HP ENVY x360 Convertible Notebook PC

Maintenance and Service Guide
IMPORTANT! This document is intended for
HP authorized service providers only.

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).

Table of contents

1   Product description

Category	Description
Product Name	HP Envy x360 Convertible Notebook PC
Processors	Processors are attached to the system board.
	• Intel Core i7–6500U processor (2.5 GHz, turbo up to 3.0Ghz, 1600MHz 3 MB L3 cache), dual 15W
	• Intel Core i5–6200U (2.3 GHz, turbo up to 2.8 GHz, 1600 MHz, 3 MB L3 cache), dual 15W
Chipset	Integrated SoC
Graphics	**Internal graphics:**
	• Intel HD Graphics 520
	Supports HD Decode, DX12, and HDMI
Panel	15.6" [39.6 cm] (1920x1080), high definition (eDP), light-emitting diode (LED), AntiGlare, 16:9 Ultra Wide Aspect Ratio, 220 nits, slim (3.2mm), ultra wide viewing angle
	15.6" [39.6 cm] (1920x1080), hidh-definition (FHD), light-emitting diode (LED), AntiGlare, 16:9 Ultra Wide Aspect Ratio, 250 nits, slim (3.2mm), ultra wide viewing angle
	Touch solution with flush glass, multitouch enabled, touch panel supports Home Key with LED
	Supports low-voltage differential signaling (LVDS) (co-layout with eDP1.2)
Memory	Supports the following system RAM configurations:
	• 16384 MB (8192 MB + 8192 MB)
	• 12288 MB (8192 MB + 4096 MB)
	• 8192 MB (8192 MB x 1)
	• 8192 MB (4096 MB x 2)
	• 6144 MB (2048 MB x 1 + 4096 MB x 1)
Hard drive	Supports **6.35-cm** (2.5-in) hard drives in **7.2-mm** (.28-in) and **7.0-mm** (.28-in) thicknesses (all hard drives use the same bracket)
	Serial ATA
	Accelerometer/hard drive protection support
	Supports the following hard drives:
	• 1 TB, 5400 rpm, 7.2 mm
	• 750 GB, 5400 rpm, 7.2 mm
	• 500 GB, 5400 rpm, 7 mm
	Support for hybrid hard drive configurations:
	• 500 GB, 5400-rpm + 8 GB NAND Hybrid hard drive, 7.0 mm
Optical drive	Support for external 9.5 mm tray load, SATA, DVD+/-RW DL SuperMulti drive
Audio and video	Integrated HP TrueVision camera: HD (1280×720 by 30 frames/sec), fixed (no tilt), with activity light
	Dual digital microphones with appropriate software - echo cancellation, noise suppression

Category	Description
	Dual speakers
	Bang & Olufsen
Ethernet	Gigabit LAN
Wireless	Integrated wireless options with dual antenna (Half Mini Card):
	Compatible with Miracast-certified devices
	Intel WiDi 5.0 support
	● Intel Dual Band Wireless-AC 3160 802.11ac 1×1 WiFi + BT 4.0 Combo Adapter
	● Intel Dual Band Wireless-AC 7265 802.11 ac 2x2 WiFi + BT 4.0 Combo Adapter (non vPRO)
External media cards	HP Multi-Format Digital Media Card Reader with push-push technology. Supports SD/SDHC/SDXC.
Ports	AC adapter: HP Smart pin plug (4.5-mm barrel)
	Audio: one combo audio-out (headphone)/audio-in (microphone) jack
	HDMI: v. 1.4, supporting up to 1080p, 1920×1080 at 60 Hz
	RJ-45/Ethernet
	(2) USB 3.0 (right side)
	(1) USB 2.0 (left side)
Keyboard/pointing devices	Full size dura coat backlit keyboard with numeric keypad
	Touchpad requirements:
	HP Control Zone Trackpad
	Taps enabled as default
	Multitouch gestures enabled – ability to turn on and off
	Support for PS/2 and SMBus
	Support for Windows 8.1 Modern TouchPad Gestures
Power requirements	Support for 45-W Smart AC adapter (using 4.5 mm plug) with localized cable plug support
	1 meter power cord
	Supports the following batteries:
	● Prismatic 3-cell, 43.5-Wh, Li-ion battery
Security	Kensington Lock slot
	TPM 2.0 support (5th generation processors)
Operating system	**Preinstalled**:
	Windows 10
Serviceability	**End user replaceable parts:**
	● AC adapter

2   External component identification

Right side

Component			Description
(1)		Hard drive light	• Blinking white: The hard drive is being accessed.
			• Amber: HP 3D DriveGuard has temporarily parked the hard drive.
(2)		Memory card reader	Reads optional memory cards that enable you to store, manage, share, or access information.
			To insert a card:
			1. Hold the card label-side up, with 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.
			To remove a card:
			▲ Press in on the card, and then remove it from the memory card reader.
(3)		USB 3.0 ports	Connect an optional USB device, such as a keyboard, mouse, external drive, printer, scanner or USB hub.
(4)		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 High-Definition Multimedia Interface (HDMI) device.
(5)		RJ-45 (network) jack/status lights	Connects a network cable.
			• White: The network is connected.
			• Amber: Activity is occurring on the network.
(6)		AC adapter and battery light	• White: The AC adapter is connected and the battery is fully charged.
			• Blinking white: The AC adapter is disconnected and the battery has reached a low battery level.
			• Amber: The AC adapter is connected and the battery is charging.

Component		Description
		● Off: The battery is not charging.
(7)	Power connector	Connects an AC adapter.
(8)	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.

Left side

Component			Description
(1)	⏻	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 shutdown procedures are ineffective, press and hold the power button down for at least 5 seconds to turn off the computer.
			To learn more about your power settings, see your power options.
			▲ Type power in the taskbar search box, and then select **Power and sleep settings**.
			– or –
			Right-click the **Start** button, and then select **Power Options**.
(2)		Vents	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.
(3)	⌁	USB 2.0 port	Connects an optional USB device, such as a keyboard, mouse, external drive, printer, scanner or USB hub.
(4)	🎧	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.

Component	Description
	WARNING! To reduce the risk of personal injury, adjust the volume before putting on headphones, earbuds, or a headset. For additional safety information, refer to the *Regulatory, Safety, and Environmental Notices*.
	Windows 10:
	Select the **Start** button, select **All apps**, select **HP Help and Support**, and then select **HP Documentation**.
	– or –
	To access the user guides, select the **Start** button, select **All apps**, select HP, and then select **HP Documentation**.
	Windows 8:
	Select the **HP Support Assistant** app on the Start screen, select **My Computer**, and then select **User guides**.
(5) — + Volume button	Controls speaker volume on the tablet.
	● To increase speaker volume, press the **+** edge of the button.
	● To decrease speaker volume, press the **–** edge of the button.

Display
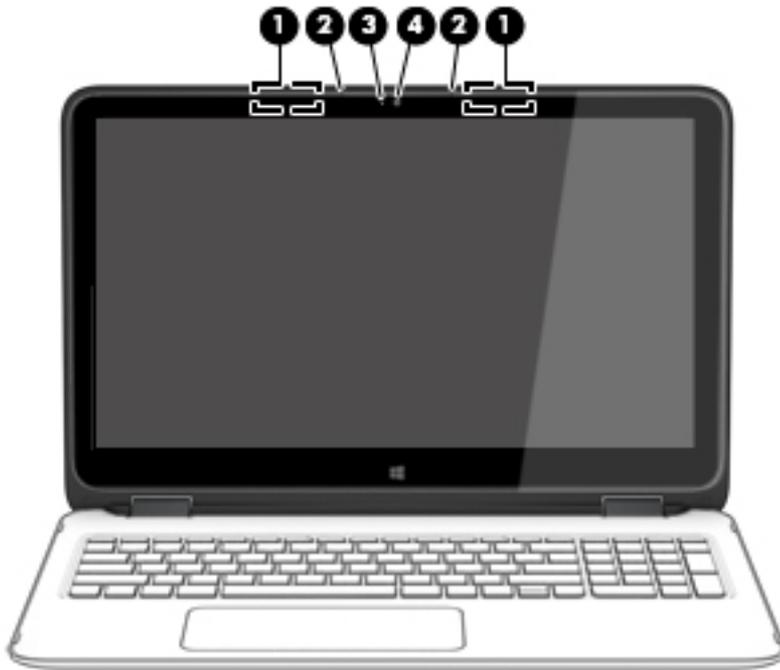
	Component	Description
(1)	WLAN antennas (2)*	Send and receive wireless signals to communicate with wireless local area networks (WLANs).
(2)	Internal microphones (2)	Record sound.
(3)	Webcam light	On: The webcam is in use.
(4)	Webcam	Records video and captures photographs. Some products allow you to video conference and chat online using streaming video. To use a webcam (integrated camera): ▲ Type `camera` in the taskbar search box, and then select **Camera**.

*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.

Windows 10:

Select the **Start** button, select **All apps**, select **HP Help and Support**, and then select **HP Documentation**.

– or –

To access the user guides, select the **Start** button, select **All apps**, select HP, and then select **HP Documentation**.

Windows 8:

Select the **HP Support Assistant** app on the Start screen, select **My Computer**, and then select **User guides**.

Display modes

Your computer has a hinge that allows you to rotate the display 360 degrees. This allows you to use your computer in three modes: productivity mode, entertainment mode, or tablet mode.

Mode		Description
Productivity mode		To use the notebook in productivity mode, raise the display until you can view the display (about 90 to 100 degrees).
Entertainment mode		To use your notebook in entertainment mode, raise the display, and then rotate it backward to a stand position (about 315 degrees). You can rest the notebook on the computer bottom or stand it on the front edges. **NOTE:** The Touchpad and keyboard functions are locked during this mode.
Tablet mode		To use your notebook as a tablet, raise the display, and then rotate it backward until it is flush with the computer bottom (360 degrees). **NOTE:** The Touchpad and keyboard functions are locked during this mode.

Top

TouchPad

Component		Description
(1)	TouchPad zone	Reads your finger gestures to move the pointer or activate items on the screen.
(2)	Left TouchPad button	Functions like the left button on an external mouse.
(3)	Right TouchPad button	Functions like the right button on an external mouse.

Lights

Component		Description
(1)	Power light	• 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.
(2)	Caps lock light	On: Caps lock is on, which switches the keys to all capital letters.
(3)	Mute light	• Amber: Computer sound is off.
		• Off: Computer sound is on.

Buttons and speakers

Component		Description
(1)	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 shutdown procedures are ineffective, press and hold the power button down for at least 5 seconds to turn off the computer.
		To learn more about your power settings, see your power options.
		▲ Type power in the taskbar search box, and then select **Power and sleep settings**.
		– or –
		Right-click the **Start** button, and then select **Power Options**.
(2)	Speakers	Produce sound.

Keys

Component		Description
(1)	esc key	Displays system information when pressed in combination with the fn key.
(2)	fn key	Executes frequently used system functions when pressed in combination with the esc key.
(3)	Windows key	Opens the **Start** menu. **NOTE:** Pressing the Windows key again will close the **Start** menu.
(4)	Action keys	Execute frequently used system functions. **NOTE:** On select models, the f5 action key turns the radiance backlight keyboard feature off or on.
(5)	num lock key	Alternates between the navigational and numeric functions on the integrated numeric keypad.
(6)	Integrated numeric keypad	When num lock is on, it can be used like an external numeric keypad.

Using the action keys

- An action key performs an assigned function.

- The icon on each action key illustrates the function for that key.

- To use an action key, press and hold the key.

Icon	Description
☀	Decreases the screen brightness incrementally as long as you hold down the key.
☀	Increases the screen brightness incrementally as long as you hold down the key.

Icon	Description
⌷□⌷	Switches the screen image between display devices connected to the system. For example, if a monitor is connected to the computer, repeatedly pressing this key alternates the screen image from the computer display to the monitor display to a simultaneous display on both the computer and the monitor.
	Turns the radiance backlight keyboard (also known as keyboard backlight) feature off or on. **NOTE:** To conserve battery power, turn off this feature.
	Mutes or restores speaker sound.
	Decreases speaker volume incrementally while you hold down the key.
	Increases speaker volume incrementally while you hold down the key.
	Plays the previous track of an audio CD or the previous section of a DVD or a BD.
▶ǁ	Begins, pauses, or resumes playback of an audio CD, a DVD, or a BD.
	Plays the next track of an audio CD or the next section of a DVD or a BD.
✈	Turns the airplane mode and wireless feature on or off. **NOTE:** The airplane mode key is also referred to as the wireless button. **NOTE:** A wireless network must be set up before a wireless connection is possible.

Bottom
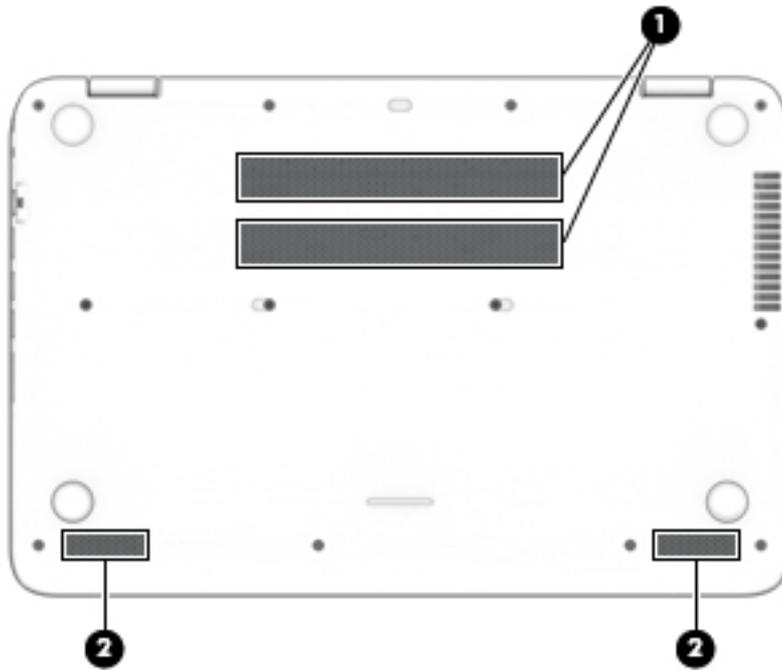
Component		Description
(1)	Vents	Enable airflow to cool internal components.
		NOTE: The computer fan starts up automatically to cool internal components and prevent overheating. It is normal for the internal fan to cycle on and off during routine operation.
(2)	Speakers	Produce sound.

Locating system information

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

IMPORTANT: The labels described in this section are on the bottom of the computer.

- 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.

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

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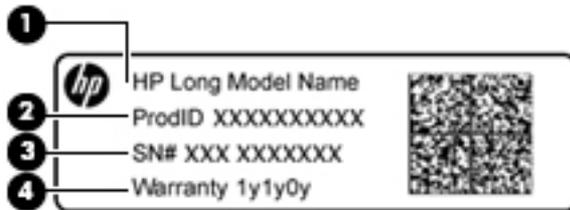
Component	
(1)	Model name (select products only)
(2)	Product number
(3)	Serial number
(4)	Warranty period

- 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

📝 **NOTE:** HP continually improves and changes product parts. For complete and current information on supported parts for your computer, go to http://partsurfer.hp.com, select your country or region, and then follow the on-screen instructions.

