HP ProBook 11 G1 Education Edition

Maintenance and Service Guide

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Product notice

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

Not all features are available in all editions of Windows 8. This computer may require upgraded and/or separately purchased hardware, drivers, and/or software to take full advantage of Windows 8 functionality. See for http://www.microsoft.com details.

Safety warning notice

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

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1 Product description

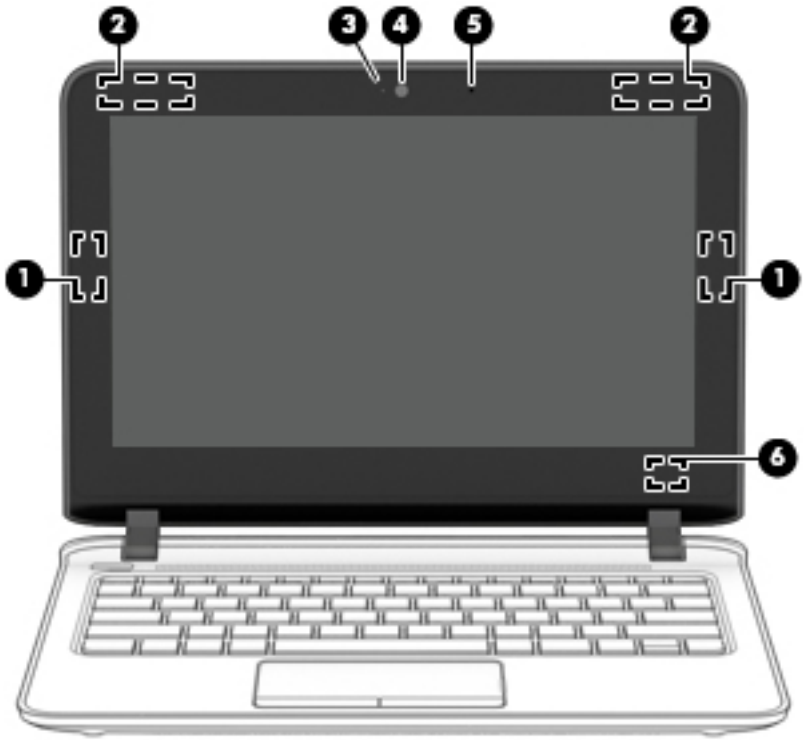
Category	Description
Product Name	HP ProBook 11 G1 Education Edition
Processor	• Intel™ Core® i3-5005U 2.00-GHz processor (1600-MHz FSB, 3.00-MB L3 cache, dual core, 15 W) • Intel Celeron® 3805U 1.90-GHz processor (1600-MHz FSB, 2.00-MB L2 cache, dual core, 15 W • Intel Celeron 3205U 1.50-GHz processor (1600-MHz FSB, 2.00-MB L2 cache, dual core, 15 W
Chipset	Integrated soldered-on-circuit (SoC) platform controller hub (PCH)
Graphics	**Internal Graphics**: Intel unified memory architecture (UMA) graphics Supports DX11, HD decode, and HDMI
Panel	11.6-in (1366×768), high-definition (HD), light-emitting diode (LED), SVA, TouchScreen display panel; 16:9 ultra-wide aspect ratio; typical brightness: 220 nits; flat (3.6-mm) 11.6-in (1366×768), HD, LED, AntiGloare SVA, non-TouchScreen display panel; 16:9 ultra-wide aspect ratio; typical brightness: 220 nits; flat (3.6-mm)
Memory	One customer-accessible memory slot Supports DDR3L PC3-12800 1600 Supports up to 8192-MB maximum system memory
Storage	Support for **6.35-cm** (2.5-in) hard drives in **7.0-mm** (.28-in) thickness Support for Accelerometer hard drive protection Support for the following single hard drive configurations: • 500-GB, 5400-rpm, 7.0-mm • 320-GB, 5400-rpm, 7.0-mm Support for M.2 2280 SATA-3 solid-state drives in 180-GB, multilevel cell (MLC) and 128-GB, triple-level cell (TLC) formats
Audio and video	Integrated HP TrueVision HD webcam, 1280×720 by 30 frames per second (fixed, no tilt, with activity LED) Single digital microphone with appropriate echo-cancellation and noise-suppression software Two speakers with DTS Sound
Ethernet	Integrated 10/100/1000 Gigabit; suppports PXE boot
Wireless	Integrated wireless local area network (WLAN) options by way of wireless module Two built-in WLAN antennas Supports the following WLAN modules: • Intel Dual Band Wireless-AC 3160 802.11 ac 1×1 WiFi + Bluetooth™ 4.0 Combo Adapter • Intel Dual Band Wireless-AC 7260 802.11 ac 2×2 WiFi + Bluetooth 4.0 Combo Adapter • Realtek RTL8723BE 802.11b/g/n 1×1 Wi-Fi + Bluetooth 4.0 Combo Adapter

Category	Description
Wireless *(continued)*	Integrated wireless wide area network (WWAN) options by way of wireless module Two built-in WWAN antennas Supports a HP hs3110 HSPA+ Mobile Broadband Module Compatible with MiraCast-certified devices
External media cards	HP multiformat Micro Digital Media Reader Slot with push-push technology. Reads data from and writes data to digital memory cards such as Secure Digital (SD™).
Ports	• AC adapter HP Smart plug (4.5mm barrel) • Audio: one combo audio-out (headphone)/audio-in (microphone) jack, supports jack auto-detection • High-definition multimedia interface (HDMI) v.1.4, supporting up to 1080p, 1920×1080 at 60 Hz • RJ45/Ethernet • USB 3.0 (3) • VGA (Dsub 15-pin) supporting: 1920×1200 external resolution @ 60 Hz, hot plug and unplug and auto-detection for correct output to wide-aspect versus standard-aspect video
Keyboard/pointing devices	Full-sized, textured, island-style keyboard **Touchpad requirements:** 2013 TouchPad Taps enabled as default Multitouch gestures enabled Ability to turn TouchPad on and off Support for Windows 8.1 modern TouchPad gestures Support for PS/2 interface
Power requirements	Support for 6-cell, 64-WHr, 4.2-AHr, Li-ion and 3-cell, 36-WHr, 3.2-AHr, Li-ion batteries Support for 65-W HP Smart adapter (non-PFC, EM, 3-wire, 4.5-mm) and 45-W HP Smart adapter (non-PFC, RC, 3-wire, 4.5-mm) AC adapters
Security	Security cable lock Trusted platform module (TPM) 1.2
Operating system	**Preinstalled:** • Windows 8.1 Chinese 64-bit (available only for PRC Country localization) • Windows 8.1 Emerging Markets 64-bit • Windows 8.1 Multi-Language 64-bit • Windows 8.1 Professional 64-bit • Windows 8.1 Professional 64-bit – Shape the Future (Professional for Education) • Windows 8.1 Professional 64-bit DPK with Windows 7 Professional 64-bit Image (not available on computer models equipped with a TouchScreen display assembly) • Windows 8.1 Professional 64-bit DPK with Windows 7 Professional 64-bit Image – Shape the Future (Professional for Education; not available on computer models equipped with a TouchScreen display assembly)

Category	Description
Operating system *(continued)*	• Windows 7 Professional 64-bit (not available on computer models equipped with a TouchScreen display assembly) • FreeDOS 2.0 (available only in the United States and Latin American countries and regions) **Restore media**: Windows 8.1 (available with any Windows 8.1 operating system, required with any Windows 8.1 Professional Downgrade operating system) and Windows 7 (available with any Windows 8 or Windows 7 Professional Downgrade operating system) **OSDVD:** • Windows 8.1 64-bit (for service only) • Windows 8.1 Country-specific 64-bit (for service only) • Windows 8.1 Professional 64-bit (included in Windows 8.1 downgrade operating system AV only) • Windows 7 Professional 64-bit (available with any Windows 7 Professional or Windows 8.1 Professional Downgrade localization) **Web support OS:** • Windows 8.1 Enterprise 64-bit • Windows 8.1 Multi-language 64-bit • Windows 8.1 Professional 64-bit
Serviceability	**End user replaceable parts:** • AC adapter • Battery • SIM (select models only)

2 External component identification

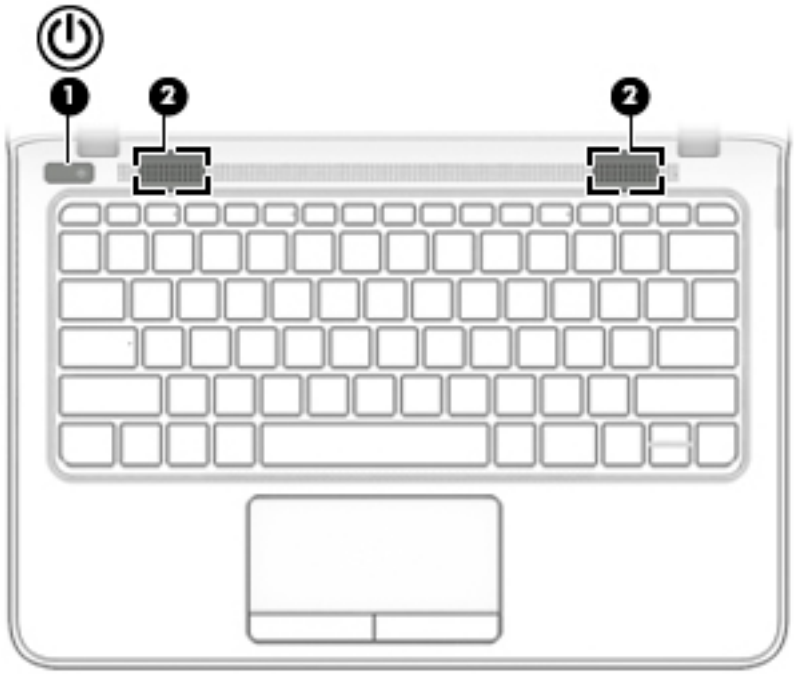
Display



Item	Component	Description
(1)	WLAN antennas (2)*	Send and receive wireless signals to communicate with WLANs.
(2)	WWAN antennas (2)*	Send and receive wireless signals to communicate with WWANs.
(3)	Webcam light	On: The webcam is in use.
(4)	Webcam	Records video and captures photographs. Some models allow you to video conference and chat online using streaming video. For information on using the webcam, access HP Support Assistant. To access HP Support Assistant, from the Start screen, select the **HP Support Assistant** app.
(5)	Microphones	Record sound.
(6)	Display switch	Turns off the display or initiates Sleep if the display is closed while the power is on. **NOTE:** The display switch is not visible from the outside of the computer.

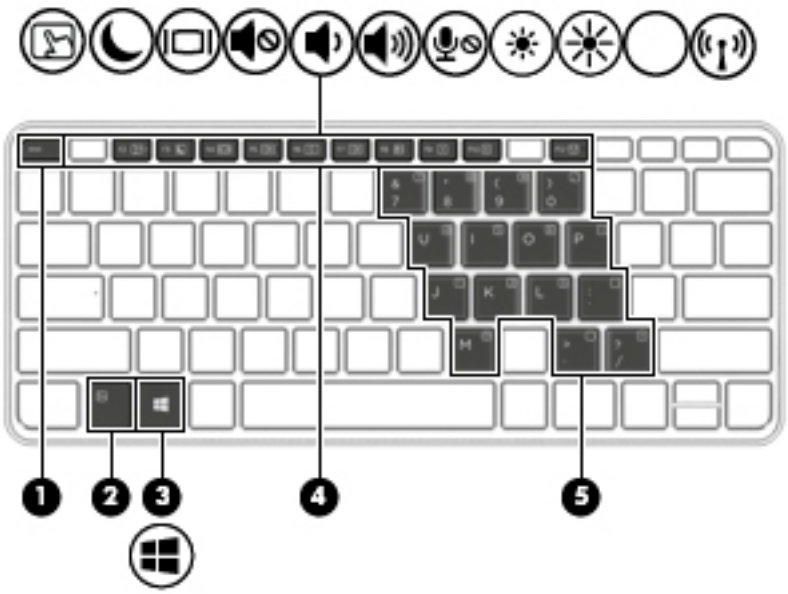
*The antennas are not visible from the outside of the computer. For optimal transmission, keep the areas immediately around the antennas free from obstructions. For wireless regulatory notices, see the section of the *Regulatory, Safety, and Environmental Notices* that applies to your country or region.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

Buttons and speakers



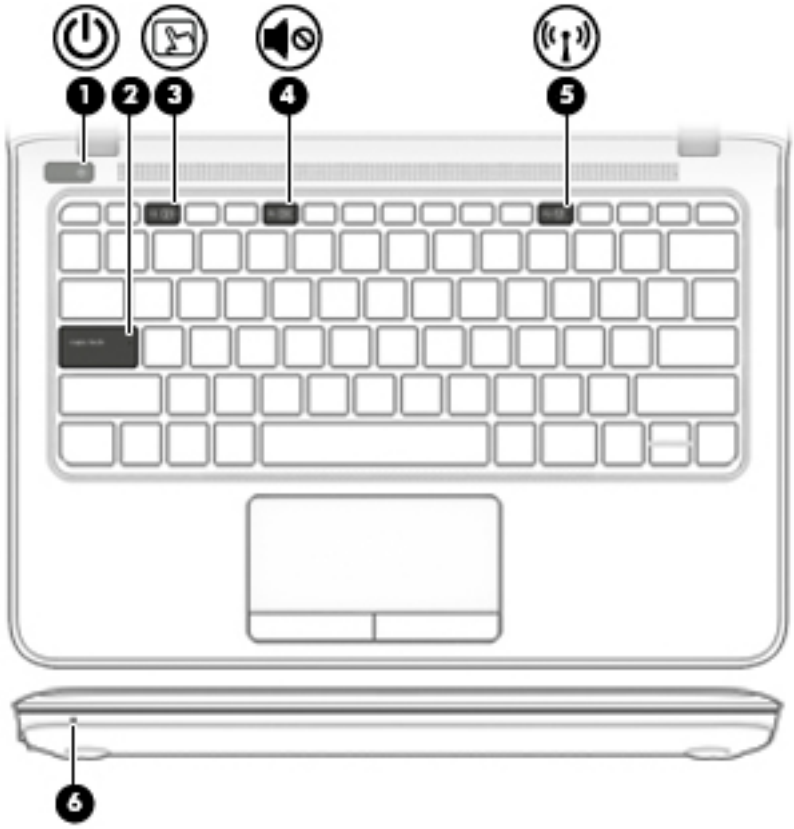
Item	Component	Description
(1)	Power button	• When the computer is off, press the button to turn on the computer. • When the computer is on, press the button briefly to initiate Sleep. • When the computer is in the Sleep state, press the button briefly to exit Sleep. • When the computer is in Hibernation, press the button briefly to exit Hibernation. **CAUTION:** Pressing and holding down the power button will result in the loss of unsaved information. If the computer has stopped responding and Windows shutdown procedures are ineffective, press and hold the power button for at least 5 seconds to turn off the computer. If the computer has stopped responding and the previous shutdown procedures are ineffective, press and hold the power button for 15 seconds to perform a hardware reset turning off the computer immediately. **NOTE:** For select models, the Intel Rapid Start Technology feature is enabled at the factory. Rapid Start Technology allows your computer to resume quickly from inactivity. To learn more about your power settings, see your power options. From the Start screen, type `power`, select **Power and sleep settings**, and then select **Power and sleep** from the list of applications.
(2)	Speakers (2)	Produce sound.

Keys



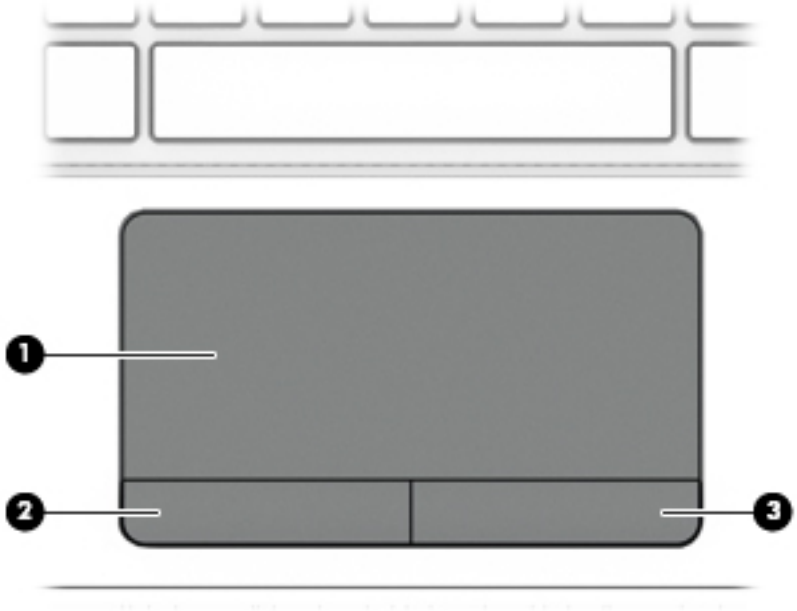
Item	Component	Description
(1)	esc key	Displays system information when pressed in combination with the fn key.
(2)	fn key	Executes frequently used system functions when pressed in combination with a function key, the num lk key, the esc key, or the b key.
(3)	Windows key	Returns you to the Start screen from an open app or the Windows desktop. **NOTE:** Pressing the Windows key again will return you to the previous screen.
(4)	Function keys	Execute frequently used system functions when pressed in combination with the fn key.
(5)	Embedded numeric keypad	When the keypad is turned on, it can be used like an external numeric keypad. Each key on the keypad performs the function indicated by the icon in the upper-right corner of the key.

Lights



Item	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. **NOTE:** For select models, the Intel® Rapid Start Technology feature is enabled at the factory. Rapid Start Technology allows your computer to resume quickly from inactivity.
(2)	Caps lock light	On: Caps lock is on, which switches the keys to all capital letters.
(3)	TouchPad light	• Amber: The TouchPad is off. • Off: The TouchPad is on.
(4)	Mute light	• Amber: Computer sound is off. • Off: Computer sound is on.
(5)	Wireless light	• Amber: Wireless is off. • Off: Wireless is on.
(6)	Hard drive light	• Blinking white: The hard drive is being accessed. • Amber: HP 3D DriveGuard has temporarily parked the hard drive.

TouchPad

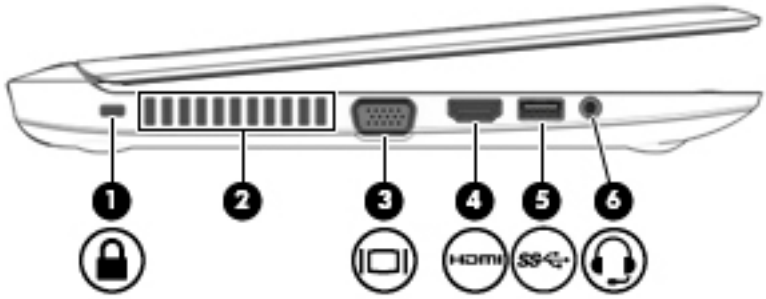


Item	Component	Description
(1)	TouchPad zone	Moves the pointer and selects or activates items on the screen. **NOTE:** The TouchPad also supports edge-swipe gestures.
(2)	Left TouchPad button	Functions like the left button on an external mouse.
(3)	Right TouchPad button	Functions like the right button on an external mouse.

