HP mt41 Mobile Thin Client

Maintenance and Service Guide

Product notice

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

Software terms

By installing, copying, downloading, or otherwise using any software product preinstalled on this computer, you agree to be bound by the terms of the HP End User License Agreement (EULA). If you do not accept these license terms, your sole remedy is to return the entire unused product (hardware and software) within 14 days for a refund subject to the refund policy of your place of purchase.

For any further information or to request a full refund of the computer, please contact your local point of sale (the seller).

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Important Notice about Customer Self-Repair Parts

⚠ **CAUTION:** Your computer includes Customer Self-Repair parts and parts that should only be accessed by an authorized service provider. See Chapter 5, "Removal and replacement procedures for Customer Self-Repair parts," for details. Accessing parts described in Chapter 6, "Removal and replacement procedures for Authorized Service Provider only parts," can damage the computer or void your warranty.

Safety warning notice

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

Table of contents

1 Product description

Category	Description
Product Name	HP mt41 Mobile Thin Client
Processors	• AMD A4-5150M with Radeon HD 8350G Graphics (dual-core; 3.3 GHz/2.7 GHz; 35 W; 1 MB L2 cache) • AMD A4-4300M with Radeon HD 7420G Graphics (dual-core; 3.0 GHz/2.5 GHz; 35 W; 1 MB L2 cache)
Chipset	AMD A76M FCH
Graphics	AMD integrated UMA graphics Support dual-display ports through an optional docking device
Panel	• 14.0 in (35.56 cm), high definition (HD), AntiGlare (AG), SVA, 45% color gamut, 1366×768 resolution, 200 cd/m^2 (nits), with camera, not available with WWAN capability • 14.0 in (35.56 cm), HD, AG, SVA, 45% color gamut, 1366×768 resolution, 200 cd/m^2 (nits), without camera, not available with WWAN capability • 14.0 in (35.56 cm), HD, AG, SVA, 45% color gamut, 1366×768 resolution, 200 cd/m^2 (nits), with WWAN, with camera • 14.0 in (35.56 cm), HD, AG, SVA, 45% color gamut, 1366×768 resolution, 200 cd/m^2 (nits), with WWAN, without camera All panels have LED backlight
Memory	Two customer-accessible/upgradable memory module slots Support for DDR3L 1600 MHz PC3L-12800 dual channel memory Support for up to 8192 MB of system RAM in the following configurations: • 8192 MB total system memory (4096 MB×2) • 4096 MB total system memory (4096 MB×1)
Hard drive	Support for **6.35 cm** (2.5 in) 16 GB SATA solid-state drive (SSD)
Upgrade drive	Support for DVD-ROM drive 9.5 mm (.37 in) Support for no drive option (weight saver)
Audio and video	Stereo speakers (2) Dual array microphone (for computer models with a webcam) HD Audio with DTS Studio sound Mono microphone (for computer models without a webcam) Integrated 720p webcam (fixed [no tilt], activity LED), select models Support for no webcam option
Ethernet	Realtek RTL8151GH-CG 10/100/1000 Ethernet Sleep states S3/S5 wake on LAN

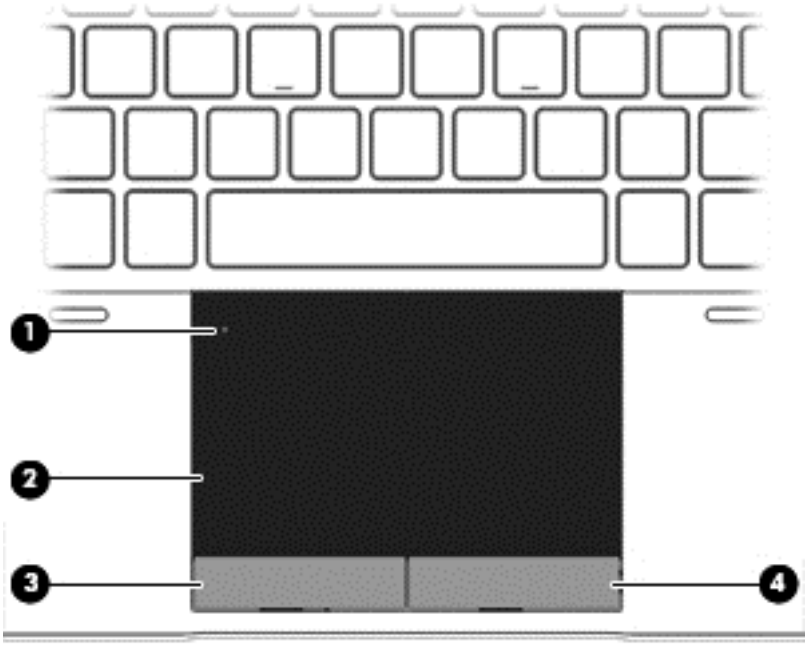
Category	Description
Wireless	Integrated wireless local area network (WLAN) options by way of wireless module Two WLAN antennas built into display assembly Support for the following WLAN formats: • Atheros 802.11 b/g/n 1×1 + Bluetooth 4.0 Combo Adapter • Broadcom 802.11 a/b/g/n 2×2 + Bluetooth 4.0 Combo Adapter
	Integrated wireless wide area network (WWAN) options by way of wireless module (select models only) Two WWAN antennas (world-wide 5 band) built into display assembly Security provided by subscriber identity module (SIM), slot located in battery bay Support for the following WWAN formats: • HP lt4111 LTE/EV-DO/HSPA+ Mobile Broadband Module • HP lt4112 LTE/HSPA+ Mobile Broadband Module Support for no WWAN option
External media cards	HP 2-in-1 multiformat Digital Media Reader Slot. Reads data from and writes data to digital memory cards such as Secure Digital (SD).
Ports	• AC adapter, HP Smart • Audio-in (mono microphone)/audio-out (stereo headphone) combo jack • DisplayPort 1.2 • Docking • RJ-45 (Ethernet) • USB 2.0* (3) • USB 2.0* charging (1) • VGA (Dsub 15 pin) supporting: 1920×1200 external resolution @ 75 Hz, hot plug and unplug and autodetection for correct output to wide-aspect versus standard aspect video * These ports support USB 2.0 by default. For details about activating the USB 3.0 port functionality, see the *User Guide*.
Keyboard/pointing devices	Full-size chiclet keyboard Spill resistant with drain TouchPad requirements: • On/off button • Support for 2-way scroll • Taps enabled by default • Gestures enabled by default: ◦ 2-finger scrolling ◦ 2-finger zoom (pinch)
Power requirements	Support for 65 W, HP Smart Adapter

Category	Description
	Support for the following batteries • 9 cell, 100 Whr, 3.0 Ahr, Li-ion battery • 6 cell, 55 Whr, 2.55 Ahr, Li-ion battery
Security	Supports security lock Trusted platform module (TPM) 1.2 (Infineon; soldered down) Preboot Authentication (Password, smart card) Integrated smart card reader
Operating system	**Preinstalled:** • Windows Embedded Standard 7, 32 bit
Serviceability	**End user replaceable parts:** • AC adapter • Battery (system) • Fan • Keyboard • Memory modules (expansion and primary) • Optical drive • SSD • WLAN module • WWAN module

2 External component identification

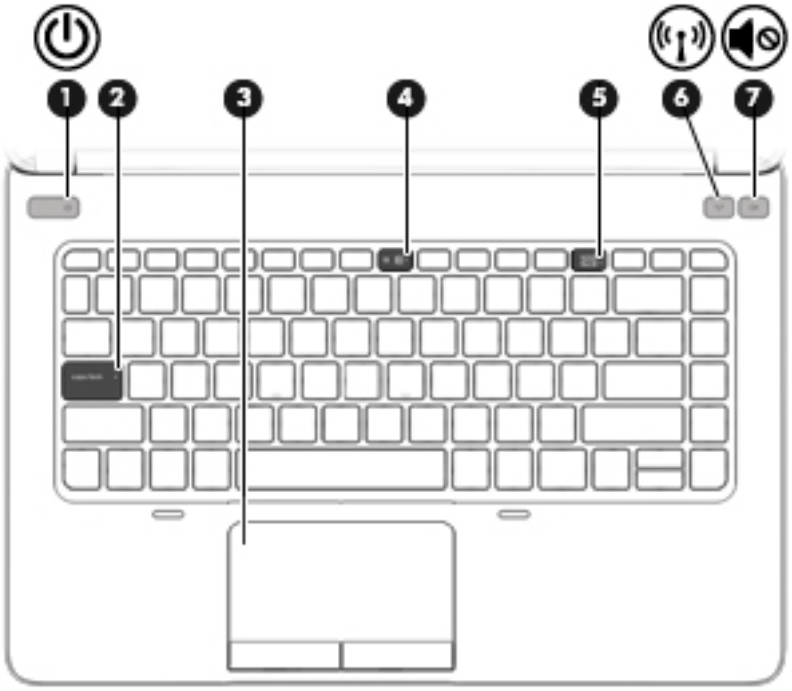
Top

TouchPad



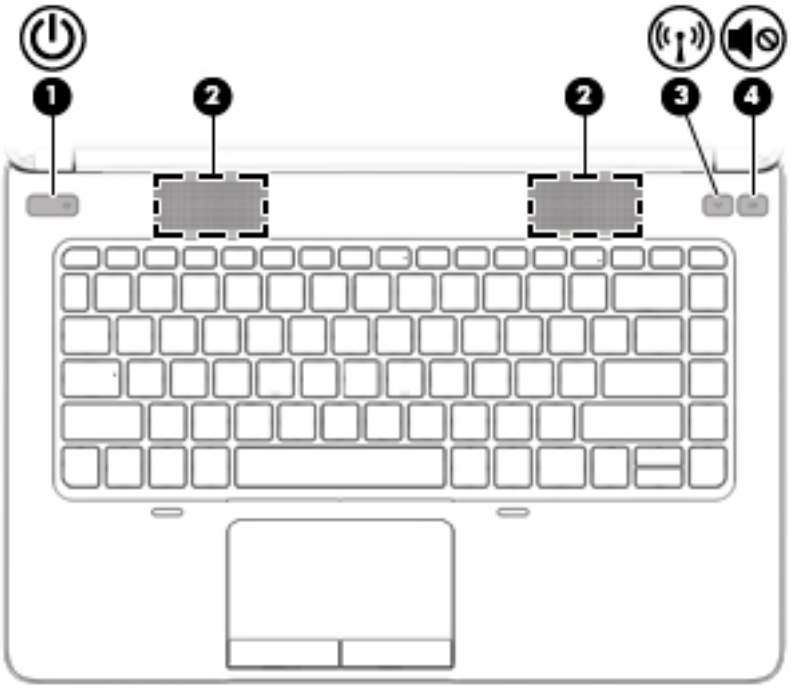
Component		Description
(1)	TouchPad on/off button	Turns the TouchPad on and off.
(2)	TouchPad zone	Moves the pointer and selects or activates items on the screen.
(3)	Left TouchPad button	Functions like the left button on an external mouse.
(4)	Right TouchPad button	Functions like the right button on an external mouse.

Lights



Component		Description
(1)	Power light	• On: The computer is on. • Blinking: The computer is in the Sleep state. • Off: The computer is off.
(2)	Caps lock light	On: Caps lock is on.
(3)	TouchPad light	• Amber: The TouchPad is off. • Off: The TouchPad is on.
(4)	Microphone mute light	• Amber: The microphone is muted. • Off: The microphone is on.
(5)	Num lock light	On: Num lock is on.
(6)	Wireless light	• White: An integrated wireless device, such as a wireless local area network (WLAN) device is on. • Amber: All wireless devices are off.
(7)	Mute light	• Amber: Computer sound is off. • Off: Computer sound is on.

Buttons and speakers



Component			Description
(1)		Power button	• When the computer is off, press the button to turn on the computer. • When the computer is on, press the button briefly to initiate Sleep. • When the computer is in the Sleep state, press the button briefly to exit Sleep. **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. To learn more about your power settings: Select **Start > Control Panel > System and Security > Power Options**.
(2)		Speakers (2)	Produce sound.
(3)		Wireless button	Turns the wireless feature on or off but does not establish a wireless connection.
(4)		Volume mute button	Mutes and restores speaker sound.

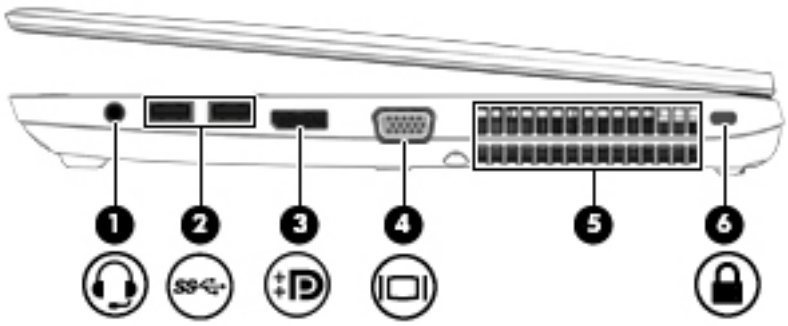
Keys

Component			Description
(1)		esc key	Displays system information when pressed in combination with the fn key.
(2)		fn key	Executes frequently used system functions when pressed in combination with a function key, the num lk key, or the esc key.
(3)		Windows key	Displays the Windows Start menu.
(4)		Function keys	Execute frequently used system functions when pressed in combination with the fn key.
(5)		Windows applications key	Displays a shortcut menu for items beneath the cursor.
(6)		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.
(7)		num lk key	Turns the embedded numeric keypad on and off when pressed in combination with the fn key.

Front

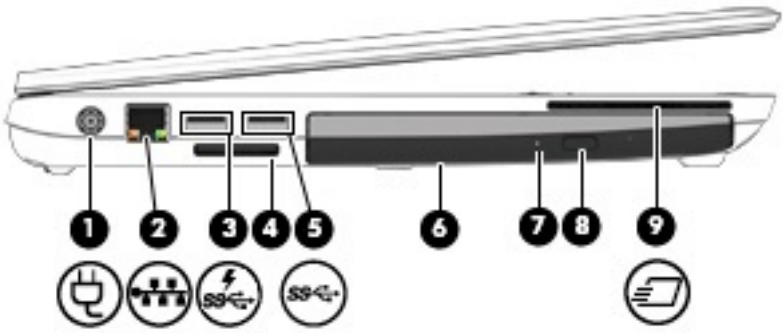
Component			Description
(1)		Wireless light	• White: An integrated wireless device, such as a wireless local area network (WLAN) device is on. • Amber: All wireless devices are off.
(2)		Power light	• On: The computer is on. • Blinking: The computer is in the Sleep state. • Off: The computer is off.
(3)		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.
(4)		Drive light	• Blinking white: The hard drive or optical disk drive is being accessed.

Right



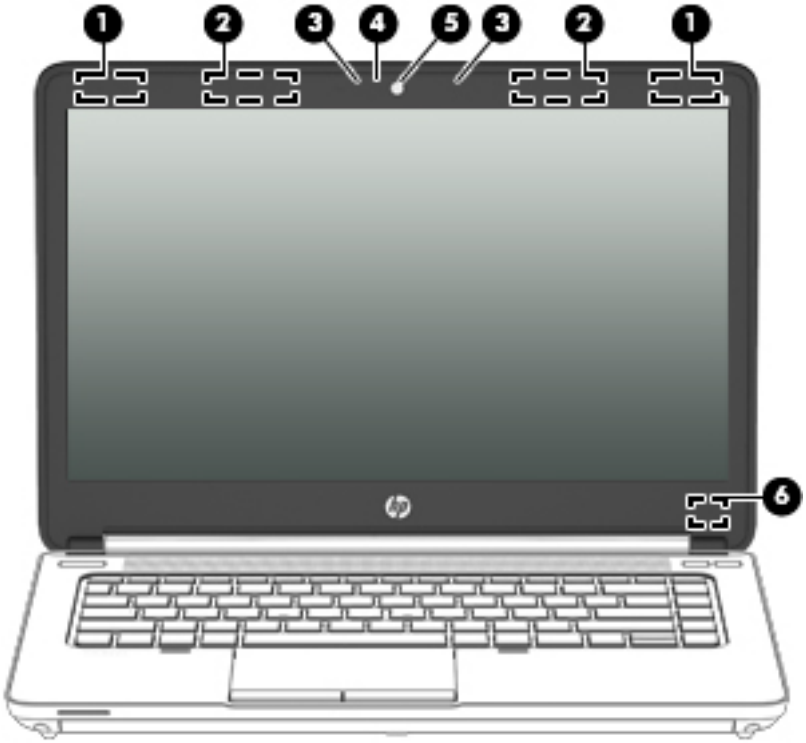
Component			Description
(1)		Audio-out (headphone)/Audio-in (microphone) jack	Produces sound when connected to optional powered stereo speakers, headphones, earbuds, a headset, or television audio. Also connects an optional headset microphone. This jack does not support optional microphone-only devices. **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 the user guides, select **Start > Hewlett-Packard > HP Documentation**. **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).
(2)		USB ports (2)	Connect optional USB devices and provide enhanced USB power performance. **NOTE:** These ports support USB 2.0 by default. For details about activating the USB 3.0 port functionality, see the *User Guide*.
(3)		Dual mode DisplayPort	Connects an optional digital display device, such as a high-performance monitor or projector.
(4)		External monitor port	Connects an external VGA monitor or projector.
(5)		Vents (2)	Enable airflow to cool internal components. **NOTE:** The computer fan starts up automatically to cool internal components and prevent overheating. It is normal for the internal fan to cycle on and off during routine operation.
(6)		Security cable slot	Attaches an optional security cable to the computer. **NOTE:** The security cable is designed to act as a deterrent, but it may not prevent the computer from being mishandled or stolen.

Left



Component			Description
(1)		Power connector	Connects an AC adapter.
(2)		RJ-45 (network) jack RJ-45 (network) lights (2)	Connects a network cable. • Amber (left): The network is showing activity. • Green (right): The network is connected.
(3)		USB charging port	Connects an optional USB device. The USB charging port can also charge select models of cell phones and MP3 players, even when the computer is off. **NOTE:** These ports support USB 2.0 by default. For details about activating the USB 3.0 port functionality, see the *User Guide*.
(4)		Memory card reader	Reads data from and writes data to memory cards such as Secure Digital (SD).
(5)		USB port	Connects optional USB devices and provide enhanced USB power performance. **NOTE:** These ports support USB 2.0 by default. For details about activating the USB 3.0 port functionality, see the *User Guide*.
(6)		Upgrade bay (optical drive shown)	The upgrade bay can hold an optical drive that reads and writes (select models only) to an optical disc. It can also hold a weight saver option.
(7)		Optical drive light (select models only)	• Green: The optical drive is being accessed. • Off: The optical drive is idle.
(8)		Optical drive eject button (select models only)	Releases the optical drive disc tray.
(9)		Smart card slot	Supports optional smart cards.