📝 **NOTE:** Details about your computer, including model, serial number, product key, and length of warranty, are on the service tag at the bottom of your computer. See Locating system information on page 15 for details.
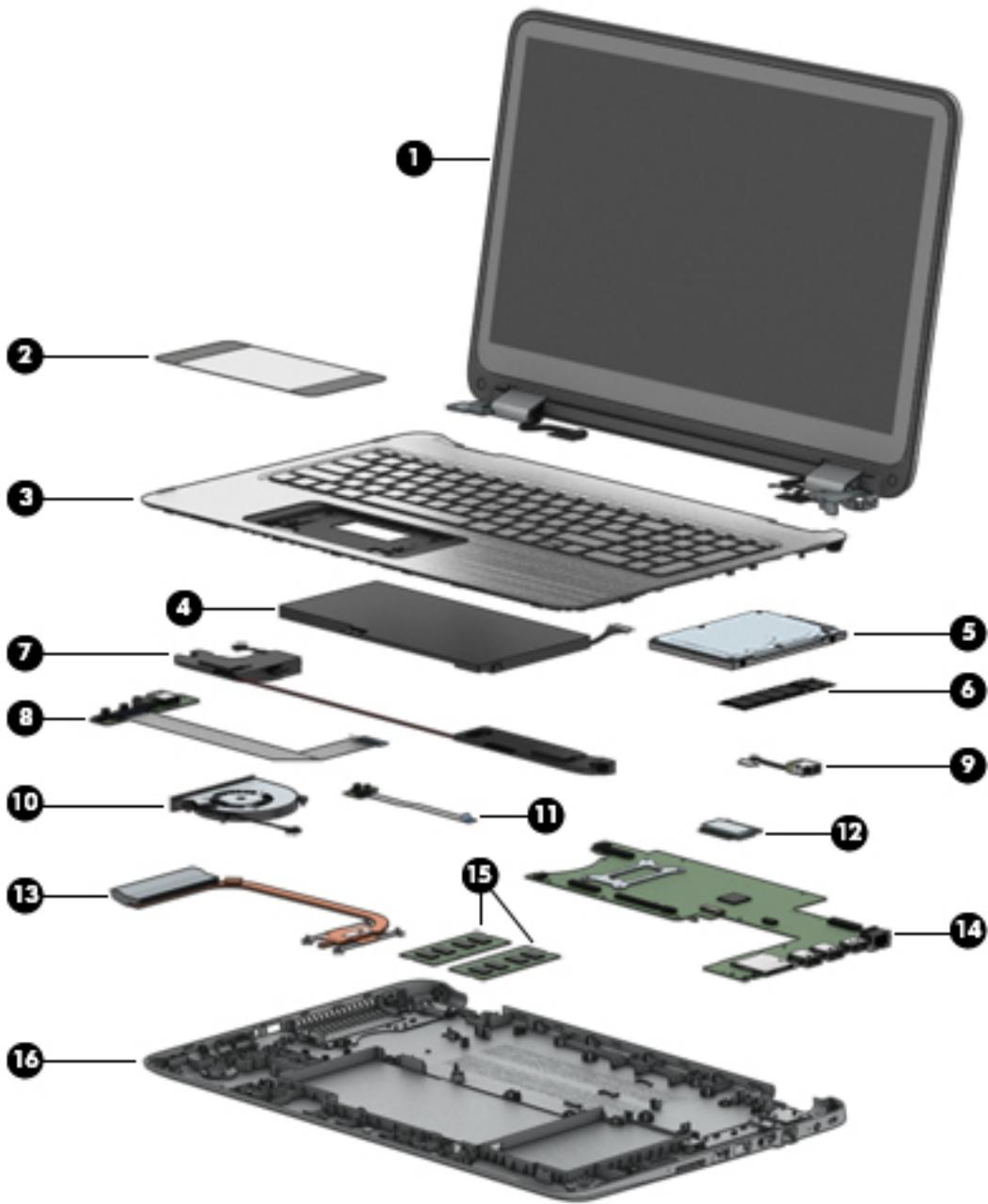
Item	Component	Spare part number
(1)	**Display assembly**	809386–001
(2)	**TouchPad board** (includes cable)	809387-001
(3)	**Top cover** (includes keyboard for use in the United States)	812879-001
(4)	**Battery**(3–cell, 43–Wh, 2.83–Ah, Li-ion)	761230-005
(5)	**Hard drive** (does not include hard drive bracket or hard drive connector cable):	
	1-TB, 5400-rpm, 7.2-mm	762990-005
	750-GB, 5400-rpm, 7.2-mm	752099-005

Item	Component	Spare part number
	500-GB, 5400-rpm, 7.0-mm	778186-005
	500-GB, 5400-rpm, 8 GB hybrid SSD, 7.0-mm	732000-005
	Hard Drive Hardware Kit (not illustrated, includes hard drive bracket and hard drive connector cable)	768020-001
(6)	**Solid State Drive** (select models only)	not spared
(7)	**Speaker Kit** (includes left and right speakers and cable)	774605-001
(8)	**USB/audio board** (includes cable)	774600-001
(9)	**Power connector cable**	768012–001
(10)	**Fan**	778793-001
(11)	**Power button board** (includes cable)	774599-001
(12)	**WLAN module** (Intel Dual Band Wireless-AC 3160 802.11 ac 1x1 WiFi + BT 4.0 Combo Adapter)	784638–005
(13)	**Heat sink** (includes replacement thermal material)	774595-001
(14)	**System board** (includes replacement thermal material):	
	Equipped with an Intel Core i7-5500U processor and the Windows 8.1 Standard operating system	809384–501
	Equipped with an Intel Core i7-5200U processor and the Windows 8.1 Standard operating system	809385–501
(15)	**Memory module** (PC3L, 12800, 1600):	
	8-GB	693374-005
	4-GB	691740-005
	2-GB	691739-005
(16)	**Base enclosure** (For use in models in North America)	812878-001

Display assembly subcomponents
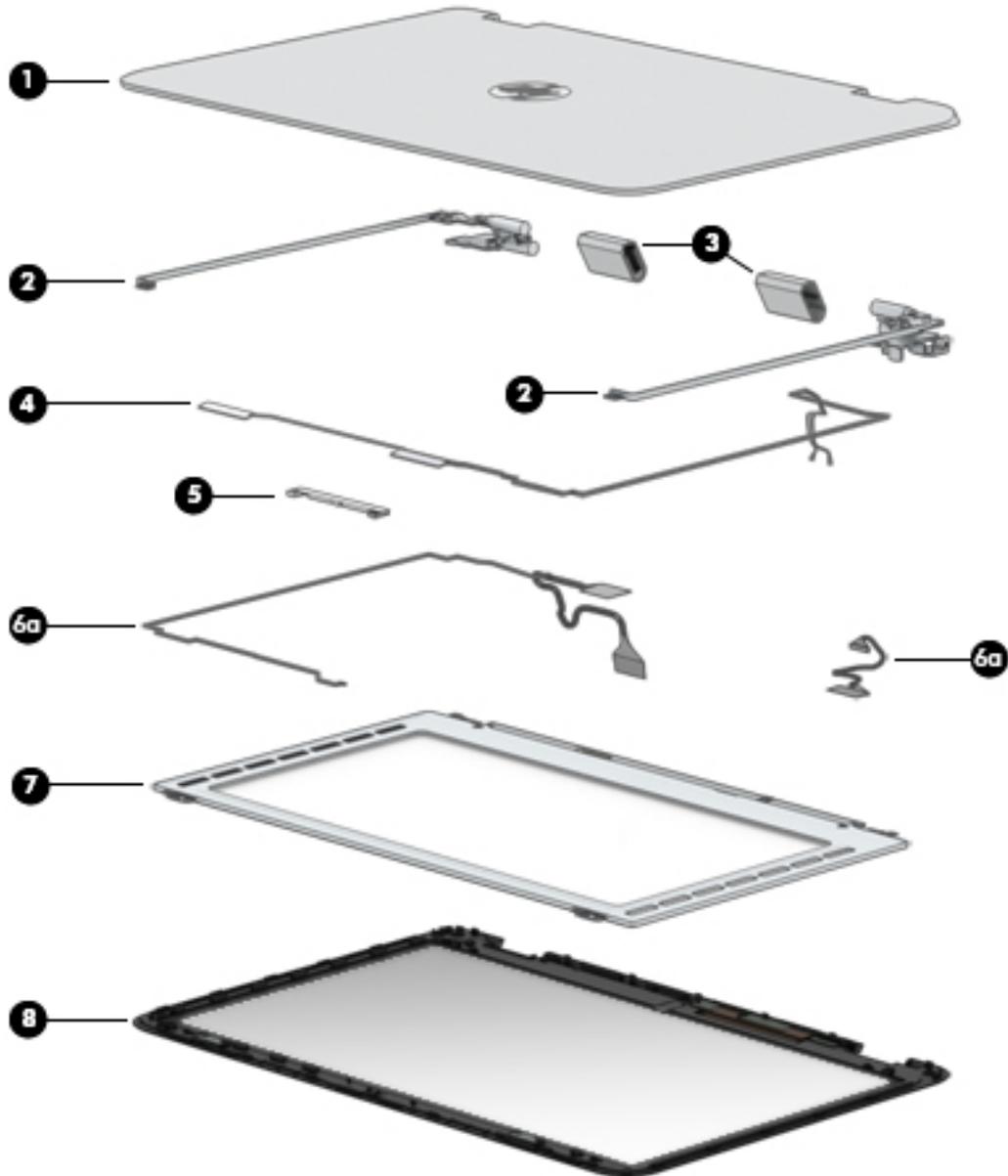
Item	Component	Spare part number
(1)	**Display enclosure**	812877–001
(2)	**Display hinges** (includes left and right hinges)	774596-001
(3)	**Display hinge covers**	774597-001
(4)	**Antenna**	774590-001
(5)	**Webcam and microphone module**	768040–001
(6a)	**Display cable kit** (includes display and webcam cable)	809388–001
	● FHD models	

Item	Component	Spare part number
	Display panel kit, includes:	809386–001
(7)	Bezel/glass	
(8)	Raw display panel	
	Fix bracket, touch control board, and backlight cable (not illustrated)	
	● FHD models	

Mass storage devices
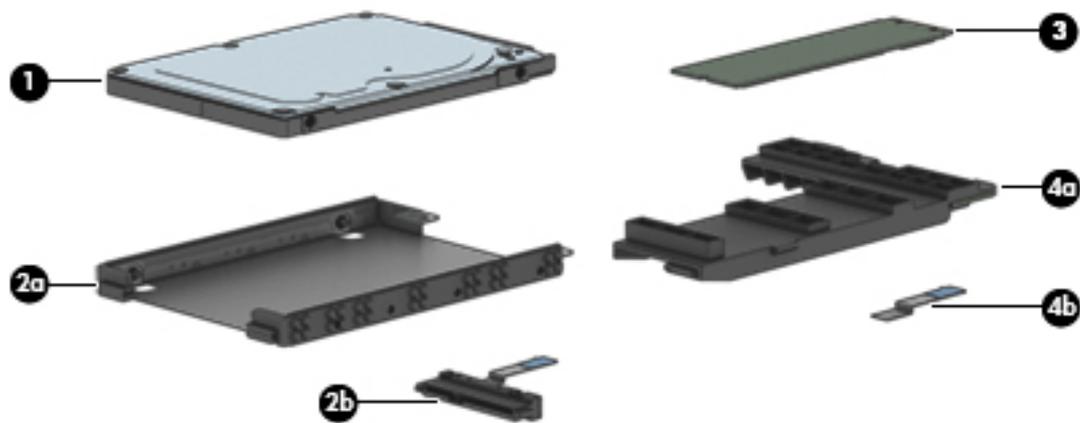
	Component	Spare part number
(1)	**Hard drive** (does not include hard drive bracket, hard drive connector cable, or screws):	
	1-TB, 5400-rpm, 7.0-mm	762990-005
	750-GB, 5400-rpm, 7.0-mm	752099-005
	500-GB, 5400-rpm, 7.0-mm	778186-005
	500-GB, 5400-rpm, 8 GB hybrid SSD, 7.0-mm	732000-005
	Hard Drive Hardware Kit, includes:	768020-001
(2a)	Hard drive bracket	
(2b)	Hard drive connector cable	
(3)	Solid state drive (select models only)	
(4a)	Solid state drive bracket (select models only)	
(4b)	Solid state drive connector cable (select models only)	
	External DVD±RW Double-Layer with SuperMulti Drive (not illustrated)	747080-001

Miscellaneous parts

Component	Spare part number
HP Smart AC adapter, 45-W, non-PFC, 4.5-mm, non-slim	741727-001
Power cord (For use in North America, 3-pin, black, 1.0-m):	755530-021
Rubber Feet Kit	768019-001
Screw Kit	774604-001
HDMI to VGA adapter	701943-001

4 Removal and replacement procedures preliminary 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

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.

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

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			
	Relative humidity		
Event	**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 ±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

5 Removal and replacement procedures for Authorized Service Provider parts

This chapter provides removal and replacement procedures for Authorized Service Provider only parts.

⚠ **CAUTION:** Components described in this chapter should only be accessed by an authorized service provider. Accessing these parts can damage the computer or void the warranty.

CAUTION: This computer does not have user-replaceable parts. Only HP authorized service providers should perform the removal and replacement procedures described here. Accessing the internal part could damage the computer or void the warranty.

Component replacement procedures

📝 **NOTE:** Details about your computer, including model, serial number, product key, and length of warranty, are on the service tag at the bottom of your computer. See for details.

📝 **NOTE:** HP continually improves and changes product parts. For complete and current information on supported parts for your computer, go to http://partsurfer.hp.com, select your country or region, and then follow the on-screen instructions.

There are as many as 76 screws that must be removed, replaced, and/or loosened when servicing Authorized Service Provider only parts. Make special note of each screw size and location during removal and replacement.

Top cover

Description	Spare part number
Top cover with keyboard for use in the United States	812879-001

IMPORTANT: Make special note of each screw and screw lock size and location during removal and replacement

Before removing 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.

