



HP Spectre 13 Pro Ultrabook and HP Spectre 13 Ultrabook

Maintenance and Service Guide

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Safety warning notice

⚠ WARNING! To reduce the possibility of heat-related injuries or of overheating the device, do not place the device directly on your lap or obstruct the device air vents. Use the device 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 device 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 Product description

Category	Description
Product Name	HP Spectre 13 Pro Ultrabook HP Spectre 13 Ultrabook
Processors	Intel Quad Core i7-4500U 1.80-GHz processor (turbo up to 3.00-GHz; 1600-MHz FSB, 4.0-MB cache, dual core, 15 W; configured with 8-GB RAM only) Intel® Quad Core® i5-4200U 1.60-GHz processor (turbo up to 2.60-GHz; 1600-MHz FSB, 3.0-MB cache, dual core. 15 W)
Chipset	Intel Lynx Point - LP PCH (Integrated in MCP)
Graphics	Intel HD Graphics 4400 Supports HD Decode, DX11, and HDMI
Panel	Flush glass design, touchscreen, multitouch enabled, 340 nits <ul style="list-style-type: none">(33.8-cm) 13.3-in display, WLED, full-high definition (FHD) (1920x1080), BrightView, 2.85-mm, UWVA (eDP 1.2) at 72% Color Gamut(33.8-cm) 13.3-in display, WLED, Quad High Definition (QHD) (2560x1440), BrightView, 2.55-mm, UWVA (eDP1.3+PSR) at 72% Color Gamut
Memory	No customer-accessible/upgradable memory module slots DDR3L-1600-MHz dual channel support Supports up to 8 GB of system RAM integrated into the system board in the following options: <ul style="list-style-type: none">8192-MB4096-MB
Solid-state drive	Single M.2 SSD Configuration as storage Supports the following SSDs: <ul style="list-style-type: none">512-GB256-GB128-GB

Category	Description
Audio and video	<p>Dual speakers</p> <p>Beats Audio</p> <p>Supports Microsoft Premium Requirements</p>
Webcam and Microphone	<p>HP TrueVision Full HD: Full HD camera - Fixed (no tilt) + activity LED, 1PC, USB 2.0, M-JPEG, 1920x1080 by 30 frames per second</p> <p>Dual array digital microphones with software; beam forming, echo cancellation, noise suppression; supports voice recognition</p>
Wireless	<p>Integrated Wireless options with dual antennas (NGFF/PCIe)</p> <p>Intel WiDi support</p> <p>Miracast support</p> <ul style="list-style-type: none"> • Intel Dual Band Wireless-AC 7260 802.11 AC 2x2 WiFi + BT 4.0 Combo Adapter (except Indonesia, Russia, and Ukraine) • Intel Wireless 7260BN 802.11 bgn 2x2 WiFi + BT 4.0 Combo Adapter (default for Indonesia, Russia, and Ukraine)
External expansion cards	<p>HP Multi-Format Digital Media Card Reader</p> <p>Supports SD/SDHC/SDXC</p> <p>Push-push insertion/removal</p>
Internal expansion cards	<p>One NGFF slot (2230) for WLAN</p> <p>One NGFF slot (2280) for SSD</p>
Ports	<p>Headphone output and microphone input combo jack (stereo)</p> <p>One mini Display Port supporting 2560x1600 max. 3200x2000 @ 60 Hz resolution</p> <p>Supports HP USB Boost (Sleep and Charge) on both ports</p> <p>AC Smart Pin adapter plug</p> <p>USB 3.0 ports (2)</p> <p>HDMI v1.4b supporting: up to 1920x1200 @ 60Hz</p>
Keyboard/pointing devices	<p>Full-size, backlit, island-style keyboard (Dura-coat, champagne gold color)</p> <p>Touchpad: default on, 2-finger scroll, pinch, rotate, 2-finger click, 3-finger flick</p> <ul style="list-style-type: none"> • ClickPad with imaging sensor • Multitouch gestures enabled • Supports Windows 8 modern trackpad gestures • Taps enabled as default

Category	Description
Power requirements	Supports 45W Smart Adapter (4.5mm barrel connector) 1.8 M length AC and DC power cords 4 cell battery, 51 WHr
Security	Intel AT-p Ready support Kensington Security Lock Trust Platform Module (TPM) support
Operating system	Windows 8.1
Serviceability	End user replaceable part: AC adapter

2 External component identification

Display



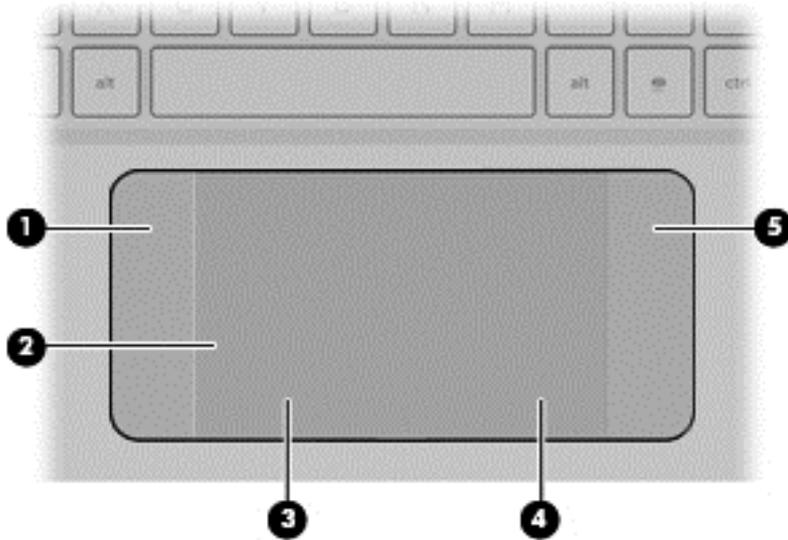
Component	Description
(1) Internal display switch	Turns off the display and initiates Sleep if the display is closed while the power is on. NOTE: The internal display switch is not visible from the outside of the computer.
(2) WLAN antennas (2)*	Send and receive wireless signals to communicate with wireless local area networks (WLANs).
(3) Internal microphones (2)	Record sound.
(4) Ambient light sensor	Automatically adjusts the display brightness based on the lighting conditions in your environment.

Component	Description
(5) Webcam	<p>Records video and captures photographs. Some models may allow you to video conference and chat online using streaming video.</p> <p>To use the webcam, from the Start screen, type <code>cyberlink</code>, and then select CyberLink YouCam from the list of applications.</p>
(6) Webcam light	On: The webcam is in use.

*The antennas are not visible from the outside of the computer. For optimal transmission, keep the areas immediately around the antennas free from obstructions. For wireless regulatory notices, see the section of the *Regulatory, Safety, and Environmental Notices* that applies to your country or region. To access this guide, from the Start screen, type `support`, and then select the **HP Support Assistant** app.

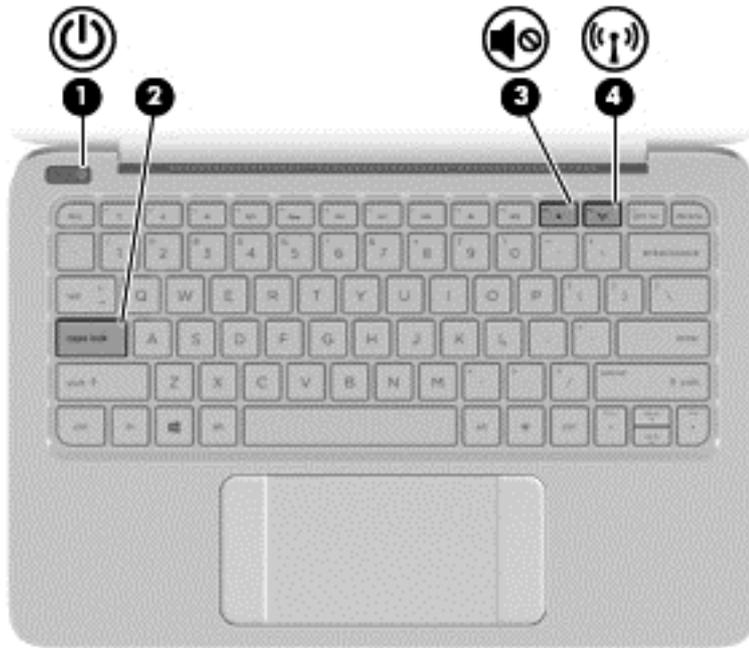
Top

TouchPad



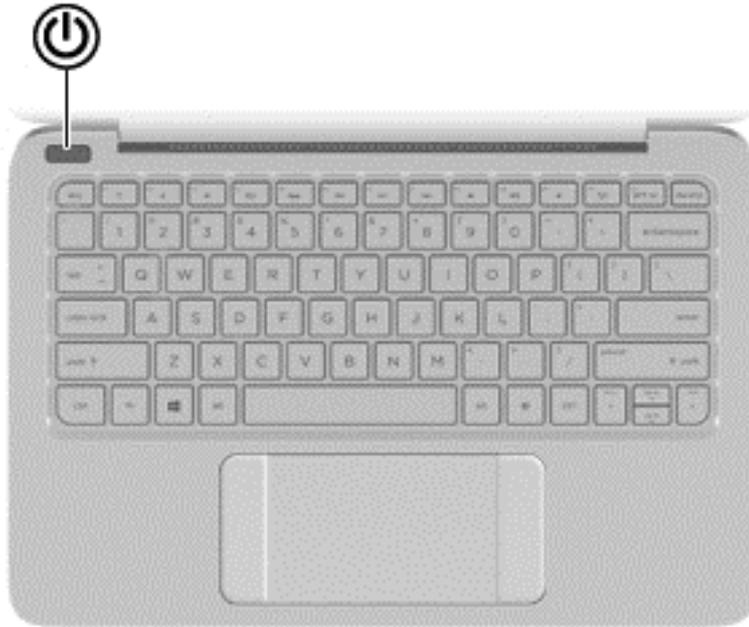
Component	Description
(1) Left control zone	Textured area that allows you to perform additional gestures.
(2) TouchPad zone	Moves the on-screen pointer and selects or activates items on the screen. NOTE: The TouchPad also supports edge-swipe gestures.
(3) Left TouchPad button	Functions like the left button on an external mouse.
(4) Right TouchPad button	Functions like the right button on an external mouse.
(5) Right control zone	Textured area that allows you to perform additional gestures.

Lights



Component	Description	
(1)  Power light	<ul style="list-style-type: none">• On: The computer is on.• Blinking: The computer is in the Sleep state, a power-saving state. The computer shuts off power to the display and other unneeded components.• Off: The computer is off or in Hibernation. Hibernation is a power-saving state that uses the least amount of power. <p>NOTE: For select models, the Intel® Rapid Start Technology feature is enabled at the factory. Rapid Start Technology allows your computer to resume quickly from inactivity.</p>	
(2) Caps lock light	On: Caps lock is on, switching the keys to all capital letters.	
(3)  Mute light	<ul style="list-style-type: none">• Amber: Computer sound is off.• Off: Computer sound is on.	
(4)  Wireless light	On: An integrated wireless device, such as a wireless local area network (WLAN) device and/or a Bluetooth® device, is on.	<p>NOTE: On some models, the wireless light is amber when all wireless devices are off.</p>

Buttons



Component	Description
-----------	-------------



Power button

- When the computer is off, press the button to turn on the computer.
- When the computer is on, press the button briefly to initiate Sleep.
- When the computer is in the Sleep state, press the button briefly to exit Sleep.
- When the computer is in Hibernation, press the button briefly to exit Hibernation.

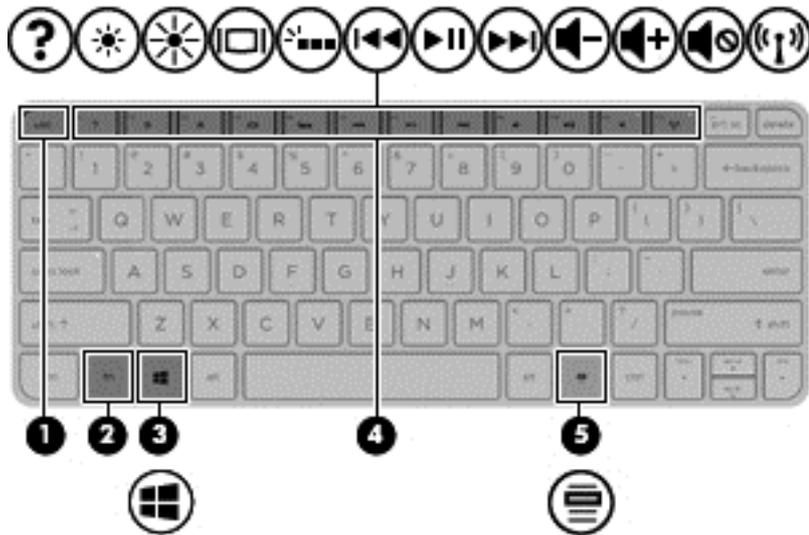
CAUTION: Pressing and holding down the power button results in the loss of unsaved information.

If the computer has stopped responding and Windows® shutdown procedures are ineffective, press and hold the power button down for at least 5 seconds to turn off the computer.

NOTE: For select models, the Intel® Rapid Start Technology feature is enabled at the factory. Rapid Start Technology allows your computer to resume quickly from inactivity.

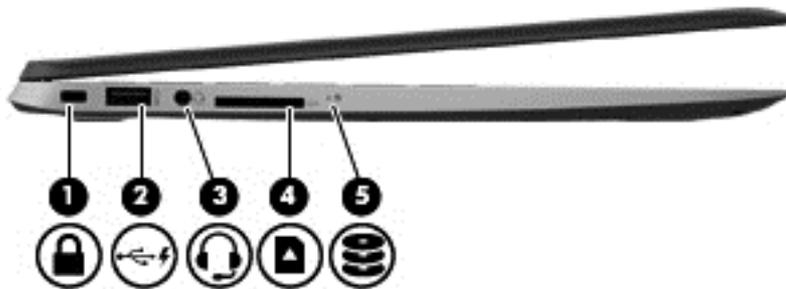
To learn more about your power settings, from the Start screen, type `power options`, select **Settings**, and then select **Power Options** from the list of applications.

