HP ProBook 430 G1 Notebook PC

Maintenance and Service Guide

First Edition: July 2013

Document Part Number: 726502-001

Product notice

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

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

Important Notice about Customer Self-Repair Parts

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

Safety warning notice

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

Table of contents

1 Product description

Category	Description
Product Name	**HP ProBook 430 G1 Notebook PC**
Processors	All processors soldered onto system board.
	Intel® Core™ i7-4500U, 1.80-GHz/3.0-GHz core turbo, 4-MB L3 cache/Intel HD Graphics 4400
	Intel Core i5-4250U, 1.30-GHz/2.6-GHz core turbo, 3-MB L3 cache/Intel HD Graphics 5000
	Intel Core i5-4200U, 1.60-GHz/2.6-GHz core turbo, 3-MB L3 cache/Intel HD Graphics 4400
	Intel Core i3-4010U, 1.70-GHz, 3-MB L3 cache/Intel HD Graphics 4400
Chipset	Intel Shark Bay ULT
Graphics	Intel HD Graphics (UMA) Branding is processor-specific.
Panel	33.8-cm (13.3-inch) HD, anti-glare, LED, 1366x768, flat (3.6 mm), SVA, 200 nits, includes camera, with or without WWAN
Memory	Two customer-accessible/upgradeable memory module slots supporting up to 16 GB of RAM
	Supports dual-channel memory
	PC3-12800, 1600-MHz, DDR3L
	Supports the following configurations: • 16384 (8192 × 2; dual channel) • 12288 (8192 + 4096; dual channel) • 8192 (8192 × 1) • 8192 (4096 × 2; dual channel) • 6144 (4096 + 2048; dual channel) • 4096 (2048 × 2; dual channel) • 4096 (4096 × 1) • 2048 (2048 × 1)

Category	Description
Hard drives	Supports 7-mm, 6.35-cm (2.50-in) SATA hard drives with HP 3D DriveGuard
	Customer-accessible
	Supports the following hard drives: • 500-GB, 7200-rpm • 500-GB, 5400-rpm • 320-GB, 5400-rpm
	Supports the following solid-state drives (SSDs): • 128-GB, SATA III
Optical drives	Supports external USB drive
Audio/Visual	Integrated dual-array microphone
	HD audio with DTS Sound+
	Stereo speakers (2)
	Integrated webcam (720p HD)
	IDT 92HD91
	Skype ready
	Headphone and microphone jacks
Ethernet	Realtek RTL8151FH-CG 10/100/1000
	S3/S4/S5 wake on LAN (both AC and battery mode)
Wireless	**Integrated WLAN options by way of wireless module:**
	Two WLAN antennas built into display assembly
	Supports “no WLAN/No BT” option
	Supports the following WLAN formats: • Realtek RTL8188EE 802.11bgn Wi-Fi Adapter • Mediatek MT7630E 802.11bgn Wi-Fi Adapter and Mediatek Bluetooth 4.0 Adapter • Intel Dual Band Wireless-N 7260AN 802.11 a/b/g/n 2x2 WiFi + BT4.0 • Broadcom BCM943228HMB 802.11abgn 2x2 Wi-Fi + BT 4.0 Combo Adapter • Atheros AR9485 802.11b/g/n 1x1 WiFi Adapter • Atheros AR9565 802.11bgn 1x1 WiFi + BT4.0 combo Adapter
	Integrated WWAN options by way of wireless module:
	Two WWAN antennas built into display assembly (world-wide 5 band, configured with panels)
	Subscriber identity module (SIM) security