Remove the top cover:

1. Position the computer upside-down.

2. Pry the two rear rubber feet off the top cover.
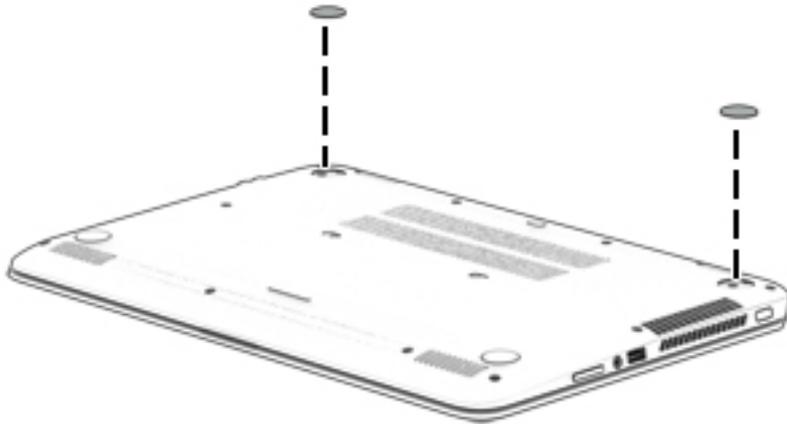
3. Remove the 12 Phillips PM2.5×6.0 screws **(1)** that secure the top cover to the computer.
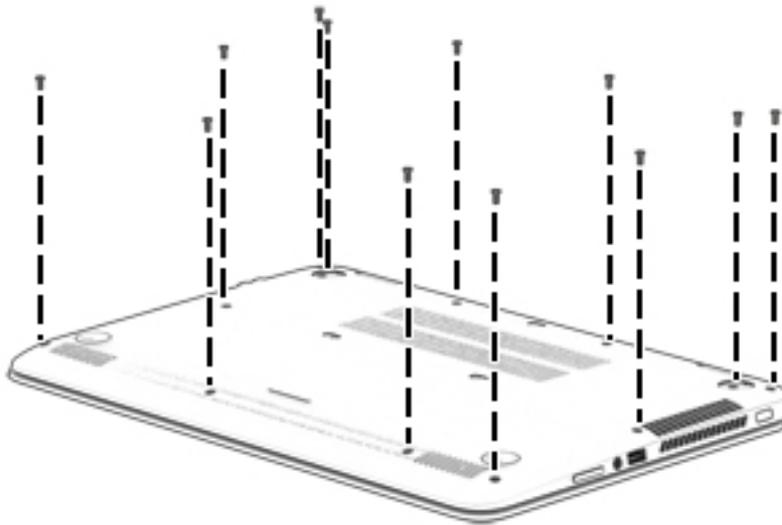
4. Separate the top cover from the computer by lifting up on the front of the top cover (starting near the touchpad) **(1)**, and then lifting the cover up and off the computer **(2)** far enough to access the keyboard and touchpad cables on the system board.

> **NOTE:** When you lift the top cover, cables are connected from the keyboard and touchpad (installed on the inside of the top cover) to the system board. Be sure not to pull the cables loose when lifting the top cover.
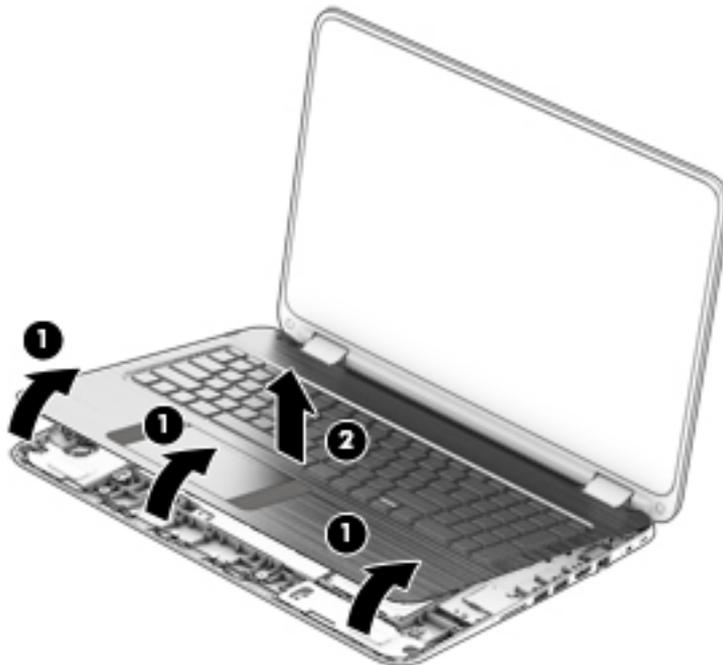
5. Disconnect the keyboard cable **(1)** and the touchpad cable **(2)** from the system board.
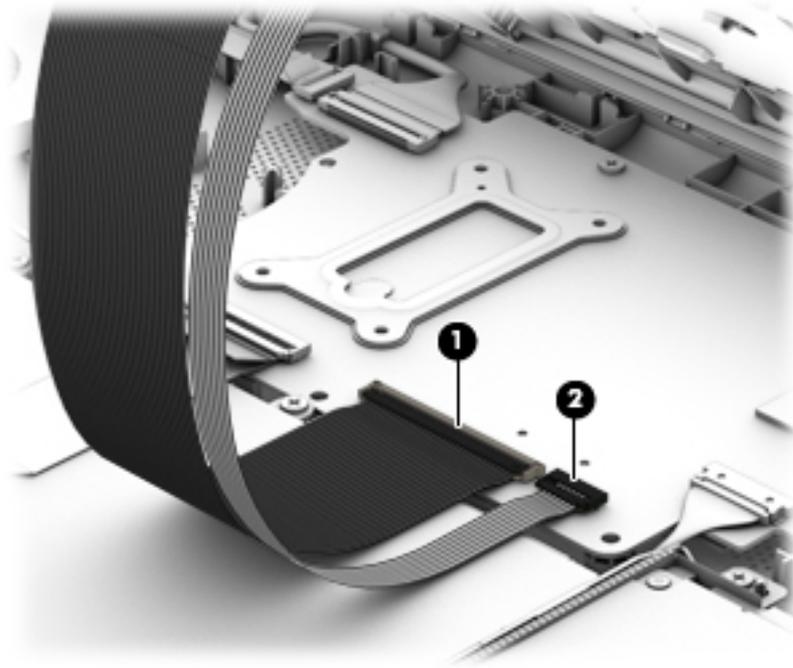
6. Remove the top cover from the computer.

Reverse this procedure to install the top cover.

Battery

NOTE: You do not have to remove the battery to remove most computer components. Be sure to disconnect the battery cable from the system board before removing any components.

| Description	Spare part number
3-cell, 43-Wh, 2.83-Ah, Li-ion battery	761230-005

Before removing the battery, 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 top cover (see).

5. Disconnect the battery.
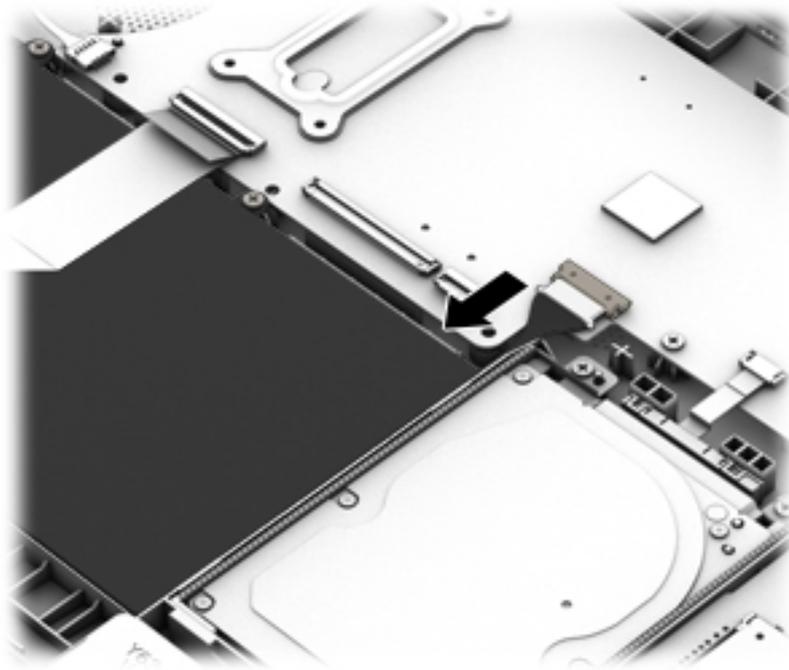
Remove the battery:

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.

1. Remove the three Phillips PM2.5×4.0 screws **(1)** that secure the battery to the computer.

2. Remove the battery **(2)**.
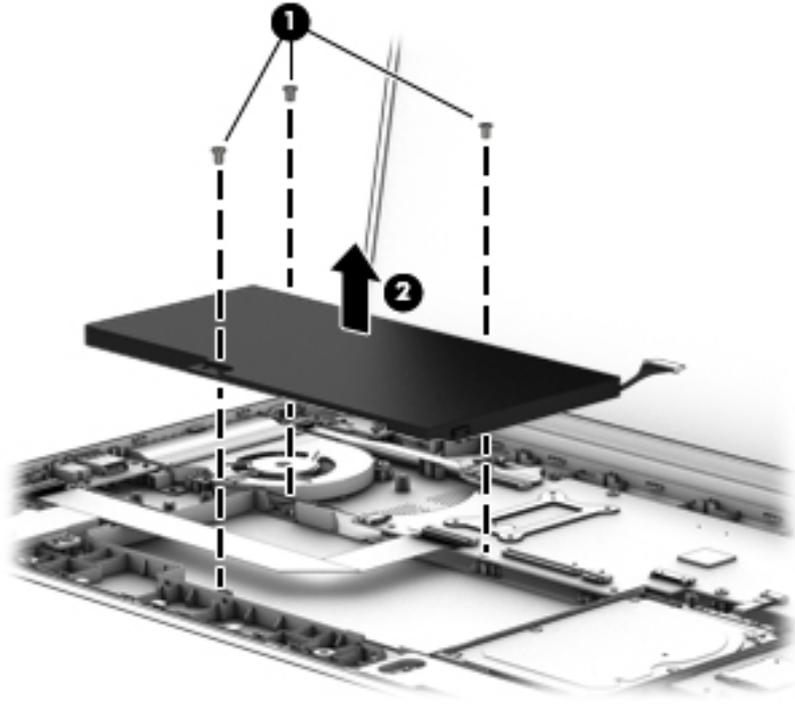
Reverse this procedure to install the battery.

TouchPad board

Description	Spare part number
Touchpad board (includes cable)	809387-001

Before removing the touchpad 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 top cover (see).

Remove the touchpad board:

1. Position the top cover upside-down.

2. Remove the three Phillips PM2.0×2.0 broadhead screws **(1)** that secure the TouchPad board to the computer.

3. Lift to disengage the cable from the adhesive securing it to the computer **(2)**.

4. Separate the touchpad board from the top cover by pulling it downward away from the top cover **(3)**.
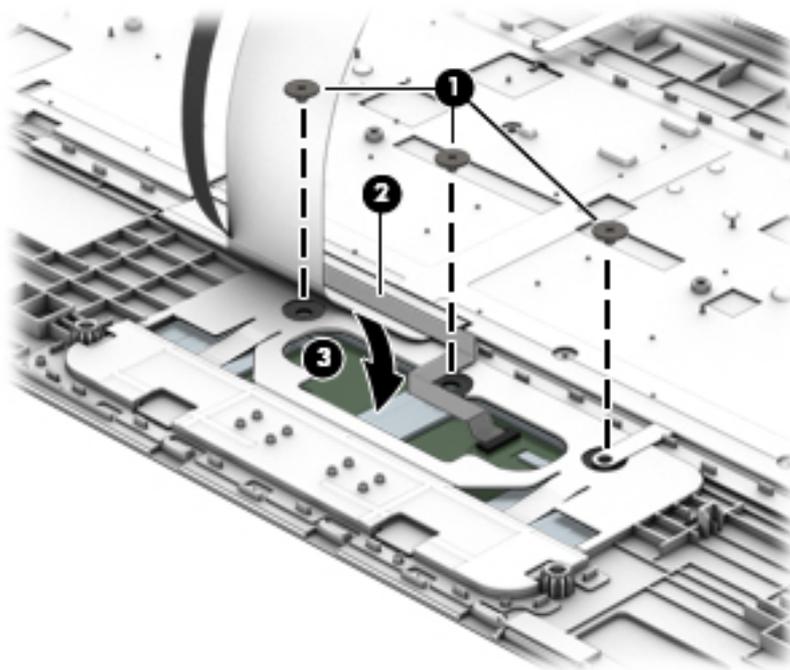
Reverse this procedure to install the touchpad board.

Hard drive

NOTE: The hard drive spare part kit does not include the hard drive bracket and hard drive connector cable. These components are included in the Hard Drive Hardware Kit, spare part number 768020-001.

Description	Spare part number
1-TB, 5400-rpm, 7.0-mm	762990-005
750-GB, 5400-rpm, 7.0-mm	752099-005
500-GB, 5400-rpm, 7.0-mm	778186-005
500-GB, 5400-rpm, 8 GB hybrid SSD, 7.0-mm	732000-005
Hard Drive Hardware Kit (includes cable, bracket, and screws)	768020-001

Before removing the hard drive, 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 top cover (see).

5. Disconnect the battery.
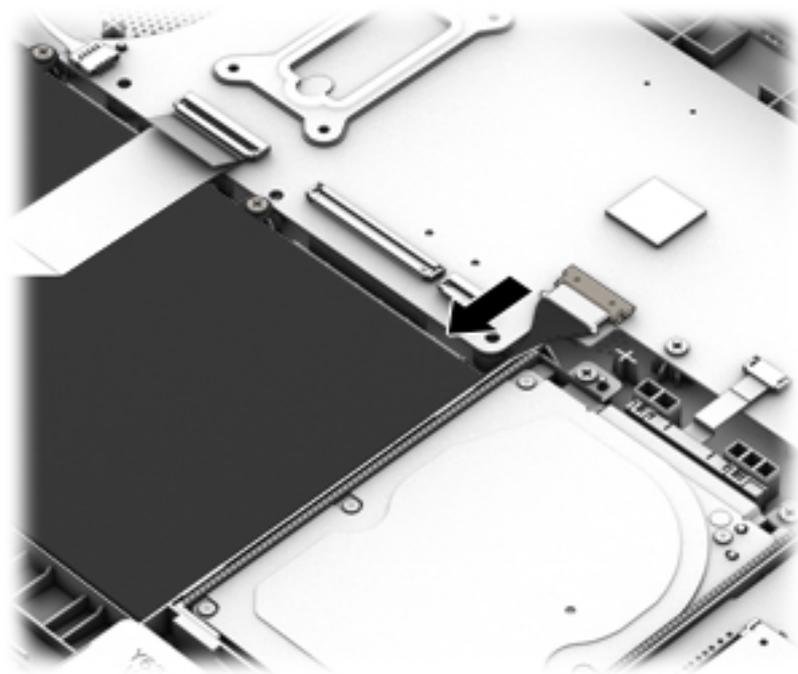
Remove the hard drive:

1. Disconnect the cable **(1)** from the system board.

2. Remove the two Phillips PM2.5×4.0 screws **(2)** that secure the hard drive to the computer.

3. Lift the hard drive out of the computer **(3)**.
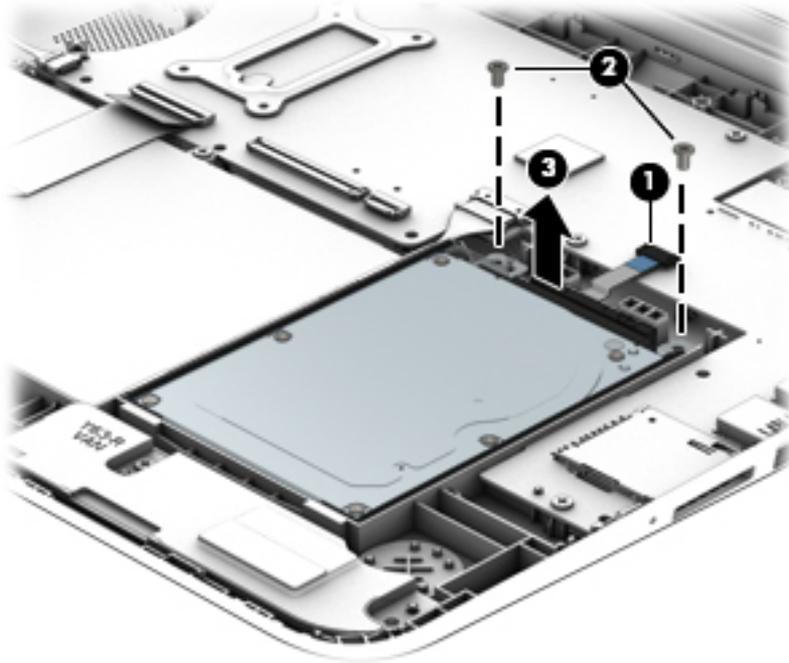
4. If it is necessary to disassemble the hard drive, perform the following steps:

    a. Disconnect the hard drive connector cable **(1)** from the hard drive.

    b. Flex the sides of the bracket to remove the pegs from the holes in the hard drive **(2)**.

    c. Remove the hard drive bracket **(3)** from the hard drive.