Keys



Component	Description
(1) <code>esc</code> key	Reveals system information when pressed in combination with the <code>fn</code> key.
(2) <code>fn</code> key	Executes frequently used system functions when pressed in combination with the <code>esc</code> key.
(3)  Windows key	Returns you to the Start screen from any app or window. NOTE: Pressing the Windows key again will return you to the most recent app that you had open.
(4) Action keys	Execute frequently used system functions.
(5)  Windows applications key	Reveals options for a selected object.

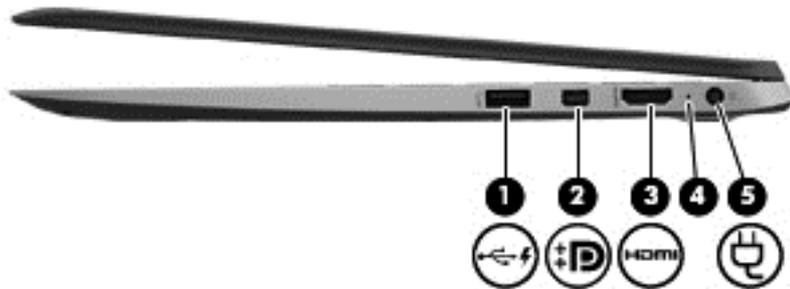
Left side



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)  USB 3.0 charging (powered) port	Connects an optional USB device. USB charging ports allow you to charge connected USB devices. Standard USB ports will not charge all USB devices or will charge using a low current. Some USB devices require power and require you to use a powered port. NOTE: USB charging ports can also charge select models of cell phones and MP3 players, even when the computer is off.
(3)  Audio-out (headphone)/Audio-in (microphone) combo jack	Connects optional powered stereo speakers, headphones, earbuds, a headset, or a television audio cable. Also connects an optional headset microphone. This jack does not support optional microphone-only devices. WARNING! To reduce the risk of personal injury, adjust the volume before putting on headphones, earbuds, or a headset. For additional safety information, refer to the <i>Regulatory, Safety, and Environmental Notices</i> . To access this guide, from the Start screen, type <code>support</code> , and then select the HP Support Assistant app. NOTE: When a device is connected to the jack, the computer speakers are disabled. NOTE: Be sure that the device cable has a 4-conductor connector that supports both audio-out (headphone) and audio-in (microphone).

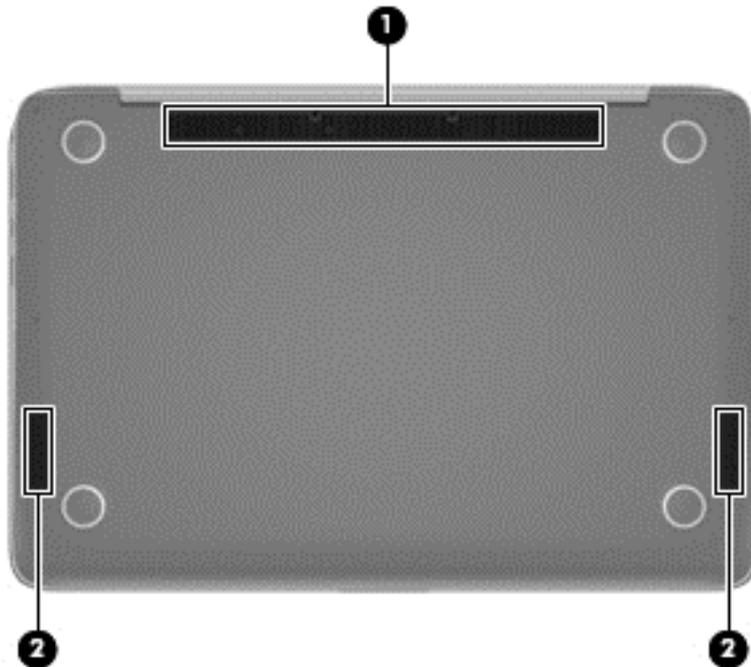
Component	Description
(4)  Memory card reader	Connects optional memory cards that store, manage, share, or access information. To insert, hold the card label side up with connectors facing the slot, and press in on the card until it is firmly seated. To remove, press in on the card and quickly release it. The card pops out.
(5)  Hard drive light	Blinking white: The hard drive is being accessed.

Right side



Component	Description
(1)  USB 3.0 port	Connects an optional USB device. USB charging ports allow you to charge connected USB devices. Standard USB ports will not charge all USB devices or will charge using a low current. Some USB devices require power and require you to use a powered port. NOTE: USB charging ports can also charge select models of cell phones and MP3 players, even when the computer is off.
(2)  Mini DisplayPort	Connects an optional digital display device, such as a high-performance monitor or projector.
(3)  HDMI port	Connects an optional video or audio device, such as a high-definition television, any compatible digital or audio component, or a high-speed HDMI device.
(4) AC adapter light	<ul style="list-style-type: none">• On: The AC adapter is connected and the battery is charged.• Off: The computer is using battery power.
(5)  Power connector	Connects an AC adapter.

Bottom



Component	Description
(1) 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.
(2) Speakers (2)	Produce sound.

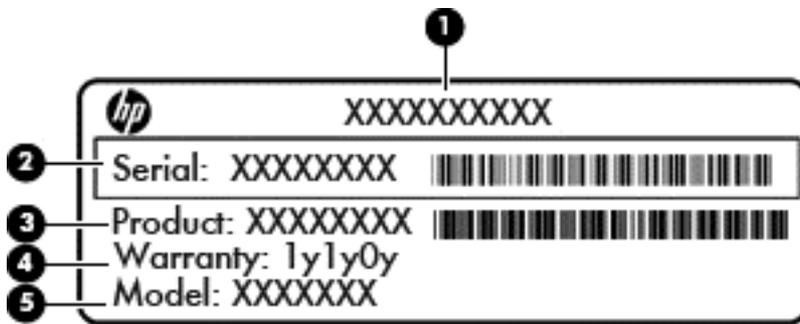
Labels

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.

- 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 number (select models only) |



Component

- | | |
|-----|-----------------|
| (1) | Serial number |
| (2) | Product number |
| (3) | Warranty period |

Component

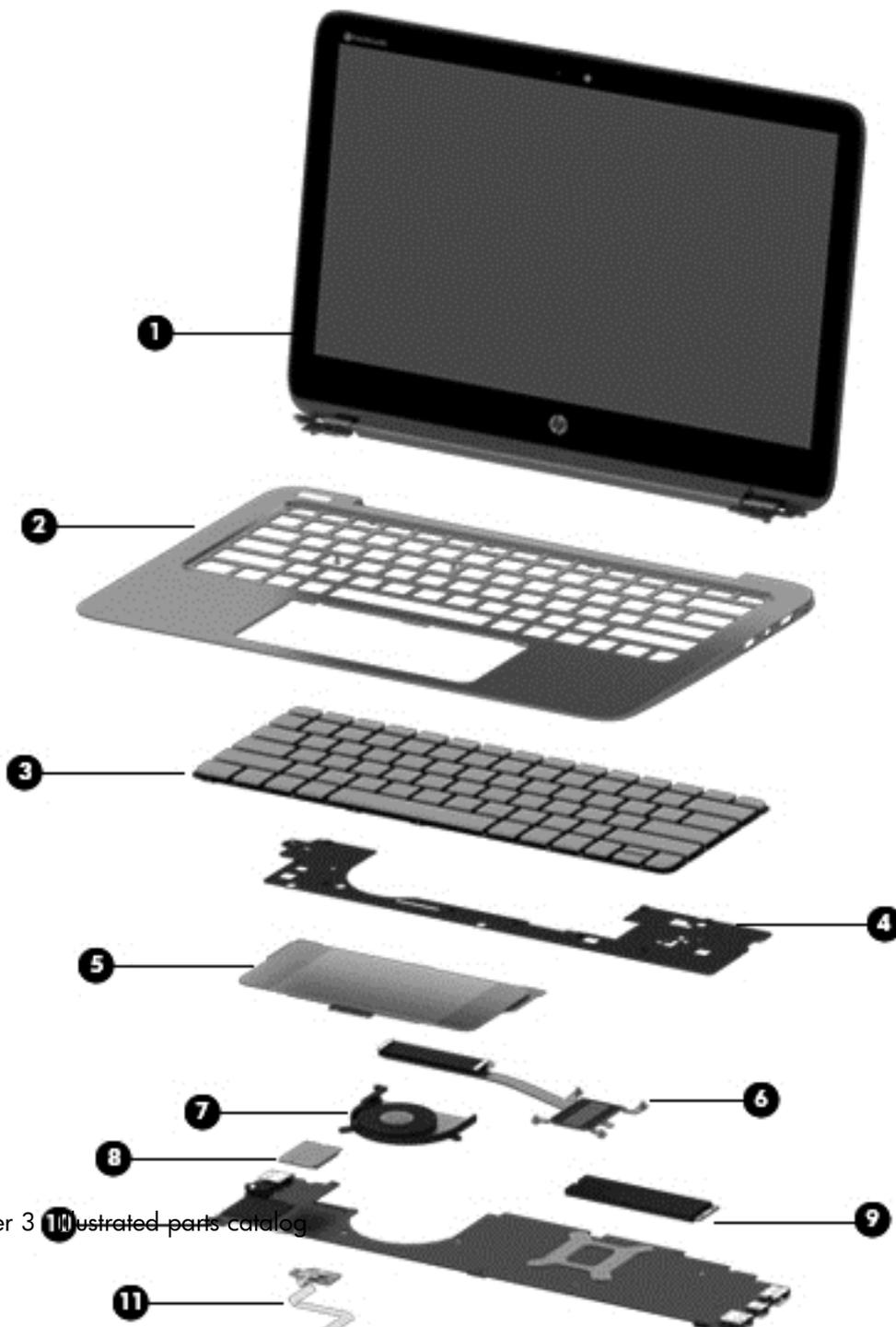
(4) Model number (select models only)

(5) Revision 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 for the countries or regions in which the devices have been approved for use.

3 Illustrated parts catalog

Computer major components



Item	Component	Spare part number
(1)	Display assembly	
	NOTE: The display assembly is spared as a whole unit only.	
	QHD	744368-001
	FHD	744369-001
(2)	Top cover (includes TouchPad):	
	For use in the United States	744381-001
	For use in the United Kingdom	744382-001
(3)	Keyboard (includes keyboard cable and screws)	743897-xx1
	NOTE: For a complete list of keyboards and associated country codes, see Sequential part number listing on page 20 .	
(4)	Keyboard backplate	744366-001
(5)	Touchpad	744361-001
(6)	Heat sink (includes replacement thermal grease)	744364-001
(7)	Fan (includes cable)	744363-001
(8)	WLAN module:	
	For use on all computer models:	
	Intel Dual Band Wireless-AC 7260 802.11 AC 2x2 WiFi + BT 4.0 Combo Adapter	710663-001
	Intel Wireless 7260BN 802.11 bgn 2x2 WiFi + BT 4.0 Combo Adapter	735532-001
	Intel Dual Band Wireless-N 7260AN 802.11a/b/g/n 2x2 WiFi + BT 4.0 Combo Adapter for use only on HP Spectre 13 Pro Ultrabook computer models	717381-005
(9)	Solid-state drive, mSATA:	
	512-MB	744380-001
	256-MB	744379-001
	128-MB	744378-001
(10)	System board (includes replacement thermal material):	
	Intel Core i7-4500U processor and 8-GB system memory for use in models with non-Windows 8 operating systems	743849-601
	Intel Core i7-4500U processor and 8-GB system memory for use in models with Windows 8 Standard operating systems	743849-501
	Intel Core i7-4500U processor and 8-GB system memory for use in models with Windows 8 Professional operating systems	743849-001
	Intel Core i5-4200U processor and 4-GB system memory for use in models with non-Windows 8 operating systems	743850-601
	Intel Core i5-4200U processor and 4-GB system memory for use in models with Windows 8 Standard operating systems	743850-501

Item	Component	Spare part number
	Intel Core i5-4200U processor and 4-GB system memory for use in models with Windows 8 Professional operating systems	743850-001
	Intel Core i5-4200U processor and 8-GB system memory for use in models with non-Windows 8 operating systems	743851-601
	Intel Core i5-4200U processor and 8-GB system memory for use in models with Windows 8 Standard operating systems	743851-501
	Intel Core i5-4200U processor and 8-GB system memory for use in models with Windows 8 Professional operating systems	743851-001
(11)	Power button board	744370-001
(12)	Power connector cable	744362-001
(13)	Speaker assembly (includes cable)	744377-001
(14)	Battery (4-cell, 51-Wh, 3.42-Ah)	734998-001
(15)	Bottom cover	744360-001

Rubber Kit



Item	Component	Spare part number
	Rubber Kit , includes: Bottom feet	744375-001

Mass storage devices

Description	Spare part number
Solid-state drive , mSATA	

Description	Spare part number
512-GB	744380-001
256-GB	744379-001
128-GB	744378-001

Miscellaneous parts

Component	Spare part number
HP Smart AC adapter (45-W)	744892-001
Adapters	
HDMI to VGA	701943-001
RJ-45 to USB	704927-001
Power cord (3-pin, black, 1.83-m):	
For use on all computer models:	
For use in Australia	490371-011
For use in Denmark	490371-081
For use in Europe	490371-021
For use in Israel	490371-BB1
For use in North America	490371-001
For use in South Korea	490371-AD1
For use in Switzerland	490371-111
For use in the United Kingdom and Singapore	490371-031
For use only on HP Spectre 13 Pro Ultrabook computer models:	
For use in India	490371-D61
For use in Japan	490371-291
For use in the People's Republic of China	490371-AA1
For use in Taiwan	490371-AB1
For use in Thailand	490371-201
Screw Kit	744376-001