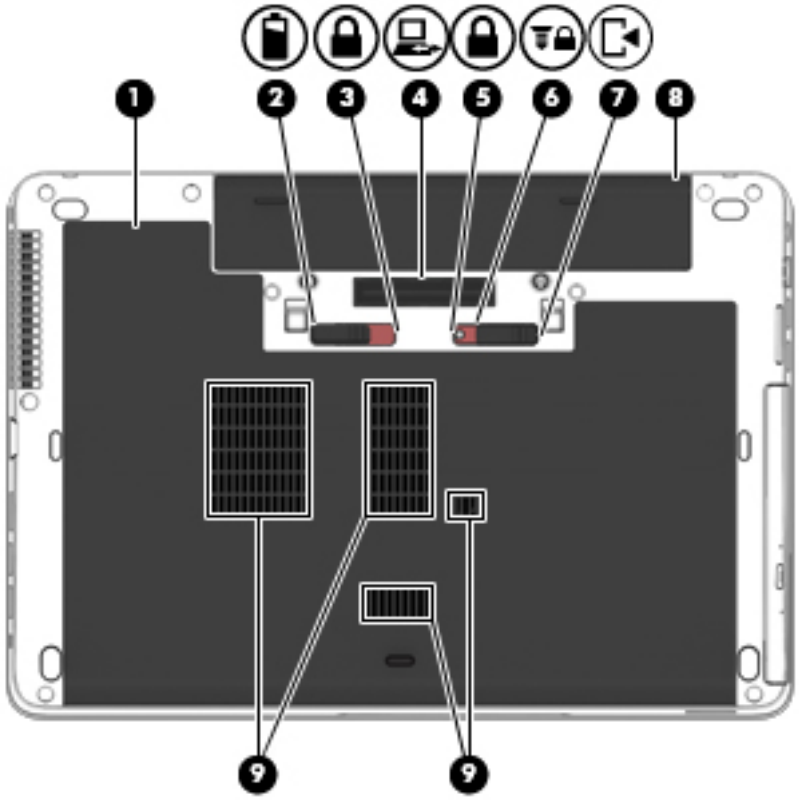
Display



Component		Description
(1)	WLAN antennas (2)*	Send and receive wireless signals to communicate with wireless local area networks (WLAN).
(2)	WWAN antennas (2)* (select models only)	Send and receive wireless signals to communicate with wireless wide area networks (WWAN).
(3)	Internal microphones (2)	Record sound.
(4)	Webcam light (select models only)	On: The webcam is in use.
(5)	Webcam (select models only)	Records video and captures still photographs.
(6)	Internal display switch	Turns off the display if the display is closed while the power is on. **NOTE:** The display switch is not visible on the outside of the computer.

*The antennas are not visible on the outside of the computer. For optimal transmission, keep the areas immediately around the antennas free from obstructions. To see wireless regulatory notices, see the section of the *Regulatory, Safety and Environmental Notices* that applies to your country or region. To access the user guides, select **Start > Hewlett-Packard > HP Documentation**.

Bottom



Component		Description
(1)	Service door	Provides access to the hard drive bay, the WLAN module slot, the WWAN module slot, and the memory module slots. **CAUTION:** To prevent an unresponsive system, replace the wireless module only with a wireless module authorized for use in the computer by the governmental agency that regulates wireless devices in your country or region. If you replace the module and then receive a warning message, remove the module to restore computer functionality, and then contact support.
(2)	Battery release latch open position	Releases the battery.
(3)	Battery release latch locked position	Holds the battery.
(4)	Docking connector	Connects an optional docking device.
(5)	Service door release latch locked position	Holds the service door.

Component		Description
(6)	Optional security screw	Locks the service door release latch in place.
(7)	Service door release latch open position	Releases the service door on the computer.
(8)	Battery bay	Holds the battery.
(9)	Vents (4)	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.

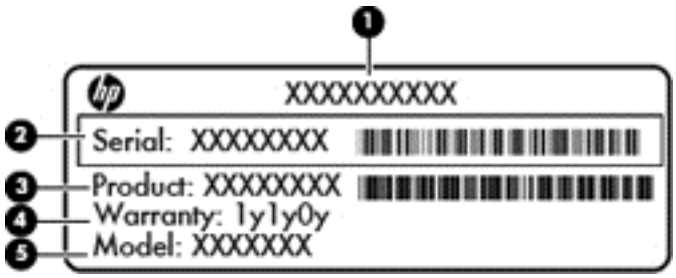
Labels

The labels affixed to the computer provide information you may need when you troubleshoot system problems or order parts for the computer:

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

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

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



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

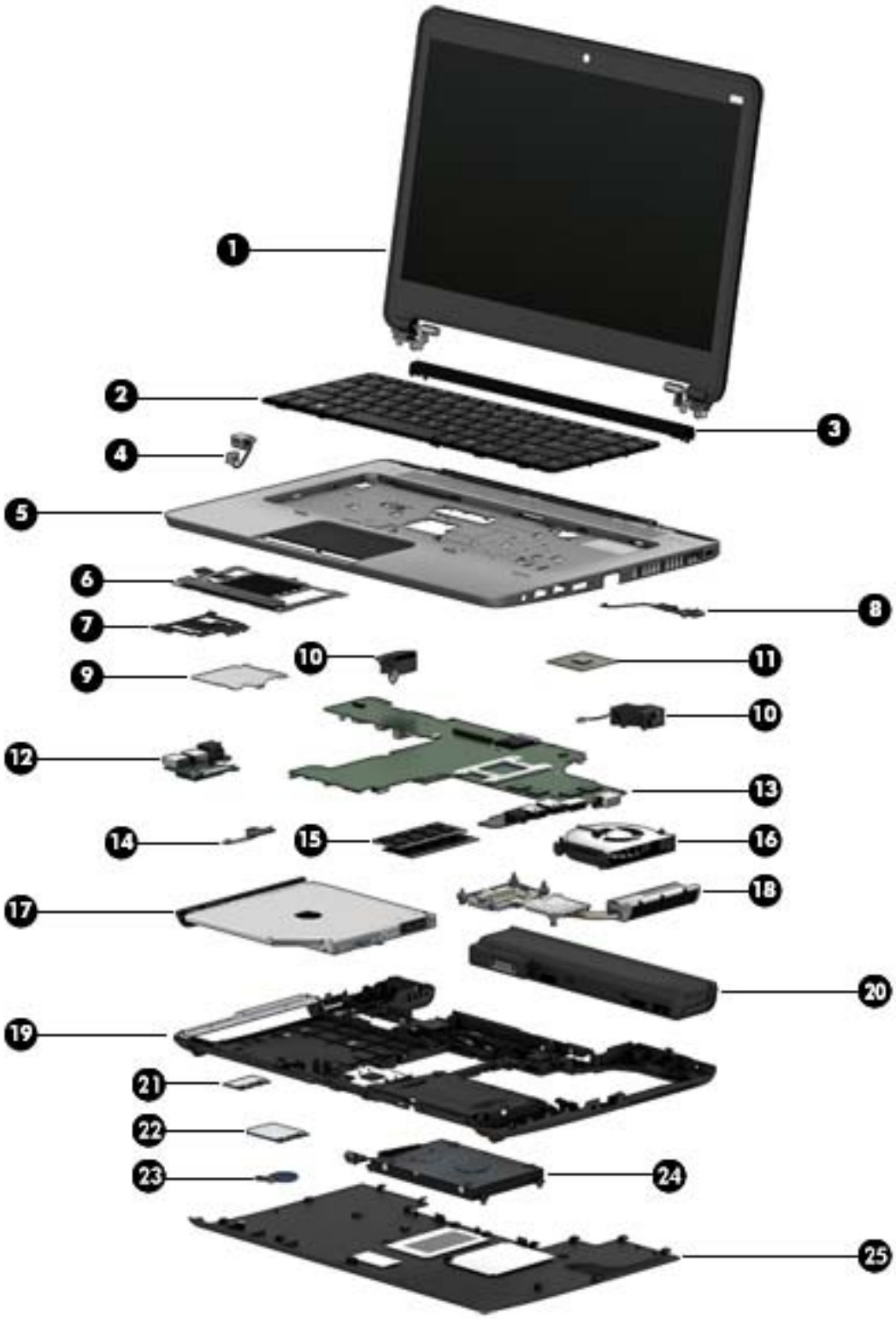
Component	
(1)	Warranty period
(2)	Model number (select models only)
(3)	Serial number
(4)	Product number

- Regulatory label(s)—Provide(s) regulatory information about the computer.
- Wireless certification label(s)—Provide(s) information about optional wireless devices and the approval markings of some of the countries or regions in which the devices have been approved for use.

3 Illustrated parts catalog

Computer major components

NOTE: Details about your computer, including model, serial number, product key, and length of warranty, are on the service tag at the bottom of your computer. See Labels on page 13 for details.



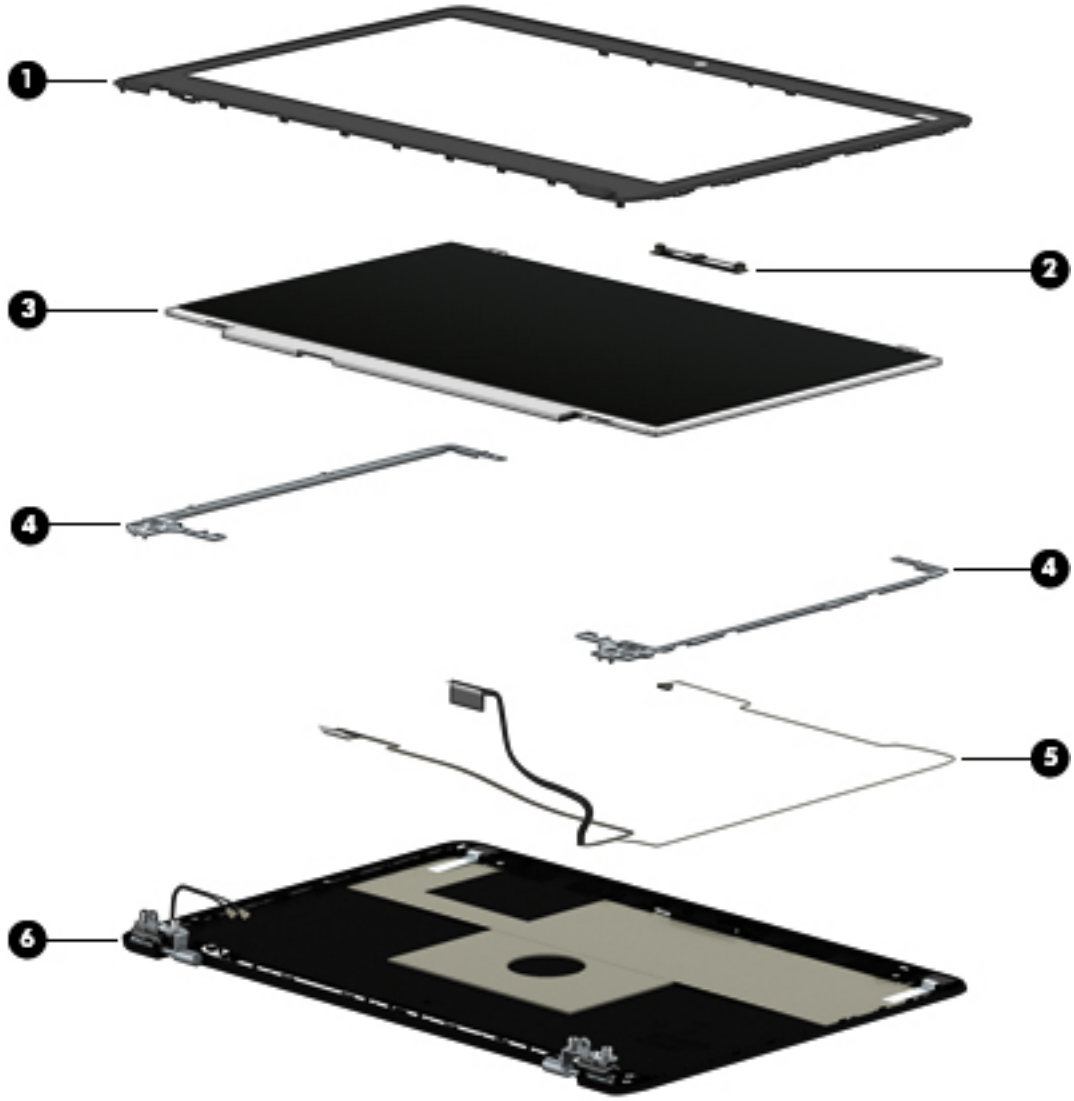
Item	Component	Spare part number
(1)	**Display assembly**: The display assembly is spared at the subcomponent level only. For more display assembly spare part information, see Display assembly subcomponents on page 20.	
	14.0 in (35.56 cm), HD display assembly equipped with a webcam	

Item	Component	Spare part number
	14.0 in (35.56 cm), HD display assembly not equipped with a webcam	
(2)	**Keyboard** (includes keyboard cable):	
	For use in Belgium	738687-A41
	For use in Brazil	738687-201
	For use in Bulgaria	738687-261
	For use in Canada	738687-DB1
	For use in the Czech Republic and Slovakia	738687-FL1
	For use in Denmark	738687-081
	For use in France	738687-051
	For use in Germany	738687-041
	For use in Greece	738687-151
	For use in Hungary	738687-211
	For use in Iceland	738687-DD1
	For use in India	738687-D61
	For use in Israel	738687-BB1
	For use in Italy	738687-061
	For use in Japan	738687-291
	For use in Latin America	738687-161
	For use in the Netherlands	738687-B31
	For use in Northwest Africa	738687-FP1
	For use in Norway	738687-091
	For use in Portugal	738687-131
	For use in Romania	738687-271
	For use in Russia	738687-251
	For use in Saudi Arabia	738687-171
	For use in Slovenia	738687-BA1
	For use in South Korea	738687-AD1
	For use in Spain	738687-071
	For use in Sweden and Finland	738687-B71
	For use in Switzerland	738687-BG1
	For use in Taiwan	738687-AB1
	For use in Thailand	738687-281
	For use in Turkey	738687-141
	For use in the United Kingdom and Singapore	738687-031

Item	Component	Spare part number
	For use in the United States	738687-001
(3)	**Keyboard bumper** (included with TouchPad button board, spare part number 738407-001)	
(4)	**Power connector cable**	738683-001
(5)	**Top cover**	738405-001
(6)	**TouchPad button board**, 2 button with bracket (includes keyboard bumper)	738407-001
(7)	**Smart card reader** (include cable, shield, and tape)	738398-001
(8)	**Function button board** (includes cable)	738401-001
(9)	**Smart card reader shield** (included with smart card reader spare part number 738398-001)	
(10)	**Speaker Kit** (includes left and right speakers and tape)	738404-001
(11)	**Processor** (includes replacement thermal material):	
	AMD A4-5150M with Radeon HD 8350G Graphics (dual-core; 3.3 GHz/2.7 GHz; 35 W; 1 MB L2 cache)	713549-001
	AMD A4-4300M with Radeon HD 7420G Graphics (dual-core; 3.0 GHz/2.5 GHz; 35 W; 1 MB L2 cache)	685990-001
(12)	**USB board**	738400-001
(13)	**System board** (includes replacement thermal material):	
	For use only on computer models equipped with a WWAN	746017-001
	For use only on computer models not equipped with a WWAN	746018-001
(14)	**Power button board** (included cable)	738399-001
(15)	**Memory modules** (PC3L, 12800, 1600 MHz):	
	4 GB	691740-001
(16)	**Fan**	738685-001
(17)	**Optical drive** (includes bezel, bracket, and screw):	
	DVD-ROM drive	744821-001
	Optical drive weight saver, not shown (included with Plastics Kit, spare part number 738402-001	
(18)	**Heat sink assembly** (included replacement thermal material)	738686-001
(19)	**Base enclosure**	738681-001
(20)	**Battery:**	
	9 cell, 100 Whr, 3.0 Ahr, Li-ion battery	718757-001
	6 cell, 55 Whr, 2.55 Ahr, Li-ion battery	718755-001
(21)	**WLAN module:**	
	Atheros 802.11 b/g/n 1×1 + Bluetooth 4.0 Combo Adapter	690019-001
	Broadcom 802.11 a/b/g/n 2×2 + Bluetooth 4.0 Combo Adapter	730668-001

Item	Component	Spare part number
(22)	**WWAN module:**	
	HP lt4111 LTE/EV-DO/HSPA+ Mobile Broadband Module	704030-001
	HP lt4112 LTE/HSPA+ Mobile Broadband Module	704031-001
(23)	**RTC battery** (includes cable and double-sided adhesive)	651948-001
(24)	**Solid-state drive** (SSD), 16 GB SATA (includes hard drive bracket, cable, and screws)	750751-001
(25)	**Service door**	738682-001
	Service door, RCTO	748357-001

Display assembly subcomponents



Item	Component	Spare part number
(1)	**Display bezel**	738712-001
(2)	**Microphone module**	
	Webcam/microphone module	738409-001
	Microphone only module	738397-001
(3)	**Display panel**, **14 in** (35.56 cm), WLED, HD, AG, SVA, flat display panel	747751-001
(4)	**Left and right display hinges** (included in Display Hinge Kit)	738396-001
(5)	**Display panel cable** (includes webcam/microphone module cable and tape)	738684-001
(6)	**Display back cover** (includes WLAN and WWAN antenna cables and gaskets)	738680-001

Mass storage devices

Item	Component	Spare part number
(1)	SSD bracket (included with SSD)	
(2)	**16 GB SATA SSD**	750751-001
(3)	**Optical drive**:	
	DVD-ROM drive (includes bezel, bracket, and screws)	744821-001
	Optical drive weight saver, not shown (included with Plastics Kit, spare part number 738402-001)	

Miscellaneous parts

Component	Spare part number
AC adapter:	
65 W HP Smart adapter (PFC, 3-wire, 4.5 mm), select models only	693710-001
65 W HP Smart adapter (NPFC, 3-wire, 4.5 mm)	693711-001
Power cord (3-pin, black, 1.83 m):	
For use in Argentina	490371-D01
For use in Australia	490371-011
For use in Denmark	490371-081
For use in Europe	490371-021

Component	Spare part number
For use in India	490371-D61
For use in Israel	490371-BB1
For use in Italy	490371-061
For use in Japan	490371-291
For use in North America	490371-001
For use in the People's Republic of China	490371-AA1
For use in South Africa	490371-AR1
For use in South Korea	490371-AD1
For use in Switzerland	490371-111
For use in Taiwan	490371-AB1
For use in Thailand	490371-201
For use in the United Kingdom and Singapore	490371-031
Expansion base	688169-001
Plastics Kit, includes WLAN bracket and optical drive weight saver	738402-001
Rubber Kit	738403-001
Screw Kit	738689-001

Sequential part number listing

CSR flag designations:

A = Mandatory

B = Optional

C = Service technician recommended

N = Non-user replaceable

Spare part number	CSR flag	Description
490371-001	A	Power cord for use in North America (3-pin, black, 1.83 m)
490371-011	A	Power cord for use in Australia (3-pin, black, 1.83 m)
490371-021	A	Power cord for use in Europe (3-pin, black, 1.83 m)
490371-031	A	Power cord for use in the United Kingdom and Singapore (3-pin, black, 1.83 m)
490371-061	A	Power cord for use in Italy (3-pin, black, 1.83 m)
490371-081	A	Power cord for use in Denmark (3-pin, black, 1.83 m)
490371-111	A	Power cord for use in Switzerland (3-pin, black, 1.83 m)
490371-201	A	Power cord for use in Thailand (3-pin, black, 1.83 m)
490371-291	A	Power cord for use in Japan (3-pin, black, 1.83 m)
490371-AA1	A	Power cord for use in the People's Republic of China (3-pin, black, 1.83 m)
490371-AB1	A	Power cord for use in Taiwan (3-pin, black, 1.83 m)
490371-AD1	A	Power cord for use in South Korea (3-pin, black, 1.83 m)
490371-AR1	A	Power cord for use in South Africa (3-pin, black, 1.83 m)
490371-BB1	A	Power cord for use in Israel (3-pin, black, 1.83 m)
490371-D01	A	Power cord for use in Argentina (3-pin, black, 1.83 m)
490371-D61	A	Power cord for use in India (3-pin, black, 1.83 m)
651948-001	N	RTC battery (includes cable and double-sided adhesive)
685990-001	N	AMD A4-4300M with Radeon HD 7420G Graphics (dual-core; 3.0 GHz/2.5 GHz; 35 W; 1 MB L2 cache, includes replacement thermal material)
688169-001	A	Expansion base
690019-001	A	Atheros 802.11 b/g/n 1×1 + Bluetooth 4.0 Combo Adapter
691740-001	A	4 GB memory module (PC3L, 12800, 1600 MHz)
693710-001	A	65 W HP Smart adapter (PFC, 3 wire, 4.5 mm), select models only
693711-001	A	65 W HP Smart adapter (nPFC, 3 wire, 4.5 mm)
704030-001	A	HP lt4111 LTE/EV-DO/HSPA+ Mobile Broadband Module
704031-001	A	HP lt4112 LTE/HSPA+ Mobile Broadband Module
713549-001	N	AMD A4-5150M with Radeon HD 8350G Graphics (dual-core; 3.3 GHz/2.7 GHz; 35 W; 1 MB L2 cache, includes replacement thermal material)

Spare part number	CSR flag	Description
718755-001	A	6 cell, 55 Whr, 2.55 Ahr, Li-ion battery
718757-001	A	9 cell, 100 Whr, 3.0 Ahr, Li-ion battery
730668-001	A	Broadcom 802.11 a/b/g/n 2×2 + Bluetooth 4.0 Combo Adapter
738396-001	C	Display Hinge Kit (includes left and right hinges)
738397-001	C	Microphone module
738398-001	C	Smart card reader (includes cable, shield, and tape)
738399-001	C	Power button board (includes cable)
738400-001	C	USB board
738401-001	C	Function button board (includes cable)
738402-001	A	Plastics Kit (includes optical drive weight saver and WLAN bracket)
738403-001	A	Rubber Kit
738404-001	C	Speaker Kit (includes left and right speakers and tape)
738405-001	C	Top cover
738407-001	C	TouchPad button board, 2 button with bracket (includes keyboard bumper)
738409-001	N	Webcam/microphone module
738680-001	C	Display back cover (includes WWAN and WLAN antennas)
738681-001	N	Base enclosure
738682-001	A	Service door
738683-001	C	Power connector cable
738684-001	C	Display panel cable (includes webcam/microphone module cable and tape)
738685-001	A	Fan
738686-001	C	Heat sink assembly (includes replacement thermal material)
738687-001	A	Keyboard for use in the United States (includes keyboard cable)
738687-031	A	Keyboard for use in the United Kingdom and Singapore (includes keyboard cable)
738687-041	A	Keyboard for use in Germany (includes keyboard cable)
738687-051	A	Keyboard for use in France (includes keyboard cable)
738687-061	A	Keyboard for use in Italy (includes keyboard cable)
738687-071	A	Keyboard for use in Spain (includes keyboard cable)
738687-081	A	Keyboard for use in Denmark (includes keyboard cable)
738687-091	A	Keyboard for use in Norway (includes keyboard cable)
738687-131	A	Keyboard for use in Portugal (includes keyboard cable)
738687-141	A	Keyboard for use in Turkey (includes keyboard cable)
738687-151	A	Keyboard for use in Greece (includes keyboard cable)
738687-161	A	Keyboard for use in Latin America (includes keyboard cable)

Spare part number	CSR flag	Description
738687-171	A	Keyboard for use in Saudi Arabia (includes keyboard cable)
738687-201	A	Keyboard for use in Brazil (includes keyboard cable)
738687-211	A	Keyboard for use in Hungary (includes keyboard cable)
738687-251	A	Keyboard for use in Russia (includes keyboard cable)
738687-261	A	Keyboard for use in Bulgaria (includes keyboard cable)
738687-271	A	Keyboard for use in Romania (includes keyboard cable)
738687-281	A	Keyboard for use in Thailand (includes keyboard cable)
738687-291	A	Keyboard for use in Japan (includes keyboard cable)
738687-A41	A	Keyboard for use in Belgium (includes keyboard cable)
738687-AB1	A	Keyboard for use in Taiwan (includes keyboard cable)
738687-AD1	A	Keyboard for use in South Korea (includes keyboard cable)
738687-B31	A	Keyboard for use in the Netherlands (includes keyboard cable)
738687-B71	A	Keyboard for use in Sweden and Finland (includes keyboard cable)
738687-BA1	A	Keyboard for use in Slovenia (includes keyboard cable)
738687-BB1	A	Keyboard for use in Israel (includes keyboard cable)
738687-BG1	A	Keyboard for use in Switzerland (includes keyboard cable)
738687-D61	A	Keyboard for use in India (includes keyboard cable)
738687-DB1	A	Keyboard for use in Canada (includes keyboard cable)
738687-DD1	A	Keyboard for use in Iceland (includes keyboard cable)
738687-FL1	A	Keyboard for use in the Czech Republic and Slovakia (includes keyboard cable)
738687-FP1	A	Keyboard for use in Northwest Africa (includes keyboard cable)
738689-001	N	Screw Kit
738712-001	C	Display bezel
744821-001	A	DVD-ROM drive
746017-001	N	System board for use only on computer models equipped with a WWAN (includes replacement thermal material)
746018-001	N	System board for use only on computer models not equipped with a WWAN (includes replacement thermal material)
747751-001	C	**14 in** (35.56 cm), WLED, HD, AG, SVA, flat display panel
748357-001	A	Service door, RCTO
750751-001	A	16 GB, SATA SSD (includes hard drive bracket, cable, and screws)

4 Removal and replacement procedures 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 and P1 screw drivers

Service considerations

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

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

Plastic parts

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

Cables and connectors

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

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

Drive handling

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

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

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

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

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

Avoid dropping drives from any height onto any surface.

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

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

Avoid exposing a drive to temperature extremes or liquids.

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

Grounding guidelines

Electrostatic discharge damage

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

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

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

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

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

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

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

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

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

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

Typical electrostatic voltage levels

	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 tabletop workstations with ground cords of one megohm resistance
- Static-dissipative tables or floor mats with hard ties to the ground
- Field service kits
- Static awareness labels
- Material-handling packages
- Nonconductive plastic bags, tubes, or boxes
- Metal tote boxes
- Electrostatic voltage levels and protective materials

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

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

5 Removal and replacement procedures for Customer Self-Repair parts

NOTE: The Customer Self-Repair program is not available in all locations. Installing a part not supported by the Customer Self-Repair program may void your warranty. Check your warranty to determine if Customer Self-Repair is supported in your location.

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 tag at the bottom of your computer. See Labels on page 13 for details.

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

There are as many as 15 screws that must be removed, replaced, and/or loosened when servicing Customer Self-Repair parts. Make special note of each screw size and location during removal and replacement.

Battery

Description	Spare part number
9 cell, 100 Whr, 3.0 Ahr, Li-ion battery	718757-001
6 cell, 55 Whr, 2.55 Ahr, Li-ion battery	718755-001

Before removing the battery, follow these steps:

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

Remove the battery:

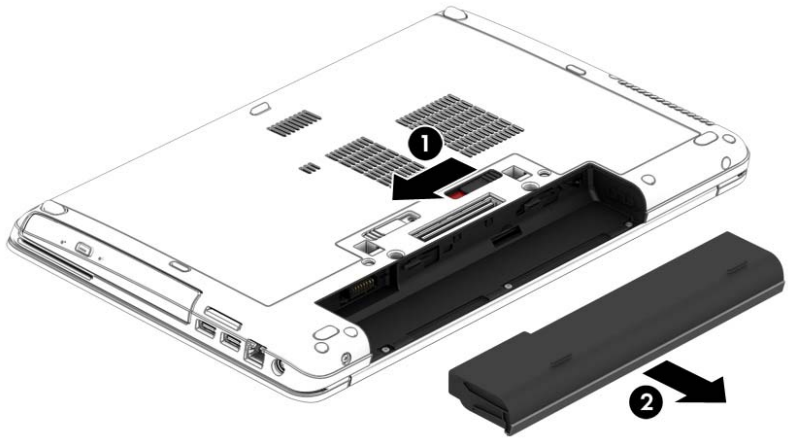
WARNING! To reduce potential safety issues, use only the user-replaceable battery provided with the computer, a replacement battery provided by HP, or a compatible battery purchased from HP.

CAUTION: Removing a user-replaceable 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.

To remove the battery:

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

1. Turn the computer upside down on a flat surface, with the battery bay toward you.
2. Slide the battery release latch **(1)** to release the battery.
3. Remove the battery from the computer **(2)**.



Reverse this procedure to install the battery.

Service door

Description	Spare part number
Service door	738682-001
Service door, RCTO	748357-001

Before removing the service door, 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 32).

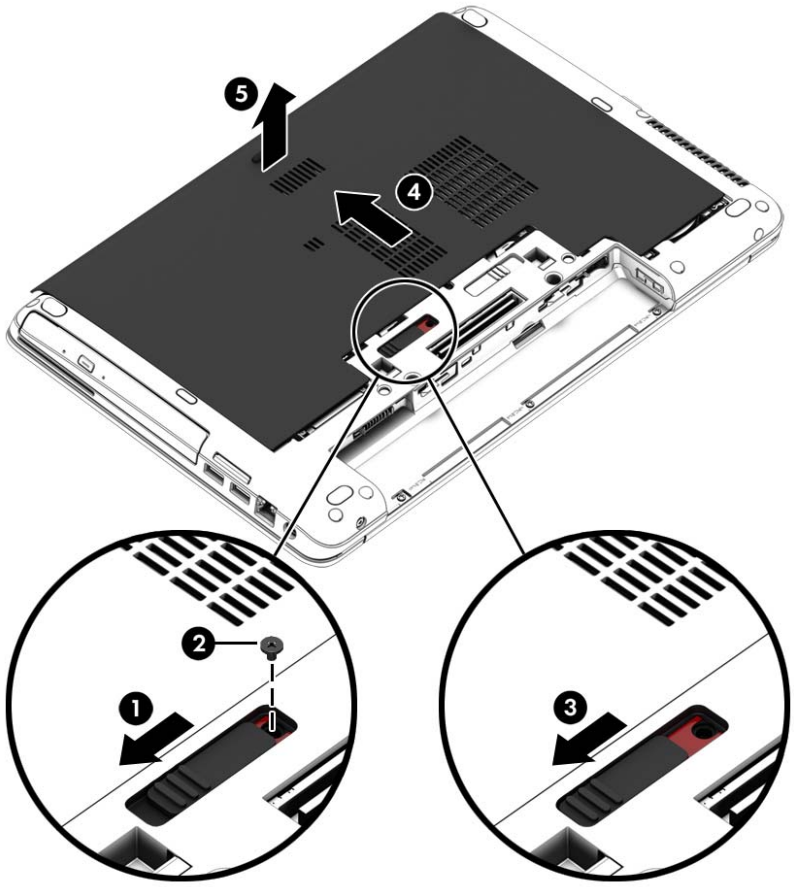
Remove the service door:

1. Turn the computer upside down on a flat surface, with the battery bay toward you.
2. Slide the service door release latch to the left **(1)**, and then remove the optional Phillips screw (if the screw is being used) **(2)**.

NOTE: If you want to use the optional screw, it is stored inside the service door.

3. Slide the release latch again **(3)** to release the service door.

4. Slide the service door toward the front of the computer **(4)**, and then lift to remove the service door **(5)**.



Reverse this procedure to install the service door.

Hard drive

NOTE: The hard drive spare part kit includes the hard drive bracket, cable and screws.

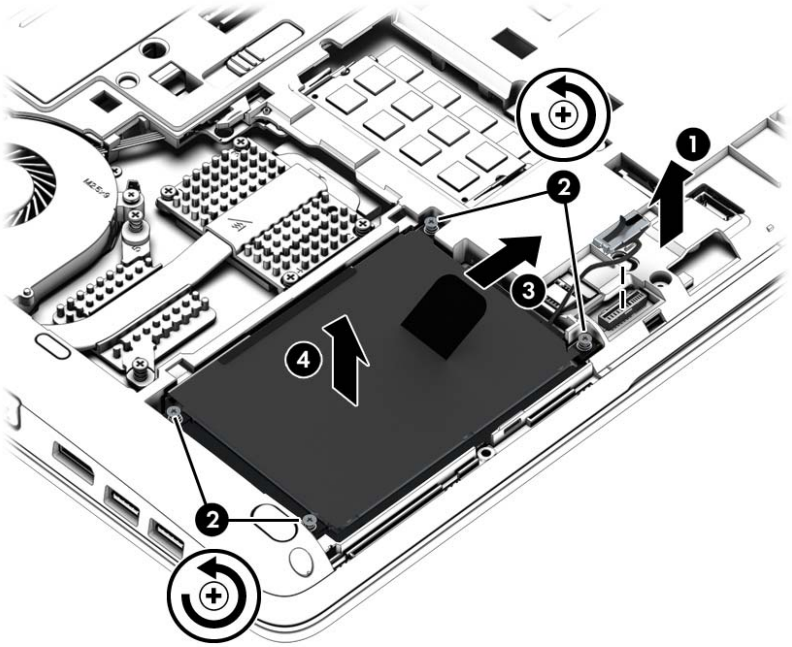
Description	Spare part number
16 GB, SATA SSD	750751-001

Before removing the hard drive, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the battery (see Battery on page 32).
5. Remove the service door (see Service door on page 33).

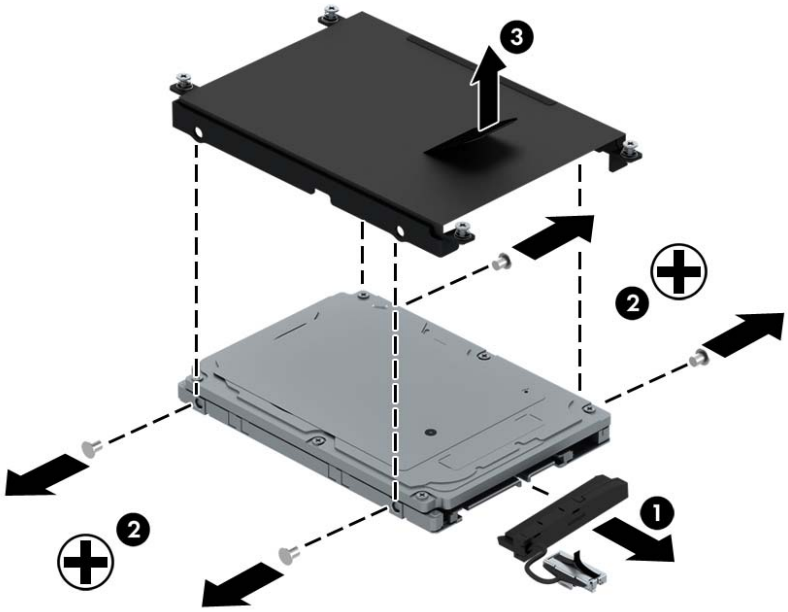
Remove the hard drive:

1. Turn the computer upside down on a flat surface, with the battery bay toward you.
2. Disconnect the hard drive cable **(1)**.
3. Loosen the four Phillips screws **(2)** connecting the hard drive to the computer.
4. Using the plastic tab **(3)**, pull and lift the hard drive, and then pull the hard drive **(4)** out of the hard drive bay.



5. If it is necessary to disassemble the hard drive, perform the following steps:
   a. Disconnect the hard drive cable **(1)** from the drive.
   b. Remove the four Phillips screws **(2)** from the hard drive.

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



Reverse this procedure to install the hard drive.

Optical drive

NOTE: The optical drive spare part kit includes a bezel and bracket.

Description	Spare part number
DVD-ROM drive (includes bezel bracket and screw)	744821-001
Optical drive weight saver (included with Plastics Kit, spare part number 738402-001)	

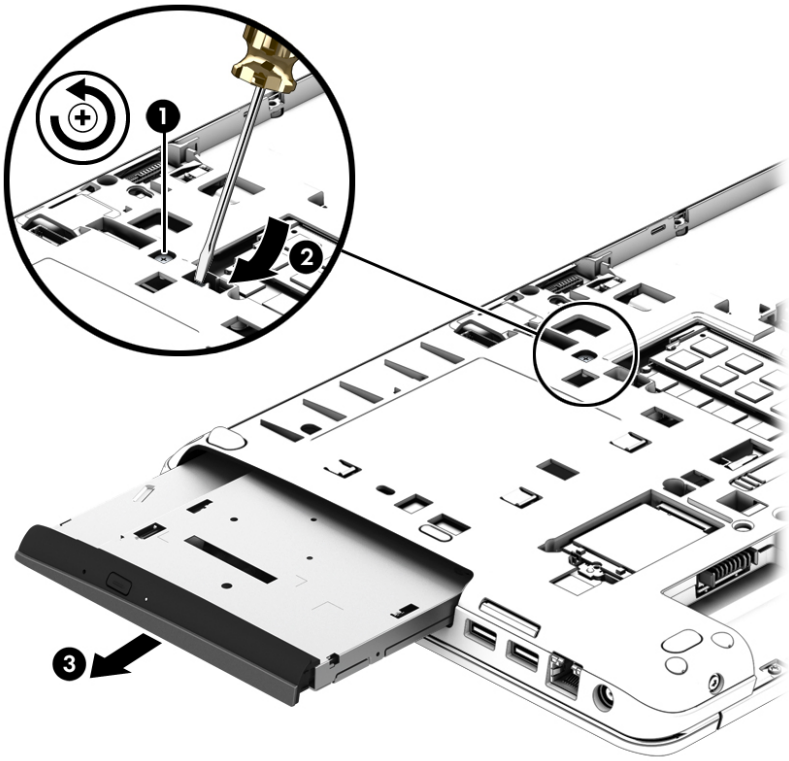
Before removing the optical drive, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the battery (see Battery on page 32).
5. Remove the service door (see Service door on page 33).

