HP ZBook 15 G2 Mobile Workstation

Maintenance and Service Guide

Product notice

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

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

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 full refund subject to the refund policy of your seller.

For any further information or to request a full refund of the price of the computer, please contact your seller.

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).

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1 Product description

Category	Description
Product Name	HP ZBook 15 G2 Mobile Workstation
Processors	• Intel® Quad Core® i7-4910MQ 2.90-GHz (SC turbo up to 3.90-GHz) processor (1600-MHz front-side bus (FSB), 8.0-MB L3 cache, 47 W) • Intel Quad Core i7-4810MQ 2.80-GHz (SC turbo up to 3.80-GHz) processor (1600-MHz FSB, 6.0-MB L3 cache, 47 W) • Intel Quad Core i7-4710MQ 2.50-GHz (SC turbo up to 3.50-GHz) processor (1600-MHz FSB, 6.0-MB L3 cache, 47 W) • Intel Quad Core i7-4610M 3.00-GHz (SC turbo up to 3.70-GHz) processor (1600-MHz FSB, 4.0-MB L3 cache, 37 W) • Intel Dual Core i5-4340M 2.90-GHz (SC turbo up to 3.60-GHz) processor (1600-MHz FSB, 3.0-MB L3 cache, 37 W) • Intel Dual Core i5-4210M 2.60-GHz (SC turbo up to 3.20-GHz) processor (1600-MHz FSB, 3.0-MB L3 cache, 37 W)
Chipset	Mobile Intel QM87
Graphics	**Switchable graphics:** • NVIDIA® Quadro® K2100M NVIDIA N15P-Q3 with 2-GB GDDR5 graphics subsystem memory (128-MB×16, 1.35-V, 1500-MHz, qty 8, 128-bit, FBW) • NVIDIA Quadro K1100M NVIDIA N15P-Q1 with 2-GB GDDR5 graphics subsystem memory (128-MB×16, 1.35-V, 1400-MHz, qty 8, 128-bit, FBW) • NVIDIA Quadro K610M NVIDIA N15M-Q2 with 1-GB GDDR5 graphics subsystem memory (128-MB×16, 1.35-V, 1300-MHz, qty 4, 64-bit, FBW) • AMD FirePro M5100) with 2-GB GDDR5 graphics subsystem memory (128-MB×16, 1.5-V, 1125-MHz, qty 8, 128-bit, FBW) Support for hybrid (switchable) graphics Support for open GL Support for DisplayPort 1.2 Support for up to 4 total displays (through APR) Support for NVIDIA Mosaic Technology
Panel	• 15.6-in, Quad HD+, AG, LED, UWVA (3200×1800 resolution, 300 nits) with or without camera • 15.6-in, full-high definition (FHD), AntiGlare (AG), light-emitting diode (LED), UWVA (1920×1080 resolution, 300 nits), with or without camera • 15.6-in, FHD, AG, LED, SVA (1280×1024 resolution), with or without camera All panels are 16:9 aspect ratio
Memory	Four customer-accessible/upgradable memory module slots Support for DDR3L 1600-MHz PC3-12800 dual channel memory Support for 32768-MB of system RAM in the following configurations:

Category	Description
	• 32768-MB total system memory (8192-MB×4)
	• 16384-MB total system memory (8192-MB×2 or 4096-MB×4)
	• 8192-MB total system memory (8192-MB×1, 4096-MB×2)
	• 4096-MB total system memory (4096-MB×1)
MiniCard solid-state drive	512-GB mSATA SSD
	256-GB mSATA SSD
Hard drive	Support for 6.35-cm (2.5-in) hard drives in 7.0-mm (.28-in) and 9.5-mm (.37-in) thickness
	Support for Serial ATA
	Support for 3D DriveGuard hard drive protection
	Support toolless removal
	Support for the following hard drives:
	• 1-TB, 7200-rpm
	• 750-GB, 7200-rpm
	• 500-GB, 7200-rpm
	• 500-GB, 7200-rpm, self-encrypting drive
	• 500-GB, 5400-rpm, self-encrypting drive, FIPS
	Support for the following 6.35-cm (2.5-in) solid-state drives:
	• 512-GB SATA-3 self-encrypting, OPAL2
	• 512-GB SATA-3
	• 256-GB SATA-3
	• 256-GB SATA-3 self-encrypting, OPAL2
	• 256-GB SATA-3 self-encrypting, OPAL1
	• 240-GB SATA-3
	• 180-GB SATA-3
	• 128-GB SATA-3
Upgrade drive	Support for the following 9.5-mm (.37-in) , SATA optical drives:
	• Blu-ray R/RE DVD±RW SuperMulti Double-Layer Drive
	• Blu-ray ROM DVD±RW SuperMulti Double-Layer Drive
	• DVD±RW SuperMulti Double-Layer Drive
	Support for 6.35-cm (2.5-in) 750-GB, 7200-rpm SATA hard drive in 7.0-mm (.28-in) and 9.5-mm (.37-in) thicknesses
	Support for the following 6.35-cm (2.5-in) drives:
	• 1-TB, 7200-rpm
	• 512-GB SATA-3 self-encrypting SSD, OPAL2
	• 512-GB SSD
	• 256-GB SED SSD, OPAL2
	Supports for no Upgrade drive option (bezel)

Category	Description
Audio and video	Stereo speakers
	Dual array microphone
	HD Audio with DTS Studio sound
	Integrated HD 720p webcam (fixed [no tilt], activity LED, 1280×720 by 30 frames per second)
	Support for no webcam option
Ethernet	Intel I217-LM 10/100/1000 Ethernet, with Intel I217-LM Gigabit Network Connection
	Support for Power Optimizer
	Intel Stable Image Platform Program (SIPP)
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:
	● Intel Dual Band Wireless-AC 7260 802.11 AC 2x2 WiFi + BT 4.0 Combo Adapter
	● Intel Dual Band Wireless-N 7260AN 802.11 a/b/g/n (2x2) WiFi + BT 4.0 combo
	● Intel Dual Band Wireless-N 7260NB 802.11 a/b/g/n (2x2) WiFi
	Integrated wireless wide area network (WWAN) options by way of wireless module (select models only)
	Two WWAN antennas built into display assembly
	Security provided by subscriber identify module (SIM), slot located in battery bay
	Support for the following WWAN formats:
	● HP hs3110 HSPA+ Mobile Broadband Module
	● HP lt4211 LTE/EV-DO/HSPA+ Gobi 4G Module
	● HP lt4112 LTE/HSPA+ Mobile Broadband Module
External media cards	ExpressCard – 54mm
	Integrated SD UHS-II flash media slot
	Supports next generation SD (Secure Digital); Backward compatible with SDHC, SDXC
Ports	● Multi-Pin AC Port
	● Combination mic-in/stereo headphone jack
	● Battery (secondary) connector
	● DisplayPort 1.2
	● Docking
	● RJ-45 (Ethernet)
	● Thunderbolt 2
	● USB 3.0 (2)
	● USB 3.0 charging (1)
	● USB: 2.0 (1)
	● VGA (Dsub 15 pin) supporting: 1920×1200 external resolution @ 75 Hz, hot plug and unplug and autodetection for correct output to wide-aspect vs. standard aspect video

Category	Description
Docking	Docking support for HP Docking Station
	Docking support for HP Advanced Docking Station
Keyboard/pointing devices	Full-size, island-style, backlit (and non-backlit) keyboard with numeric keypad
	Gesture support: MultiTouch gestures enabled, two-finger scrolling, and pinch-zoom as default
	Support for Windows dual-point (pointing stick with 3 pointing stick buttons plus TouchPad with 3 TouchPad buttons)
	DuraKeys
	Spill Resistant with drain
	TouchPad requirements:
	● On/off button
	● Glass with chemical etched surface (DuraPad)
	● Support for 2-way scroll
	● Taps enabled by default
	● Gestures enabled by default:
	◦ 2-finger scrolling
	◦ 2-finger zoom (pinch)
	● Image sensor TouchPad
Power requirements	Support for the following AC adapters:
	● 200-W, HP Smart Adapter, slim
	● 150-W, HP Smart Adapter, slim
	3-wire plug (with ground pin)
Power requirements *(continued)*	Support for the following batteries
	● 9-cell, 100-WHr, 3.0-AHr, Li-ion battery
	● 9-cell, 73-WHr, 2.2-AHr, Li-ion battery
	● 8-cell, 83-WHr, 2.8-AHr, Li-ion battery
	● 8-cell, 75-WHr, 2.8-AHr, Li-ion battery
Security	Support security lock
	Trusted platform module (TPM) 1.2 (Infineon; soldered down) and TPM Enhanced Drive Lock (For the People's Republic of China and Asia Pacific countries and regions, disabled but available)
	Fingerprint reader
	Integrated smart card reader
	Preboot authentication (password, smart card)
Operating system	**Preinstalled:**
	● Windows 10 Home 64 High-end
	● Windows 10 Home 64 High-end Chinese Market
	● Windows 10 Home 64 High-end Single Language

Category	Description
	• Windows 10 Professional 64
	• Windows 10 Professional 64 Downgrade Windows 7 64
	• Windows 8.1 CH 64-bit (only available in the People's Republic of China with Hardware Kit)
	• Windows 8.1 CH 64 CPPP
	• Windows 8.1 Professional 64-bit
	• Windows 8.1 Professional 64-bit MSNA
	• Windows 8.1 Professional 64-bit for Education
	• Windows 8.1 Professional 64-bit DPK with Windows 7 Professional 64-bit Image
	• Windows 8.1 Professional 64-bit DPK with Windows 7 Professional 64-bit Image MSNA
	• Windows 7 Professional 64-bit
	• Windows 7 Professional 64-bit MSNA
	• FreeDOS 2.0
	• Ubuntu Linux
	Restore media-DRDVD:
	• DRDVD Windows 10 (available with any Windows 10 operating system, required any Windows 10 downgrade operating system)
	• DRDVD Windows 8.1 (available with any Windows 8.1 loc, required any Windows 8.1 Professional downgrade operating system)
	• DRDVD Windows 7 Service Pack 1 (available with any Windows 8.1 or Windows 7 Professional downgrade loc)
	• SRDVD Ubuntu Linux
Operating system *(continued)*	**Restore media-OSDVD:**
	• Windows 8.1 64-bit (for service only)
	• Windows 8.1 Country-Specific 64-bit (for service only)
	• Windows 8.1 Emerging Market 64-bit (for service only)
	• Windows 8.1 Professional 64-bit (only available and required with Windows 8.1 downgrade operating systems)
	• Windows 7 Professional 64-bit, Service Pack 1 (available with any Windows 8.1 Professional or Windows 7 Professional downgrade loc, not available in the People's Republic of China)
	Certified:
	• Microsoft WHCK
	• SuSE Linux Enterprise (SLED) Service Pack 2, 64-bit
	Web-only support:
	• Windows 10 Enterprise
	• Windows 8.1 Enterprise 64-bit
	• Windows 7 Enterprise 64-bit, Service Pack 1
	• Windows 7 Enterprise 32-bit, Service Pack 1
	• Windows 7 Professional 32-bit, Service Pack 1

Category	Description
	● Windows 7 Ultimate 64-bit, Service Pack 1
	● Windows 7 Ultimate 32-bit, Service Pack 1
Serviceability	**End user replaceable parts:**
	● AC adapter
	● Battery (system)
	● Hard drive
	● Keyboard
	● Memory modules (4, 2 expansion and 2 primary)
	● mSATA SSD
	● Optical drive
	● SSD
	● WLAN module
	● WWAN module

2 External component identification

Display

Component		Description
(1)	WLAN antennas *	Send and receive wireless signals to communicate with wireless local area networks (WLAN).
(2)	WWAN antennas * (select models only)	Send and receive wireless signals to communicate with wireless wide area networks (WWAN).
(3)	Internal microphones	Record sound.
(4)	Webcam light (select models only)	On: The webcam is in use.
(5)	Webcam (select models only)	Records video and captures photographs. Some models allow you to video conference and chat online using streaming video. To use the webcam: **Windows 7**: Select **Start > All Programs > Communication and Chat > CyberLink YouCam**. **Windows 8.1**: Access HP Support Assistant. To access HP Support Assistant, from the Start screen, select the **HP Support Assistant** app. **Windows 10**: Type `camera` in the taskbar search box, and then select **Camera**.
(6)	Internal display switch	Turns off the display or initiates Sleep if the display is closed while the power is on.

Component	Description
	NOTE: The display switch is not visible from the outside of the computer.

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

Windows 7: Select **Start > Help and Support > User Guides**.

Windows 8.1: From the Start screen, type support, and then select the **HP Support Assistant** app.

Windows 10: Select **Start**, select **All apps**, select **HP Help and Support**, and then select **HP Documentation**.

Top

TouchPad
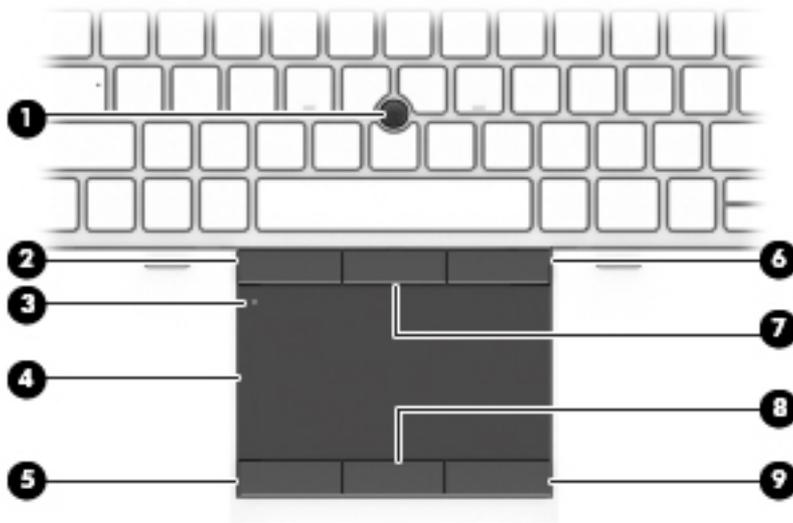
Component		Description
(1)	Pointing stick	Moves the pointer and selects or activates items on the screen.
(2)	Left pointing stick button	Functions like the left button on an external mouse.
(3)	TouchPad on/off button	Turns the TouchPad on and off.
(4)	TouchPad zone	Reads your finger gestures to move the pointer and select or activate items on the screen. **NOTE:** The TouchPad also supports edge-swipe gestures.
(5)	Left TouchPad button	Functions like the left button on an external mouse.
(6)	Right pointing stick button	Functions like the right button on an external mouse.
(7)	Center pointing stick button	Functions like the center button on an external mouse.
(8)	Center TouchPad button	Functions like the center button on an external mouse.
(9)	Right TouchPad button	Functions like the right button on an external mouse.

Lights

Component		Description
(1)	Power light	● On: The computer is on.
		● Blinking: The computer is in the Sleep state, a power-saving state. The computer shuts off power to the display and other unneeded components.
		● Off: The computer is off or in Hibernation. Hibernation is a power-saving state that uses the least amount of power.
		NOTE: For select models, the Intel® Rapid Start Technology feature is enabled at the factory. Rapid Start Technology allows your computer to resume quickly from inactivity.
(2)	Caps lock light	On: Caps lock is on, which switches the keys to all capital letters.
(3)	Microphone mute light	● Amber: microphone sound is off.
		● Off: microphone sound is on.
(4)	Num lock light	On: Num lock is on.
(5)	Wireless light	On: An integrated wireless device, such as a wireless local area network (WLAN) device and/or a Bluetooth® device, is on.
		NOTE: On some models, the wireless light is amber when all wireless devices are off.
(6)	Mute light	● Amber: Computer sound is off.
		● Off: Computer sound is on.

Buttons, speakers, and fingerprint reader (select models only)

Component		Description
(1)	Power button	• When the computer is off, press the button to turn on the computer.
		• When the computer is on, press the button briefly to initiate Sleep.
		• When the computer is in the Sleep state, press the button briefly to exit Sleep.
		• When the computer is in Hibernation, press the button briefly to exit Hibernation.
		CAUTION: Pressing and holding down the power button will result in the loss of unsaved information.
		If the computer has stopped responding and Windows shutdown procedures are ineffective, press and hold the power button for at least 5 seconds to turn off the computer.
		NOTE: For select models, the Intel® Rapid Start Technology feature is enabled at the factory. Rapid Start Technology allows your computer to resume quickly from inactivity.
		To learn more about your power settings, see your power options:
		Windows 7: Select **Start > Control Panel > System and Security > Power Options**.
		Windows 8.1: From the Start screen, type `power`, select **Power and sleep settings**, and then select **Power and sleep** from the list of applications.
		Windows 10: Type `power` in the taskbar search box, and then select **Power and sleep settings**.
		– or –

Component		Description
		Right-click the **Start** button, and then select **Power Options**.
(2)	Speakers	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.
(5)	Fingerprint reader (select models only)	Allows a fingerprint logon to Windows, instead of a password logon.

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, the esc key, or the b key.
(3)	Windows button	**Windows 7**: Displays the Windows Start menu. **Windows 8.1**: Returns you to the Start screen from an open app or the Windows desktop. **NOTE:** Pressing the Windows key again will return you to the previous screen. **Windows 10**: Opens the Windows **Start** menu. **NOTE:** Pressing the Windows key again will close the **Start** menu.
(4)	Function keys	Execute frequently used system functions when pressed in combination with the fn key.

Component		Description
(5)	num lk key	Alternates between the navigational and numeric functions on the integrated numeric keypad.
(6)	Integrated numeric keypad	When num lk has been enabled, it can be used like an external numeric keypad.

Front

Component			Description
(1)	((¡))	Wireless light	On: An integrated wireless device, such as a wireless local area network (WLAN) device and/or a Bluetooth® device, is on. **NOTE:** On some models, the wireless light is amber when all wireless devices are off.
(2)	⏻	Power light	• On: The computer is on. • Blinking: The computer is in the Sleep state, a power-saving state. The computer shuts off power to the display and other unneeded components. • Off: The computer is off or in Hibernation. Hibernation is a power-saving state that uses the least amount of power. **NOTE:** For select models, the Intel® Rapid Start Technology feature is enabled at the factory. Rapid Start Technology allows your computer to resume quickly from inactivity.
(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)	⊜	Hard drive/optical drive light	• Blinking white: The hard drive or optical drive is being accessed. • Amber: HP 3D DriveGuard has temporarily parked the hard drive.

Left

Component			Description
(1)	🔒	Security cable slot	Attaches an optional security cable to the computer.
			NOTE: The security cable is designed to act as a deterrent, but it may not prevent the computer from being mishandled or stolen.
(2)		USB 2.0 port	Connects an optional USB device, such as a keyboard, mouse, external drive, printer, scanner or USB hub.
(3)		Vent	Enables airflow to cool internal components.
			NOTE: The computer fan starts up automatically to cool internal components and prevent overheating. It is normal for the internal fan to cycle on and off during routine operation.
(4)		Thunderbolt DisplayPort	Connects an optional high-resolution display device or a high-performance data device.
			NOTE: Thunderbolt is new technology. Install all the latest drivers for your Thunderbolt device before connecting the device to the Thunderbolt DisplayPort. Thunderbolt cable and Thunderbolt device (sold separately) must be compatible with Windows. To determine whether your device is Thunderbolt Certified for Windows, go to https://thunderbolttechnology.net/products.
(5)		Dual-Mode DisplayPort	Connects an optional digital display device, such as a high-performance monitor or projector.
(6)		USB 3.0 charging (powered) port	Connects an optional USB device, such as a keyboard, mouse, external drive, printer, scanner or USB hub. Standard USB ports will not charge all USB devices or will charge using a low current. Some USB devices require power and require you to use a powered port.
			NOTE: USB charging ports can also charge select models of cell phones and MP3 players, even when the computer is off.
(7)		Smart card reader	Supports optional smart cards.
(8)		ExpressCard slot or smart card reader (depending on the configuration)	Supports optional ExpressCards or smart cards.

Right

Component		Description
(1)	Memory card reader	Reads optional memory cards that store, manage, share, or access information.
(2)	Audio-out (headphone)/Audio-in (microphone) jack	Connects optional powered stereo speakers, headphones, earbuds, a headset, or a television audio cable. Also connects an optional headset microphone. This jack does not support optional microphone-only devices.
		WARNING! To reduce the risk of personal injury, adjust the volume before putting on headphones, earbuds, or a headset. For additional safety information, see the *Regulatory, Safety, and Environmental Notices*. To access this guide:
		Windows 7: Select **Start > Help and Support > User Guides**.
		Windows 8.1:
		From the Start screen, type `support`, and then select the **HP Support Assistant** app.
		– or –
		From the Windows desktop, click the question mark icon in the notification area, at the far right of the taskbar.
		Windows 10:
		Select **Start**, select **All apps**, select **HP Help and Support**, and then select **HP Documentation**.
		NOTE: When a device is connected to the jack, the computer speakers are disabled.
		Be sure that the device cable has a 4-conductor connector that supports both audio-out (headphone) and audio-in (microphone).
(3)	USB 3.0 port	Connects an optional USB device, such as a keyboard, mouse, external drive, printer, scanner, or USB hub.
(4)	Upgrade bay (optical drive shown) (select models only)	Depending on your computer model, reads an optical disc or reads and writes to an optical disc.
(5)	Optical drive eject button (select models only)	Releases the optical drive disc tray.
(6)	External monitor port	Connects an external VGA monitor or projector.

Rear

Component		Description
(1)	USB 3.0 port	Connects an optional USB device, such as a keyboard, mouse, external drive, printer, scanner or USB hub.
(2)	Power connector	Connects an AC adapter.
(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)	RJ-45 (network) jack/lights	Connects a network cable. • Green (left): The network is connected. • Amber (right): The network is showing activity.

Bottom
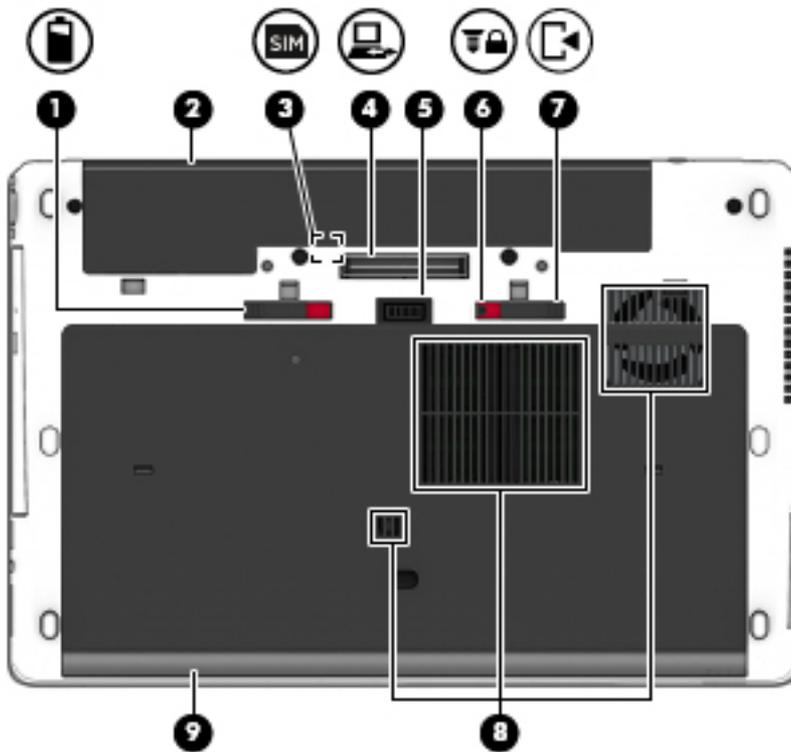
Component		Description
(1)	🔋	Battery release latch	Releases the battery from the battery bay.
(2)		Battery bay	Holds the battery.
(3)	SIM	SIM slot	Supports a wireless subscriber identity module (SIM). The SIM slot is located inside the battery bay.
(4)	💻	Docking connector	Connects an optional docking device.
(5)		Accessory battery connector	Connects an optional accessory battery.
(6)	🔒	Service door release lock	Locks the service door.
(7)		Service door release latch	Releases the service door on the computer.
(8)		Vents (3)	Enable airflow to cool internal components.

Component		Description
		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.
(9)		Service door	Provides access to the hard drive bay, the wireless LAN (WLAN) module slot, the WWAN module slot, and the memory module slots.
			CAUTION: To prevent an unresponsive system, replace the wireless module only with a wireless module authorized for use in the computer by the governmental agency that regulates wireless devices in your country or region. If you replace the module and then receive a warning message, remove the module to restore computer functionality, and then contact support..
			To access Help and Support in **Windows 7**, select **Start > Help and Support**.
			To access HP Support Assistant in **Windows 8.1**, from the Start screen, select the **HP Support Assistant** app.
			Windows 10: Type `support` in the taskbar search box, and then select the **HP Support Assistant** app.
			– or –
			Click the question mark icon in the taskbar.