       The hard drive bracket and hard drive connector cable are available in the Hard Drive Hardware Kit, spare part number 768020-001.
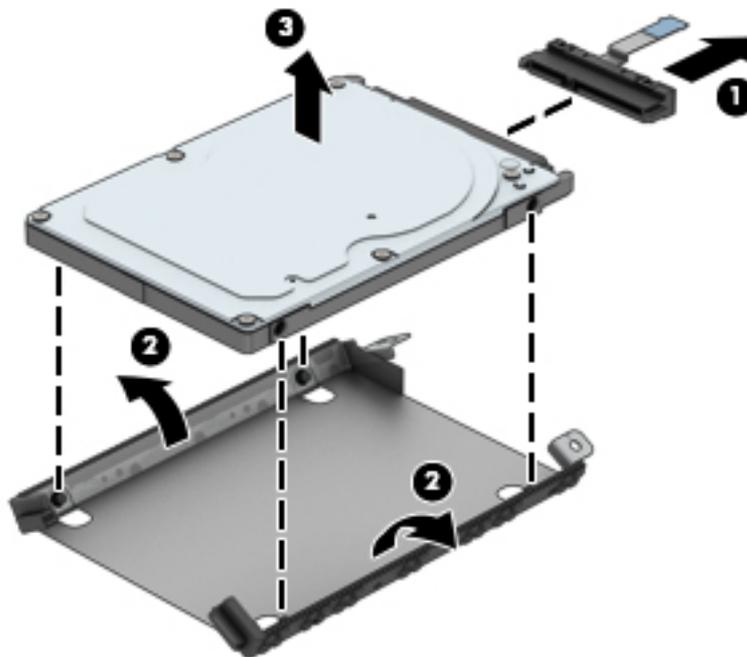
Reverse this procedure to install the hard drive.

WLAN module

Description	Spare part number
Intel Dual Band Wireless–AC 3160 802.11 ac 1x1 WiFi + BT 4.0 Combo Adapter	784638–005

⚠ **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 top cover (see).

5. Disconnect the battery.
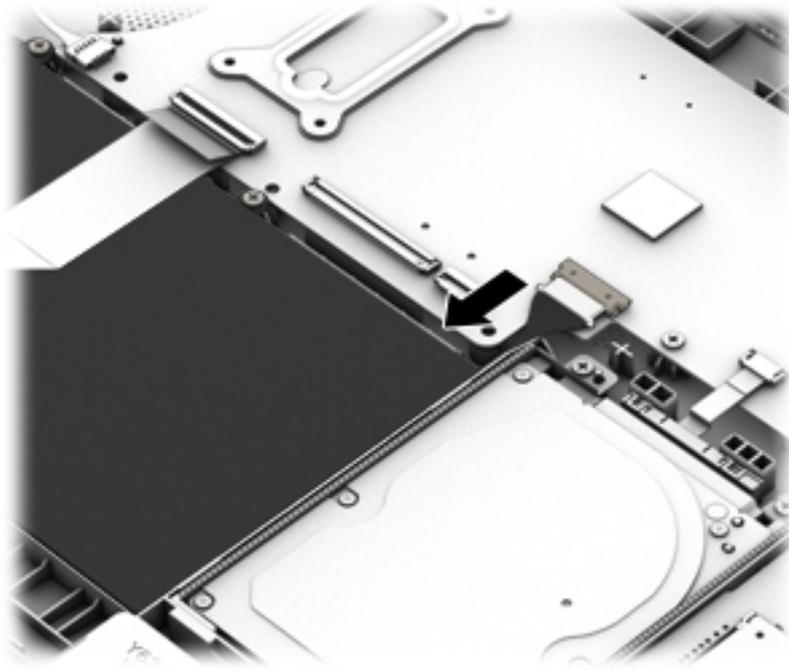
Remove the WLAN module:

1. Disconnect the WLAN antenna cables **(1)** from the terminal 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 system board. (The WLAN module tilts up.)

3. Remove the WLAN module **(3)** by pulling the module away from the slot at an angle.
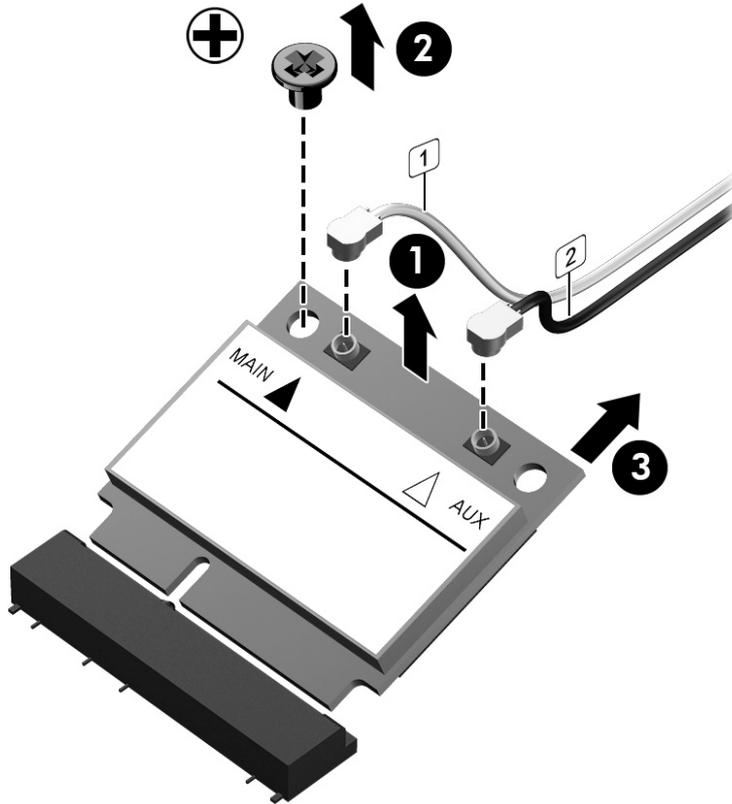
NOTE: If the WLAN antenna cables are not connected to the terminals on the WLAN module, the protective sleeves must be installed on the antenna connectors, as shown in the following illustration.
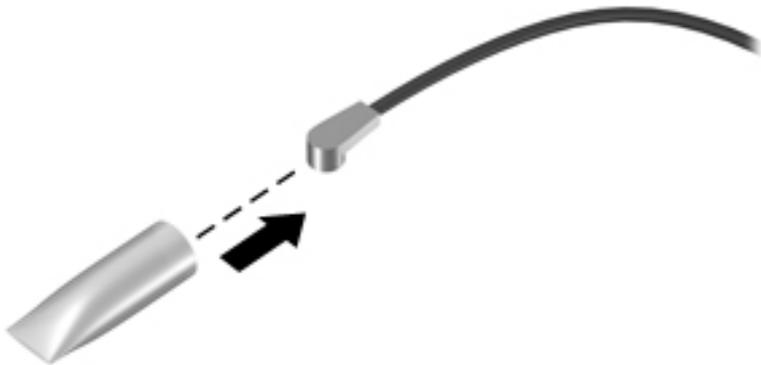
Reverse this procedure to install the WLAN module.

Speakers

| Description	Spare part number
Speaker Kit (includes left and right speakers and cable)	774605-001

Before removing the speakers, 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 top cover (see Top cover on page 28).

5. Disconnect the battery.
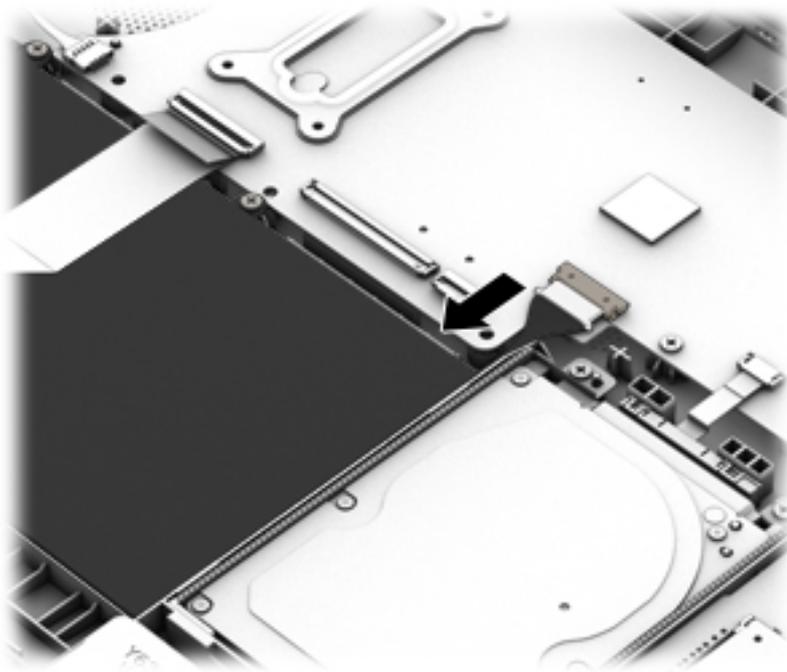
Remove the speakers:

1. Disconnect the speaker cable from the system board **(1)**.

2. Remove the cable from clips built into chassis **(2)**.

3. Remove the two Phillips PM2.5×4.0 screws **(3)** that secure the speakers to the computer.

4. Remove the speakers **(4)** from the computer.
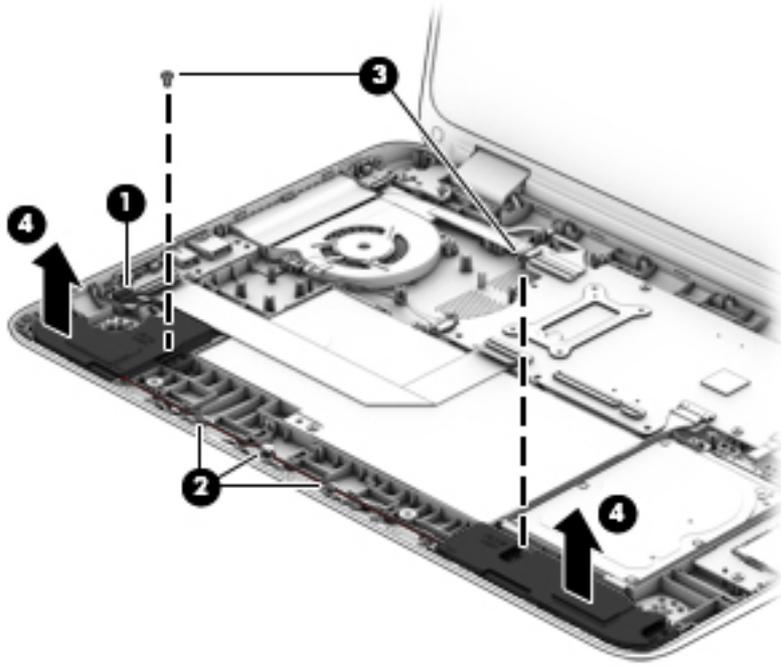
Reverse this procedure to install the speakers.

USB/audio board

Description	Spare part number
USB/audio board (includes cable)	774600-001

Before removing the USB/audio board, 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 top cover (see Top cover on page 28).

To remove the USB/audio board:

1. Disconnect the USB/audio cable from the system board **(1)**.

2. Disconnect the speaker cable from the USB/audio board **(2)**.

3. Remove the Phillips PM2.5×4.0 screw **(3)**.

4. Lift the USB/audio board and cable from the computer **(4)**.
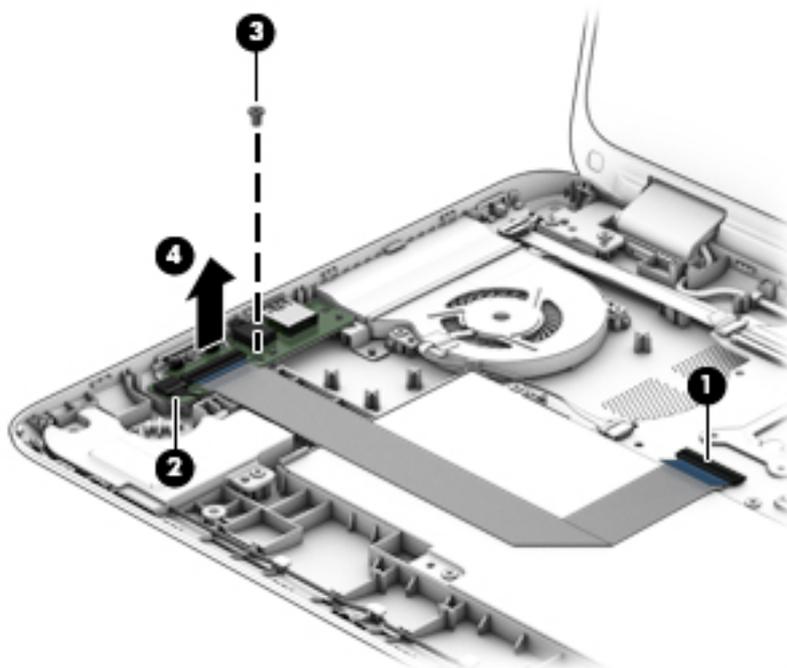
Reverse this procedure to install the USB/audio board.

Fan

| Description	Spare part number
Fan	778793-001

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 top cover (see Top cover on page 28).

5. Disconnect the battery.
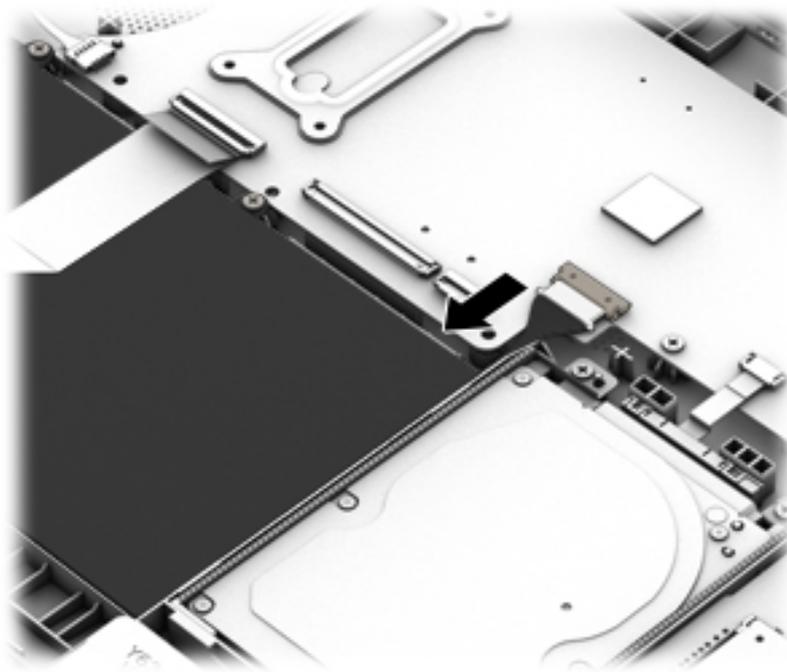
Remove the fan:

> **NOTE:** You do not have to remove the heat sink to remove the fan.