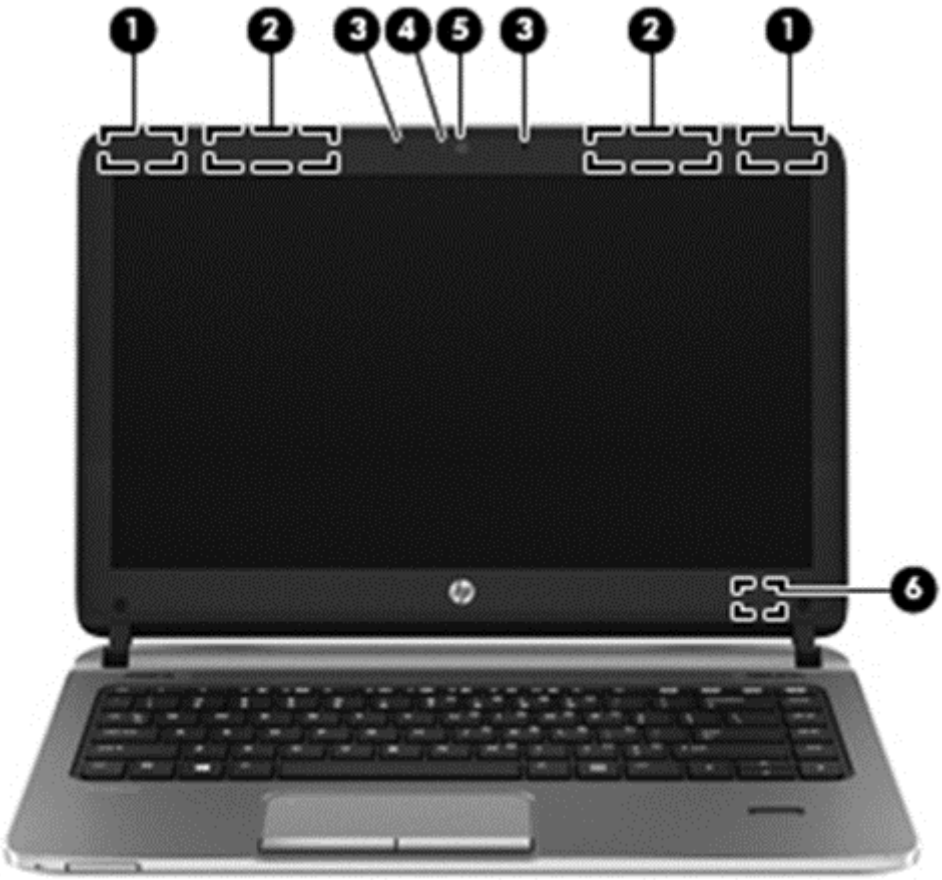
Category	Description
	Supports “no WWAN” option
	Supports the following WWAN modules: • HP lt4112 LTE/HSPA+ Gobi 4G Module • HP hs3110 HSPA+ Mobile Broadband Module
	Integrated personal area network (PAN) options by way of WLAN/ Bluetooth® combo card:
	Bluetooth 4.0 only supported by combo card
External media card	Digital Media Reader Slot
Ports	Audio-in (stereo microphone)
	Audio-out (stereo headphone)
	RJ-45 (Ethernet, includes link and activity lights)
	USB 3.0 (2)
	USB 2.0 powered (1)
	VGA (Dsub 15-pin) supporting 1600 × 1200 external resolution at 75-GHz (hot plug/unplug with auto-detect)
	HDMI
	Multi-pin AC port
Keyboard/pointing devices	Full-sized chiclet keyboard
	Touchpad includes: supports 2-way scroll with legend, taps enabled by default, 2-finger scrolling and zoom enabled by default
Power requirements	Smart AC adapter with localized cable plug support (3-wire plug with ground pin):
	65-W (for India and the People’s Republic of China)
	45-W
	4-cell, 44-Wh, 3.0 Ah Li-ion battery (In-line cavity)
Security	Integrated fingerprint reader
	Intel AT support
	Support security lock
	Support no fingerprint reader option
Operating system	**Preinstalled:**
	Windows 7 Professional 64
	Windows 7 Professional 64 – MSNA
	Windows 7 Home Premium 64
	Windows 7 Home Basic 64

Category	Description
	Windows 8 Professional 64-bit Digital Product Key (DPK) with Windows 7 Professional 64
	Windows 8 Professional 64-bit
	Windows 8 Multi-language (ML) 64-bit
	Windows 8 Emerging Markets (EM) 64-bit
	Windows 8 Chinese Markets (CH) 64-bit
	Novell™: SuSE Linux™ – SLED 11, 64-bit, SP2 (not available with WWAN)
	FreeDOS
	Windows 8 Professional 64-bit with Office 2010 Professional
	Restore Media:
	DRDVD/SRDVD: • DRDVD Windows 7 • DRDVD Windows 8 • SRDVD SuSE Linux Enterprise (SLED) Service Pack 2, 64-bit
	OSDVD: • Windows 7 Home Basic 64 • Windows 7 Home Premium 64 • Windows 7 Professional 32 • Windows 7 Professional 64 • Windows 8 Professional 64
	Web-only support:
	Windows 7 Home Basic 32
	Windows 7 Home Premium 32
	Windows 7 Professional 32
	Certified:
	Microsoft WHQL
	SuSE Linux Enterprise (SLED) Service Pack 2, 64-bit
Serviceability	**End-user replaceable parts:**
	AC adapter
	Battery (system)
	Hard drive
	Memory module