Service tag

When ordering parts or requesting information, provide the computer serial number and model number provided on the service tag.
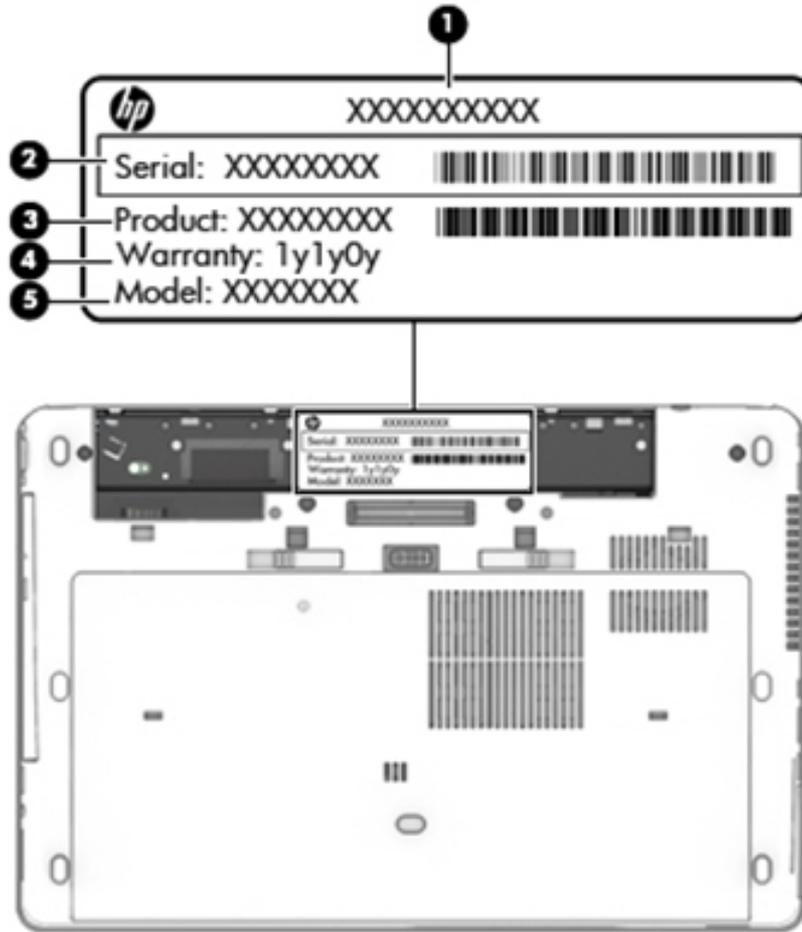
Item	Description	Function
(1)	Product name	This is the product name affixed to the front of the computer.
(2)	Serial number (s/n)	This is an alphanumeric identifier that is unique to each product.
(3)	Part number/Product number (p/n)	This number provides specific information about the product's hardware components. The part number helps a service technician to determine what components and parts are needed.
(4)	Warranty period	This number describes the duration of the warranty period for the computer.
(5)	Model description	This is the alphanumeric identifier used to locate documents, drivers, and support for the computer.

3   Illustrated parts catalog

Computer major components
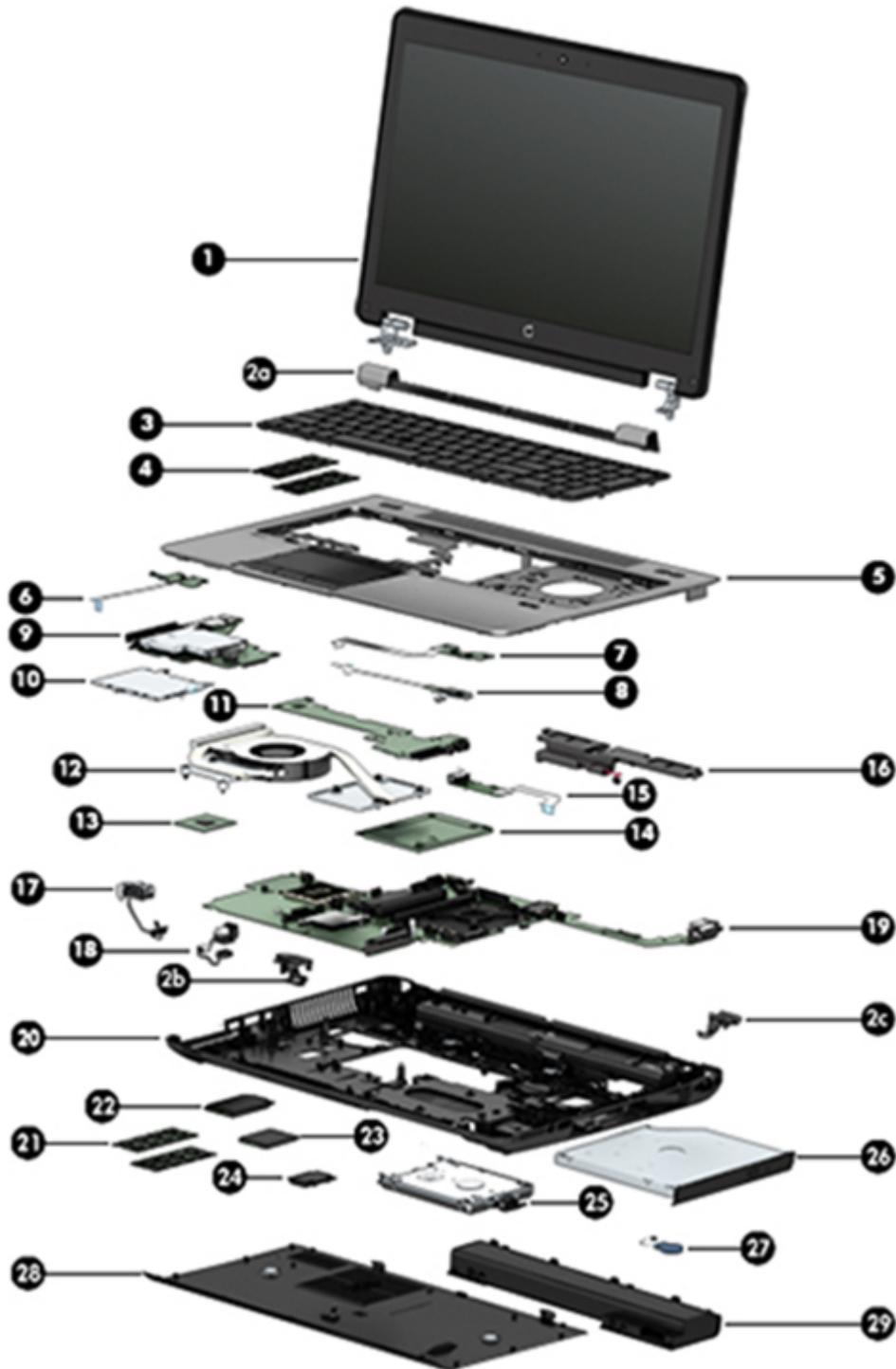
Item	Component	Spare part number
(1)	**Display assembly**: The DreamVision display assembly is spared as a whole unit assembly only. The LED display assembly is spared at the subcomponent level only. For more LED display assembly spare part information, see LED display assembly subcomponents on page 25.	
	15.6-in, FHD, UWVA, DreamVision display assembly equipped with a webcamera	735965-001
	15.6-in, FHD, UWVA, DreamVision display assembly not equipped with a webcamera	735964-001
	Hinge Cover Kit, includes:	734294-001
(2a)	Hinge cover (includes HP logo)	
(2b)	Left-side rear corner cover	
(2c)	Right-side-side rear corner cover	
(3)	**Keyboard** (includes keyboard cable):	
	Keyboard with backlight and pointing stick (includes keyboard cable, backlight cable, and pointing stick cable):	
	For use in Belgium	733688-A41
	For use in Brazil	733688-201
	For use in Bulgaria	733688-261
	For use in Canada	733688-DB1
	For use in the Czech Republic and Slovakia	733688-FL1
	For use in Denmark	733688-081
	For use in France	733688-051
	For use in Germany	733688-041
	For use in Greece	733688-151
	For use in Hungary	733688-211
	For use in Iceland	733688-DD1
	For use in India	733688-D61
	For use in Israel	733688-BB1
	For use in Italy	733688-061
	For use in Japan	733688-291
	For use in Latin America	733688-161
	For use in the Netherlands	733688-B31
	For use in Northwest Africa	733688-FP1
	For use in Norway	733688-091
	For use in Portugal	733688-131
	For use in Romania	733688-271
	For use in Russia	733688-251
	For use in Saudi Arabia	733688-171
	For use in Slovenia	733688-BA1

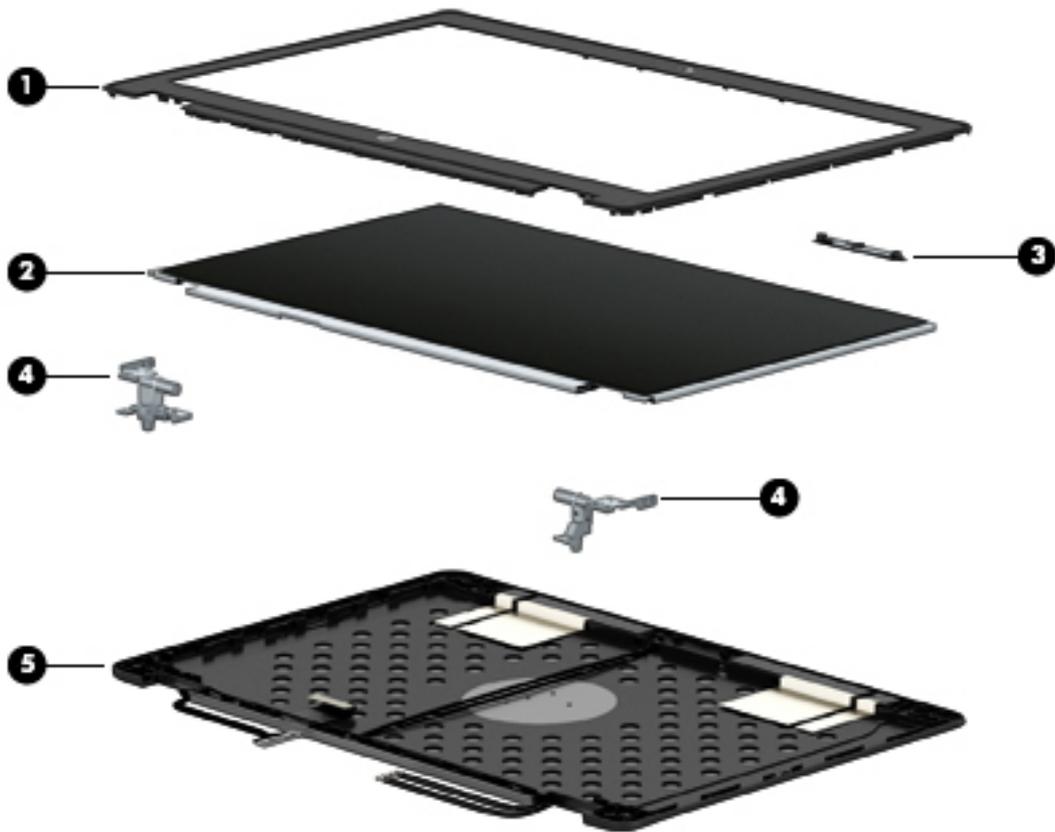| Item	Component	Spare part number
	For use in South Korea	733688-AD1
	For use in Spain	733688-071
	For use in Sweden and Finland	733688-B71
	For use in Switzerland	733688-BG1
	For use in Taiwan	733688-AB1
	For use in Thailand	733688-281
	For use in Turkey	733688-141
	For use in Turkey (F)	733688-541
	For use in the United Kingdom and Singapore	733688-031
	For use in the United States	733688-001
	Keyboard with pointing stick (includes keyboard cable and pointing stick cable):	
	For use in Belgium	745663-A41
	For use in Brazil	745663-201
	For use in Bulgaria	745663-261
	For use in Canada	745663-DB1
	For use in the Czech Republic and Slovakia	745663-FL1
	For use in Denmark	745663-081
	For use in France	745663-051
	For use in Germany	745663-041
	For use in Greece	745663-151
	For use in Hungary	745663-211
	For use in Iceland	745663-DD1
	For use in Israel	745663-BB1
	For use in Italy	745663-061
	For use in Japan	745663-291
	For use in Latin America	745663-161
	For use in the Netherlands	745663-B31
	For use in Northwest Africa	745663-FP1
	For use in Norway	745663-091
	For use in Portugal	745663-131
	For use in Romania	745663-271
	For use in Russia	745663-251
	For use in Saudi Arabia	745663-171
	For use in Slovenia	745663-BA1

Item	Component	Spare part number
	For use in South Korea	745663-AD1
	For use in Spain	745663-071
	For use in Sweden and Finland	745663-B71
	For use in Switzerland	745663-BG1
	For use in Taiwan	745663-AB1
	For use in Thailand	745663-281
	For use in Turkey	745663-141
	For use in Turkey F	745663-541
	For use in the United Kingdom and Singapore	745663-031
	For use in the United States	745663-001
(4)	**Primary memory module** (PC3L, 12800, 1600-MHz):	
	8-GB	693374-001
	4-GB	691740-001
(5)	**Top cover** (includes TouchPad, TouchPad cable, and TouchPad bracket)	734281-001
(6)	**Power button board** (includes cable)	734285-001
(7)	**Function button board** (includes cable and double-sided adhesive)	734284-001
(8)	**Fingerprint reader board** (includes cable and double-sided adhesive)	734286-001
(9)	**ExpressCard assembly** (includes activity LEDs and Thunderbolt port, Dual Mode DisplayPort, and USB port)	794579-001
(10)	**Smart card reader** (includes cable)	742159-001
(11)	**Audio/USB board** (includes SD Card reader)	734288-001
(12)	**Fan/heat sink assembly** (includes replacement thermal material):	
	For use only with an NVIDIA Quadro K1100M NVIDIA N15P-Q1 graphics board, spare part number 785223-001	734289-001
	For use only with an NVIDIA Quadro K610M NVIDIA N15M-Q2 graphics board, spare part number 785225-001	734290-001
	For use only with an NVIDIA Quadro K2100M NVIDIA N15P-Q3 graphics board, spare part number 785224-001	734291-001
	For use only with an AMD FirePro M5100 graphics board, spare part number 784470-001	784469-001
(13)	**Processor** (includes replacement thermal material):	
	Intel Quad Core i7-4910MQ 2.90-GHz (SC turbo up to 3.90-GHz) processor (1600-MHz FSB, 8.0-MB L3 cache, 47 W)	778693-001
	Intel Quad Core i7-4810MQ 2.80-GHz (SC turbo up to 3.80-GHz) processor (1600-MHz FSB, 6.0-MB L3 cache, 47 W)	778692-001
	Intel Quad Core i7-4710MQ 2.50-GHz (SC turbo up to 3.50-GHz) processor (1600-MHz FSB, 6.0-MB L3 cache, 47 W)	773212-001
	Intel Quad Core i7-4610M 3.00-GHz (SC turbo up to 3.70-GHz) processor (1600-MHz FSB, 4.0-MB L3 cache, 37 W)	765141-001

Item	Component	Spare part number
	Intel Dual Core i5-4340M 2.90-GHz (SC turbo up to 3.60-GHz) processor (1600-MHz FSB, 3.0-MB L3 cache, 37 W)	765142-001
	Intel Dual Core i5-4210M 2.60-GHz (SC turbo up to 3.20-GHz) processor (1600-MHz FSB, 3.0-MB L3 cache, 37 W)	768420-001
(14)	**Graphics board** (includes replacement thermal material):	
	NVIDIA Quadro K1100M NVIDIA N15P-Q1 graphics board	785223-001
	NVIDIA Quadro K610M NVIDIA N15M-Q2 graphics board	785225-001
	NVIDIA Quadro K2100M NVIDIA N15P-Q3 graphics board	785224-001
	AMD FirePro M5100 graphics board	784470-001
(15)	**USB board** (includes cable and double-sided adhesive)	734293-001
(16)	**Speakers** (include cable)	734292-001
(17)	**RJ-45 (network) cable** (included in the Cable Kit, spare part number 785222-001)	
(18)	**Power connector cable** (included in the Cable Kit, spare part number 785222-001)	
(19)	**System board** (includes battery connector bracket and replacement thermal material):	
	All system boards use the following part numbers:	
	xxxxxx-001: Windows 7 or non-Windows operating systems	
	xxxxxx-501: Windows 8.1 Standard operating system	
	xxxxxx-601: Windows 8.1 or Windows 10 operating system	
	For use only on computer models equipped with an Intel Quad Core processor	784468-xxx
	For use only on computer models equipped with an Intel Dual Core processor	784467-xxx
(20)	**Base enclosure** (includes 4 rubber feet, battery lock latch, battery release latch, and RJ-45 cover)	785221-001
(21)	**Expansion memory modules** (2, PC3L, 12800, 1600-MHz):	
	8-GB	693374-001
	4-GB	691740-001
(22)	**Solid-state drive** (SSD):	
	512-GB, SATA-3	795962-001
	512-GB, Z Turbo Drive, PCIe	813138-001
	512-GB, SATA-3, self-encrypting drive (SED), OPAL 2	813139-001
	256-GB, SATA-3	795959-001
	256-GB, SATA-3, self-encrypting drive (SED), OPAL 1	795960-001
	256-GB, SATA-3, self-encrypting drive (SED), OPAL 2	795961-001
	256-GB, M.2, PCIe	795955-001
	240-GB, SATA-3	795958-001
	180-GB, SATA-3	795957-001
	128-GB, SATA-3	795956-001

Item	Component	Spare part number
	128-GB, Z Turbo Drive, PCIe	813137-001
(23)	**WWAN module:**	
	HP lt4111 LTE/EV-DO/HSPA+ Mobile Broadband Module (for use in the United States and Canada)	740011-001
	HP lt4111 LTE/EV-DO/HSPA+ Mobile Broadband Module	793116-001
	HP hs3110 HSPA+ Mobile Broadband Module	822828-001
(24)	**WLAN module:**	
	Intel Dual Band Wireless-AC 7260 802.11 AC 2x2 WiFi + BT 4.0 Combo Adapterr	710663-001
	Intel Dual Band Wireless-N 7260AN 802.11 a/b/g/n (2x2) WiFi + BT 4.0 combo	717379-001
	Intel Dual Band Wireless-N 7260NB 802.11 a/b/g/n (2x2) WiFi	717380-001
	Intel Dual Band Wireless-N 7260AN 802.11 a/b/g/n (2x2) WiFi + BT 4.0 combo (for use in Indonesia)	747833-001
(25)	**Hard drive** (does not include hard drive bracket or screws):	
	1-TB, 7200-rpm, 9.5-mm	766644-001
	1-TB, 5400-rpm, 2.5-in	778192-001
	750-GB, 7200-rpm, 2.5-in	778191-001
	500-GB, 7200-rpm, 7.0-mm	703267-001
	500-GB, 5400-rpm, 7.0-mm, FIPS	730946-001
	500-GB, 7200-rpm, 7.0-mm, self-encrypting	703268-001
	Hard Drive Hardware Kit (not illustrated, includes hard drive bracket and screws)	734280-001
(26)	**Optical drive** (includes bezel and bracket):	
	Blu-ray R/RE DVD±RW SuperMulti Double-Layer Drive	735600-001
	Blu-ray ROM DVD±RW SuperMulti Double-Layer Drive	735599-001
	DVD±RW SuperMulti Double-Layer Drive	735602-001
	Hard drive upgrade bay	734298-001
(27)	**RTC battery** (includes cable and double-sided adhesive)	734300-001
(28)	**Service cover**	734278-001
(29)	**Battery:**	
	9-cell, 100-WHr, 3.0-AHr, Li-ion battery	634087-001
	9-cell, 73-WHr, 2.2-AHr, Li-ion battery	634089-001
	8-cell, 83-WHr, 2.8-AHr, Li-ion battery	708456-001
	8-cell, 75-WHr, 2.8-AHr, Li-ion battery	708455-001

LED display assembly subcomponents

Item	Component	Spare part number
(1)	**Display bezel:**	
	For use only on computer models equipped with a webcamera	734301-001
	For use only on computer models not equipped with a webcamera	734302-001
	For use only on computer models equipped with a QHD+ display and with a webcamera	784471-001
	For use only on computer models not equipped with a QHD+ display and with a webcamera	784472-001
	For use only on computer models equipped with an Innolux display and a webcamera	784473-001
	For use only on computer models not equipped with an Innolux display and a webcamera	784474-001
(2)	**Display panel:**	
	15.6-in, FHD, UWVA, LED display panel	735607-001
	15.6-in, FHD, SVA, LED display panel	735604-001
	15.6-in, QHD+, UWVA, LED display panel	797849-001
(3)	**Webcamera/microphone module** (includes double-sided adhesive)	784208-001
	Microphone module (includes double-sided adhesive)	735370-001

Item	Component	Spare part number
(4)	**Display hinges** (includes left and right hinges and display panel cable bracket)	784464-001
(5)	**Display Panel Support Kit** (includes display enclosure, display panel cable, and wireless antenna cables and transceivers)	784466-001

Bracket Kit
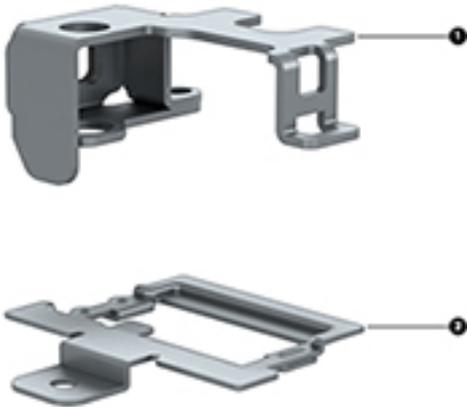
Item	Component	Spare part number
	Bracket Kit, includes:	734299-001
(1)	Security cable lock bracket	
(2)	Fingerprint reader board bracket	

Cable Kit

Item	Component	Spare part number
	Cable Kit, includes:	785222-001
(1)	RJ-45 (network) cable	
(2)	Power connector cable	
	Replacement thermal material (not illustrated)	

Plastics Kit
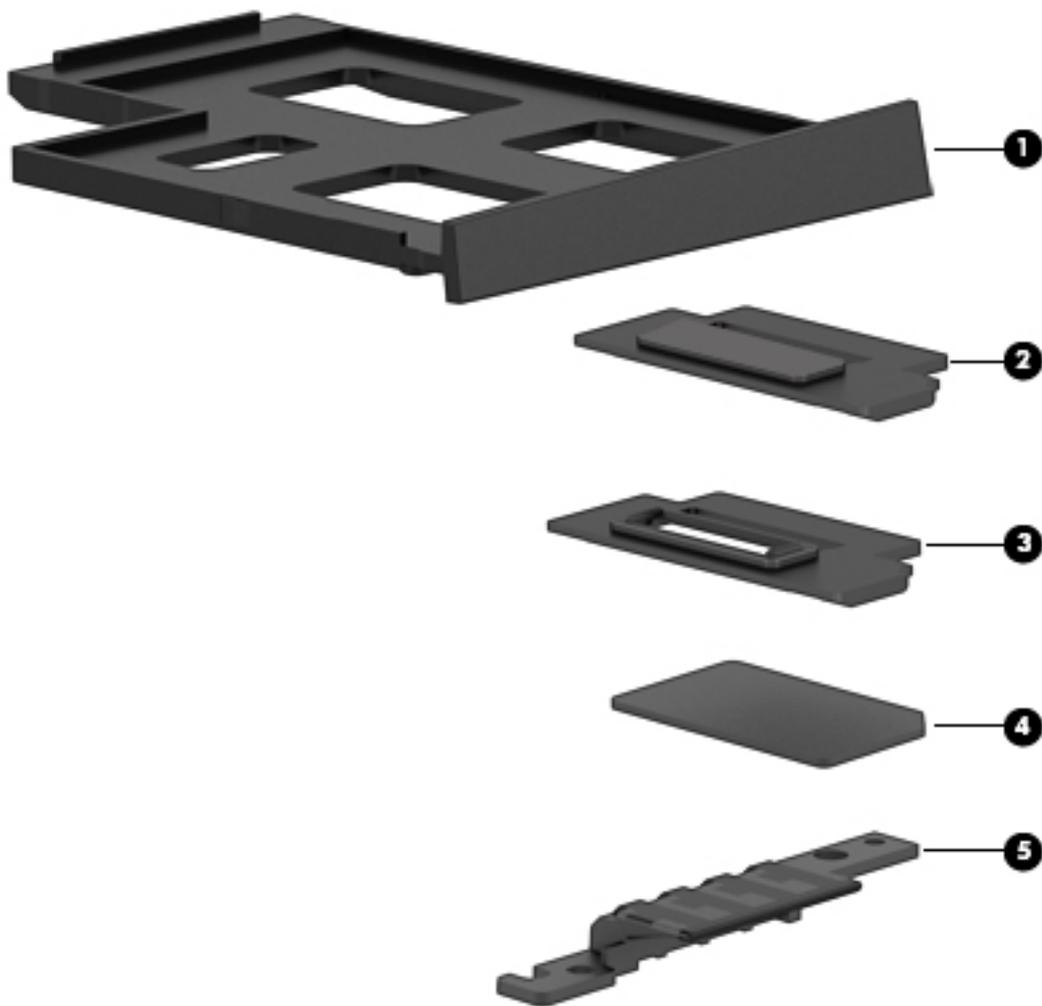
Item	Component	Spare part number
	Plastics Kit, includes:	734297-001
(1)	ExpressCard reader bezel	
(2)	Fingerprint reader blank cover	
(3)	Fingerprint reader bezel	
(4)	SD card reader bezel	
(5)	System lens	

Mass storage devices

Item	Component	Spare part number
(1)	**Solid-state drive**, 2.5-inch	
	512-GB, SATA-3	795962-001
	512-GB, SATA-3, self-encrypting drive (SED), OPAL 2	813139-001
	256-GB, SATA-3	795959-001
	256-GB, SATA-3, self-encrypting drive (SED), OPAL 1	795960-001
	256-GB, SATA-3, self-encrypting drive (SED), OPAL 2	795961-001
	240-GB, SATA-3	795958-001
	180-GB, SATA-3	795957-001
	128-GB, SATA-3	795956-001
(2)	**Solid-state drive, M.2, PCIe**	
	512-GB, Z Turbo Drive, PCIe	813138-001
	256-GB	795955-001
	128-GB, Z Turbo Drive, PCIe	813137-001

Item	Component	Spare part number
	Hard Drive Hardware Kit, includes:	734280-001
(3)	Hard drive bracket	
	Screws (not illustrated)	
(4)	**Hard drive** (does not include hard drive bracket or screws):	
	1-TB, 7200-rpm, 9.5-mm	766644-001
	1-TB, 5400-rpm, 2.5-in	778192-001
	750-GB, 7200-rpm, 2.5-in	778191-001
	500-GB, 7200-rpm, 7.0-mm	703267-001
	500-GB, 5400-rpm, 7.0-mm, FIPS	730946-001
	500-GB, 7200-rpm, 7.0-mm, self-encrypting	703268-001
(5)	**Optical drive** (includes bezel and bracket):	
	Blu-ray R/RE DVD±RW SuperMulti Double-Layer Drive	735600-001
	Blu-ray ROM DVD±RW SuperMulti Double-Layer Drive	735599-001
	DVD±RW SuperMulti Double-Layer Drive	735602-001
	Hard drive upgrade bay	734298-001

Miscellaneous parts

Component	Spare part number
AC adapter:	
200-W HP Smart adapter (PFC, 3-wire, 4.5-mm)	693708-001
150-W HP Smart adapter (PFC, 3-wire, 4.5-mm)	693707-001
Power cord (3-pin, black, 1.83-m):	
For use in APD	491683-D91
For use in Argentina	490371-D01
For use in Australia	490371-011
For use in Brazil	490371-202
For use in Denmark	490371-081
For use in Europe	490371-021
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

Component	Spare part number
	491683-001
For use in the People's Republic of China	490371-AA1
For use in Singapore	491683-AF1
For use in South Africa	490371-AR1
For use in South Korea	490371-AD1
For use in Switzerland	490371-111
For use in Thailand	490371-201
For use in the United Kingdom and Singapore	490371-031
	491683-031
Power cord (3-pin, black, 1.00-m):	
For use in Taiwan	755530-AB1
Docking station, cable lock	575921-001
HP Ultraslim Keyed Cable Lock	703372-001
HP DisplayPort to HDMI 1.4 Adapter	749288-001
Screw Kit	734282-001
Mouse	
HP USB laser	674318-001
HP Wireless	691922-001
HP Professional Slim Top Load	703888-001

4 Removal and replacement procedures preliminary requirements

Tools required

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

- Flat-bladed 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 Service tag on page 16 for details.