Front

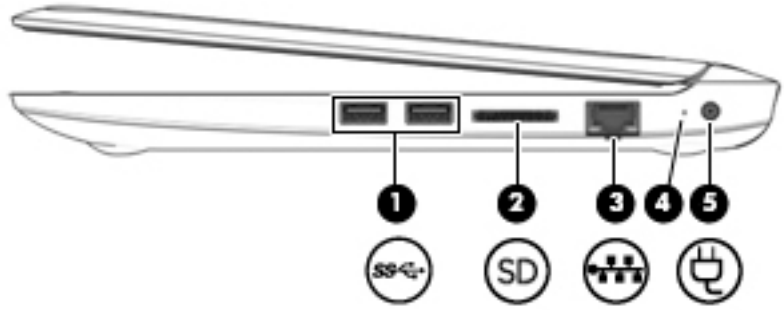
Item	Component	Description
(1)	Hard drive light	• Blinking white: The hard drive is being accessed. • Amber: HP 3D DriveGuard has temporarily parked the hard drive.

Left side



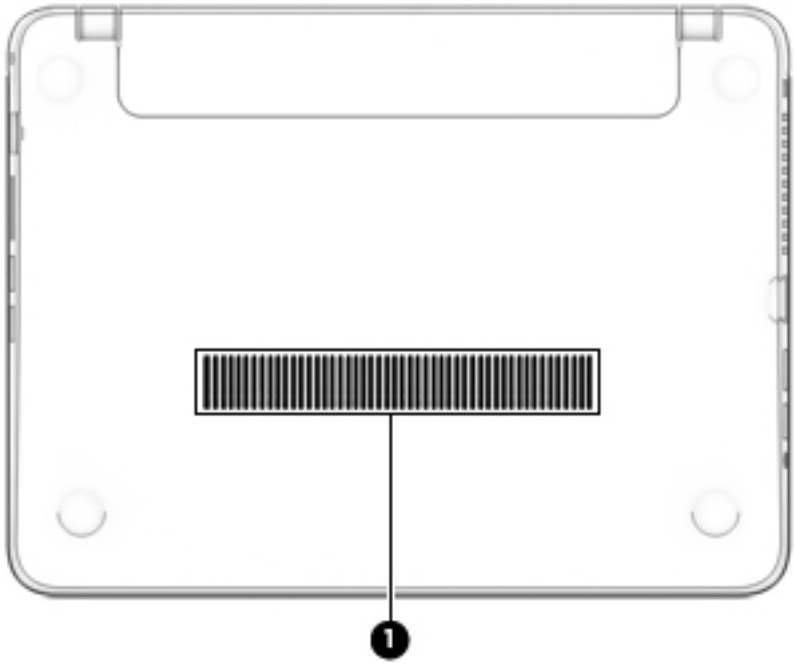
Item	Component	Description
(1)	Security cable slot	Attaches an optional security cable to the computer. **NOTE:** The security cable is designed to act as a deterrent, but it may not prevent the computer from being mishandled or stolen.
(2)	Vent	Enables airflow to cool internal components. **NOTE:** The computer fan starts up automatically to cool internal components and prevent overheating. It is normal for the internal fan to cycle on and off during routine operation.
(3)	External monitor port	Connects an external VGA monitor or projector.
(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 HDMI device.
(5)	USB 3.0 port	Each USB 3.0 port connects an optional USB device, such as a keyboard, mouse, external drive, printer, scanner or USB hub.
(6)	Audio-out (headphone)/Audio-in (microphone) jack	Connects optional powered stereo speakers, headphones, earbuds, a headset, or a television audio cable. Also connects an optional headset microphone. This jack does not support optional microphone-only devices. **WARNING!** To reduce the risk of personal injury, adjust the volume before putting on headphones, earbuds, or a headset. For additional safety information, see the *Regulatory, Safety, and Environmental Notices*. To access this guide, from the Start screen, type `support`, and then select the **HP Support Assistant** app. **NOTE:** When a device is connected to the jack, the computer speakers are disabled. **NOTE:** Be sure that the device cable has a 4-conductor connector that supports both audio-out (headphone) and audio-in (microphone).

Right side



Item	Component	Description
(1)	USB 3.0 port	Each USB 3.0 port connects an optional USB device, such as a keyboard, mouse, external drive, printer, scanner or USB hub.
(2)	Memory card reader	Reads optional memory cards that store, manage, share, or access information.
(3)	RJ-45 (network) jack/lights	Connects a network cable. • Green (right): The network is connected. • Amber (left): Activity is occurring on the network.
(4)	AC adapter/Battery light	• White: The computer is connected to external power and the battery is charged from 90 to 99 percent. • Amber: The computer is connected to external power and the battery is charged from 0 to 90 percent. • Blinking amber: A battery that is the only available power source has reached a low battery level. When the battery reaches a critical battery level, the battery light begins blinking rapidly. • Off: The battery is fully charged.
(5)	Power connector	Connects an AC adapter.

Bottom



Item	Component	Description
(1)	Vent	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.

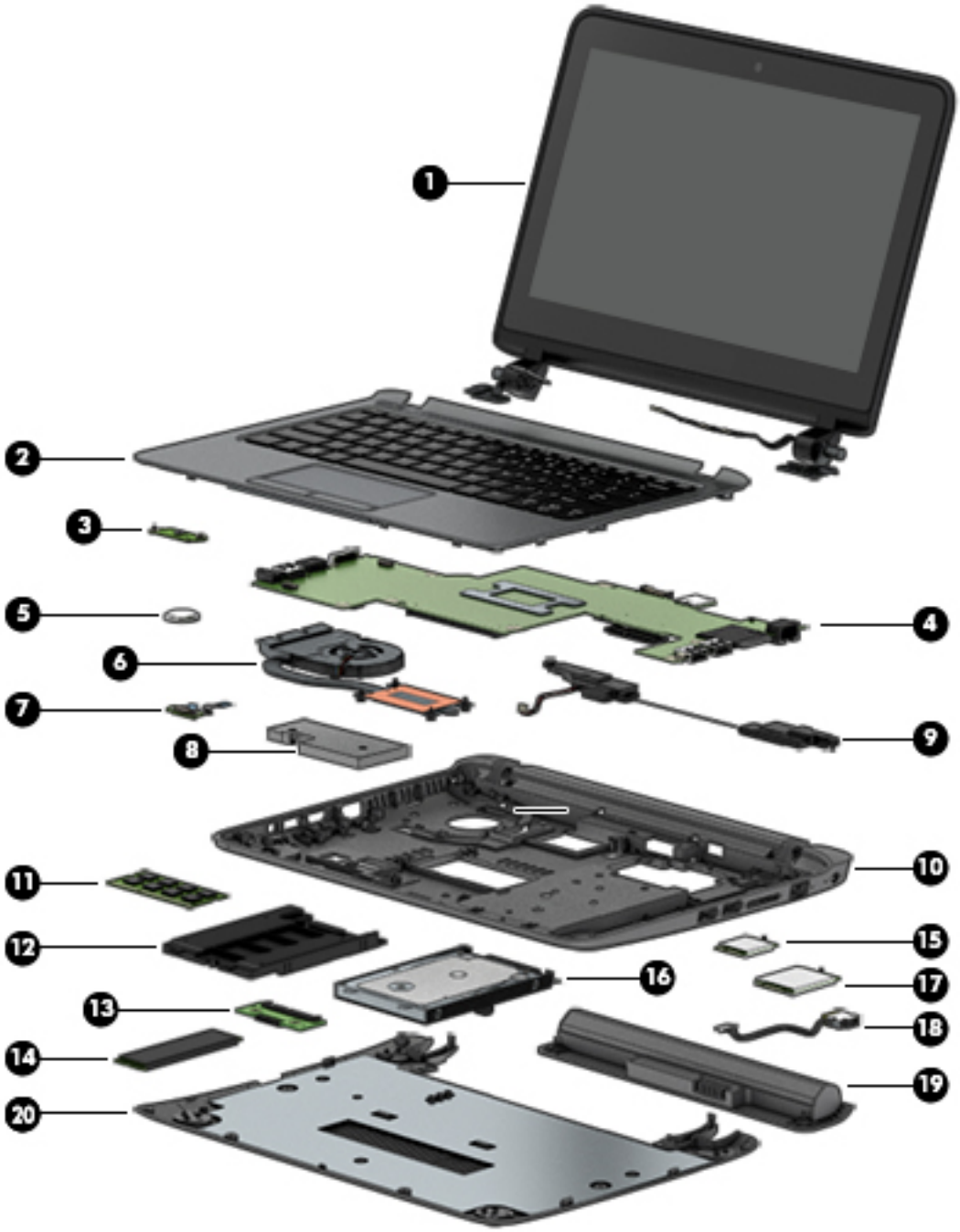
3 Illustrated parts catalog

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.

Locating the model number, serial number, product number, and warranty information

The model number **(1)**, serial number **(2)**, product number **(3)**, and warranty information **(4)** are located on the bottom of the computer. This information may be needed when traveling internationally or when contacting support.

Computer major components



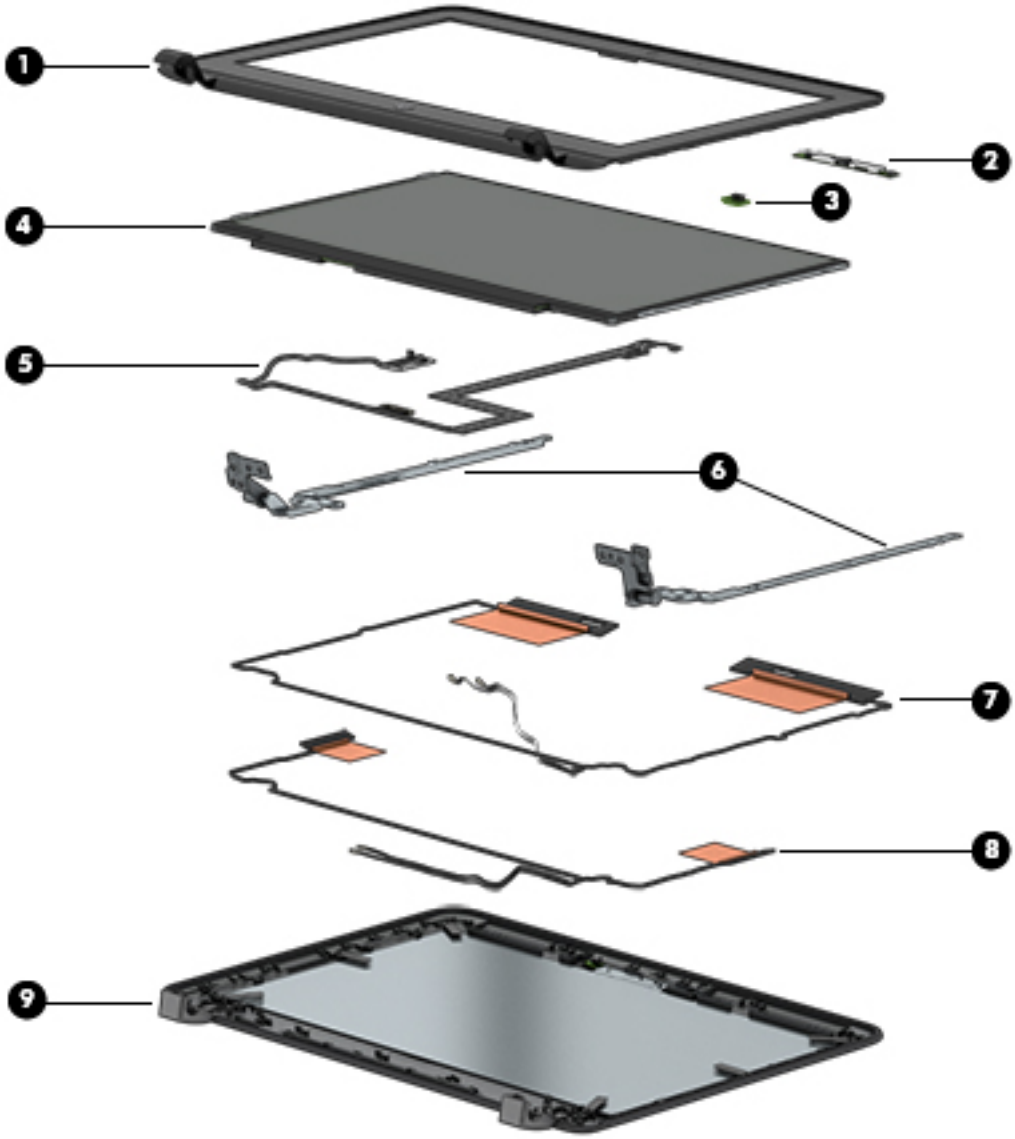
Item	Component	Spare part number
(1)	**Display assembly**: The non-TouchScreen display assembly is spared at the subcomponent level only. The TouchScreen display assembly is spared as a whole unit replacement spare part kit (see below). For more non-TouchScreen display assembly spare part information, see Display assembly components on page 17.	
	Display assembly (11.6-in, HD, LED, 1366×768, SVA, TouchScreen; includes webcam/microphone module and wireless antenna cables)	809862-001
(2)	**Keyboard/top cover** (includes keyboard cable and TouchPad):	

Item	Component	Spare part number
	NOTE: The keyboard/top cover spare part kit does not include the TouchPad cable or the TouchPad button board cable. The TouchPad cable and the TouchPad button board cable are included in the Cable Kit, spare part number 809856-001.	
	For use in Belgium	809848-A41
	For use in Bulgaria	809848-261
	For use in Canada	809848-DB1
	For use in the Czech Republic and Slovakia	809848-FL1
	For use in Denmark, Finland, and Norway	809848-DH1
	For use in France	809848-051
	For use in Germany	809848-041
	For use in Greece	809848-151
	For use in Hungary	809848-211
	For use in India	809848-D61
	For use in Israel	809848-BB1
	For use in Italy	809848-061
	For use in Latin America	809848-161
	For use in the Netherlands	809848-B31
	For use in Northwest Africa	809848-FP1
	For use in Portugal	809848-131
	For use in Russia	809848-251
	For use in Saudi Arabia	809848-171
	For use in Slovenia	809848-BA1
	For use in South Korea	809848-AD1
	For use in Spain	809848-071
	For use in Sweden and Finland	809848-B71
	For use in Switzerland	809848-BG1
	For use in Taiwan	809848-AB1
	For use in Thailand	809848-281
	For use in Turkey	809848-141
	For use in the United Kingdom and Singapore	809848-031
	For use in the United States	809848-001
(3)	**Power button board** **NOTE:** The power button board spare part kit does not include the power button board cable. The power button board cable is included in the Cable Kit, spare part number 809856-001.	809865-001
(4)	**System board** (includes a graphics subsystem with UMA memory and replacement thermal material):	

Item	Component	Spare part number
	Equipped with an Intel Core i3-5005U 2.00-GHz processor (1600-MHz FSB, 3.00-MB L3 cache, dual core, 15 W) and the Windows 8 Professional operating system	809874-601
	Equipped with an Intel Core i3-5005U 2.00-GHz processor (1600-MHz FSB, 3.00-MB L3 cache, dual core, 15 W) and the Windows 8 Standard operating system	809874-501
	Equipped with an Intel Core i3-5005U 2.00-GHz processor (1600-MHz FSB, 3.00-MB L3 cache, dual core, 15 W) and a non-Windows 8 operating system	809874-001
	Equipped with an Intel Celeron 3805U 1.90-GHz processor (1600-MHz FSB, 2.00-MB L2 cache, dual core, 15 W) and the Windows 8 Professional operating system	817352-601
	Equipped with an Intel Celeron 3805U 1.90-GHz processor (1600-MHz FSB, 2.00-MB L2 cache, dual core, 15 W) and the Windows 8 Standard operating system	817352-001
	Equipped with an Intel Celeron 3805U 1.90-GHz processor (1600-MHz FSB, 2.00-MB L2 cache, dual core, 15 W) and a non-Windows 8 operating system	817352-001
	Equipped with an Intel Celeron 3205U 1.50-GHz processor (1600-MHz FSB, 2.00-MB L2 cache, dual core, 15 W) and the Windows 8 Professional operating system	809873-601
	Equipped with an Intel Celeron 3205U 1.50-GHz processor (1600-MHz FSB, 2.00-MB L2 cache, dual core, 15 W) and the Windows 8 Standard operating system	809873-001
	Equipped with an Intel Celeron 3205U 1.50-GHz processor (1600-MHz FSB, 2.00-MB L2 cache, dual core, 15 W) and a non-Windows 8 operating system	809873-001
(5)	**RTC battery**	616073-001
(6)	**Fan/heat sink assembly** (includes fan cable, 4 captive screws [secured by C-clips], and replacement thermal material)	809857-001
(7)	**Hard drive LED board** **NOTE:** The hard drive LED board spare part kit does not include the hard drive LED board cable. The hard drive LED board cable is included in the Cable Kit, spare part number 809856-001.	809864-001
(8)	**Counterweight**	809860-001
(9)	**Speaker Kit** (includes left and right speakers, cables, and four rubber isolators)	809870-001
(10)	**Base enclosure**	809854-001
	Rubber Kit (not illustrated, includes base enclosure screw plugs and screws covers)	809868-001
(11)	**Memory module** (PC3L, 12800, 1600):	
	8 GB	693374-005
	4 GB	691740-005
	2 GB	691739-005
(12)	**Hard drive** (5400-rpm, SATA, 7.0-mm, does not include hard drive bracket or screws): **NOTE:** The hard drive bracket and screws are included in the Hard Drive Hardware Kit, spare part number 809858-001.	
	500-GB, 5400-rpm, SATA, 7.0-mm	778186-005
	320-GB, 5400-rpm, SATA, 7.0-mm	645088-001
(13)	**Solid-state drive** (M.2, SATA-3; does not include solid-state drive connector board, solid-state drive tray, or screws): **NOTE:** The solid-state drive tray and screws are included in the Solid-State Drive Hardware Kit, spare part number 809859-001. The solid-state drive connector board is available using spare part number 811608-001.	