Category	Description
	WLAN module
	WWAN module, SIM
	Keyboard

2 External component identification

Display - Windows models



Component		Description
(1)	WLAN antennas (2)* (select models only)	Send and receive wireless signals to communicate with wireless local area networks (WLAN).
(2)	WWAN antennas (2)* (select models only)	Send and receive wireless signals to communicate with wireless wide area networks (WWAN).
(3)	Internal microphones (2)	Record sound.
(4)	Webcam light	On: The webcam is in use.

Component		Description
(5)	Webcam	Records video and captures still photographs. For information on using the webcam, access HP Support Assistant. To access HP Support Assistant on the Start screen, select the **HP Support Assistant** app.
(6)	Internal display switch	Turns off the display or initiates Sleep if the display is closed while the power is on. **NOTE:** The display switch is not visible on the outside of the computer.
*The antennas are not visible on the outside of the computer. For optimal transmission, keep the areas immediately around the antennas free from obstructions. To see wireless regulatory notices, see the section of the *Regulatory, Safety, and Environmental Notices* that applies to your country or region. To access the user guides, select the **HP Support Assistant** app on the Start screen, select **My computer**, and then select **User guides**.		

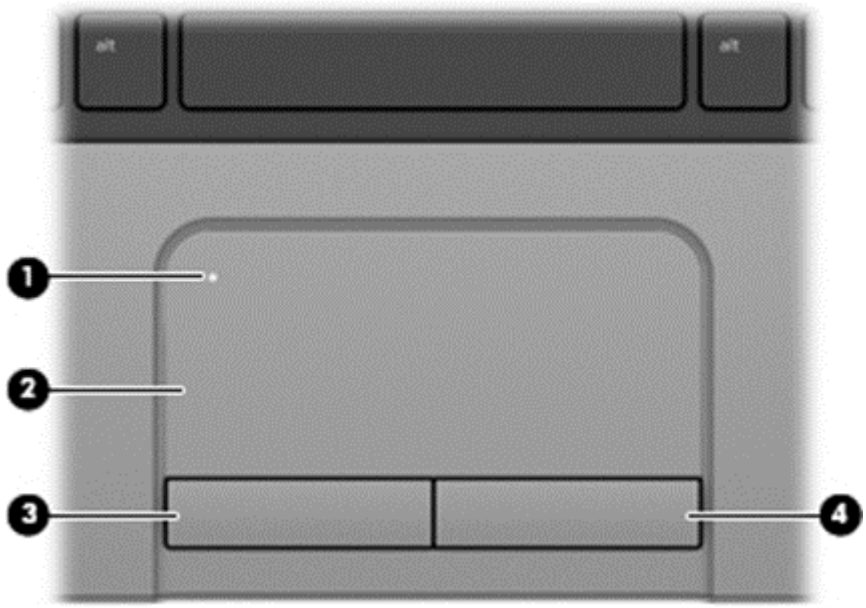
Display - SLED models

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

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

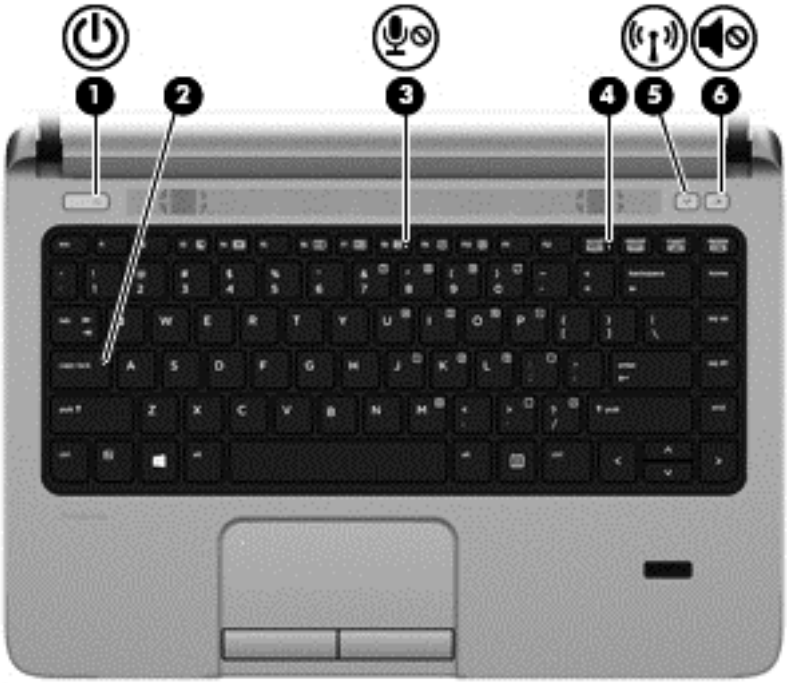
Top

TouchPad



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

Lights (select models only)



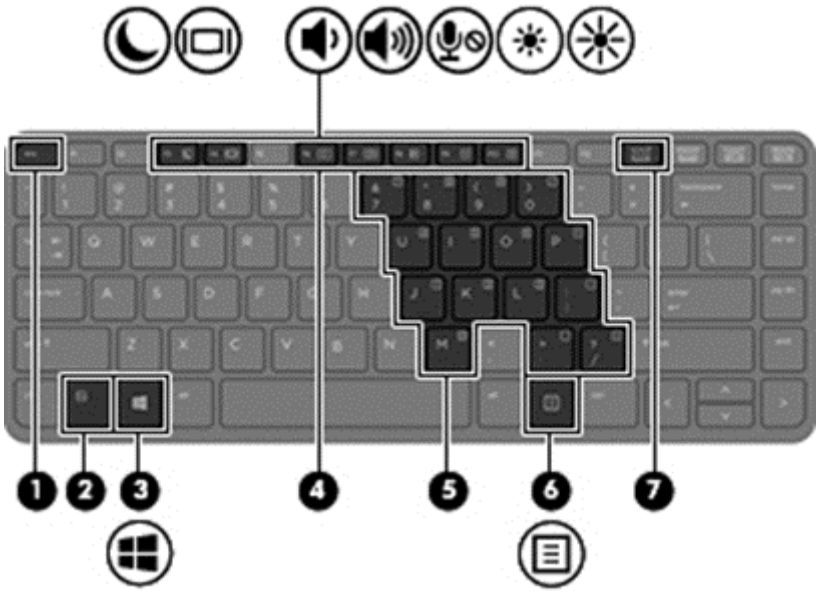