1. Disconnect the fan cable **(1)** from the system board.

2. Remove the three Phillips PM2.5×4.0 screws **(2)** that secure the fan to the computer.

3. Remove the fan **(3)**.
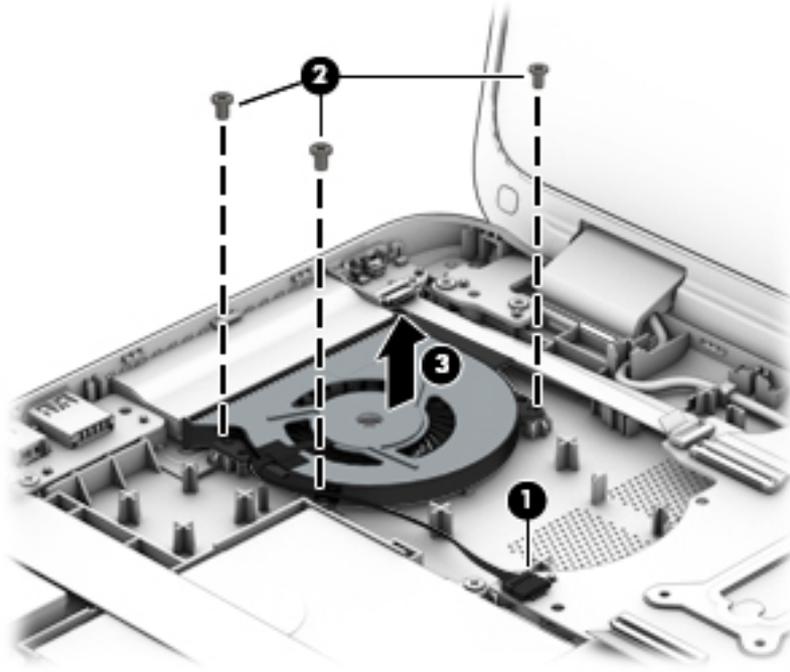
Reverse this procedure to install the fan.

Power button board

Description	Spare part number
Power button board (includes cable)	774599-001

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 top cover (see).

5. Disconnect the battery.
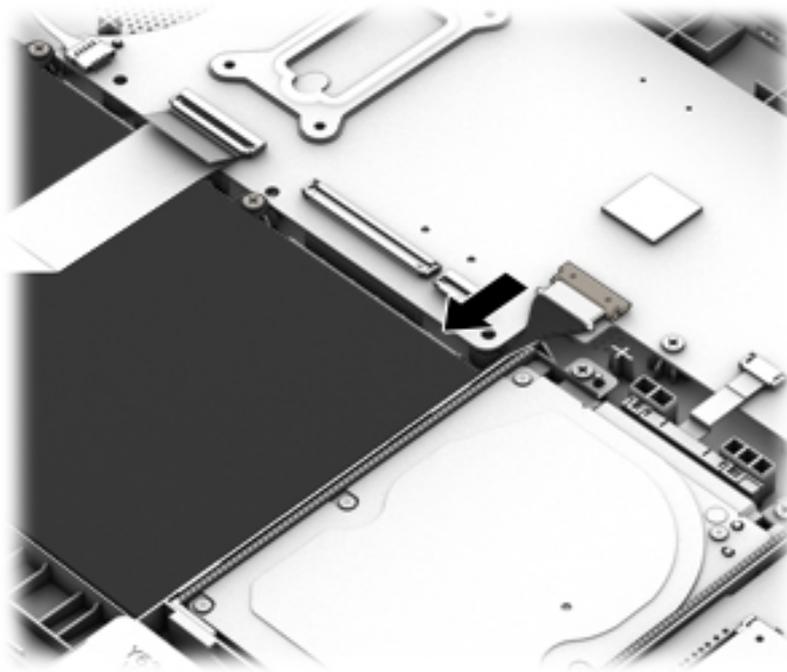
Remove the power button board:

1. Disconnect the power button board cable **(1)** from the system board.

2. Remove the Phillips PM2.5×4.0 screw **(2)** that secures the power button board to the computer.

3. Remove the power button board and cable **(3)**.
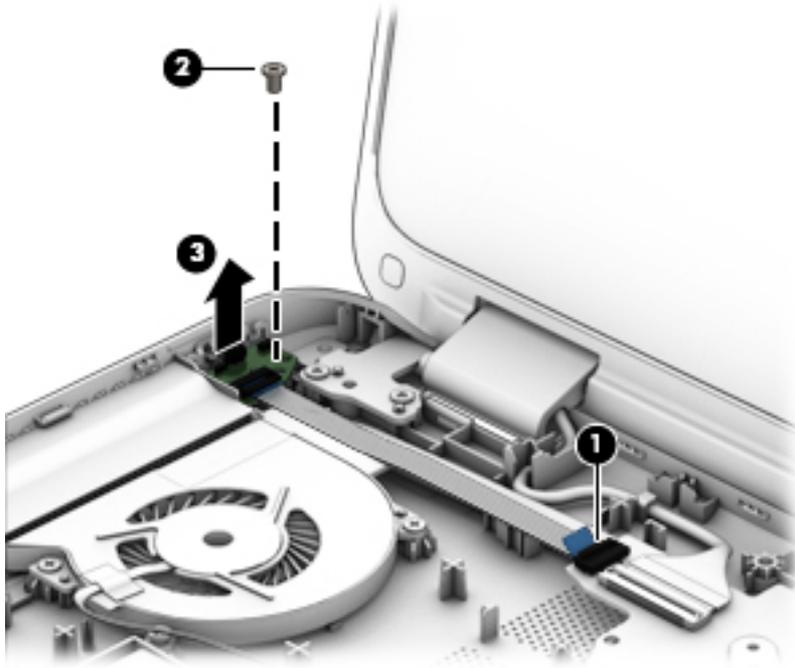
Reverse this procedure to install the power button board.

System board

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

| Description	Spare part number
Intel Core i7-5500U processor and a non-Windows 8 operating system	809384-001
Equipped with an Intel Core i7-5500U processor and the Windows 8.1 Standard operating system	809384–501
Intel Core i5-5200U processor and a non-Windows 8 operating system	809385-001
Equipped with an Intel Core i7-5200U processor and the Windows 8.1 Standard operating system	809385–501

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 top cover (see).

5. Disconnect the battery.
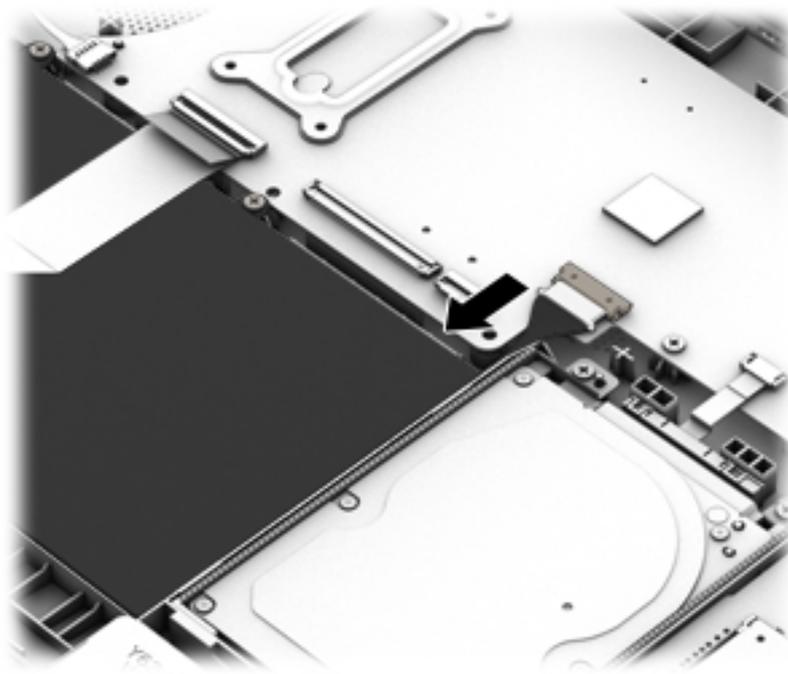
NOTE: When replacing the system board, be sure that the following components are removed from the defective system board and installed on the replacement system board:

- WLAN module (see)

- Memory module (see)

- Heat sink (see)

Remove the system board:

1. Disconnect the following cables from the system board:

   (1): Power button board cable

   (2): Left display cable

   (3): Power connector cable

   (4): Right display cable

   (5): Fan cable

   (6): USB/audio cable

   (7): Hard drive cable
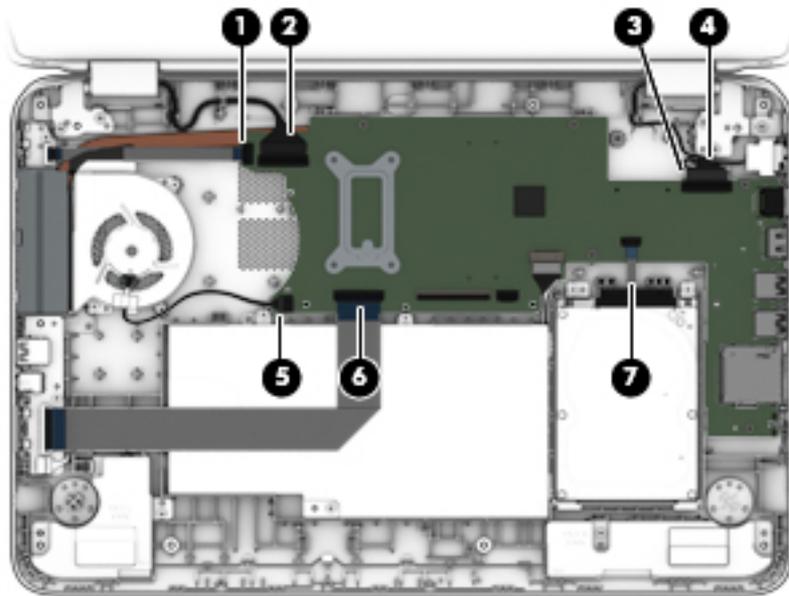
2. Remove the two nuts **(1)** that secure the system board to the computer.

3. Remove the five Phillips PM2.5×4.0 screws **(2)** that secure the system board to the computer.

4. Flex the side of the computer so you can lift the heat sink out **(3)**, and then lift the left side of the system board **(4)**, and then pull it away from the side connectors and remove it from the computer.
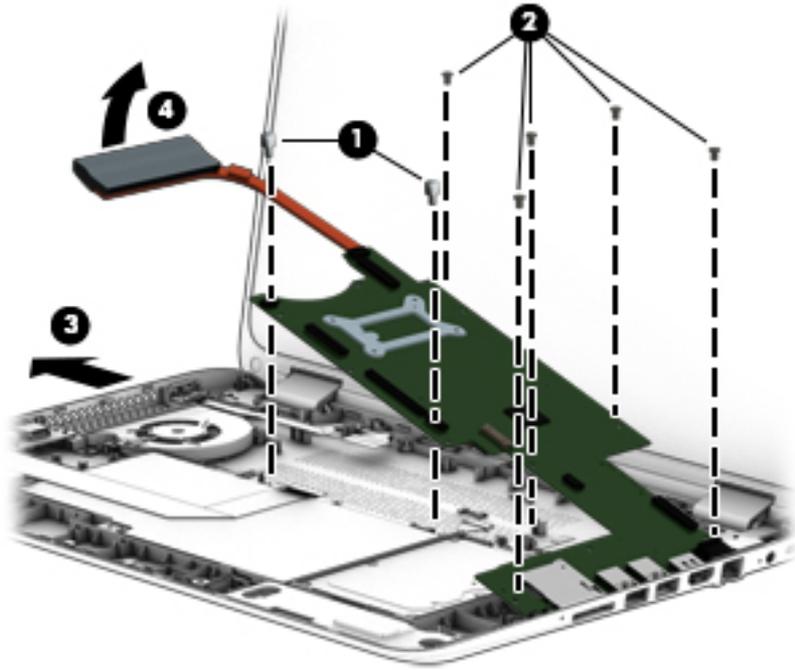
Reverse this procedure to install the system board.

Memory module

Description	Spare part number
8-GB (PC3L, 12800, 1600-MHz)	693374-005
4-GB (PC3L, 12800, 1600-MHz)	691740-005
2-GB (PC3L, 12800, 1600-MHz)	691739-005

Update BIOS before adding memory modules

Before adding new memory, make sure you update the computer to the latest BIOS.

⚠ **CAUTION:** Failure to update the computer to the latest BIOS prior to installing new memory may result in various system problems.

To update BIOS:

1. Navigate to www.hp.com.
2. Click **Support & Drivers > click Drivers & Software**.
3. In the **Enter a product name/number box**, type the computer model information, and then click **Search**.
4. Click the link for the computer model.
5. Select the operating system, and then click **Next**.
6. Under **Step 2: Select a Download**, click the **BIOS** link.
7. Click the link for the most recent BIOS.
8. Click the **Download** button, and then follow the on-screen instructions.

Before removing a memory 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 top cover (see Top cover on page 28).

5. Disconnect the battery.
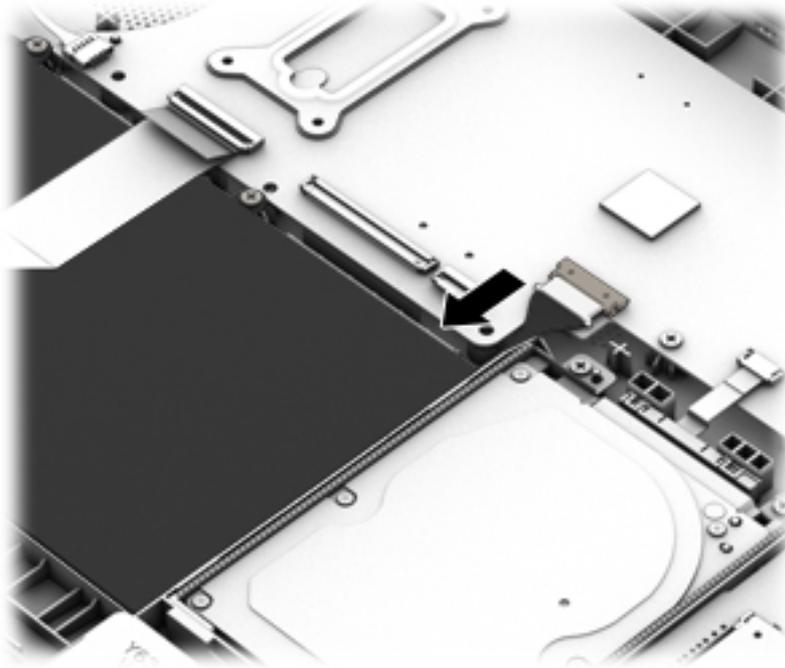
6. Remove the WLAN module (see WLAN module on page 37).