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

There are as many as 16 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	634087-001
9-cell, 73-WHr, 2.2-AHr, Li-ion battery	634089-001
8-cell, 83-WHr, 2.8-AHr, Li-ion battery	708456-001
8-cell, 75-WHr, 2.8-AHr, Li-ion battery	708455-001

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.

1. Turn the computer upside down on a flat surface.

2. Slide the battery release latch **(1)** to release the battery.

📝 **NOTE:**   The battery release latch automatically returns to its original position.

3. Pivot the battery **(2)** upward.

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

Reverse this procedure to install the battery.

Service cover

Description	Spare part number
Service cover	734278-001

Before removing the service 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.
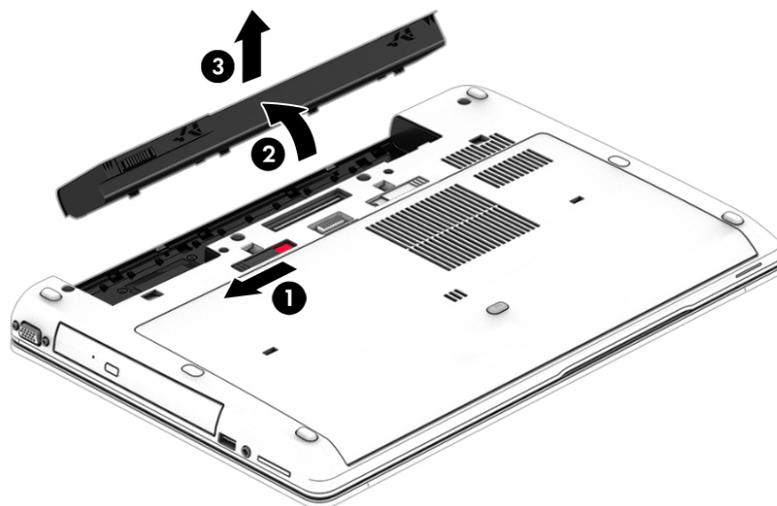
4. Remove the battery (see Battery on page 37).

Remove the service cover:

1. Slide the service cover release latch to the left **(1)**, and then remove the optional Phillips PM2.0×4.5 screw (if the screw is being used) **(2)**.

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

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

3. Slide the service cover toward the front of the computer **(4)**, and then lift to remove the service cover **(5)**.
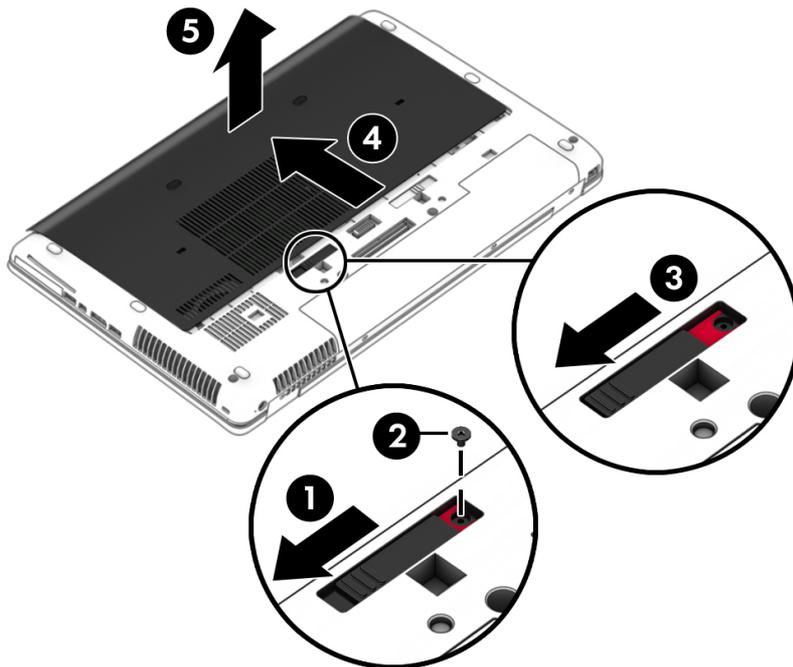
Reverse this procedure to install the service cover.

Hard drive

📝 **NOTE:** The hard drive spare part kit does not include the hard drive bracket or screws. These components are included in the Hard Drive Hardware Kit, spare part number 734280-001.

Description	Spare part number
Hard drive, 2.5-inch	
1-TB, 7200-rpm, 9.5-mm	766644-001
1-TB, 5400-rpm, 2.5-in	778192-001
750-GB, 7200-rpm, 2.5-in	778191-001
500-GB, 7200-rpm, 7.0-mm	703267-001
500-GB, 5400-rpm, 7.0-mm, FIPS	730946-001
500-GB, 7200-rpm, 7.0-mm, self-encrypting	703268-001
Solid-state drive (SSD)	
512-GB, SATA-3	795962-001
512-GB, SATA-3, self-encrypting drive (SED), OPAL 2	813139-001
256-GB, SATA-3	795959-001
256-GB, SATA-3, self-encrypting drive (SED), OPAL 1	795960-001
256-GB, SATA-3, self-encrypting drive (SED), OPAL 2	795961-001
240-GB, SATA-3	795958-001
180-GB, SATA-3	795957-001
128-GB, SATA-3	795956-001

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 37).

5. Remove the service cover (see Service cover on page 38).

Remove the hard drive:

1. Loosen the 3 hard drive captive screws **(1)**.

2. Pull the hard drive tab **(2)** to the left to disconnect the hard drive.

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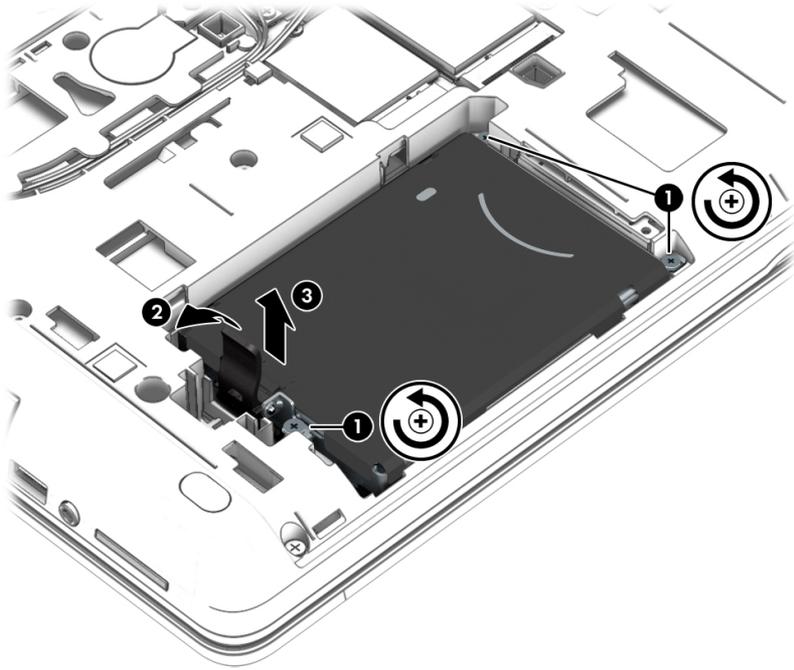
4. If it is necessary to disassemble the hard drive, perform the following steps:

a. Position the hard drive with the hard drive tab toward you.

b. Remove the four Phillips PM3.0×3.5 screws **(1)** that secure the hard drive bracket to the hard drive.

c. Remove the hard drive bracket **(2)** from the hard drive.

The hard drive bracket and screws are available in the Hard Drive Hardware Kit, spare part number 734280-001.
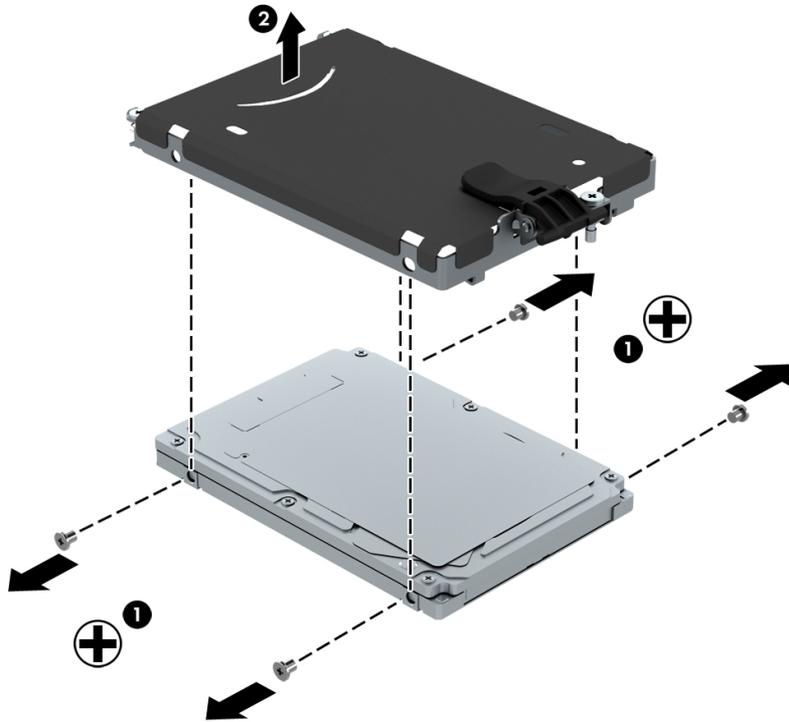
Reverse this procedure to install the hard drive.

Optical drive

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

Description	Spare part number
Blu-ray R/RE DVD±RW SuperMulti Double-Layer Drive	735600-001
Blu-ray ROM DVD±RW SuperMulti Double-Layer Drive	735599-001
DVD±RW SuperMulti Double-Layer Drive	735602-001
Hard drive upgrade bay	734298-001

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 37).

5. Remove the service cover (see Service cover on page 38).

Remove the optical drive:

1. Position the computer 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 from the computer.

4. Remove the optical drive **(3)**.
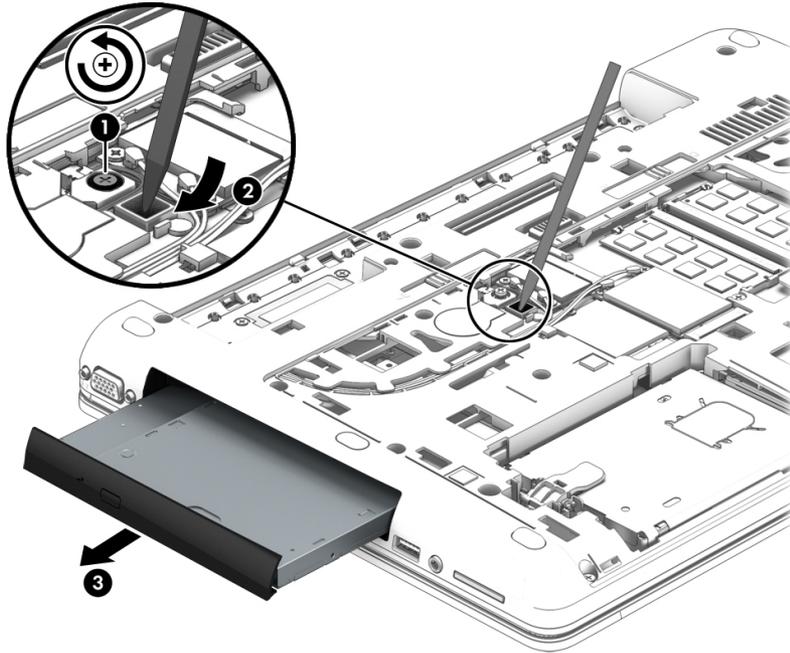
Reverse this procedure to install the optical drive.

WWAN module

Description	Spare part number
HP lt4111 LTE/EV-DO/HSPA+ Mobile Broadband Module (for use in the United States and Canada)	740011-001
HP lt4111 LTE/EV-DO/HSPA+ Mobile Broadband Module	793116-001
HP hs3110 HSPA+ Mobile Broadband Module	822828-001

⚠ **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 37).

5.   Remove the service cover (see Optical drive on page 41).

Remove the WWAN module:

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

📝 **NOTE:**   The WWAN antenna cable labeled "5" connects to the WWAN module "Main" terminal labeled "5". The WWAN antenna cable labeled "6" connects to the WWAN module "Aux/GPS" terminal labeled "6".

2.   Remove the Phillips PM2.0×3.25 screw **(2)** that secures the WWAN module to the system board. (The WWAN module tilts up.)

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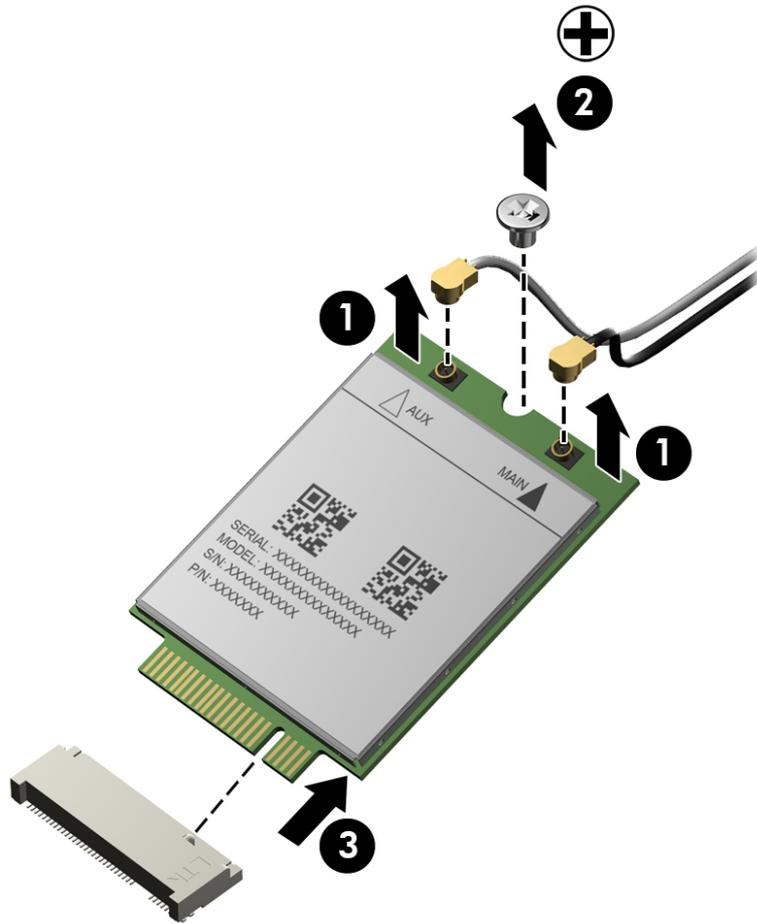
NOTE: If the WWAN antenna cables are not connected to the terminals on the WWAN module, protective sleeves should be installed on the antenna connectors, as shown in the following illustration.
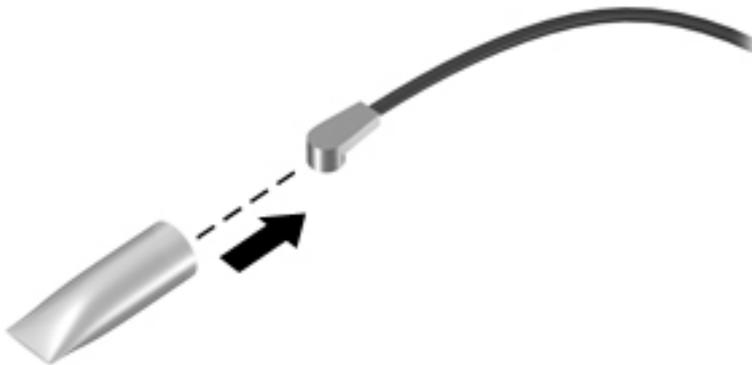
Reverse this procedure to install the WWAN module.

Solid-state drive (M.2)

Description	Spare part number
512-GB, M.2, PCIe	813138-001
256-GB, M.2, PCIe	795955-001
128-GB, M.2, PCIe	813137-001

Before removing the solid-state 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 37).

5. Remove the service cover (see Service cover on page 38).

Remove the solid-state drive:

1. Remove the Phillips PM2.0×3.5 screw **(1)** that secures the solid-state drive to the system board.

2. Remove the solid-state drive **(2)** by pulling the drive away from the slot at an angle.

Reverse this procedure to install the solid-state drive.

WLAN module

Description	Spare part number
Intel Dual Band Wireless-AC 7260 802.11 AC 2x2 WiFi + BT 4.0 Combo Adapter	710663-001
Intel Dual Band Wireless-N 7260AN 802.11 a/b/g/n (2x2) WiFi + BT 4.0 combo	717379-001
Intel Dual Band Wireless-N 7260NB 802.11 a/b/g/n (2x2) WiFi	717380-001
Intel Dual Band Wireless-N 7260AN 802.11 a/b/g/n (2x2) WiFi + BT 4.0 combo (for use in Indonesia)	747833-001

⚠ **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 37).

5. Remove the service cover (see Service cover on page 38).

Remove the WLAN module:

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

📝 **NOTE:** The WLAN antenna cable labeled "1" connects to the WLAN module "Main" terminal labeled "1". The WLAN antenna cable labeled "2" connects to the WLAN module "Aux" terminal labeled "2".

2. Remove the Phillips PM2.0×3.0 screw **(2)** that secures the WLAN module to the system board. (The WLAN module tilts up.)

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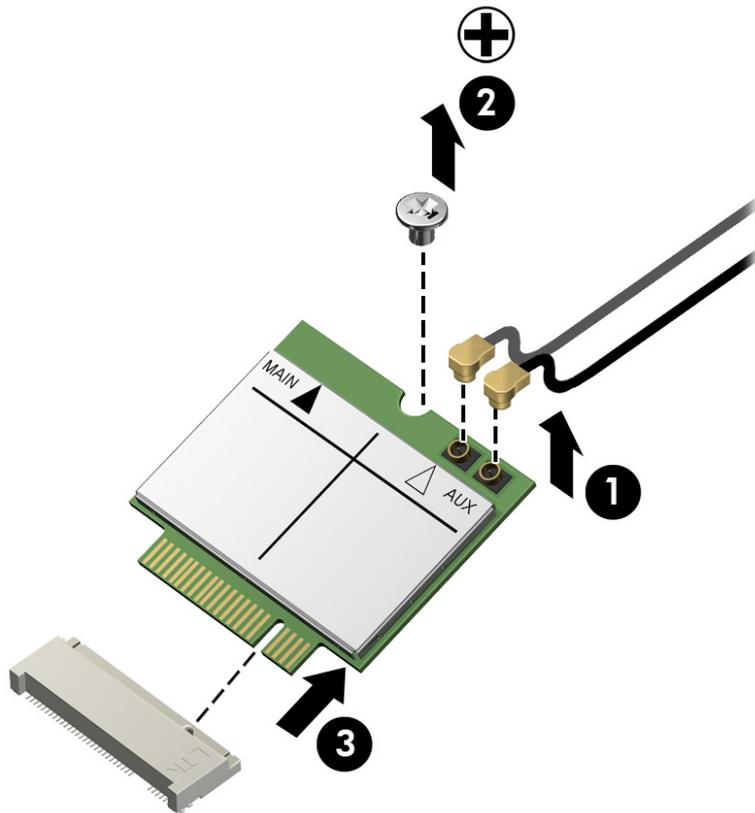
NOTE: If the WLAN antenna cables are not connected to the terminals on the WLAN module, protective sleeves should be installed on the antenna connectors, as shown in the following illustration.
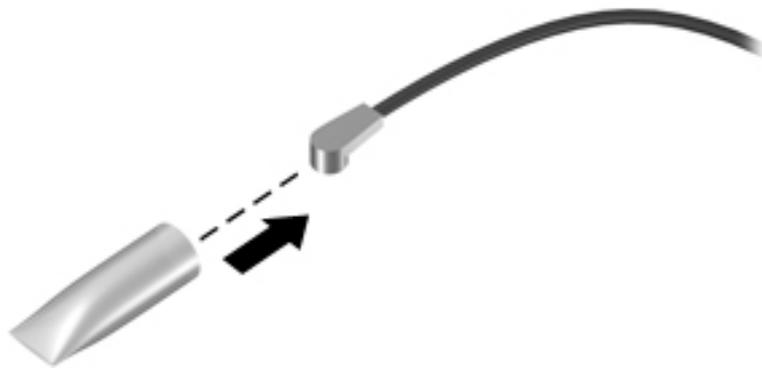
Reverse this procedure to install the WLAN module.

Primary memory module
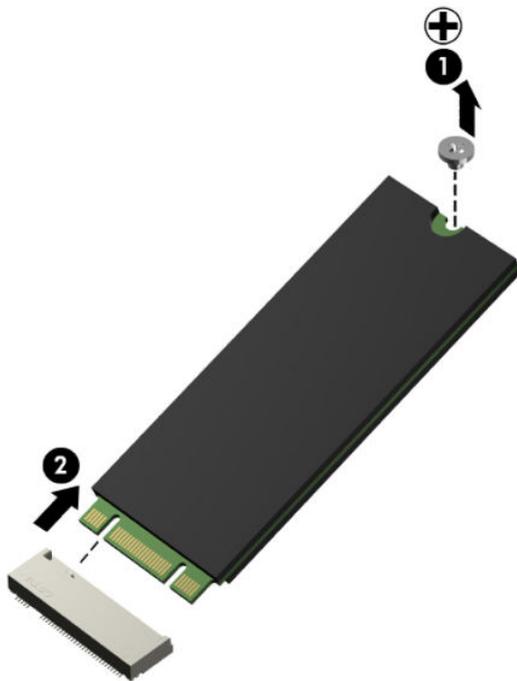
Description	Spare part number
8-GB (PC3L, 12800, 1600-MHz)	693374-001
4-GB (PC3L, 12800, 1600-MHz)	691740-001

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.

To update BIOS:

1. Navigate to www.hp.com.

2. Click **Support & Drivers > click Drivers & Software**.

3. In the **Enter a product name/number box**, type the computer model information, and then click **Search**.

4. Click the link for the computer model.

5. Select the operating system, and then click **Next**.

6. Under **Step 2: Select a Download**, click the **BIOS** link.

7. Click the link for the most recent BIOS.

8. Click the **Download** button, and then follow the on-screen instructions.

Before removing a memory module, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.

2. Disconnect the power from the computer by unplugging the power cord from the computer.

3. Disconnect all external devices from the computer.

4. Remove the battery (see Battery on page 37).

5. Remove the service cover (see Optical drive on page 41).

Remove the memory module:

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

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

Reverse this procedure to install a memory module.

Keyboard

| For use in country or region	Spare part number	For use in country or region	Spare part number
Keyboard with backlight and pointing stick (includes keyboard cable, backlight cable, and pointing stick cable):			
For use in Belgium	733688-A41	For use in Northwest Africa	733688-FP1
For use in Brazil	733688-201	For use in Norway	733688-091
For use in Bulgaria	733688-261	For use in Portugal	733688-131
For use in Canada	733688-DB1	For use in Romania	733688-271
For use in the Czech Republic and Slovakia	733688-FL1	For use in Russia	733688-251
For use in Denmark	733688-081	For use in Saudi Arabia	733688-171
For use in France	733688-051	For use in Slovenia	733688-BA1
For use in Germany	733688-041	For use in South Korea	733688-AD1
For use in Greece	733688-151	For use in Spain	733688-071
For use in Hungary	733688-211	For use in Sweden and Finland	733688-B71
For use in Iceland	733688-DD1	For use in Switzerland	733688-BG1
For use in India	733688-D61	For use in Taiwan	733688-AB1
For use in Israel	733688-BB1	For use in Thailand	733688-281
For use in Italy	733688-061	For use in Turkey	733688-141
		For use in Turkey F	733688-541
For use in Japan	733688-291	For use in the United Kingdom and Singapore	733688-031
For use in Latin America	733688-161	For use in the United States	733688-001
For use in the Netherlands	733688-B31		
Keyboard with pointing stick (includes keyboard cable and pointing stick cable):			
For use in Belgium	745663-A41	For use in Northwest Africa	745663-FP1
For use in Brazil	745663-201	For use in Norway	745663-091
For use in Bulgaria	745663-261	For use in Portugal	745663-131
For use in Canada	745663-DB1	For use in Romania	745663-271
For use in the Czech Republic and Slovakia	745663-FL1	For use in Russia	745663-251
For use in Denmark	745663-081	For use in Saudi Arabia	745663-171
For use in France	745663-051	For use in Slovenia	745663-BA1
For use in Germany	745663-041	For use in South Korea	745663-AD1
For use in Greece	745663-151	For use in Spain	745663-071
For use in Hungary	745663-211	For use in Sweden and Finland	745663-B71
For use in Iceland	745663-DD1	For use in Switzerland	745663-BG1
For use in Israel	745663-BB1	For use in Taiwan	745663-AB1

For use in country or region	Spare part number	For use in country or region	Spare part number
For use in Italy	745663-061	For use in Thailand	745663-281
For use in Japan	745663-291	For use in Turkey	745663-141
		For use in Turkey F	745663-541
For use in Latin America	745663-161	For use in the United Kingdom and Singapore	745663-031
For use in the Netherlands	745663-B31	For use in the United States	745663-001

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 37).