Component			Description
(1)		Power light	• On: The computer is on. • Blinking: The computer is in the Sleep state (Windows 8) or Suspend state (SLED). **NOTE:** The elapsed time between blinks is longer than on previous models. • Off: The computer is off (Windows 8) or in Hibernation (SLED).
(2)		Caps lock light	On: Caps lock is on.
(3)		Microphone mute light	Amber: Microphone is off.
(4)		Num lock light	On: Num lock is on.
(5)		Wireless light (select models only)	• White: An integrated wireless device, such as a wireless local area network (WLAN) device and/or a Bluetooth® device, is on. • Amber: All wireless devices are off.
(6)		Mute light	• Amber: Computer sound is off. • White: Computer sound is on.

Buttons and fingerprint reader (select models only)

Component		Description
(1)	Power button	• When the computer is off, press the button to turn on the computer. • (Windows 8) When the computer is in the Sleep state, press the button briefly to exit Sleep. • (SLED) When the computer is in the Suspend state, press the button briefly to exit Suspend. • (SLED) When the computer is on, press the button briefly to initiate Suspend. • 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 in Windows 8. If the computer has stopped responding and shutdown procedures are ineffective, press and hold the power button for at least 5 seconds to turn off the computer. To learn more about your power settings, see your power options. In Windows 8, from the Start screen, type `power`, select **Settings**, and then select **Power Options**. In SLED, select **Computer > Control Center**, in the left pane click **System**, and then click **Power Management** in the right pane.
(2)	Speakers (2)	Produce sound.