Remove the optical drive:

1. Position the computer upside down with the left side toward you.
2. Loosen the captive screw **(1)** that secures the optical drive to the computer.
3. Insert a thin tool into the optical drive tab access **(2)** and press the tab to the left to release the optical drive or weight saver from the computer.

4. Remove the optical drive or weight saver **(3)**.



Reverse this procedure to install the optical drive.

WWAN module

Description	Spare part number
HP lt4111 LTE/EV-DO/HSPA+ Mobile Broadband Module	704030-001
HP lt4112 LTE/HSPA+ Mobile Broadband Module	704031-001

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. 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 32).
5. Remove the service door (see Service door on page 33).

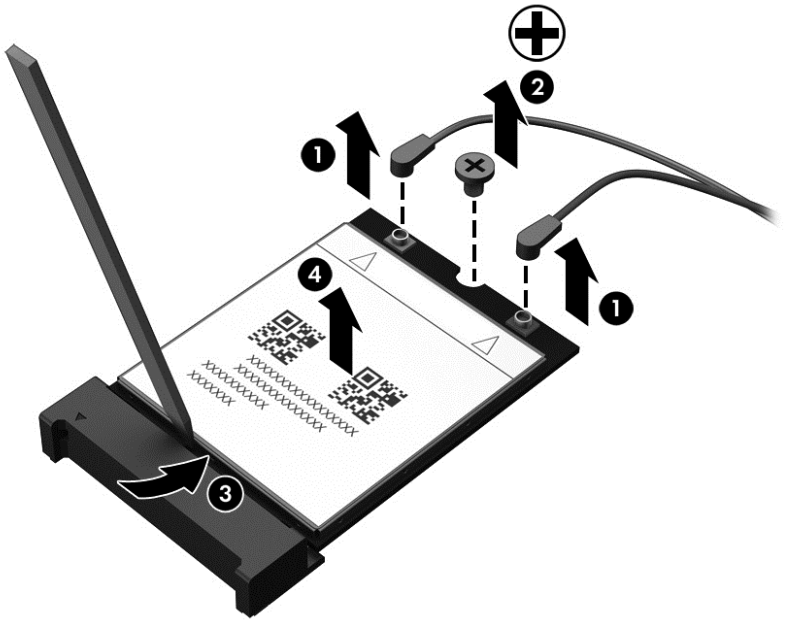
Remove the WWAN module:

1. Turn the computer upside down on a flat surface, with the battery bay toward you.
2. Disconnect the WWAN antenna cables **(1)** from the terminals on the WWAN module.
3. Remove the Phillips screw **(2)** that secures the WWAN module to the system board.

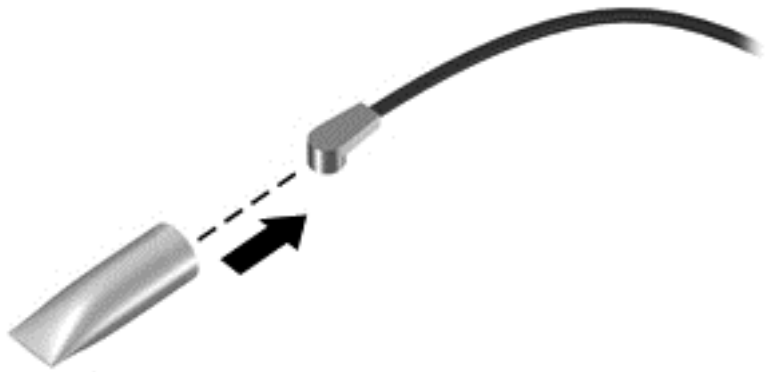
NOTE: The WWAN module will not tilt up. Do not attempt to remove the WWAN module at an angle.

4. Insert a thin, non metallic tool **(3)** between the WWAN module and connector to release the WWAN module from the connector.

5. Remove the WWAN module **(4)** by pulling the module straight up.



NOTE: If the WWAN antenna cables are not connected to the terminals on the WWAN module, protective sleeves should be installed on the antenna connectors, as shown in the following illustration.



Reverse this procedure to install the WWAN module.

WLAN module

Description	Spare part number
Atheros 802.11 b/g/n 1×1 + Bluetooth 4.0 Combo Adapter	690019-001
Broadcom 802.11 a/b/g/n 2×2 + Bluetooth 4.0 Combo Adapter	730668-001

CAUTION: To prevent an unresponsive system, replace the wireless module only with a wireless module authorized for use in the computer by the governmental agency that regulates wireless devices in your country or region. If you replace the module and then receive a warning message, remove the module to restore device functionality, and then contact technical support.

Before removing the WLAN module, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the battery (see Battery on page 32).
5. Remove the service door (see Service door on page 33).
6. If there is a WWAN module, remove the WWAN module (see WWAN module on page 38).

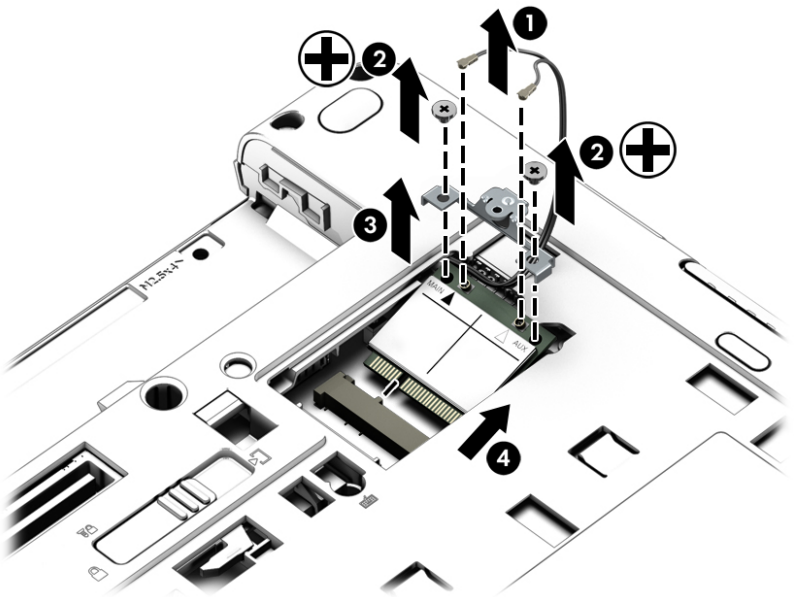
Remove the WLAN module:

1. Turn the computer upside down on a flat surface, with the battery bay toward you.
2. Disconnect the WLAN antenna cables **(1)** from the terminals on the WLAN module.

NOTE: The WLAN antenna cable labeled “1” connects to the WLAN module “Main” terminal labeled “1”. The WLAN antenna cable labeled “2” connects to the WLAN module “Aux” terminal labeled “2”.

3. Remove the two Phillips screws **(2)** that secure the WLAN module to the system board,
4. If there is a WLAN bracket, remove the WLAN bracket **(3)**. (The WLAN bracket is part of the Plastics Kit, spare part number 738402-001.)

5. The WLAN module tilts up. Remove the WLAN module **(4)** by pulling the module away from the slot at an angle.



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

Reverse this procedure to install the WLAN module.

Memory module

NOTE: Primary and expansion memory is installed in a stacked configuration in the bottom of the computer. Primary memory is installed in the bottom slot.

Description	Spare part number
4 GB (PC3L, 12800, 1600 MHz)	691740-001

Update BIOS before adding memory modules

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

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

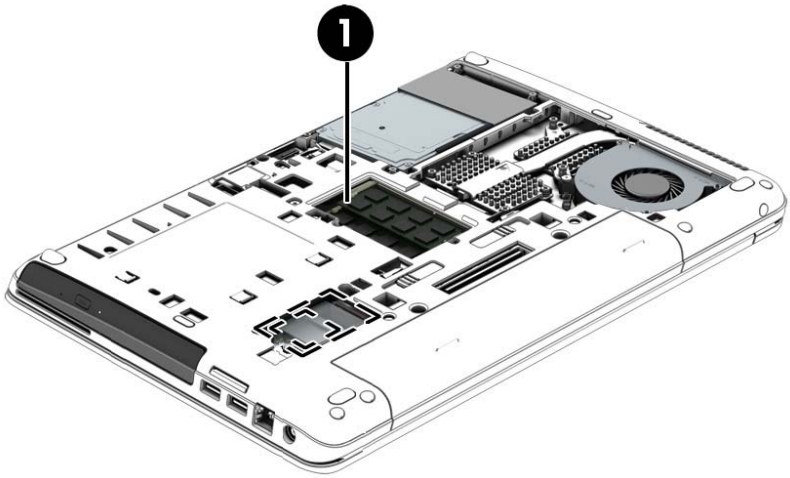
For steps on updating BIOS, see Updating the BIOS on page 83.

Before removing a memory module, follow these steps:

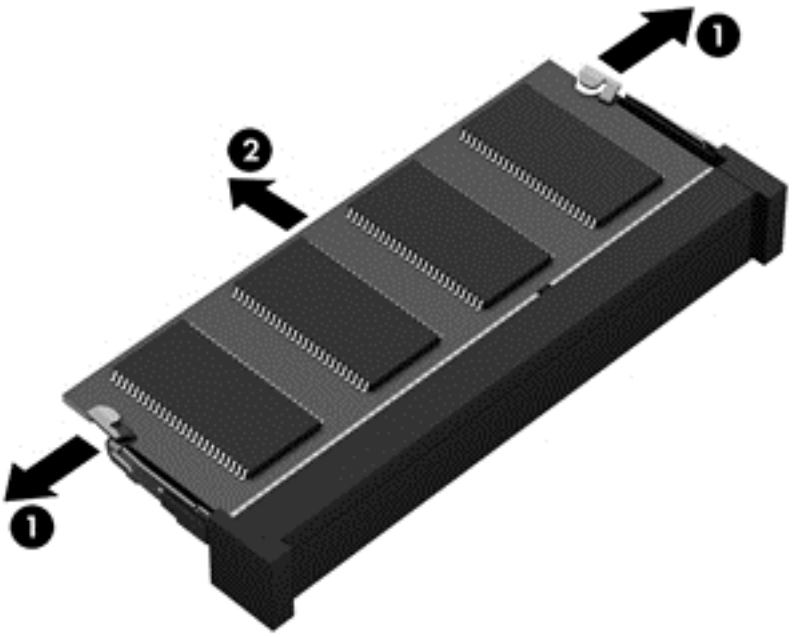
1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the battery (see Battery on page 32).
5. Remove the service door (see Service door on page 33).

Remove the memory module:

1. Turn the computer upside down on a flat surface, with the battery bay toward you.
2. Locate the memory modules **(1)**.



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



Reverse this procedure to install a memory module.

Fan

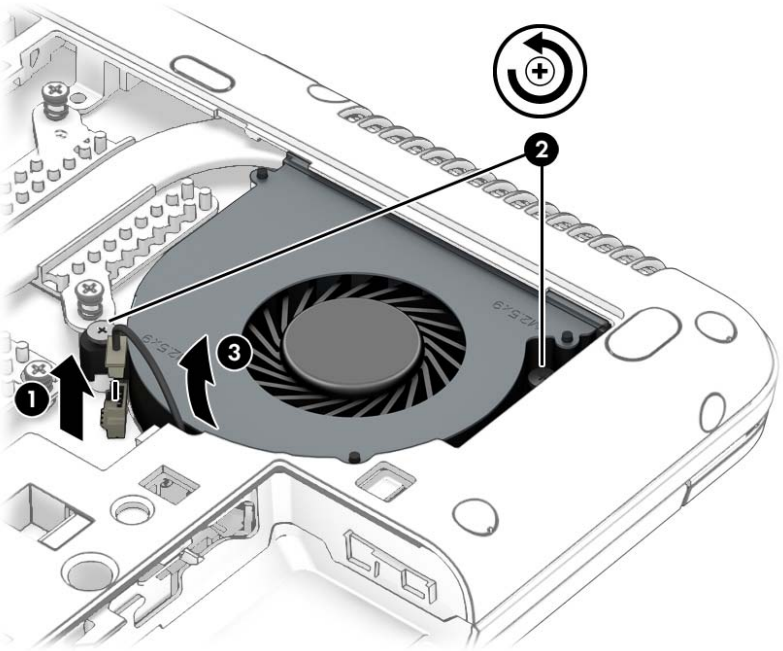
Description	Spare part number
Fan	738685-001

Before removing the fan, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the battery (see Battery on page 32).
5. Remove the service door (see Service door on page 33).

Remove the fan:

1. Turn the computer upside down on a flat surface, with the battery bay toward you.
2. Disconnect the fan cable **(1)** from the system board.
3. Loosen the two captive Phillips screws **(2)** that secure the fan to the top cover.
4. Remove the fan **(3)**.



Reverse this procedure to install the fan.

Keyboard

For use in country or region	Spare part number	For use in country or region	Spare part number
Keyboard (includes keyboard cable):		For use in the Netherlands	738687-B31
For use in Belgium	738687-A41	For use in Northwest Africa	738687-FP1
For use in Brazil	738687-201	For use in Norway	738687-091
For use in Bulgaria	738687-261	For use in Portugal	738687-131
For use in Canada	738687-DB1	For use in Romania	738687-271
For use in the Czech Republic and Slovakia	738687-FL1	For use in Russia	738687-251
For use in Denmark	738687-081	For use in Saudi Arabia	738687-171
For use in France	738687-051	For use in Slovenia	738687-BA1
For use in Germany	738687-041	For use in South Korea	738687-AD1
For use in Greece	738687-151	For use in Spain	738687-071
For use in Hungary	738687-211	For use in Sweden and Finland	738687-B71
For use in Iceland	738687-DD1	For use in Switzerland	738687-BG1
For use in India	738687-D61	For use in Taiwan	738687-AB1
For use in Israel	738687-BB1	For use in Thailand	738687-281
For use in Italy	738687-061	For use in Turkey	738687-141
For use in Japan	738687-291	For use in the United Kingdom and Singapore	738687-031
For use in Latin America	738687-161	For use in the United States	738687-001

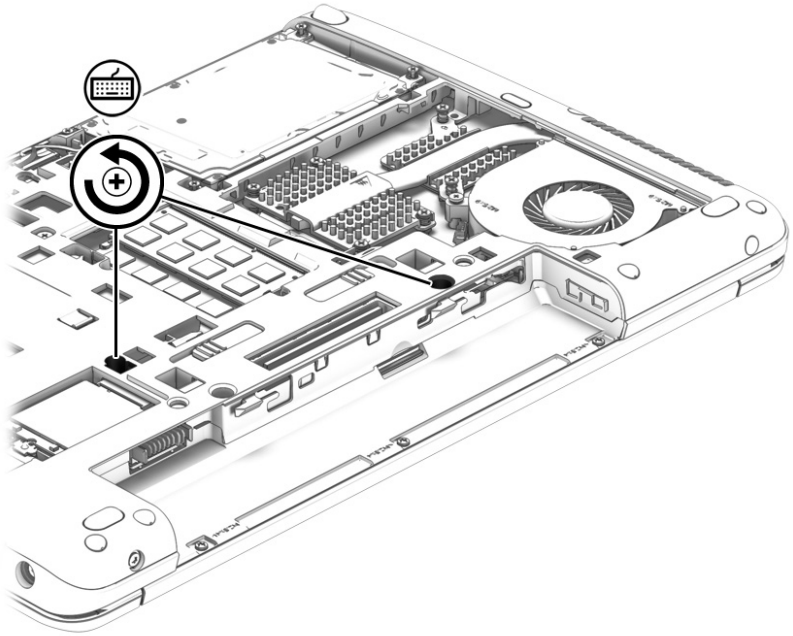
Before removing the keyboard, follow these steps:

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 32).
5. Remove the service door (see Service door on page 33).

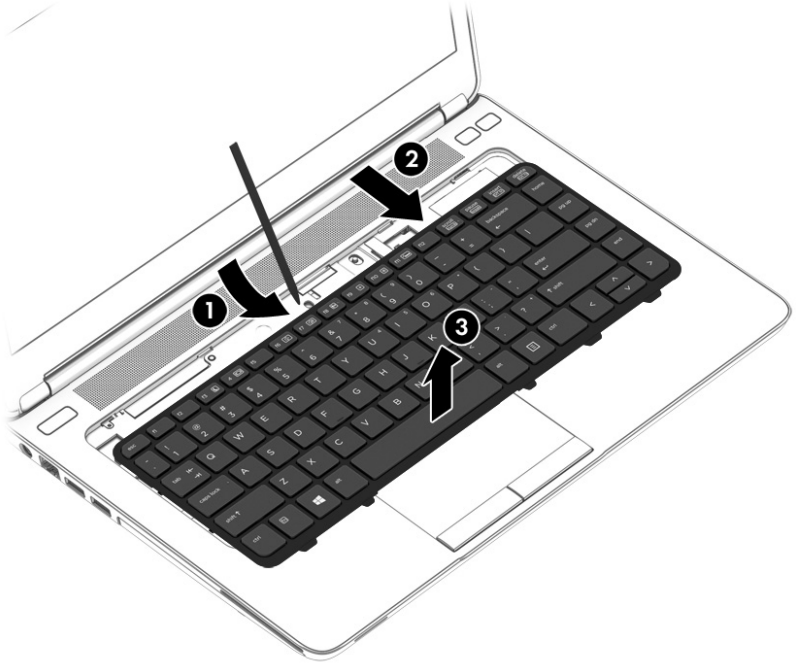
Remove the keyboard:

1. Turn the computer upside down on a flat surface, with the battery bay toward you.

2. Loosen the two captive screws that secure the keyboard to the computer.

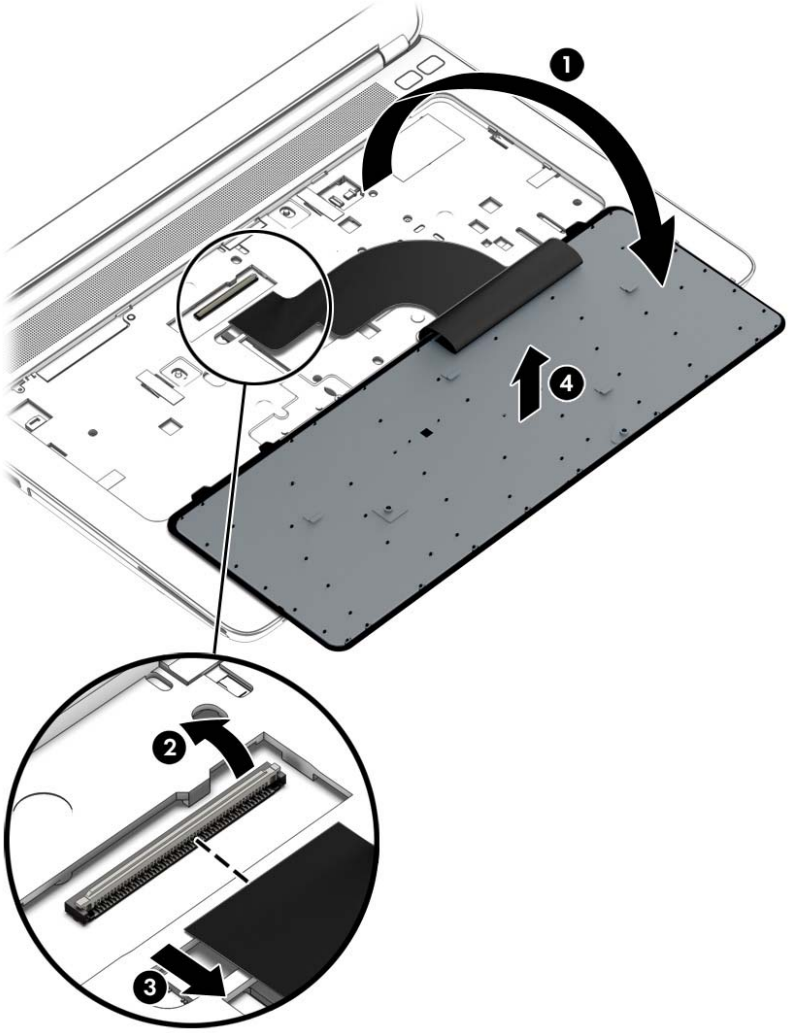


3. Open the computer facing toward you.
4. Insert a thin tool **(1)** at the back of the keyboard to release the tabs, and then press on the back of the keyboard until the keyboard disengages from the computer.
5. Push down on the keyboard, and then slide the keyboard **(2)** toward the front of the computer.
6. Lift the keyboard **(3)** up.