5. Remove the service cover (see Service cover on page 38).

6. Remove the optical drive (see Optical drive on page 41).

Remove the keyboard:

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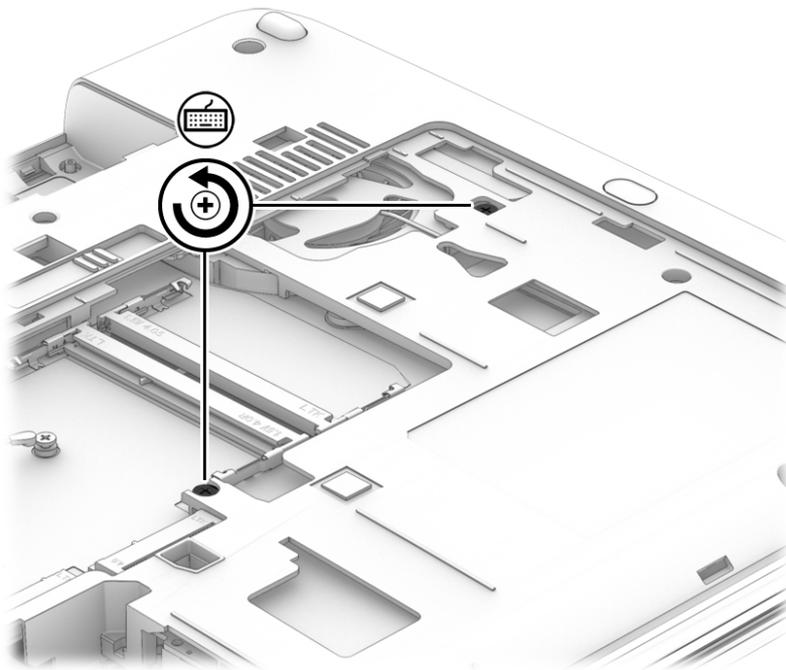
2. Partially open the computer.

3. Rest and secure the computer on its left side.

4. Insert a thin tool into the keyboard release hole in the optical drive bay, and then press on the back of the keyboard until the keyboard disengages from the computer.
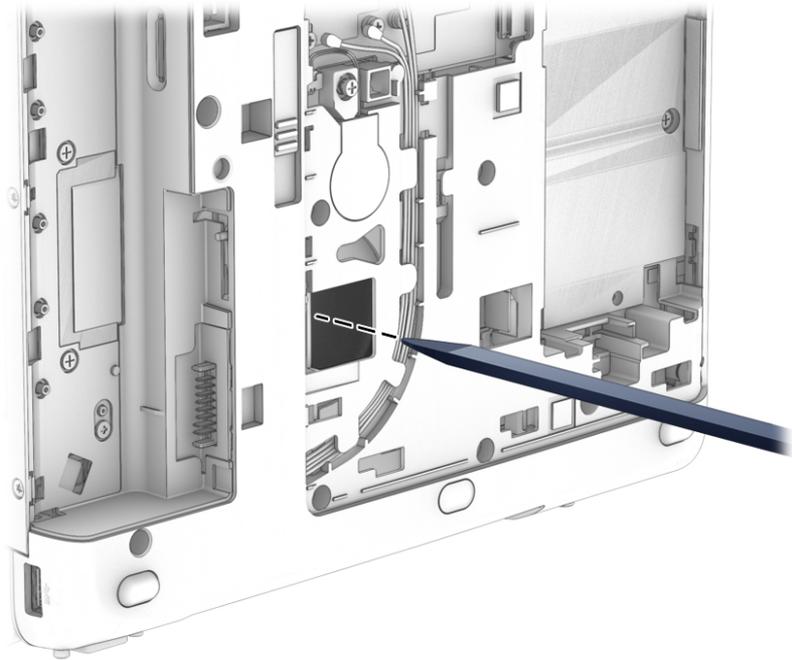
5. Turn the computer right-side up, with the front toward you.

6. Open the computer as far as it will open.

7. Lift the rear edge of the keyboard until it rests at an angle.

8. Swing the rear edge of the keyboard **(1)** up and forward until it rests upside down on the palm rest.

9. Release the zero insertion force (ZIF) connector **(2)** to which the keyboard cable is attached, and then disconnect the keyboard cable from the system board.

10. Release the ZIF connector **(3)** to which the pointing stick cable is attached, and then disconnect the pointing stick cable from the system board.

11. Remove the keyboard **(4)**.
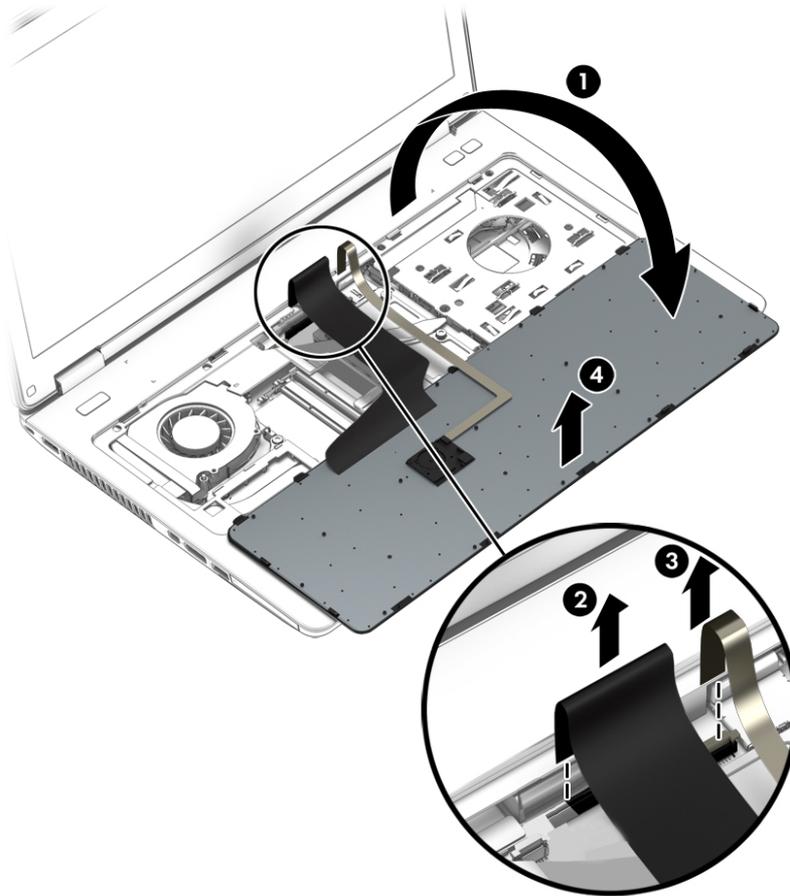
Reverse this procedure to install the keyboard.

Expansion memory module

Description	Spare part number
8-GB (PC3L, 12800, 1600-MHz)	693374-001
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.

To update BIOS:

1. Navigate to www.hp.com.

2. Click **Support & Drivers > click Drivers & Software**.

3. In the **Enter a product name/number box**, type the computer model information, and then click **Search**.

4. Click the link for the computer model.

5. Select the operating system, and then click **Next**.

6. Under **Step 2: Select a Download**, click the **BIOS** link.

7. Click the link for the most recent BIOS.

8. Click the **Download** button, and then follow the on-screen instructions.

Before removing a memory module, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.

2. Disconnect the power from the computer by unplugging the power cord from the computer.

3. Disconnect all external devices from the computer.

4. Remove the battery (see Battery on page 37).

5. Remove the service cover (see Optical drive on page 41).

Remove the memory module:

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

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

Reverse this procedure to install a memory module.

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

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

There are as many as 74 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.

RTC battery

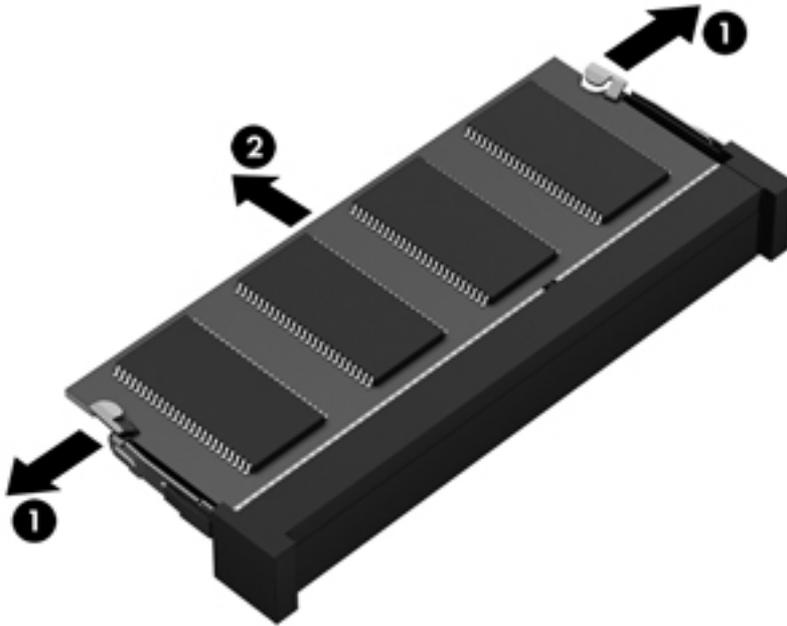| Description	Spare part number
RTC battery (includes cable and double-sided adhesive)	734300-001

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 37).

5. Remove the service cover (see Service cover on page 38).

Remove the RTC battery:

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

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

3. Remove the RTC battery and cable.

Reverse this procedure to install the RTC battery.

Top cover

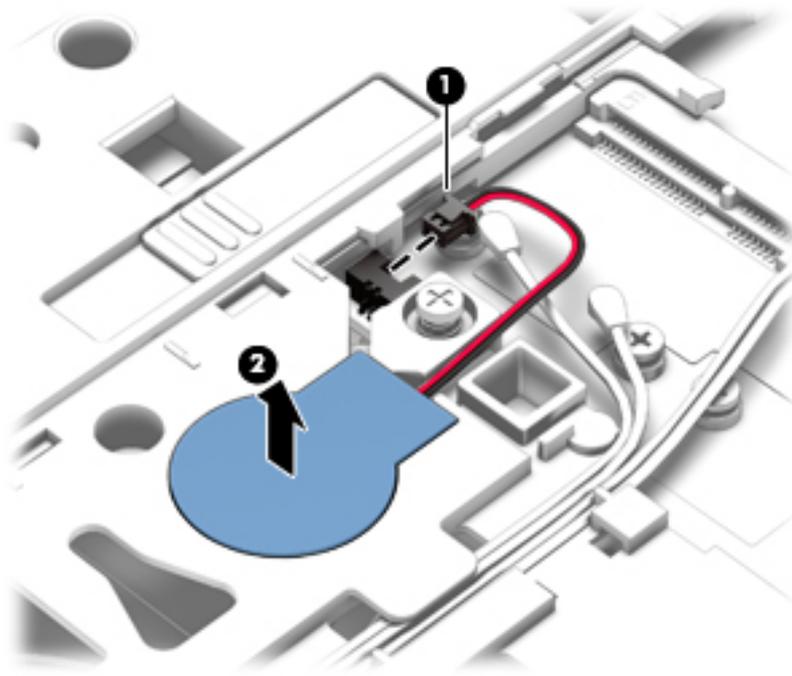| Description	Spare part number
Top cover (includes TouchPad, TouchPad cable, and TouchPad bracket)	734281-001

Before removing the top cover, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.

2. Disconnect the power from the computer by unplugging the power cord from the computer.

3. Disconnect all external devices from the computer.

4. Remove the battery (see Battery on page 37), and then remove the following components:

    a. Service cover (see Service cover on page 38)

    b. Hard drive (see Hard drive on page 39)

    c. Optical drive (see Optical drive on page 41)

    d. Keyboard (see Keyboard on page 50)

NOTE: When replacing the top cover, be sure to remove the following components from the defective top cover and install them on the replacement top cover:

- Function button board (see Function button board on page 64)

- Power button board (see Power button board on page 66)

- Fingerprint reader board (see Fingerprint reader board on page 62)

Remove the top cover:

1. Close the computer.

2. Turn the computer upside down with the front toward you.

3. Remove the eight Torx T8M2.5×6.5 screws that secure the top cover to the computer.
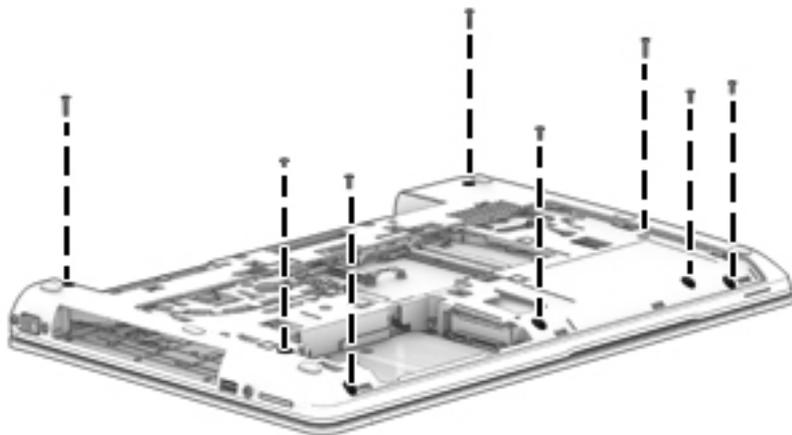
4. Remove the following screws that secure the top cover to the computer:

(1) Three Torx T8M2.5×4.5 screws in the optical drive bay

(2) Four Torx T8M2.5×4.5 screws in the battery bay

(3) Two Phillips PM2.0×3.0 screws in the hard drive bay

5. Turn the computer right side up with the front toward you.
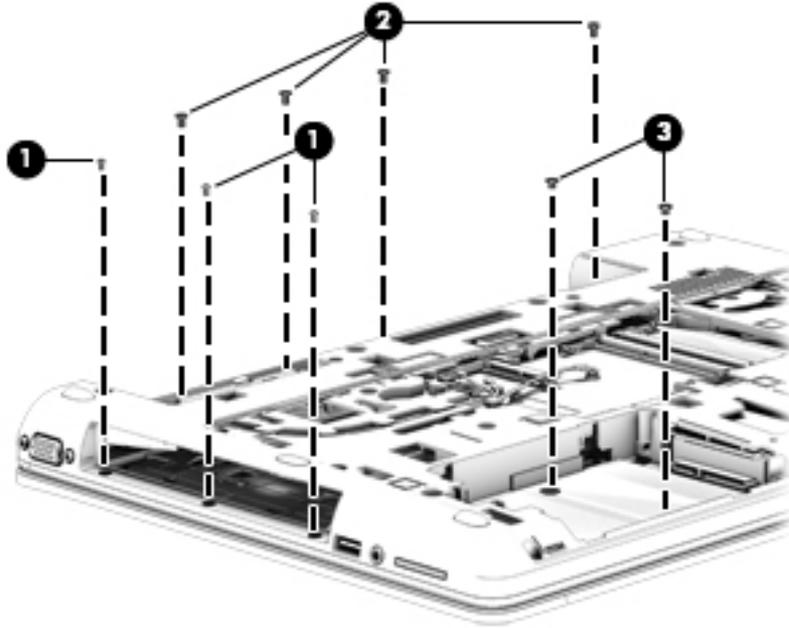
6. Open the computer.

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

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

9. Remove the Torx T8M2.5×6.5 screw **(3)** that secures the top cover to the computer.
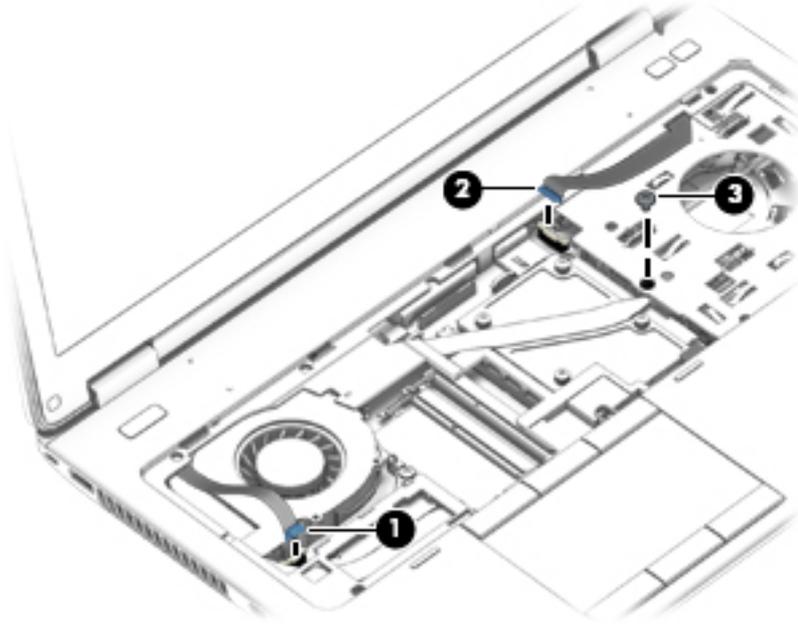
10. Lift the rear edge of the top cover **(1)** until the left and right sides and the front edge detach from the computer.

11. Slide the top cover **(2)** forward until the fingerprint reader board cable and the TouchPad cable are accessible.

12. Release the ZIF connector to which the fingerprint reader board cable is attached, and then disconnect the fingerprint reader board cable **(3)** from the system board.

13. Release the ZIF connector to which the TouchPad cable is attached, and then disconnect the TouchPad cable **(4)** from the system board.

14. Remove the top cover **(5)**.
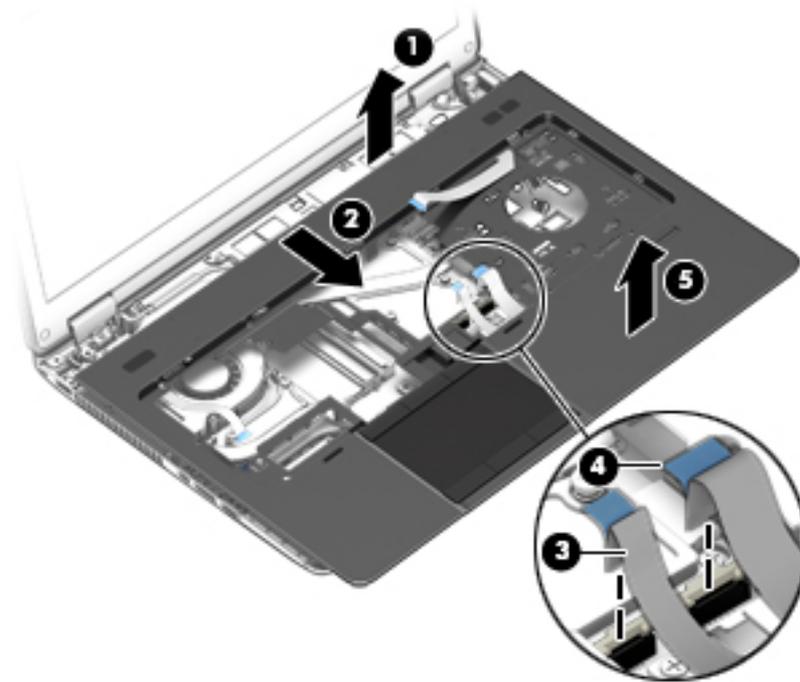
Reverse this procedure to install the top cover.

Fingerprint reader board

Description	Spare part number
Fingerprint reader board (includes cable and double-sided adhesive)	734286-001

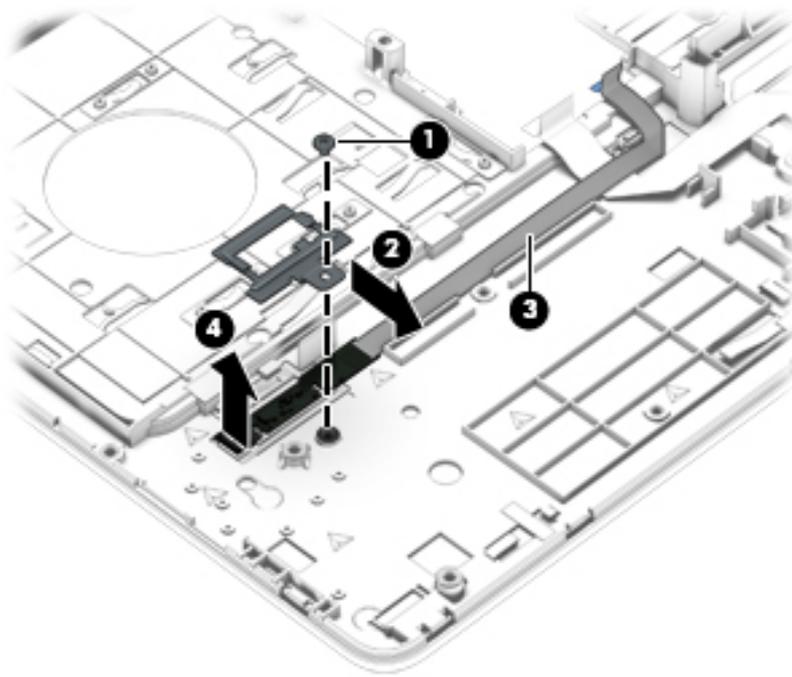Before removing the fingerprint reader board, follow these steps:

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 37), and then remove the following components:

    a. Service cover (see Service cover on page 38)

    b. Hard drive (see Hard drive on page 39)

    c. Optical drive (see Optical drive on page 41)

    d. Keyboard (see Keyboard on page 50)

    e. Top cover (see Top cover on page 58)

Remove the fingerprint reader board:

1. Turn the top cover upside down with the front toward you.

2. Remove the Phillips PM2.0×3.0 screw **(1)** that secures the fingerprint reader board and bracket to the top cover.

3. Slide the fingerprint reader board **(2)** bracket forward and remove it.

    The fingerprint reader board bracket is available in the Bracket Kit, spare part number 734299-001.

4. Detach the fingerprint reader board cable **(3)** from the top cover. (The fingerprint reader board cable is attached to the top cover with double-sided adhesive.)

5. Remove the fingerprint reader board **(4)** and cable.

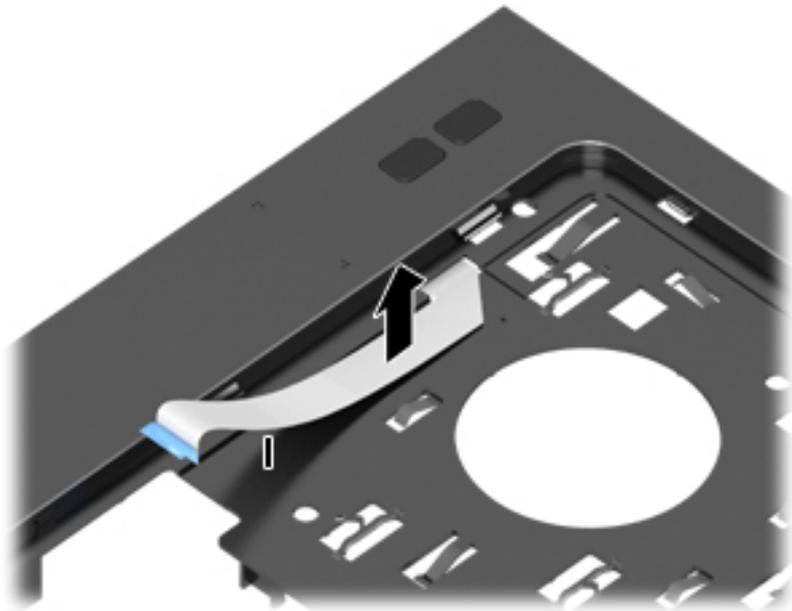Reverse this procedure to install the fingerprint reader board.

Function button board

Description	Spare part number
Function button board (includes cable and double-sided adhesive)	734284-001

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 37), and then remove the following components:

   a. Service cover (see Service cover on page 38)

   b. Hard drive (see Hard drive on page 39)

   c. Optical drive (see Optical drive on page 41)

   d. Keyboard (see Keyboard on page 50)

   e. Top cover (see Top cover on page 58)

Remove the function button board:

1. Detach the function button board cable from the top cover. (The function button board cable is attached to the top cover with double-sided adhesive.)

2. Turn the top cover upside down, with the front toward you.

3. Release the function button board cable through the opening **(1)** in the top cover.

4. Remove the Phillips PM2.0×3.0 screw **(2)** that secures the function button board to the top cover.

5. Lift the right side of the function button board **(3)** until it rests at an angle.

6. Remove the function button board **(4)** by sliding it up and to the right at an angle.
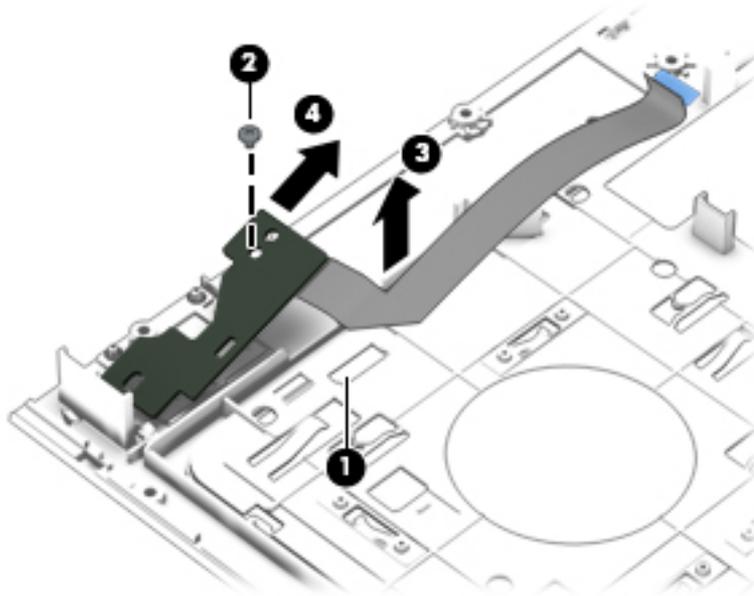
Reverse this procedure to install the function button board.