Component		Description
(3)	Wireless button (select models only)	Turns the wireless feature on or off but does not establish a wireless connection. **NOTE:** (SLED) A wireless connection may be established if one has been previously configured.
(4)	Volume mute button	Mutes and restores speaker sound.
(5)	Fingerprint reader (select models only)	Allows a fingerprint logon instead of a password logon.

Keys



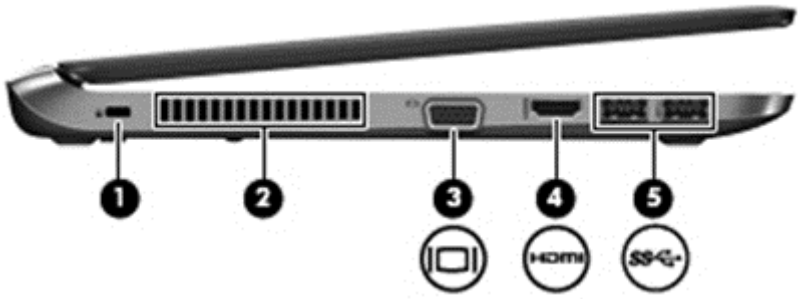
Component		Description
(1)	esc key	Displays system information when pressed in combination with the fn key.
(2)	fn key	Executes frequently used system functions when pressed in combination with a function key, the num lk key, the esc key, or the b key.
(3)	Windows button (Windows only)	Returns you to the Start screen from an open app or the Windows desktop. **NOTE:** Pressing the Windows button again will return you to the previous screen.
(4)	Function keys	Execute frequently used system functions when pressed in combination with the fn key.

Component		Description
(5)	Embedded numeric keypad	When the keypad is turned on, it can be used like an external numeric keypad. Each key on the keypad performs the function indicated by the icon in the upper-right corner of the key.
(6)	Windows applications key	(Windows 8) Displays options for a selected object. (SLED) Displays a shortcut menu for items beneath the cursor.
(7)	num lk key	Turns the embedded numeric keypad on and off when pressed in combination with the fn key. Alternates between the navigational and numeric functions on the integrated numeric keypad.

Front

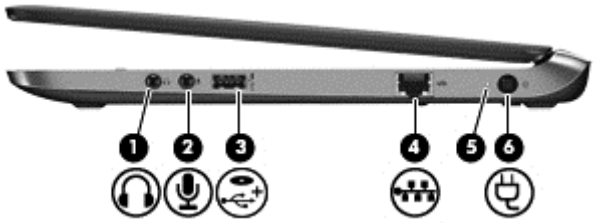
Component		Description
(1)	Hard drive light	• Blinking white: The hard drive is being accessed. • Amber: HP 3D DriveGuard has temporarily parked the hard drive.
(2)	Media Card Reader	Reads data from and writes data to memory sticks and digital memory cards such as Secure Digital (SD).

Left



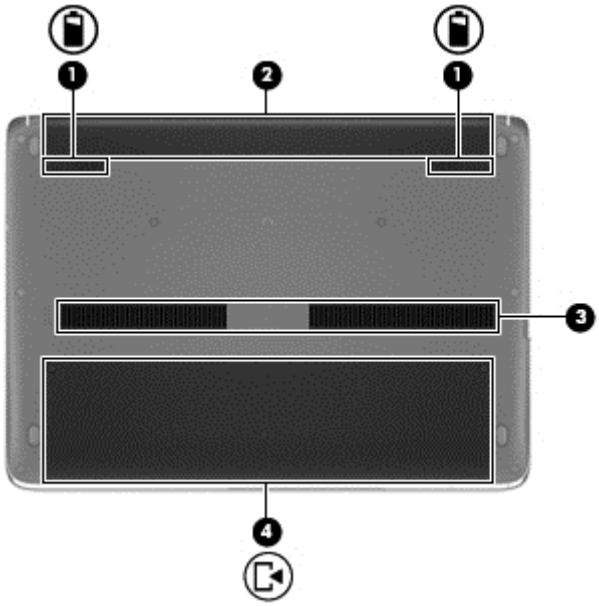
Component			Description
(1)		Security cable slot	Attaches an optional security cable to the computer. **NOTE:** The security cable is designed to act as a deterrent, but it may not prevent the computer from being mishandled or stolen.
(2)		Vent	Enables airflow to cool internal components. **NOTE:** The computer fan starts up automatically to cool internal components and prevent overheating. It is normal for the internal fan to cycle on and off during routine operation.
(3)		External monitor port	Connects an external VGA monitor or projector.
(4)	HDMI	HDMI port	Connects an optional video or audio device, such as a high-definition television, or any compatible digital or audio component.
(5)		USB 3.0 ports (2)	Connect optional USB 3.0 devices and provide enhanced USB power performance.