Item	Component	Spare part number
	500-GB, 5400-rpm, SATA, 7.0-mm	778186-005
	320-GB, 5400-rpm, SATA, 7.0-mm	645088-001
(14)	**Solid-state drive tray** (included with screws in the Solid-State Drive Hardware Kit, spare part number 809859-001)	
(15)	**Solid-state drive connector board**	811608-001
(16)	**WLAN module:**	
	Intel Dual Band Wireless-AC 3160 802.11 ac 1×1 WiFi + Bluetooth 4.0 Combo Adapter	751416-005
	Intel Dual Band Wireless-AC 7260 802.11 ac 2×2 WiFi + Bluetooth 4.0 Combo Adapter	756763-005
	Realtek RTL8723BE 802.11b/g/n 1×1 Wi-Fi + Bluetooth 4.0 Combo Adapter	792610-005
(17)	**HP hs3110 HSPA+ Mobile Broadband Module**	793516-005
(18)	**Power connector cable** (included in the Cable Kit, spare part number 809856-001)	
(19)	**Battery** (includes two captive Phillips PM2.0×5.6 screws, each secured by a C-clip)	
	6-cell, 64-WHr, 4.2-AHr, Li-ion	797430-001
	3-cell, 36-WHr, 3.2-AHr, Li-ion	797429-001
(20)	**Bottom cover** (includes rubber feet, shielding, and vent)	809866-001

Display assembly components



Item	Description	Spare part number
(1)	**Display bezel**	809855-001
(2)	**Webcam/microphone module** (includes double-sided adhesive)	809875-001
(3)	**Display LED board** (includes double-sided adhesive) **NOTE:** The display LED board spare part kit does not include the display LED board cable. The display LED board cable is included in the Cable Kit, spare part number 809856-001.	809863-001
(4)	**Display panel** (11.6-in, LED, HD, SVA, AntiGlare)	809867-001
(5)	**Display panel cable** (includes webcam/microphone module cable; included in the Cable Kit, spare part number 809856-001)	
(6)	**Display Hinge Kit** (includes left and right display hinges)	809861-001
	Antenna Kit, includes:	809852-001

Item	Description	Spare part number
(7)	WLAN antenna cables and transceivers	
(8)	WWAN antenna cables and transceivers	
(9)	**Display back cover**	809853-001

Miscellaneous parts

Component	Spare part number
AC adapter:	
65-W HP Smart adapter (non-PFC, EM, 3-wire, 4.5-mm)	714657-001
45-W HP Smart adapter (non-PFC, RC, 3-wire, 4.5-mm)	741727-001
Cable Kit, includes: • Display LED board cable • Display panel cable • Hard drive LED board cable • Power button board cable • Power connector cable • TouchPad board cable • TouchPad button board cable	809856-001
Power cord (3-pin, black, 1.00-m):	
For use in Australia	755530-011
For use in Denmark	755530-081
For use in India	755530-D61
For use in Italy	755530-061
For use in North America	755530-001
For use in Switzerland	755530-111
For use in the United Kingdom and Singapore	755530-031
Rubber Kit (includes base enclosure screw plugs and screw covers)	809868-001
Screw Kit	809869-001

4 Removal and replacement preliminary requirements

Tools required

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

- Flat-bladed screw driver
- Magnetic screw driver
- Phillips P0 screw driver
- Torx8 screw driver

Service considerations

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

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

Plastic parts

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

Cables and connectors

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

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

Drive handling

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

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

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

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

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

Avoid dropping drives from any height onto any surface.

After removing drive, place it in a static-proof bag.

Avoid exposing a 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, screw drivers, 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 computerop 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 Customer Self-Repair 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.

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.

Component replacement procedures

NOTE: Please read and follow the procedures described here to access and replace Customer Self-Repair parts successfully.

NOTE: Details about your computer, including model, serial number, product key, and length of warranty, are on the service label at the bottom of your computer. See Locating the model number, serial number, product number, and warranty information on page 12 for details.

This chapter provides removal and replacement procedures for Customer Self-Repair parts.

There are as many as 2 screws that must be removed, replaced, and/or loosened when servicing the Customer Self-Repair parts. Make special note of each screw size and location during removal and replacement.

Battery

NOTE: The battery spare part kit includes two captive Phillips PM2.0×5.6 screws, each secured by a C-clip.

Description	Spare part number
6-cell, 64-WHr, 4.2-AHr, Li-ion	797430-001
3-cell, 36-WHr, 3.2-AHr, Li-ion	797429-001

Before disassembling the computer, follow these steps:

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

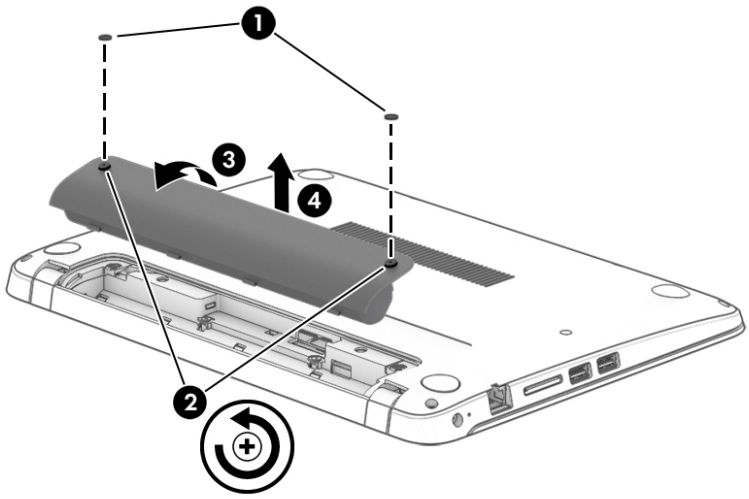
WARNING! To reduce potential safety issues, use only the battery provided with the computer, a replacement battery provided by HP, or a compatible battery purchased from HP.

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

Remove the battery:

1. Close the computer.
2. Turn the computer upside down with the front toward you.
3. Remove the two screw covers **(1)** that conceal the battery retention screws.

   The battery screw covers are included in the Rubber Kit, spare part number 809868-001.
4. Loosen the two Phillips PM2.0×5.6 captive screws **(2)** that secure the battery to the computer.
5. Pivot the front edge of the battery **(3)** up and back until it rests at an angle.
6. Remove the battery **(4)**.



Reverse this procedure to install the battery.

6 Removal and replacement procedures for Authorized Service Provider parts

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

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.

Component replacement procedures

NOTE: Details about your computer, including model, serial number, product key, and length of warranty, are on the service label at the bottom of your computer. See Locating the model number, serial number, product number, and warranty information on page 12 for details.

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

There are as many as 65 screws that must be removed, replaced, and/or loosened when servicing the Authorized Service Provider only parts. Make special note of each screw size and location during removal and replacement.

Bottom cover

Description	Spare part number
Bottom cover (includes rubber feet, shielding, and vent)	809866-001

Before removing the bottom cover, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the battery (see Battery on page 24).

Remove the bottom cover:

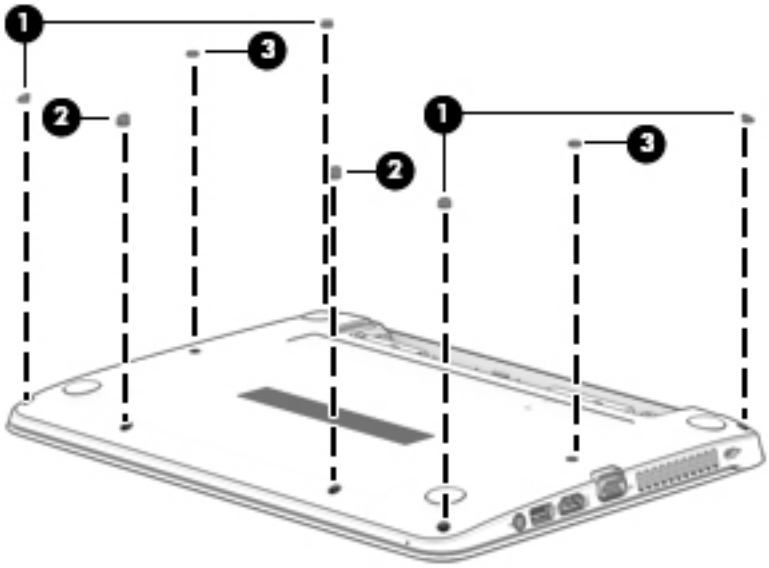
1. Remove the following plugs that conceal the bottom cover screws:

   (1) Four plugs in the corners of the computer

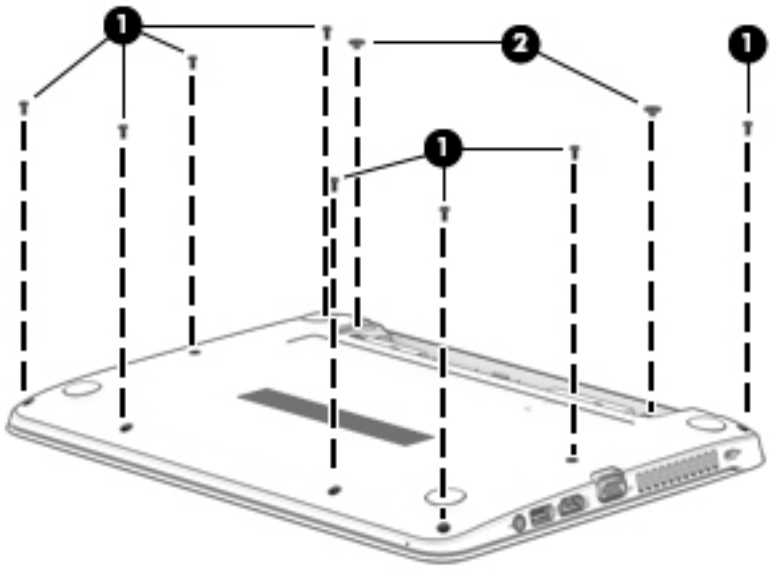
   (2) Two plugs on the front edge of the computer

   (3) Two plugs in the middle of the computer

   The bottom cover screw covers are included in the Rubber Kit, spare part number 809868-001.

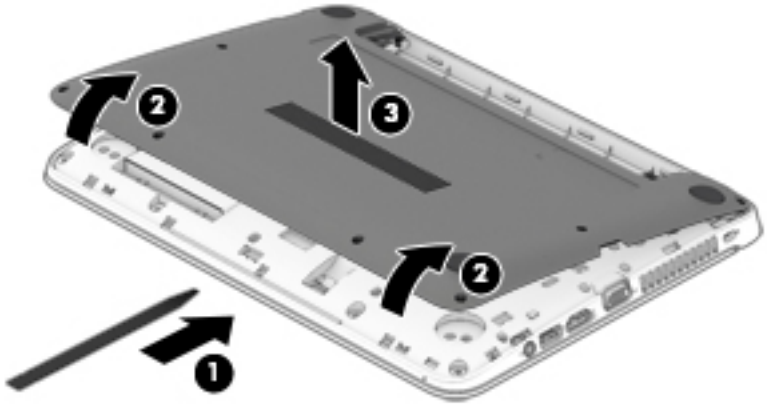


2. Remove the eight Torx8 T8M2.0×5.6 screws **(4)** that secure the bottom cover to the computer.
3. Remove the two Phillips PM2.0×3.7 broad head screws **(5)** that secure the bottom cover to the computer in the battery bay.



4. Use a case utility tool **(1)** or a similar thin, plastic tool to separate the bottom cover from the base enclosure.
5. Swing the front edge of the bottom cover **(2)** up and to the back until it separates from the base enclosure.

6. Remove the bottom cover **(3)**.



Reverse this procedure to install the bottom cover.

Hard drive

NOTE: The hard drive spare kit does not include the hard drive bracket or screws. The hard drive bracket and screws are included in the Hard Drive Hardware Kit, spare part number 809858-001.

Description	Spare part number
500-GB, 5400-rpm, SATA, 7.0-mm	778186-005
320-GB, 5400-rpm, SATA, 7.0-mm	645088-001

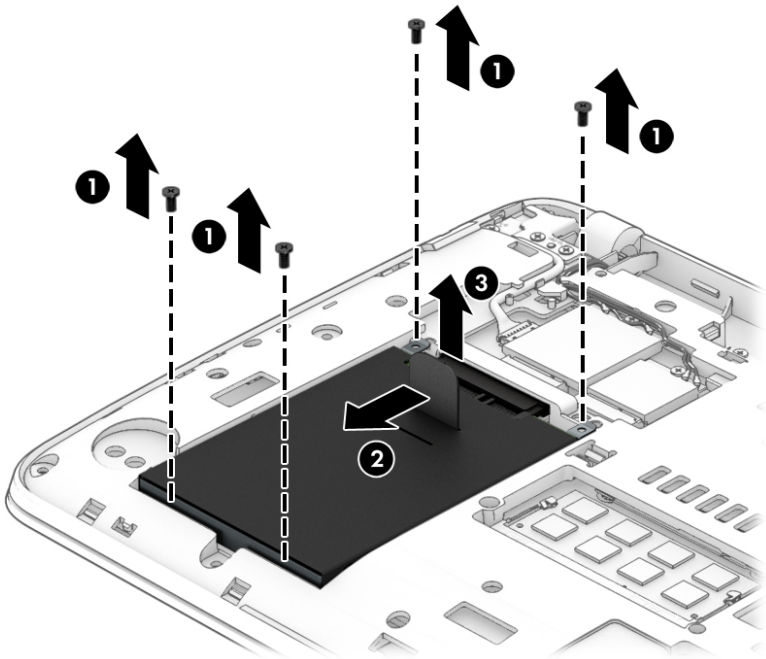
Before removing the hard drive, follow these steps:

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 battery (see Battery on page 24).
5. Remove the bottom cover (see Bottom cover on page 26).

Remove the hard drive:

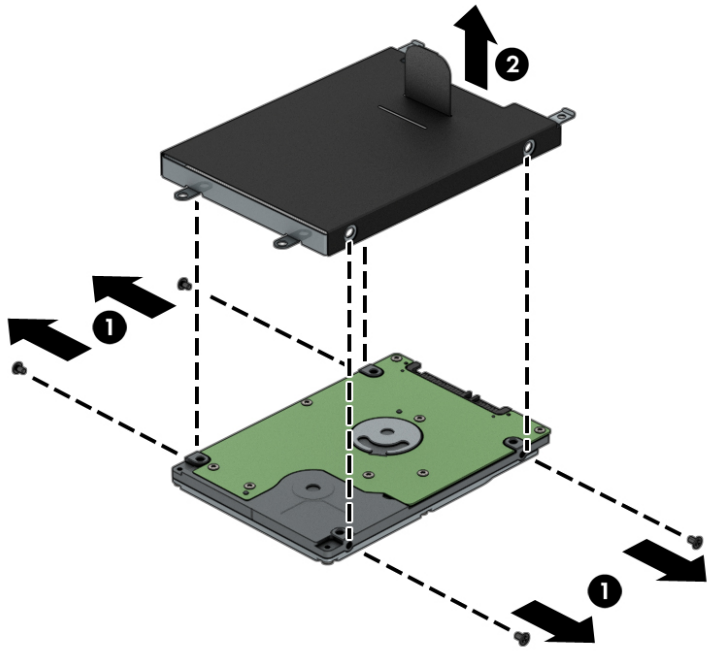
1. Remove the four Phillips PM2.5×5.8 screws **(1)** that secure the hard drive to the base enclosure.
2. Slide the hard drive **(2)** forward until it disconnects from the system board.

3. Remove the hard drive **(3)**.



4. If it is necessary to replace the hard drive bracket, remove the four Phillips PM3.0×4.1 screws **(1)** that secure the hard drive bracket to the hard drive.
5. Lift the bracket straight up **(2)** and remove the bracket from the hard drive.

   The hard drive bracket and screws are included in the Hard Drive Hardware Kit, spare part number 809858-001.



Reverse this procedure to reassemble and install the hard drive.

Solid-state drive

NOTE: The hard drive spare kit does not include the hard drive bracket or screws. The hard drive bracket and screws are included in the Hard Drive Hardware Kit, spare part number 809858-001.

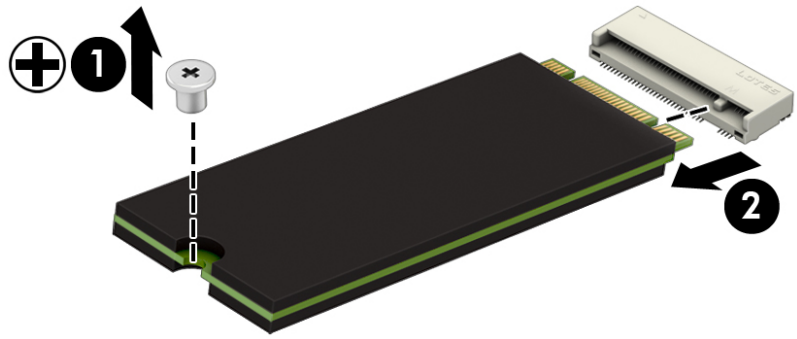
Description	Spare part number
500-GB, 5400-rpm, SATA, 7.0-mm	778186-005
320-GB, 5400-rpm, SATA, 7.0-mm	645088-001

Before removing the hard drive, 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 battery (see Battery on page 24).
5. Remove the bottom cover (see Bottom cover on page 26).

Remove the solid-state drive:

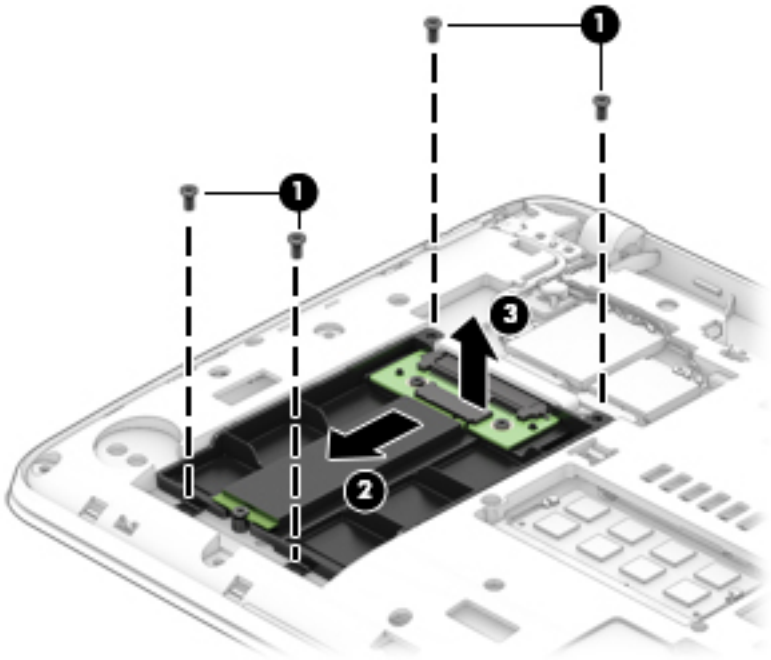
1. Remove the Phillips PM2.0×3.7 broad head screw **(1)** that secures the solid-state drive to the solid-state drive tray. (The solid-state drive tilts up.)
2. Remove the solid-state drive **(2)** by pulling it away from the slot at an angle.



3. If it is necessary to replace the solid-state drive tray, remove the four Phillips PM3.0×4.1 screws **(1)** that secure the solid-state drive tray to the base enclosure.
4. Slide the solid-state drive tray **(2)** forward until it disconnects from the system board.

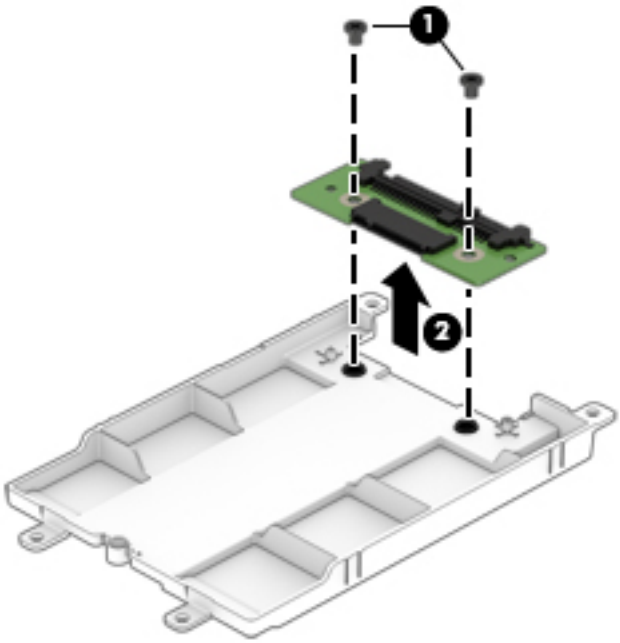
5. Remove the solid-state drive tray **(3)**.

   The solid-state drive tray and screws are included in the Solid-State Drive Hardware Kit, spare part number 809859-001.