Power button board

Description	Spare part number
Power button board (includes cable)	734285-001

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 37), and then remove the following components:

    a. Service cover (see Service cover on page 38)

    b. Hard drive (see Hard drive on page 39)

    c. Optical drive (see Optical drive on page 41)

    d. Keyboard (see Keyboard on page 50)

    e. Top cover (see Top cover on page 58)

Remove the power button board:

1. Turn the top cover upside down, with the front toward you.

2. Remove the Phillips PM2.0×3.0 screw **(1)** that secures the power button board to the top cover.

3. Release the clips **(2)** that secure the power button board to the top cover.

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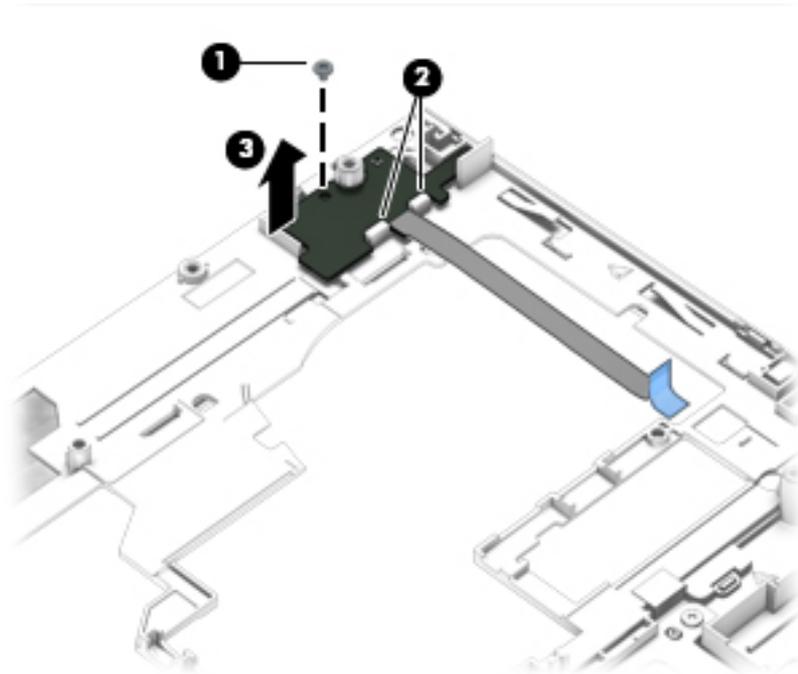
Reverse this procedure to install the power button board.

ExpressCard assembly

Description	Spare part number
ExpressCard assembly (includes activity LEDs and Thunderbolt port, Dual Mode DisplayPort, and USB port)	794579-001

Before removing the ExpressCard 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 37), and then remove the following components:

   a. Service cover (see Service cover on page 38)

   b. Hard drive (see Hard drive on page 39)

   c. Optical drive (see Optical drive on page 41)

   d. Keyboard (see Keyboard on page 50)

   e. Top cover (see Top cover on page 58)

Remove the ExpressCard assembly:

1. Remove the Torx T8M2.5×4.5 screw **(1)** that secures the system lens to the base enclosure.

2. Remove the system lens **(2)**.

   The system lens is available in the Plastics Kit, spare part number 734297-001.

3. Remove the three Torx T8M2.5×4.5 screws **(3)** that secure the ExpressCard assembly to the base enclosure.

4. Disconnect the ExpressCard assembly **(4)** from the system board by lifting up on the right side of the assembly.

5. Remove the the ExpressCard assembly **(5)**.

Reverse this procedure to install the ExpressCard assembly.

Smart card reader

Description	Spare part number
Smart card reader (includes cable)	742159-001

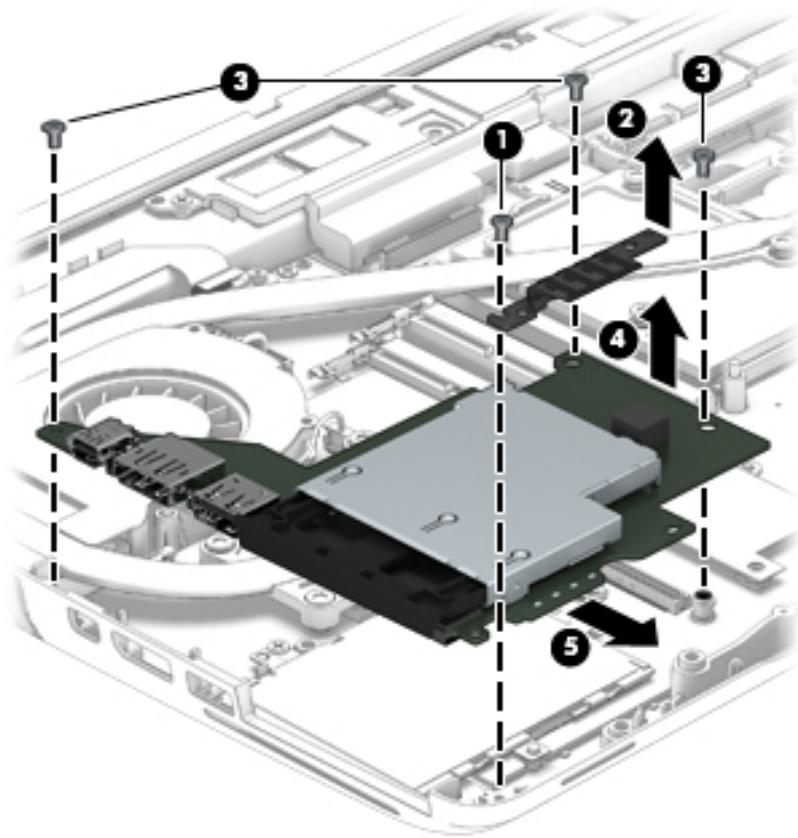Before removing the smart card reader, follow these steps:

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 37), and then remove the following components:

    a. Service cover (see Service cover on page 38)

    b. Hard drive (see Hard drive on page 39)

    c. Optical drive (see Optical drive on page 41)

    d. Keyboard (see Keyboard on page 50)

    e. Top cover (see Top cover on page 58)

    f. ExpressCard assembly (see ExpressCard assembly on page 67)

Remove the smart card reader:

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

2. Remove the two Torx T8M2.5×4.5 screws **(2)** that secure the smart card reader to the base enclosure.

3. Remove the smart card reader **(3)**.
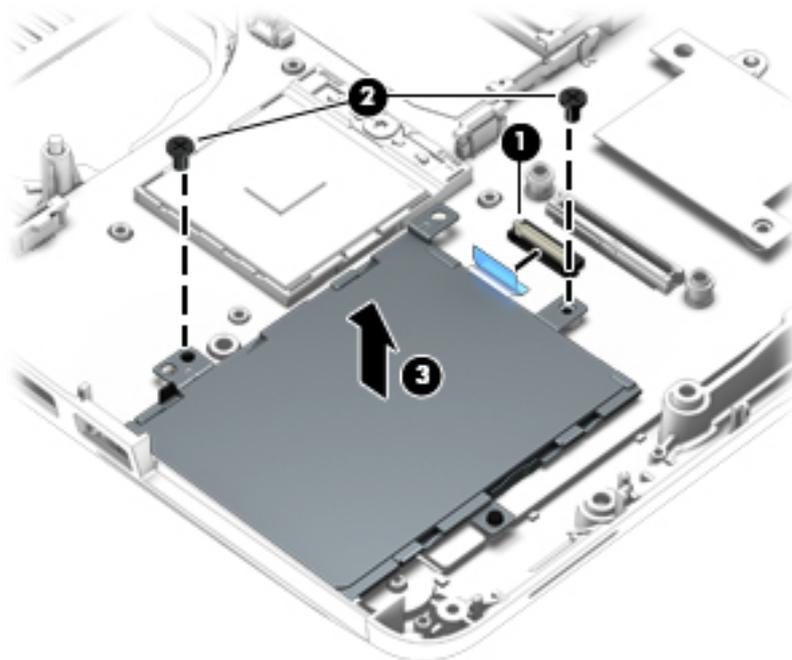
Reverse this procedure to install the smart card reader and cable.

Audio/USB board

Description	Spare part number
Audio/USB board (includes SD Card reader)	734288-001

Before removing the audio/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), and then remove the following components:

    a. Service cover (see)

    b. Hard drive (see)

    c. Optical drive (see)

    d. Keyboard (see)

    e. Top cover (see)

Remove the audio/USB board:

1. Remove the four Torx T8M2.5×4.5 screws **(1)** that secure the audio/USB board to the base enclosure.

2. Disconnect the audio/USB board **(2)** from the system board by lifting up on the left side of the audio/USB board.

3. Remove the audio/USB board.

Reverse this procedure to install the audio/USB board.

USB board

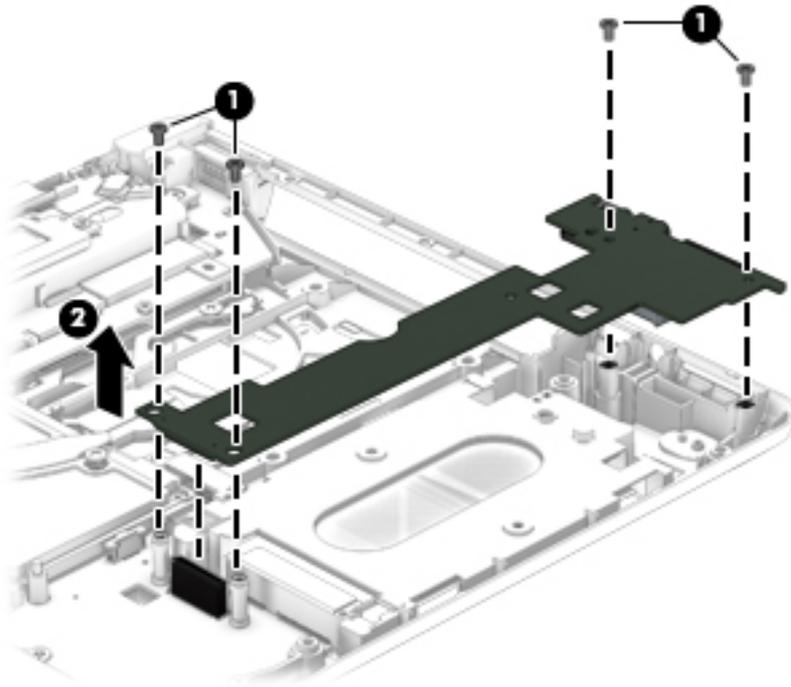| Description	Spare part number
USB board (includes cable and double-sided adhesive)	734293-001

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 37), and then remove the following components:

   a. Service cover (see Service cover on page 38)

   b. Hard drive (see Hard drive on page 39)

   c. Optical drive (see Optical drive on page 41)

   d. Keyboard (see Keyboard on page 50)

   e. Top cover (see Top cover on page 58)

Remove the USB board:

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

2. Detach the USB board cable **(2)** from the base enclosure. (The USB board cable is attached to the base enclosure with double-sided adhesive.)

3. Remove the Torx T8M2.5×4.5 screw **(3)** that secures the USB board to the base enclosure.
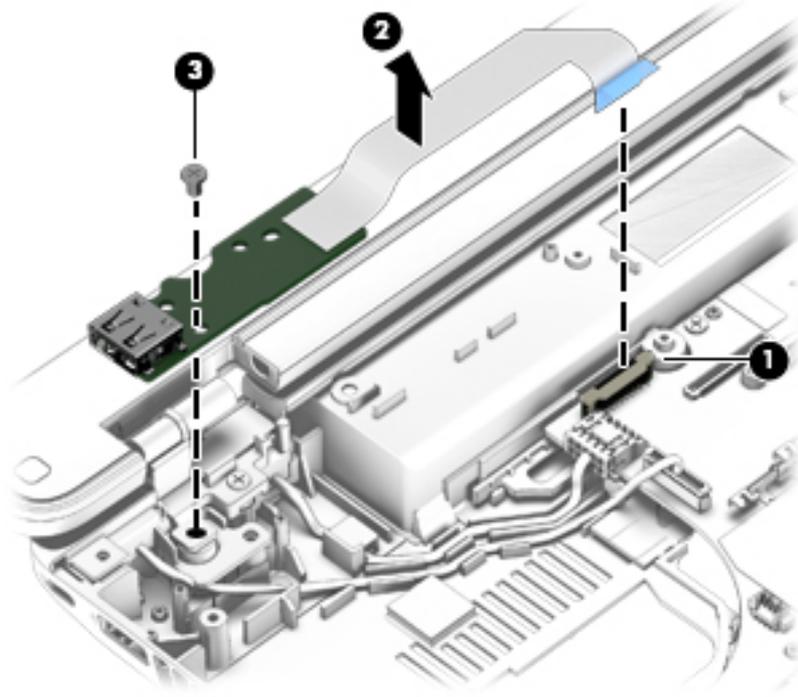
4. Remove the USB board and cable.

Reverse this procedure to install the USB board.

Speakers

Description	Spare part number
Speakers (includes cable)	734292-001

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 37), and then remove the following components:

   a. Service cover (see Service cover on page 38)

   b. Hard drive (see Hard drive on page 39)

   c. Optical drive (see Optical drive on page 41)

   d. Keyboard (see Keyboard on page 50)

   e. Top cover (see Top cover on page 58)

Remove the speakers:

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

2. Remove the two Phillips PM2.0×3.0 screws **(1)** that secure the speakers to the base enclosure.

3. Remove the speakers **(3)** and cable.
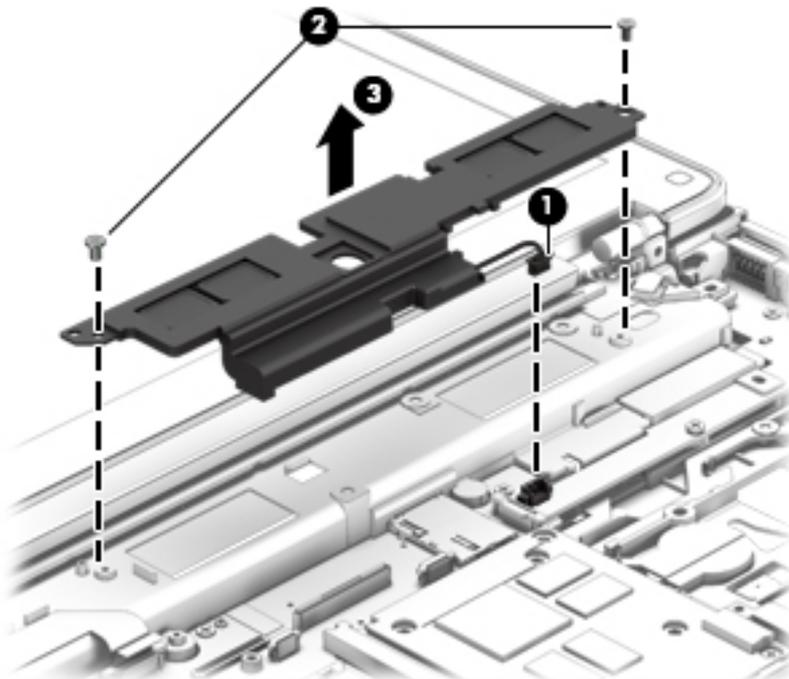
Reverse this procedure to install the speakers.

Fan/heat sink assembly

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

Description	Spare part number
For use only with an NVIDIA Quadro K1100M NVIDIA N15P-Q1 graphics board, spare part number 785223-001	734289-001
For use only with an NVIDIA Quadro K610M NVIDIA N15M-Q2 graphics board, spare part number 785225-001	734290-001
For use only with an NVIDIA Quadro K2100M NVIDIA N15P-Q3 graphics board, spare part number 785224-001	734291-001
For use only with an AMD FirePro M5100 graphics board, spare part number 784470-001	784469-001

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

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.

2. Disconnect the power from the computer by unplugging the power cord from the computer.

3. Disconnect all external devices from the computer.

4. Remove the battery (see), and then remove the following components:

   a. Service cover (see)

   b. Hard drive (see)

   c. Optical drive (see)

   d. Keyboard (see)

   e. Top cover (see)

Remove the fan/heat sink assembly:

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

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

3. Following the 5 through 8 sequence stamped into the graphics board heat sink, loosen the four Phillips captive screws **(3)** that secure the graphics board heat sink to the system board.

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

    📝 **NOTE:** Due to the adhesive quality of the thermal material located between the fan/heat sink assembly and the system board components, it may be necessary to move the fan/heat sink assembly from side to side to detach it.
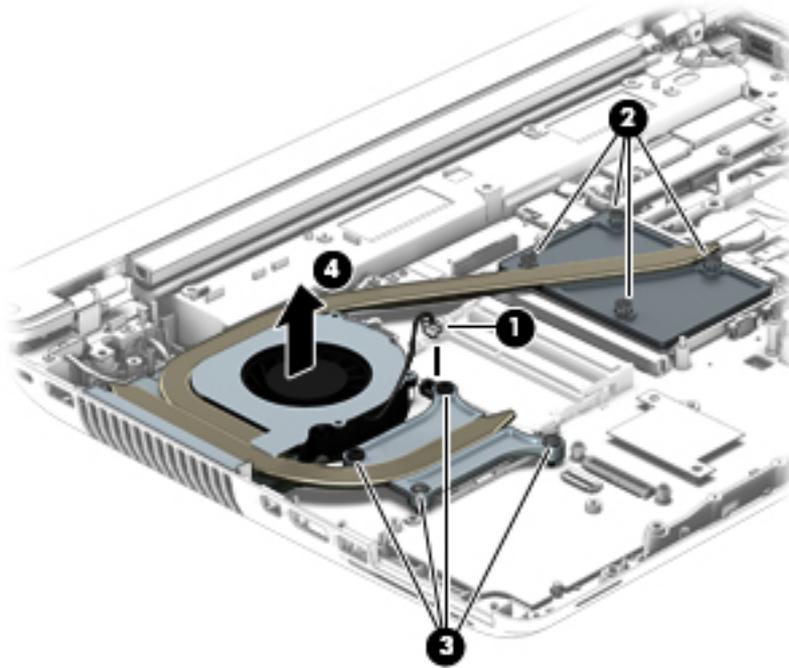
📝 **NOTE:** The thermal material must be thoroughly cleaned from the surfaces of the fan/heat sink assembly and the system board components each time the fan/heat sink assembly is removed. Replacement thermal material is included with the fan/heat sink assembly, processor, and system board spare part kits.

● Various thermal pads are used on the graphics board components **(1)** and **(7)** and the heat sink sections **(2)** and **(8)** that service them

● Thermal paste is used on the processor **(3)** and the heat sink section **(4)** that services it

● Thermal paste is used on the graphics board processor **(5)** and the heat sink section **(6)** that services it
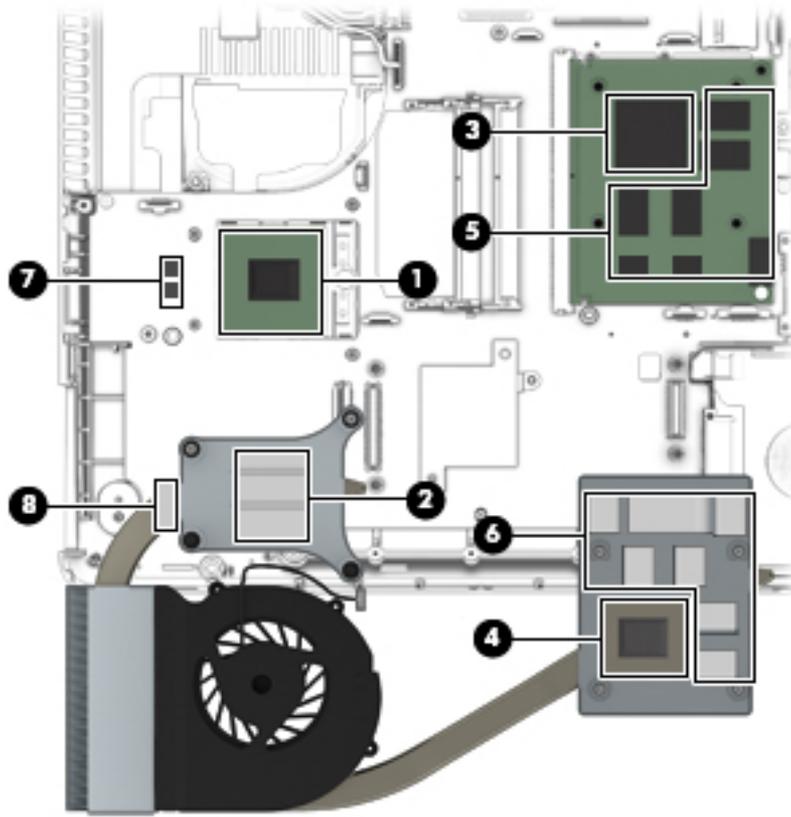
Reverse this procedure to install the fan/heat sink assembly.

Processor

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

Description	Spare part number
Intel Quad Core i7-4910MQ 2.90-GHz (SC turbo up to 3.90-GHz) processor (1600-MHz FSB, 8.0-MB L3 cache, 47 W)	778693-001
Intel Quad Core i7-4810MQ 2.80-GHz (SC turbo up to 3.80-GHz) processor (1600-MHz FSB, 6.0-MB L3 cache, 47 W)	778692-001
Intel Quad Core i7-4710MQ 2.50-GHz (SC turbo up to 3.50-GHz) processor (1600-MHz FSB, 6.0-MB L3 cache, 47 W)	773212-001
Intel Quad Core i7-4610M 3.00-GHz (SC turbo up to 3.70-GHz) processor (1600-MHz FSB, 4.0-MB L3 cache, 37 W)	765141-001
Intel Dual Core i5-4340M 2.90-GHz (SC turbo up to 3.60-GHz) processor (1600-MHz FSB, 3.0-MB L3 cache, 37 W)	765142-001
Intel Dual Core i5-4210M 2.60-GHz (SC turbo up to 3.20-GHz) processor (1600-MHz FSB, 3.0-MB L3 cache, 37 W)	768420-001

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 37), and then remove the following components:

   a. Service cover (see Service cover on page 38)

   b. Hard drive (see Hard drive on page 39)

   c. Optical drive (see Optical drive on page 41)

   d. Keyboard (see Keyboard on page 50)

   e. Top cover (see Top cover on page 58)

   f. Fan/heat sink assembly (see Fan/heat sink assembly on page 74)

Remove the processor:

1. Use a Torx8 screw driver **(1)** to turn the processor locking screw one-half turn counterclockwise **(2)**, until you hear a click.

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

> **NOTE:** The gold triangle **(4)** on the processor must be aligned with the triangle icon embossed on the processor socket when you install the processor.
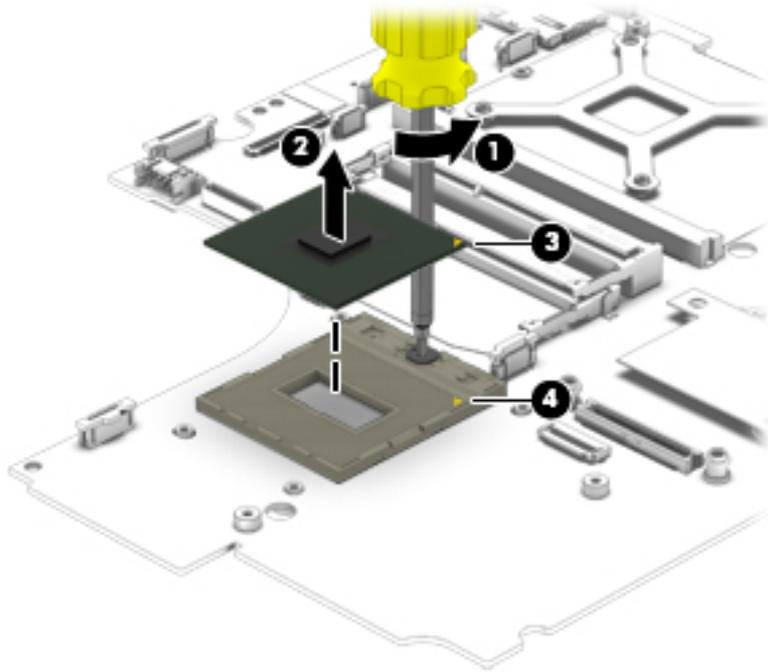
Reverse this procedure to install the processor.

Graphics board

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

Description	Spare part number
NVIDIA Quadro K1100M NVIDIA N15P-Q1 graphics board	785223-001
NVIDIA Quadro K610M NVIDIA N15M-Q2 graphics board	785225-001
NVIDIA Quadro K2100M NVIDIA N15P-Q3 graphics board	785224-001
AMD FirePro M5100 graphics board	784470-001

Before removing the graphics 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 37), and then remove the following components:

    a. Service cover (see Service cover on page 38)

    b. Hard drive (see Hard drive on page 39)

c. Optical drive (see <u>Optical drive on page 41</u>)

d. Keyboard (see <u>Keyboard on page 50</u>)

e. Top cover (see <u>Top cover on page 58</u>)

f. Fan/heat sink assembly (see <u>Fan/heat sink assembly on page 74</u>)

Remove the graphics board:

1. Remove the two Torx T8M2.5×4.5 screws **(1)** that secure the graphics board to the system board. (The graphics board tilts up.)

2. Remove the graphics board **(2)** by pulling the board away from the slot at an angle.

Reverse this procedure to install the graphics board.

Display assembly

NOTE: The DreamVision display assembly is spared as a whole unit assembly only. The LED display assembly is spared at the subcomponent level only. For more LED display assembly spare part information, see the individual removal subsections.

