen image extended across both the computer and external device.
 - **Second screen only:** View the screen image on the external device only. Each time you press **fn+f4**, the display state changes.

6 Power management

Shutting down the computer


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

The shutdown 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

To shut down the computer, follow these steps:

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

1. Save your work and close all open programs.
2. Select **Computer > Shutdown > Shut Down**.

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

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


Setting power options


Using power-saving states

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

When Suspend is initiated, the power lights blink and the screen clears. Your work is saved to memory, letting you exit the Suspend state faster than exiting Hibernation. If the computer is in the Suspend state for an extended period or if the battery reaches a critical battery level while in the Suspend 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 Suspend or Hibernation while reading from or writing to a disc or an external memory card.

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

Initiating and exiting Suspend

The system is set at the factory to initiate Suspend after a period of inactivity when running on battery power or on external power.

Power settings and timeouts can be changed using Power Management in Control Center.

With the computer on, you can initiate Suspend in any of the following ways:

- Briefly press the power button.
- Close the display.



NOTE: This works only when the computer is running on battery power.

- Select **Computer > Shutdown > Suspend**.
- Click the **Power** icon, located on the far right of the taskbar, and then click **Suspend**.

To exit Suspend:

- ▲ Briefly press the power button.

When the computer exits Suspend, the power lights turn on and your work returns to the screen where you stopped working.

Initiating and exiting Hibernation

The system is set at the factory to initiate Hibernation after a period of inactivity when running on battery power or on external power, or when the battery reaches a critical battery level.

Power settings and timeouts can be changed using Power Management in Control Center.

With the computer on, you can initiate Hibernation in any of the following ways:

- Briefly press the power button.
- Select **Computer > Shutdown > Hibernate**.
- Click the **Power** icon, located on the far right of the taskbar, and then click **Hibernate**.

To exit Hibernation:

- ▲ Briefly press the power button.

When the computer exits Hibernation, the power lights turn on and your work returns to the screen where you stopped working.

Using the Power icon

The **Power** icon is located in the notification area, at the far right of the taskbar. The **Power** icon 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, click the **Power** icon. The pop up menu will display the information. The information may also be provided by hovering over the **Power** icon with the mouse cursor.
- To access Power Management Preferences, right-click the **Power** icon, and then click **Preferences**.

Using power management

Power management is a collection of system settings that manages how the computer uses power. Power management can help you conserve power, maximize performance, or balance the two.

You can customize power management settings.

Viewing the current power management settings

- ▲ Right-click the **Power** icon in the notification area, at the far right of the taskbar, and then click **Preferences**.


Changing the current power management settings

1. Right-click the **Power** icon in the notification area, at the far right of the taskbar, and then click **Preferences**.
2. Change the settings on the **On AC Power** tab, **On Battery Power** tab, and **General** tab, as needed.


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 a charged battery is in the computer and 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:** When you disconnect AC power, the display brightness is automatically decreased to save battery life. For information on increasing or decreasing display brightness, see [Keyboard and pointing devices on page 20](#).

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.

Displaying the remaining battery charge

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

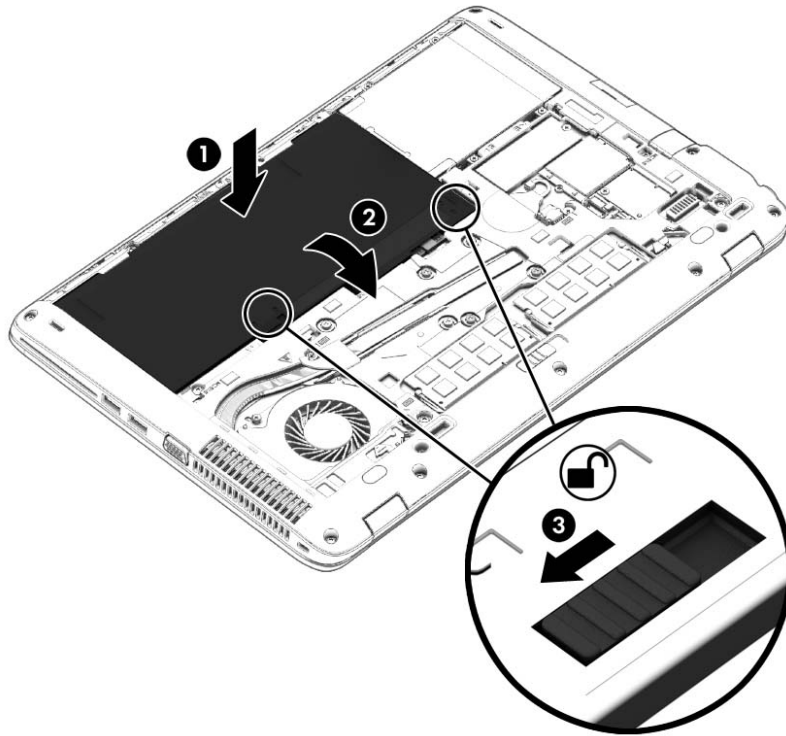
Inserting or removing the battery

Inserting a battery

To insert the battery:

1. Turn the computer upside down on a flat surface, with the battery bay toward you.
2. Remove the service door (see [Removing the service door on page 41](#)).

3. Insert the battery **(1)** into the battery bay until it is seated **(2)**.
Slide the battery release latches to lock the battery into place **(3)**.



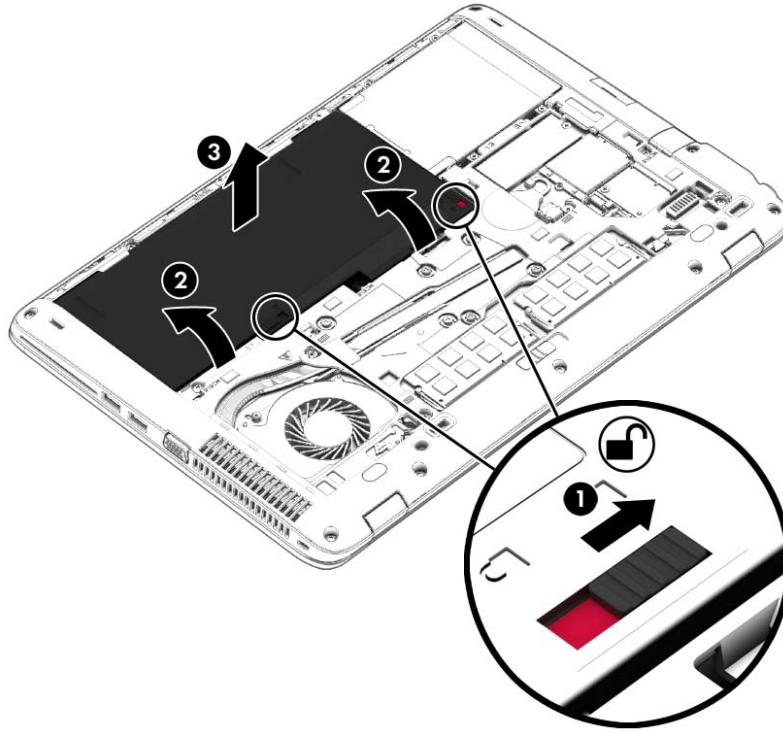
Removing a battery

To remove the battery:

⚠ CAUTION: Removing a battery that is the sole power source for the computer can cause loss of information. To prevent loss of information, save your work and shut down the computer through Windows before removing the battery.