Sequential part number listing

Spare part number	Description
490371-001	Power cord for use on all computer models in North America (3-pin, black, 1.83-m)
490371-011	Power cord for use on all computer models in Australia (3-pin, black, 1.83-m)
490371-021	Power cord for use on all computer models in Europe (3-pin, black, 1.83-m)
490371-031	Power cord for use on all computer models in the United Kingdom and Singapore (3-pin, black, 1.83-m)
490371-081	Power cord for use on all computer models in Denmark (3-pin, black, 1.83-m)
490371-111	Power cord for use on all computer models in Switzerland (3-pin, black, 1.83-m)
490371-201	Power cord for use only on HP Spectre 13 Pro Ultrabook computer models in Thailand (3-pin, black, 1.83-m)
490371-291	Power cord for use only on HP Spectre 13 Pro Ultrabook computer models in Japan (3-pin, black, 1.83-m)
490371-AA1	Power cord for use only on HP Spectre 13 Pro Ultrabook computer models in the People's Republic of China (3-pin, black, 1.83-m)
490371-AB1	Power cord for use only on HP Spectre 13 Pro Ultrabook computer models in Taiwan (3-pin, black, 1.83-m)
490371-AD1	Power cord for use on all computer models in South Korea (3-pin, black, 1.83-m)
490371-BB1	Power cord for use on all computer models in Israel (3-pin, black, 1.83-m)
490371-D61	Power cord for use only on HP Spectre 13 Pro Ultrabook computer models in India (3-pin, black, 1.83-m)
701943-001	HDMI to VGA Adapter
704927-001	RJ-45 to USB adapter
710663-001	Intel Dual Band Wireless-AC 7260 802.11 AC 2x2 WiFi + BT 4.0 Combo Adapter
717381-005	Intel Dual Band Wireless-N 7260AN 802.11a/b/g/n 2x2 WiFi + BT 4.0 Combo Adapter for use only on HP Spectre 13 Pro Ultrabook computer models
734998-001	4-cell, 51-Wh, 3.42-Ah, Li-ion battery
735532-001	Intel Wireless 7260BN 802.11 bgn 2x2 WiFi + BT 4.0 Combo Adapter
743849-001	System board with Intel Core i7-4500U processor and 8-GB system memory for use in models with non-Windows 8 operating systems
743849-501	System board with Intel Core i7-4500U processor and 8-GB system memory for use in models with Windows 8 Standard operating systems
743849-601	System board with Intel Core i7-4500U processor and 8-GB system memory for use in models with Windows 8 Professional operating systems
743850-001	System board with Intel Core i5-4200U processor and 4-GB system memory for use in models with non-Windows 8 operating systems
743850-501	System board with Intel Core i5-4200U processor and 4-GB system memory for use in models with Windows 8 Standard operating systems

Spare part number	Description
743850-601	System board with Intel Core i5-4200U processor and 4-GB system memory for use in models with Windows 8 Professional operating systems
743851-001	System board with Intel Core i5-4200U processor and 8-GB system memory for use in models with non-Windows 8 operating systems
743851-501	System board with Intel Core i5-4200U processor and 8-GB system memory for use in models with Windows 8 Standard operating systems
743851-601	System board with Intel Core i5-4200U processor and 8-GB system memory for use in models with Windows 8 Professional operating systems
743897-001	Keyboard for use in the United States (includes keyboard cable and screws)
743897-031	Keyboard for use in the United Kingdom and Singapore (includes keyboard cable and screws)
743897-041	Keyboard with for use in Germany (includes keyboard cable and screws)
743897-051	Keyboard for use in France (includes keyboard cable and screws)
743897-061	Keyboard for use in Italy (includes keyboard cable and screws)
743897-071	Keyboard for use in Spain (includes keyboard cable and screws)
743897-131	Keyboard for use in Portugal (includes keyboard cable and screws)
743897-141	Keyboard with for use in Turkey (includes keyboard cable and screws)
743897-151	Keyboard for use in Greece (includes keyboard cable and screws)
743897-161	Keyboard for use in Latin America (includes keyboard cable and screws)
743897-171	Keyboard for use in Saudi Arabia (includes keyboard cable and screws)
743897-251	Keyboard for use in Russia (includes keyboard cable and screws)
743897-A41	Keyboard for use in Belgium (includes keyboard cable and screws)
743897-AD1	Keyboard for use in South Korea (includes keyboard cable and screws)
743897-B31	Keyboard for use in the Netherlands (includes keyboard cable and screws)
743897-BB1	Keyboard for use in Israel (includes keyboard cable and screws)
743897-BG1	Keyboard for use in Switzerland (includes keyboard cable and screws)
743897-DB1	Keyboard for use in Canada (includes keyboard cable and screws)
743897-DH1	Keyboard for use in the Netherlands (includes keyboard cable and screws)
743897-FL1	Keyboard for use in the Czech Republic and Slovakia (includes keyboard cable and screws)
744360-001	Bottom cover
744361-001	Touchpad board
744362-001	Power connector cable
744363-001	Fan (includes cable)
744364-001	Heat sink (includes replacement thermal grease)
744366-001	Keyboard backplate

Spare part number	Description
744368-001	Display assembly, 33.8-cm (13.3-in), QHD, touchscreen
744369-001	Display assembly, 33.8-cm (13.3-in), FHD, touchscreen
744370-001	Power button board
744375-001	Rubber Kit (includes bottom feet)
744376-001	Screw Kit
744377-001	Speaker assembly (includes cable)
744378-001	128-GB mSATA solid-state drive
744379-001	256-GB mSATA solid-state drive
744380-001	512-GB mSATA solid-state drive
744381-001	Top cover for use in the United States
744382-001	Top cover for use in the United Kingdom
744892-001	45-W HP Smart AC adapter

4 Removal and replacement procedures

Preliminary replacement requirements

Tools required

You will need the following tools to complete the removal and replacement procedures:

- Flat-bladed screwdriver
- Magnetic screwdriver
- Phillips P0 and P1 screwdrivers

Service considerations

The following sections include some of the considerations that you must keep in mind during disassembly and assembly procedures.

 **NOTE:** As you remove each subassembly from the computer, place the subassembly (and all accompanying screws) away from the work area to prevent damage.

Plastic parts

 **CAUTION:** Using excessive force during disassembly and reassembly can damage plastic parts. Use care when handling the plastic parts. Apply pressure only at the points designated in the maintenance instructions.

Cables and connectors

 **CAUTION:** When servicing the computer, be sure that cables are placed in their proper locations during the reassembly process. Improper cable placement can damage the computer.

Cables must be handled with extreme care to avoid damage. Apply only the tension required to unseat or seat the cables during removal and insertion. Handle cables by the connector whenever possible. In all cases, avoid bending, twisting, or tearing cables. Be sure that cables are routed in such a way that they cannot be caught or snagged by parts being removed or replaced. Handle flex cables with extreme care; these cables tear easily.

Drive handling

⚠ CAUTION: Drives are fragile components that must be handled with care. To prevent damage to the computer, damage to a drive, or loss of information, observe these precautions:

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

Before handling a drive, be sure that you are discharged of static electricity. While handling a drive, avoid touching the connector.

Before removing a diskette drive or optical drive, be sure that a diskette or disc is not in the drive and be sure that the optical drive tray is closed.

Handle drives on surfaces covered with at least one inch of shock-proof foam.

Avoid dropping drives from any height onto any surface.

After removing a hard drive, an optical drive, or a diskette drive, place it in a static-proof bag.

Avoid exposing an internal hard drive to products that have magnetic fields, such as monitors or speakers.

Avoid exposing a drive to temperature extremes or liquids.

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

Grounding guidelines

Electrostatic discharge damage

Electronic components are sensitive to electrostatic discharge (ESD). Circuitry design and structure determine the degree of sensitivity. Networks built into many integrated circuits provide some protection, but in many cases, ESD contains enough power to alter device parameters or melt silicon junctions.

A discharge of static electricity from a finger or other conductor can destroy static-sensitive devices or microcircuitry. Even if the spark is neither felt nor heard, damage may have occurred.

An electronic device exposed to ESD may not be affected at all and can work perfectly throughout a normal cycle. Or the device may function normally for a while, then degrade in the internal layers, reducing its life expectancy.

⚠ CAUTION: To prevent damage to the computer when you are removing or installing internal components, observe these precautions:

Keep components in their electrostatic-safe containers until you are ready to install them.

Before touching an electronic component, discharge static electricity by using the guidelines described in this section.

Avoid touching pins, leads, and circuitry. Handle electronic components as little as possible.

If you remove a component, place it in an electrostatic-safe container.

The following table shows how humidity affects the electrostatic voltage levels generated by different activities.

⚠ CAUTION: A product can be degraded by as little as 700 V.

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

Packaging and transporting guidelines

Follow these grounding guidelines when packaging and transporting equipment:

- To avoid hand contact, transport products in static-safe tubes, bags, or boxes.
- Protect ESD-sensitive parts and assemblies with conductive or approved containers or packaging.
- Keep ESD-sensitive parts in their containers until the parts arrive at static-free workstations.
- Place items on a grounded surface before removing items from their containers.
- Always be properly grounded when touching a component or assembly.
- Store reusable ESD-sensitive parts from assemblies in protective packaging or nonconductive foam.
- Use transporters and conveyors made of antistatic belts and roller bushings. Be sure that mechanized equipment used for moving materials is wired to ground and that proper materials are selected to avoid static charging. When grounding is not possible, use an ionizer to dissipate electric charges.

Workstation guidelines

Follow these grounding workstation guidelines:

- Cover the workstation with approved static-shielding material.
- Use a wrist strap connected to a properly grounded work surface and use properly grounded tools and equipment.
- Use conductive field service tools, such as cutters, screwdrivers, and vacuums.
- When fixtures must directly contact dissipative surfaces, use fixtures made only of static-safe materials.
- Keep the work area free of nonconductive materials, such as ordinary plastic assembly aids and Styrofoam.
- Handle ESD-sensitive components, parts, and assemblies by the case or PCM laminate. Handle these items only at static-free workstations.
- Avoid contact with pins, leads, or circuitry.
- Turn off power and input signals before inserting or removing connectors or test equipment.

Equipment guidelines

Grounding equipment must include either a wrist strap or a foot strap at a grounded workstation.

- When seated, wear a wrist strap connected to a grounded system. Wrist straps are flexible straps with a minimum of one megohm $\pm 10\%$ resistance in the ground cords. To provide proper ground, wear a strap snugly against the skin at all times. On grounded mats with banana-plug connectors, use alligator clips to connect a wrist strap.
- When standing, use foot straps and a grounded floor mat. Foot straps (heel, toe, or boot straps) can be used at standing workstations and are compatible with most types of shoes or boots. On conductive floors or dissipative floor mats, use foot straps on both feet with a minimum of one megohm resistance between the operator and ground. To be effective, the conductive must be worn in contact with the skin.

The following grounding equipment is recommended to prevent electrostatic damage:

- Antistatic tape
- Antistatic smocks, aprons, and sleeve protectors
- Conductive bins and other assembly or soldering aids
- Nonconductive foam
- Conductive tabletop workstations with ground cords of one megohm resistance
- Static-dissipative tables or floor mats with hard ties to the ground
- Field service kits
- Static awareness labels
- Material-handling packages
- Nonconductive plastic bags, tubes, or boxes
- Metal tote boxes
- Electrostatic voltage levels and protective materials

The following table lists the shielding protection provided by antistatic bags and floor mats.

Material	Use	Voltage protection level
Antistatic plastics	Bags	1,500 V
Carbon-loaded plastic	Floor mats	7,500 V
Metallized laminate	Floor mats	5,000 V

Component replacement procedures

This chapter provides removal and replacement procedures.

There are as many as 103 screws that must be removed, replaced, and/or loosened when servicing the computer. Make special note of each screw size and location during removal and replacement.

Feet

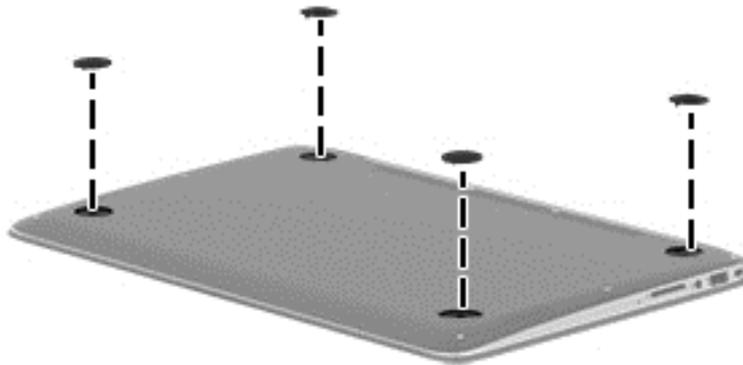
Description	Spare part number
Rubber Kit	744375-001

Before removing the feet, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.

Remove the feet:

1. Position the computer upside-down.
2. Lift/pry to disengage the adhesive that secures the feet to the bottom cover.



Reverse the removal procedures to install the feet.

Bottom cover

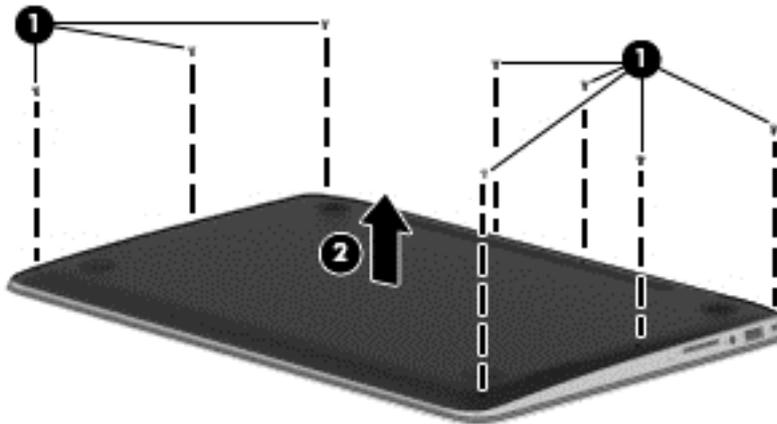
Description	Spare part number
Bottom cover	744360-001

Before removing the bottom cover, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.