6. If it is necessary to replace the solid-state drive connector board, remove the two Phillips PM2.0×3.7 broad head screws **(1)** that secure the solid-state drive connector board to the solid-state drive tray.
7. Remove the solid-state drive connector board **(2)**.

   The solid-state drive connector board is available using spare part number 811608-001.



Reverse this procedure to reassemble and install the solid-state drive.

Memory module

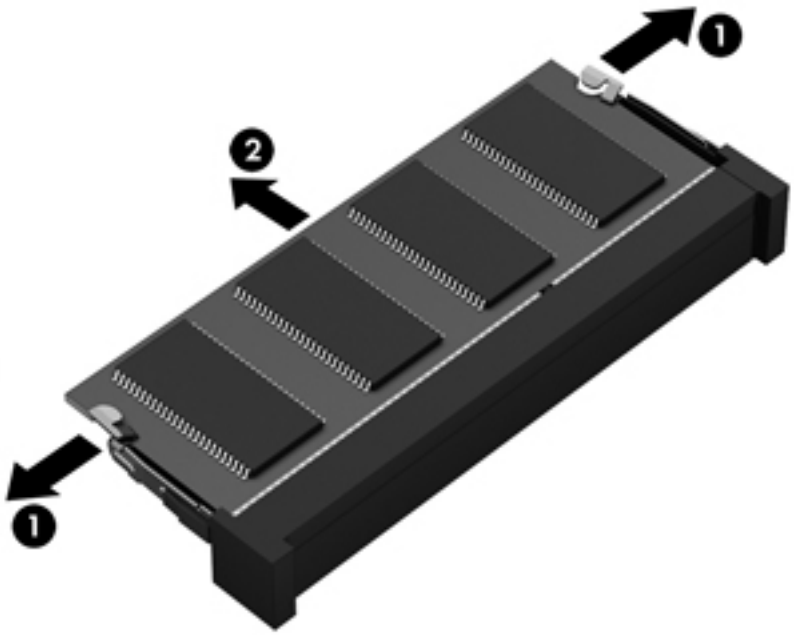
Description	Spare part number
8-GB (PCL3, 12800, 1600)	693374-005
4-GB (PCL3, 12800, 1600)	691740-005
2-GB (PCL3, 12800, 1600)	691739-005

Before removing the memory module, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 24).
5. Remove the bottom cover (see Bottom cover on page 26).

Remove the memory module:

1. Spread the retaining tabs **(1)** on each side of the memory module slot to release the memory module. (The memory module tilts up.)
2. Remove the memory module **(2)** by pulling it away from the slot at an angle.



Reverse this procedure to install a memory module.

WWAN module

Description	Spare part number
HP hs3110 HSPA+ Mobile Broadband Module	793516-005

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 WWAN module, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 24).
5. Remove the bottom cover (see Bottom cover on page 26).

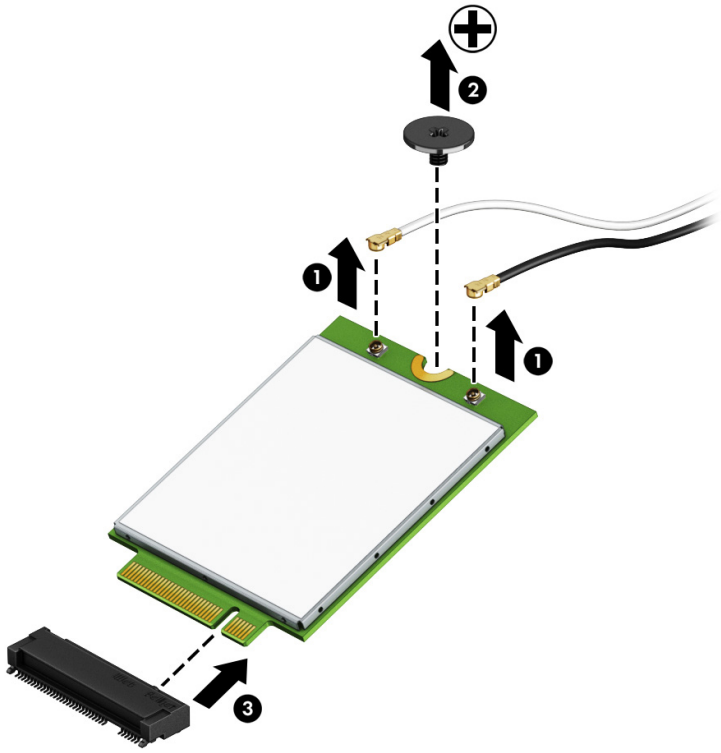
Remove the WWAN module:

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

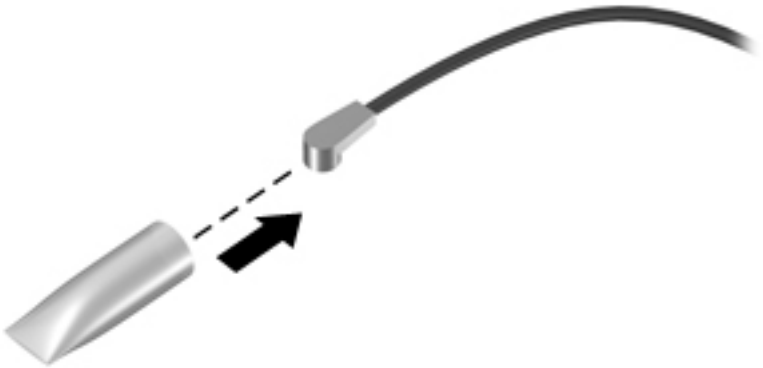
NOTE: The #5/red WWAN antenna cable connects to the WWAN module #5/Main terminal. The #6/blue WWAN antenna cable connects to the WWAN module #6/Aux terminal.

2. Remove the Phillips PM2.0×3.7 broad head screw **(2)** that secures the WWAN module to the base enclosure. (The WWAN module tilts up.)

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



NOTE: If the WWAN antenna is not connected to the terminal on the WWAN module, a protective sleeve must be installed on the antenna connector, as shown in the following illustration.



Reverse this procedure to install the WWAN module.

WLAN module

Description	Spare part number
Intel Dual Band Wireless-AC 3160 802.11 ac 1×1 WiFi + Bluetooth 4.0 Combo Adapter	751416-005
Intel Dual Band Wireless-AC 7260 802.11 ac 2×2 WiFi + Bluetooth 4.0 Combo Adapter	756763-005
Realtek RTL8723BE 802.11b/g/n 1×1 Wi-Fi + Bluetooth 4.0 Combo Adapter	792610-005

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. 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 battery (see Battery on page 24).
5. Remove the bottom cover (see Bottom cover on page 26).

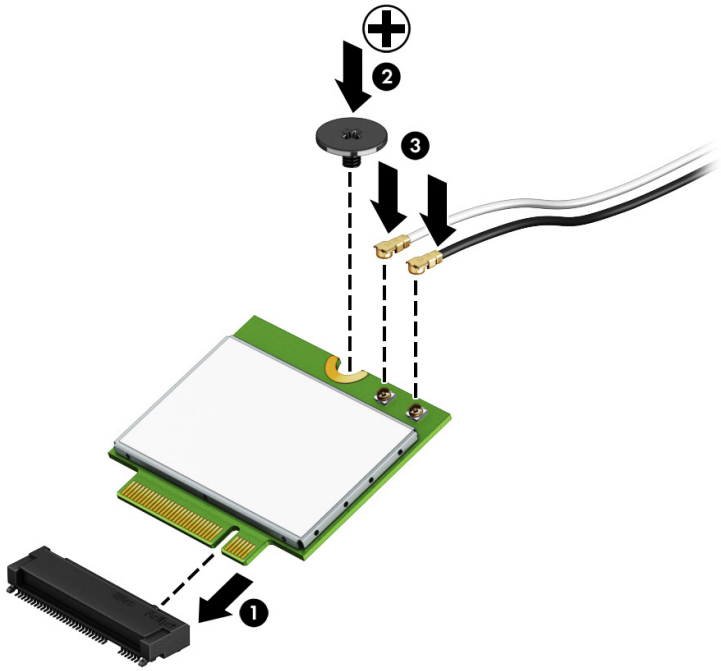
Remove the WLAN module:

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

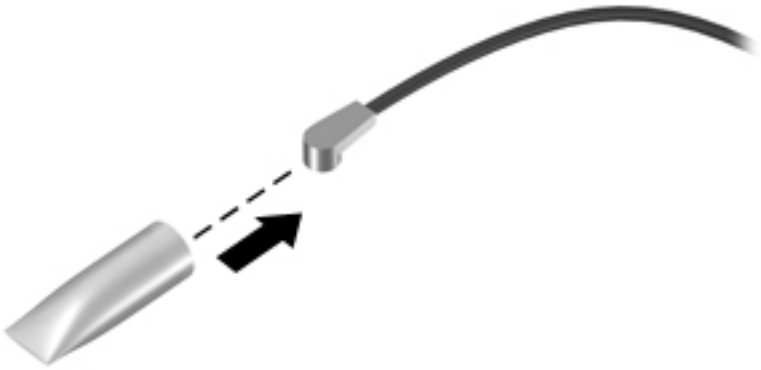
NOTE: The #1/white WLAN antenna cable connects to the WLAN module #1/Main terminal. The #2/black WLAN antenna cable connects to the WLAN module #1/Aux terminal.

2. Remove the Phillips PM2.0×3.7 broad head screw **(2)** that secures the WLAN module to the base enclosure. (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 is not connected to the terminal on the WLAN module, a protective sleeve must be installed on the antenna connector, as shown in the following illustration.



Reverse this procedure to install the WLAN module.

Display assembly

NOTE: The non-TouchScreen display assembly is spared at the subcomponent level only. For non-TouchScreen display assembly disassembly information, see the individual disassembly subsections.

The TouchScreen display assembly is spared as a whole unit replacement spare part kit and is available using spare part number 809862-001.

Before removing the display assembly, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the battery (see Battery on page 24).
5. Remove the bottom cover (see Bottom cover on page 26).

Remove the display assembly:

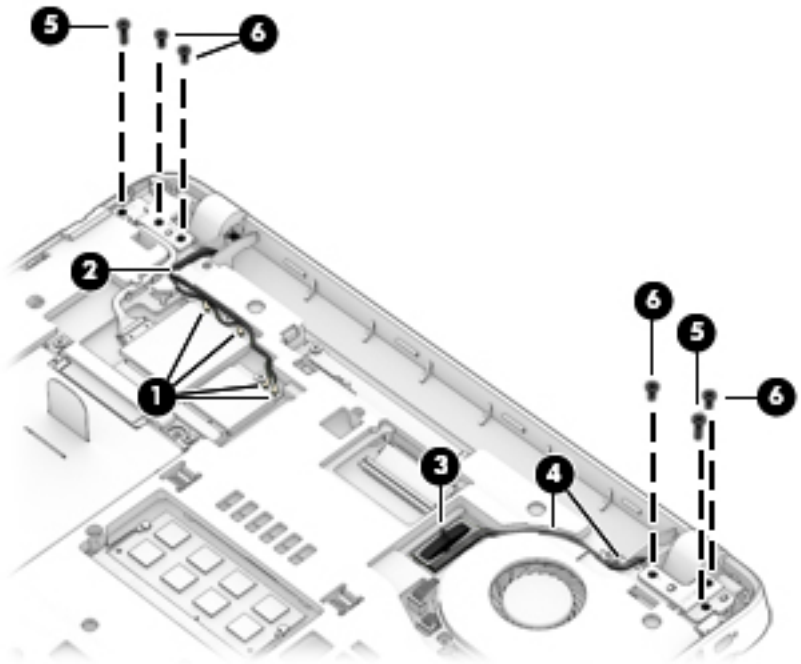
1. Disconnect the wireless antenna cables **(1)** from the terminals on the WWAN module and the WLAN module.

NOTE: The #1/white WLAN antenna cable connects to the WLAN module #1/Main terminal. The #2/black WLAN antenna cable connects to the WLAN module #2/Aux terminal.

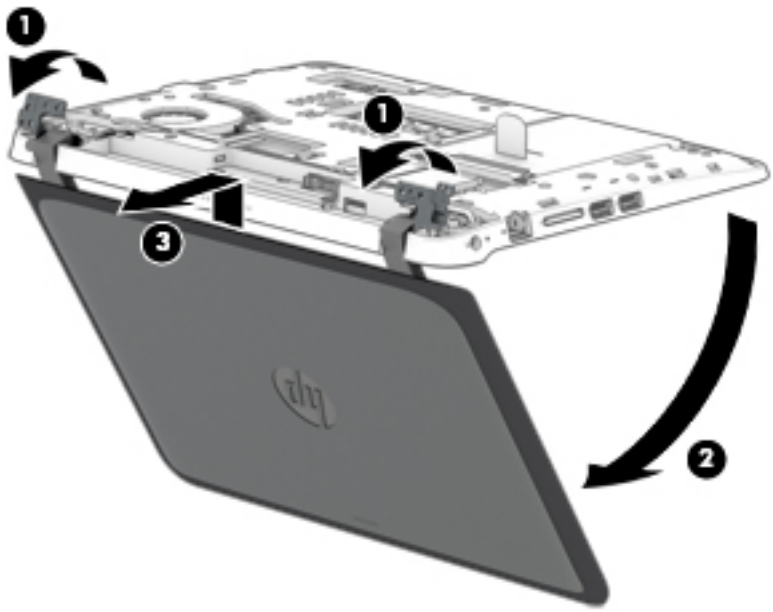
NOTE: The #5/red WWAN antenna cable connects to the WWAN module #5/Main terminal. The #6/blue WWAN antenna cable connects to the WWAN module #6/Aux terminal.

2. Release the wireless antenna cables from the retention clips **(2)** built into the base enclosure.
3. Disconnect the display panel cable **(3)** from the system board.
4. Release the display panel cable from the retention clips **(4)** and channel built into the base enclosure.
5. Remove the two Phillips PM2.5×8.6 screws **(5)** that secure the display assembly to the base enclosure.

6. Remove the four Phillips PM2.5×5.8 screws **(6)** that secure the display assembly to the base enclosure.



7. Partially open the computer.
8. Swing the display hinges **(1)** to the open position.
9. Slide the display assembly **(2)** forward until the display hinges are clear of the base enclosure.
10. Remove the display assembly **(3)**.



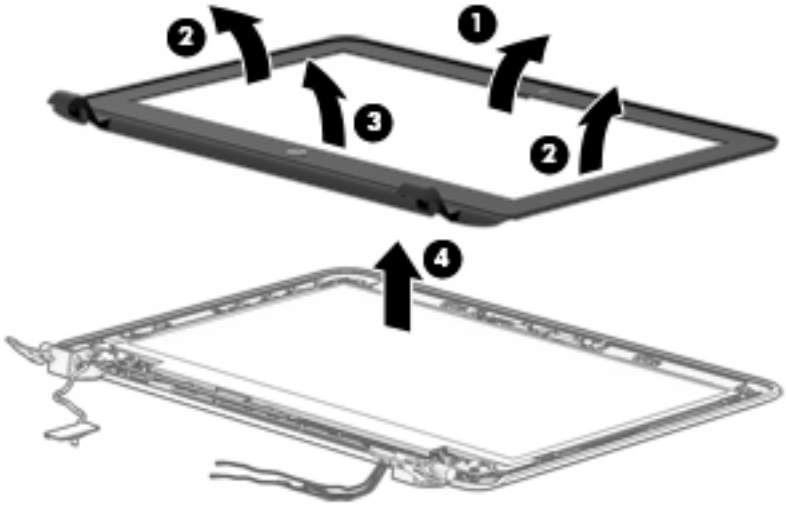
NOTE: Steps 11 through 18 apply only to computer models equipped with a non-TouchScreen display assembly.

11. If it is necessary to replace the display bezel or any of the non-TouchScreen display assembly subcomponents:

    a. Flex the inside edges of the top edge **(1)**, the left and right sides **(2)**, and the bottom edge **(3)** of the display bezel until the bezel disengages from the display back cover.

    b. Remove the display bezel **(4)**.

    The display bezel is available using spare part number 809855-001.

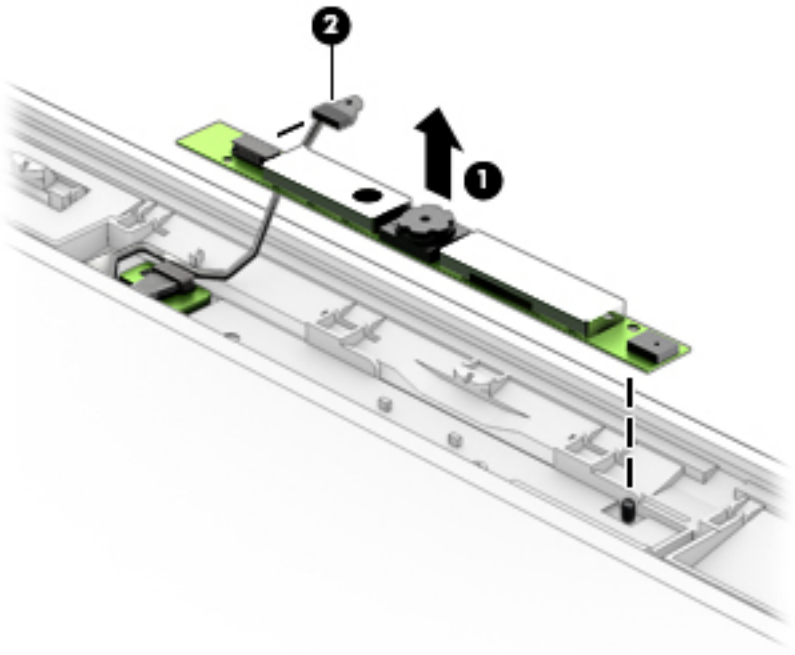


12. If it is necessary to replace the webcam/microphone module:

    a. Remove the display bezel.

    b. Disconnect the display LED board cable **(1)** from the webcam/microphone module.

c. Detach the webcam/microphone module **(2)** from the display back cover. (The webcam/microphone module is attached to the display back cover with double-sided adhesive.)



d. Remove the webcam/microphone module.

The webcam/microphone module is available using spare part number 809875-001.

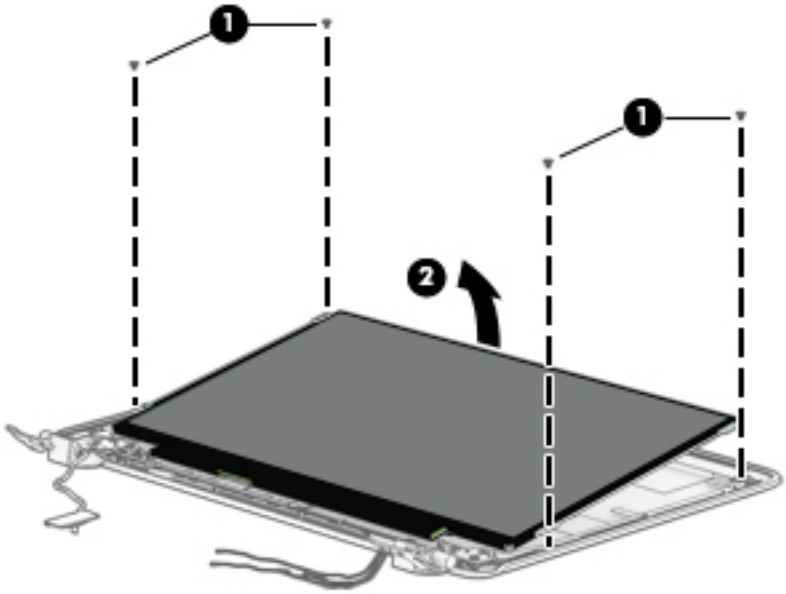
13. If it is necessary to replace the display panel:

a. Remove the display bezel.

b. Remove the four Phillips PM2.0×2.0 screws **(1)** that secure the display panel to the display enclosure.