1. Turn the computer upside down on a flat surface, with the battery bay toward you.
2. Remove the service door (see [Removing the service door on page 41](#)).
3. Slide the battery release latches **(1)**, and then lift the battery **(2)**.

4. Remove the battery from the computer (3).



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 or an optional power adapter.

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.




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.

Maximizing battery life

To maximize battery life:

1. Select **Computer > Control Center**.
2. In the left pane, click **System**, and then click **Power Management** in the right pane.
3. On the **On Battery Power** tab:
 - Adjust the slider to the right of **Put computer to sleep when inactive for** to 10 minutes.
 - Select the **Suspend** or **Hibernate** option from the dialog box to the right of **When laptop lid is closed**.
 - Select the **Hibernate** or **Shutdown** option from the dialog box to the right of **When battery power is critically low**.
4. Adjust the slider to the right of **Put display to sleep when inactive for** to 6 minutes, and select the check box next to **Reduce backlight brightness**.
5. Select the check box next to **Dim display when idle**.
6. Click **Close**.

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

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 Management in Control Center. Preferences set using Power Management do not affect lights.

Identifying low battery levels

When a battery that is the sole power source for the computer reaches a low or critical battery level, the following behavior occurs:

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

Resolving a low battery level

Resolving a low battery level when external power is available

- ▲ Connect the computer to external power using one of the following devices:
 - AC adapter
 - Optional docking or expansion device
 - Optional power adapter purchased as an accessory from HP

Resolving a low battery level when a charged battery is available

1. Turn off the computer or initiate Hibernation.
2. Replace the discharged battery with a charged battery.
3. Turn on the computer.

Resolving a low battery level when no power source is available

- Initiate Hibernation.
- 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. Replace the discharged battery with a charged battery, or connect the AC adapter to the computer and to external power.
2. Exit Hibernation by briefly pressing the power button.

Conserving battery power


- Turn off wireless and local area network (LAN) connections and exit modem applications when you are not using them.
- Disconnect unused external devices that are not plugged into an external power source.
- Stop, disable, or remove any external memory cards that you are not using.
- Decrease display brightness.
- Initiate Suspend or Hibernation, or shut down the computer when you are not using it.

Storing a battery

 **CAUTION:** To reduce the risk of 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.

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


Replacing the battery

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.


You can find details about the battery by clicking the **Battery** icon in the notification area, at the far right of the taskbar, and then click **Laptop Battery**.

 **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.


Using external AC power

 **NOTE:** For information on connecting to AC power, see the *Setup Instructions* poster provided in the computer box.

External AC power is supplied through an approved AC adapter or an optional docking or expansion device.

 **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.

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

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

- When you are charging or calibrating a battery
- When you are installing or modifying system software
- When 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** 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.

Testing an AC adapter

Test the AC adapter if the computer exhibits any of the following symptoms when it is connected to AC power:

- The computer does not turn on.
- The display does not turn on.
- The power lights are off.


To test the AC adapter:

1. Shut down the computer.
2. Remove the service door (see [Removing the service door on page 41](#)).
3. Remove the battery from the computer (see [Removing a battery on page 34](#)).
4. Connect the AC adapter to the computer, and then plug it into an AC outlet.
5. Turn on the computer.
 - If the power lights turn **on**, the AC adapter is functioning properly.
 - If the power lights remain **off**, the AC adapter is not functioning and should be replaced.

Contact support for information on obtaining a replacement AC power adapter.

Hybrid Graphics (select models only)

Select computers are equipped with the Hybrid Graphics feature.


 **NOTE:** To determine if Hybrid Graphics is installed on your computer, see your notebook graphics processor configuration and software Help.

Hybrid Graphics offers two modes for processing graphics:

- High Performance mode—Applications assigned to this mode run on the higher-performance graphics processing unit (GPU) for optimal performance.
- Power Saving mode—Applications assigned to this mode run on the lower-performance GPU to conserve battery power.

Using Hybrid Graphics (select models only)


The Hybrid Graphics feature allows an application to run in either High Performance mode or Power Saving mode, based on the application's graphics-processing demands. Typically, 3D and gaming applications run on the higher-performance GPU, and applications with lightweight graphics-processing demands run on the lower-performance GPU. You can change the mode an application uses (High Performance or Power Saving) through the Hybrid Graphics control panel.

 **NOTE:** Due to hardware limitations, some applications can be run in only one of the two modes.

For more information, see your Hybrid Graphics software Help.

7 Drives

Handling drives

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

Observe these precautions:

- Before you move a computer that is connected to an external hard drive, initiate Suspend 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 Suspend, 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 an 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. Airport conveyer belts and similar security devices that check carry-on baggage use X-rays instead of magnetism and do not damage drives.

Removing or replacing the service door

Removing the service door

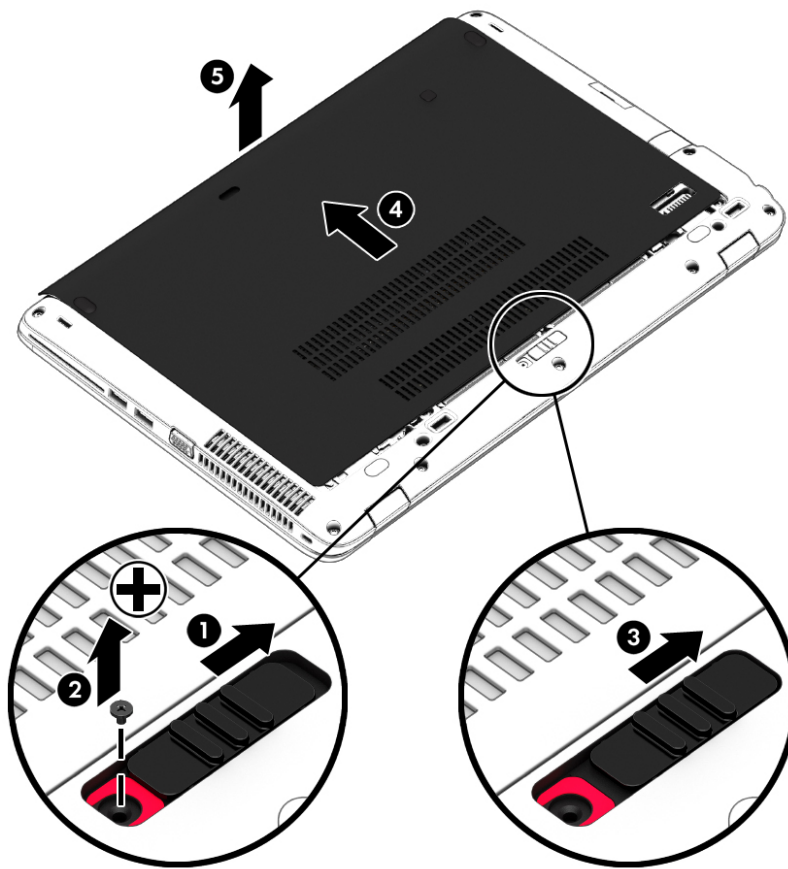
Remove the service door to access the battery, memory module slot, hard drive, and other components.

1. With the battery bay toward you, slide the service door release latch **(1)** to the left, remove the screw (if the optional screw is being used) **(2)**, and then slide the release latch again **(3)** to release the service door.



NOTE: If you do not want to use the optional screw, you can store it inside the service door.