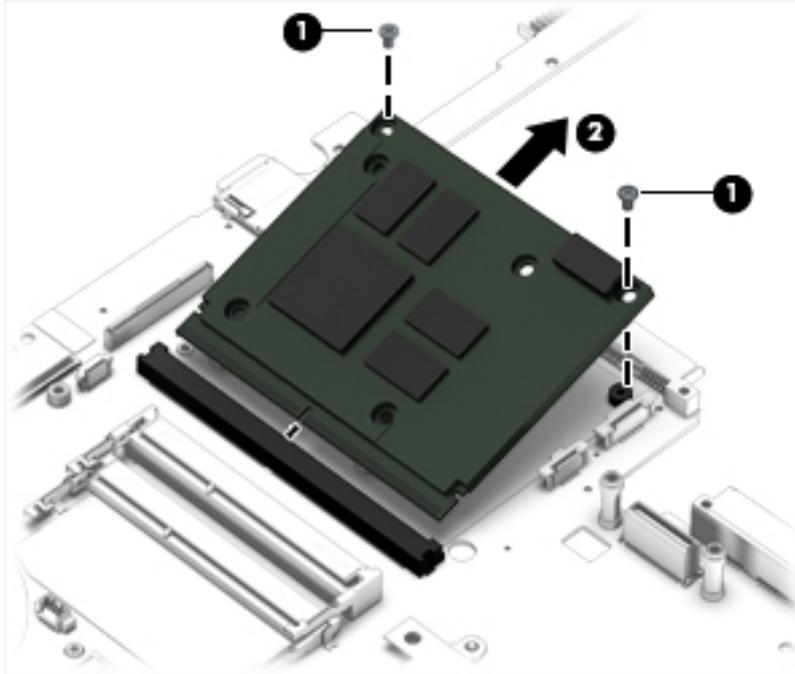| Description	Spare part number
15.6-in, FHD, UWVA, DreamVision display assembly equipped with a webcamera	735965-001
15.6-in, FHD, UWVA, DreamVision display assembly not equipped with a webcamera	735964-001

To remove the display assembly and access the LED 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 37), and then remove the following components:

    a. Service cover (see Service cover on page 38)

    b. Hard drive (see Hard drive on page 39)

    c. Optical drive (see Optical drive on page 41)

    d. Keyboard (see Keyboard on page 50)

    e. Top cover (see Top cover on page 58)

Remove the display assembly:

1. Close the computer.

2. Turn the computer upside down, with the rear toward you.

3. Make sure that the WWAN antenna cables are disconnected from the WWAN module (see WWAN module on page 43).

4. Make sure that the WLAN antenna cables are disconnected from the WLAN module (see WLAN module on page 46).

5. Release the wireless antenna cables **(1)** from the routing clips **(2)** and channels built into the base enclosure.
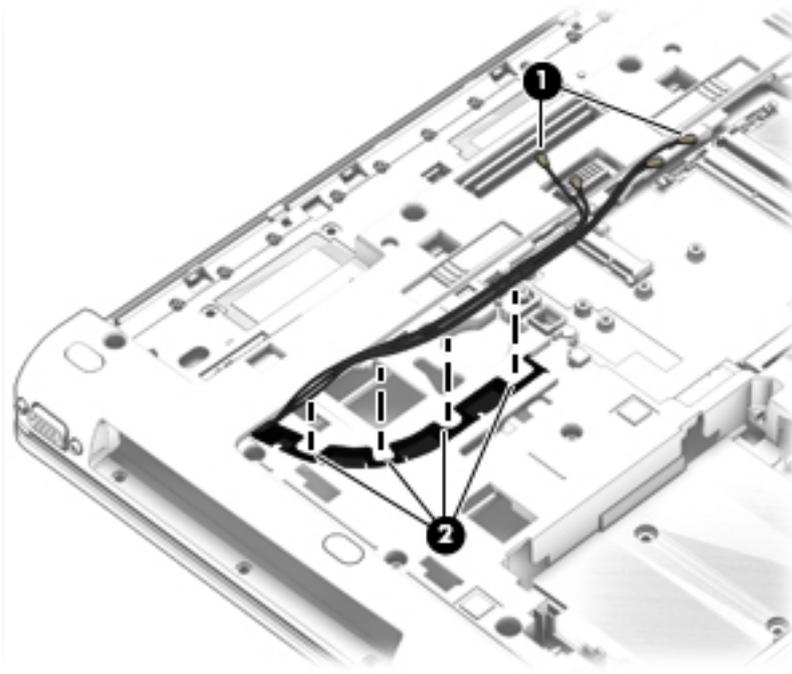
6. Turn the computer right side up, with the rear toward you.

7. Remove the four Torx T8M2.0×3.0 screws **(1)** that secure the hinge cover to the computer.

8. Remove the hinge cover **(2)**.

The hinge cover is available using spare part number 734294-001.
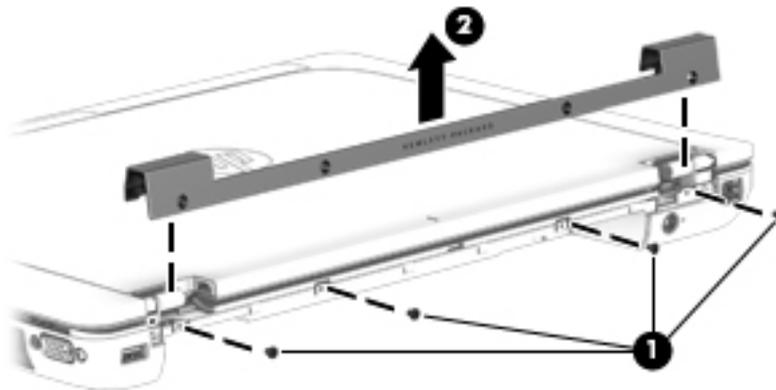
9. Remove the two Torx T8M2.5×4.5 screws that secure the display assembly to the base enclosure.

10. Position the computer with the front toward you.

11. Open the computer as far as it will open.

12. Remove the Phillips PM2.0×3.0 screw **(1)** that secures the display panel cable and bracket to the system board.

13. Remove the display panel cable bracket **(2)**.

The display panel cable bracket is included in the Hinge Kit, spare part number 784464-001.

14. Disconnect the display panel cable **(3)** from the system board.

15. Detach the display panel cable **(4)** from the base enclosure. (The display panel cable is attached to the base enclosure with double-sided adhesive.)
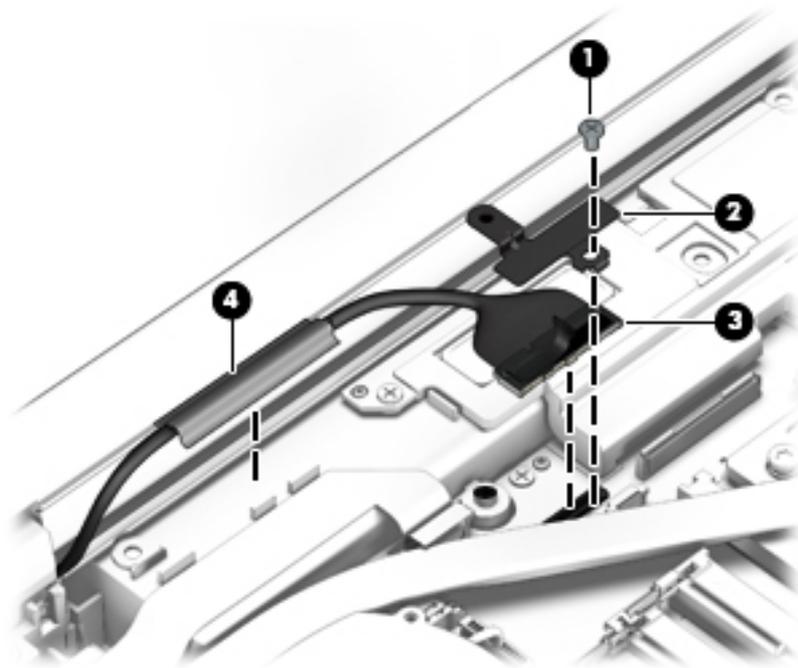
16. Release the wireless antenna cables from the routing channels built into the base enclosure.
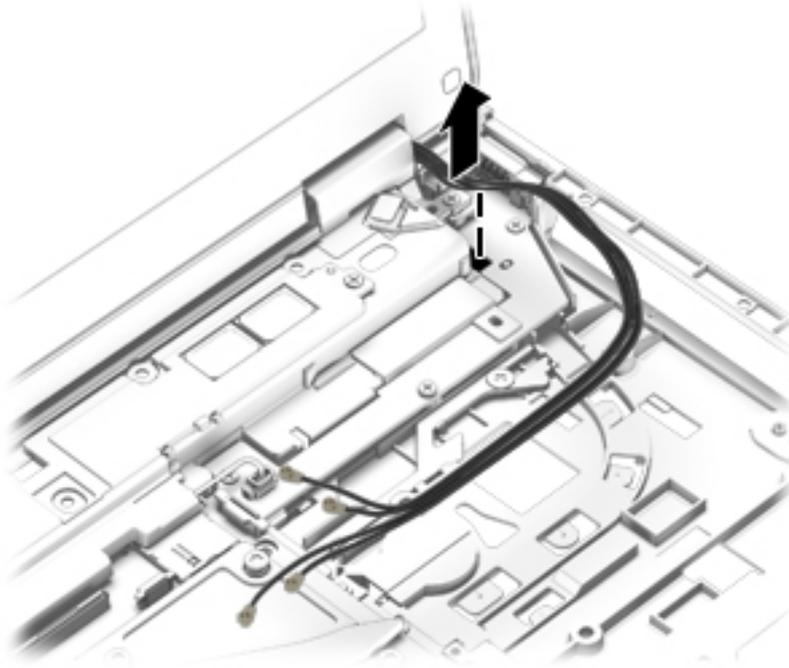
17. Remove the two Torx T8M2.5×6.5 screws **(1)** that secure the display assembly to the base enclosure.

18. Remove the display assembly **(2)**.
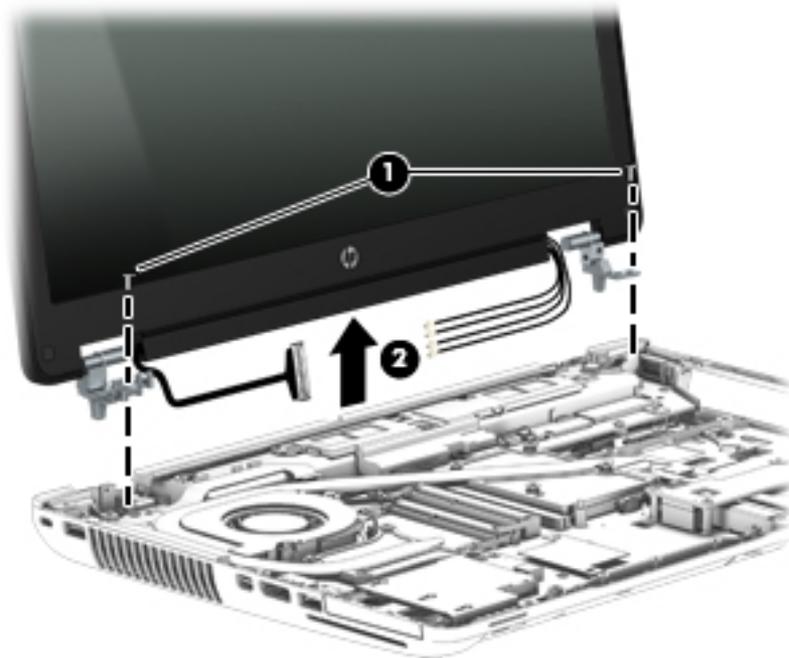
NOTE: Steps 19 through 22 apply only to LED display assemblies.

19. If it is necessary to replace the display bezel or any of the LED display assembly subcomponents:

a. Remove the two screw covers **(1)** and the two Phillips PM2.0×5.5 screws **(2)** that secure the display bezel to the display assembly.

The screw covers are available in all LED display assembly subcomponent spare part kits.
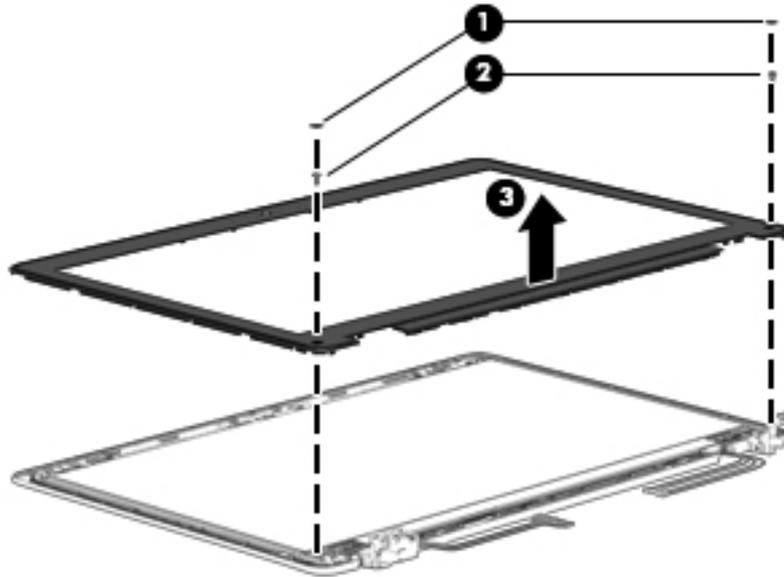
b. Flex the inside edges of the top edge **(1)**, the left and right sides **(2)**, and the bottom edge **(3)** of the display bezel until the bezel disengages from the display enclosure.

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

The display bezel is available using the following spare part numbers:

734301-001: Models with a webcam

734302-001: Models without a webcam

784471-001: Models with a QHD+ display and a webcam

784472-001: Models with a QHD+ display and without a webcam

784473-001: Models with an Innolux display panel and a webcam

784474-001: Models with an Innolux display panel and without a webcam
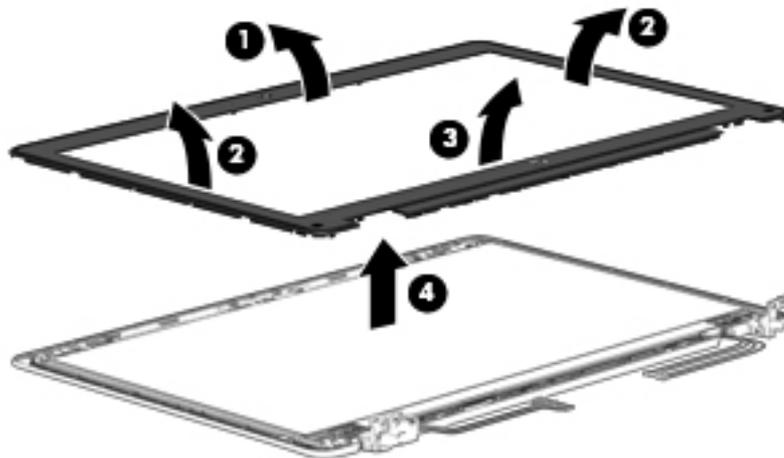
20. If it is necessary to replace the display panel:

    a. Remove the four Phillips PM2.0×3.0 screws that secure the display panel to the display enclosure.
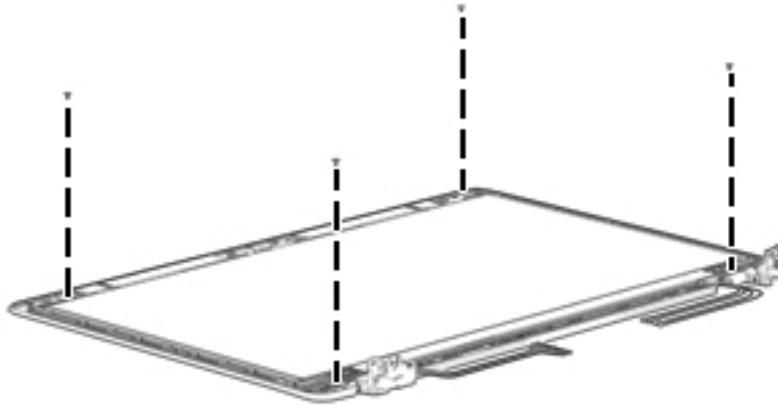
> ⚠ **CAUTION:** Before turning the display panel upside down, make sure the work surface is clear of tools, screws, and any other foreign objects. Failure to follow this caution can result in damage to the display panel.

    b. Lift the top edge of the display panel **(1)** and swing it up and forward until it rests upside down in front of the display enclosure.

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

    d. Disconnect the display panel cable **(3)** from the display panel.
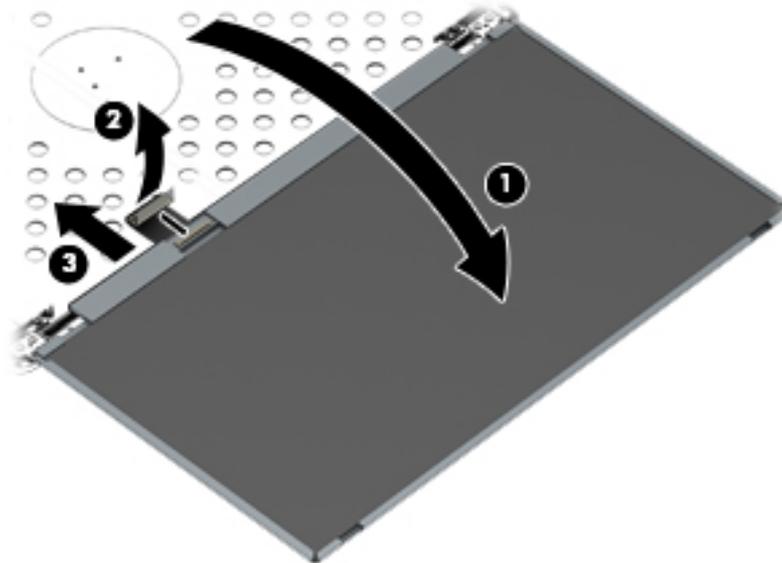
    e. Remove the display panel.

        The display panel is available using spare part numbers 735607-001 (15.6-in, FHD, UWVA, LED display panel), 735604-001 (15.6-in, FHD, SVA, LED display panel) and 797849-001 (15.6-in, QHD +, UWVA, LED display panel).

21. If it is necessary to replace the webcamera/microphone module or microphone module:

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

a. Disconnect the webcamera/microphone module cable **(1)** from the webcamera/
microphone module.

b. Detach the webcamera/microphone module **(2)** from the display enclosure. (The webcamera/
microphone module is attached to the display enclosure with double-sided adhesive.)
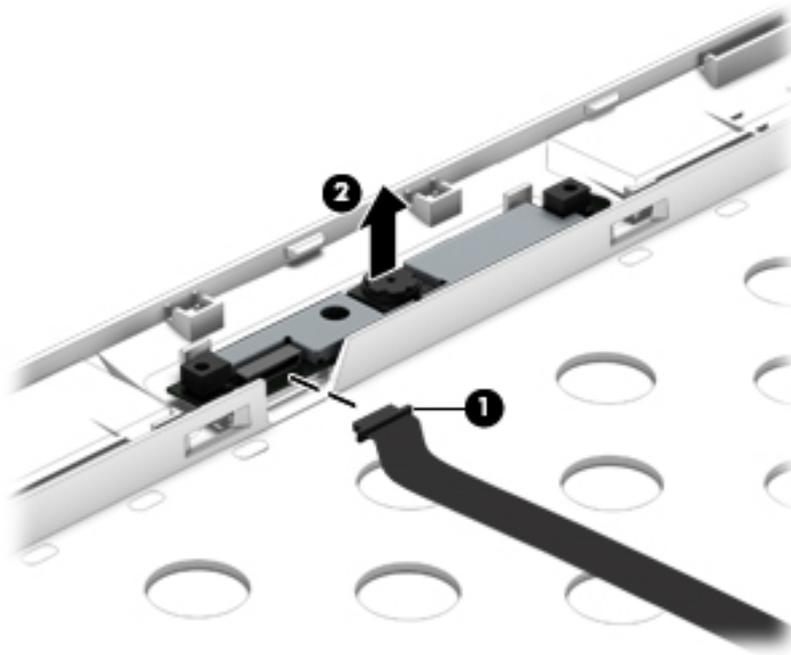
c. Remove the webcamera/microphone module.

The webcamera/microphone module is available using spare part number 784208-001. The
microphone module is available using spare part number 735370-001.

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

a. Remove the four Torx T8M2.5×4.5 screws **(1)** that secure the display hinges to the display panel.

b. Remove the display hinges **(2)**.

The display hinges are available using spare part number 784464-001 and include the left and right hinges.
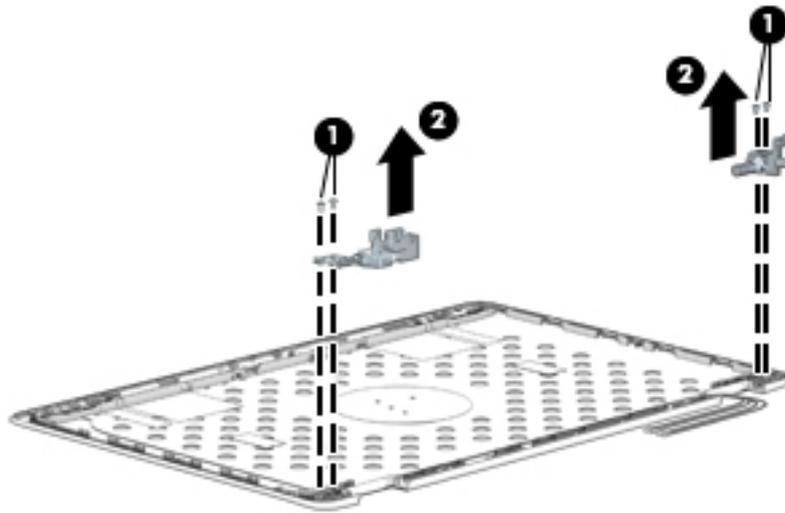
Reverse this procedure to reassemble and install the display assembly.

System board

NOTE: The system board spare part kit includes battery connector bracket and replacement thermal material.

All system boards use the following part numbers:

xxxxxx-001: Windows 7 or non-Windows operating systems

xxxxxx-501: Windows 8.1 Standard operating system

xxxxxx-601: Windows 8.1 or Windows 10 operating system

Description	Spare part number
For use only on computer models equipped with an Intel Quad Core processor	784468-xxx
For use only on computer models equipped with an Intel Dual Core processor	784467-xxx

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 37), and then remove the following components:

   a. Service cover (see Service cover on page 38)

   b. Hard drive (see Hard drive on page 39)

   c. Optical drive (see Optical drive on page 41)

d. Keyboard (see Keyboard on page 50)

e. Top cover (see Top cover on page 58)

f. ExpressCard assembly (see ExpressCard assembly on page 67)

g. Audio/USB board (see Audio/USB board on page 70)

h. Speakers (see Speakers on page 73)

i. Fan/heat sink assembly (see Fan/heat sink assembly on page 74)

j. Display assembly (see Display assembly on page 80)

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 43)

- Solid-state drive (see Solid-state drive (M.2) on page 45)

- WLAN module (see WLAN module on page 46)

- Expansion memory (see Primary memory module on page 48)

- Primary memory (see Expansion memory module on page 54)

- smart card reader (see Smart card reader on page 69)

- Processor (see Processor on page 77)

- Graphics board (see Graphics board on page 78)

Remove the system board:

1. Make sure that the RTC battery cable is disconnected from the system board (see RTC battery on page 56).

2. Disconnect the following cables from the system board:

    (1) Power connector cable

    (2) RJ-45 (network) cable

    (3) USB board cable
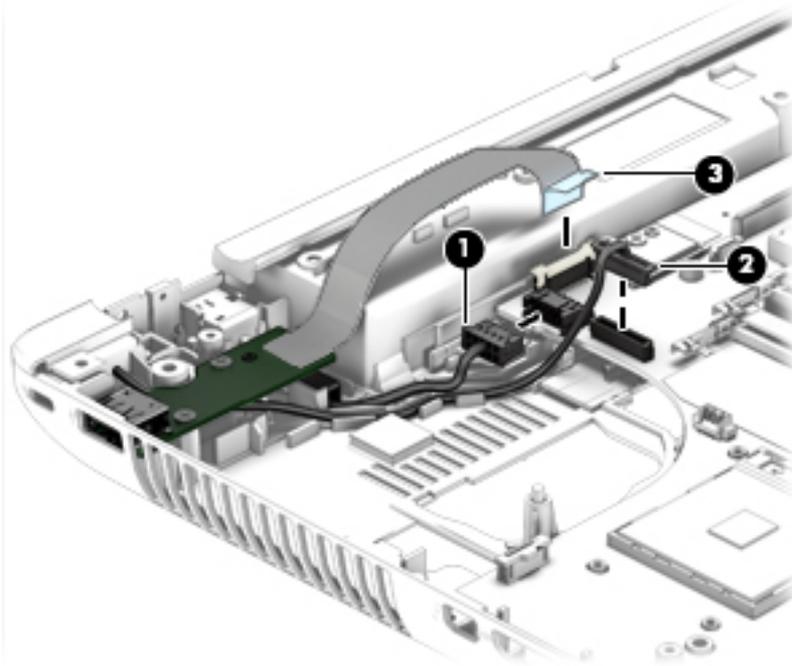
3. Remove the right-side rear corner cover **(1)**.

    The right-side rear corner cover is included in the Hinge Cover Kit, spare part number 734294-001.

4. Remove the seven Torx T8M2.5×4.5 screws **(2)** that secure the system board to the base enclosure.
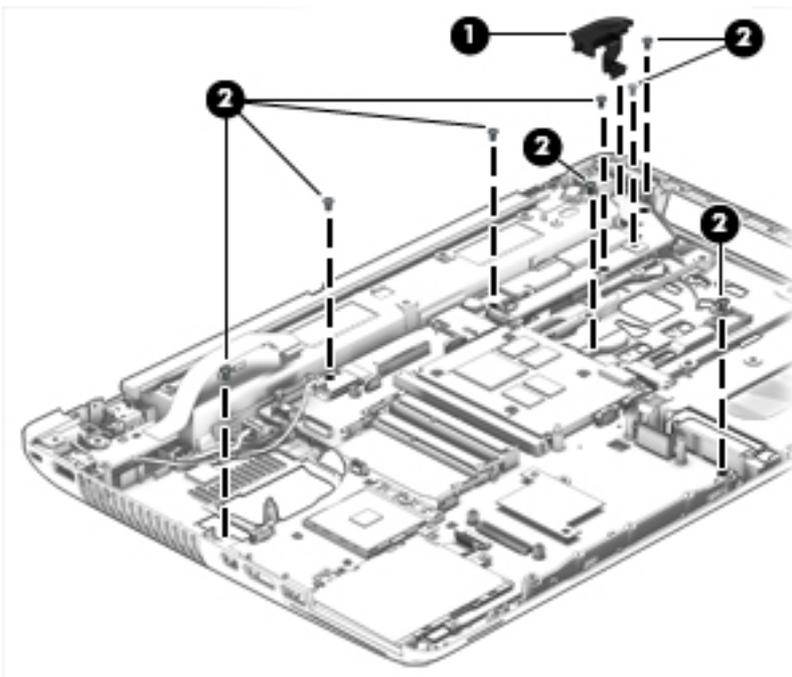
5. Lift up on the left side of the system board **(1)** until it rests at an angle.