⚠ **CAUTION:** Before turning the display panel upside down, make sure the work surface is clear of tools, screws, and any other foreign objects. Failure to follow this caution can result in damage to the display panel.

c. Lift the top edge of the display panel **(2)** and swing it up and forward until it rests upside down in front of the display back cover.

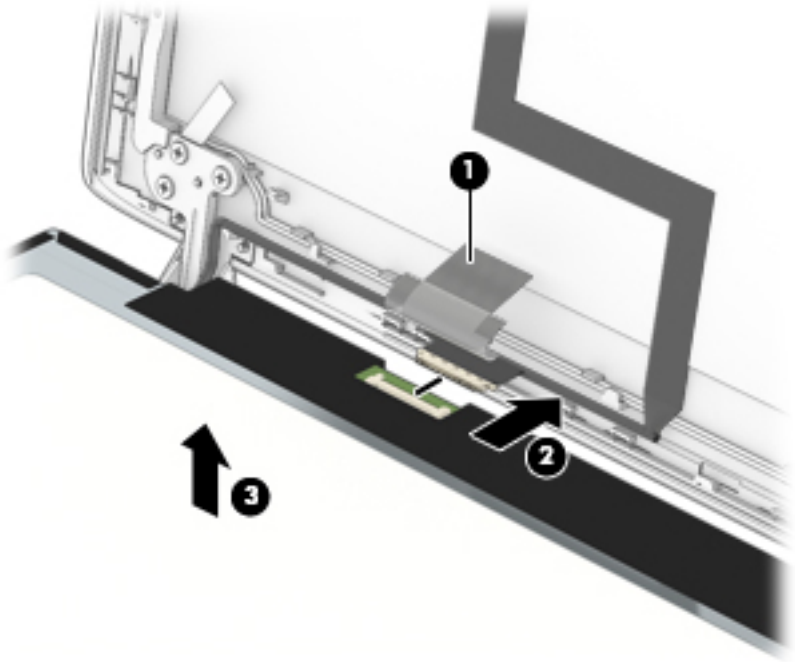


d. Release the adhesive strip **(1)** that secures the display panel cable connector to the display panel.

e. Disconnect the display panel cable **(2)** from the display panel.

f. Remove the display panel **(3)**.

The display panel is available using spare part number 783089-001.



14. If it is necessary to replace the display LED board:

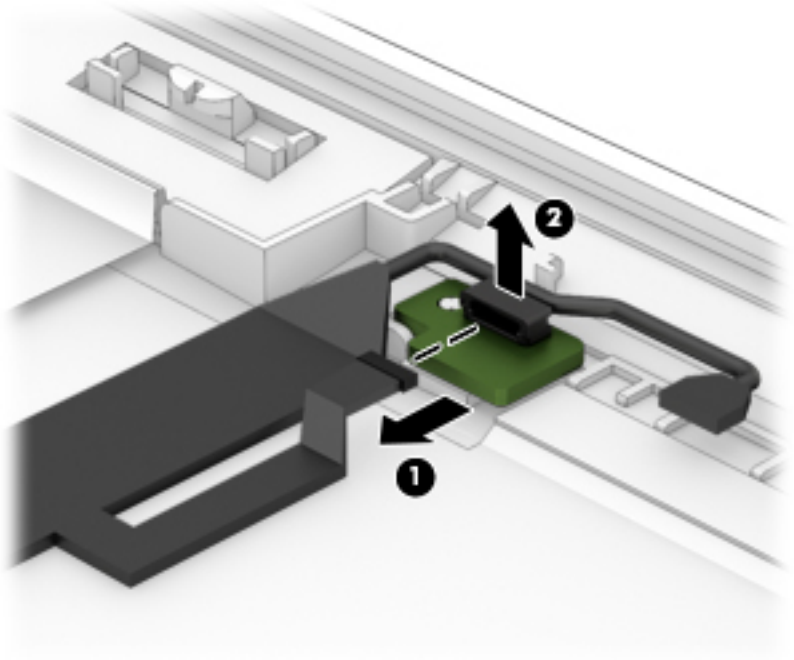
a. Remove the display bezel.

b. Remove the webcam/microphone module.

c. Remove the display panel.

d. Disconnect the display panel cable **(1)** from the display LED board.

e. Detach the display LED board **(3)** from the display back cover. (The display LED board is attached to the display back cover with double-sided adhesive.)



f. Remove the display LED board.

The display LED board spare part kit does not include the display LED board cable. The display LED board cable is included in the Cable Kit, spare part number 809856-001.

15. If it is necessary to replace the display panel cable:

a. Remove the display bezel.

b. Remove the display panel.

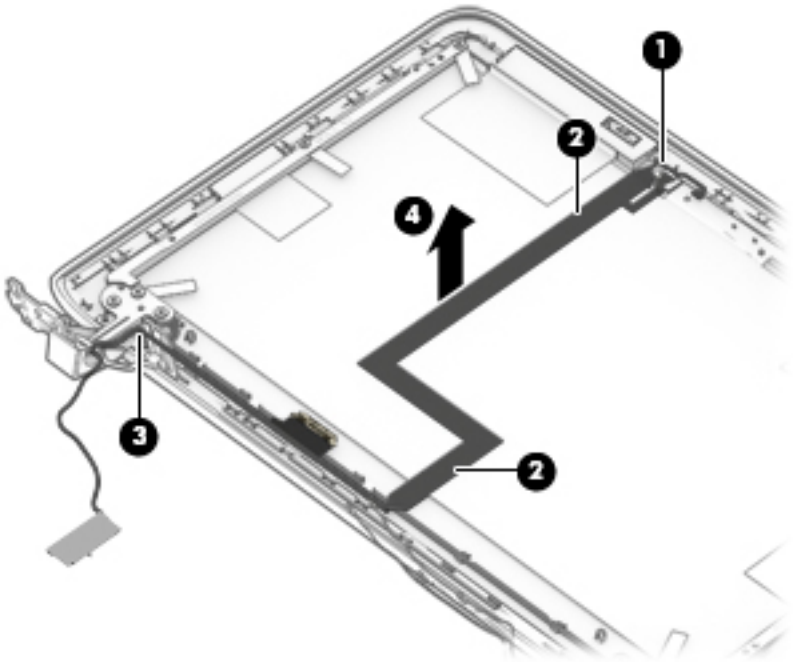
c. Disconnect the display panel cable **(1)** from the display LED board.

d. Detach the display panel cable **(2)** from the display back cover. (The display panel cable is attached to the display back cover with double-sided adhesive.)

e. Release the display panel cable from the retention clip **(3)** built into the left hinge.

f. Remove the display panel cable **(4)**.

The display panel cable is included in the Cable Kit, spare part number 809856-001.



16. If it is necessary to replace the display hinges:

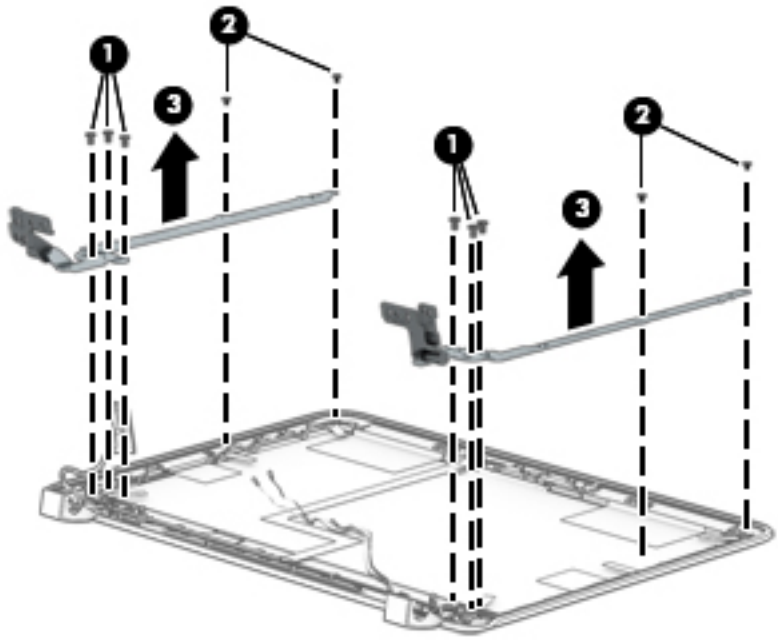
a. Remove the display bezel.

b. Remove the display panel.

c. Remove the six Phillips PM2.5×3.0 screws **(1)** and the four Phillips PM2.0×2.0 screws **(2)** that secure the display hinges to the display enclosure.

d. Remove the display hinges **(3)**.

The display hinges are included in the Display Hinge Kit, spare part number 809861-001.



17. If it is necessary to replace the WLAN antenna cables and transceivers:

a. Remove the display bezel.

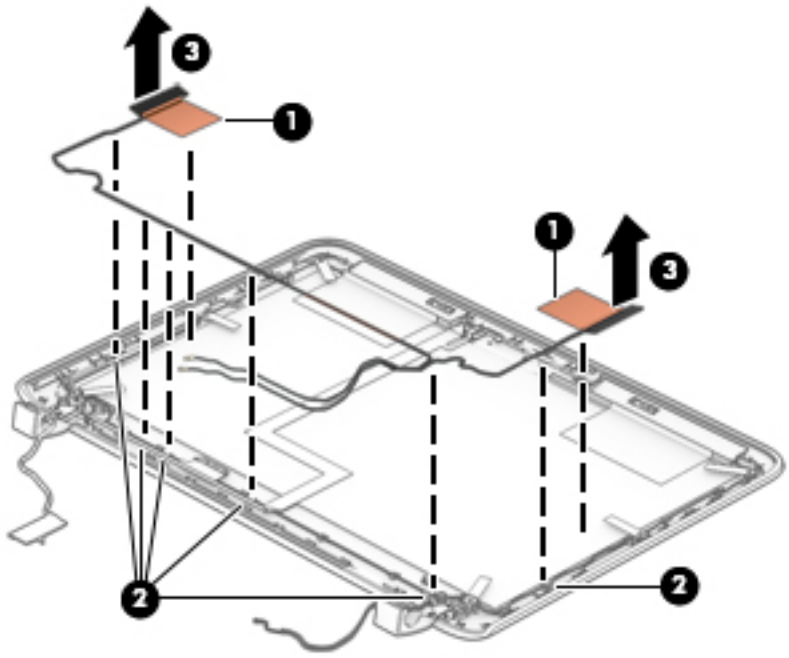
b. Remove the display panel.

c. Detach the WLAN antenna transceivers **(1)** from the display back cover. (The WLAN antenna transceivers are attached to the display back cover with double-sided adhesive.)

d. Release the WLAN antenna cables from the clips **(2)** and routing channel built into the left and right sides and the bottom edge of the display enclosure.

e. Remove the WLAN antenna cables and transceivers **(4)**.

The WLAN antenna cables and transceivers are included in the Antenna Kit, spare part number 809852-001.



18. If it is necessary to replace the WWAN antenna cables and transceivers:

a. Remove the display bezel.

b. Remove the display panel.

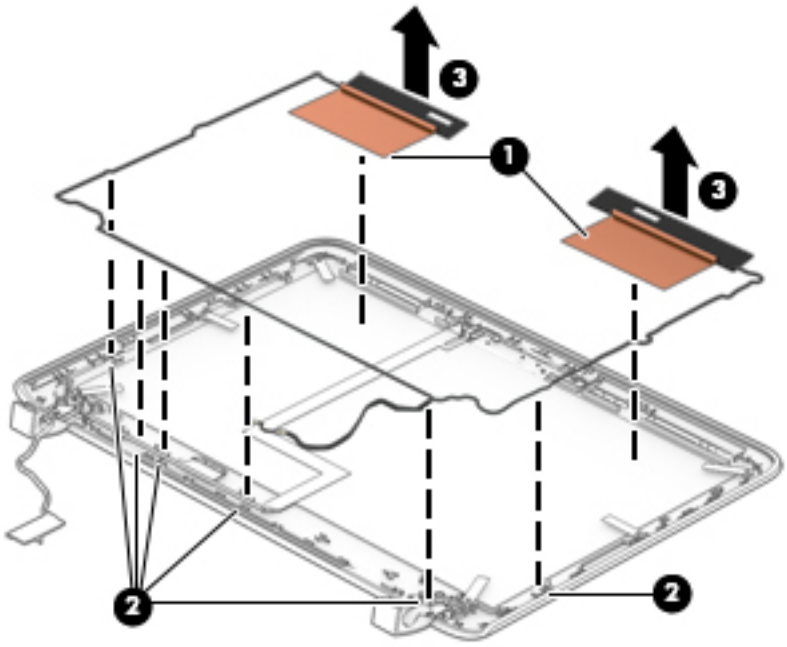
c. Remove the WLAN antenna cables and transceivers.

d. Detach the WWAN antenna transceivers **(1)** from the display back cover. (The WWAN antenna transceivers are attached to the display back cover with double-sided adhesive.)

e. Release the WWAN antenna cables from the clips **(2)** and routing channel built into the left and right sides and the bottom edge of the display enclosure.

f. Remove the WWAN antenna cables and transceivers **(3)**.

The WWAN antenna cables and transceivers are included in the Antenna Kit, spare part number 809852-001.



Reverse this procedure to reassemble install the display assembly.

Power connector cable

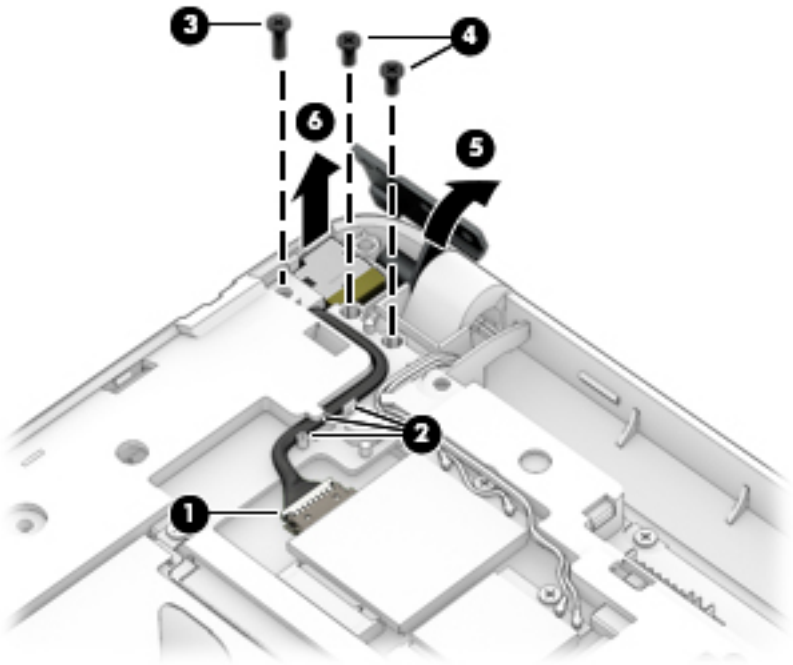
NOTE: The power connector cable is included in the Cable Kit, spare part number 809856-001.

Before removing the power connector cable, 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 battery (see Battery on page 24).
5. Remove the bottom cover (see Bottom cover on page 26).

Remove the power connector cable:

1. Disconnect the power connector cable **(1)** from the system board.
2. Release the power connector cable from the retention clips **(2)** built into the base enclosure.
3. Remove the Phillips PM2.5×8.6 screw **(3)** and the two Phillips PM2.5×5.8 screws **(4)** that secure the display left hinge to the base enclosure.
4. Swing the left display hinge **(5)** to the open position.
5. Remove the power connector cable **(6)**.



Reverse this procedure to install the power connector cable.

Keyboard/top cover

NOTE: The keyboard/top cover spare part kit does not include the TouchPad cable or the TouchPad button board cable. The TouchPad cable and the TouchPad button board cable are included in the Cable Kit, spare part number 809856-001.

Description	Spare part number	Description	Spare part number
For use in Belgium	783090-A41	For use in Latin America	783090-161
For use in Canada	783090-DB1	For use in the Netherlands	783090-B31
For use in Denmark, Finland, and Norway	783090-DH1	For use in Russia	783090-251
For use in France	783090-051	For use in Spain	783090-071
For use in Germany	783090-041	For use in Switzerland	783090-BG1
For use in Italy	783090-061	For use in the United Kingdom	783090-031
For use in Japan	783090-291	For use in the United States	783090-001

Before removing the keyboard/top cover, follow these steps:

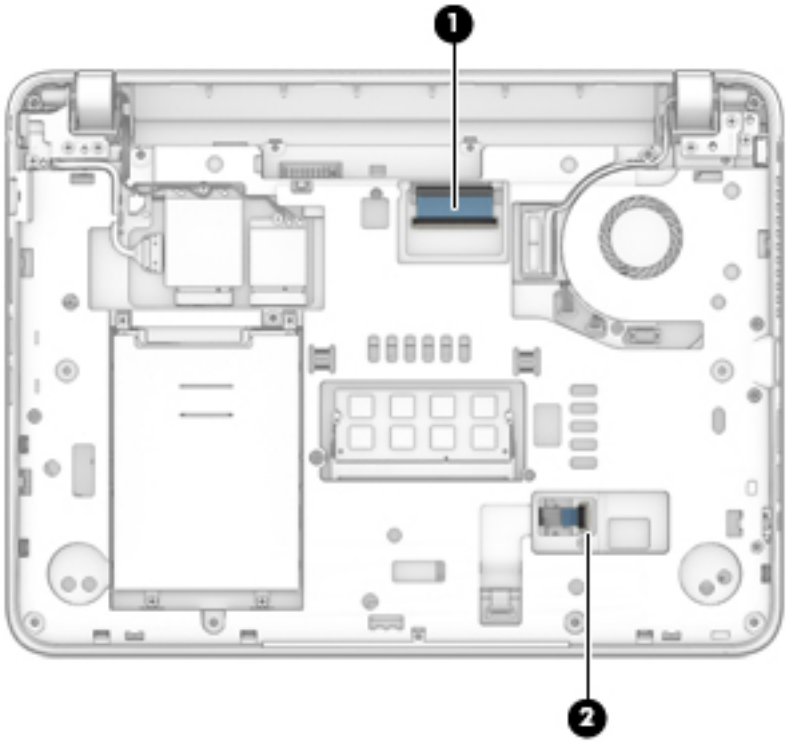
1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the battery (see Battery on page 24).
5. Remove the bottom cover (see Bottom cover on page 26).
6. Remove the hard drive (see Hard drive on page 28).

NOTE: When replacing the keyboard/top cover, be sure that the power button board (see Power button board on page 51) is removed from the defective keyboard/top cover and installed on the replacement keyboard/top cover.

Remove the keyboard/top cover:

1. Release the ZIF connector **(1)** to which the keyboard cable is attached, and then disconnect the keyboard cable from the system board.