2. Slide the service door towards the front of the computer **(4)** and lift **(5)** to remove the service door.




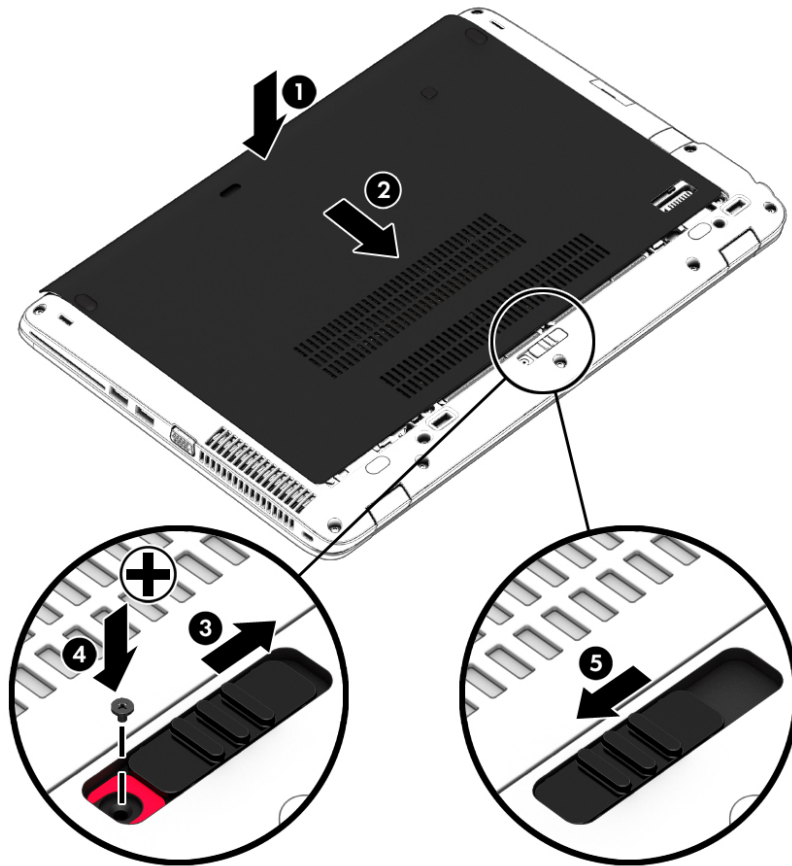
Replacing the service door

Replace the service door after accessing the battery, memory module slot, hard drive, regulatory label, and other components.


1. Tilt down the service door to align the front edge of the service door near the front edge of the computer **(1)**.
2. Insert the alignment tabs **(2)** on the rear edge of the service door with the notches on the computer.
3. Slide the service door towards the battery bay until the service door snaps into place.

4. With the battery bay toward you, slide the service door release latch to the left **(3)**, and if you choose to, insert and tighten the optional screw **(4)** to hold the service door in place. Slide the release latch to the right to lock the service door **(5)**.

 **NOTE:** If you do not want to use the optional screw, you can store it inside the service door.



Replacing or upgrading the 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.

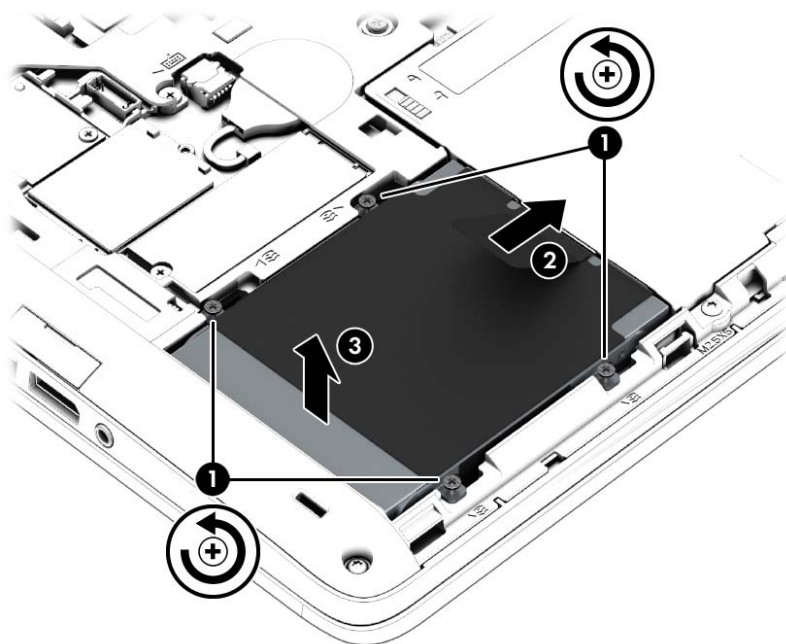
If you are not sure whether the computer is off, turn the computer on by pressing the power button. Then shut down the computer through the operating system.

Removing the hard drive


To remove a hard drive:

1. Save your work and shut down the computer.
2. Disconnect AC power and external devices connected to the computer.
3. Turn the computer upside down on a flat surface.
4. Remove the service door (see [Removing the service door on page 41](#)).

5. Remove the battery (see [Removing a battery on page 34](#)).
6. Loosen the 4 hard drive screws (1). Slide the hard drive (2) forward, and then remove the drive (3).

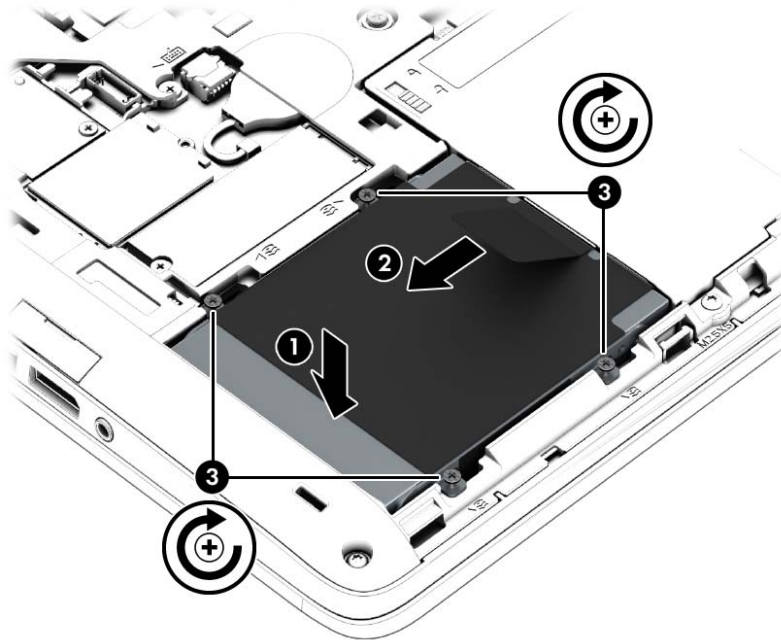


Installing a hard drive

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

To install the hard drive:

1. Insert the hard drive into the hard drive bay at an angle (1), and then lay the hard drive flat in the hard drive bay (2).
2. Pull the plastic tab (3) towards the center of the computer to engage the hard drive with the connector.
3. Tighten the hard drive screws (4).




4. Insert the battery (see [Inserting a battery on page 33](#)).
5. Replace the service door (see [Replacing the service door on page 41](#)).
6. Connect AC power and external devices to the computer.
7. Turn on the computer.


Using HP 3D DriveGuard

HP 3D DriveGuard protects a hard drive by parking the drive and halting data 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:** Because solid-state drives (SSDs) lack moving parts, HP 3D DriveGuard is unnecessary.