Remove the bottom cover:

1. Position the computer upside-down.
2. Remove the 8 Torx T5M2.0×3.0 screws **(1)** that secure the bottom cover to the computer.
3. Lift the bottom cover off the computer **(2)**.



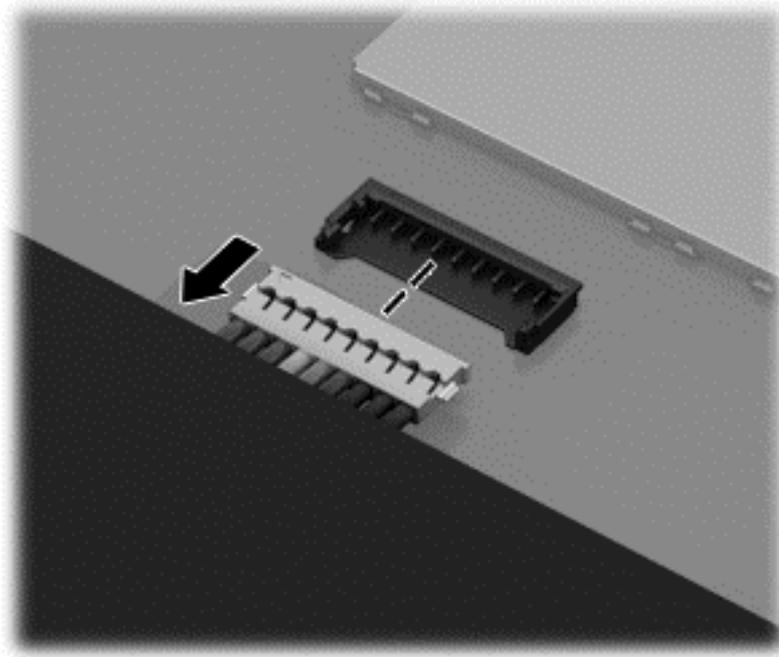
Reverse the removal procedures to install the bottom cover.

Solid-state drive (SSD)

Description	Spare part number
512-GB mSATA, SSD	744380-001
256-GB mSATA, SSD	744379-001
128-GB mSATA, SSD	744378-001

Before removing the solid-state drive module, follow these steps:

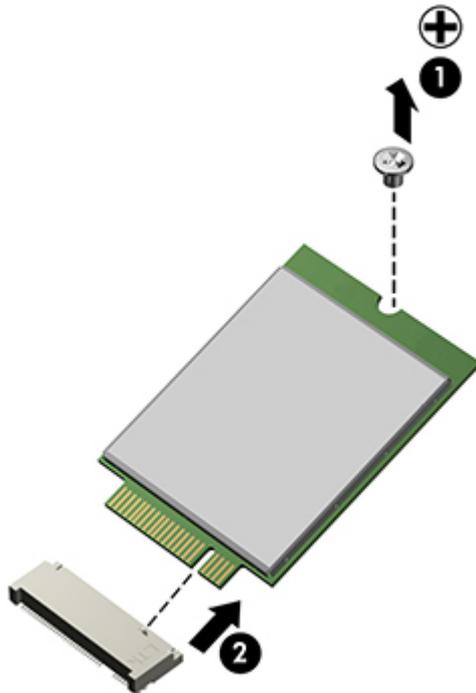
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see [Bottom cover on page 29](#)).
5. Disconnect the battery.



Remove the solid-state drive:

1. Remove the Phillips PM2.0×3.0 screw **(1)** that secures the drive to the computer. The rear of the drive pops up.

2. Pull the drive out of the socket **(2)**.



Reverse this procedure to install the solid-state drive.

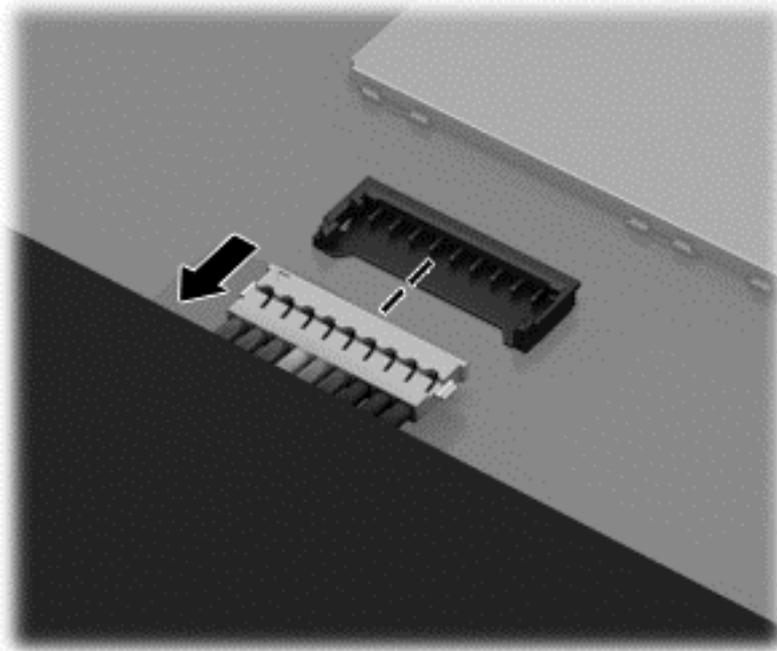
WLAN module

Description	Spare part number
Intel Dual Band Wireless-AC 7260 802.11 AC 2x2 WiFi + BT 4.0 Combo Adapter for use on all computer models	710663-001
Intel Wireless 7260BN 802.11 bgn 2x2 WiFi + BT 4.0 Combo Adapter for use on all computer models	735532-001
Intel Dual Band Wireless-N 7260AN 802.11 a/b/g/n 2x2 WiFi + BT 4.0 Combo Adapter for use only on HP Spectre 13 Pro Ultrabook computer models	717381-005

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 device functionality, and then contact technical support.

Before removing the WLAN module, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see [Bottom cover on page 29](#)).
5. Disconnect the battery.



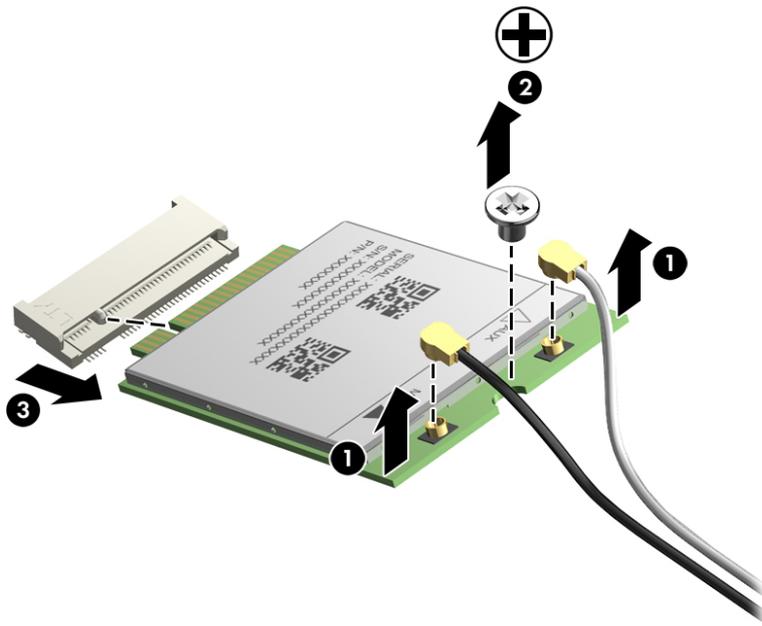
Remove the WLAN module:

1. Disconnect the WLAN antenna cables **(1)** from the terminals on the WLAN module.

 **NOTE:** The WLAN antenna cable labeled “1” connects to the WLAN module “Main” terminal labeled “1”. The WLAN antenna cable labeled “2” connects to the WLAN module “Aux” terminal labeled “2”. If the computer is equipped with an 802.11a/b/g/n WLAN module, the yellow WLAN antenna cable connects to the middle terminal on the WLAN module.

2. Remove the Phillips PM2.0×3.0 screw **(2)** that secures the WLAN module to the base enclosure.
3. Remove the WLAN module **(3)** by pulling the module away from the slot.

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



 **NOTE:** If the WLAN antennas are not connected to the terminals on the WLAN module, the protective sleeves must be installed on the antenna connectors, as shown in the following illustration.

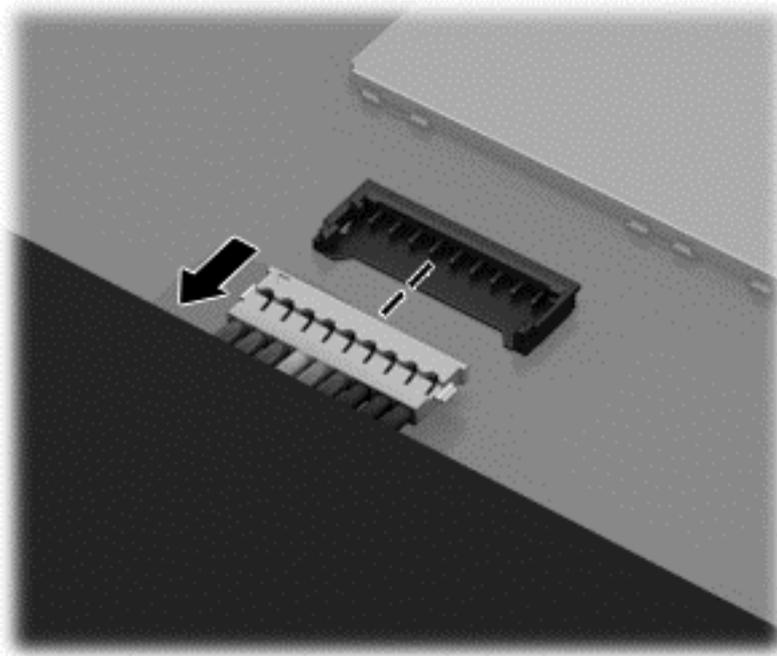
Reverse this procedure to install the WLAN module.

Display assembly

Description	Spare part number
33.8-cm (13.3-in), QHD, touchscreen	744368-001
33.8-cm (13.3-in), FHD, touchscreen	744369-001

Before removing the display assembly, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see [Bottom cover on page 29](#)).
5. Disconnect the battery.

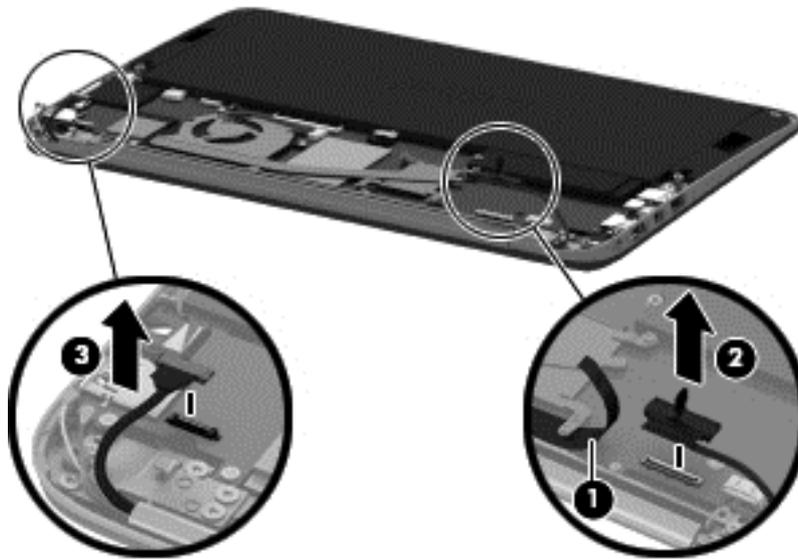


6. Disconnect the antennas from the WLAN module (see [WLAN module on page 32](#)).

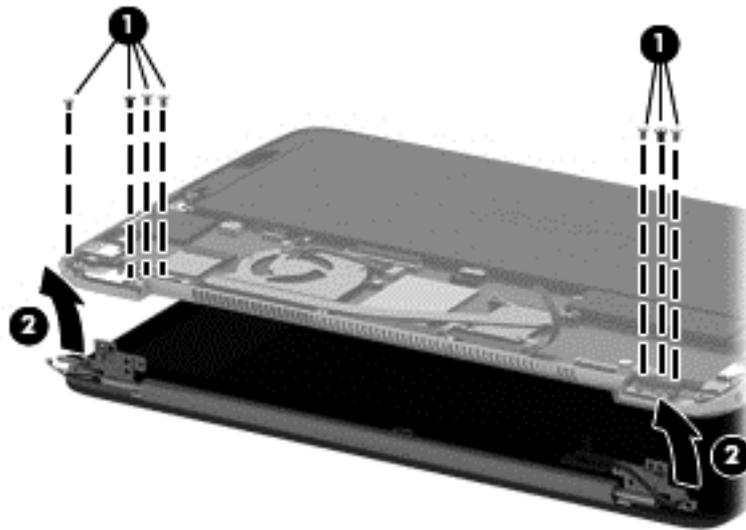
Remove the display assembly:

1. Remove the Mylar tape from atop display cable connector **(1)**

2. Disconnect the display panel cable **(2)** and the control cable **(3)** from the system board.

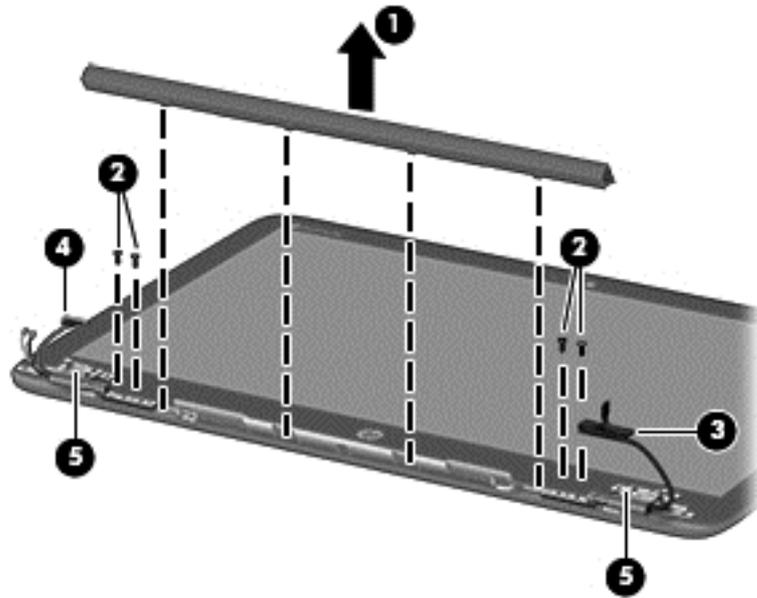


3. Remove the 7 Phillips PM2.5×4.0 screws **(1)** that secure the display assembly to the computer.
4. Rotate the computer upward to open the display hinges, and then separate the display from the computer **(2)**.