7. Swing the keyboard **(1)** up and forward until it rests upside down on the palm rest.

8. Release the ZIF connector **(2)** by lifting connector tab.
9. Disconnect the keyboard cable **(3)** from the system board.
10. Remove the keyboard **(4)**.



Reverse this procedure to install the keyboard.

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 or void the warranty.

Component replacement procedures

NOTE: Details about your computer, including model, serial number, product key, and length of warranty, are on the service tag at the bottom of your computer. See Labels on page 13 for details.

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

There are as many as 68 screws that must be removed, replaced, and/or loosened when servicing the computer. Make special note of each screw size and location during removal and replacement.

Display panel

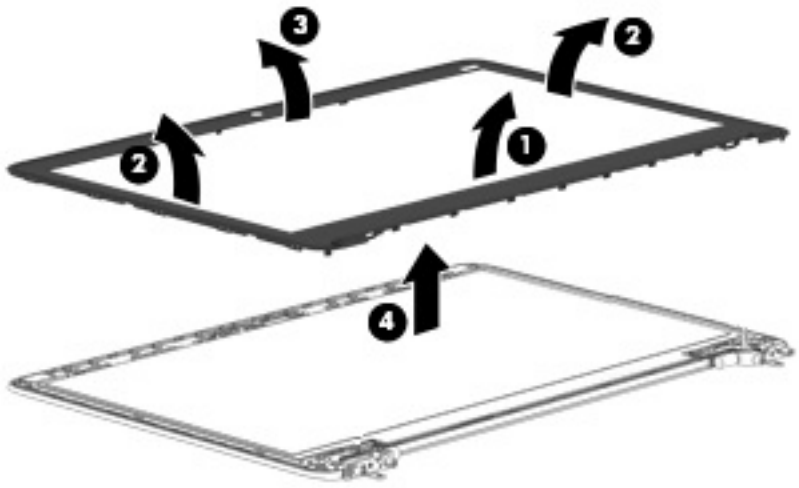
Description	Spare part number
Display bezel	738712-001
Display panel, **14 in** (35.56 cm), WLED, HD, AG, SVA, flat display panel	747751-001

Before removing the display panel, 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 32).

Remove the panel:

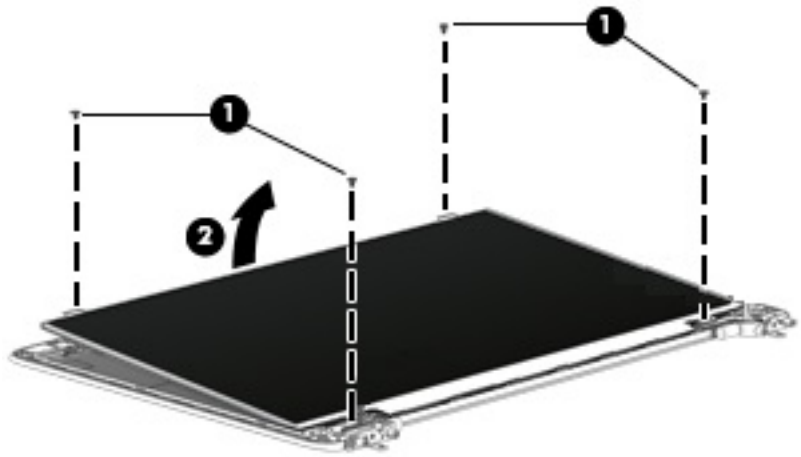
1. Open the computer with the display facing you.
2. Flex the inside edges of the top edge **(1)**, the left and right sides **(2)**, and the bottom edge **(3)** of the display bezel until the bezel disengages from the display enclosure.
3. Remove the display bezel **(4)**.



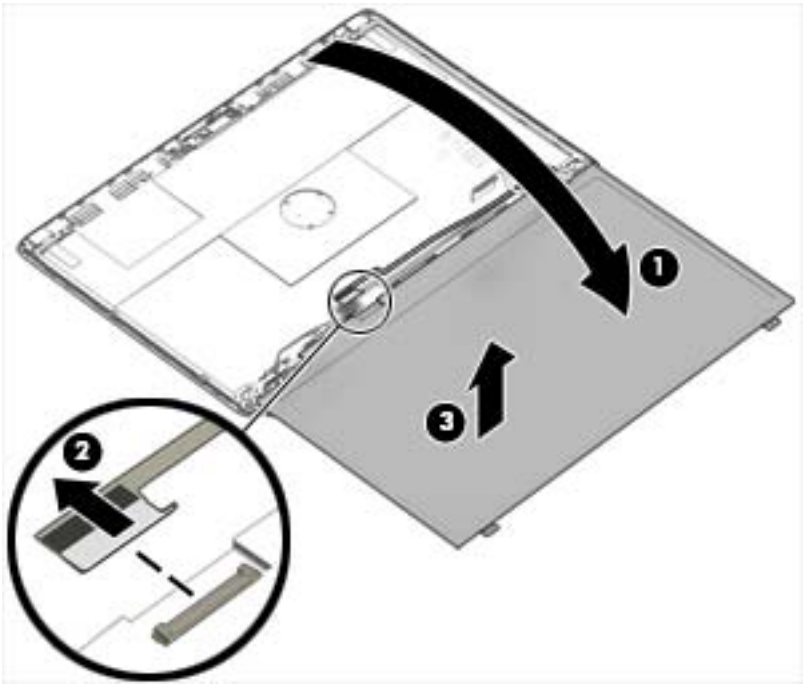
1. Remove the four Phillips screws **(1)** that secure the display panel to the display enclosure.

⚠ **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.

2. Lift the top edge of the display panel **(2)**.



3. Swing the display panel **(1)** up and forward until it rests upside down in front of the display back cover.
4. Release the adhesive strip **(2)** that secures the display panel cable connector to the display panel.
5. Remove the display panel **(3)**.



Reverse this procedure to replace the panel.

Heat sink assembly

NOTE: The heat sink assembly spare part kit includes replacement thermal material.

Description	Spare part number
Heat sink assembly (includes replacement thermal material)	738686-001

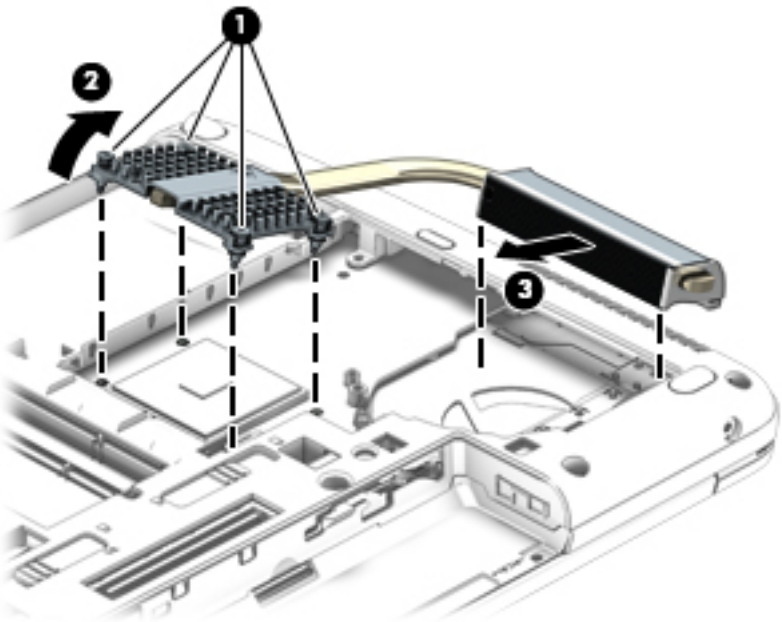
Before removing the heat sink assembly, follow these steps:

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 32), and then remove the following components:
   a. Service door (see Service door on page 33)
   b. Fan (see Fan on page 44)

Remove the heat sink assembly:

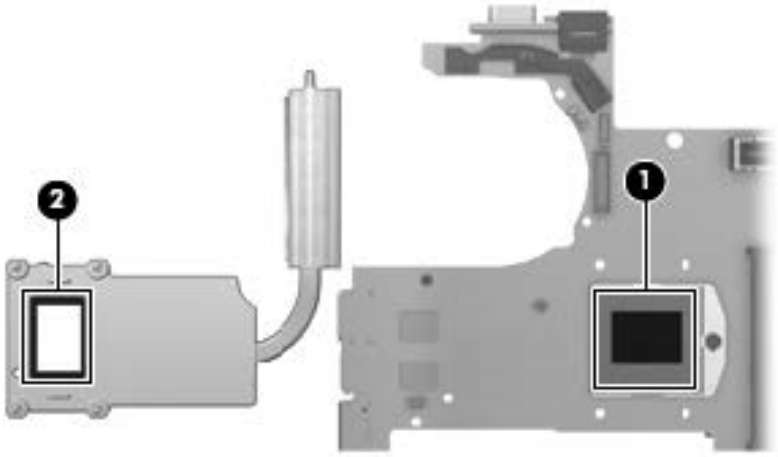
1. Position the computer upside down, with the battery bay facing you.
2. Following the 1 through 4 sequence stamped into the processor heat sink, loosen the four Phillips captive screws **(1)** that secure the processor heat sink to the system board.
3. Lift the heat sink assembly at an angle **(2)**.
4. Remove the heat sink assembly **(3)**.

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



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

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



Reverse this procedure to install the heat sink assembly.

Processor

NOTE: The processor spare part kit includes replacement thermal material.

Description	Spare part number
AMD A4-5150M with Radeon HD 8350G Graphics (dual-core; 3.3 GHz/2.7 GHz; 35 W; 1 MB L2 cache)	713549-001
AMD A4-4300M with Radeon HD 7420G Graphics (dual-core; 3.0 GHz/2.5 GHz; 35 W; 1 MB L2 cache)	685990-001

Before removing the processor, follow these steps:

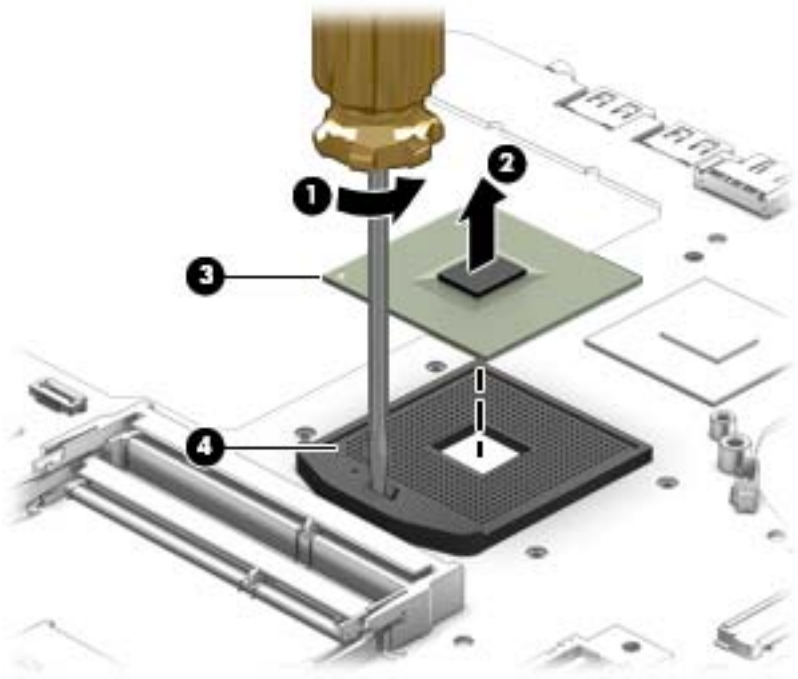
1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the battery (see Battery on page 32), and then remove the following components:
   a. Service door (see Service door on page 33)
   b. Fan (see Fan on page 44)
   c. Heat sink assembly (see Heat sink assembly on page 51)

Remove the processor:

1. Position the computer upside down, with the battery bay facing you.
2. Use a flathead screwdriver **(1)** to turn the processor locking screw one-half turn counterclockwise, until you hear a click.

3. Lift the processor **(2)** straight up, and remove it.

NOTE: The gold triangle **(3)** on the processor must be aligned with the triangle icon **(4)** embossed on the processor socket when you install the processor.



Reverse this procedure to install the processor.

Base enclosure

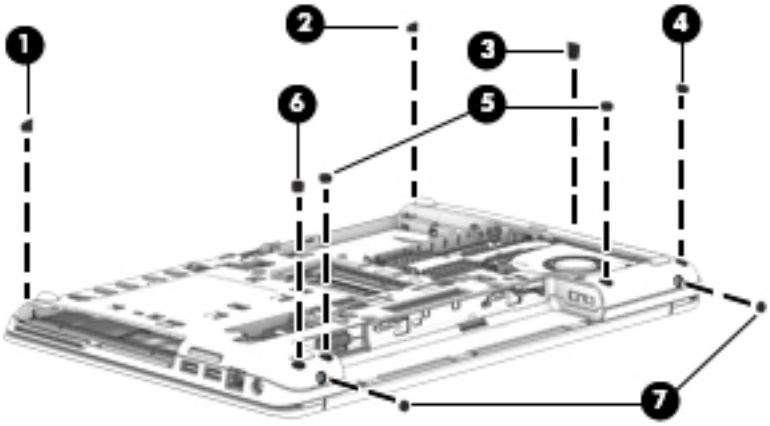
Description	Spare part number
Base enclosure	738681-001

Before removing the bottom cover, follow these steps:

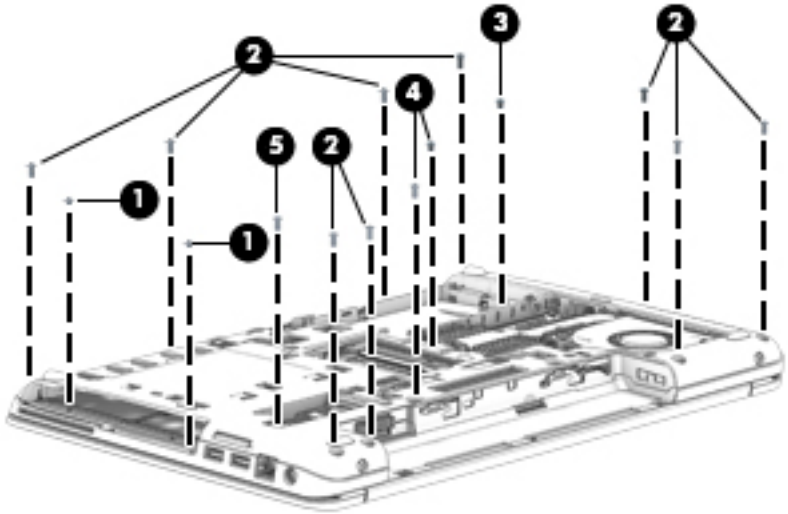
1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the battery (see Battery on page 32).
5. Remove the service door (see Service door on page 33).

Remove the base enclosure:

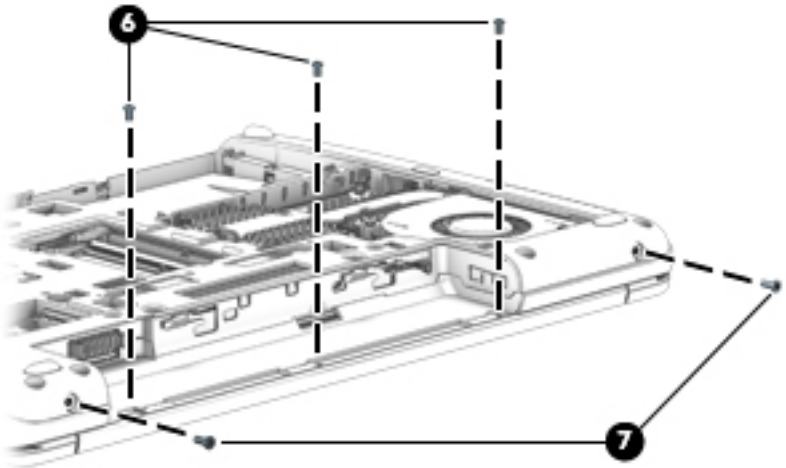
1. Position the computer upside down, with the battery bay facing you.
2. Remove the two front rubber screw covers **(1)** and **(2)**, the one screw cover **(3)** on the middle left edge, the four back rubber screw covers **(4)**, **(5)**, and **(6)**, and the two back panel screw covers **(7)**.



3. Remove the two Phillips screws **(1)** in the optical drive bay area, the nine Torx screws **(2)** on the front edge and rear corners and rear panel, the one Torx screw **(3)** in the fan area, the two Torx screws **(4)** in the memory module bay area and the one Torx screw **(5)** in the wireless module area that secure the base enclosure to the top cover.