2. Release the ZIF connector **(2)** to which the TouchPad button board cable is attached, and then disconnect the TouchPad button board cable from the system board.



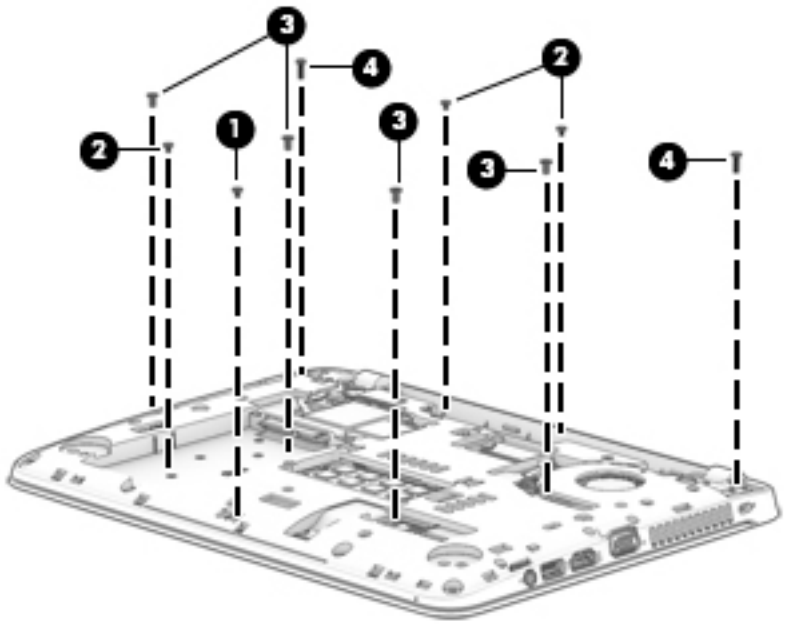
3. Remove the following screws that secure the keyboard/top cover to the base enclosure:

   (1) One Phillips PM2.0×3.7 screw on the front edge of the keyboard/top cover

   (2) One Phillips PM2.0×3.7 broad head screw in the hard drive bay

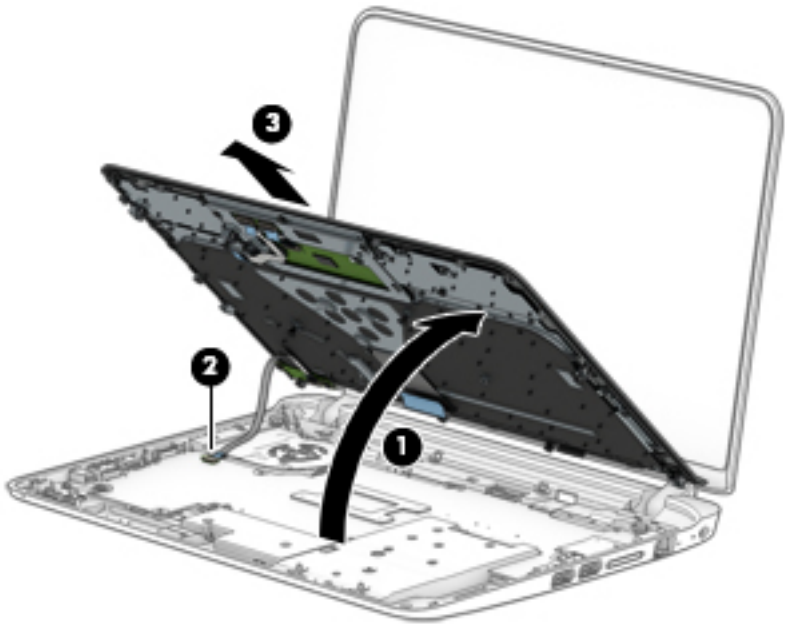
   (3) Six Phillips PM2.0×5.6 screws

   (4) Two Phillips PM2.5×8.6 screws on the display hinges



4. Turn the computer right side up with the front toward you.
5. Open the computer as far as it will open.
6. Lift the front edge **(1)** of the keyboard/top cover until it separates from the front edge of the base enclosure.
7. Release the ZIF connector **(2)** to which the power button board cable is attached, and then disconnect the power button board cable from the system board.

8. Remove the keyboard/top cover **(3)**.



Reverse this procedure to install the keyboard/top cover.

Power button board

Description	Spare part number
Power button board	809865-001
NOTE: The power button board spare part kit does not include the power button board cable. The power button board cable is included in the Cable Kit, spare part number 809856-001.	

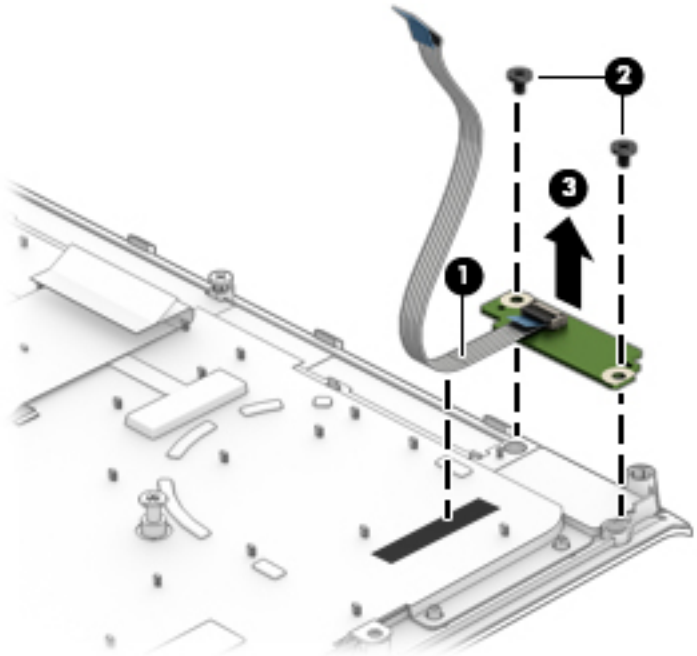
Before removing the power button board, follow these steps:

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 battery (see Battery on page 24), and then remove the following components:
   a. Bottom cover (see Bottom cover on page 26)
   b. Hard drive (see Hard drive on page 28)
   c. Keyboard/top cover (see Keyboard/top cover on page 48)

Remove the power button board:

1. Turn the keyboard/top cover upside down with the front toward you.
2. Detach the power button board cable **(1)** from the keyboard/top cover. (The power button board cable is attached to the keyboard/top cover with double-sided adhesive.)

3. Remove the two Phillips PM2.0×3.7 broad head screws **(2)** that secure the power button board to the keyboard/top cover.
4. Remove the power button board **(3)**.



Reverse this procedure to install the power button board.

Hard drive LED board

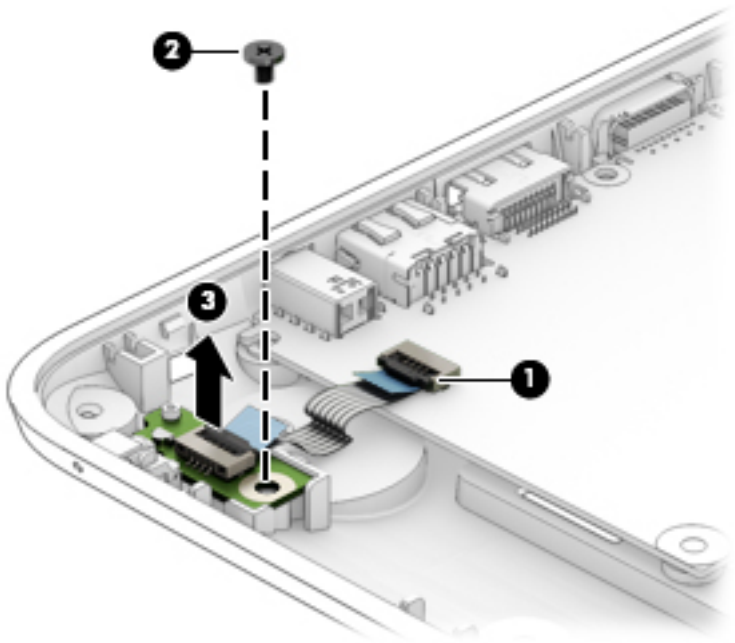
Description	Spare part number
Hard drive LED board	809864-001
NOTE: The hard drive LED board spare part kit does not include the hard drive LED board cable. The hard drive LED board cable is included in the Cable Kit, spare part number 809856-001.	

Before removing the hard drive LED 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 battery (see Battery on page 24), and then remove the following components:
   a. Bottom cover (see Bottom cover on page 26)
   b. Hard drive (see Hard drive on page 28)
   c. Keyboard/top cover (see Keyboard/top cover on page 48)

Remove the hard drive LED board:

1. Release the ZIF connector **(1)** to which the hard drive LED board cable is attached, and then disconnect the hard drive LED board cable from the system board.
2. Remove the Phillips PM2.0×3.7 broad head screw **(2)** that secures the hard drive LED board to the base enclosure.
3. Remove the hard drive LED board **(3)**.



Reverse this procedure to install the hard drive LED board.

Counterweight

Description	Spare part number
Counterweight	809864-001

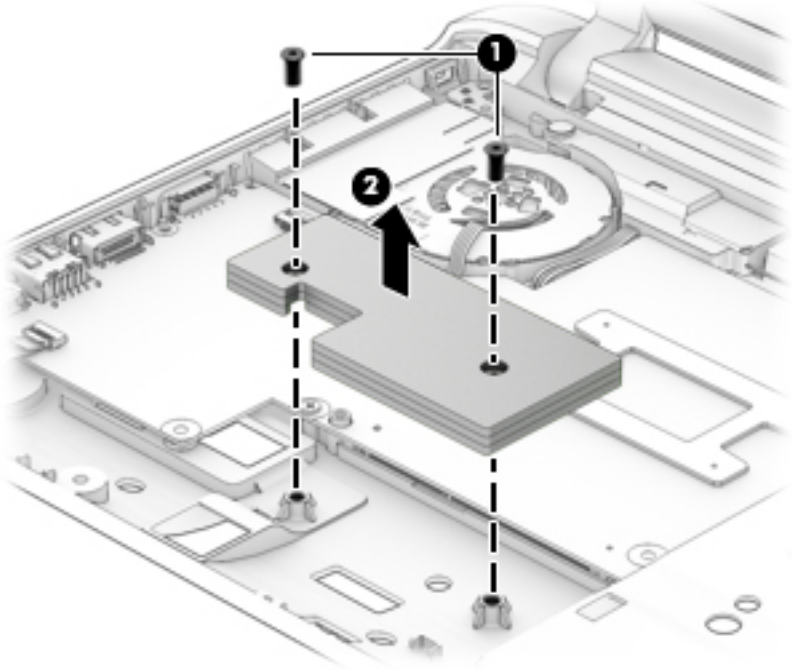
Before removing the counterweight, follow these steps:

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 battery (see Battery on page 24), and then remove the following components:
   a. Bottom cover (see Bottom cover on page 26)
   b. Hard drive (see Hard drive on page 28)
   c. Keyboard/top cover (see Keyboard/top cover on page 48)

Remove the counterweight:

1. Remove the two Phillips PM2.5×5.4 screws **(1)** that secure the counterweight to the base enclosure.

2. Remove the counterweight **(2)**.



Reverse this procedure to install the counterweight.

System board

NOTE: The system board spare part kit includes a graphics subsystem with UMA memory and replacement thermal material.

Description	Spare part number
Equipped with an Intel Core i3-5005U 2.00-GHz processor (1600-MHz FSB, 3.00-MB L3 cache, dual core, 15 W) and the Windows 8 Professional operating system	809874-601
Equipped with an Intel Core i3-5005U 2.00-GHz processor (1600-MHz FSB, 3.00-MB L3 cache, dual core, 15 W) and the Windows 8 Standard operating system	809874-501
Equipped with an Intel Core i3-5005U 2.00-GHz processor (1600-MHz FSB, 3.00-MB L3 cache, dual core, 15 W) and a non-Windows 8 operating system	809874-001
Equipped with an Intel Celeron 3805U 1.50-GHz processor (1600-MHz FSB, 2.00-MB L2 cache, dual core, 15 W) and the Windows 8 Professional operating system	817352-601
Equipped with an Intel Celeron 3805U 1.50-GHz processor (1600-MHz FSB, 2.00-MB L2 cache, dual core, 15 W) and the Windows 8 Standard operating system	817352-001
Equipped with an Intel Celeron 3805U 1.50-GHz processor (1600-MHz FSB, 2.00-MB L2 cache, dual core, 15 W) and a non-Windows 8 operating system	817352-001
Equipped with an Intel Celeron 3205U 1.50-GHz processor (1600-MHz FSB, 2.00-MB L2 cache, dual core, 15 W) and the Windows 8 Professional operating system	809873-601
Equipped with an Intel Celeron 3205U 1.50-GHz processor (1600-MHz FSB, 2.00-MB L2 cache, dual core, 15 W) and the Windows 8 Standard operating system	809873-001
Equipped with an Intel Celeron 3205U 1.50-GHz processor (1600-MHz FSB, 2.00-MB L2 cache, dual core, 15 W) and a non-Windows 8 operating system	809873-001

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 battery (see Battery on page 24), and then remove the following components:
   a. Bottom cover (see Bottom cover on page 26)
   b. Hard drive (see Hard drive on page 28)
   c. WWAN module (see WWAN module on page 33)
   d. Keyboard/top cover (see Keyboard/top cover on page 48)

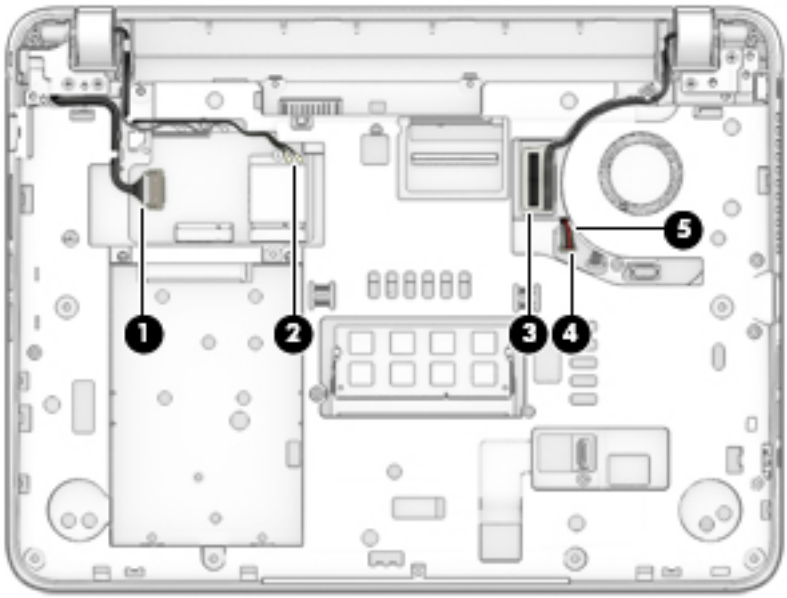
NOTE: When replacing the system board, be sure that the fan/heat sink assembly (see Fan/heat sink assembly on page 58) and the RTC battery (see RTC battery on page 60) are removed from the defective system board and installed on the system board.

Remove the system board:

1. Disconnect the power connector cable **(1)** from the system board.
2. Disconnect the WLAN antenna cables **(2)** from the terminals on the WLAN module.

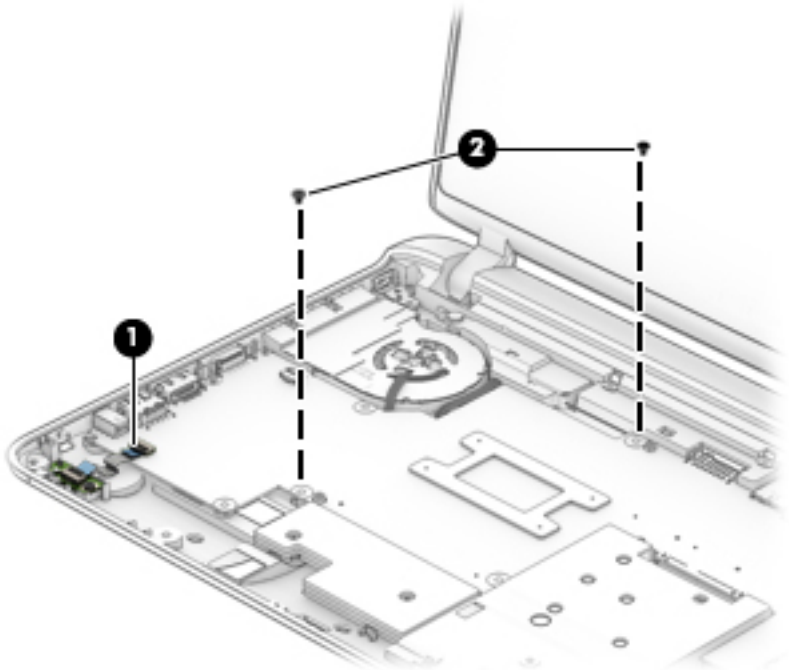
NOTE: The #1/white WLAN antenna cable connects to the WLAN module #1/Main terminal. The #2/black WLAN antenna cable connects to the WLAN module #1/Aux terminal.

3. Disconnect the display panel cable **(3)** from the system board.
4. Disconnect the speaker cable **(4)** from the system board.
5. Release the speaker cable **(5)** from the retention clip built into the base enclosure.

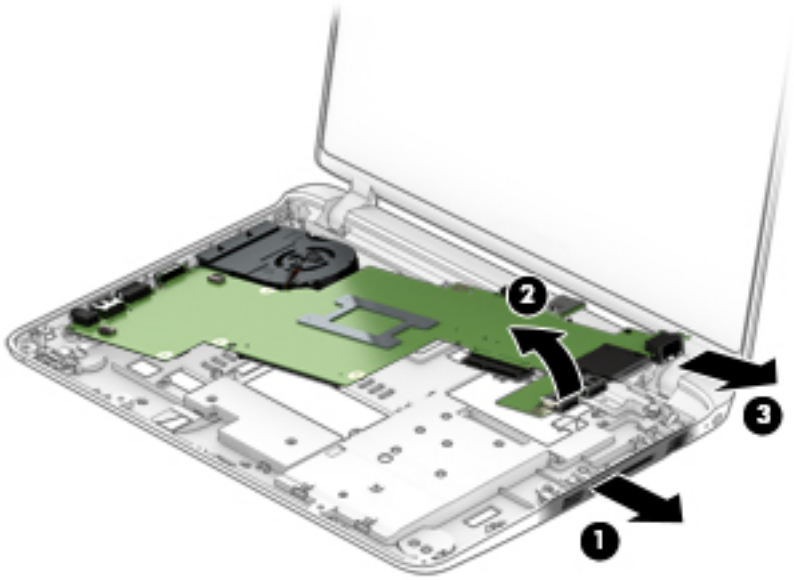


6. Release the ZIF connector **(1)** to which the hard drive LED board cable is attached, and then disconnect the hard drive LED board cable from the system board.

7. Remove the two Phillips PM2.0×3.7 broad head screws **(2)** that secure the system board to the base enclosure.



8. Carefully flex the right side of the base enclosure **(1)** so that the connectors on the right side of the system board clear the base enclosure.
9. Lift the right side of the system board **(2)** until it rests at an angle.
10. Remove the system board **(3)** by sliding it up and to the right at an angle.



Reverse this procedure to install the system board.