5. If it is necessary to remove the clutch cover or the display hinges:
 - a. Remove the clutch cover (the plastic piece on the bottom of the display) by pulling it straight up to disengage it **(1)**.
 - b. Remove the 4 Phillips PM2.5×5.0 screws (2 from each hinge) that secure the hinges to the display.
 - c. Remove the antennas and the control cable from the left hinge **(2)**.

- d. Remove the display cable from the right hinge **(3)** and the control cable from the left hinge **(4)**.
- e. Lift the hinges from the display **(5)**.



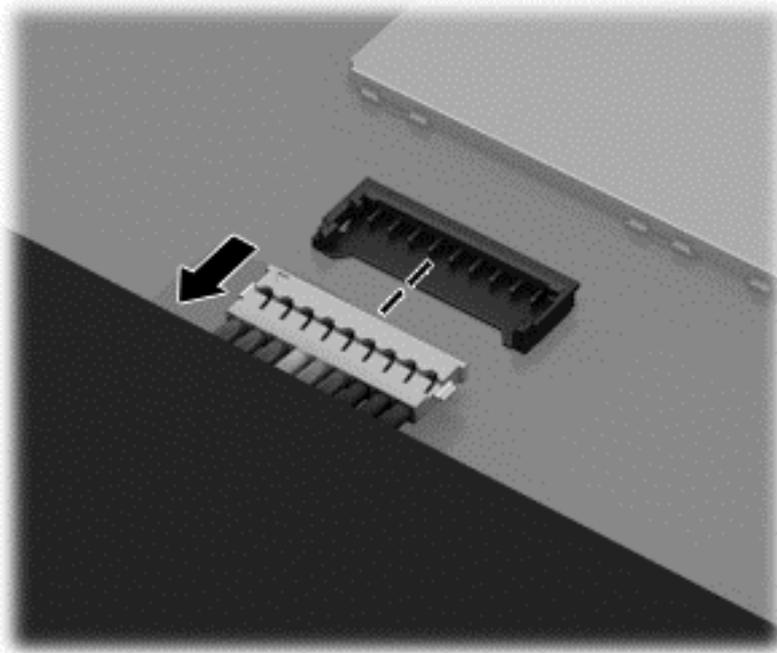
Reverse this procedure to reassemble and install the display assembly.

Speaker assembly

Description	Spare part number
Speaker assembly (includes cable)	744377-001

Before removing the speaker assembly, follow these steps:

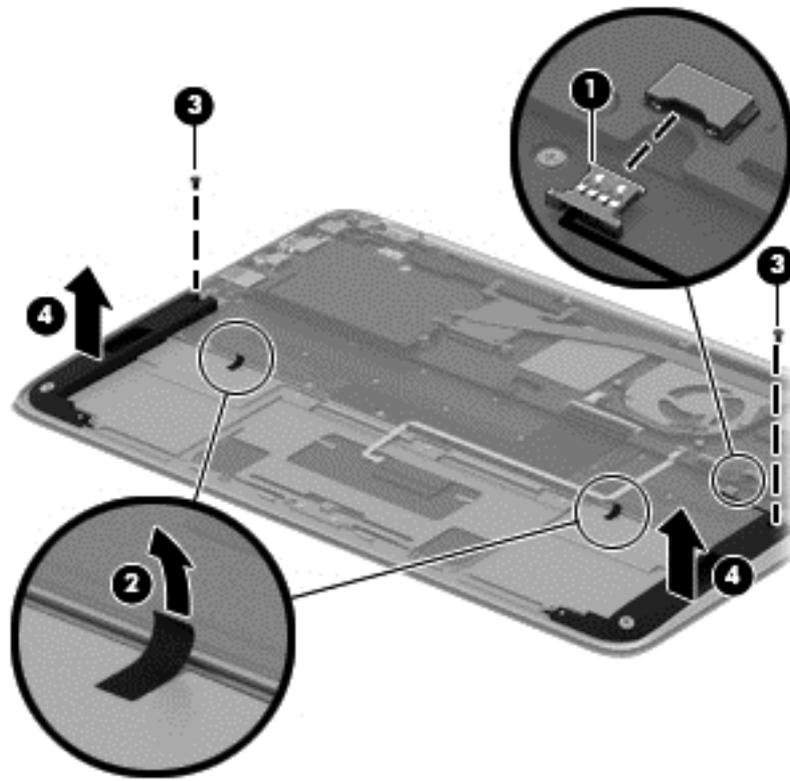
1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see [Bottom cover on page 29](#)).
5. Disconnect the battery.



Remove the speaker assembly:

1. Disconnect the speaker cable from the system board **(1)**.
2. Remove the Mylar from atop the wire between the speakers **(2)**.
3. Remove one Phillips PM2.5×4.0 screw **(3)** from each speaker.

4. Lift the speakers **(4)** from the computer.



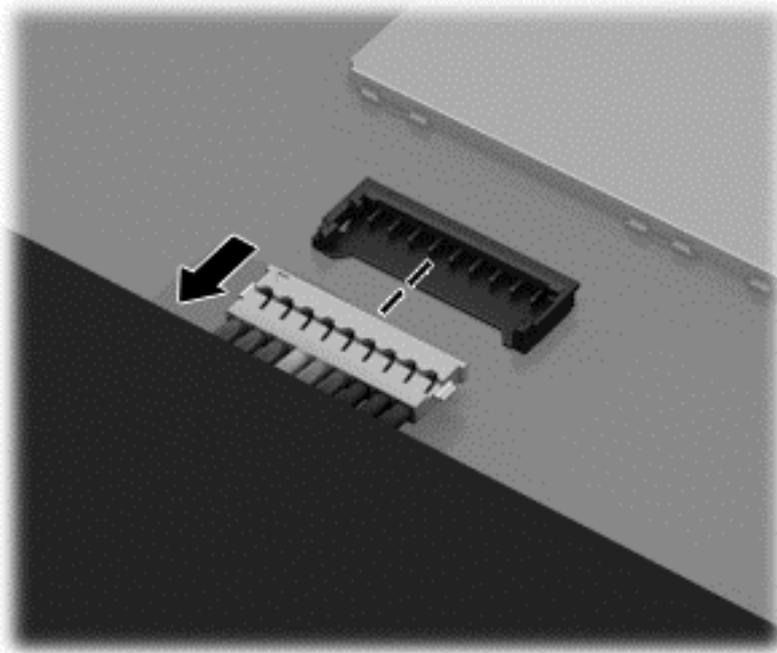
Reverse this procedure to install the speaker assembly.

Touchpad

Description	Spare part number
Touchpad board (includes cable)	744361-001

Before removing the touchpad, follow these steps:

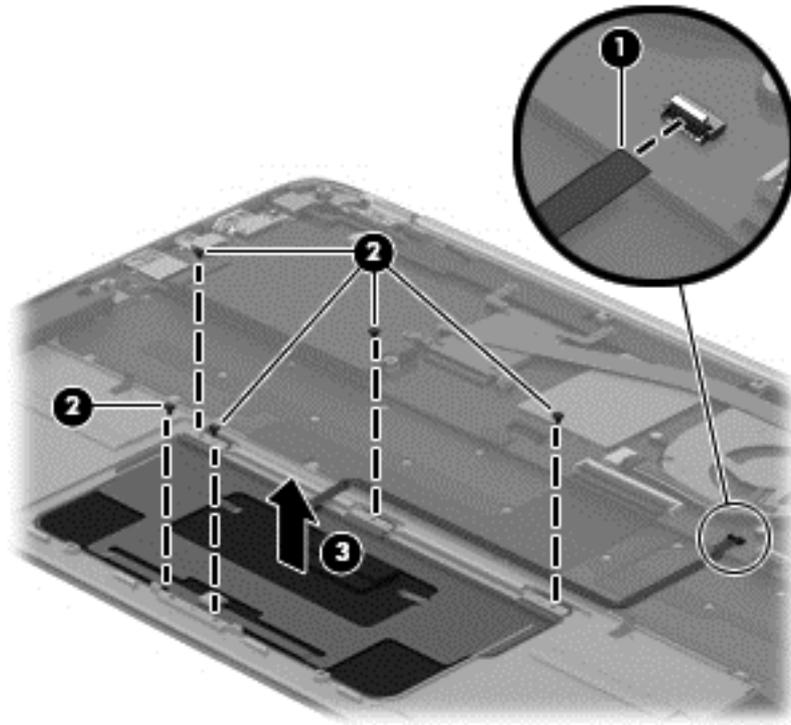
1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see [Bottom cover on page 29](#)).
5. Disconnect the battery.



Remove the touchpad:

1. Disconnect the touchpad cable from the system board **(1)**.
2. Remove the 5 Phillips PM1.0×2.0 screws **(2)** that secure the touchpad to the top cover.

3. Lift the touchpad straight up and off the top cover **(3)**.



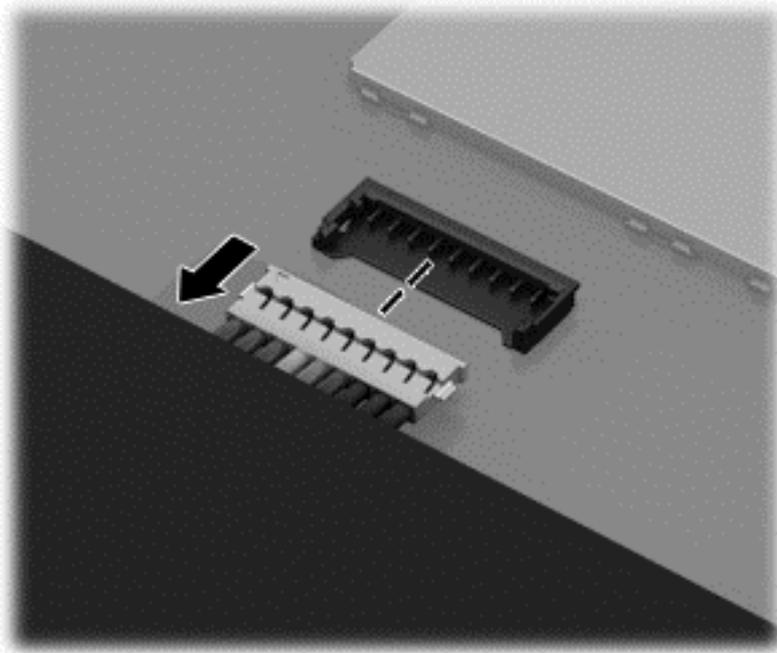
Reverse this procedure to install the touchpad.

Fan

Description	Spare part number
Fan (includes cable)	744363-001

Before removing the fan, follow these steps:

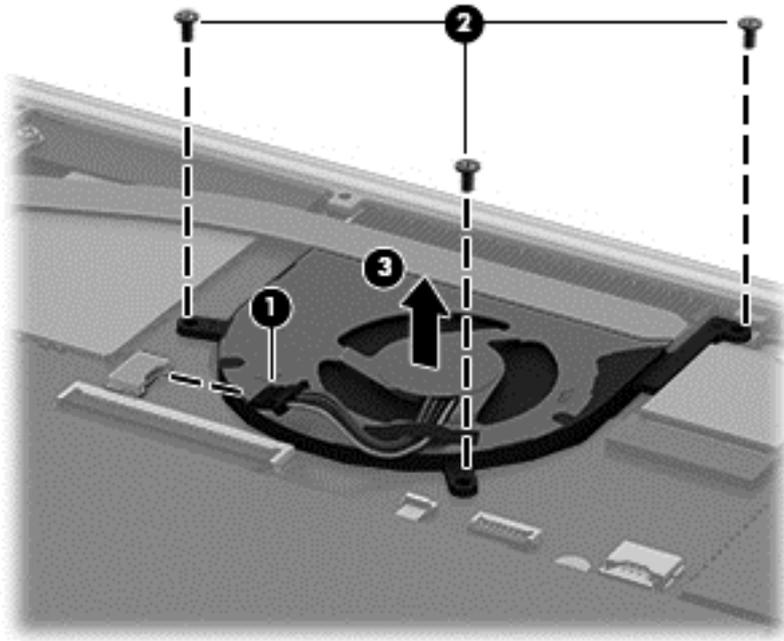
1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see [Bottom cover on page 29](#)).
5. Disconnect the battery.



Remove the fan:

1. Disconnect the fan cable **(1)** from the system board.
2. Loosen the 3 Phillips PM2.0×3.0 screws **(2)** that secure the fan to the computer.

3. Remove the fan **(3)** from the computer.



Reverse this procedure to install the fan.