4. Remove the three Torx screws in the battery bay **(6)** and the two back cover screws **(7)**.

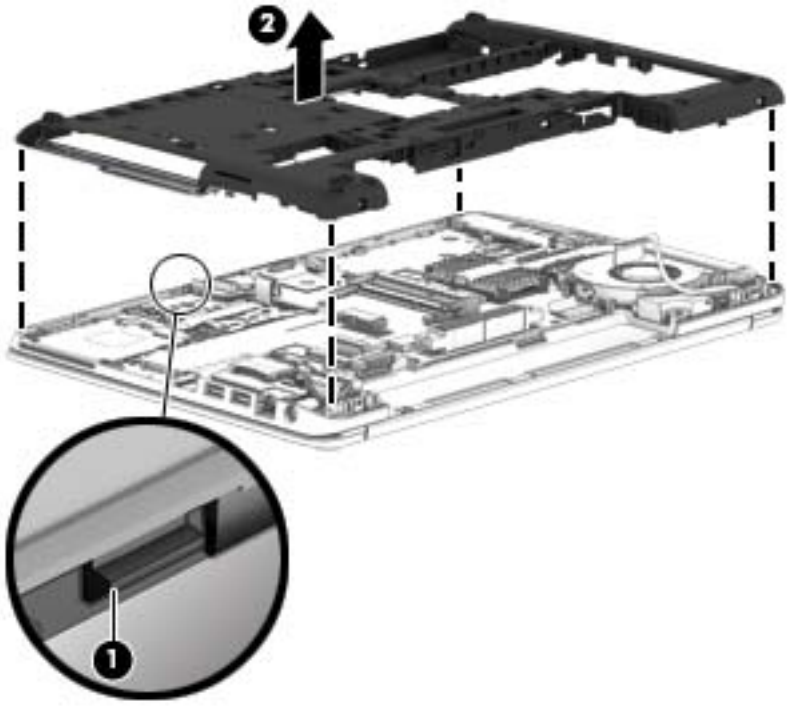


NOTE: Make sure the wireless cables route cleanly through the opening in the base enclosure to prevent them from catching on the enclosure.

NOTE: Make sure any SD cards or SD blanks have been removed.

5. Detach the clips **(1)** in front of the hard drive area before lifting the base enclosure.

6. Remove the base enclosure **(2)** from the top cover.



Reverse this procedure to install the base enclosure.

Display assembly

Component	Spare part number
Display back cover (includes WWAN and WLAN antennas)	738680-001
Display bezel	738712-001
Display Hinge Kit (includes left and right hinges)	738396-001
Display panel, **14 in** (35.56 cm), WLED, HD, AG, SVA, flat display panel	747751-001
Display panel cable (includes webcam/microphone module cable and tape)	738684-001
Microphone module	738397-001
Webcam/microphone module	738409-001

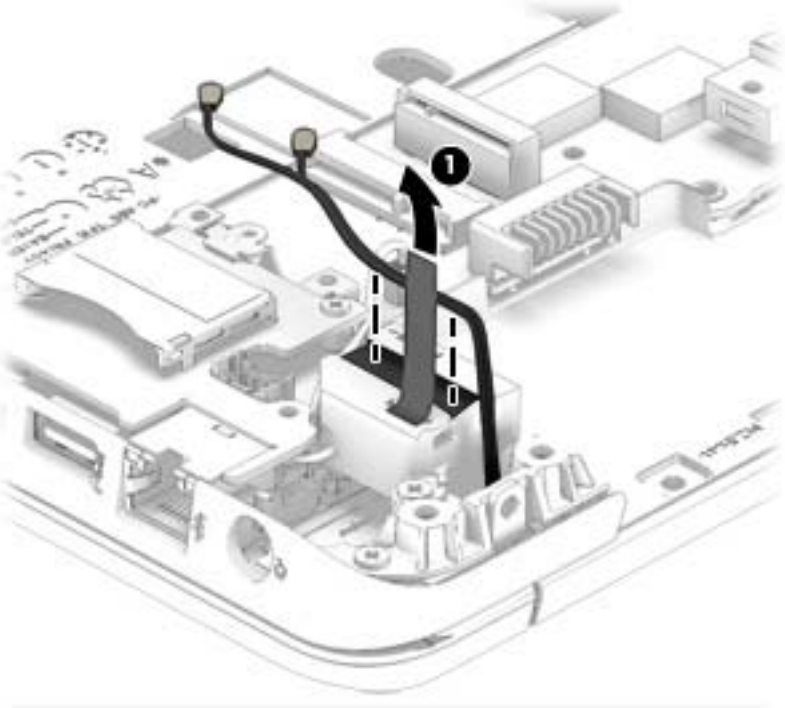
To remove the display assembly and access the display assembly subcomponents, follow these steps:

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 32), and then remove the following components:
   a. Service door (see Service door on page 33)
   b. Base enclosure (see Base enclosure on page 55)

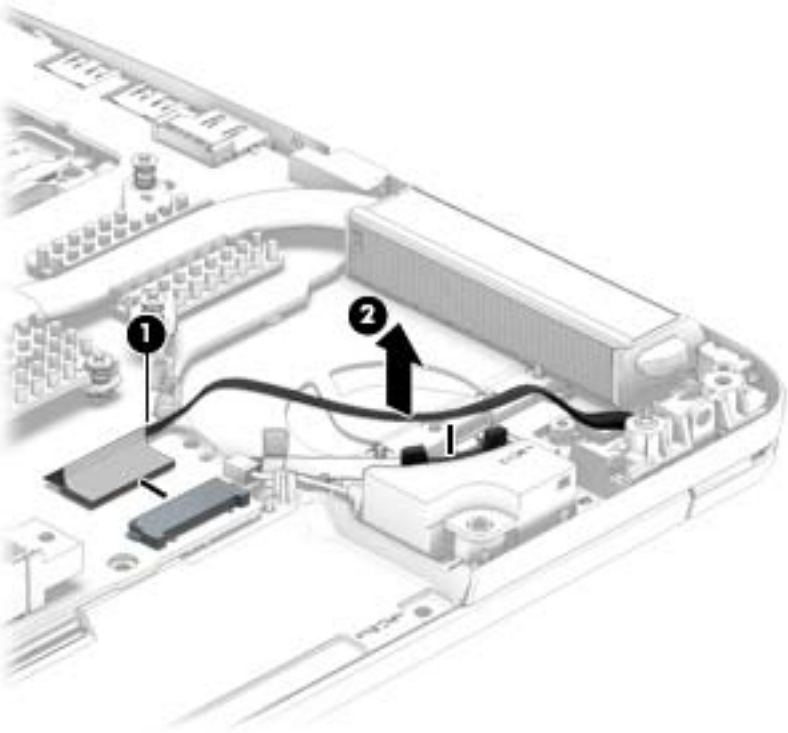
Remove the display assembly:

1. Turn the computer upside down, with the battery bay toward you.
2. Make sure that the WWAN antenna cables are disconnected from the WWAN module (see WWAN module on page 38).
3. Make sure that the WLAN antenna cables are disconnected from the WLAN module (see WLAN module on page 40).

4. Remove the tape to release the wireless antenna cables **(1)** from the left speaker, and move the wireless cables out of the way.

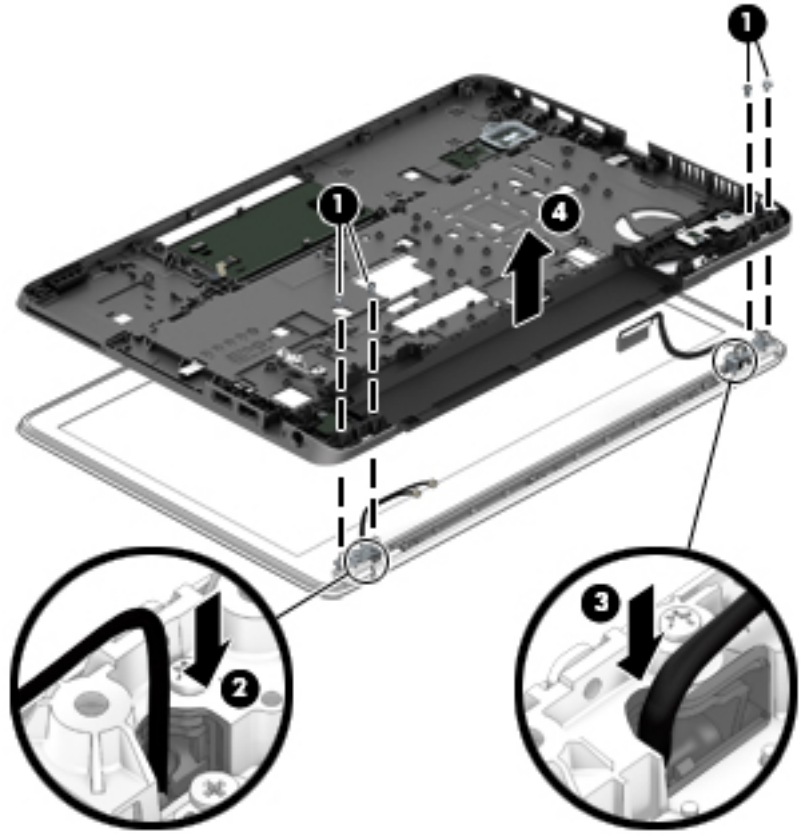


5. Disconnect the display panel cable **(1)** from the system board, and remove the display panel cable **(2)** from the routing on the right speaker.

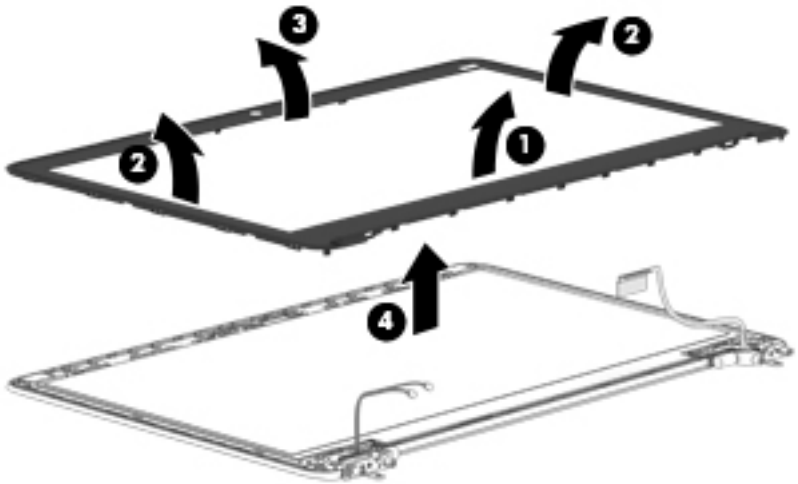


6. Turn the computer right-side up, with the battery bay toward you.

7. Remove the four Torx screws **(1)** that secure the top cover to the computer.
8. Make sure the wireless cables **(2)** and display panel cable **(3)** feed cleanly through the openings.
9. Remove the top cover **(4)** from the display assembly.



10. If it is necessary to replace the display bezel or any of the LED 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 enclosure.
    b. Remove the display bezel **(4)**.

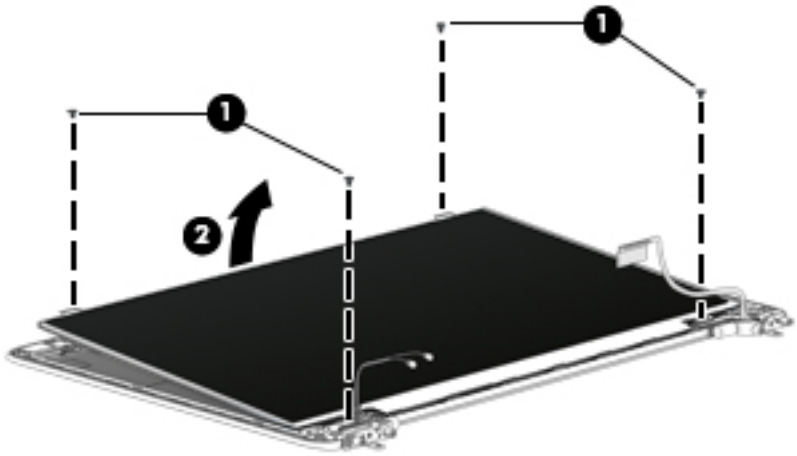


11. If it is necessary to replace the display panel:

    a. Remove the four Phillips 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.

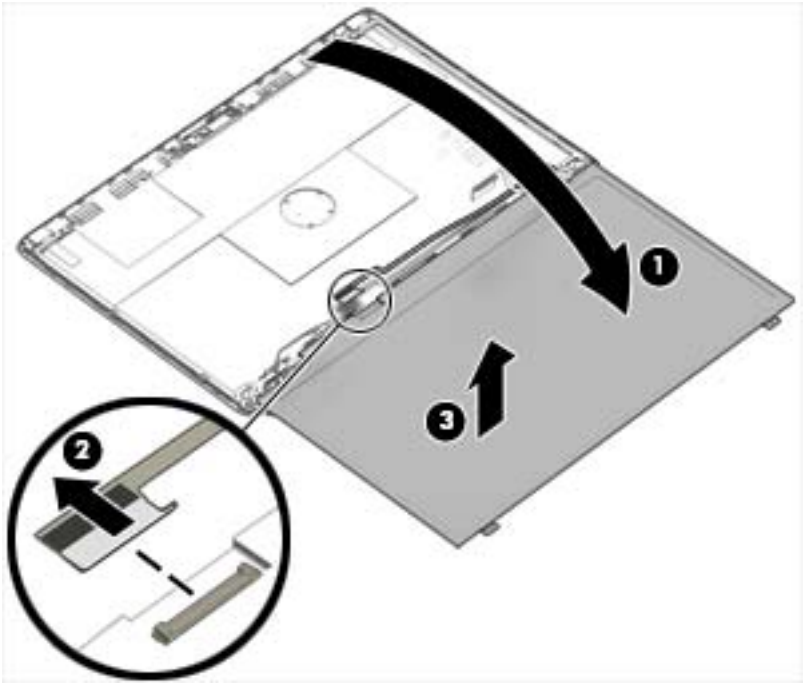
    b. Lift the top edge of the display panel **(2)**.



    c. Swing the display panel **(1)** up and forward until it rests upside down in front of the display back cover.

    d. Release the adhesive strip **(2)** that secures the display panel cable connector to the display panel.

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

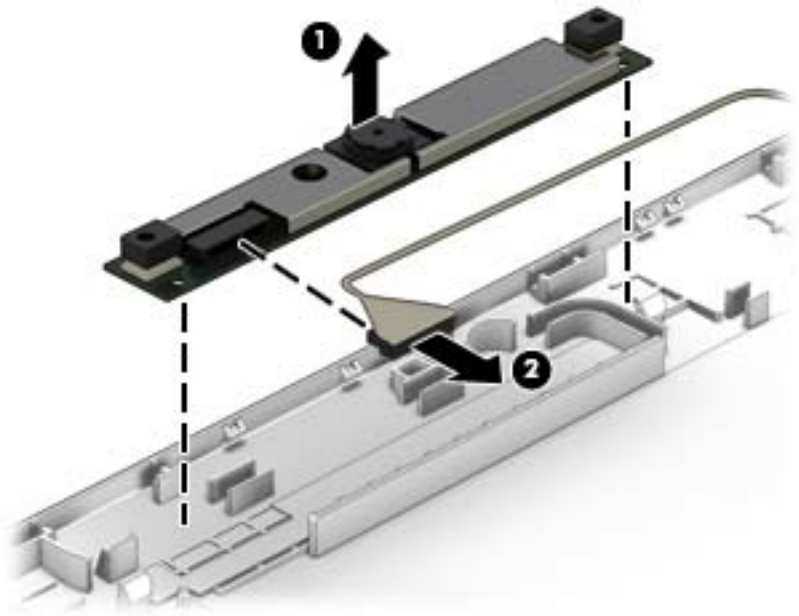


12. If it is necessary to replace the webcam/microphone module or microphone module:

⚠ **CAUTION:** Handle the webcam/microphone module or microphone module with caution. These modules have a thin profile and are susceptible to damage when not handled carefully.

   a. Lift the module **(1)** from the display back cover. (The module is attached to the display back cover with double-sided adhesive.)

   b. Detach the cable **(2)** from the module.

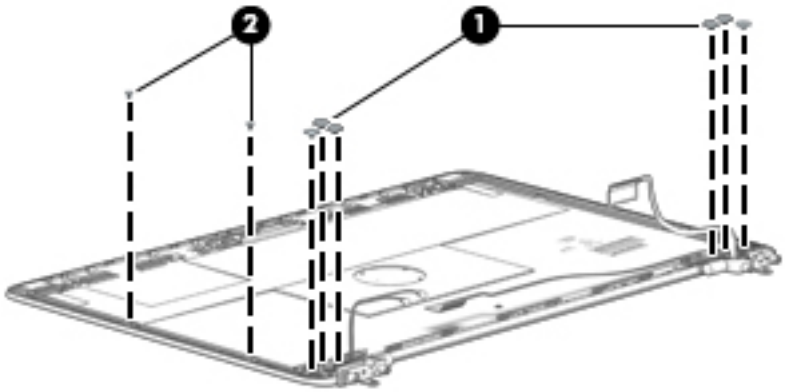


   c. Remove the module.

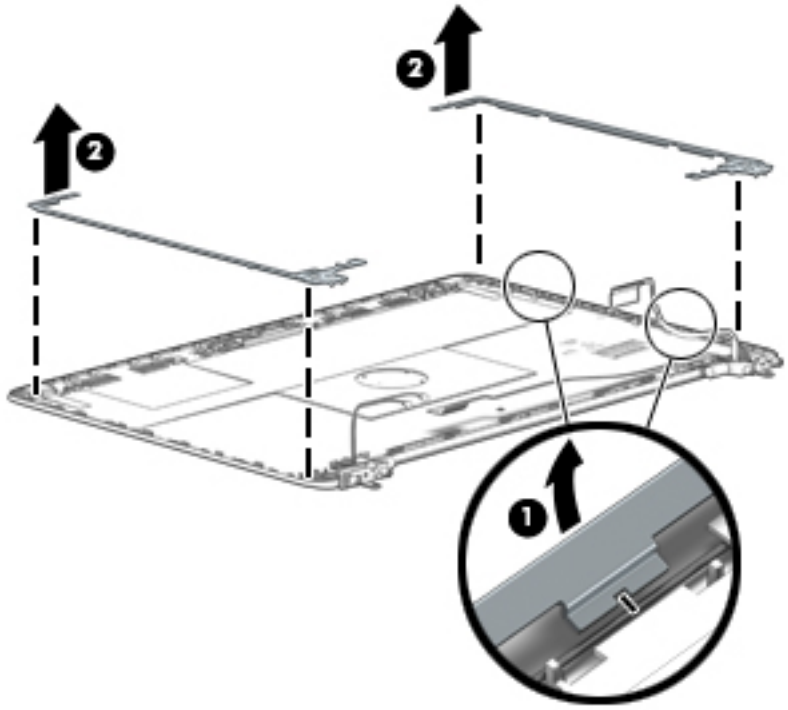
13. If it is necessary to replace the display hinges:

   a. Remove the six Phillips screws **(1)** that secure the display hinges to the display panel.