 **NOTE:** A hard drive in a primary hard drive bay or in a secondary hard drive bay is protected by HP 3D DriveGuard. A hard drive installed in an optional docking device or connected to a USB port is not protected by HP 3D DriveGuard.

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

Identifying HP 3D DriveGuard status

The hard drive light on the computer changes color to show that a drive in the primary hard drive bay and/or the drive in a secondary hard drive bay (select models only) is parked. To determine whether a drive is currently protected or whether it is parked, view the icon on the desktop in the notification area, at the far right of the taskbar.


8 External cards and devices

Using memory card readers

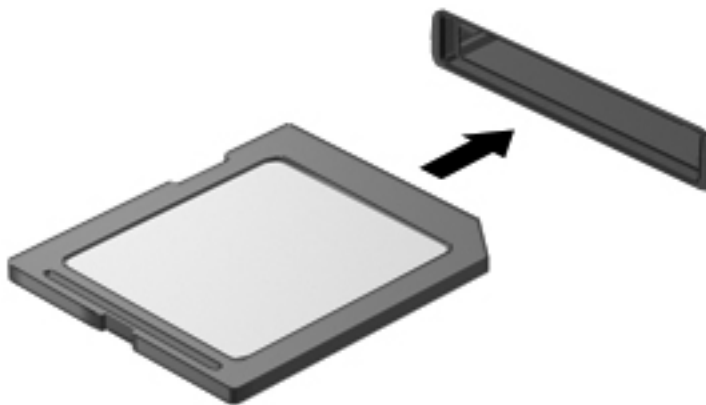
Optional memory cards provide secure data storage and convenient data sharing. These cards are often used with digital media–equipped cameras and PDAs as well as with other computers.

To determine which memory card formats that are supported on your computer, see [Getting to know your computer on page 3](#).


Inserting a memory card

 **CAUTION:** To reduce the risk of damage to the memory card connectors, use minimal force to insert a memory card.

1. Hold the card label-side up, with the connectors facing the computer.
2. Insert the card into the memory card reader, and then press in on the card until it is firmly seated.




Removing a memory card

 **CAUTION:** To reduce the risk of loss of data or an unresponsive system, use the following procedure to safely remove the memory card.

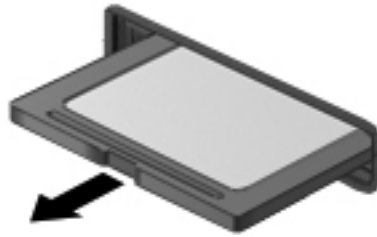
Save your information and close all programs associated with the memory card.

To remove a memory card:


1. Open File Browser by selecting **Computer > Nautilus**.
2. In the **Places** list in the left pane of File Browser, click the **Eject** icon next to the name of the memory card.

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

3. Pull the card out of the slot.



Using smart cards (select models only)

 **NOTE:** The term *smart card* is used throughout this chapter to see both smart cards and Java™ cards.

A smart card is a credit card-sized accessory that carries a microchip containing memory and a microprocessor. Like personal computers, smart cards have an operating system to manage input and output, and they include security features to protect against tampering.

Industry-standard smart cards are used with the smart card reader.

A PIN is needed to gain access to the contents of the microchip. For more information about smart card security features, see Help and Support.

Inserting a smart card

1. Hold the card label-side up, and gently slide the card into the smart card reader until the card is seated.
2. Follow the on-screen instructions for logging on to the computer using the smart card PIN.

Removing a smart card

- ▲ Grasp the edge of the smart card, and then pull it out of the smart card reader.


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, see the manufacturer's instructions.

The computer has at least 1 USB port that supports USB 1.0, 1.1, 2.0, or 3.0 devices. Your computer may also have a USB charging port that provides power to an external device. An optional docking device or 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.


 **NOTE:** The USB port on your computer may look slightly different from the illustration in this section.

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



 **NOTE:** When you connect a USB storage device, you may see a message in the notification area to let you know that the device is recognized by the system.

Removing a USB device


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

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


To remove a USB device:

1. Open File Browser by selecting **Computer > Nautilus**.
2. In the **Places** list in the left pane of File Browser, click the **Eject** icon next to the name of the device.
3. Remove the device.

Using optional external devices

 **NOTE:** For more information about required software and drivers, or to learn which computer port to use, see 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 optional external drives

Removable external drives expand your options for storing and accessing information. A USB drive can be added by connecting the drive to a USB port on the computer.


 **NOTE:** HP external USB optical drives should be connected to the powered USB port on the computer.


USB drives include the following types:


- 1.44-megabyte diskette drive
- External hard drive (a hard drive with an adapter attached)
- External optical drive (CD and DVD)
- MultiBay device

9 Memory modules


The computer has one memory module compartment. The capacity of the computer can be upgraded by adding a memory module to the vacant expansion memory module slot or by upgrading the existing memory module in the primary 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, ensure that you are discharged of static electricity by touching a grounded metal object.

 **NOTE:** To use a dual-channel configuration when adding a second memory module, be sure that both memory modules are identical.

To replace a memory module:


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

Shut down the computer before adding or replacing memory modules. Do not remove a memory module while the computer is on, in the Suspend state, or in Hibernation.

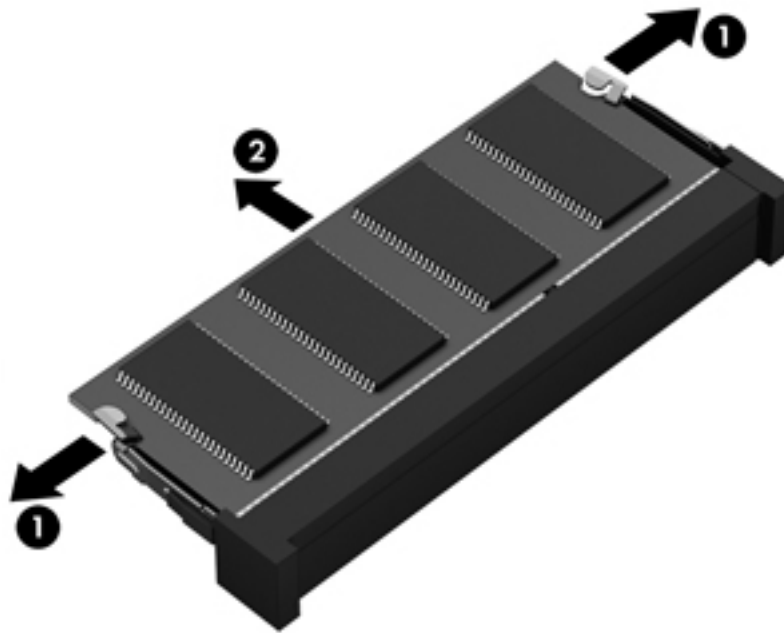
If you are not sure whether the computer is off or in Hibernation, turn the computer on by pressing the power button. Then shut down the computer through the operating system.

1. Save your work and shut down the computer.
2. Disconnect AC power and external devices connected to the computer.
3. Turn the computer upside down on a flat surface.
4. Remove the service door (see [Removing the service door on page 41](#)).
5. Remove the battery (see [Removing a battery on page 34](#)).
6. If you are replacing a memory module, 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, and do not bend the memory module.