6. Remove the system board **(2)** by sliding it up and to the left at an angle.
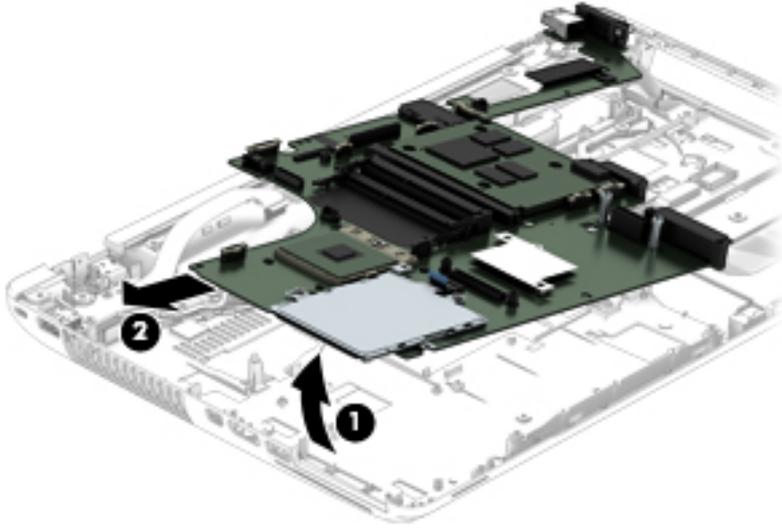
Reverse this procedure to install the system board.

Power connector cable

NOTE: The power connector cable is included in the Cable Kit, spare part number 785222-001.

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 37), and then remove the following components:

   a. Service cover (see Service cover on page 38)

   b. Hard drive (see Hard drive on page 39)

   c. Optical drive (see Optical drive on page 41)

   d. Keyboard (see Keyboard on page 50)

   e. Top cover (see Top cover on page 58)

   f. ExpressCard assembly (see ExpressCard assembly on page 67)

   g. Audio/USB board (see Audio/USB board on page 70)

   h. USB board (see USB board on page 71)

   i. Speakers (see Speakers on page 73)

   j. Fan/heat sink assembly (see Fan/heat sink assembly on page 74)

   k. Display assembly (see Display assembly on page 80)

Remove the power connector cable:

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

2. Release the power connector cable **(2)** from the clips built into the base enclosure.

3. Release the power connector **(3)** from the clips and mold built into the base enclosure.
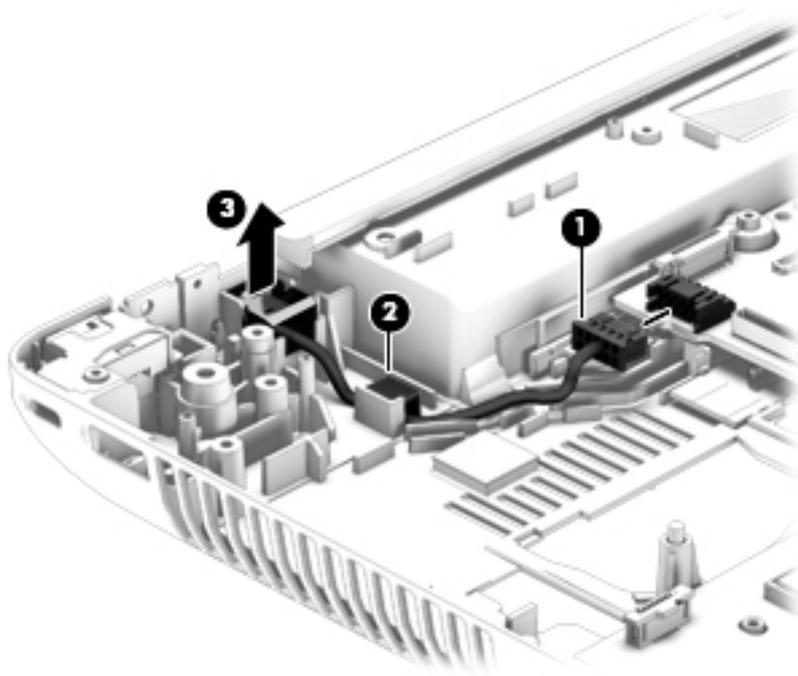
4. Remove the power connector cable.

Reverse this procedure to install the power connector cable.

RJ-45 (network) cable

NOTE: The RJ-45 (network) cable is included in the Cable Kit, spare part number 785222-001.

Before removing the RJ-45 (network) 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 37), and then remove the following components:

   a. Service cover (see Service cover on page 38)

   b. Hard drive (see Hard drive on page 39)

   c. Optical drive (see Optical drive on page 41)

   d. Keyboard (see Keyboard on page 50)

   e. Top cover (see Top cover on page 58)

   f. ExpressCard assembly (see ExpressCard assembly on page 67)

   g. Audio/USB board (see Audio/USB board on page 70)

   h. USB board (see USB board on page 71)

   i. Speakers (see Speakers on page 73)

   j. Fan/heat sink assembly (see Fan/heat sink assembly on page 74)

   k. Display assembly (see Display assembly on page 80)

Remove the RJ-45 (network) cable:

1. Remove the Phillips PM2.0×5.5 screw **(1)** that secures the left-side rear corner cover to the base enclosure.

2. Remove the left-side rear corner cover **(2)**.

The left-side rear corner cover is included in the Hinge Cover Kit, spare part number 734294-001.
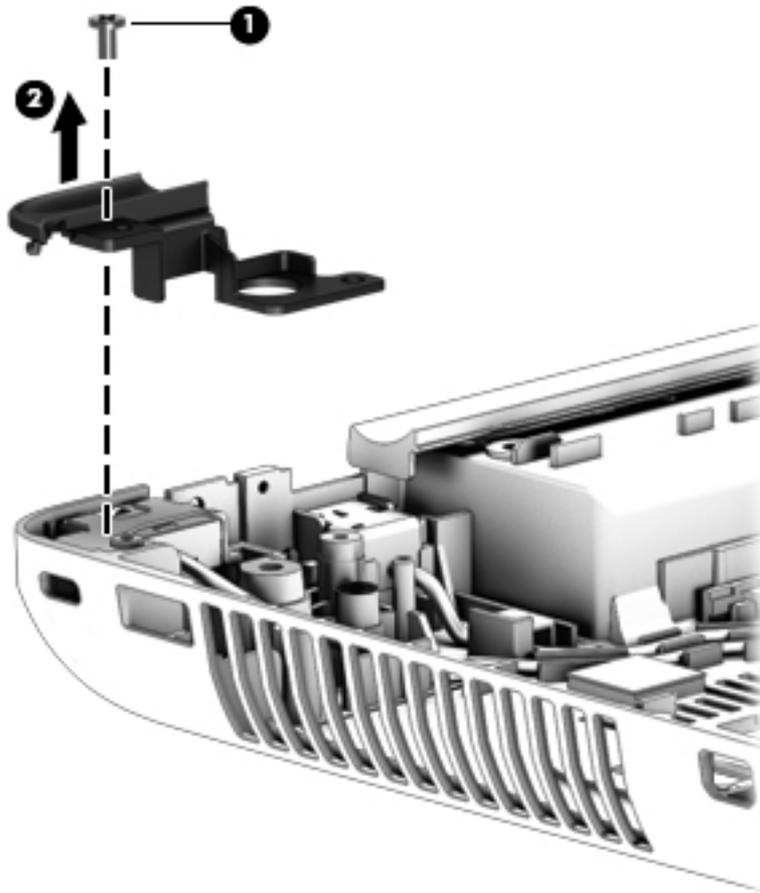
3. Remove the Phillips PM2.0×5.5 screw **(1)** that secures the security cable lock bracket to the base enclosure.

4. Remove the security cable lock bracket **(2)**.

The security cable lock bracket is included in the Bracket Kit, spare part number 734299-001.

5. Remove the RJ-45 (network) cable **(3)**.
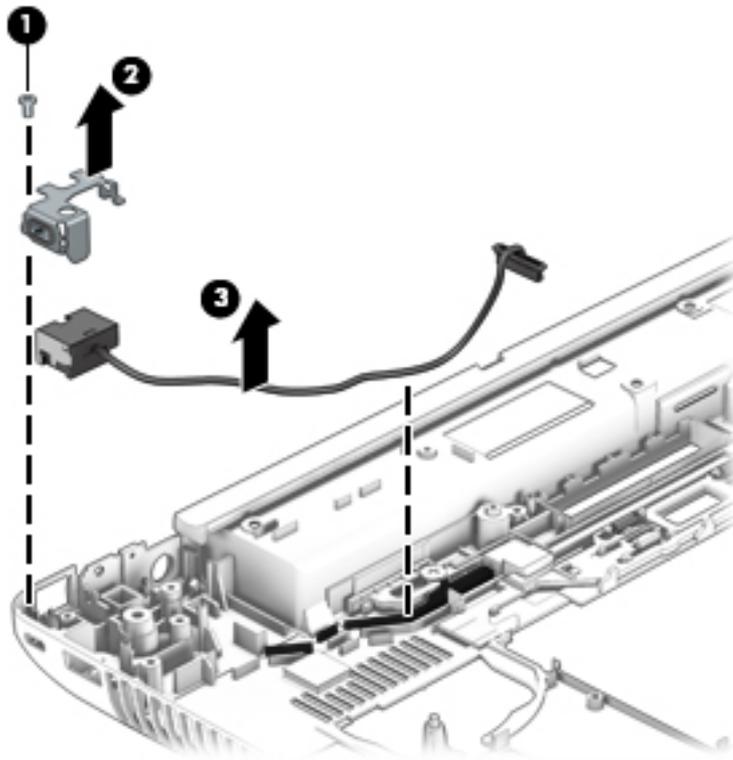
Reverse this procedure to install the RJ-45 (network) cable.

7 Computer Setup (BIOS) and MultiBoot in Windows 7

Using Computer Setup

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

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

Starting Computer Setup

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

To start Computer Setup, follow these steps:

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

2. Press f10 to enter Computer Setup.

Navigating and selecting in Computer Setup

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

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

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

2. Press f10 to enter Computer Setup.

   - To select a menu or a menu item, use the tab key and the keyboard arrow keys and then press enter, or use a pointing device to click the item.

   - To scroll up and down, click the up arrow or the down arrow in the upper-right corner of the screen, or use the up arrow key or the down arrow key on the keyboard.

   - To close open dialog boxes and return to the main Computer Setup screen, press esc, and then follow the on-screen instructions.

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

- To exit Computer Setup menus without saving your changes:

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

  – or –

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

- To save your changes and exit Computer Setup menus:

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

  – or –

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

Your changes go into effect when the computer restarts.

Restoring factory settings in Computer Setup

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

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

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

2. Press f10 to enter Computer Setup.

3. Use a pointing device or the arrow keys to select **Main > Restore Defaults**.

4. Follow the on-screen instructions.

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

   – or –

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

Your changes go into effect when the computer restarts.

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

Updating the BIOS

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

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

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

Determining the BIOS version

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

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

1. Start Computer Setup.

2. Use a pointing device or the arrow keys to select **Main > System Information**.

3. To exit Computer Setup without saving your changes, click the **Exit** icon in the lower-right corner of the screen, and then follow the on-screen instructions.

   – or –

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

Downloading a BIOS update

⚠ **CAUTION:** To reduce the risk of damage to the computer or an unsuccessful installation, download and install a BIOS update only when the computer is connected to reliable external power using the AC adapter. Do not download or install a BIOS update while the computer is running on battery power, docked in an optional docking device, or connected to an optional power source. During the download and installation, follow these instructions:

Do not disconnect power on the computer by unplugging the power cord from the AC outlet.

Do not shut down the computer or initiate Sleep.

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

1. Access Help and Support by selecting **Start > Help and Support**.

2. Select **Updates and tune-ups**, and then select **Check for HP updates now**.

3. At the download area, follow these steps:

   a. Identify the most recent BIOS update and compare it to the BIOS version currently installed on your computer. Make a note of the date, name, or other identifier. You may need this information to locate the update later, after it has been downloaded to your hard drive.

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

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

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

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

1. Select **Start > Computer**.

2. Click your hard drive designation. The hard drive designation is typically Local Disk (C:).

3. Using the hard drive path you recorded earlier, open the folder on your hard drive that contains the update.

4. Double-click the file that has an .exe extension (for example, *filename*.exe).

   The BIOS installation begins.

5. Complete the installation by following the on-screen instructions.

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

Using MultiBoot

About the boot device order

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

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

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

Choosing MultiBoot preferences

You can use MultiBoot in the following ways:

- To set a new boot order that the computer uses each time it is turned on, by changing the boot order in Computer Setup.

- To dynamically choose the boot device, by pressing esc while the "Press the ESC key for Startup Menu" message is displayed at the bottom of the screen, and then pressing f9 to enter the Boot Device Options menu.

- To use MultiBoot Express to set variable boot orders. This feature prompts you for a boot device each time the computer is turned on or restarted.

Setting a new boot order in Computer Setup

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

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

2. Press f10 to enter Computer Setup.

3. Use a pointing device or the arrow keys to select the **Legacy Boot Order** list, and then press enter.

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

   – or –

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

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

   – or –

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

Dynamically choosing a boot device using the f9 prompt

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

1. Open the Select Boot Device menu by turning on or restarting the computer, and then pressing esc while the "Press the ESC key for Startup Menu" message is displayed at the bottom of the screen.

2. Press f9.

3. Use a pointing device or the arrow keys to select a boot device, then press enter.

Setting a MultiBoot Express prompt

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

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

2. Press f10 to enter Computer Setup.

3. Use a pointing device or the arrow keys to select **System Configuration > Boot Options**, and then press enter.

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

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

   – or –

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

Your changes go into effect when the computer restarts.

Entering MultiBoot Express preferences

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

- To specify a boot device from the Express Boot menu, select your preference within the allotted time, and then press enter.

- To prevent the computer from defaulting to the current MultiBoot setting, press any key before the allotted time expires. The computer will not start until you select a boot device and press enter.

- To allow the computer to start according to the current MultiBoot settings, wait for the allotted time to expire.

Using HP Sure Start

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

For more information, go to http://www.hp.com/support, and then select your country. Select **Drivers & Downloads**, and then follow the on-screen instructions.

8 Computer Setup (BIOS) and MultiBoot in Windows 8.1

Using Computer Setup

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

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

Starting Computer Setup

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

To start Computer Setup, follow these steps:

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

2. Press f10 to enter Computer Setup.

Navigating and selecting in Computer Setup

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

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

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

2. Press f10 to enter Computer Setup.

   - To select a menu or a menu item, use the tab key and the keyboard arrow keys and then press enter, or use a pointing device to click the item.

   - To scroll up and down, click the up arrow or the down arrow in the upper-right corner of the screen, or use the up arrow key or the down arrow key on the keyboard.

   - To close open dialog boxes and return to the main Computer Setup screen, press esc, and then follow the on-screen instructions.

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

- To exit Computer Setup menus without saving your changes:

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

  – or –

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

- To save your changes and exit Computer Setup menus:

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

  – or –

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

Your changes go into effect when the computer restarts.

Restoring factory settings in Computer Setup

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

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

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

2. Press f10 to enter Computer Setup.

3. Use a pointing device or the arrow keys to select **Main > Restore Defaults**.

4. Follow the on-screen instructions.

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

   – or –

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

Your changes go into effect when the computer restarts.

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

Updating the BIOS

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

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

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

Determining the BIOS version

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

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

1. Start Computer Setup.

2. Use a pointing device or the arrow keys to select **Main > System Information**.

3. To exit Computer Setup without saving your changes, click the **Exit** icon in the lower-right corner of the screen, and then follow the on-screen instructions.

   – or –

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

Downloading a BIOS update

> ⚠ **CAUTION:** To reduce the risk of damage to the computer or an unsuccessful installation, download and install a BIOS update only when the computer is connected to reliable external power using the AC adapter. Do not download or install a BIOS update while the computer is running on battery power, docked in an optional docking device, or connected to an optional power source. During the download and installation, follow these instructions:

Do not disconnect power on the computer by unplugging the power cord from the AC outlet.

Do not shut down the computer or initiate Sleep.

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

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

2. Click **Updates and tune-ups**, and then click **Check for HP updates now**.

3. Follow the on-screen instructions.

4. At the download area, follow these steps:

    a. Identify the most recent BIOS update and compare it to the BIOS version currently installed on your computer. Make a note of the date, name, or other identifier. You may need this information to locate the update later, after it has been downloaded to your hard drive.

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

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

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

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

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

2. Click your hard drive designation. The hard drive designation is typically Local Disk (C:).

3. Using the hard drive path you recorded earlier, open the folder on your hard drive that contains the update.

4. Double-click the file that has an .exe extension (for example, *filename*.exe).

    The BIOS installation begins.

5. Complete the installation by following the on-screen instructions.

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

Using MultiBoot

About the boot device order

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

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

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

Choosing MultiBoot preferences

You can use MultiBoot in the following ways:

- To set a new boot order that the computer uses each time it is turned on, by changing the boot order in Computer Setup.

- To dynamically choose the boot device, by pressing esc while the "Press the ESC key for Startup Menu" message is displayed at the bottom of the screen, and then pressing f9 to enter the Boot Device Options menu.

- To use MultiBoot Express to set variable boot orders. This feature prompts you for a boot device each time the computer is turned on or restarted.

Setting a new boot order in Computer Setup

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

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

2. Press f10 to enter Computer Setup.

3. Use a pointing device or the arrow keys to select one of the following options:

   - **Advanced > Boot Options > UEFI Boot Order > UEFI Hybrid**

   - **Advanced > Boot Options > UEFI Boot Order > UEFI Native Boot mode**

   - **Advanced > Boot Options > Legacy Boot Order > Legacy Boot Mode**

   Press enter.

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

   – or –

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

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

	– or –

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

Dynamically choosing a boot device using the f9 prompt

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

1.	Open the Select Boot Device menu by turning on or restarting the computer, and then pressing esc while
the "Press the ESC key for Startup Menu" message is displayed at the bottom of the screen.

2.	Press f9.

3.	Use a pointing device or the arrow keys to select a boot device, then press enter.

Setting a MultiBoot Express prompt

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

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

2.	Press f10 to enter Computer Setup.

3.	Use a pointing device or the arrow keys to select **Advanced > Boot Options > MultiBoot Express Boot
Popup Delay (Sec)**, and then press enter.

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

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

	– or –

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

Your changes go into effect when the computer restarts.

Entering MultiBoot Express preferences

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

●	To specify a boot device from the Express Boot menu, select your preference within the allotted time,
and then press enter.

●	To prevent the computer from defaulting to the current MultiBoot setting, press any key before the
allotted time expires. The computer will not start until you select a boot device and press enter.

●	To allow the computer to start according to the current MultiBoot settings, wait for the allotted time to
expire.

Using HP Sure Start

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

For more information, go to http://www.hp.com/support, and then select your country. Select **Drivers & Downloads**, and then follow the on-screen instructions.

9 Computer Setup (BIOS), TPM, and HP Sure Start in Windows 10

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:

▲ Start Computer Setup.

- Computers or tablets with keyboards:

  ▲ Turn on or restart the computer, and when the HP logo appears, press f10 to enter Computer Setup.

- Tablets without keyboards:

  ▲ Turn off the tablet. Press the power button in combination with the volume down button until the Startup menu is displayed, and then tap **F10** to enter Computer Setup.

Navigating and selecting in 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 select the item.

  NOTE: On tablets without keyboards, you can use your finger to make selections.

- To scroll up and down, select 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:

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

  – or –

  Select **Main**, select **Ignore Changes and Exit**, and then press enter.

- To save your changes and exit Computer Setup menus:

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

  – or –

  Select **Main**, select **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. Start Computer Setup. See Starting Computer Setup on page 107.

2. Select **Main**, and then select **Apply Factory Defaults and Exit**.

   NOTE: On select products, the selections may display **Restore Defaults** instead of **Apply Factory Defaults and Exit**.

3. Follow the on-screen instructions.

4. To save your changes and exit, select the **Save** icon in the lower-right corner of the screen, and then follow the on-screen instructions.

   – or –

   Select **Main**, select **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 decide whether you need to update Computer Setup (BIOS), first determine the BIOS version on your computer.

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

1. Start Computer Setup. See Starting Computer Setup on page 107.

2. Select **Main**, and then select **System Information**.

3. To exit Computer Setup without saving your changes, select the **Exit** icon in the lower-right corner of the screen, and then follow the on-screen instructions.

    – or –

    Select **Main**, select **Ignore Changes and Exit**, and then press enter.

To check for later BIOS versions, see Downloading a BIOS update on page 109.

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

    – or –

    Select the question mark icon in the taskbar.

2. Select **Updates**, and then select **Check for updates and messages**.

3. Follow the on-screen instructions.

4. At the download area, follow these steps:

    a. Identify the most recent BIOS update and compare it to the BIOS version currently installed on your computer. Make a note of the date, name, or other identifier. You may need this information to locate the update later, after it has been downloaded to your hard drive.

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

        Make a note of the path to the location on your hard drive where the BIOS update is downloaded. You will need to access this path when you are ready to install the update.

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

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

1. Type `file` in the taskbar search box, and then select **File Explorer**.

2. Select your hard drive designation. The hard drive designation is typically Local Disk (C:).

3. Using the hard drive path you recorded earlier, open the folder that contains the update.

4. Double-click the file that has an .exe extension (for example, *filename*.exe).

   The BIOS installation begins.

5. Complete the installation by following the on-screen instructions.

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

Changing the boot order using the f9 prompt

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

1. Access the Boot Device Options menu:

   - Computers or tablets with keyboards:

     ▲ Turn on or restart the computer, and when the HP logo appears, press f9 to enter the Boot Device Options menu.

   - Tablets without keyboards:

     ▲ Turn off the tablet. Press the power button in combination with the volume down button until the Startup menu is displayed, and then tap **F9** to enter the Boot Device Options menu.

2. Select a boot device, then press enter.

TPM BIOS settings (select products only)

IMPORTANT: Before enabling Trusted Platform Module (TPM) functionality on this system, you must ensure that your intended use of TPM complies with relevant local laws, regulations and policies, and approvals or licenses must be obtained if applicable. For any compliance issues arising from your operation/usage of TPM which violates the above mentioned requirement, you shall bear all the liabilities wholly and solely. HP will not be responsible for any related liabilities.

TPM provides additional security for your computer. You can modify the TPM settings in Computer Setup (BIOS).

NOTE: If you change the TPM setting to Hidden, TPM is not visible in the operating system.

To access TPM settings in Computer Setup:

1. Start Computer Setup. See Starting Computer Setup on page 107.

2. Select **Security**, select **TPM Embedded Security**, and then follow the on-screen instructions.

Using HP Sure Start (select products only)

Select computer models are configured with HP Sure Start, a technology that continuously monitors the computer's BIOS for attacks or corruption. If the BIOS becomes corrupted or is attacked, HP Sure Start automatically restores the BIOS to its previously safe state, without user intervention.

HP Sure Start is configured and already enabled so that most users can use the HP Sure Start default configuration. The default configuration can be customized by advanced users.

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

10 HP PC Hardware Diagnostics (UEFI)

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

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

To start HP PC Hardware Diagnostics UEFI:

1. Start BIOS:

   - Computers or tablets with keyboards:

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

   - Tablets without keyboards:

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

       - or -

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

2. Press or tap f2.

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

   a. Connected USB drive

   > **NOTE:** To download the HP PC Hardware Diagnostics (UEFI) tool to a USB drive, see Downloading HP PC Hardware Diagnostics (UEFI) to a USB device on page 113.

   b. Hard drive

   c. BIOS

3. When the diagnostic tool opens, select the type of diagnostic test you want to run, and then follow the on-screen instructions. On a tablet, press the volume down button to stop a diagnostic test.

> **NOTE:** If you need to stop a diagnostic test on computers or tablets with a keyboard, press esc.

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

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

Download the latest UEFI version:

1. Go to http://www.hp.com/go/techcenter/pcdiags. The HP PC Diagnostics home page is displayed.
2. In the HP PC Hardware Diagnostics section, click the **Download** link, and then select **Run**.

Download any version of UEFI for a specific product:

1. Go to http://www.hp.com/support, and then select your country. The HP Support page is displayed.
2. Click **Drivers & Downloads**.
3. In the text box, enter the product name, and then click **Go**.

   – or –

   Click **Find Now** to let HP automatically detect your product.
4. Select your computer, and then select your operating system.
5. In the **Diagnostic** section, follow the on-screen instructions to select and download the UEFI version you want.

11 Backup and recovery in Windows 7

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

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

Creating recovery media and backups

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

1. After you successfully set up the computer, create HP Recovery media. This step creates a Windows 7 operating system DVD and a *Driver Recovery* DVD. The Windows DVD can be used to reinstall the original operating system in cases where the hard drive is corrupted or has been replaced. The *Driver Recovery* DVD installs specific drivers and applications. See Creating recovery media with HP Recovery Disc Creator on page 114.

2. Use Windows Backup and Recovery tools to perform the following:

   - Back up individual files and folders
   - Back up your entire hard drive (select models only)
   - Create system repair discs (select models only) with the installed optical drive (select models only) or an optional external optical drive
   - Create system restore points

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

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

   In case of system failure, you can use the backup files to restore the contents of your computer. See Backing up your information on page 115.