Fan/heat sink assembly

Description	Spare part number
Fan/heat sink assembly (includes fan cable, 4 captive screws [secured by C-clips], and replacement thermal material)	809857-001

Before removing the fan/heat sink assembly, follow these steps:

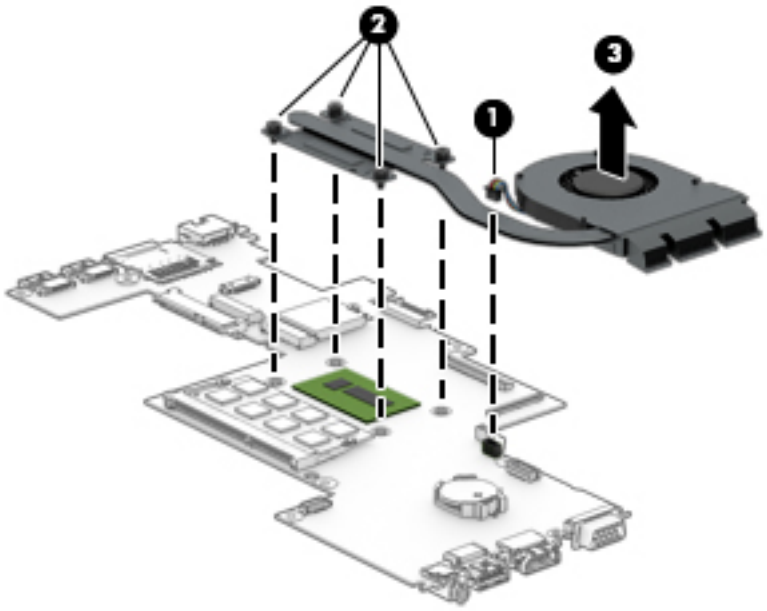
1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the battery (see Battery on page 24), and then remove the following components:
   a. Bottom cover (see Bottom cover on page 26)
   b. Hard drive (see Hard drive on page 28)
   c. WWAN module (see WWAN module on page 33)
   d. Keyboard/top cover (see Keyboard/top cover on page 48)
   e. System board (see System board on page 55)

Remove the fan/heat sink assembly:

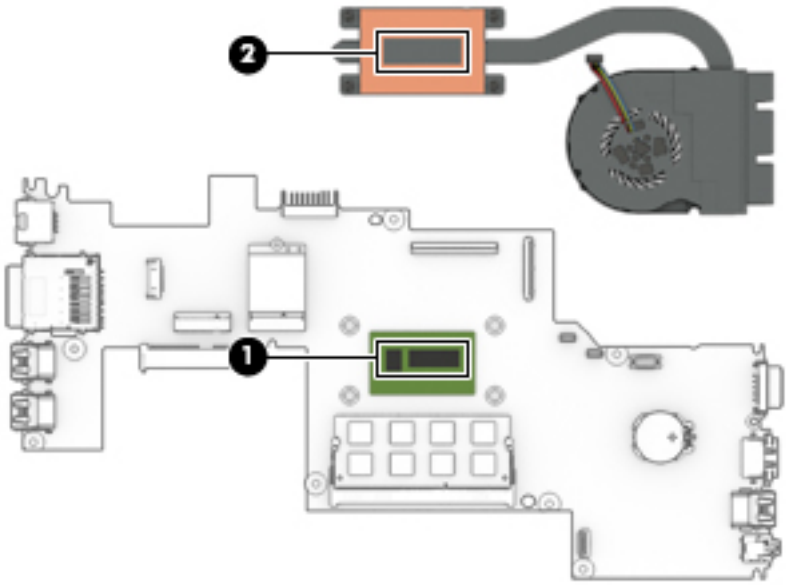
1. Turn the system board upside down with the front toward you.
2. Disconnect the fan cable **(1)** from the system board.
3. Loosen the four Phillips captive screws **(2)** that secure the fan/heat sink assembly to the system board.

NOTE: Due to the adhesive quality of the thermal material located between the fan/heat sink assembly and system board components, it may be necessary to move the fan/heat sink assembly from side to side to detach it.

4. Remove the fan/heat sink assembly **(3)**.



NOTE: The thermal material must be thoroughly cleaned from the surfaces of the fan/heat sink assembly and the system board each time the fan/heat sink assembly is removed. Thermal material is used on the processor **(1)** and the fan/heat sink assembly section **(2)** that services it.



Reverse this procedure to install the fan/heat sink assembly.

RTC battery

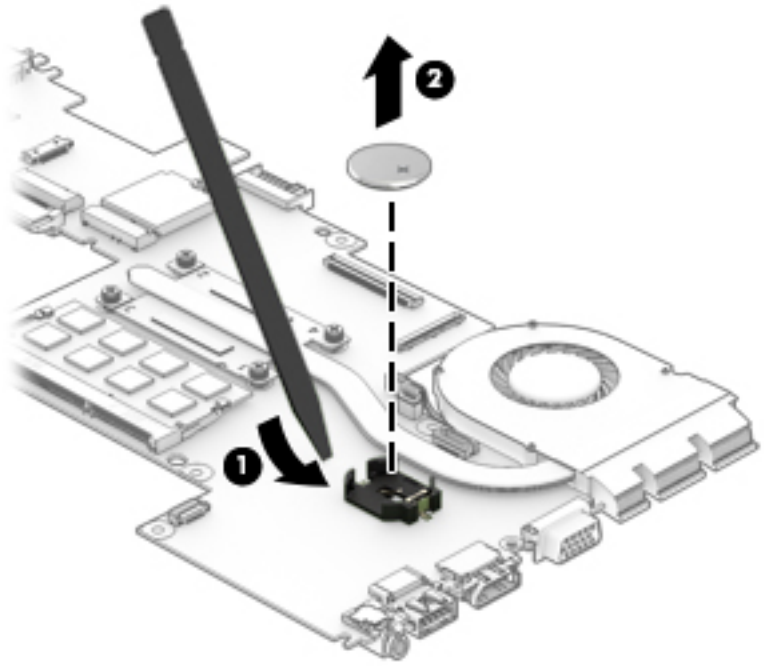
Description	Spare part number
RTC battery	616073-001

Before removing the RTC 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 battery (see Battery on page 24), and then remove the following components:
   a. Bottom cover (see Bottom cover on page 26)
   b. Hard drive (see Hard drive on page 28)
   c. WWAN module (see WWAN module on page 33)
   d. Keyboard/top cover (see Keyboard/top cover on page 48)
   e. System board (see System board on page 55)

Remove the RTC battery:

1. Turn the system board upside down with the front toward you.
2. Use a flat-bladed, non-metallic tool to release the RTC battery from the socket on the system board **(1)**.
3. Remove the RTC battery **(2)**.



Reverse this procedure to install the RTC battery. When installing the RTC battery, make sure the "+" sign faces up.

Speakers

Description	Spare part number
Speaker Kit (includes left and right speakers, cables, and four rubber isolators)	809870-001

Before removing the speakers, follow these steps:

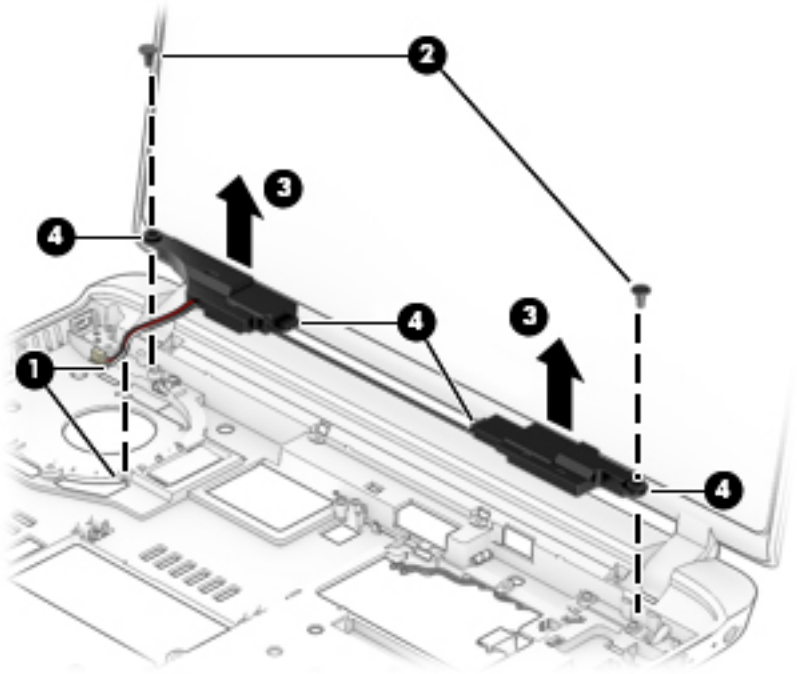
1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the battery (see Battery on page 24), and then remove the following components:
   a. Bottom cover (see Bottom cover on page 26)
   b. Hard drive (see Hard drive on page 28)
   c. WWAN module (see WWAN module on page 33)
   d. Keyboard/top cover (see Keyboard/top cover on page 48)
   e. System board (see System board on page 55)

Remove the speakers:

1. Release the speaker cable from the routing clip **(1)** built into the base enclosure.
2. Remove the two Phillips PM2.0×5.5 shoulder screws **(2)** that secure the speakers to the base enclosure.

3. Remove the speakers **(3)**.

NOTE: When removing the speakers, make note of the location of the four rubber isolators. Removal of or damage to these isolators can cause degradation to speaker performance.



Reverse this procedure to install the speakers.

7 Computer Setup (BIOS), MultiBoot, and HP PC Hardware Diagnostics (UEFI) – Windows 8

Using Computer Setup

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

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

Starting Computer Setup

NOTE: An external keyboard or mouse connected to a USB port can be used with Computer Setup only if USB legacy support is enabled.

To start Computer Setup, follow these steps:

1. Turn on or restart the computer, and then press esc while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
2. Press f10 to enter Computer Setup.

Navigating and selecting in Computer Setup

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

1. Turn on or restart the computer, and then press esc while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.

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

2. Press f10 to enter Computer Setup.
   - To select a menu or a menu item, use the tab key and the keyboard arrow keys and then press enter, or use a pointing device to click the item.
   - To scroll up and down, click the up arrow or the down arrow in the upper-right corner of the screen, or use the up arrow key or the down arrow key on the keyboard.
   - To close open dialog boxes and return to the main Computer Setup screen, press esc, and then follow the on-screen instructions.

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

- To exit Computer Setup menus without saving your changes:

  Click the **Exit** icon in the lower-right corner of the screen, and then follow the on-screen instructions.

– or –

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

- To save your changes and exit Computer Setup menus:

  Click the **Save** icon in the lower-right corner of the screen, and then follow the on-screen instructions.

  – or –

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

Your changes go into effect when the computer restarts.

Restoring factory settings in Computer Setup

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

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

1. Turn on or restart the computer, and then press esc while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
2. Press f10 to enter Computer Setup.
3. Use a pointing device or the arrow keys to select **Main > Restore Defaults**.
4. Follow the on-screen instructions.
5. To save your changes and exit, click the **Save** icon in the lower-right corner of the screen, and then follow the on-screen instructions.

   – or –

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

Your changes go into effect when the computer restarts.

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

Updating the BIOS

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

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

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

Determining the BIOS version

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

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

1. Start Computer Setup.
2. Use a pointing device or the arrow keys to select **Main > System Information**.
3. To exit Computer Setup without saving your changes, click the **Exit** icon in the lower-right corner of the screen, and then follow the on-screen instructions.

   – or –

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

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 on the computer by unplugging the power cord from the AC outlet.

Do not shut down the computer or initiate Sleep.

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

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

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

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

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

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

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

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

Using MultiBoot

About the boot device order

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

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

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

Choosing MultiBoot preferences

You can use MultiBoot in the following ways:

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

Setting a new boot order in Computer Setup

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

1. Turn on or restart the computer, and then press esc while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
2. Press f10 to enter Computer Setup.
3. Use a pointing device or the arrow keys to select one of the following options:
   - **Advanced > Boot Options > UEFI Boot Order > UEFI Hybrid**
   - **Advanced > Boot Options > UEFI Boot Order > UEFI Native Boot mode**
   - **Advanced > Boot Options > Legacy Boot Order > Legacy Boot Mode**

   Press enter.
4. To move the device up in the boot order, use a pointing device to click the up arrow, or press the + key.

   – or –

   To move the device down in the boot order, use a pointing device to click the down arrow, or press the - key.
5. To save your changes and exit Computer Setup, click the **Save** icon in the lower-left corner of the screen, and then follow the on-screen instructions.

   – or –

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

Dynamically choosing a boot device using the f9 prompt

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

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

Setting a MultiBoot Express prompt

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

1. Turn on or restart the computer, and then press esc while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
2. Press f10 to enter Computer Setup.
3. Use a pointing device or the arrow keys to select **Advanced > Boot Options > MultiBoot Express Boot Popup Delay (Sec)**, and then press enter.

4. In the **MultiBoot Express Popup Delay (Sec)** field, enter the length of time in seconds that you want the computer to display the startup location menu before it defaults to the current MultiBoot setting. (When 0 is selected, the Express Boot startup location menu is not displayed.)

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

   – or –

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

Your changes go into effect when the computer restarts.

Entering MultiBoot Express preferences

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

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

Using HP PC Hardware Diagnostics (UEFI)

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

To start HP PC Hardware Diagnostics UEFI:

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

   The BIOS searches three places for the 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 69.

   b. Hard drive

   c. BIOS

2. When the diagnostic tool opens, use the keyboard arrow keys to 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: Instructions for downloading HP PC Hardware Diagnostics (UEFI) are provided in English only.

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. Click the **Download** link in the HP PC Hardware Diagnostics section, 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. In the text box, enter the product name, and then click **Go**.

   - or -

   Click **Find Now** to let HP automatically detect your product.
4. Select your computer model, and then select your operating system.
5. In the Diagnostic section, click **HP UEFI Support Environment**.

   - or -

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

8 Computer Setup (BIOS), MultiBoot, and HP PC Hardware Diagnostics (UEFI) – Windows 7

Using Computer Setup

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

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

Starting Computer Setup

NOTE: An external keyboard or mouse connected to a USB port can be used with Computer Setup only if USB legacy support is enabled.

To start Computer Setup, follow these steps:

1. Turn on or restart the computer, and then press esc while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
2. Press f10 to enter Computer Setup.

Navigating and selecting in Computer Setup

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

1. Turn on or restart the computer, and then press esc while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.

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

2. Press f10 to enter Computer Setup.
   - To select a menu or a menu item, use the tab key and the keyboard arrow keys and then press enter, or use a pointing device to click the item.
   - To scroll up and down, click the up arrow or the down arrow in the upper-right corner of the screen, or use the up arrow key or the down arrow key on the keyboard.
   - To close open dialog boxes and return to the main Computer Setup screen, press esc, and then follow the on-screen instructions.

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

- To exit Computer Setup menus without saving your changes:

  Click the **Exit** icon in the lower-right corner of the screen, and then follow the on-screen instructions.

– or –

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

- To save your changes and exit Computer Setup menus:

  Click the **Save** icon in the lower-right corner of the screen, and then follow the on-screen instructions.

  – or –

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

Your changes go into effect when the computer restarts.

Restoring factory settings in Computer Setup

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

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

1. Turn on or restart the computer, and then press esc while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
2. Press f10 to enter Computer Setup.
3. Use a pointing device or the arrow keys to select **Main > Restore Defaults**.
4. Follow the on-screen instructions.
5. To save your changes and exit, click the **Save** icon in the lower-right corner of the screen, and then follow the on-screen instructions.

   – or –

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

Your changes go into effect when the computer restarts.

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

Updating the BIOS

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

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

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

Determining the BIOS version

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

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

1. Start Computer Setup.
2. Use a pointing device or the arrow keys to select **Main > System Information**.
3. To exit Computer Setup without saving your changes, click the **Exit** icon in the lower-right corner of the screen, and then follow the on-screen instructions.

   – or –

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

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 on the computer by unplugging the power cord from the AC outlet.

Do not shut down the computer or initiate Sleep.

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

1. Access Help and Support by selecting **Start > Help and Support**.
2. Select **Updates and tune-ups**, and then select **Check for HP updates now**.
3. 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. Make a note of the date, name, or other identifier. You may need this information to locate the update later, after it has been downloaded to your hard drive.

   b. Follow the on-screen instructions to download your selection to the hard drive.

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

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

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

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

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

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

Using MultiBoot

About the boot device order

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

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

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

Choosing MultiBoot preferences

You can use MultiBoot in the following ways:

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

Setting a new boot order in Computer Setup

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

1. Turn on or restart the computer, and then press esc while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
2. Press f10 to enter Computer Setup.
3. Use a pointing device or the arrow keys to select the **Legacy Boot Order** list, and then press enter.

4. To move the device up in the boot order, use a pointing device to click the up arrow, or press the + key.

   – or –

   To move the device down in the boot order, use a pointing device to click the down arrow, or press the - key.

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

   – or –

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

Dynamically choosing a boot device using the f9 prompt

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

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

Setting a MultiBoot Express prompt

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

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

   – or –

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

Your changes go into effect when the computer restarts.

Entering MultiBoot Express preferences

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

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

Using HP PC Hardware Diagnostics (UEFI) (select models only)

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

To start HP PC Hardware Diagnostics UEFI:

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

   After pressing f2, the BIOS searches three places for the HP PC Hardware Diagnostics (UEFI) 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 76.

   b. Hard drive

   c. BIOS

2. Use the keyboard arrow keys to 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 while it is running, 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.

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. Click the **Download** link in the HP PC Hardware Diagnostics section, 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. In the text box, enter the product name, and then click **Go**.

   - or -

   Click **Find Now** to let HP automatically detect your product.
4. Select your computer model, and then select your operating system.
5. In the Diagnostic section, click **HP UEFI Support Environment**.

   - or -

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

9 Specifications

	Metric	U.S.
Computer dimensions		
Width	**22.74 cm**	11.88 in
Depth	**30.18 cm**	8.95 in
Height	**2.54 cm**	1.00 in
Weight		
Computers equipped with a TouchScreen display assembly	**1.79 kg**	3.95 lbs
Computers equipped with a non-TouchScreen display assembly	**1.70 kg**	3.75 lbs
Operating voltage and current	19.5 V dc @ 3.33 A – 65 W	
	19.5 V dc @ 2.31 A – 45 W	
NOTE: This product is designed for IT power systems in Norway with phase-to-phase voltage not exceeding 240 V rms.		
NOTE: The computer operating voltage and current can be found on the system regulatory label.		
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.		

10 Backup and recovery – Windows 8

To protect your information, use Windows backup and restore utilities to back up individual files and folders, back up your entire hard drive, create system repair media (select models only) by using the installed optical drive (select models only) or an optional external optical drive, or create system restore points. In case of system failure, you can use the backup files to restore the contents of your computer.

From the Start screen, type `restore`, click **Settings**, and then select from the list of displayed options.

NOTE: For detailed instructions on various backup and restore options, perform a search for these topics in Windows Help and Support.

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

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

Backing up your information

Recovery after a system failure is as good as your most recent backup. You should create system repair media and your initial backup immediately after initial system setup. As you add new software and data files, you should continue to back up your system on a regular basis to maintain a reasonably current backup.

For more information on the Windows backup features, see Windows Help and Support.

Performing a system recovery

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

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

NOTE: If you are unable to boot (start up) your computer and you cannot use the system repair media you previously created (select models only), you must purchase Windows operating system media to reboot the computer and repair the operating system. For additional information, see Using Windows operating system media (purchased separately) on page 80.