Heat sink

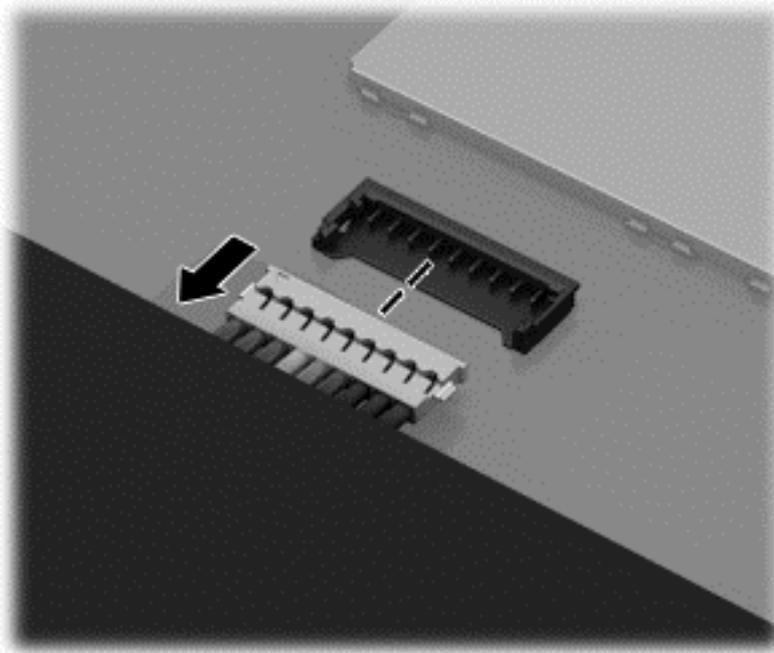
 **NOTE:** The heat sink spare part kit includes replacement thermal grease.

You do NOT have to remove the heat sink to remove the system board.

Description	Spare part number
Heat sink	744364-001

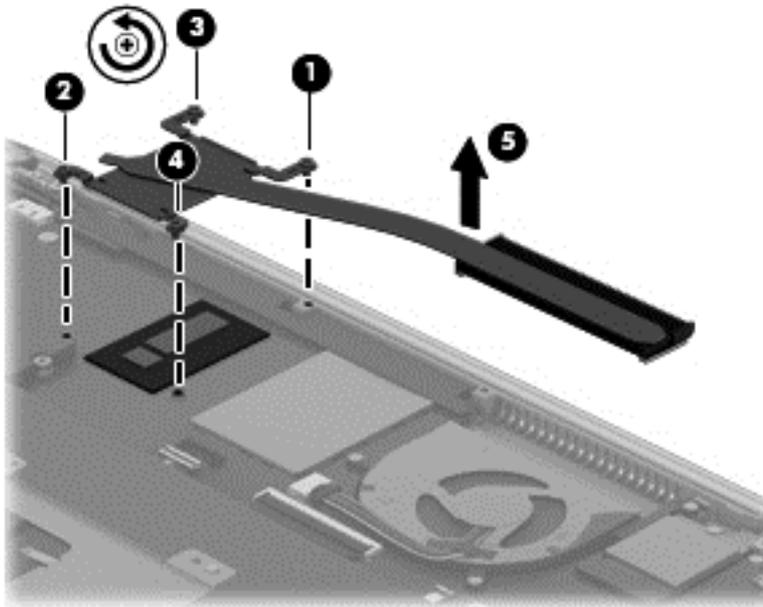
Before removing the heat sink, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see [Bottom cover on page 29](#)).
5. Disconnect the battery.



Remove the heat sink:

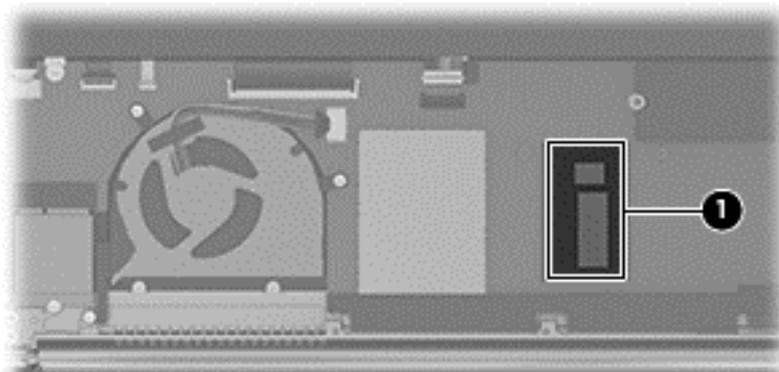
1. Loosen the 4 captive Phillips screws **(1)** – **(4)** that secure the heat sink to the system board, and then remove the heat sink **(5)**.



2. The following illustration shows the replacement thermal material locations on a computer model equipped with a graphics subsystem with discrete memory.

 **NOTE:** The thermal material must be thoroughly cleaned from the surfaces of the heat sink and the system board components each time the heat sink is removed. Replacement thermal material is included with the heat sink and system board spare part kits.

Thermal grease is used on the processor **(1)** and the heat sink section **(2)** that services it



Reverse this procedure to install the heat sink.

Battery

Description	Spare part number
Battery, 4-cell, 51-Wh, 3.42-Ah	734998-001

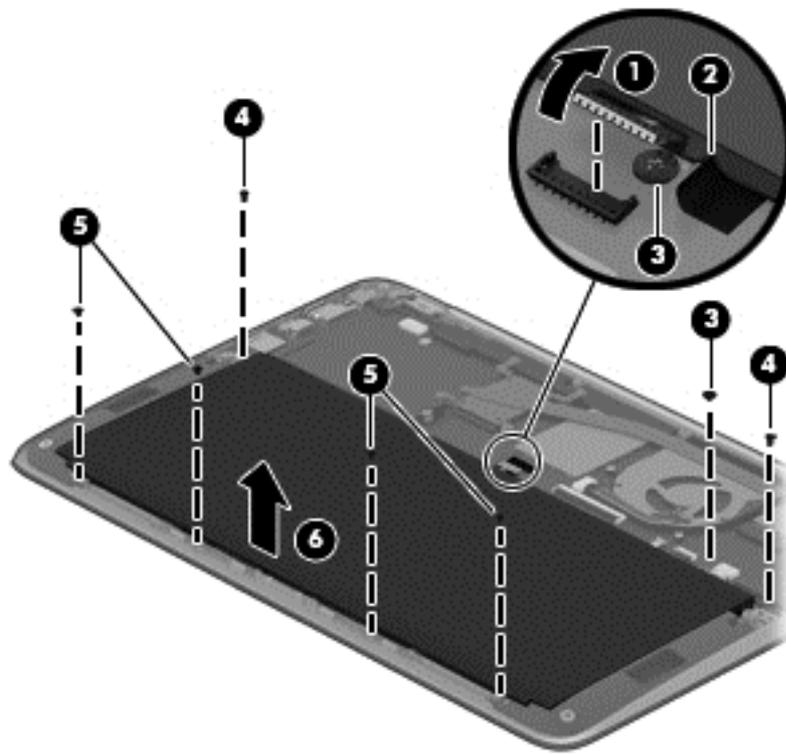
Before disassembling the computer, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see [Bottom cover on page 29](#)).

Remove the battery:

1. Disconnect the battery cable from the system board **(1)**.
2. Remove the Mylar from atop the broadhead screw near the top of the battery **(2)**.
3. Remove the 2 Phillips PM2.0×3.0 broadhead screws **(3)** that secure the battery to the computer.
4. Remove the 2 Phillips PM2.0×4.0 screws **(4)** that secure the battery to the computer.
5. Remove the 4 Phillips PM2.0×3.0 screws **(5)** along the bottom of the battery that secure it to the computer.

6. Remove the battery from the computer (6).



Remove the removal procedure to install the battery.

System board

 **NOTE:** The system board spare part kit includes replacement thermal material.

You do NOT have to remove the heat sink to remove the system board. You do have to remove the fan to remove the system board.

Description	Spare part number
System board with Intel Core i7-4500U processor and 8-GB system memory for use in models with non-Windows 8 operating systems	743849-001
System board with Intel Core i7-4500U processor and 8-GB system memory for use in models with Windows 8 Standard operating systems	743849-501
System board with Intel Core i7-4500U processor and 8-GB system memory for use in models with Windows 8 Professional operating systems	743849-601
System board with Intel Core i5-4200U processor and 4-GB system memory for use in models with non-Windows 8 operating systems	743850-001
System board with Intel Core i5-4200U processor and 4-GB system memory for use in models with Windows 8 Standard operating systems	743850-501
System board with Intel Core i5-4200U processor and 4-GB system memory for use in models with Windows 8 Professional operating systems	743850-601
System board with Intel Core i5-4200U processor and 8-GB system memory for use in models with non-Windows 8 operating systems	743851-001
System board with Intel Core i5-4200U processor and 8-GB system memory for use in models with Windows 8 Standard operating systems	743851-501
System board with Intel Core i5-4200U processor and 8-GB system memory for use in models with Windows 8 Professional operating systems	743851-61

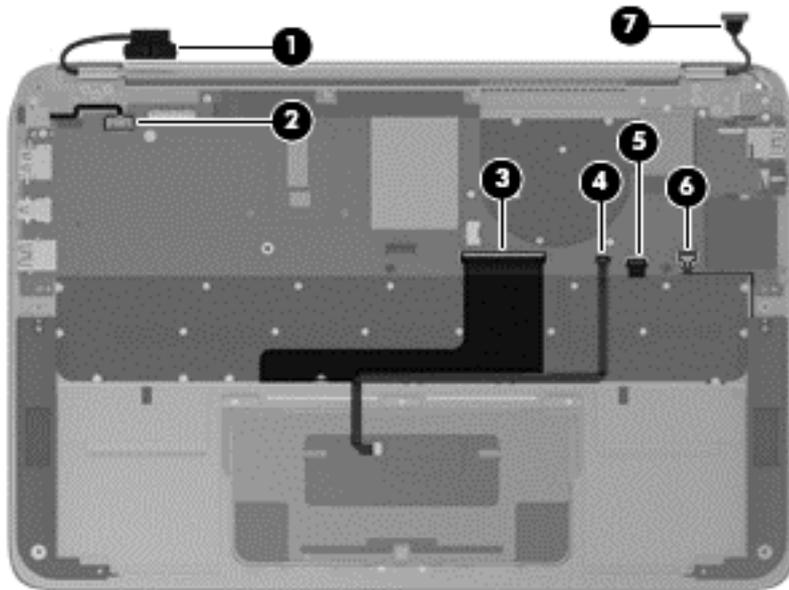
Before removing the system board, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the following components:
 - a. Bottom cover (see [Bottom cover on page 29](#))
 - b. Battery (see [Battery on page 46](#))
 - c. WLAN module (see [WLAN module on page 32](#))
 - d. Fan (see [Fan on page 41](#))

 **NOTE:** If replacing the system board, be sure to remove the heat sink from the old board and install it on the new board.

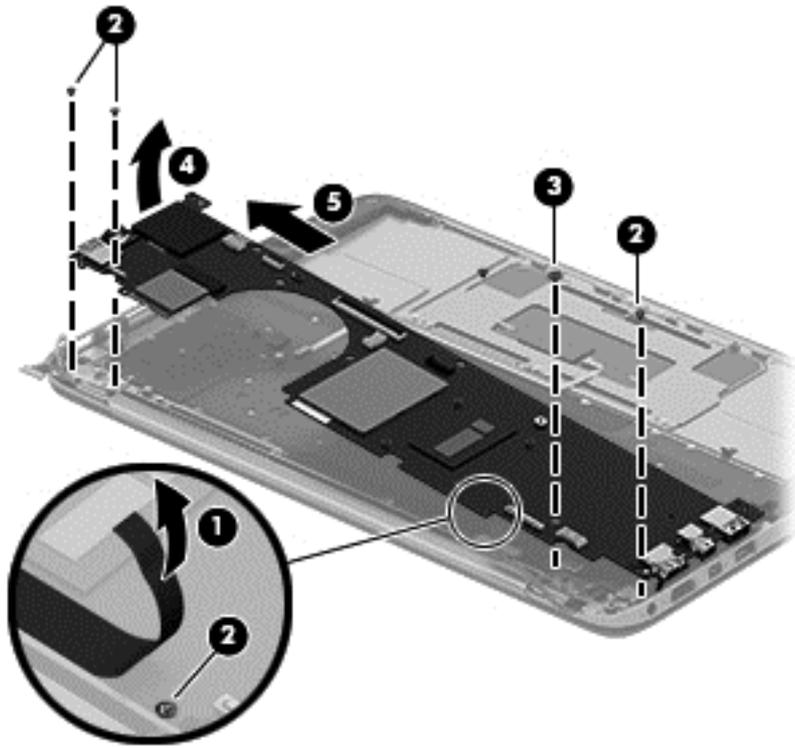
Remove the system board:

1. Disconnect the following cables from the system board.
 - **(1)**: Display cable
 - **(2)**: Power connector cable
 - **(3)**: Large keyboard cable
 - **(4)**: Small keyboard cable
 - **(5)**: Power button board cable
 - **(6)**: Speaker cable
 - **(7)**: Control cable



2. Lift the Mylar tape **(1)** to gain access to one of the screws **(2)**.
3. Remove the 4 Phillips PM2.0×3.0 screws **(2)** that secure the system board to the computer.
4. Remove the Phillips PM2.0×3.0 broadhead screw **(3)** that secures the system board to the computer.
5. Lift the left side of the board **(4)**.

6. Pull the board up and away toward the left (5).



Reverse this procedure to install the system board.