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



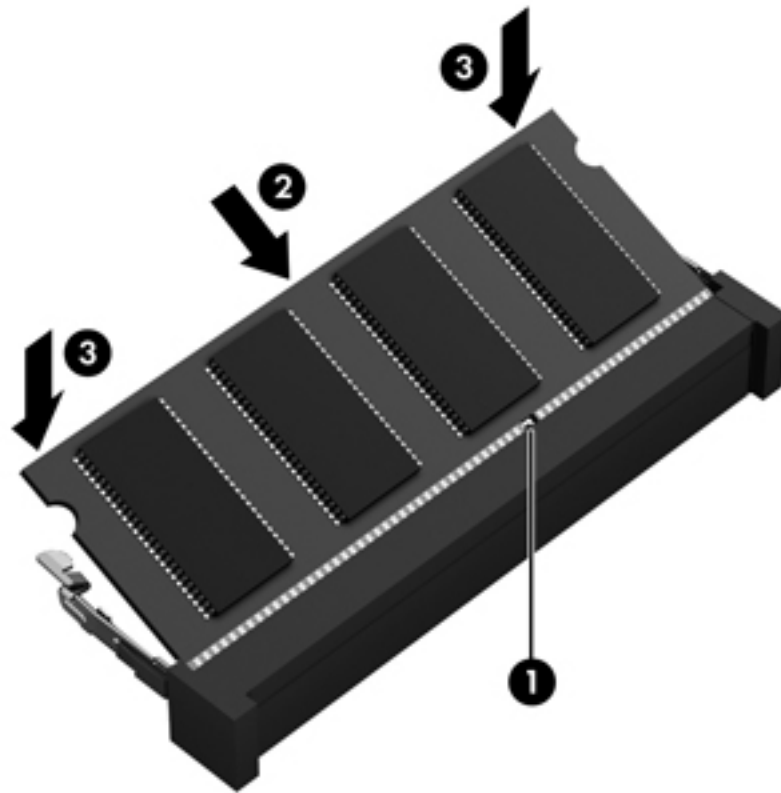
To protect a memory module after removal, place it in an electrostatic-safe container.

7. 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, and do not bend 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.

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



8. Replace the battery (see [Inserting a battery on page 33.](#))
9. Replace the service door (see [Replacing the service door on page 41.](#))
10. Turn the computer right-side up, and then reconnect AC power and external devices to the computer.
11. Turn on the computer.

10 Security

Protecting the computer



NOTE: Security solutions are designed to act as deterrents, but they may not deter software attacks or prevent the computer from being mishandled or stolen.

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 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 Computer Setup.

To protect against	Use this security feature
Unauthorized use of the computer	Authentication using passwords
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• Operating system 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 utility accessed by pressing **f10** when the computer is turned on or restarted. When using Computer Setup, you must use the keys on your computer to navigate and make selections.

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 the Computer Setup utility that is preinstalled on the computer.

- Setup and DriveLock passwords are set in Computer Setup and are managed by the system BIOS.
- If you forget both the DriveLock user password and the DriveLock master password set in Computer Setup, the hard drive that is protected by the passwords is permanently locked and can no longer be used.

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.

The following tables list commonly used passwords and describe their functions.

Setting passwords in the operating system

Operating system passwords	Function
Root password	Protects access to an operating system root-level account.
User password	Protects access to an operating system user account.

Setting passwords in Computer Setup

Computer Setup passwords	Function
BIOS administrator password*	Protects access to Computer Setup.
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.
TPM embedded security password (select models only)	<p>When enabled as a BIOS administrator password, protects access to the computer contents when the computer turns on, restarts, or exits Hibernation.</p> <p>This password requires the optional embedded security chip to support this security feature.</p>
*For details about each of these passwords, see the following topics.	

Managing a BIOS administrator password

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


1. Open Computer Setup by turning on or restarting the computer. While the “Press the ESC key for Startup Menu” message is displayed in the lower-left corner of the screen, press **esc**. When the Startup Menu is displayed, press **f10**.
2. Use a pointing device or the arrow keys to select **Security > Setup BIOS Administrator password**, and then press **enter**.
 - To set a BIOS administrator password, type your password in the **Enter New Password** and **Confirm New Password** fields, and then press **enter**.
 - To change a BIOS administrator password, type your current password in the **Enter Current Password** field, type a new password in the **Enter New Password** and **Confirm New Password** fields, and then press **enter**.
 - To delete a BIOS administrator password, type your current password in the **Enter Password** field, and then press **enter** 4 times.
3. To save your changes and exit Computer Setup, use the arrow keys to select **Exit > Exit Saving Changes**.

Your changes take effect when the computer restarts.

Entering a BIOS administrator password

At the **Enter password** prompt, type your administrator password, and then press **enter**. After 3 unsuccessful attempts to enter the administrator password, you must restart the computer and try again.

Using a Computer Setup DriveLock password

 **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 or an advanced port replicator 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.

Managing a DriveLock password

To set, change, or delete a DriveLock password in Computer Setup, follow these steps:

1. Turn on 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 Computer Setup.
3. Use a pointing device or the arrow keys to select **Security > DriveLock Password**, and then press follow the on-screen instructions.
4. To confirm DriveLock protection on the drive you have selected, type `DriveLock` in the confirmation field, and then press **enter**.



NOTE: The DriveLock confirmation is case sensitive.

Your changes 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.

Using Computer Setup Automatic DriveLock

In a multiple-user environment, you can set an Automatic DriveLock password. When the Automatic DriveLock password is enabled, a random user password and a DriveLock master password will be created for you. When any user passes the password credential, the same random user and DriveLock master password will be used to unlock the drive.



NOTE: You must have a BIOS administrator password before you can access the Automatic DriveLock features.

Managing an Automatic DriveLock password

To enable or disable an Automatic DriveLock password 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.
2. Press **f10** to enter Computer Setup.
3. Use a pointing device or the arrow keys to select **Security > Automatic DriveLock**, and then follow the on-screen instructions.

Using firewall software


Firewalls are designed to prevent unauthorized access to a system or network. A firewall can be a software program you install on your computer and/or network, or it can be a solution made up of both hardware and software.

There are two types of firewalls to consider:


- Host-based firewalls—Software that protects only the computer it is installed on.
- Network-based firewalls—Network-based firewalls are installed between the computers on the network and the connection to the Internet. Network-based firewalls can be dedicated devices or devices such as routers or switches with firewall capability.

When a firewall is installed on a system, all data sent to and from the system is monitored and compared with a set of user-defined security criteria. Any data that does not meet those criteria is blocked.


Your computer or networking equipment may already have a firewall installed. If not, firewall software solutions are available.

 **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 resolve 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.


1. To view or modify the firewall settings, select **Computer > YaST**.


 **NOTE:** When accessing YaST, you are prompted for the root password.

2. In the left pane, click **Security and Users**, and then click **Firewall** in the right pane.

 **NOTE:** When modifying firewall settings, you are prompted for the root password.

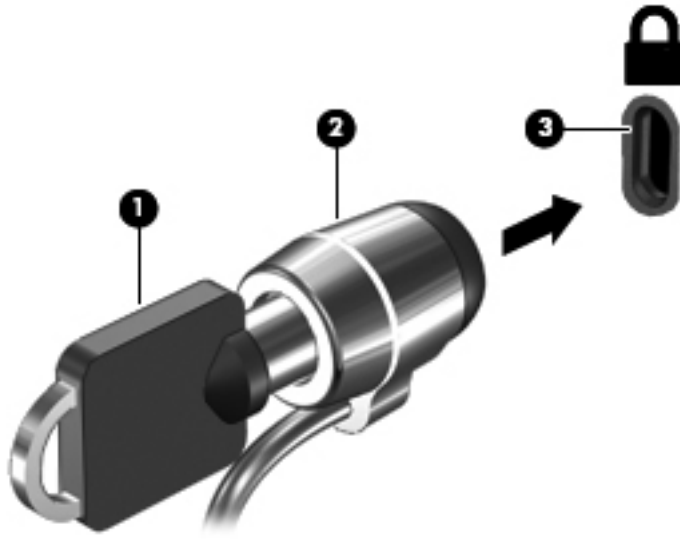
Installing an optional security cable

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

 **NOTE:** The security cable slot on your computer may look different from the illustration in this section. See [Getting to know your computer on page 3](#) for the location of the security cable slot on your computer.