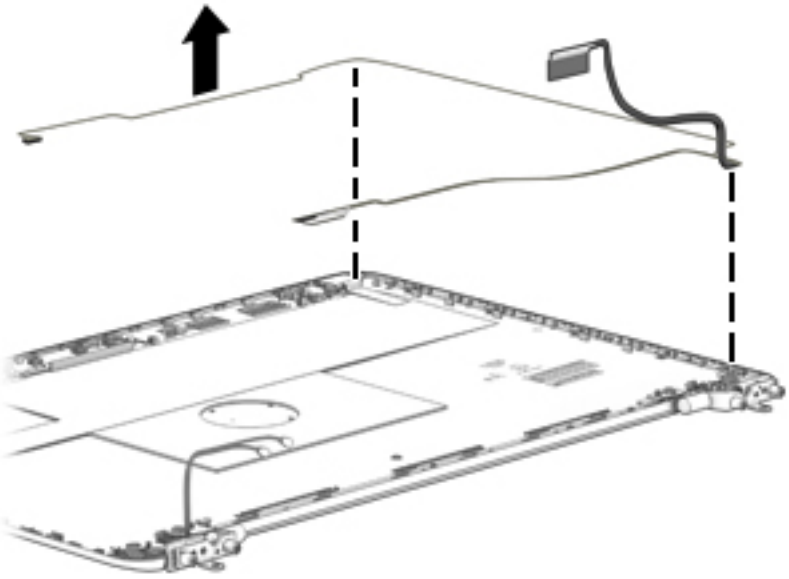
   b. Remove the two Torx screws **(2)** on the left hinge.



c. Release the right hinge snaps **(1)** and remove the hinges **(2)**.



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



Reverse this procedure to reassemble and install the display assembly.

USB board

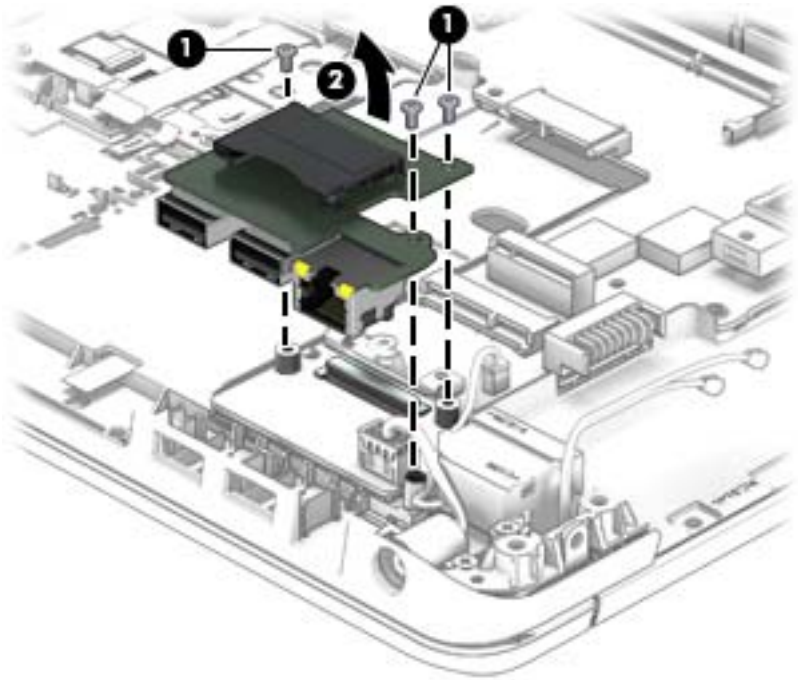
Description	Spare part number
USB board	738400-001

Before removing the USB 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 32), and then remove the following components:
   a. Service door (see Service door on page 33)
   b. Base enclosure (see Base enclosure on page 55)

Remove the USB board:

1. Position the top cover upside down, with the battery bay facing away from you.
2. Remove the three Torx screws **(1)** connecting the USB board to the system board.
3. Lift the inside edge of the USB board **(2)**, and remove it from the base enclosure.



Reverse this procedure to install the USB board.

Speakers

Description	Spare part number
Speakers (includes left and right speakers and tape)	738404-001

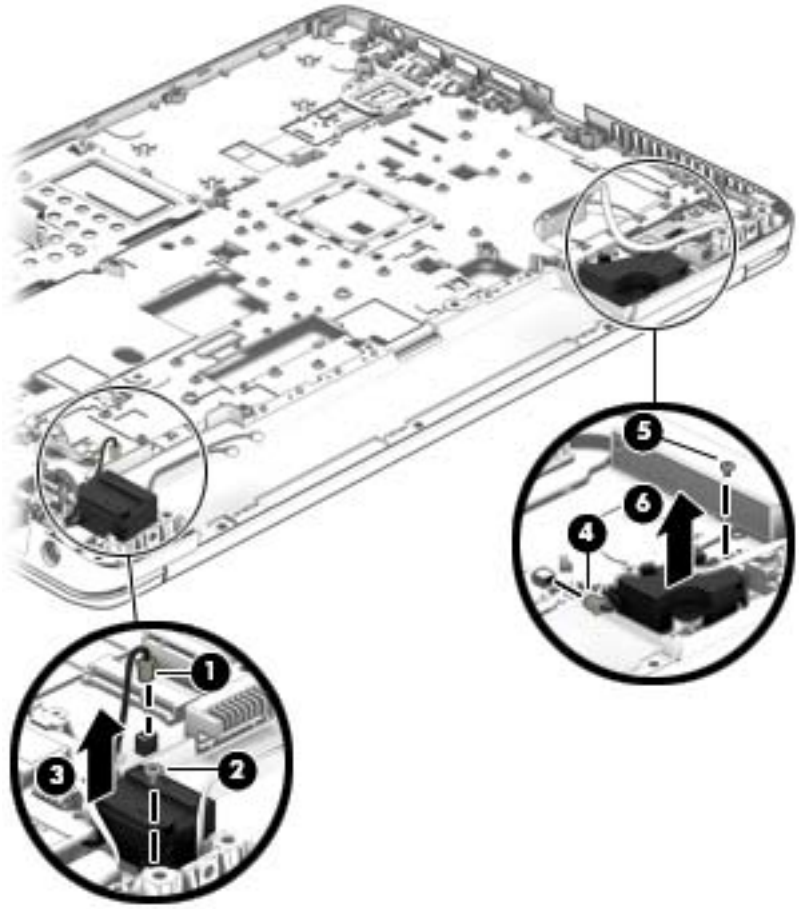
Before removing the speakers, follow these steps:

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 32), and then remove the following components:
   a. Service door (see Service door on page 33)
   b. Base enclosure (see Base enclosure on page 55)

Remove the speakers:

1. Position the top cover upside down, with the battery bay facing you.
2. Disconnect the speaker cables **(1)** and **(4)** from the system board.
3. Remove the two Phillips screws **(2)** and **(5)** that secure the speakers to the base enclosure.

4. Remove the speakers **(3)** and **(6)**.



Reverse this procedure to install the speakers.

Power connector cable

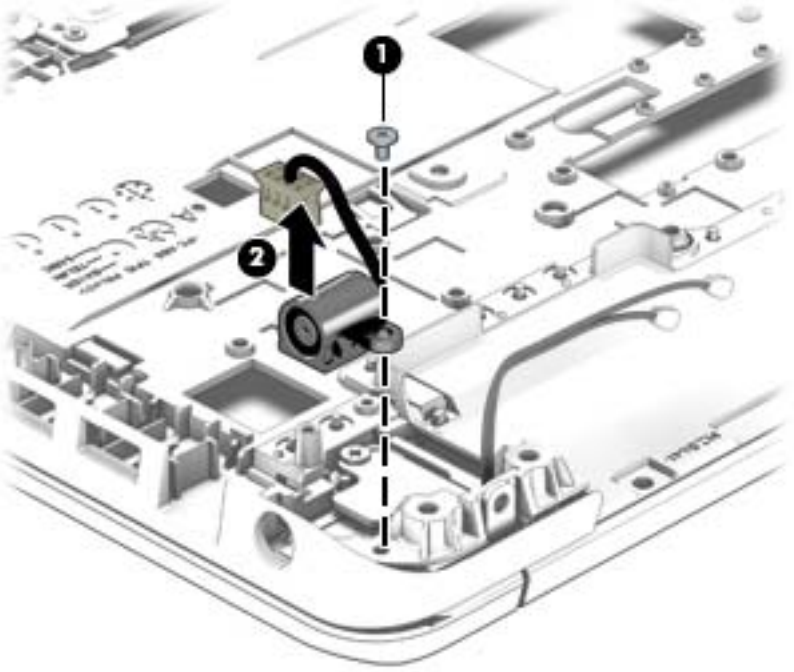
Description	Spare part number
Power connector cable	738683-001

Before removing the power connector cable, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the battery (see Battery on page 32), and then remove the following components:
   a. Service door (see Service door on page 33)
   b. Base enclosure (see Base enclosure on page 55)

Remove the power connector cable:

1. Position the top cover upside down, with the battery bay facing you.
2. Remove the Torx screw **(1)** from the base enclosure.
3. Remove the power connector cable **(2)** from the base enclosure.



Reverse this procedure to install the power connector cable.

Power button board

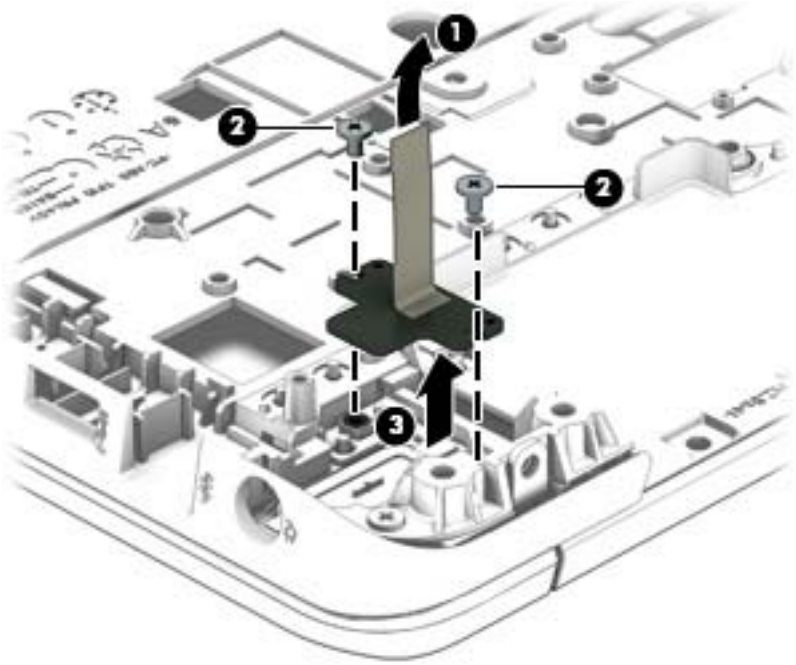
Description	Spare part number
Power button board (includes cable)	738399-001

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 32), and then remove the following components:
   a. Service door (see Service door on page 33)
   b. Base enclosure (see Base enclosure on page 55)
   c. USB board (see USB board on page 64)
   d. Speakers (see Speakers on page 65)
   e. Power connector cable (see Power connector cable on page 66)

Remove the power button board:

1. Turn the top cover upside down, with the front toward you.
2. Lift up the power button board cable **(1)**.
3. Remove the two Phillips screws **(2)** that secure the power button board to the top cover.
4. Remove the power button board **(3)** and cable.



Reverse this procedure to install the power button board.

System board

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

Description	Spare part number
For use only on computer models equipped with a WWAN	746017-001
For use only on computer models not equipped with a WWAN	746018-001

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 32), and then remove the following components:
   a. Service door (see Service door on page 33)
   b. Hard drive (see Hard drive on page 34)
   c. Optical drive (see Optical drive on page 36)
   d. Keyboard (see Keyboard on page 45)
   e. Base enclosure (see Base enclosure on page 55)
   f. USB board (see USB board on page 64)

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

- WWAN module (see WWAN module on page 38)
- WLAN module (see WLAN module on page 40)
- Memory (see Memory module on page 42)
- Processor (see Processor on page 53)
- RTC battery (see RTC battery on page 73)

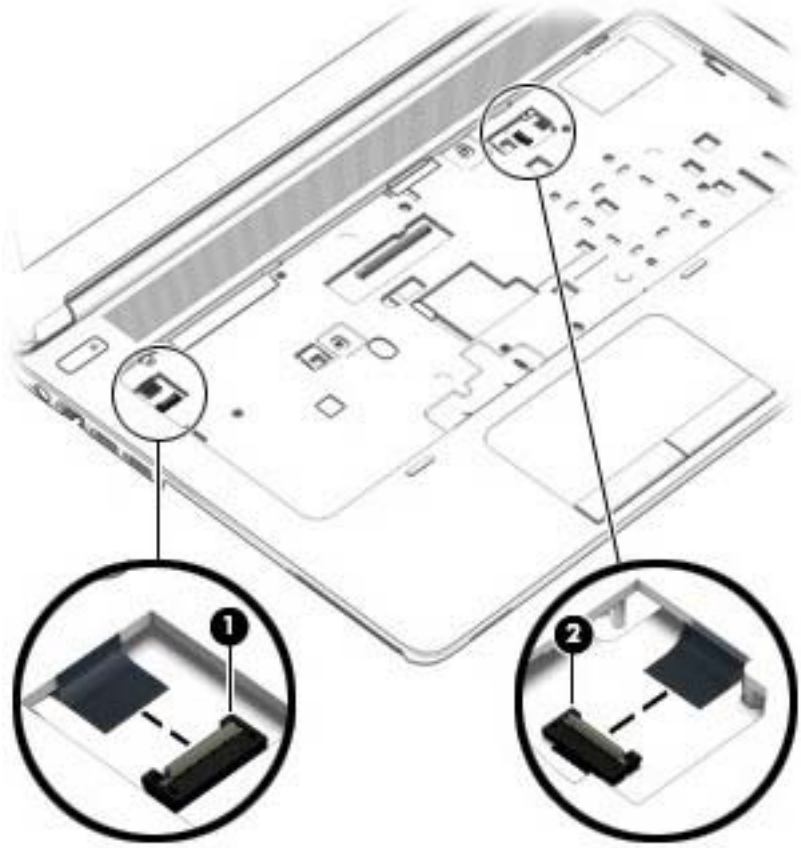
Remove the system board:

1. Position the computer so that the top cover is right-side up.

2. Disconnect the following from the system board:

   (1) Power button board ZIF connector

   (2) Function button board reverse ZIF connector



3. Turn the top cover upside down.

4. Disconnect the following cables from the system board:

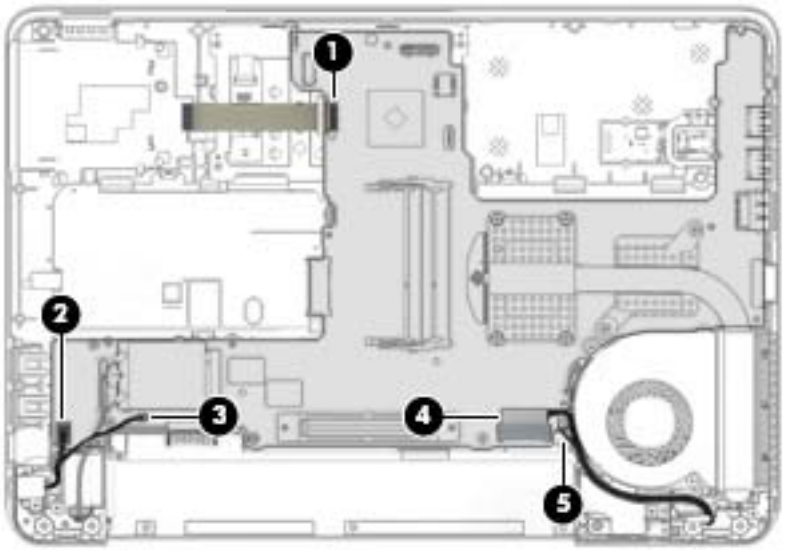
   (1) Card reader ZIF connector

   (2) Power connector cable

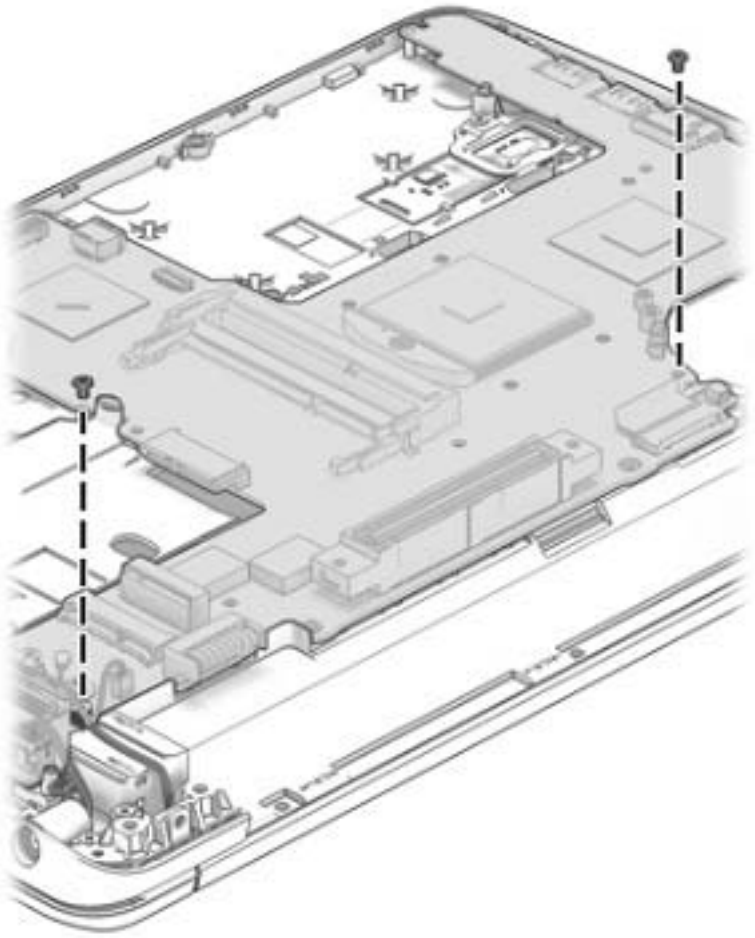
   (3) Right speaker cable

   (4) Display panel cable

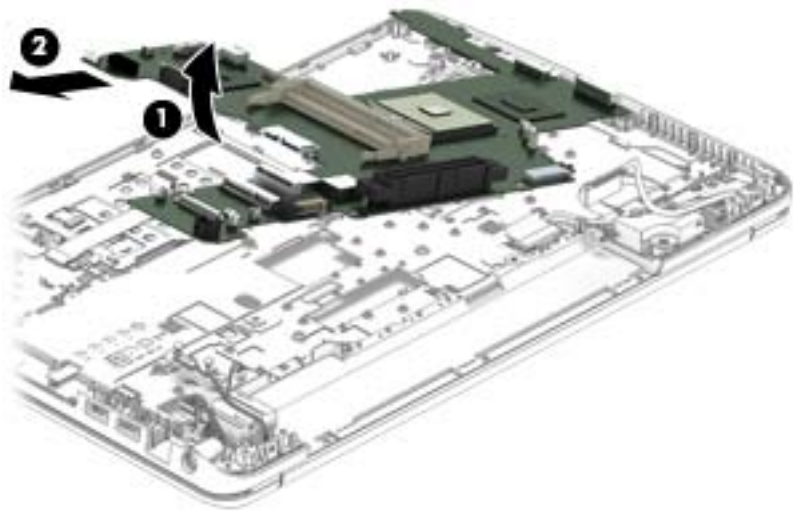
   (5) Left speaker cable



5. Remove the two Torx screws connecting the system board to the top cover.



6. Lift the middle left side **(1)** of the system board, and then remove the board **(2)** by sliding it up and to the left at an angle.