7. Remove the system board (see System board on page 46).

Remove the memory module:

1. Position the system board upside-down.

2. Spread the retaining tabs **(1)** on each side of the memory module slot to release the memory module. (The memory module tilts up.)

3. Remove the memory module **(2)** by pulling the module away from the slot at an angle.

Reverse this procedure to install a memory module.

Heat sink

Description	Spare part number
Heat sink (includes replacement thermal material)	774595-001

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 top cover (see).

5. Disconnect the battery.

6. Remove the WLAN module (see).

7. Remove the system board (see).

Remove the heat sink:

NOTE: You do not have to remove the fan to remove the heat sink. You must disengage the tape that secures the heat sink to the fan.

1. Position the system board upside-down.

2. Following the 1 through 4 sequence stamped into the heat sink, loosen the four captive Phillips screws **(1)** that secure the heat sink to the system board.

3. Remove the heat sink **(2)**.

📝 **NOTE:** Due to the adhesive quality of the thermal material located between the heat sink and the system board components, it may be necessary to move the heat sink from side to side to detach it.
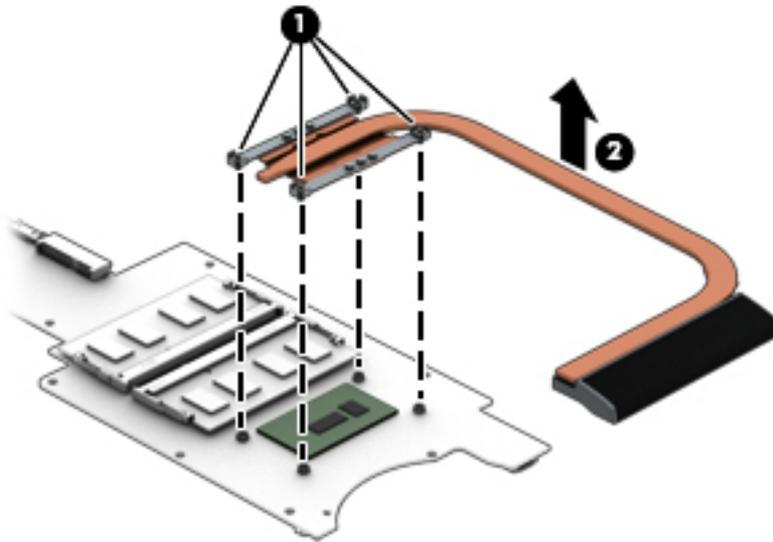
📝 **NOTE:** The thermal material must be thoroughly cleaned from the surfaces of the heat sink and the system board components each time the heat sink is removed. Thermal paste is used on the processor **(1)** and the heat sink section **(2)** that services it
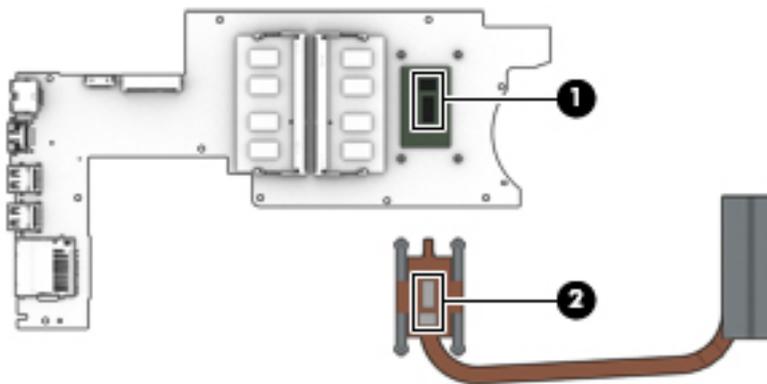
Reverse this procedure to install the heat sink.

Display assembly

Before removing the display assembly, 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 top cover (see).

5. Disconnect the battery.
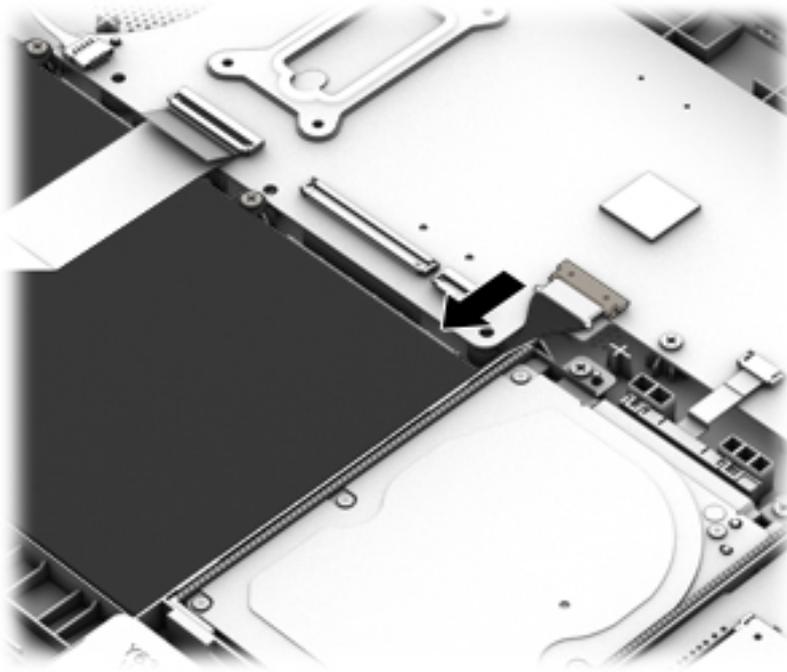
To remove the display assembly:

1. Disconnect the left display panel cable **(1)** from the system board.

2. Disconnect the antenna cables **(2)** from the WLAN module.

3. Disconnect the right display panel cable **(3)** from the system board.
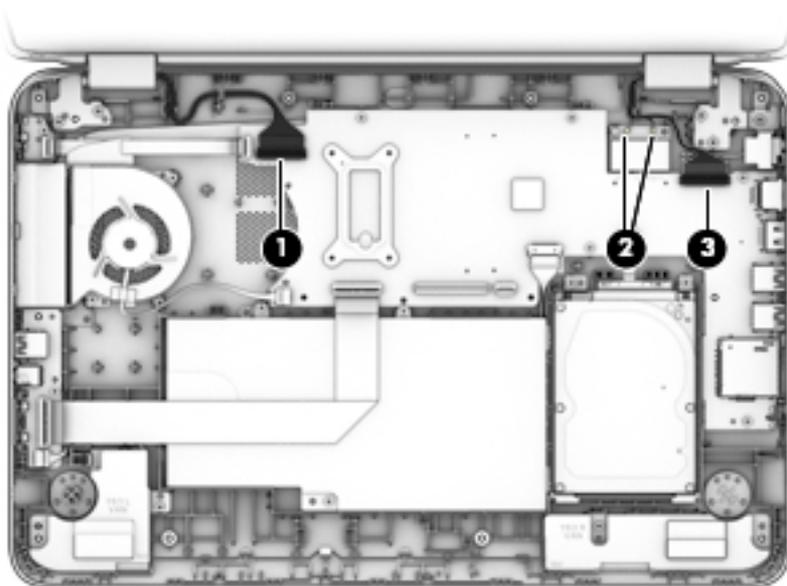
4. Remove two Phillips PM2.5×5.5 screws from each hinge **(1)** and the smaller Phillips PM2.5×3.6 screw from the right hinge **(2)** that secures the display assembly to the computer.

⚠ **CAUTION:** Support the display assembly when removing the screws. Failure to support the display assembly can result in damage to the display assembly and other computer components.

5. Remove the display assembly from the computer **(3)**.
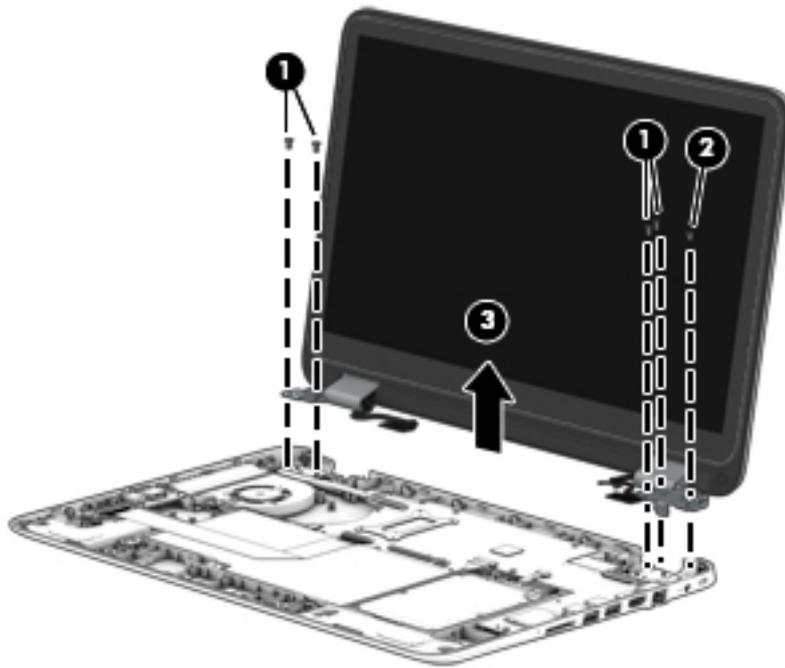
If it is necessary to replace any of the display assembly subcomponents:

1. To remove the display panel and bezel from the display enclosure:

📝 **NOTE:** The display enclosure is available using spare part number 812878-001.

a. Remove the two screw covers **(1)**.

b. Remove the two Phillips PM2.5×4.0 screws **(2)** that secure the enclosure to the display panel.

c. Pry to separate the enclosure from the display **(3)**.
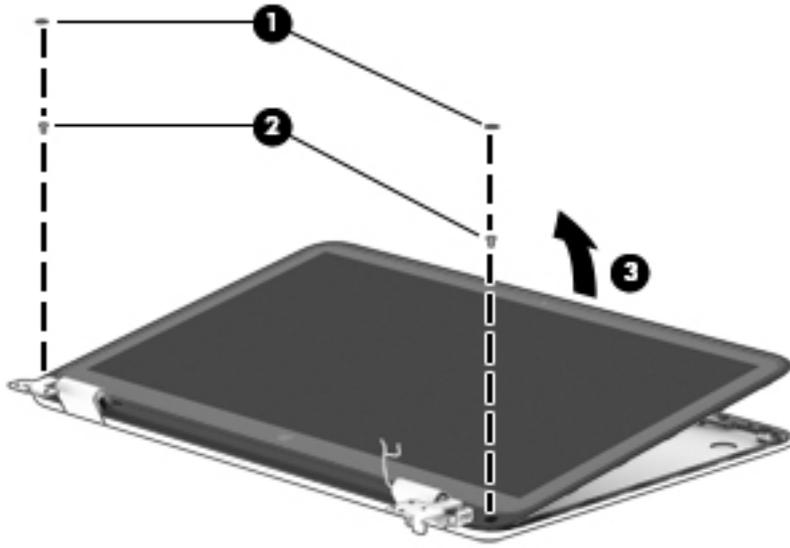
2. The webcam and microphone module is mounted on the inside of the bezel. To remove the webcam and microphone module:

NOTE: The webcam is available using spare part number 768040-001.

a. Position the display bezel/display panel assembly upside-down.

b. Disconnect the cable **(1)** from the module.

c. Use a thin tool to lift the webcam module to disengage the adhesive that secures it to the display **(2)**, and then remove the webcam module **(3)**.
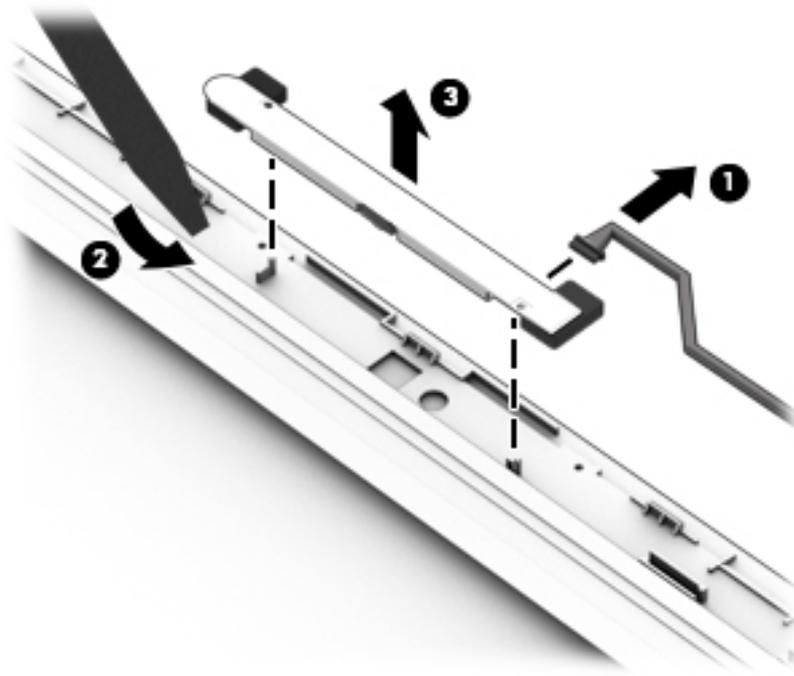
3. The touch screen display cable connects to the board at the bottom of the bezel. To disconnect the touch screen display cable from the display bezel, pull the cable upward to disconnect.

> **NOTE:** The touch screen display cable is available in the cable kit using spare part number 809388-001 for FHD panels.