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.



4. Remove the key and keep it in a safe place.


Using the fingerprint reader (select models only)

An integrated fingerprint reader is available on select computer models. In order to use the fingerprint reader, you must set up a user account with a password on the computer. This account allows you to log on to your computer with a swipe of a designated finger.

Enabling fingerprint authentication during logon

To enable fingerprint authentication during logon:

1. Select **Computer > YaST**.
2. Enter your root password, and then click **Continue**.
3. In the left pane, click **Hardware**, and then click **Fingerprint Reader** in the right pane.
4. Select the **Use Fingerprint Reader** option.

 **NOTE:** To enroll your fingerprint, you must open the user management utility. You can start this utility from the account setup dialog box by selecting the check box next to **Start user management after finish**.

Enrolling your fingerprint

If you did not enroll your fingerprint when you set up your fingerprint user account, you can open the user management utility to modify your fingerprint settings. To open the user management utility and enroll your fingerprint:

1. Select **Computer > YaST**.
2. Enter your root password, and then click **Continue**.
3. In the left pane, click **Security and Users**, and then click **User and Group Management** in the right pane.

4. Select the account that you want to modify, and then click **Edit**.
5. Click the **Plug-Ins** tab, click **Set the user's fingerprint**, and then click **Launch**.
6. Follow the on-screen instructions to enroll your fingerprint.



NOTE: After your fingerprint is enrolled, you can swipe your finger on the fingerprint reader when you turn on the computer, unlock the computer, or resume from the Suspend or Hibernation state, instead of typing a password.

11 Backup and Recovery

Recovery after a system failure is as good as your most recent backup. 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.

Your computer includes tools provided by HP to help you safeguard your information and retrieve it if ever needed.

Creating backups

1. Create restore media immediately after you set up the computer. For more information, see [Performing a system recovery on page 61](#).
2. As you add files, routinely create a backup of your system and personal information.

Backing up your information

You should back up your computer files on a regular schedule to maintain a current backup. You can manually back up your information to an optional external drive, a network drive, or discs. Back up your system at the following times:

- At regularly scheduled times
- Before the computer is repaired or restored
- Before you add or modify hardware or software

To back up your home directory files using **Backup Manager Settings**:

1. Select **Computer > More Applications > Tools > Backup Manager Settings**, and click **Backup my home directory**.
2. Click **Storage Destination Location**, and then select a location to back up your information.
3. Click **Schedule**, and then select a time schedule to perform backups at a regularly scheduled time.

To immediately back up your information, click the **Backup Now** check box.




NOTE: Before you back up your information, be sure you have designated a location to save the backup files.

4. Click **Save and Backup** to start the backup and to save the backup settings.

To restore backup files:

1. Select **Computer > More Applications > Tools > Backup Manager Restore**.
2. Click **Backup Source**, and then select the location of the backup files.
3. Click **Restore Destination**, and then select the destination to restore the files.
4. To restore all files from the selected location, click **Restore all files**. To restore select files only, click **Restore selected files**, click **Select Files** and then select the files to be restored.


5. Under **Restore Point**, click the time and date of the backup.


 **NOTE:** If multiple backups have been performed, click **Use the latest version** to restore the latest version.

6. Click **Restore** to start restoring the files, or click **Cancel** to cancel the operation.


Performing a system recovery

Recovery allows you to repair or restore the computer to its original factory state. You can create an HP Factory Image, using an installed or an external DVD±RW optical drive.

 **NOTE:** Your computer may not come equipped with an internal optical drive. In order to create the HP Factory Image, you may need to plug in an external optical drive.

 **CAUTION:** Using Recovery 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 recovery tool reinstalls the original operating system and HP programs and drivers that were installed at the factory. Software, drivers, and updates not installed by HP must be manually reinstalled. Personal files must be restored from a backup.

To restore the computer using the HP Factory Image, you must first create the recovery ISO file and then burn it to an optical disc.

 **NOTE:** HP recommends that you create the HP Factory Image in the event of a system failure.


1. Select **Computer > More Applications**.
2. In the left pane, click **Tools**, and then click **Create HP Factory Image** in the right pane.
3. Enter the root password when prompted.
4. Right-click on the HP_Recovery.iso file and select **Open with Brasero**.
5. Insert a blank DVD disc and select **Burn**. This creates the HP Factory Image Restore DVD.

To restore the computer from the recovery disc, follow these steps:

1. If possible, back up all personal files.
2. Insert the HP Factory Image Restore DVD into the optical drive and restart the computer.
3. As the computer is restarting, press **f9** to open the Computer Setup boot option menu.
4. Select **Optical Disk Drive** from the Boot Options menu and press **enter**.
5. Press **enter** to select **Restore System from Media**.
6. At both of the System Recovery prompts, select **Yes**.

Remove everything and reinstall SLED

Sometimes you want to perform detailed reformatting of your computer, or you want to remove personal information before you give away or recycle your computer. The process described in this section provides a speedy, simple way to return the computer to its original state. This option removes all personal data, applications, and settings from your computer, and reinstalls the Linux operating system.

 **IMPORTANT:** This option does not provide backups of your information. Before using this option, back up any personal information you wish to retain.

You can initiate this option by using the **f11** key.

To use the **f11** key:

Press **f11** while the computer boots.


– or –

Press and hold **f11** as you press the power button.


Select **System Recovery** and follow the on-screen instructions.

12 Computer Setup (BIOS) and Advanced System Diagnostics

Computer Setup, or Basic Input/Output System (BIOS), controls communication between all the input and output devices on the system (such as disk drives, display, keyboard, mouse, and printer). Computer Setup includes settings for the types of peripherals installed, the startup sequence of the computer, and the amount of system and extended memory.

 **NOTE:** Use extreme care when making changes in Computer Setup. Errors can prevent the computer from operating properly.

Starting Computer Setup

 **NOTE:** An external keyboard or mouse connected to a USB port 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, 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 Computer Setup.

Using Computer Setup

Navigating and selecting in Computer Setup

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 Computer Setup.

To exit Computer Setup menus, choose one of the following methods:

- To exit Computer Setup menus 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 **Menu > Ignore Changes and Exit**, and then press **enter**.
- To save your changes and exit Computer Setup menus, click the **Save** 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 **Menu > Save Changes and Exit**, and then press **enter**.

Your changes go into effect when the computer restarts.

Restoring factory settings in Computer Setup

 **NOTE:** Restoring defaults will not change the hard drive mode.


To return all settings in Computer Setup to the values that were set at the factory, 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 Computer Setup.
3. Use a pointing device or the arrow keys to select **Menu > Restore Defaults**.
4. Follow the on-screen instructions.
5. To save your changes and exit, click the **Save** icon in the lower-left corner of the screen, and then follow the on-screen instructions.

– or –

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

Your changes go into effect when the computer restarts.