Power connector cable

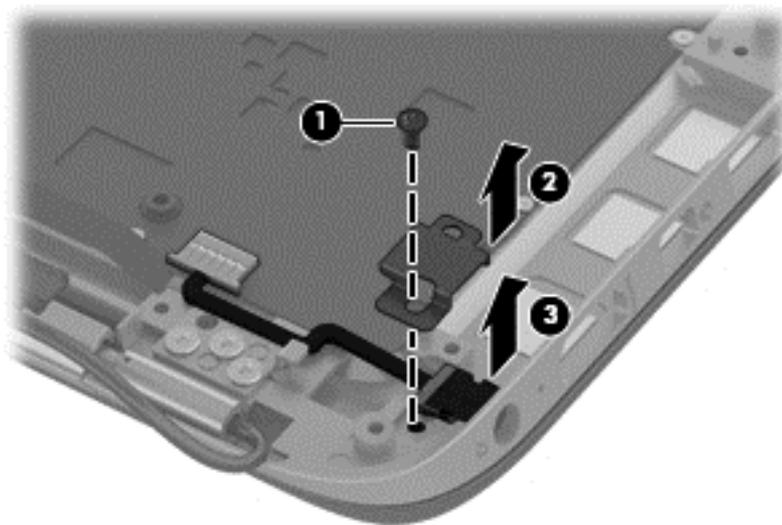
Description	Spare part number
Power connector cable	744362-001

Before removing the power connector cable, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the following components:
 - a. Bottom cover (see [Bottom cover on page 29](#))
 - b. Battery (see [Battery on page 46](#))
 - c. WLAN module (see [WLAN module on page 32](#))
 - d. Fan (see [Fan on page 41](#))
 - e. System board (see [System board on page 48](#))

Remove the power connector cable:

1. Remove the Phillips PM2.0×3.0 screw **(1)** that secures the power connector cable to the computer.
2. Lift the bracket from atop the connector **(2)**.
3. Lift the connector straight up and out of the computer **(3)**.



Reverse this procedure to install the power connector cable.

Power button board

Description	Spare part number
Power button board (includes cable and plastic power button)	744370-001

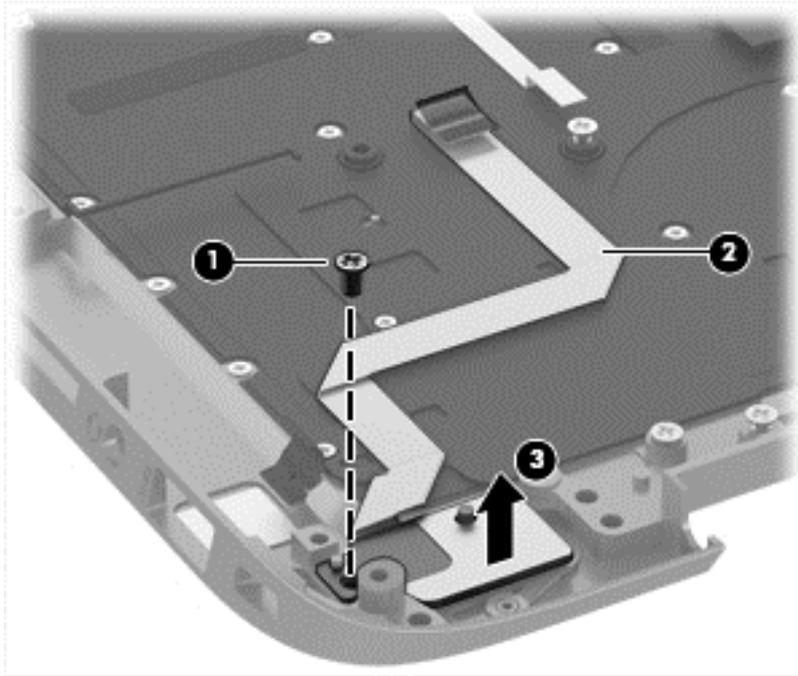
Before removing the power button board, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the following components:
 - a. Bottom cover (see [Bottom cover on page 29](#))
 - b. Battery (see [Battery on page 46](#))
 - c. WLAN module (see [WLAN module on page 32](#))
 - d. Fan (see [Fan on page 41](#))
 - e. System board (see [System board on page 48](#))

Remove the power button board:

1. Remove the Phillips PM2.0×3.0 screw **(1)** that secures the power button board to the computer.
2. Pull up on the cable to disconnect it from the adhesive that secures it to the computer **(2)**.

3. Remove the power button board from the computer **(3)**.



Reverse this procedure to install the power button board.

Keyboard and top cover

Description	Spare part number
Top cover for use in the United States	744381-001
Top cover for use in the United Kingdom	744382-001
Keyboard	743897-xx1
NOTE: For a complete list of keyboards and associated country codes, see Sequential part number listing on page 20 .	
Keyboard backplate	744366-001

Before separating the keyboard from the top cover, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the following components:
 - a. Bottom cover (see [Bottom cover on page 29](#))
 - b. Battery (see [Battery on page 46](#))
 - c. WLAN module (see [WLAN module on page 32](#))
 - d. Fan (see [Fan on page 41](#))
 - e. System board (see [System board on page 48](#))

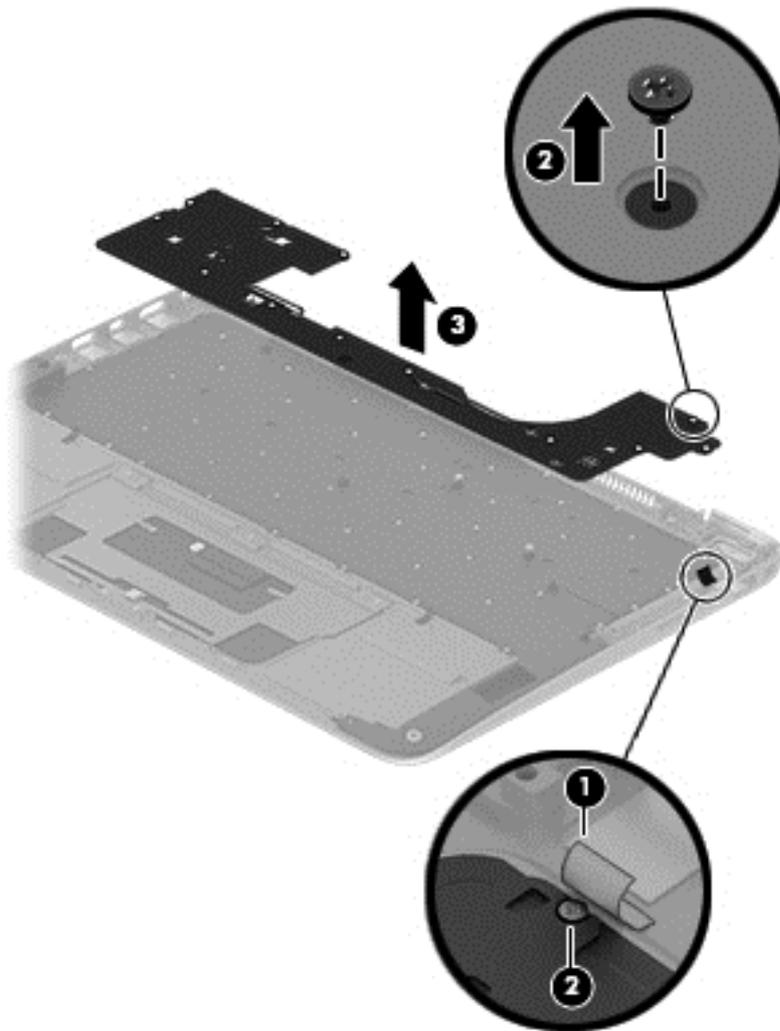
Separate the keyboard from the top cover:

1. Lift the tape over the left screw **(1)**.
2. Remove the 12 Phillips PM1.0×2.0 screws **(2)** that secure the keyboard backplate to the top cover.



NOTE: Only one screw is shown in the following image, but you must remove 12 screws to remove the keyboard backplate. Screw locations are shown as white dots on the backplate in the following image.

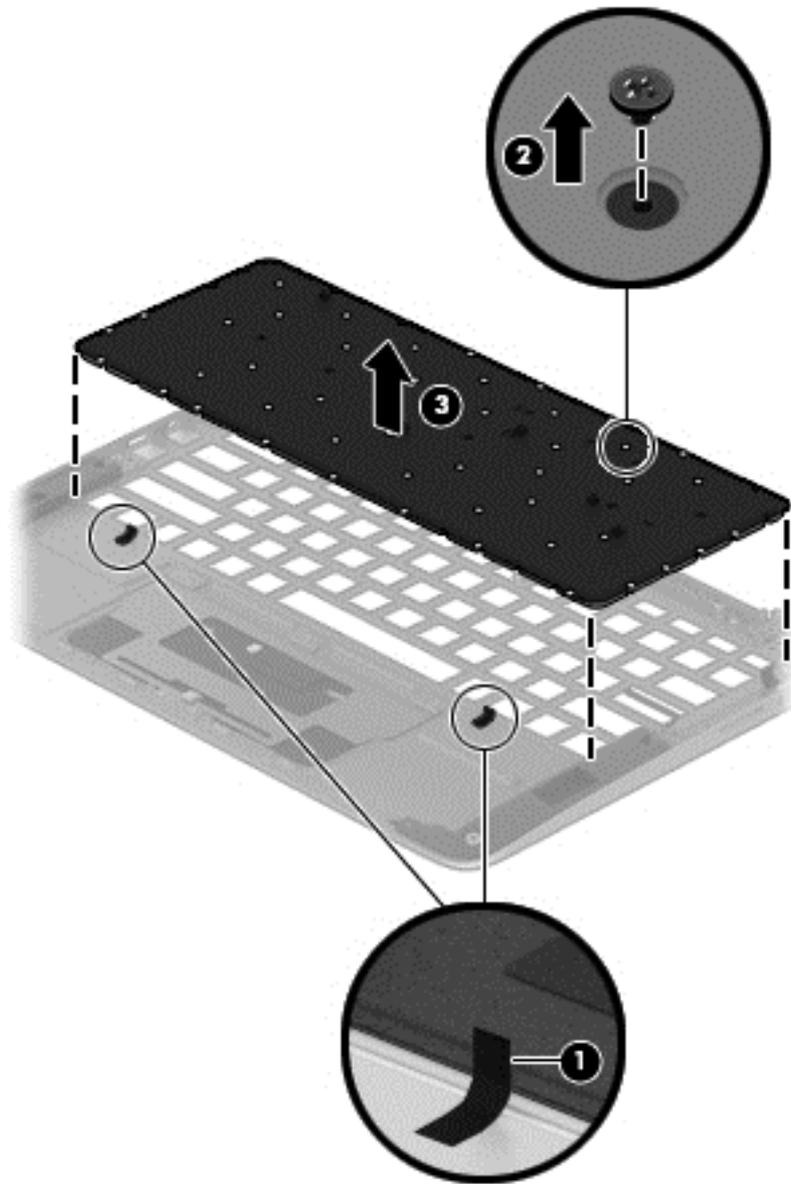
3. Lift the keyboard backplate from the top cover **(3)**



4. Lift the two pieces of Mylar tape that secure the keyboard to the top cover **(1)**.
5. Remove the 47 Phillips PM1.0×2.0 screws **(2)** that secure the keyboard to the top cover.

 **NOTE:** Only one screw is shown in the following image, but you must remove 47 screws to remove the keyboard. Screw locations are shown as white dots on the keyboard in the following image.

6. Separate the keyboard from the top cover (3).



7. Remove the keyboard.

Reverse this procedure to install the keyboard.

5 Using Setup Utility (BIOS) and HP PC Hardware Diagnostics (UEFI)

Setup Utility, 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). Setup Utility (BIOS) includes settings for the types of devices installed, the startup sequence of the computer, and the amount of system and extended memory.

Starting Setup Utility (BIOS)

To start Setup Utility (BIOS), turn on or restart the computer, quickly press **esc**, and then press **f10**.

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

Updating the BIOS

Updated versions of the BIOS may be available on the HP website.

Most BIOS updates on the HP website 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 revealed by pressing **fn** + **esc** (if you are already in Windows) or by using Setup Utility (BIOS).

1. Start Setup Utility (BIOS) (see [Starting Setup Utility \(BIOS\) on page 57](#)).
2. Use the arrow keys to select **Main**. Be sure that you make note of the BIOS version.
3. To exit Setup Utility (BIOS) without saving your changes, use the arrow keys to select **Exit**, select **Exit Discarding Changes**, and then press **enter**.
4. Select **Yes**.

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 Sleep.

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

1. From the Start screen, type `support`, and then select the **HP Support Assistant** app.
2. Click **Updates and tune-ups**, and then click **Check for HP updates now**.
3. Follow the on-screen instructions.
4. At the download area, follow these steps:
 - a. Identify the most recent BIOS update and compare it to the BIOS version currently installed on your computer. If the update is more recent than your BIOS, make a note of the date, name, or other identifier. You may need this information to locate the update later, after it has been downloaded to your hard drive.
 - b. Follow the on-screen instructions to download your selection to the hard drive.

If the update is more recent than your BIOS, make a note of the path to the location on your hard drive where the BIOS update is downloaded. You will need to access this path when you are ready to install the update.

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

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

1. From the Start screen, type `file`, and then select **File Explorer**.
2. Click your hard drive designation. The hard drive designation is typically Local Disk (C:).
3. Using the hard drive path you recorded earlier, open the folder on your hard drive that contains the update.
4. Double-click the file that has an `.exe` extension (for example, `filename.exe`).

The BIOS installation begins.
5. Complete the installation by following the on-screen instructions.

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

Using HP PC Hardware Diagnostics (UEFI)

HP PC Hardware Diagnostics is a Unified Extensible Firmware Interface (UEFI) that allows you to run diagnostic tests to determine whether the computer hardware is functioning properly. The tool runs outside the operating system so that it can isolate hardware failures from issues that are caused by the operating system or other software components.

To start HP PC Hardware Diagnostics UEFI:

1. Turn on or restart the computer, quickly press **esc**, and then press **f2**.

The BIOS searches three places for the diagnostics tools in the following order:

- a. Connected USB drive

 **NOTE:** To download the HP PC Hardware Diagnostics (UEFI) tool to a USB drive, see [Downloading HP PC Hardware Diagnostics \(UEFI\) to a USB device on page 59](#).

- b. Hard drive

- c. BIOS

2. When the diagnostic tool opens, click the type of diagnostic test you want to run, and then follow the on-screen instructions.