Right



Component			Description
(1)		Audio-out (headphone) jack	Produces sound when connected to optional powered stereo speakers, headphones, earbuds, a headset, or television audio. **WARNING!** To reduce the risk of personal injury, adjust the volume before putting on headphones, earbuds, or a headset. For additional safety information, see the *Regulatory, Safety, and Environmental Notices*. To access the user guides in Windows 8, select the **HP Support Assistant** app on the Start screen, select **My computer**, and then select **User guides**. **NOTE:** When a device is connected to the jack, the computer speakers are disabled.
(2)		Audio-in (microphone) jack	Connects an optional computer headset microphone, stereo array microphone, or monaural microphone.
(3)		USB 2.0 + powered port	Connect optional USB 2.0 devices and provide enhanced USB power performance.
(4)		RJ-45 (network) jack RJ-45 (network) lights (2)	Connects a network cable. • Green (right): The network is connected. • Amber (left): The network is showing activity.
(5)		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 89 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.
(6)		Power connector	Connects an AC adapter.

Bottom

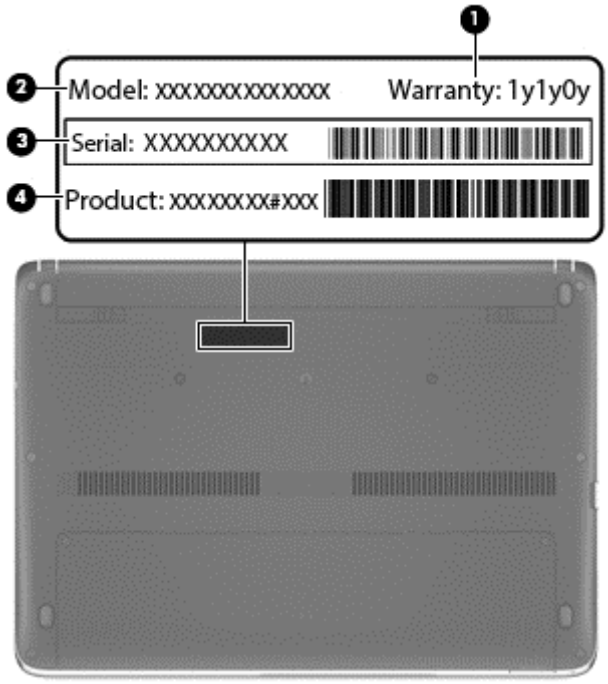


Component			Description
(1)		Battery release latches (2)	Releases the battery.
(2)		Battery bay	Holds the battery.
(3)		Vent	Enable airflow to cool internal components. **NOTE:** The computer fan starts up automatically to cool internal components and prevent overheating. It is normal for the internal fan to cycle on and off during routine operation.
(4)		Service door	Provides access to the wireless LAN (WLAN) module slot, the WWAN module slot, the SIM 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 through HP Support Assistant. To access HP Support Assistant from the Start screen, select the **HP Support Assistant** app.
(5)	SIM	SIM slot (Windows 8 models only)	Supports a wireless subscriber identity module (SIM). The SIM slot is located inside the service door.

Service tag and PCID label

Service tag

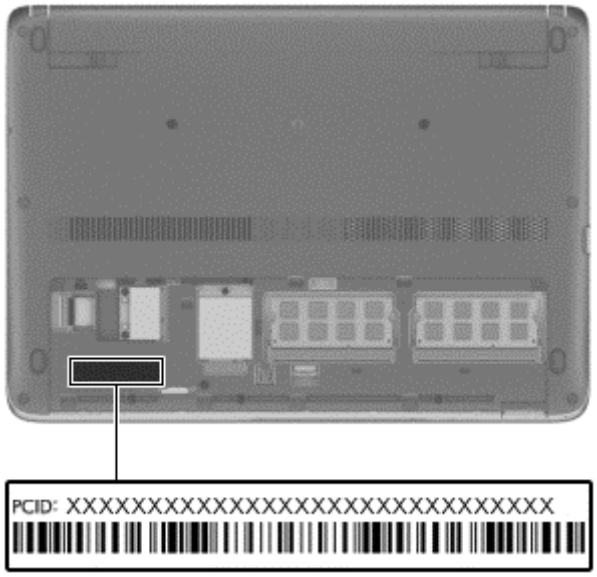
When ordering parts or requesting information, provide the computer serial number and model description provided on the service tag.