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

Updating the BIOS

Updated versions of the BIOS may be available on the HP Web site.

Most BIOS updates on the HP Web site are packaged in compressed files called *SoftPaqs*.

Some download packages contain a file named *Readme.txt*, which contains information regarding installing and troubleshooting the file.

Determining the BIOS version


To determine whether available BIOS updates contain later BIOS versions than those currently installed on the computer, you need to know the version of the system BIOS currently installed.

BIOS version information (also known as *ROM date* and *System BIOS*) can be displayed as follows:


1. Start Computer Setup.
2. Use a pointing device or the arrow keys to select **Menu > System Information**.
3. 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 **Menu > Ignore Changes and Exit**, and then press **enter**.

 **NOTE:** You can also determine the BIOS version by turning on or restarting the computer, pressing the **esc** key while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen, and then pressing the **f1** key. Follow the on-screen instructions to exit this screen.

Downloading a BIOS update


 **CAUTION:** To reduce the risk of 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 Suspend or Hibernation.

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

-
1. Open your web browser. For U.S. support, go to <http://www.hp.com/go/contactHP>. For worldwide support, go to http://welcome.hp.com/country/us/en/wwcontact_us.html.
 2. Follow the on-screen instructions to identify your computer and access the BIOS update you want to download.
 3. Click the option for software and driver downloads, type your computer model number in the product box, and then press **enter**. Follow the on-screen instructions to identify your computer and access the BIOS update you want to download.
 4. Click your specific product from the models listed.
 5. Click the appropriate operating system.
 6. Go to the BIOS section and download the BIOS software package.
 7. Follow the installation instructions as provided with the downloaded BIOS software package.

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

Using Advanced System Diagnostics

Advanced System Diagnostics allows you to run diagnostic tests to determine if the computer hardware is functioning properly. The following diagnostic tests are available in Advanced System Diagnostics:

- **Start-up test**—This test analyzes the main computer components that are required to start the computer.
- **Run-in test**—This test repeats the start-up test and checks for intermittent problems that the start-up test does not detect.
- **Hard disk test**—This test analyzes the physical condition of the hard drive, and then checks all data in every sector of the hard drive. If the test detects a damaged sector, it attempts to move the data to a good sector.
- **Memory test**—This test analyzes the physical condition of the memory modules. If it reports an error, replace the memory modules immediately.
- **Battery test**—This test analyzes the condition of the battery and calibrates the battery if necessary. If the battery fails the test, contact support to report the issue and purchase a replacement battery.
- **System Tune-Up**—This group of additional tests checks your computer to make sure that the main components are functioning correctly. System Tune-Up runs longer and more comprehensive tests on memory modules, hard drive SMART attributes, the hard drive surface, the battery (and battery calibration), video memory, and the WLAN module status.

You can view system information and error logs in the Advanced System Diagnostics window.

To start Advanced System Diagnostics:

1. Turn on or restart the computer. While the “Press the ESC key for Startup Menu” message is displayed in the lower-left corner of the screen, press **esc**. When the Startup Menu is displayed, press **f2**.
2. Click the diagnostic test you want to run, and then follow the on-screen instructions.



NOTE: If you need to stop a diagnostics test while it is running, press **esc**.

13 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 upgrade bay
- Optical drive
- Notebook hard drive
- USB diskette drive
- USB CD-ROM
- USB hard drive
- Notebook Ethernet
- Secure Digital (SD) Memory Card
- Docking station upgrade bay
- External SATA drive

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.

A Troubleshooting and support

The following sections are included in this appendix:

- [Troubleshooting](#)
- [Contacting customer support](#)
- [Labels](#)

Troubleshooting

The following sections describe several common issues and solutions.

The computer is unable to start up

If the computer does not turn on when you press the power button, the following suggestions may help you determine why the computer does not start up:

- If the computer is plugged into an AC outlet, plug another electrical device into the outlet to be sure that the outlet is providing adequate power.



NOTE: Use only the AC adapter provided with the computer or one approved by HP for this computer.

- If the computer is plugged into an external power source other than an AC outlet, plug the computer into an AC outlet using the AC adapter. Be sure that the power cord and AC adapter connections are secure.

The computer screen is blank

If the screen is blank but you have not turned off the computer, one or more of these settings may be the cause:


- The computer may be in the Suspend state or in Hibernation. To exit Suspend or Hibernation, briefly press the power button. Suspend and Hibernation are energy-saving features that turn off the display. Suspend and Hibernation can be initiated by the system while the computer is on but is not in use, or when the computer has reached a low battery level. To change these and other power settings, right-click the **Battery** icon in the notification area, at the far right of the taskbar, and then click **Preferences**.
- The computer may not be set to display the image on the computer screen. To transfer the image to the computer screen, press **fn+f4**. On most models, when an optional external display, such as a monitor, is connected to the computer, the image can be displayed on the computer screen or the external display, or on both devices simultaneously. When you press **fn+f4** repeatedly, the image alternates among the computer display, one or more external displays, and simultaneous display on all devices.

Software is functioning abnormally

If the software is unresponsive or responds abnormally, restart the computer by selecting **Computer > Shutdown > Restart**. If you cannot restart the computer using this procedure, refer to the next section, [The computer is on but not responding on page 69](#).

The computer is on but not responding

If the computer is turned on but is not responding to software or keyboard commands, try the following emergency shutdown procedures, in the sequence provided, until shutdown occurs:


 **CAUTION:** Emergency shutdown procedures result in the loss of unsaved information.


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

The computer is unusually warm

It is normal for the computer to feel warm to the touch while it is in use. But if the computer feels *unusually* warm, it may be overheating because a vent is blocked.

If you suspect that the computer is overheating, allow the computer to cool to room temperature. Be sure to keep all vents free from obstructions while you are using the computer.

 **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).

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

An external device is not working

Follow these suggestions if an external device does not function as expected:

- Turn on the device according to the manufacturer's instructions.
- Be sure that all device connections are secure.
- Be sure that the device is receiving electrical power.
- Be sure that the device, especially if it is older, is compatible with the operating system.
- Be sure that the correct drivers are installed and updated.

The wireless network connection is not working

If a wireless network connection is not working as expected, follow these suggestions:

- To enable or disable a wireless or wired network device, right-click the **Network Connection** icon in the notification area, at the far right of the taskbar. To enable devices, select the check box from the menu option. To disable the device, clear the check box.
- Be sure that the wireless device is turned on.
- Be sure that the computer wireless antennas are free from obstructions.
- Be sure that the cable or DSL modem and its power cord are properly connected and that the lights are on.

- Be sure that the wireless router or access point is properly connected to its power adapter and to the cable or DSL modem, and that the lights are on.
- Disconnect and then reconnect all cables, and turn the power off and then back on.

A disc does not play

- Save your work and close all open programs before playing a CD or a DVD.
- Log off the Internet before playing a CD or a DVD.
- Be sure that you insert the disc properly.
- Be sure that the disc is clean. If necessary, clean the disc with filtered water and a lint-free cloth. Wipe from the center of the disc to the outer edge.
- Check the disc for scratches. If you find scratches, treat the disc with an optical disc repair kit available at many electronics stores.
- Disable Suspend mode before playing the disc.

Do not initiate Hibernation or Suspend while playing a disc. Otherwise, you may see a warning message asking if you want to continue. If this message is displayed, click **No**. After you click No, the computer may behave in either of the following ways:

- Playback may resume.