Using the Windows recovery tools

To recover information you previously backed up, see Windows Help and Support for steps on restoring files and folders.

To recover your information using Automatic Repair, follow these steps:

CAUTION: Some Startup Repair options will completely erase and reformat the hard drive. All files you have created and any software installed on the computer are permanently removed. When reformatting is complete, the recovery process restores the operating system, as well as the drivers, software, and utilities from the backup used for recovery.

1. If possible, back up all personal files.
2. If possible, check for the presence of the Recovery Image partition and the Windows partition.

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

   – or –

   From the Start screen, type `pc`, and then select **This PC**.

   NOTE: If the Windows partition and the Recovery Image partition are not listed, you must recover your operating system and programs using the Windows operating system DVD and the *Driver Recovery* media (both purchased separately). For additional information, see Using Windows operating system media (purchased separately) on page 80.
3. If the Windows partition and the Recovery Image partition are listed, restart the computer by pressing and holding the shift key while clicking **Restart**.
4. Select **Troubleshoot**, then select **Advanced Options**, and then select **Startup Repair**.
5. Follow the on-screen instructions.

NOTE: For additional information on recovering information using the Windows tools, perform a search for these topics in Windows Help and Support.

Using f11 recovery tools

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

To recover the original hard drive image using f11:

1. If possible, back up all personal files.
2. If possible, check for the presence of the Recovery Image partition: From the Start screen, type `pc`, and then select **This PC**.

   NOTE: If the Recovery Image partition is not listed, you must recover your operating system and programs using the Windows operating system media and the *Driver Recovery* media (both purchased separately). For additional information, see Using Windows operating system media (purchased separately) on page 80.
3. If the Recovery Image partition is listed, restart the computer, and then press esc while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.

4. Press f11 while the “Press <F11> for recovery” message is displayed on the screen.
5. Follow the on-screen instructions.

Using Windows operating system media (purchased separately)

To order a Windows operating system DVD, contact 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.

CAUTION: Using a Windows operating system media completely erases hard drive contents and reformats the hard drive. All files that you have created and any software that you have installed on the computer are permanently removed. When reformatting is complete, the recovery process helps you restore the operating system, as well as drivers, software, and utilities.

To initiate a full install of the operating system using a Windows operating system DVD:

NOTE: This process takes several minutes.

1. If possible, back up all personal files.
2. Insert the Windows operating system DVD into the optical drive, and then restart the computer.
3. When prompted, press any keyboard key.
4. Follow the on-screen instructions.

After the installation is completed:

1. Eject the Windows operating system media and then insert the *Driver Recovery* media.
2. Install the Hardware Enabling Drivers first, and then install Recommended Applications.

Using Windows Refresh or Windows Reset

When your computer is not working properly and you need to regain system stability, the Windows Refresh option allows you to start fresh and keep what is important to you.

The Windows Reset option allows you to perform detailed reformatting of your computer, or remove personal information before you give away or recycle your computer. For more information on these features, see Windows Help and Support.

Using HP Software Setup

HP Software Setup can be used to reinstall drivers or select software that has been corrupted or deleted from the system.

1. From the Start screen, type `HP Software Setup`.
2. Open HP Software Setup.
3. Follow the on-screen directions to reinstall drivers or select software.

11 Backup and recovery

Your computer includes HP and Windows tools to help you safeguard your information and retrieve it if you ever need to. These tools will help you return your computer to a proper working state, all with simple steps. This section provides information about the following processes:

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

Creating recovery media and backups

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

1. After you successfully set up the computer, create HP Recovery media. This step creates a Windows 7 operating system DVD and a *Driver Recovery* DVD. The Windows DVD can be used to reinstall the original operating system in cases where the hard drive is corrupted or has been replaced. The *Driver Recovery* DVD installs specific drivers and applications. See Creating recovery media with HP Recovery Disc Creator on page 82.
2. Use Windows Backup and Recovery tools to perform the following:
   - Back up individual files and folders
   - Back up your entire hard drive (select models only)
   - Create system repair discs (select models only) with the installed optical drive (select models only) or an optional external optical drive
   - Create system restore points

NOTE: This guide describes an overview of backing up, restoring, and recovering options. For more details about the tools provided, see Help and Support. To access Help and Support, select **Start > Help and Support**.

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

In case of system failure, you can use the backup files to restore the contents of your computer. See Backing up your information on page 82.

Guidelines

- When creating recovery media or backing up to discs, use any of the following types of discs (purchased separately): DVD+R, DVD+R DL, DVD-R, DVD-R DL, or DVD±RW. The discs you use will depend on the type of optical drive you are using.
- Be sure that the computer is connected to AC power before you start the recovery media creation process or the backup process.

Creating recovery media with HP Recovery Disc Creator

HP Recovery Disc Creator is a software program that offers an alternative way to create recovery media. After you successfully set up the computer, you can create recovery media using HP Recovery Disc Creator. This recovery media allows you to reinstall your original operating system as well as select drivers and applications if the hard drive becomes corrupted. HP Recovery Disc Creator can create two kinds of recovery DVDs:

- Windows 7 operating system DVD—Installs the operating system without additional drivers or applications.
- *Driver Recovery* DVD—Installs specific drivers and applications only, in the same way that the HP Software Setup utility installs drivers and applications.

Creating recovery media

NOTE: The Windows 7 operating system DVD can be created only once. Thereafter, the option to create that media will not be available after you create a Windows DVD.

To create the Windows DVD:

1. Select **Start > All Programs > Productivity and Tools > HP Recovery Disc Creator**.
2. Select **Windows disk**.
3. From the drop-down menu, select the drive for burning the recovery media.
4. Click the **Create** button to start the burning process.

After the Windows 7 operating system DVD has been created, create the *Driver Recovery* DVD:

1. Select **Start > All Programs > Productivity and Tools > HP Recovery Disc Creator**.
2. Select **Driver disk**.
3. From the drop-down menu, select the drive for burning the recovery media.
4. Click the **Create** button to start the burning process.

Backing up your information

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

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

Note the following when backing up:

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

NOTE: For detailed instructions on various backup and restore options, perform a search for these topics in Help and Support. To access Help and Support, select **Start > Help and Support**.

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

To create a backup using Windows Backup and Restore:

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

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

Performing a system recovery

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

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

NOTE: If you are unable to boot (start up) your computer and you cannot use the system repair media you previously created (select models only), you must purchase Windows 7 operating system media to reboot the computer and repair the operating system. For additional information, see Using Windows 7 operating system media on page 84.

Using the Windows recovery tools

Using the Windows recovery tools, you can:

- Recover individual files
- Restore the computer to a previous system restore point
- Recover information using recovery tools

NOTE: For detailed instructions on various recovery and restore options, perform a search for these topics in Help and Support. To access Help and Support, select **Start > Help and Support**.

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

To recover information you previously backed up:

1. Select **Start > All Programs > Maintenance > Backup and Restore**.
2. Follow the on-screen instructions to recover your system settings, your computer (select models only), or your files.

To recover your information using Startup Repair, follow these steps:

CAUTION: Some Startup Repair options will completely erase and reformat the hard drive. All files you have created and any software installed on the computer are permanently removed. When reformatting is complete, the recovery process restores the operating system, as well as the drivers, software, and utilities from the backup used for recovery.

1. If possible, back up all personal files.
2. If possible, check for the presence of the Windows partition.

   To check for the Windows partition, select **Start > Computer**.

   NOTE: If the Windows partition is not listed, you must recover your operating system and programs using the Windows 7 operating system DVD and the *Driver Recovery* media. For additional information, see Using Windows 7 operating system media on page 84.
3. If the Windows partition is listed, restart the computer, and then press f8 before the Windows operating system loads.
4. Select **Startup Repair**.
5. Follow the on-screen instructions.

NOTE: For additional information on recovering information using the Windows tools, select **Start > Help and Support**.

Using f11 recovery tools (select models only)

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

To recover the original hard drive image using f11:

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

   NOTE: If the HP Recovery partition is not listed, you must recover your operating system and programs using the Windows 7 operating system media and the *Driver Recovery* media. For additional information, see Using Windows 7 operating system media on page 84.
3. If the HP Recovery partition is listed, restart the computer, and then press esc while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
4. Press f11 while the “Press <F11> for recovery” message is displayed on the screen.
5. Follow the on-screen instructions.

Using Windows 7 operating system media

If you cannot use the recovery media you previously created using the HP Recovery Disc Creator (select models only), you must purchase a Windows 7 operating system DVD to reboot the computer and repair the operating system.

To order a Windows 7 operating system DVD, go to the HP website. For U.S. support, go to http://www.hp.com/support. For worldwide support, go to http://welcome.hp.com/country/us/en/

wwcontact_us.html. You can also order the DVD by calling support. For contact information, see the *Worldwide Telephone Numbers* booklet included with the computer.

CAUTION: Using a Windows 7 operating system DVD completely erases hard drive contents and reformats the hard drive. All files that you have created and any software that you have installed on the computer are permanently removed. When reformatting is complete, the recovery process helps you restore the operating system, as well as drivers, software, and utilities.

To initiate recovery using a Windows 7 operating system DVD:

NOTE: This process takes several minutes.

1. If possible, back up all personal files.
2. Restart the computer, and then insert the Windows 7 operating system DVD into the optical drive before the Windows operating system loads.
3. When prompted, press any keyboard key.
4. Follow the on-screen instructions.
5. Click **Next**.
6. Select **Repair your computer**.
7. Follow the on-screen instructions.

After the repair is completed:

1. Eject the Windows 7 operating system DVD and then insert the *Driver Recovery* DVD.
2. Install the Hardware Enabling Drivers first, and then install Recommended Applications.

12 Statement of Volatility

The purpose of this chapter is to provide general information regarding nonvolatile memory in industry-standards based HP Business Notebook PC systems and provide general instructions for restoring nonvolatile memory that can contain personal data after the system has been powered off and the hard drive has been removed.

HP Business Notebook PC products that use Intel®-based or AMD®-based system boards contain volatile DDR memory. The amount of nonvolatile memory present in the system depends upon the system configuration. Intel-based and AMD-based system boards contain nonvolatile memory subcomponents as originally shipped from HP assuming that no subsequent modifications have been made to the system and assuming that no applications, features, or functionality have been added to or installed on the system.

Following system shutdown and removal of all power sources from an HP Business Notebook PC system, personal data can remain on volatile system memory (DIMMs) for a finite period of time and will also remain in nonvolatile memory. The steps below will remove personal data from the notebook PC, including the nonvolatile memory found in Intel-based and AMD-based system boards.

1. Follow steps (a) through (j) below to restore the nonvolatile memory that can contain personal data. Restoring or re-programming nonvolatile memory that does not store personal data is neither necessary nor recommended.

   a. Enter BIOS (F10) Setup by powering on the system and pressing F10 when prompted near the bottom of the display, or press the ESC key to display the start up menu, then press F10. If the system has a BIOS administrator password, enter the password at the prompt.

   b. Select **Main > Restore Defaults**.

   c. Select the **Security** menu, and then **Restore Security Level Defaults**.

   d. If an asset or ownership tag is set, select the **Security** menu and scroll down to the **Utilities** menu. Select **System IDs**, and the select **Asset Tracking Number**. Press the spacebar once to clear the tag, then press Enter to return to the prior menu.

   e. If a DriveLock password is set, select the **Security** menu, scroll down to **Hard Drive Tools** under the **Utilities** menu, select **Hard Drive Tools**, select **DriveLock**, then uncheck **DriveLock password on restart**.

   f. If an Automatic DriveLock password is set, select the **Security** menu, scroll down to **Hard Drive Tools** under the **Utilities** menu, select **Hard Drive Tools**, scroll down to **Automatic DriveLock**, then select the desired hard drive and disable protection. At the automatic drive lock warning screen, select **Yes** to continue. Repeat this procedure if more than one hard drive has an Automatic DriveLock password.

   g. Select the **Main** menu, then **Reset BIOS Security to factory default**. Click **yes** at the warning message.

   h. Select the **Main** menu, then **Save Changes and Exit**.

i. Reboot the system. If the system has a Trusted Platform Module (TPM) and/or fingerprint sensor, one or two prompts will appear. One to clear the TPM and the other to Reset Fingerprint Sensor; press F1 to accept or F2 to reject.

j. Remove all power and system batteries for at least 24 hours.

2. Remove and retain the storage drive or clear the contents of the drive.

   Clear the drive contents by using the BIOS Setup Secure Erase command option, or by using a third party utility designed to erase data from an SSD. To run Secure Erase, follow these steps:

   a. Enter BIOS Setup by powering on the system, and then pressing F10 when prompted near the bottom of the display.

   b. Select the **Security** menu and scroll down to the **Utilities** menu.

   c. Select **Hard Drive Tools**.

   d. Under **Utilities**, select **Secure Erase**, and then select the desired hard drive.

Non-volatile memory usage

Non Volatile Memory Type	Amount (Size)	Does this memory store customer data?	Does this memory retain data when power is removed?	What is the purpose of this memory?	How is data input into this memory?	How is this memory write protected?
HP Sure Start flash (select models only)	2 MB	No	Yes	Provides protected backup of critical System BIOS code, EC firmware, and critical PC configuration data for select platforms that support HP Sure Start. For more information, see Using HP Sure Start (select models only) on page 90.	Data cannot be written to this device via the host processor. The content is managed solely by the HP Sure Start Embedded Controller.	This memory is protected by the HP Sure Start Embedded Controller.
Real Time Clock (RTC) battery backed-up CMOS configuration memory (CMOS)	256 Bytes	No	Yes	Stores system date and time and limited keyboard controller data.	Using the F10 Setup utility or changing the Microsoft Windows date & time.	This memory is not write-protected. HP recommends password protecting the F10 Setup utility.
Controller (NIC) EEPROM	64 Kbytes (not customer accessible)	No	Yes	Store NIC configuration and NIC firmware.	Using a utility from the NIC vendor that can be run from DOS.	A utility is required to write data to this memory and is available from NIC vendor. Writing data to this ROM in an inappropriate manner will render the NIC non-functional.

Non Volatile Memory Type	Amount (Size)	Does this memory store customer data?	Does this memory retain data when power is removed?	What is the purpose of this memory?	How is data input into this memory?	How is this memory write protected?
Keyboard ROM	64 Kbytes (not customer accessible)	No	Yes	Stores firmware code (keyboard, mouse, & battery management).	Programmed at the factory. Code is updated when the system BIOS is updated.	A utility is required for writing data to this memory and is available on the HP website. Writing data to this ROM in an inappropriate manner can render the PC non-functional.
DIMM Serial Presence Detect (SPD) configuration data	256 Bytes per memory module, 128 Bytes programmable (not customer accessible)	No	Yes	Stores memory module information.	Programmed by the memory vendor.	Data cannot be written to this memory when the module is installed in a PC. The specific write protection method varies by memory vendor.
System BIOS	4 to 5 MBytes	Yes	Yes	Store system BIOS code and PC configuration data.	System BIOS code is programmed at the factory. Code is updated when the system BIOS is updated. Configuration data and settings are input using the F10 setup utility or a custom utility.	A utility is required for writing data to this memory and is available on the HP website. Writing data to this ROM in an inappropriate manner can render the PC non-functional.
Intel Management Engine Firmware (present only in specific ZBook and EliteBook models. For more information, go to http://www.hp.com/support, and select your country. Select **Drivers & Downloads**, and then follow the on-screen instructions.)	1.5 or 5MByte	Yes	Yes	Stores Management Engine Code, Settings, Provisioning Data and iAMT third party data store.	Management Engine Code is programmed at the factory. Code is updated via Intel secure firmware update utility. Unique Provisioning Data can be entered at the factory or by an administrator using the Management Engine (MEBx) setup utility. The third party data store contents can populated by a remote management console or local applications registered by an administrator to have access to the space.	The Intel chipset is configured to enforce HW protection to block all direct read/write access to this area. An Intel utility is required for updating the firmware. Only firmware updates digitally signed by Intel can be applied using this utility.
Bluetooth flash	2Mbit	No	Yes	Stores Bluetooth configuration and firmware.	Programmed at the factory. Tools for writing data to this memory are not publicly available but can be obtained from the silicon vendor.	A utility is required for writing data to this memory and is made available through newer versions of the driver if the flash requires an upgrade.
802.11 WLAN EEPROM	4kb to 8kb	No	Yes	Stores configuration and calibration data.	Programmed at the factory. Tools for writing data to this memory are not made public.	A utility is required for writing data to this memory and is typically not made available to the public unless a firmware upgrade is

Non Volatile Memory Type	Amount (Size)	Does this memory store customer data?	Does this memory retain data when power is removed?	What is the purpose of this memory?	How is data input into this memory?	How is this memory write protected?
						necessary to address a unique issue.
Web Camera	64K bit	No	Yes	Store Web Cam configuration and firmware.	Using a utility from the device manufacturer that can be run from Windows.	A utility is required for writing data to this memory and is typically not made available to the public unless a firmware upgrade is necessary to address a unique issue.
Fingerprint Reader	512kByte Flash	Yes	Yes	Stores fingerprint templates.	By enrolling in HP ProtectTools Security Manager.	Only a digitally signed application can make the call to write to the flash.

Questions and answers

1. **How can the BIOS settings be restored (returned to factory settings)?**

   a. Turn on or restart the computer and press F10 when prompted near the bottom of the display.

   b. Select **Main**, then select **Restore defaults**.

   c. Follow the on-screen instructions.

   d. Select **Main**, save changes and exit, then press Enter.

2. **What kind of configuration data is stored on the DIMM Serial Presence Detect (SPD) memory module? How would this data be written?**

   The DIMM SPD memory contains information about the memory module such as size, serial number, data width, speed/timing, voltage and thermal information. This information is written by the module manufacturer and stored on an EEPROM. This EEPROM cannot be written to when the memory module is installed in a PC. Third party tools do exist that can write to the EEPROM when the memory module is not installed in a PC. There are various third party tools available to read SPD memory.

3. **Does the “Firmware Hub for System BIOS” contain the BIOS program? Is this chip writable, and if so how?**

   The Firmware Hub does contain the BIOS program and is writable. A utility is required to perform the write function.

4. **In some PC systems, the Firmware Hub for System BIOS is a flash memory chip so that updates can be written by the customer. Is this true for these BIOS chips?**

   Yes, they are flash memory chips.

5. **What is meant by “Restore the nonvolatile memory found in Intel-based system boards”?**

   This relates to clearing the Real Time Clock (RTC) CMOS memory that contains PC configuration data.

6. **Does resetting the CMOS configuration memory return the PC back to factory defaults?**

The process of resetting the CMOS will return certain system settings to factory default but will not reset many of the system data and configuration defaults to their factory settings. To return these system data and configuration defaults to factory settings, refer to question and answer 1 and follow the instructions for returning the BIOS settings to factory defaults.

Using HP Sure Start (select models only)

Select computer models are configured with HP Sure Start, a technology that continuously monitors your computer's BIOS for attacks or corruption. If the BIOS becomes corrupted or is attacked, HP Sure Start restores the BIOS to its previously safe state automatically, without user intervention. Those select computer models ship with HP Sure Start configured and enabled. Most users can use HP Sure Start with the default configuration.

To access the latest documentation on HP Sure Start, go to http://www.hp.com/support, and select your country. Select **Drivers & Downloads**, and then follow the on-screen instructions.

13 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.

14 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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