Reverse this procedure to install the system board.

RTC battery

Description	Spare part number
RTC battery (includes cable and double-sided adhesive)	651948-001

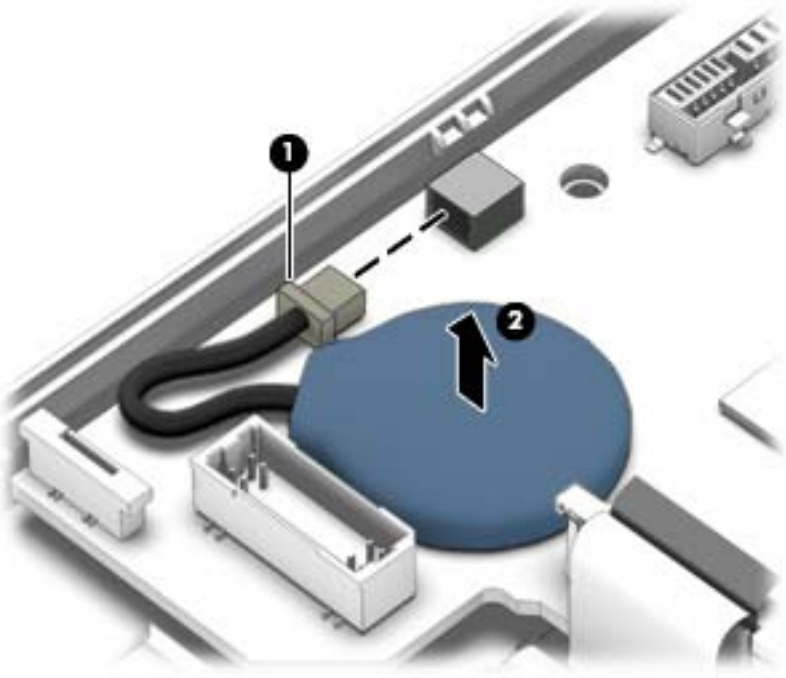
Before removing the RTC battery, follow these steps:

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 32), and then remove the following components:
   a. Service door (see Service door on page 33)
   b. Hard drive (see Hard drive on page 34)
   c. Optical drive (see Optical drive on page 36)
   d. Keyboard (see Keyboard on page 45)
   e. Base enclosure (see Base enclosure on page 55)
   f. USB board (see USB board on page 64)
   g. System board (see System board on page 69)

Remove the RTC battery:

1. Turn the top cover upside down, with the front toward you.
2. Disconnect the RTC battery cable **(1)** from the system board.

3. Detach the RTC battery **(2)** from the base enclosure. (The RTC battery is attached to the base enclosure with double-sided adhesive.)



4. Remove the RTC battery and cable.

Reverse this procedure to install the RTC battery.

Function button board

Description	Spare part number
Function button board (includes cable)	738401-001

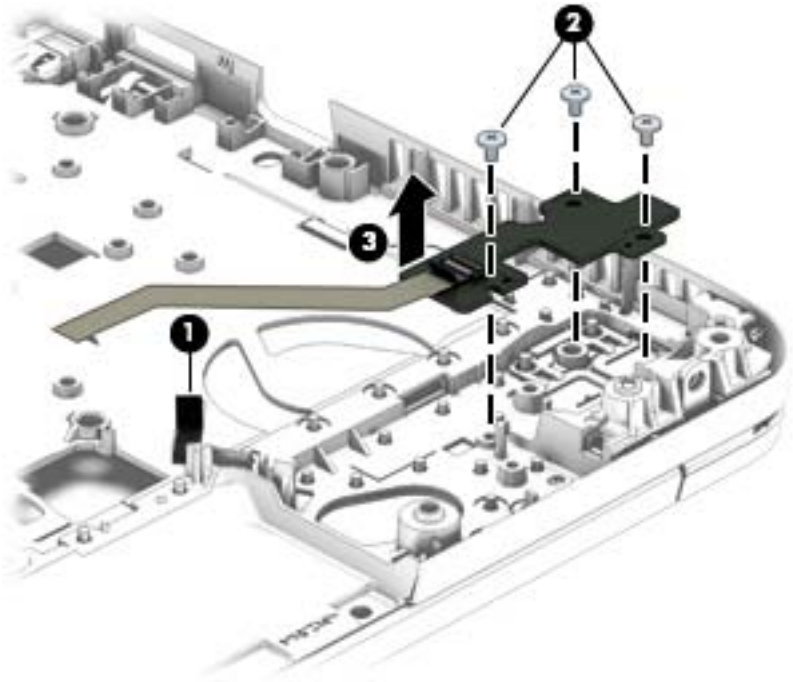
Before removing the function button board, follow these steps:

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 32), and then remove the following components:
   a. Service door (see Service door on page 33)
   b. Hard drive (see Hard drive on page 34)
   c. Optical drive (see Optical drive on page 36)
   d. Keyboard (see Keyboard on page 45)
   e. Base enclosure (see Base enclosure on page 55)
   f. USB board (see USB board on page 64)
   g. System board (see System board on page 69)

Remove the function button board:

1. Turn the top cover upside down, with the battery bay facing you.
2. Remove the tape **(1)** to release the function button board cable from the top cover.
3. Remove the three screws **(2)** that secure the function button board to the top cover.

4. Remove the function button board **(3)**.



Reverse this procedure to install the function button board.

Smart card reader

Description	Spare part number
Smart card reader (includes cable, shield, and tape)	738398-001

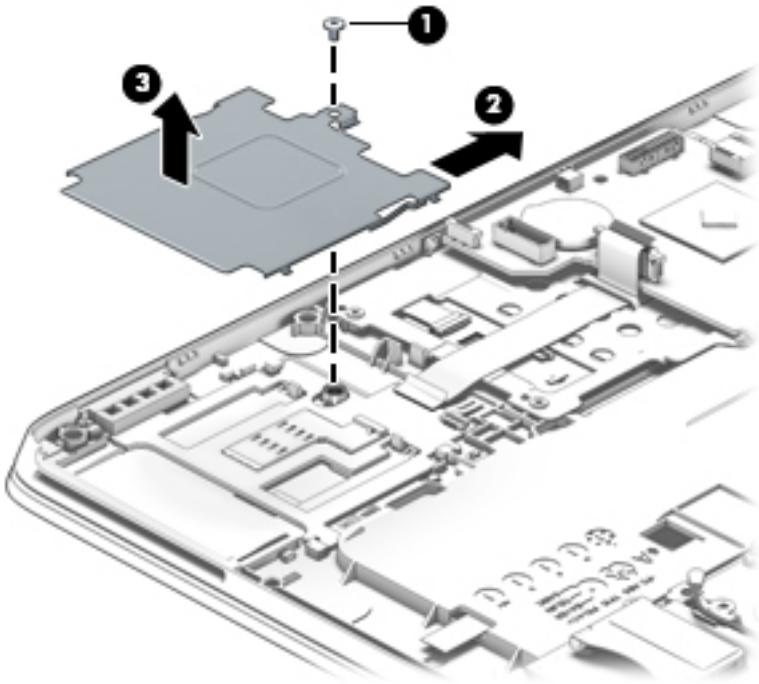
Before removing the smart card reader, follow these steps:

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 32), and then remove the following components:
   a. Service door (see Service door on page 33)
   b. Hard drive (see Hard drive on page 34)
   c. Optical drive (see Optical drive on page 36)
   d. Keyboard (see Keyboard on page 45)
   e. Base enclosure (see Base enclosure on page 55)
   f. USB board (see USB board on page 64)
   g. System board (see System board on page 69)

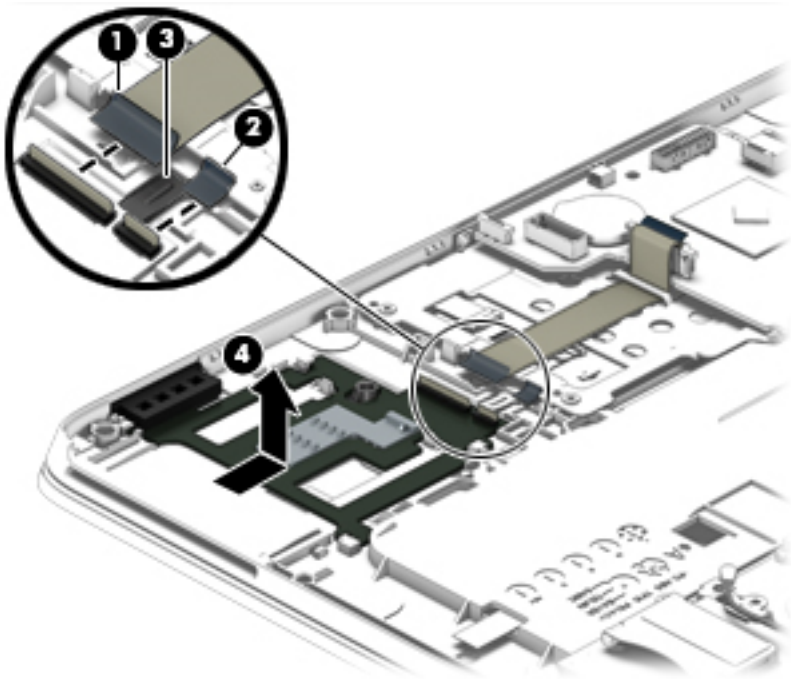
Remove the smart card reader:

1. Turn the top cover upside down, with the front toward you.
2. Remove the screw **(1)** connecting the smart card reader shield to the top cover.

3. Slide the smart card reader shield **(2)** away from the edge of the computer, and then lift up the shield **(3)** to remove it.



4. Release the ZIF connector **(1)** to which the smart card reader cable is attached.
5. Lift the clip **(2)** that secures the smart card reader to the base enclosure.
6. Release the clip **(3)**.
7. Remove the smart card reader **(4)**.



Reverse this procedure to install the smart card reader.

TouchPad button board

Description	Spare part number
TouchPad button board (includes keyboard bumper)	738407-001

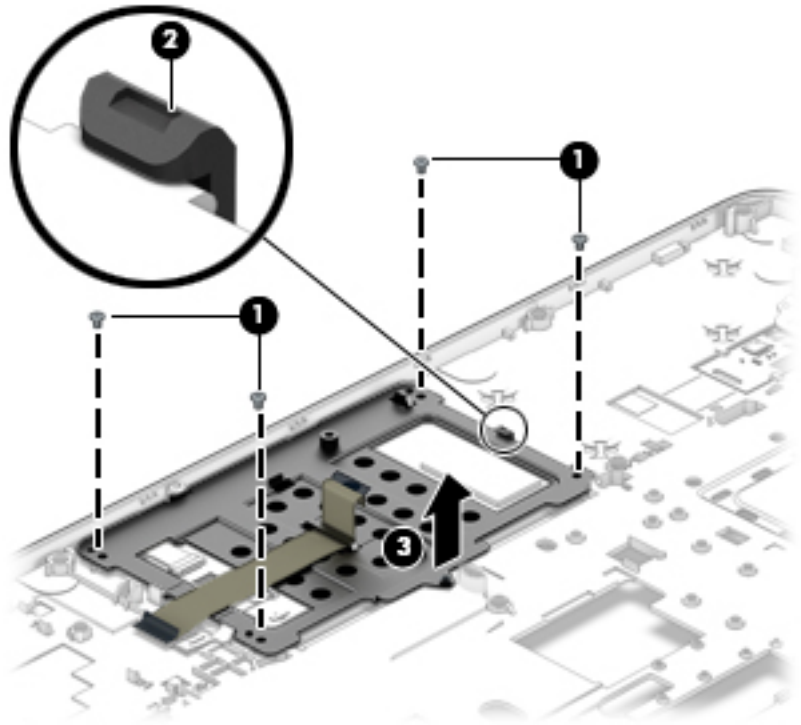
Before removing the TouchPad button board, follow these steps:

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 32), and then remove the following components:
   a. Service door (see Service door on page 33)
   b. Hard drive (see Hard drive on page 34)
   c. Optical drive (see Optical drive on page 36)
   d. Keyboard (see Keyboard on page 45)
   e. Base enclosure (see Base enclosure on page 55)
   f. USB board (see USB board on page 64)
   g. System board (see System board on page 69)
   h. Smart card reader (see Smart card reader on page 77)

Remove the TouchPad button board:

1. Turn the top cover upside down, with the front toward you.
2. Remove the four screws **(1)** that secure the TouchPad button board to the top cover.
3. Release one of the three retention hooks **(2)** that secure the TouchPad button board to the top cover, and then release the tape from the top cover.

4. Remove the TouchPad button board **(3)**.



Reverse this procedure to install the TouchPad button board.

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

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 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 tab key and 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 tab key and 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 displayed 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 tab key and 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 the HP website, http://www.hp.com.
2. Click **Support**, and then click **Download drivers**.
3. Enter the product name in the text box, and the click **Go**.
4. Select your computer model, and then select your operating system.
5. In the BIOS section, 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 displayed on the screen after the download is complete. If no instructions are displayed, 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 **Advanced > Boot Options > UEFI Boot Order** for UEFI Hybrid or UEFI Native Boot Mode, or select **Advanced > Boot Options > Legacy Boot Order** for Legacy Boot Mode, 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 **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) (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 86.

   b. Hard drive

   c. BIOS

2. Click the type of diagnostic test you want to run, and then follow the on-screen instructions.

NOTE: If you need to stop a diagnostic test 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.

1. Go to http://www.hp.com.
2. Click **Support**, and then click the **Download drivers** tab.
3. Enter the product name in the text box, and then click **Go**.

4. Select your computer model, and then select your operating system.
5. In the Diagnostic section, click **HP UEFI Support Environment**.

   – or –

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

8 Specifications

Computer specifications

	Metric	U.S.
Dimensions		
Width	**34.0 cm**	13.39 in
Depth	**23.7 cm**	9.33 in
Height (front to rear)	**2.53 cm to 2.9 cm**	.99 in to 1.14 in
Weight (computer equipped 6 cell battery and ODD weight saver)	**2.083 kg**	4.59 lb
Weight (computer equipped 6 cell battery and ODD)	**2.212 kg**	4.87 lb
Weight (computer equipped 9 cell battery and ODD weight saver)	**2.181 kg**	4.80 lb
Weight (computer equipped 9 cell battery and ODD)	**2.31 kg**	5.09 lb
Input power		
Operating voltage and current	19.5 V dc @ 3.33 A – 65 W	
Temperature		
Operating	**5°C to 35°C**	41°F to 95°F
Nonoperating	**-20°C to 60°C**	-4°F to 140°F
Relative humidity (non-condensing)		
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.

9 Statement of Volatility

The purpose of this document is to provide general information regarding non-volatile 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 AMD®-based system boards contain volatile DDR memory. The amount of nonvolatile memory present in the system depends upon the system configuration. 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 AMD-based system boards. Some of these steps are disclosed in the Maintenance & Service Guides available for HP PC products available on the product support pages at www.hp.com.

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?
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 M 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.
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.

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?
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.
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 necessary to address a unique issue.
Webcam	64K bit	No	Yes	Store webcam 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.

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. **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.

10 Power cord set requirements

The wide-range input feature of the computer permits it to operate from any line voltage from 100 to 120 V ac, or from 220 to 240 V 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 or regions must meet the requirements of the country and 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 A and a nominal voltage rating of 125 or 250 V ac, as required by the power system of each country or region.
- The appliance coupler must meet the mechanical configuration of an EN 60 320/IEC 320 Standard Sheet C13 connector for mating with the appliance inlet on the back of the computer.

Requirements for specific countries and regions

Country/region	Accredited agency	Applicable note number
Argentina	IRAM	1
Australia	SAA	1
Austria	OVE	1
Belgium	CEBEC	1
Brazil	ABNT	1
Canada	CSA	2
Chile	IMQ	1
Denmark	DEMKO	1
Finland	FIMKO	1
France	UTE	1
Germany	VDE	1
India	ISI	1
Israel	SII	1
Italy	IMQ	1
Japan	JIS	3
The Netherlands	KEMA	1
New Zealand	SANZ	1
Norway	NEMKO	1
The People's Republic of China	CCC	4
Saudi Arabia	SASO	7
Singapore	PSB	1
South Africa	SABS	1
South Korea	KTL	5
Sweden	SEMKO	1
Switzerland	SEV	1
Taiwan	BSMI	6
Thailand	TISI	1
The United Kingdom	ASTA	1

Country/region	Accredited agency	Applicable note number
The United States	UL	2

1. The flexible cord must be Type HO5VV-F, 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.
2. The flexible cord must be Type SVT/SJT 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 ac) or NEMA 6-15P (15 A, 250 V ac) configuration. CSA or C-UL mark. UL file number must be on each element.
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 VCTF, 3-conductor, 0.75 mm² or 1.25 mm² conductor size. The wall plug must be a two-pole grounding type with a Japanese Industrial Standard C8303 (7 A, 125 V ac) 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 CCC certification mark.
5. The flexible cord must be Type H05VV-F 3-conductor, 0.75 mm² conductor size. KTL logo and individual approval number must be on each element. Corset approval number and logo must be printed on a flag label.
6. The flexible cord must be Type HVCTF 3-conductor, 1.25 mm² conductor size. Power cord set fittings (appliance coupler, cable, and wall plug) must bear the BSMI certification mark.
7. For 127 V ac, the flexible cord must be Type SVT or SJT 3-conductor, 18 AWG, with plug NEMA 5-15P (15 A, 125 V ac), with UL and CSA or C-UL marks. For 240 V ac, the flexible cord must be Type H05VV-F 3-conductor, 0.75 mm² or 1.00 mm2 conductor size, with plug BS 1363/A with BSI or ASTA marks.

11 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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