4. The display/webcam cable connects to the bottom of the display panel. To remove the display/webcam cable:

> **NOTE:** The display/webcam cable is available in the cable kit using spare part number 809388-001 for FHD models.

    a. Position the display bezel/display panel assembly upside-down.

    b. Disconnect the display cable from the connector at the bottom of the display panel **(1)**.

    c. Disconnect the webcam cable from the webcam **(2)**.

    d. Remove the cable from the routing path and clips along the right side of the display bezel **(3)**.

e. Remove the display/webcam cable **(4)**.
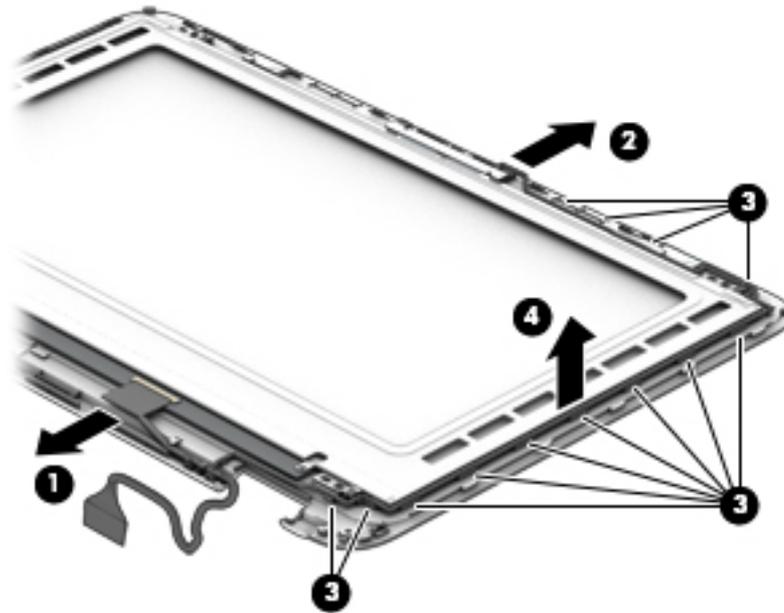
5. To remove the display panel from the bezel:

NOTE: The display panel and bezel are available using spare part number 809386-001 for FHD panels.

a. Position the display bezel/display panel assembly upside-down.

b. If necessary, disconnect the display/webcam cable from the connector at the bottom of the display panel **(1)**.

c. Remove the four Phillips PM2.0×3.0 screws **(2)** that secure the display panel to the display enclosure.

d. Remove the display panel from the bezel **(3)**.
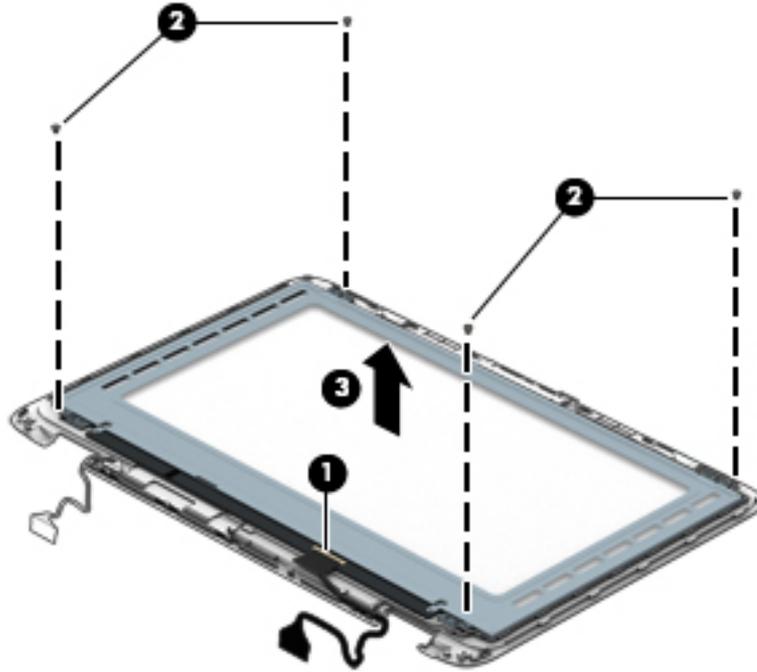
6. The display hinges are located in the display enclosure. To remove the display hinges:

NOTE: The display hinges are available using spare part number 774596-001.

a. Position the display enclosure so you can access the internal parts.

b. Remove the four Phillips PM2.5×4.0 screws from the bottom of the hinges **(1)** and the two Phillips PM2.0×3.0 screws **(2)** from the top of the hinges that secure the hinges to the display enclosure.

c. Remove the hinges from the display **(3)**.
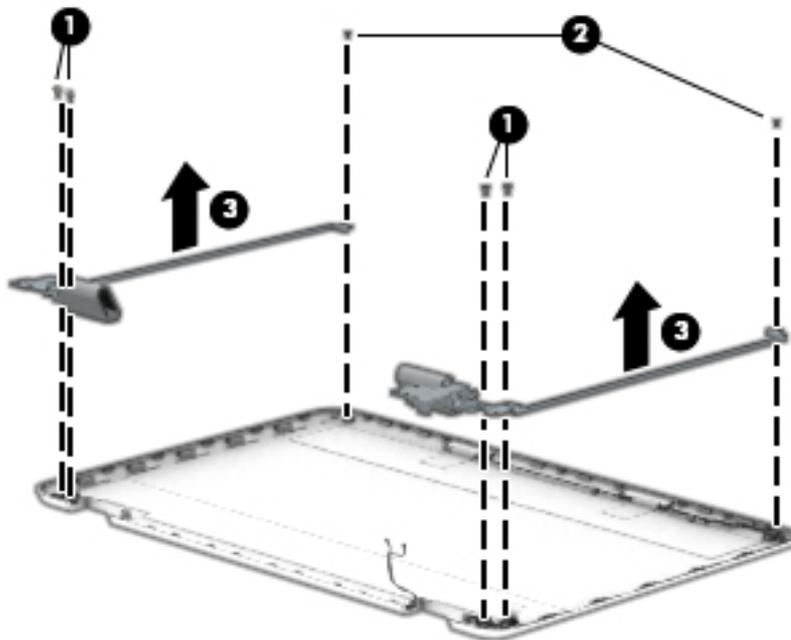
7. The hinge covers are installed on the display hinges. To remove the display hinge covers:

NOTE: The display hinge covers are available using spare part number 774597-001.

   a. From the inside of the hinge covers, remove the two Phillips PM2.0×3.0 screws (one per hinge) **(1)** that secure the hinge covers to the hinges.

   b. Pull the hinge covers off the hinges **(2)**.
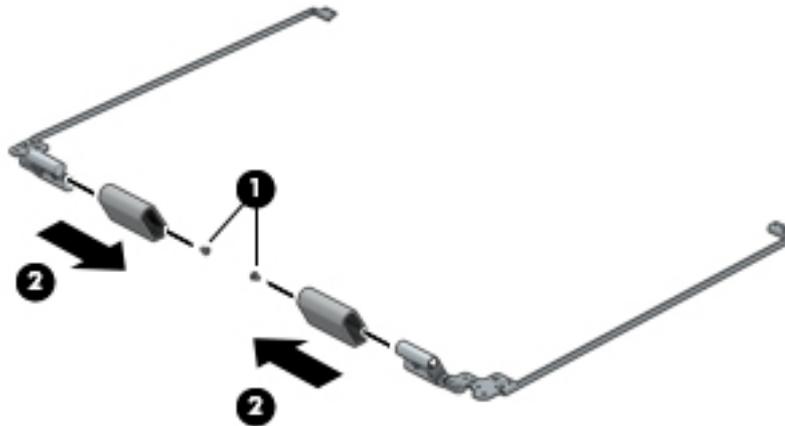
8. The antenna cables are installed in the display enclosure. To remove the antenna cables:

NOTE: The antenna cables are available using spare part number 774590-001.

   a. Lift the tape that secures the antenna cables to the bottom of the display enclosure **(1)**.

   b. Remove the cables from the clips built into the enclosure **(2)**.

   c. Lift the tape that secures the transceivers at the top of the display **(3)**, and then remove the antenna cables from the display enclosure **(4)**.
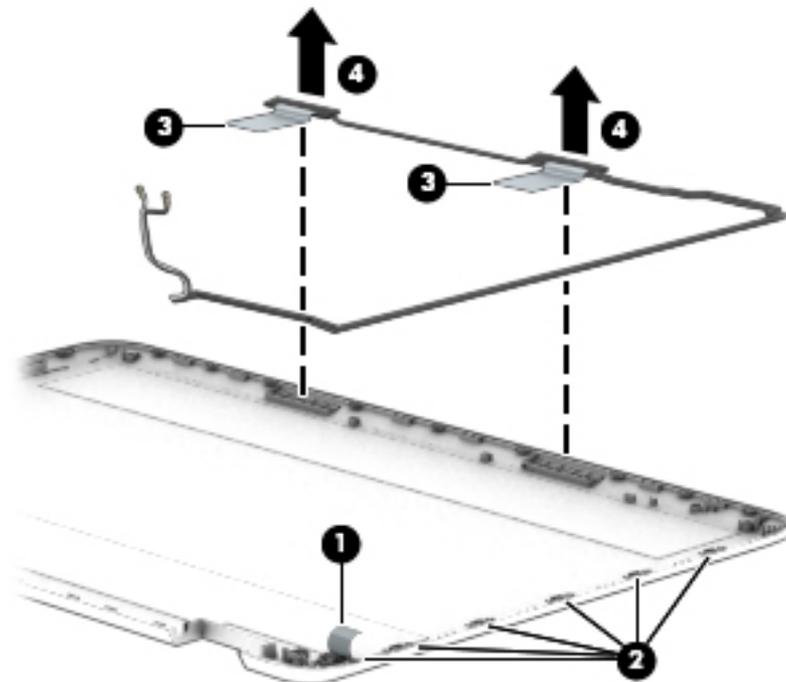
Reverse this procedure to reassemble and install the display assembly.

Power connector cable

Description	Spare part number
Power connector cable	768012-001

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 top cover (see).

5. Disconnect the battery.
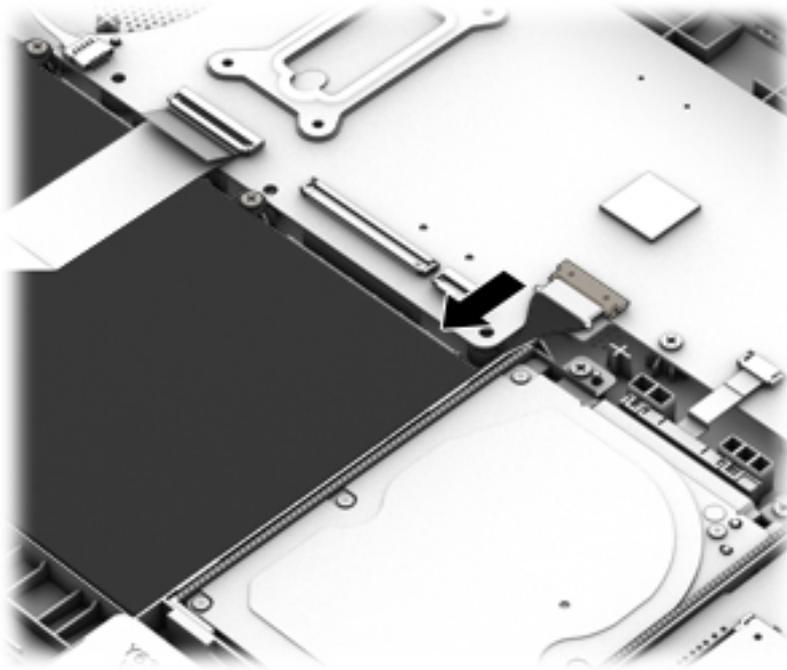
6. Remove the display (see).

Remove the power connector cable:

1. Disconnect the power connector cable **(1)** from the system board.

2. Remove the power connector **(2)** from the computer.
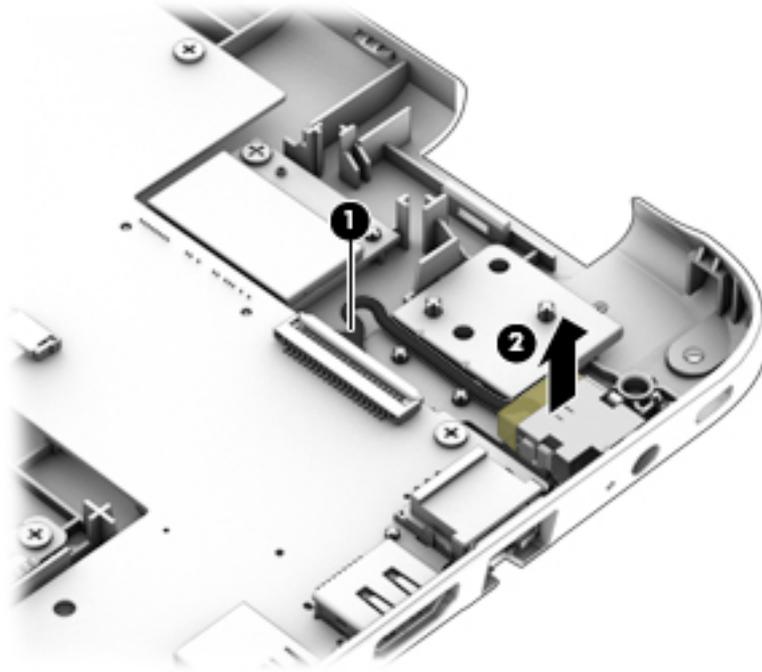
Reverse this procedure to install the power connector cable.

6   Using Setup Utility (BIOS) in Windows 10

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.

NOTE: To start Setup Utility on convertible computers, your computer must be in notebook mode and you must use the keyboard attached to your notebook. The on-screen keyboard, which displays in tablet mode, cannot access Setup Utility.

Starting Setup Utility (BIOS)

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

NOTE: To start Setup Utility on convertible computers, your computer must be in notebook mode and you must use the keyboard attached to your notebook. The on-screen keyboard, which displays in tablet mode, cannot access Setup Utility.

- Computers or tablets with keyboards:

  ▲   Turn on or restart the computer, quickly press esc, and then press f10.

- Tablets without keyboards:

  1.   Turn on or restart the tablet, and then quickly hold down the volume down button.

       - or -

       Turn on or restart the tablet, and then quickly hold down the Windows button.

  2.   Tap **f10**.

Updating Setup Utility (BIOS)

Updated versions of Setup Utility (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 decide whether you need to update Setup Utility (BIOS), first determine the BIOS version on your computer.

To reveal the BIOS version information (also known as *ROM date* and *System BIOS*):

1.   Type `support` in the taskbar search box, and then select the **HP Support Assistant** app.

     – or –

Click the question mark icon in the taskbar.

2. Select **My PC**, and then select **Specifications**.

– or –

▲ Use Setup Utility (BIOS).

To use Setup Utility (BIOS):

1. Start Setup Utility (BIOS) (see Starting Setup Utility (BIOS) on page 63).

2. Select **Main**, select System Information, and then make note of the BIOS version.

3. Select **Exit**, select **No**, and then follow the on-screen instructions.

To check for later BIOS versions, see Downloading a BIOS update on page 64.

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.

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

1. Type `support` in the taskbar search box, and then select the **HP Support Assistant** app.

– or –

Click the question mark icon in the taskbar.

2. Click **Updates**, and then click **Check for updates and messages**.

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 version, 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.

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.

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

1. Type `file` in the taskbar search box, 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 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.

Synchronizing a tablet and keyboard (select products only)

For a tablet with a detachable keyboard, when you attach the tablet to the keyboard and restart the computer, Setup Utility (BIOS) checks to see if the Embedded Controller firmware on the keyboard needs to be synchronized. If so, synchronization begins. If the synchronization is interrupted, a notification screen displays for 10 seconds before the tablet restarts and attempts to synchronize again.

📝 **NOTE:** The Embedded Controller firmware will synchronize ONLY if the tablet or keyboard battery is more than 50% charged, or if your tablet is connected to AC power.

7 Using Setup Utility (BIOS) in Windows 8.1

Using Setup Utility (BIOS)

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.

NOTE: To start the Setup Utility, your computer must be in notebook mode and you must ust the keyboard attached to your notebook. The on-screen keyboard, which displays in tablet mode cannot access the Setup Utility.

Starting Setup Utility (BIOS)

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

- Computers:

    ▲ Turn on or restart the computer, quickly press esc, and then press f10.

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 the one currently installed on the computer, you need to know the version of the system BIOS that is installed.

BIOS version information (also known as *ROM date* and *System BIOS*) can be revealed from the Start screen by typing support, selecting the **HP Support Assistant** app, selecting **My computer**, and then selecting **System Information**, or by using Setup Utility (BIOS).

1. Start Setup Utility (BIOS) (see).

2. Select **Main**, and then make note of your BIOS version.

3. Select **Exit**, select **Exit Discarding Changes**, and then follow the on-screen instructions.

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.