 **NOTE:** If you need to stop a diagnostic test, press **esc**.

Downloading HP PC Hardware Diagnostics (UEFI) to a USB device

 **NOTE:** Instructions for downloading HP PC Hardware Diagnostics (UEFI) are provided in English only.

1. Go to <http://www.hp.com>.
2. Click **Support & Drivers**, and then click the **Drivers & Downloads** tab.
3. Enter the product name in the text box, and then click **Go**.
4. Select your computer model, and then select your operating system.
5. In the **Diagnostic** section, click **HP UEFI Support Environment**.

– or –

Click **Download**, and then select **Run**.

6 Specifications

Computer specifications

	Metric	U.S.
Dimensions		
Width	32.4 cm	14.72 in
Depth	22.0 cm	9.86 in
Height (front to back)	1.4 to 1.5 cm	1.34 to 1.42 in
Weight		
	1.62 kg	3.56 lbs
Input power		
Operating voltage and current	18.5 V dc @ 3.5 A - 45 W	
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%	
Nonoperating	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
NOTE: Applicable product safety standards specify thermal limits for plastic surfaces. The device operates well within this range of temperatures.		

13.3-inch FHD display specifications

	Metric	U.S.
Dimensions		
Height	20.5 cm	8.1 in
Width	32.0 cm	12.6 in
Diagonal	33.8 cm	13.3 in
Resolution	1920x1080	
Number of colors	16,777,216	
Contrast ratio	700:1 (typical)	
Brightness	340 nits (typical)	
Pixel resolution		
Pitch	0.1529 (H) x 0.1529 (V) mm	
Format	FHD (1920 x 1080)	
Configuration	RGB vertical stripe	
Backlight	LED	
Total power consumption	Total 6.10 W(Max.) @ cell 1.15W(Max.), BL 4.95 W(Max.)	
Viewing angle	89° horizontal, 89° vertical (typical)	

13.3-inch QHD display specifications

	Metric	U.S.
Dimensions		
Height	20.5 cm	8.1 in
Width	32.0 cm	12.6 in
Diagonal	33.8 cm	13.3 in
Resolution	2560x1440	
Number of colors	16,777,216	
Contrast ratio	700:1 (typical)	
Brightness	340 nits (typical)	
Pixel resolution		
Pitch	0.1146 (H) x 0.1146 (V) mm	
Format	QHD (2560 x 1440)	
Configuration	RGB vertical stripe	
Backlight	LED	
Total power consumption	Total 6.10 W(Max.) @ cell 1.15W(Max.), BL 4.95 W(Max.)	
Viewing angle	85° horizontal, 85° vertical (typical)	

7 Backing up, restoring, and recovering

This chapter provides information about the following processes:

- Creating recovery media and backups
- Restoring and recovering your system

Creating recovery media and backups

1. After you successfully set up the computer, create HP Recovery media. This step creates a backup of the HP Recovery partition on the computer. The backup can be used to reinstall the original operating system in cases where the hard drive is corrupted or has been replaced.

HP Recovery media you create will provide the following recovery options:

- **System Recovery**—Reinstalls the original operating system and the programs that were installed at the factory.
- **Minimized Image Recovery**—Reinstalls the operating system and all hardware-related drivers and software, but not other software applications.
- **Factory Reset**—Restores the computer to its original factory state by deleting all information from the hard drive and re-creating the partitions. Then it reinstalls the operating system and the software that was installed at the factory.

See [Creating HP Recovery media on page 63](#).

2. Use the Windows tools to create system restore points and create backups of personal information. For more information and steps, see Help and Support. From the Start screen, type `help`, and then select **Help and Support**.

Creating HP Recovery media

HP Recovery Manager is a software program that offers a way to create recovery media after you successfully set up the computer. HP Recovery media can be used to perform system recovery if the hard drive becomes corrupted. System recovery reinstalls the original operating system and the software programs installed at the factory, and then configures the settings for the programs. HP

Recovery media can also be used to customize the system or restore the factory image if you replace the hard drive.

- Only one set of HP Recovery media can be created. Handle these recovery tools carefully, and keep them in a safe place.
- HP Recovery Manager examines the computer and determines the required storage capacity for the blank USB flash drive or the number of blank DVD discs that will be required.
- To create recovery discs, your computer must have an optical drive with DVD writer capability, and you must use only high-quality blank DVD-R, DVD+R, DVD-R DL, or DVD+R DL discs. Do not use rewritable discs such as CD±RW, DVD±RW, double-layer DVD±RW, or BD-RE (rewritable Blu-ray) discs; they are not compatible with HP Recovery Manager software. Or instead you can use a high-quality blank USB flash drive.
- If your computer does not include an integrated optical drive with DVD writer capability, but you would like to create DVD recovery media, you can use an external optical drive (purchased separately) to create recovery discs, or you can obtain recovery discs from support. See the *Worldwide Telephone Numbers* booklet included with the computer. You can also find contact information from the HP website. Go to <http://www.hp.com/support>, select your country or region, and follow the on-screen instructions. If you use an external optical drive, it must be connected directly to a USB port on the computer; the drive cannot be connected to a USB port on an external device, such as a USB hub.
- Be sure that the computer is connected to AC power before you begin creating the recovery media.
- The creation process can take up to an hour or more. Do not interrupt the creation process.
- If necessary, you can exit the program before you have finished creating all of the recovery DVDs. HP Recovery Manager will finish burning the current DVD. The next time you start HP Recovery Manager, you will be prompted to continue, and the remaining discs will be burned.

To create HP Recovery media:



IMPORTANT: For tablets, connect to the keyboard dock before beginning these steps (select models only).

1. From the Start screen, type `recovery`, and then select **HP Recovery Manager**.
2. Select **Recovery Media Creation**, and then follow the on-screen instructions.

If you ever need to recover the system, see [Recovering using HP Recovery Manager on page 65](#).

Restore and recovery

There are several options for recovering your system. Choose the method that best matches your situation and level of expertise:

- Windows offers several options for restoring from backup, refreshing the computer, and resetting the computer to its original state. For more information and steps, see Help and Support. From the Start screen, type `help`, and then select **Help and Support**.
- If you need to correct a problem with a preinstalled application or driver, use the Drivers and Applications Reinstall option of HP Recovery Manager to reinstall the individual application or driver.

From the Start screen, type `recovery`, select **HP Recovery Manager**, select **Drivers and Applications Reinstall**, and then follow the on-screen instructions.

- If you want to reset your computer using a minimized image, you can choose the HP Minimized Image Recovery option from the HP Recovery partition (select models only) or HP Recovery media. Minimized Image Recovery installs only drivers and hardware-enabling applications. Other applications included in the image continue to be available for installation through the Drivers and Applications Reinstall option in HP Recovery Manager. For more information, see [Recovering using HP Recovery Manager on page 65](#).
- If you want to recover the computer's original factory partitioning and content, you can choose the System Recovery option from the HP Recovery partition (select models only) or use the HP Recovery media that you have created. For more information, see [Recovering using HP Recovery Manager on page 65](#). If you have not already created recovery media, see [Creating HP Recovery media on page 63](#).
- If you have replaced the hard drive, you can use the Factory Reset option of HP Recovery media to restore the factory image to the replacement drive. For more information, see [Recovering using HP Recovery Manager on page 65](#).
- If you wish to remove the recovery partition to reclaim hard drive space, HP Recovery Manager offers the Remove Recovery Partition option.

For more information, see [Removing the HP Recovery partition on page 67](#).

Recovering using HP Recovery Manager

HP Recovery Manager software allows you to recover the computer to its original factory state by using the HP Recovery media that you created or by using the HP Recovery partition (select models only). If you have not already created recovery media, see [Creating HP Recovery media on page 63](#).

Using HP Recovery media, you can choose from one of the following recovery options:

- System Recovery—Reinstalls the original operating system, and then configures the settings for the programs that were installed at the factory.
- Minimized Image Recovery (select models only)—Reinstalls the operating system and all hardware-related drivers and software, but not other software applications.
- Factory Reset—Restores the computer to its original factory state by deleting all information from the hard drive and re-creating the partitions. Then it reinstalls the operating system and the software that was installed at the factory.

The HP Recovery partition (select models only) allows System Recovery and Minimized Image Recovery.

What you need to know

- HP Recovery Manager recovers only software that was installed at the factory. For software not provided with this computer, you must either download the software from the manufacturer's website or reinstall the software from the media provided by the manufacturer.
- Recovery through HP Recovery Manager should be used as a final attempt to correct computer issues.
- HP Recovery media must be used if the computer hard drive fails. If you have not already created recovery media, see [Creating HP Recovery media on page 63](#).
- To use the Factory Reset option, you must use HP Recovery media. If you have not already created recovery media, see [Creating HP Recovery media on page 63](#).
- If the HP Recovery media does not work, you can obtain recovery media for your system from support. See the *Worldwide Telephone Numbers* booklet included with the computer. You can also find contact information from the HP website. Go to <http://www.hp.com/support>, select your country or region, and follow the on-screen instructions.

 **IMPORTANT:** HP Recovery Manager does not automatically provide backups of your personal data. Before beginning recovery, back up any personal data you wish to retain.

Using the HP Recovery partition (select models only)

The HP Recovery partition (select models only) allows you to perform a system recovery or minimized image recovery without the need for recovery discs or a recovery USB flash drive. This type of recovery can only be used if the hard drive is still working.

To start HP Recovery Manager from the HP Recovery partition:

 **IMPORTANT:** For tablets, connect to the keyboard dock before beginning these steps (select models only).

1. Press **f11** while the computer boots.
– or –
Press and hold **f11** as you press the power button.
2. Choose your keyboard layout.

3. Select **Troubleshoot** from the boot options menu.
4. Select **Recovery Manager**, and then follow the on-screen instructions.

Using HP Recovery media to recover

You can use HP Recovery media to recover the original system. This method can be used if your system does not have an HP Recovery partition or if the hard drive is not working properly.

1. If possible, back up all personal files.
2. Insert the HP Recovery disc you created, and then restart the computer.

 **NOTE:** If the computer does not automatically restart in HP Recovery Manager, change the computer boot order. See [Changing the computer boot order on page 67](#).

3. Follow the on-screen instructions.

Changing the computer boot order

If computer does not restart in HP Recovery Manager, you can change the computer boot order, which is the order of devices listed in BIOS where the computer looks for startup information. You can change the selection for an optical drive or a USB flash drive.

To change the boot order:

1. Insert the HP Recovery media you created.
2. Restart the computer, quickly press **esc**, and then press **f9** for boot options.
3. Select the optical drive or USB flash drive you want to boot from.
4. Follow the on-screen instructions.

Removing the HP Recovery partition

HP Recovery Manager software allows you to remove the HP Recovery partition to free up hard drive space.

 **IMPORTANT:** After you remove the HP Recovery partition, you can no longer use the Windows Refresh option, the Windows option to remove everything and reinstall Windows, or the HP Recovery Manager option. So before you remove the Recovery partition, create HP Recovery media; see [Creating HP Recovery media on page 63](#).

Follow these steps to remove the HP Recovery partition:

1. From the Start screen, type `recovery`, and then select **HP Recovery Manager**.
2. Select **Remove Recovery Partition**, and then follow the on-screen instructions.

8 Power cord set requirements

The wide-range input feature of the computer permits it to operate from any line voltage from 100 to 120 volts AC, or from 220 to 240 volts AC.

The 3-conductor power cord set included with the computer meets the requirements for use in the country or region where the equipment is purchased.

Power cord sets for use in other countries and regions must meet the requirements of the country or region where the computer is used.

Requirements for all countries

The following requirements are applicable to all countries and regions:

- The length of the power cord set must be at least **1.0 m** (3.3 ft) and no more than **2.0 m** (6.5 ft).
- All power cord sets must be approved by an acceptable accredited agency responsible for evaluation in the country or region where the power cord set will be used.
- The power cord sets must have a minimum current capacity of 10 amps and a nominal voltage rating of 125 or 250 V AC, as required by the power system of each country or region.
- The appliance coupler must meet the mechanical configuration of an EN 60 320/IEC 320 Standard Sheet C13 connector for mating with the appliance inlet on the back of the computer.

Requirements for specific countries and regions

Country/region	Accredited agency	Applicable note number
Australia	EANSW	1
Austria	OVE	1
Belgium	CEBC	1
Canada	CSA	2
Denmark	DEMKO	1
Finland	FIMKO	1
France	UTE	1
Germany	VDE	1
Italy	IMQ	1
Japan	METI	3
The Netherlands	KEMA	1
Norway	NEMKO	1
The People's Republic of China	COC	5
South Korea	EK	4
Sweden	SEMKO	1
Switzerland	SEV	1
Taiwan	BSMI	4
The United Kingdom	BSI	1
The United States	UL	2

1. The flexible cord must be Type HO5VV-F, 3-conductor, 1.0-mm² conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country or region where it will be used.
2. The flexible cord must be Type SPT-3 or equivalent, No. 18 AWG, 3-conductor. The wall plug must be a two-pole grounding type with a NEMA 5-15P (15 A, 125 V) or NEMA 6-15P (15 A, 250 V) configuration.
3. The appliance coupler, flexible cord, and wall plug must bear a "T" mark and registration number in accordance with the Japanese Dentori Law. The flexible cord must be Type VCT or VCTF, 3-conductor, 1.00-mm² conductor size. The wall plug must be a two-pole grounding type with a Japanese Industrial Standard C8303 (7 A, 125 V) configuration.
4. The flexible cord must be Type RVV, 3-conductor, 0.75-mm² conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country or region where it will be used.
5. The flexible cord must be Type VCTF, 3-conductor, 0.75-mm² conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country or region where it will be used.

9 Recycling

When a non-rechargeable or rechargeable battery has reached the end of its useful life, do not dispose of the battery in general household waste. Follow the local laws and regulations in your area for battery disposal.

HP encourages customers to recycle used electronic hardware, HP original print cartridges, and rechargeable batteries. For more information about recycling programs, see the HP Web site at <http://www.hp.com/recycle>.

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