Guidelines

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

Creating recovery media with HP Recovery Disc Creator

HP Recovery Disc Creator is a software program that offers an alternative way to create recovery media. After you successfully set up the computer, you can create recovery media using HP Recovery Disc Creator. This recovery media allows you to reinstall your original operating system as well as select drivers and

applications if the hard drive becomes corrupted. HP Recovery Disc Creator can create two kinds of recovery DVDs:

- Windows 7 operating system DVD—Installs the operating system without additional drivers or applications.

- *Driver Recovery* DVD—Installs specific drivers and applications only, in the same way that the HP Software Setup utility installs drivers and applications.

Creating recovery media

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

To create the Windows DVD:

1. Select **Start > All Programs > Productivity and Tools > HP Recovery Disc Creator**.

2. Select **Windows disk**.

3. From the drop-down menu, select the drive for burning the recovery media.

4. Click the **Create** button to start the burning process.

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

1. Select **Start > All Programs > Productivity and Tools > HP Recovery Disc Creator**.

2. Select **Driver disk**.

3. From the drop-down menu, select the drive for burning the recovery media.

4. Click the **Create** button to start the burning process.

Backing up your information

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

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

Note the following when backing up:

- Store personal files in the Documents library, and back it up regularly.

- Back up templates that are stored in their associated directories.

- Save customized settings that appear in a window, toolbar, or menu bar by taking a screen shot of your settings. The screen shot can be a time-saver if you have to reset your preferences.

- When backing up to discs, number each disc after removing it from the drive.

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

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

To create a backup using Windows Backup and Restore:

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

1. Select **Start > All Programs > Maintenance > Backup and Restore**.

2. Follow the on-screen instructions to set up your backup, create a system image (select models only), or create system repair media (select models only).

Performing a system recovery

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

- Windows recovery tools: You can use Windows Backup and Restore to recover information you have previously backed up. You can also use Windows Startup Repair to fix problems that might prevent Windows from starting correctly.

- f11 recovery tools (select models only): You can use the f11 recovery tools to recover your original hard drive image. The image includes the Windows operating system and software programs installed at the factory.

📝 **NOTE:** If you are unable to boot (start up) your computer and you cannot use the system repair media you previously created (select models only), you must purchase Windows 7 operating system media to reboot the computer and repair the operating system. For additional information, see Using Windows 7 operating system media on page 117.

Using the Windows recovery tools

Using the Windows recovery tools, you can:

- Recover individual files

- Restore the computer to a previous system restore point

- Recover information using recovery tools

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

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

To recover information you previously backed up:

1. Select **Start > All Programs > Maintenance > Backup and Restore**.

2. Follow the on-screen instructions to recover your system settings, your computer (select models only), or your files.

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

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

1. If possible, back up all personal files.

2. If possible, check for the presence of the Windows partition.

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

    NOTE: If the Windows partition is not listed, you must recover your operating system and programs using the Windows 7 operating system DVD and the *Driver Recovery* media. For additional information, see Using Windows 7 operating system media on page 117.

3. If the Windows partition is listed, restart the computer, and then press f8 before the Windows operating system loads.

4. Select **Startup Repair**.

5. Follow the on-screen instructions.

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

Using f11 recovery tools (select models only)

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

To recover the original hard drive image using f11:

1. If possible, back up all personal files.

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

    NOTE: If the HP Recovery partition is not listed, you must recover your operating system and programs using the Windows 7 operating system media and the *Driver Recovery* media. For additional information, see Using Windows 7 operating system media on page 117.

3. If the HP Recovery partition is listed, restart the computer, and then press esc while the "Press the ESC key for Startup Menu" message is displayed at the bottom of the screen.

4. Press f11 while the "Press <F11> for recovery" message is displayed on the screen.

5. Follow the on-screen instructions.

Using Windows 7 operating system media

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

To order a Windows 7 operating system DVD, go to the HP website. For U.S. support, go to http://www.hp.com/support. For worldwide support, go to http://welcome.hp.com/country/us/en/wwcontact_us.html. You can also order the DVD by calling support. For contact information, see the *Worldwide Telephone Numbers* booklet included with the computer.

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

To initiate recovery using a Windows 7 operating system DVD:

NOTE: This process takes several minutes.

1. If possible, back up all personal files.

2. Restart the computer, and then insert the Windows 7 operating system DVD into the optical drive before the Windows operating system loads.

3. When prompted, press any keyboard key.

4. Follow the on-screen instructions.

5. Click **Next**.

6. Select **Repair your computer**.

7. Follow the on-screen instructions.

After the repair is completed:

1. Eject the Windows 7 operating system DVD and then insert the *Driver Recovery* DVD.

2. Install the Hardware Enabling Drivers first, and then install Recommended Applications.

12 Backup and recovery in Windows 8.1

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

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

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

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

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

Backing up your information

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

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

Performing a system recovery

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

- Windows recovery tools: You can use Windows Backup and Restore to recover information you have previously backed up. You can also use Windows Automatic Repair to fix problems that might prevent Windows from starting correctly.

- f11 recovery tools: You can use the f11 recovery tools to recover your original hard drive image. The image includes the Windows operating system and software programs installed at the factory.

NOTE: If you are unable to boot (start up) your computer and you cannot use the system repair media you previously created (select models only), you must purchase Windows operating system media to reboot the computer and repair the operating system. For additional information, see Using Windows operating system media (purchased separately) on page 121.

Using the Windows recovery tools

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

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

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

1.   If possible, back up all personal files.

2.   If possible, check for the presence of the Recovery Image partition and the Windows partition.

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

     – or –

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

     📝 **NOTE:**   If the Windows partition and the Recovery Image partition are not listed, you must recover your operating system and programs using the Windows operating system DVD and the *Driver Recovery* media (both purchased separately). For additional information, see Using Windows operating system media (purchased separately) on page 121.

3.   If the Windows partition and the Recovery Image partition are listed, restart the computer by pressing and holding the shift key while clicking **Restart**.

4.   Select **Troubleshoot**, then select **Advanced Options**, and then select **Startup Repair**.

5.   Follow the on-screen instructions.

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

Using f11 recovery tools

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

To recover the original hard drive image using f11:

1.   If possible, back up all personal files.

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

     📝 **NOTE:**   If the Recovery Image partition is not listed, you must recover your operating system and programs using the Windows operating system media and the *Driver Recovery* media (both purchased separately). For additional information, see Using Windows operating system media (purchased separately) on page 121.

3.   If the Recovery Image partition is listed, restart the computer, and then press esc while the "Press the ESC key for Startup Menu" message is displayed at the bottom of the screen.

4.   Press f11 while the "Press <F11> for recovery" message is displayed on the screen.

5.   Follow the on-screen instructions.

Using Windows operating system media (purchased separately)

To order a Windows operating system DVD, contact support. See the *Worldwide Telephone Numbers* booklet included with the computer. You can also find contact information from the HP website. Go to http://www.hp.com/support, select your country or region, and follow the on-screen instructions.

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

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

📝 **NOTE:** This process takes several minutes.

1. If possible, back up all personal files.

2. Insert the Windows operating system DVD into the optical drive, and then restart the computer.

3. When prompted, press any keyboard key.

4. Follow the on-screen instructions.

After the installation is completed:

1. Eject the Windows operating system media and then insert the *Driver Recovery* media.

2. Install the Hardware Enabling Drivers first, and then install Recommended Applications.

Using Windows Refresh or Windows Reset

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

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

Using HP Software Setup

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

1. From the Start screen, type `HP Software Setup`.

2. Open HP Software Setup.

3. Follow the on-screen directions to reinstall drivers or select software.

13 Backup and recovery in Windows 10

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

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

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

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

– or –

Click the question mark icon in the taskbar.

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

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

Creating recovery media and backups

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

- Use HP Recovery Manager to create HP Recovery media after you successfully set up the computer. This step creates a backup of the HP Recovery partition on the computer. The backup can be used to reinstall the original operating system in cases where the hard drive is corrupted or has been replaced. For information on creating recovery media, see Creating HP Recovery media (select products only) on page 122. For information on the recovery options that are available using the recovery media, see Using Windows tools on page 123.

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

  For more information, see Recovering using HP Recovery Manager on page 124.

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

Creating HP Recovery media (select products only)

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

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

You can use Windows tools to create system restore points and create backups of personal information, see Using Windows tools on page 123.

●   If your computer does list the Recovery partition and the Windows partition, you can use HP Recovery Manager to create recovery media after you successfully set up the computer. HP Recovery media can be used to perform system recovery if the hard drive becomes corrupted. System recovery reinstalls the original operating system and software programs that were installed at the factory and then configures the settings for the programs. HP Recovery media can also be used to customize the system or restore the factory image if you replace the hard drive.

    ◦   Only one set of recovery media can be created. Handle these recovery tools carefully, and keep them in a safe place.

    ◦   HP Recovery Manager examines the computer and determines the required storage capacity for the media that will be required.

    ◦   To create recovery discs, your computer must have an optical drive with DVD writer capability, and you must use only high-quality blank DVD-R, DVD+R, DVD-R DL, or DVD+R DL discs. Do not use rewritable discs such as CD±RW, DVD±RW, double-layer DVD±RW, or BD-RE (rewritable Blu-ray) discs; they are not compatible with HP Recovery Manager software. Or, instead, you can use a high-quality blank USB flash drive.

    ◦   If your computer does not include an integrated optical drive with DVD writer capability, but you would like to create DVD recovery media, you can use an external optical drive (purchased separately) to create recovery discs. If you use an external optical drive, it must be connected directly to a USB port on the computer; the drive cannot be connected to a USB port on an external device, such as a USB hub. If you cannot create DVD media yourself, you can obtain recovery discs for your computer from HP. See the *Worldwide Telephone Numbers* booklet included with the computer. You can also find contact information on the HP website. Go to http://www.hp.com/support, select your country or region, and follow the on-screen instructions.

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

    ◦   The creation process can take an hour or more. Do not interrupt the creation process.

    ◦   If necessary, you can exit the program before you have finished creating all of the recovery DVDs. HP Recovery Manager will finish burning the current DVD. The next time you start HP Recovery Manager, you will be prompted to continue.

To create HP Recovery media:

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

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

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

If you ever need to recover the system, see Recovering using HP Recovery Manager on page 124.

Using Windows tools

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

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

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

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

Restore and recovery

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

IMPORTANT: Not all methods are available on all products.

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

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

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

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

- If you want to recover the Windows partition to original factory content, you can choose the System Recovery option from the HP Recovery partition (select products only) or use the HP Recovery media. For more information, see Recovering using HP Recovery Manager on page 124. If you have not already created recovery media, see Creating HP Recovery media (select products only) on page 122.

- On select products, if you want to recover the computer's original factory partition and content, or if you have replaced the hard drive, you can use the Factory Reset option of HP Recovery media. For more information, see Recovering using HP Recovery Manager on page 124.

- On select products, if you want to remove the recovery partition to reclaim hard drive space, HP Recovery Manager offers the Remove Recovery Partition option.

  For more information, see Removing the HP Recovery partition (select products only) on page 126.

Recovering using HP Recovery Manager

HP Recovery Manager software allows you to recover the computer to its original factory state by using the HP Recovery media that you either created or that you obtained from HP, or by using the HP Recovery partition (select products only). If you have not already created recovery media, see Creating HP Recovery media (select products only) on page 122.

What you need to know before you get started

- HP Recovery Manager recovers only software that was installed at the factory. For software not provided with this computer, you must either download the software from the manufacturer's website or reinstall the software from the media provided by the manufacturer.

  IMPORTANT: Recovery through HP Recovery Manager should be used as a final attempt to correct computer issues.

- HP Recovery media must be used if the computer hard drive fails. If you have not already created recovery media, see Creating HP Recovery media (select products only) on page 122.

- To use the Factory Reset option (select products only), you must use HP Recovery media. If you have not already created recovery media, see Creating HP Recovery media (select products only) on page 122.

- If your computer does not allow the creation of HP Recovery media or if the HP Recovery media does not work, you can obtain recovery media for your system from support. See the *Worldwide Telephone Numbers* booklet included with the computer. You can also find contact information from the HP

website. Go to http://www.hp.com/support, select your country or region, and follow the on-screen instructions.

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

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

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

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

- Factory Reset—Restores the computer to its original factory state by deleting all information from the hard drive and re-creating the partitions. Then it reinstalls the operating system and the software that was installed at the factory.

The HP Recovery partition (select products only) allows System Recovery only.

Using the HP Recovery partition (select products only)

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

To start HP Recovery Manager from the HP Recovery partition:

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

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

    - or-

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

    For tablets without keyboards:

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

    - or -

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

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

3. Select **Recovery Manager**, and then follow the on-screen instructions.

Using HP Recovery media to recover

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

1. If possible, back up all personal files.

2. Insert the HP Recovery media, and then restart the computer.

    NOTE: If the computer does not automatically restart in HP Recovery Manager, change the computer boot order. See Changing the computer boot order on page 126.

3. Follow the on-screen instructions.

Changing the computer boot order

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

To change the boot order:

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

1.   Insert the HP Recovery media.

2.   Access BIOS:

For computers or tablets with keyboards attached:

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

For tablets without keyboards:

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

- or -

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

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

4.   Follow the on-screen instructions.

Removing the HP Recovery partition (select products only)

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

IMPORTANT: After you remove the HP Recovery partition, you will not be able to perform System Recovery or create HP recovery media from the HP Recovery partition. So before you remove the Recovery partition, create HP Recovery media; see Creating HP Recovery media (select products only) on page 122.

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

Follow these steps to remove the HP Recovery partition:

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

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

14 Specifications

Computer specifications

	Metric	U.S.
Dimensions		
Width	**38.2 cm**	15.0 in
Depth	**25.7 cm**	10.1 in
Height (front to rear, LED display assembly)	**3.1 to 3.6 cm**	1.2 to 1.4 in
Weight (computer equipped with Intel Dual Core processor, 500-GB hard drive, optical drive, one memory module, WLAN module, fingerprint reader, modem module, and 8-cell battery)	**2.93 kg**	6.45 lb
Weight (computer equipped with Intel Dual Core processor one memory module, 128-GB solid-state drive, WLAN module, fingerprint reader, and 8-cell battery)	**2.82 kg**	6.2 lb
Input power		
Operating voltage and current	19.5 V dc @ 6.15 A - 120 W, Slim Smart AC Adapter (select models only)	
	19.5 V dc @ 7.69 A - 150 W, Slim Smart AC Adapter (select models only)	
	19.5 V dc @ 10.3A – 200 W, Slim Smart AC Adapter (select models only)	
Temperature		
Operating	**5°C to 35°C**	41°F to 95°F
Nonoperating	**-20°C to 60°C**	-4°F to 140°F
Relative humidity (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.

Hard drive specifications

	1-TB*	750-GB**	500-GB**
Dimensions			
Height	9.5 mm	9.5 mm	9.5 mm
Length	100.4 mm	100.4 mm	100.4 mm
Width	69.9 mm	69.9 mm	69.9 mm
Weight	110 g	110 g	110 g
Interface type	SATA	SATA	SATA
Transfer rate			
Synchronous (maximum)	1.1 GB/sec	1.1 GB/sec	1.1 GB/sec
Security	ATA security	ATA security	ATA security
Seek times (typical read, including setting)			
Single track	1.5 ms	1.5 ms	1.5 ms
Average (read/write)	11/13 ms	11/13 ms	11/13 ms
Maximum	22 ms	22 ms	22 ms
Logical blocks	1,953,525,168	1,465,149,168	976,773,168
Disk rotational speed	5400 rpm or 7200 rpm	7200 rpm	5400 rpm or 7200 rpm
Operating temperature	0°C to 60°C (32°F to 140°F)		

*1 TB = 1 trillion bytes when referring to hard drive storage capacity. Actual accessible capacity is less.

**1 GB = 1 billion bytes when referring to hard drive storage capacity. Actual accessible capacity is less.

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

15 Statement of memory volatility

The purpose of this chapter is to provide general information regarding nonvolatile memory in HP Business PCs. This chapter also provides 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 PC products that use Intel®-based or AMD®-based system boards contain volatile DDR memory. The amount of nonvolatile memory present in the system depends upon the system configuration. Intel-based and AMD-based system boards contain nonvolatile memory subcomponents as originally shipped from HP, assuming that no subsequent modifications have been made to the system and assuming that no applications, features, or functionality have been added to or installed on the system.

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

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

    a. 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:** If the system has a BIOS administrator password, enter the password at the prompt.

    b. Select **Main**, select **Restore Defaults**, and then select **Yes** to load defaults.

    c. Select the **Security** menu, select **Restore Security Level Defaults**, and then select **Yes** to 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 then select **Asset Tracking Number**. Clear the tag, and then make the selection to return to the prior menu.

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

    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, and then select **Reset BIOS Security to factory default**. Click **Yes** at the warning message.

    h. Select the **Main** menu, select **Save Changes and Exit**, select **Yes** to save changes and exit, and then select **Shutdown**.

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

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

2. Complete one of the following:

● Remove and retain the storage drive.

– or –

● Clear the drive contents by using a third party utility designed to erase data from an SSD.

– or –

● Clear the contents of the drive by using the following BIOS Setup Secure Erase command option steps:

IMPORTANT: If you clear data using Secure Erase, it cannot be recovered.

a. 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.

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

c. Select **Hard Drive Tools**.

d. Under **Utilities**, select **Secure Erase**, select the hard drive storing the data you want to clear, and then follow the on-screen instructions to continue.

– or –

● Clear the contents of the drive by using the following Disk Sanitizer command steps:

IMPORTANT: If you clear data using Disk Sanitizer, it cannot be recovered.

NOTE: The amount of time it takes for Disk Sanitizer to run can take several hours. Plug the computer into an AC outlet before starting.

a. 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.

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

c. Select **Hard Drive Tools**.

d. Under **Utilities**, select **Disk Sanitizer**, select the hard drive storing the data you want to clear, and then follow the on-screen instructions to continue.

Nonvolatile memory usage

Nonvolatile Memory Type	Amount (Size)	Does this memory store customer data?	Does this memory retain data when power is removed?	What is the purpose of this memory?	How is data input into this memory?	How is this memory write-protected?
HP Sure Start flash (select models only)	2 MBytes	No	Yes	Provides protected backup of critical System BIOS code, EC firmware, and critical PC configuration data for select platforms that support HP Sure Start. For more information, see Using HP Sure Start (select models only) on page 134.	Data cannot be written to this device via the host processor. The content is managed solely by the HP Sure Start Embedded Controller.	This memory is protected by the HP Sure Start Embedded Controller.
Real Time Clock (RTC) battery backed-up CMOS configuration memory	256 Bytes	No	Yes	Stores system date and time and noncritical data.	RTC battery backed-up CMOS is programmed using the Computer Setup (BIOS), or changing the Microsoft Windows date & time.	This memory is not write-protected.
Controller (NIC) EEPROM	64 KBytes (not customer accessible)	No	Yes	Stores NIC configuration and NIC firmware.	NIC EEPROM is programmed 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 the NIC vendor. Writing data to this ROM in an inappropriate manner will render the NIC 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.	DIMM SPD is programmed by the memory vendor.	Data cannot be written to this memory when the module is installed in a PC. The specific write-protection method varies by memory vendor.
System BIOS	4 MBytes to 5 MBytes	Yes	Yes	Stores 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 Computer Setup (BIOS) or a custom utility.	**NOTE:** Writing data to this ROM in an inappropriate manner can render the PC non-functional. A utility is required for writing data to this memory and is available on the HP website; go to http://www.hp.com/support, and select your country. Select **Drivers &**

Nonvolatile 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?
						Downloads, and then follow the on-screen instructions.
Intel Management Engine Firmware (present in only specific ZBook and EliteBook models. For more information, go to http://www.hp.com/support, and select your country. Select **Drivers & Downloads**, and then follow the on-screen instructions.)	1.5 MBytes or 5 MBytes	Yes	Yes	Stores Management Engine Code, Settings, Provisioning Data and iAMT third-party data store.	Management Engine Code is programmed at the factory. Code is updated via Intel secure firmware update utility. Unique Provisioning Data can be entered at the factory or by an administrator using the Management Engine (MEBx) setup utility. The third party data store contents can be populated by a remote management console or local applications that have been registered by an administrator to have access to the space.	The Intel chipset is configured to enforce hardware protection to block all direct read/write access to this area. An Intel utility is required for updating the firmware. Only firmware updates digitally signed by Intel can be applied using this utility.
Bluetooth flash	2 Mbit	No	Yes	Stores Bluetooth configuration and firmware.	Bluetooth flash is 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 whenever the flash requires an upgrade.
802.11 WLAN EEPROM	4 Kbit to 8 Kbit	No	Yes	Stores configuration and calibration data.	802.11 WLAN EEPROM is 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.
Web camera	64 Kbit	No	Yes	Stores webcam configuration and firmware.	Webcam memory is programmed using a utility from the device manufacturer that can be run from Windows.	A utility is required for writing data to this memory and is typically not made available to the public unless a firmware upgrade is necessary to address a unique issue.
Fingerprint reader	512 KByte flash	Yes	Yes	Stores fingerprint templates.	Fingerprint reader memory is programmed by user enrollment in HP ProtectTools Security Manager.	Only a digitally signed application can make the call to write to the flash.

Questions and answers

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

   📝 **IMPORTANT:** Restore defaults does not securely erase any data on your hard drive. See question and answer 6 for steps to securely erase data.

   Restore defaults does not reset the Custom Secure Boot keys. See question and answer 7 for information about resetting the keys.

   a. 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.

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

   c. Follow the on-screen instructions.

   d. Select **Main**, select **Save Changes and Exit**, and then follow the on-screen instructions.

2. **What is a UEFI BIOS, and how is it different from a legacy BIOS?**

   The Unified Extensible Firmware Interface (UEFI) BIOS is an industry-standard software interface between the platform firmware and an operating system (OS). It is a replacement for the older BIOS architecture, but supports much of the legacy BIOS functionality.

   Like the legacy BIOS, the UEFI BIOS provides an interface to display the system information and configuration settings and to change the configuration of your computer before an OS is loaded. BIOS provides a secure run-time environment that supports a Graphic User Interface (GUI). In this environment, you can use either a pointing device (Touchscreen, TouchPad, pointing stick, or USB mouse) or the keyboard to navigate and make menu and configuration selections. The UEFI BIOS also contains basic system diagnostics.

   The UEFI BIOS provides functionality beyond that of the legacy BIOS. In addition, the UEFI BIOS works to initialize the computer's hardware before loading and executing the OS; the run-time environment allows the loading and execution of software programs from storage devices to provide more functionality, such as advanced hardware diagnostics (with the ability to display more detailed system information) and advanced firmware management and recovery software.

   HP has provided options in Computer Setup (BIOS) to allow you to run in legacy BIOS, if required by the operating system. Examples of this requirement would be if you upgrade or downgrade the OS.

3. **Where does the UEFI BIOS reside?**

   The UEFI BIOS resides on a flash memory chip. A utility is required to write to the chip.

4. **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. Various third-party tools are available to read SPD memory.

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

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

6. **How can the BIOS security be reset to factory defaults and data erased?**

IMPORTANT: Resetting will result in the loss of information.

These steps will not reset Custom Secure Boot Keys. See question and answer 7 for information about resetting the keys.

a. 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.

b. Select **Main**, and then select **Reset BIOS Security to Factory Default**.

c. Follow the on-screen instructions.

d. Select **Main**, select **Save Changes and Exit**, and then follow the on-screen instructions.

7. **How can the Custom Secure Boot Keys be reset?**

Secure Boot is a feature to ensure that only authenticated code can start on a platform. If you enabled Secure Boot and created Custom Secure Boot Keys, simply disabling Secure Boot will not clear the keys. You must also select to clear the Custom Secure Boot Keys. Use the same Secure Boot access procedure you used to create the Custom Secure Boot Keys, but make the selection to clear or delete all Secure Boot Keys.

a. 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.

b. Select the **Security** menu, select **Secure Boot Configuration**, and then follow the on-screen instructions.

c. At the **Secure Boot Configuration** window, select **Secure Boot**, select **Clear Secure Boot Keys**, and then follow the on-screen instructions to continue.

Using HP Sure Start (select models only)

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

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

16 Power cord set requirements

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

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

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

Requirements for all countries

The following requirements are applicable to all countries and regions:

- The length of the power cord set must be at least 1.0 m (3.3 ft) and no more than 2.0 m (6.5 ft).
- All power cord sets must be approved by an acceptable accredited agency responsible for evaluation in the country or region where the power cord set will be used.
- The power cord sets must have a minimum current capacity of 10 amps and a nominal voltage rating of 125 or 250 V AC, as required by the power system of each country or region.
- The appliance coupler must meet the mechanical configuration of an EN 60 320/IEC 320 Standard Sheet C13 connector for mating with the appliance inlet on the back of the computer. Requirements for all countries 113

Requirements for specific countries and regions

Country/region	Accredited agency	Applicable note number
Australia	EANSW	1
Austria	OVE	1
Belgium	CEBC	1
Canada	CSA	2
Denmark	DEMKO	1
Finland	FIMKO	1
France	UTE	1
Germany	VDE	1
Italy	IMQ	1
Japan	METI	3
The Netherlands	KEMA	1
Norway	NEMKO	1
The People's Republic of China	COC	5

Country/region	Accredited agency	Applicable note number
South Korea	EK	4
Sweden	CEMKO	1
Switzerland	SEV	1
Taiwan	BSMI	4
The United Kingdom	BSI	1
The United States	UL	2

1. The flexible cord must be Type HO5VV-F, 3-conductor, 1.0-mm² conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country or region where it will be used.

2. The flexible cord must be Type SPT-3 or equivalent, No. 18 AWG, 3-conductor. The wall plug must be a two-pole grounding type with a NEMA 5-15P (15 A, 125 V) or NEMA 6-15P (15 A, 250 V) configuration.

3. The appliance coupler, flexible cord, and wall plug must bear a "T" mark and registration number in accordance with the Japanese Dentori Law. The flexible cord must be Type VCT or VCTF, 3-conductor, 1.00-mm² conductor size. The wall plug must be a two-pole grounding type with a Japanese Industrial Standard C8303 (7 A, 125 V) configuration.

4. The flexible cord must be Type RVV, 3-conductor, 0.75-mm² conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country or region where it will be used.

5. The flexible cord must be Type VCTF, 3-conductor, 0.75-mm² conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country or region where it will be used.

17 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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