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

1. From the Start screen, type `support`, and then select the **HP Support Assistant** app.

   – or –

   From the Windows desktop, click the question mark icon in the taskbar area of the Windows desktop.

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.

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

1. From the Start screen, type `file`, and then select **File Explorer**.

   – or –

   From the Windows desktop, right-click the **Start** button, 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.

8 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.

When HP PC Hardware Diagnostics (UEFI) detects a failure that requires hardware replacement, a 24-digit Failure ID code is generated. This ID code can then be provided to support to help determine how to correct the problem.

NOTE: To start diagnostics on a convertible computer, your computer must be in notebook mode and you must use the keyboard attached.

To start HP PC Hardware Diagnostics (UEFI), follow these steps:

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

2. Press f2.

   The BIOS searches three places for the diagnostic 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 68.

   b. Hard drive

   c. BIOS

3. When the diagnostic tool opens, select 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: The HP PC Hardware Diagnostics (UEFI) download instructions are provided in English only, and you must use a Windows computer to download and create the HP UEFI support environment because only .exe files are offered.

There are two options to download HP PC Hardware Diagnostics to a USB device.

Download the latest UEFI version

1. Go to http://www.hp.com/go/techcenter/pcdiags. The HP PC Diagnostics home page is displayed.

2. In the HP PC Hardware Diagnostics section, click the **Download** link, and then select **Run**.

Download any version of UEFI for a specific product

1. Go to http://www.hp.com/support, and then select your country. The HP Support page is displayed.

2. Click **Drivers & Downloads**.

3. Use the categories listed to find your product.

– or –

Click **Find Now** to let HP automatically detect your product.

4. Select your computer, and then select your operating system.

5. In the **Diagnostic** section, follow the on-screen instructions to select and download the UEFI version you want.

9 Backing up, restoring, and recovering in Windows 10

This chapter provides information about the following processes. The information in the chapter is standard procedure for most products.

- Creating recovery media and backups

- Restoring and recovering your system

For additional information, refer to the HP support assistant app.

▲ Type `support` in the taskbar search box, and then select the **HP Support Assistant** app.

– or –

Click the question mark icon in the taskbar.

IMPORTANT: If you will be performing recovery procedures on a tablet, the tablet battery must be at least 70% charged before you start the recovery process.

IMPORTANT: For a tablet with a detachable keyboard, connect the keyboard to the keyboard dock before beginning any recovery process.

Creating recovery media and backups

The following methods of creating recovery media and backups are available on select products only. Choose the available method according to your computer model.

- Use HP Recovery Manager to create HP Recovery media after you successfully set up the computer. 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. For information on creating recovery media, see Creating HP Recovery media (select products only) on page 70. For information on the recovery options that are available using the recovery media, see Using Windows tools on page 71.

- Use Windows tools to create system restore points and create backups of personal information.

  For more information, see Recovering using HP Recovery Manager on page 72.

  NOTE: If storage is 32 GB or less, Microsoft System Restore is disabled by default.

Creating HP Recovery media (select products only)

If possible, check for the presence of the Recovery partition and the Windows partition. From the **Start** menu, select **File Explorer**, and then select **This PC**.

- If your computer does not list the Windows partition and the Recovery partition, 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 on the HP website. Go to http://www.hp.com/support, select your country or region, and follow the on-screen instructions.

You can use Windows tools to create system restore points and create backups of personal information, see .

- If your computer does list the Recovery partition and the Windows partition, you can use HP Recovery Manager 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 software programs that were 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 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 media 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. 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. If you cannot create DVD media yourself, you can obtain recovery discs for your computer from HP. See the *Worldwide Telephone Numbers* booklet included with the computer. You can also find contact information on the HP website. Go to http://www.hp.com/support, select your country or region, and follow the on-screen instructions.

  ◦ Be sure that the computer is connected to AC power before you begin creating the recovery media.

  ◦ The creation process can take 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.

To create HP Recovery media:

IMPORTANT: For a tablet with a detachable keyboard, connect the keyboard to the keyboard dock before beginning these steps.

1. Type `recovery` in the taskbar search box, and then select **HP Recovery Manager**.

2. Select **Create recovery media**, and then follow the on-screen instructions.

If you ever need to recover the system, see .

Using Windows tools

You can create recovery media, system restore points, and backups of personal information using Windows tools.

NOTE: If storage is 32 GB or less, Microsoft System Restore is disabled by default.

For more information and steps, see the Get started app.

▲ Select the **Start** button, and then select the **Get started** app.

Restore and recovery

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

IMPORTANT: Not all methods are available on all products.

- Windows offers several options for restoring from backup, refreshing the computer, and resetting the computer to its original state. For more information see the Get started app.

    ▲ Select the **Start** button, and then select the **Get started** app.

- If you need to correct a problem with a preinstalled application or driver, use the Reinstall drivers and/or applications option (select products only) of HP Recovery Manager to reinstall the individual application or driver.

    ▲ Type `recovery` in the taskbar search box, select **HP Recovery Manager**, select **Reinstall drivers and/or applications**, and then follow the on-screen instructions.

- If you want to recover the Windows partition to original factory content, you can choose the System Recovery option from the HP Recovery partition (select products only) or use the HP Recovery media. For more information, see Recovering using HP Recovery Manager on page 72. If you have not already created recovery media, see Creating HP Recovery media (select products only) on page 70.

- On select products, if you want to recover the computer's original factory partition and content, or if you have replaced the hard drive, you can use the Factory Reset option of HP Recovery media. For more information, see Recovering using HP Recovery Manager on page 72.

- On select products, if you want 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 (select products only) on page 75.

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 either created or that you obtained from HP, or by using the HP Recovery partition (select products only). If you have not already created recovery media, see Creating HP Recovery media (select products only) on page 70.

What you need to know before you get started

- 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.

    IMPORTANT: 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 (select products only) on page 70.

- To use the Factory Reset option (select products only), you must use HP Recovery media. If you have not already created recovery media, see Creating HP Recovery media (select products only) on page 70.

- If your computer does not allow the creation of HP Recovery media or 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 want to retain.

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

NOTE: Only the options available for your computer display when you start the recovery process.

● System Recovery—Reinstalls the original operating system, and then configures the settings for the programs that were installed at the factory.

● 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 products only) allows System Recovery only.

Using the HP Recovery partition (select products only)

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

To start HP Recovery Manager from the HP Recovery partition:

IMPORTANT: For a tablet with a detachable keyboard, connect the keyboard to the keyboard dock before beginning these steps (select products only).

1. Type recovery in the taskbar search box, select **Recovery Manager**, and then select **HP Recovery Environment**.

   - or-

   For computers or tablets with keyboards attached, press f11 while the computer boots, or press and hold f11 as you press the power button.

   For tablets without keyboards:

   Turn on or restart the tablet, and then quickly hold down the volume down button; then select f11.

   - or -

   Turn on or restart the tablet, and then quickly hold down the Windows button; then select f11.

2. Select **Troubleshoot** from the boot options menu.

3. 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 media, and then restart the computer.

   NOTE: If the computer does not automatically restart in HP Recovery Manager, change the computer boot order. See .

3. Follow the on-screen instructions.

Changing the computer boot order

If your 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 to an optical drive or a USB flash drive.

To change the boot order:

IMPORTANT: For a tablet with a detachable keyboard, connect the keyboard to the keyboard dock before beginning these steps.

1. Insert the HP Recovery media.

2. Access BIOS:

    For computers or tablets with keyboards attached:

    ▲ Turn on or restart the computer or tablet, quickly press esc, and then press f9 for boot options.

    For tablets without keyboards:

    ▲ Turn on or restart the tablet, and then quickly hold down the volume down button; then select **f9**.

       - or -

       Turn on or restart the tablet, and then quickly hold down the Windows button; then select **f9**.

3. Select the optical drive or USB flash drive from which you want to boot.

4. Follow the on-screen instructions.

Removing the HP Recovery partition (select products only)

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 will not be able to perform System Recovery or create HP recovery media from the HP Recovery partition. So before you remove the Recovery partition, create HP Recovery media; see Creating HP Recovery media (select products only) on page 70.

NOTE: The Remove Recovery Partition option is only available on products that support this function.

Follow these steps to remove the HP Recovery partition:

1. Type `recovery` in the taskbar search box, and then select **HP Recovery Manager**.

2. Select **Remove Recovery Partition**, and then follow the on-screen instructions.

10 Backing up, restoring, and recovering in Windows 8.1

This chapter provides information about the following processes. The information in the chapter is standard procedure for most models.

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

For additional information, refer to Help and Support.

▲ From the Start screen, type `help`, and then select **Help and Support**.

Creating recovery media and backups

The following methods of creating recovery media and backups are available on select models only. Choose the available method according to your computer model.

- Use HP Recovery Manager after you successfully set up the computer to 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. For information on creating recovery media, see Creating HP Recovery media (select models only) on page 76. For information on the recovery options that are available using the recovery media, see Recovering using HP Recovery Manager on page 78.

- Use Windows tools to create system restore points and create backups of personal information.

  For more information, see Using Windows tools on page 77.

  NOTE: If storage is 32 GB or less, Microsoft System Restore is disabled by default.

Creating HP Recovery media (select models only)

IMPORTANT: If your computer does not list a **Create recovery media** option, 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.

HP Recovery Manager is a software program that allows you 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 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 media 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 for your computer 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 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:

1. From the Start screen, type `recovery`, and then select **HP Recovery Manager**.

2. Select **Create recovery media**, and then follow the on-screen instructions.

If you ever need to recover the system, see .

Using Windows tools

You can create system restore points and create backups of personal information using Windows tools.

NOTE: If storage is 32 GB or less, Microsoft System Restore is disabled by default.

For more information and steps, see Help and Support.

▲ From the Start screen, type `help`, and then select **Help and Support**.

Restore and recovery

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

IMPORTANT: Not all methods are available on all models.

- Windows offers several options for restoring from backup, refreshing the computer, and resetting the computer to its original state. For more information see Help and Support.

    ▲ From the Start screen, type `help`, and then select the **Help and Support**.

- If you need to correct a problem with a preinstalled application or driver, use the Reinstall drivers and/or applications option of HP Recovery Manager to reinstall the individual application or driver.

    ▲ From the Start screen, type `recovery`, select **HP Recovery Manager**, select **Reinstall drivers and/or applications**, and then follow the on-screen instructions.

- On select models, 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 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 Reinstall drivers and/or applications option in HP Recovery Manager.

    For more information, see Recovering using HP Recovery Manager on page 78.

- If you want to recover the Windows partition to original factory content, you can choose the System Recovery option from the HP Recovery partition (select models only) or use the HP Recovery media. For more information, see Recovering using HP Recovery Manager on page 78. If you have not already created recovery media, see Creating HP Recovery media (select products only) on page 70.

- On select models, if you want to recover the computer's original factory partition and content , or if you have replaced the hard drive, you can use the Factory Reset option of HP Recovery media. For more information, see Recovering using HP Recovery Manager on page 78.

- On select models, if you want 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 (select models only) on page 80.

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 either created or that you obtained from support, or by using the HP Recovery partition (select models only). If you have not already created recovery media, see Creating HP Recovery media (select products only) on page 70.

What you need to know before you get started

- 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.

IMPORTANT: 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 (select products only) on page 70.

- To use the Factory Reset option (select models only), you must use HP Recovery media. If you have not already created recovery media, see Creating HP Recovery media (select products only) on page 70.

- If your computer does not allow the creation of HP Recovery media or 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 want to retain.

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

NOTE: Only the options available for your computer display when you start the recovery process.

- 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 (select models only).

Using the HP Recovery partition (select models only)

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

To start HP Recovery Manager from the HP Recovery partition:

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

1. From the Start screen, type `recovery`, select **Recovery Manager**, and then select **HP Recovery Environment**.

   - or-

   Press f11 while the computer boots, or press and hold f11 as you press the power button.

2. Select **Troubleshoot** from the boot options menu.

3. 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 media, 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 80.

3.	Follow the on-screen instructions.

Changing the computer boot order

If your 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:

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

1.	Insert the HP Recovery media.

2.	Start Computer Setup:

    For computers or tablets with keyboards attached:

    ▲	Turn on or restart the computer or tablet, quickly press esc, and then press f9 for boot options.

    For computers or tablets without keyboards attached:

    ▲	Turn on or restart the computer, quickly press the volume down button, and then tap **f9** for boot options.

    - or -

    Turn on or restart the computer, quickly press the Windows button, and then tap **f9** for boot options.

3.	Select the optical drive or USB flash drive from which you want to boot.

4.	Follow the on-screen instructions.

Removing the HP Recovery partition (select models only)

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 or the Windows option to remove everything and reinstall Windows. In addition, you will not be able to perform System Recovery or Minimized Image Recovery from the HP Recovery partition. So before you remove the Recovery partition, create HP Recovery media; see Creating HP Recovery media (select products only) on page 70.

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.

11   Specifications

Computer specifications

	Metric	U.S.
Dimensions		
Width	**38.37 cm**	15.11 in
Depth	**25.85 cm**	10.18 in
Height (front to back)	**2.36 cm**	.93 in
Weight	**2.29 kg**	5.07 lb
Input power		
Operating voltage and current	19.5 V dc @ 2.31 – 45 W (select models only)	
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.

15.6-inch display specifications

	Metric	U.S.
Dimensions		
Height	**20.77 cm**	8.175 in
Width	**37.78 cm**	14.875 in
Diagonal	**39.62 cm**	15.6 in
Number of colors	Up to 16.8 million	
Contrast ratio	500:1 (typical)	
Brightness	200 nits	

	Metric	U.S.
Pixel resolution		
Pitch	0.252mm x 0.252mm	
Format	1366×768	
Configuration	RGB vertical stripe	
Backlight	LED	
Character display	80 × 25	
Total power consumption	2.0 W	
Viewing angle	±65° horizontal, ±50° vertical (typical)	

Hard drive specifications

	500 GB*	750 GB*	1 TB*	500-GB* hybrid
Dimensions				
Height	7.0 mm	7.0 mm	7.0 mm	7.0 mm
Width	69.9 mm	69.9 mm	69.9 mm	70 mm
Weight	110 g	110 g	110 g	95 g
Interface type	SATA	SATA	SATA	SATA
Transfer rate	1.1 GB/sec	1.1 GB/sec	1.1 GB/sec	100 MB/sec
Security	ATA security	ATA security	ATA security	ATA security
Seek times (typical read, including setting)				
Single track	1.5 ms	1.5 ms	1.5 ms	2 ms
Average	11/13 ms	11/13 ms	11/13 ms	12 ms
Maximum	22 ms	22 ms	22 ms	22 ms
Logical blocks	976,773,168	976,773,168	976,773,168	976,773,168
Disk rotational speed	5400 rpm	5400 rpm	5400 rpm	5400 rpm
Operating temperature	0°C to 60°C (32°F to 140°F)	0°C to 60°C (32°F to 140°F)	0°C to 60°C (32°F to 140°F)	0°C to 60°C (32°F to 140°F)

*Size refers to hard drive storage capacity. Actual accessible capacity is less. Actual drive specifications may differ slightly.

NOTE: Certain restrictions and exclusions apply. Contact support for details.

12 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 all countries 113

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

Country/region	Accredited agency	Applicable note number
South Korea	EK	4
Sweden	CEMKO	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.

13 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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