– or –

- The playback window in the multimedia program may close. To return to playing the disc, click the **Play** button in your multimedia program to restart the disc. In rare cases, you may need to exit the program and then restart it.

A movie is not visible on an external display

1. If both the computer display and an external display are turned on, press **fn+f4** one or more times to switch between the 2 displays.
2. Configure the monitor settings to make the external display primary:
 - a. Right-click on a blank area of the computer desktop, and select **Screen resolution**.
 - b. Specify a primary display and a secondary display.



NOTE: When using both displays, the DVD image will not appear on any display designated as the secondary display.

Contacting customer support

If the information provided in this guide does not address your questions, you can contact HP Customer Support at:

<http://www.hp.com/go/contactHP>



NOTE: For worldwide support, click **Contact HP worldwide** on the left side of the page, or go to http://welcome.hp.com/country/us/en/wwcontact_us.html.

Here you can:

- Chat online with an HP technician.



NOTE: When technical support chat is not available in a particular language, it is available in English.

- E-mail HP Customer Support.
- Find HP Customer Support worldwide telephone numbers.
- Locate an HP service center.

Labels

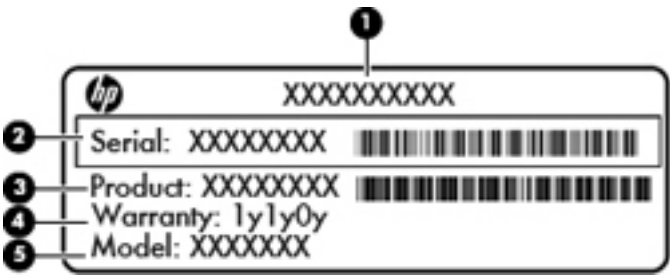
The labels affixed to the computer provide information you may need when you troubleshoot system problems or travel internationally with the computer:

IMPORTANT: All labels described in this section will be located in one of 3 places depending on your computer model: Affixed to the bottom of the computer, located in the battery bay, or under the service door.

For help finding these locations, see the descriptions in the section [Bottom on page 12](#).

- Service label—Provides important information to identify your computer. When contacting support, you will probably be asked for the serial number, and possibly for the product number or the model number. Locate these numbers before you contact support.

NOTE: Your service labels will resemble one of the examples shown below. Refer to the illustration that most closely matches the service label on your computer.



Component	
(1)	Product name
(2)	Serial number
(3)	Product number
(4)	Warranty period
(5)	Model description (select models only)



Component	
(1)	Warranty period
(2)	Model number

Component	
(3)	Serial number
(4)	Product number

- Regulatory label(s)—Provide(s) regulatory information about the computer.
- Wireless certification label(s)—Provide(s) 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.


B Cleaning your computer

- [Cleaning products](#)
- [Cleaning procedures](#)

Cleaning products

Use the following products to safely clean and disinfect your computer:

- Dimethyl benzyl ammonium chloride 0.3 percent maximum concentration (For example: germicidal disposable wipes. These wipes come in a variety of brand names.)
- Alcohol-free glass cleaning fluid
- Water with mild soap solution
- Dry microfiber cleaning cloth or a chamois (static-free cloth without oil)
- Static-free cloth wipes


 **CAUTION:** Avoid the following cleaning products:

Strong solvents, such as alcohol, acetone, ammonium chloride, methylene chloride, and hydrocarbons, which can permanently damage the surface of the compute.

Fibrous materials, such as paper towels, which can scratch the computer. Over time, dirt particles and cleaning agents can get trapped in the scratches.

Cleaning procedures


Follow the procedures in this section to safely clean your computer or tablet PC.

 **WARNING!** To prevent electric shock or damage to components, do not attempt to clean your computer or tablet PC while it is turned on:

Turn off the computer or tablet PC.

Disconnect external power.

Disconnect all powered external devices.

 **CAUTION:** Do not spray cleaning agents or liquids directly on any computer or tablet PC surface. Liquids dripped on the surface can permanently damage internal components.

Cleaning the display

Gently wipe the display using a soft, lint-free cloth moistened with an *alcohol-free* glass cleaner. Be sure that the display is dry before closing the display.

Cleaning the sides and cover

To clean and disinfect the sides and cover, use a soft microfiber cloth or chamois moistened with one of the cleaning solutions listed previously or use an acceptable germicidal disposable wipe.



NOTE: When cleaning the cover of the computer, use a circular motion to aid in removing dirt and debris.

Cleaning the TouchPad and keyboard



CAUTION: When cleaning the TouchPad and keyboard, do not let liquids drip between the keys. This can permanently damage internal components.

- To clean and disinfect the TouchPad and keyboard, use a soft microfiber cloth or chamois moistened with one of the cleaning solutions listed previously or use an acceptable germicidal disposable wipe.
- To prevent keys from sticking and to remove dust, lint, and particles from the keyboard, use a can of compressed air with a straw extension.



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.

Cleaning a tablet PC pen and pen holder (select models only)

Using one of the cleaning solutions listed previously, moisten a soft microfiber cloth or chamois or use an acceptable germicidal disposable wipe:

- To clean the pen, rub the pen in an up and down motion to aid in removing dirt and debris.
- To clean the pen holder, use a rotating motion around the opening of the pen holder.



CAUTION: Do not put any fluid or material other than the pen in the pen holder. The pen holder is not sealed off from some of the internal electronics of the tablet PC.

C Specifications

The following sections are included in this appendix:

- [Input power](#)
- [Operating environment](#)


Input power


The power information in this section may be helpful if you plan to travel internationally with the computer.

The computer operates on DC power, which can be supplied by an AC or a DC power source. The AC power source must be rated at 100–240 V, 50–60 Hz. Although the computer can be powered from a standalone DC power source, it should be powered only with an AC adapter or a DC power source supplied and approved by HP for use with this computer.

The computer can operate on DC power within the following specifications.

Input Power	Rating
Operating voltage and current	19.5V dc @ 2.31 A — 45 W
	19.5V dc @ 3.33 A — 65 W

 **NOTE:** This product is designed for IT power systems in Norway with phase-to-phase voltage not exceeding 265 V rms.

 **NOTE:** The computer operating voltage and current can be found on the system regulatory label inside the battery bay.

Operating environment

Factor	Metric	U.S.
Temperature		
Operating	5°C to 35°C	41°F to 95°F
Nonoperating	-20°C to 60°C	-4°F to 140°F
Relative humidity (noncondensing)		
Operating	10% to 90%	10% to 90%
Nonoperating	5% to 95%	5% to 95%
Maximum altitude (unpressurized)		
Operating	-15 m to 3,048 m	-50 ft to 10,000 ft
Nonoperating	-15 m to 12,192 m	-50 ft to 40,000 ft

D Electrostatic discharge

Electrostatic discharge is the release of static electricity when two objects come into contact—for example, the shock you receive when you walk across the carpet and touch a metal door knob.

A discharge of static electricity from fingers or other electrostatic conductors may damage electronic components. To prevent damage to the computer, damage to a drive, or loss of information, observe these precautions:

- If removal or installation instructions direct you to unplug the computer, unplug it after being properly grounded and before removing a cover.
- Keep components in their electrostatic-safe containers until you are ready to install them.
- Avoid touching pins, leads, and circuitry. Handle electronic components as little as possible.
- Use nonmagnetic tools.
- Before handling components, discharge static electricity by touching an unpainted metal surface of the component.
- If you remove a component, place it in an electrostatic-safe container.

If you need more information about static electricity or assistance with component removal or installation, contact Customer Support.

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