- Warranty period **(1)**. This number describes the duration (in years) of the warranty period for the computer.
- Model name **(2)**. This is the product name affixed to the front of the computer.
- Serial number (s/n) **(3)**. This is an alphanumeric identifier that is unique to each product.
- Part number/Product number (p/n) **(4)**. 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.

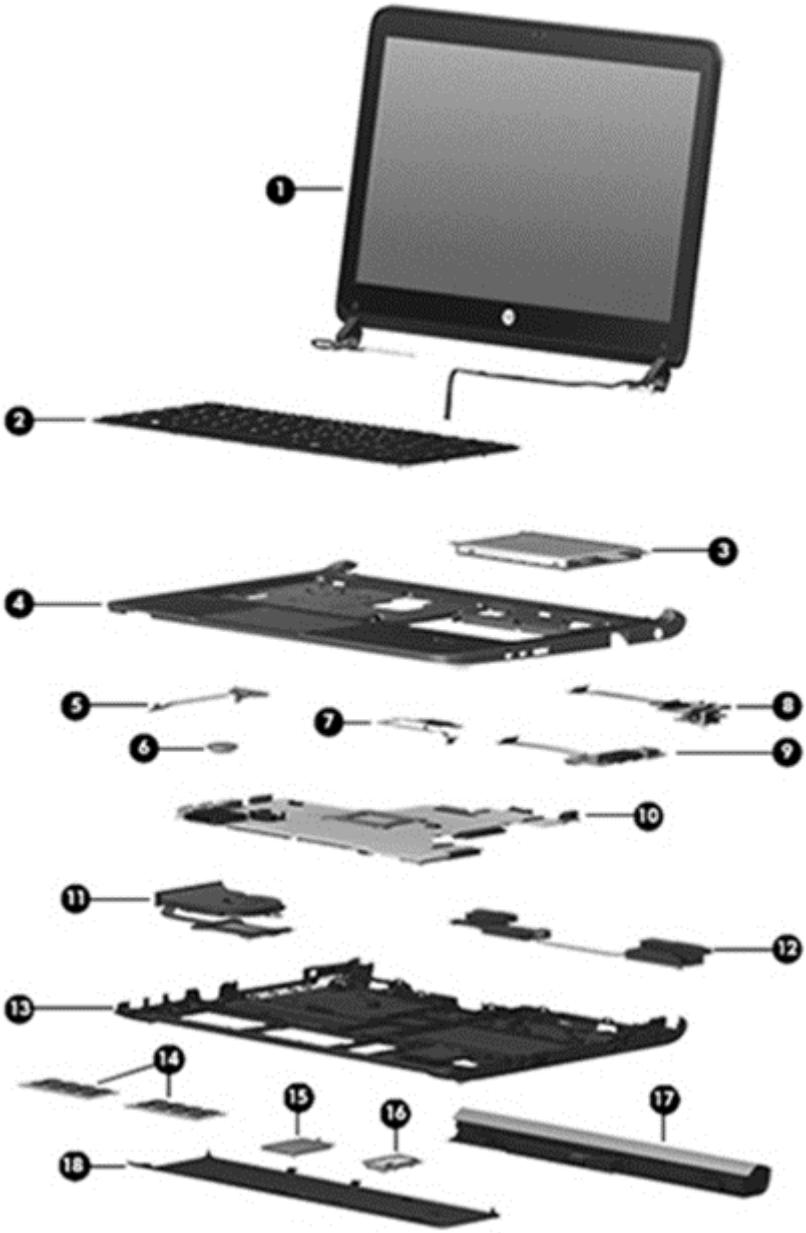
PCID label

The PCID label provides the information required to properly reset the notebook firmware (BIOS) back to factory shipped specifications when replacing the system board. The label may have a different number of characters depending on the operating system on the computer.



3 Illustrated parts catalog

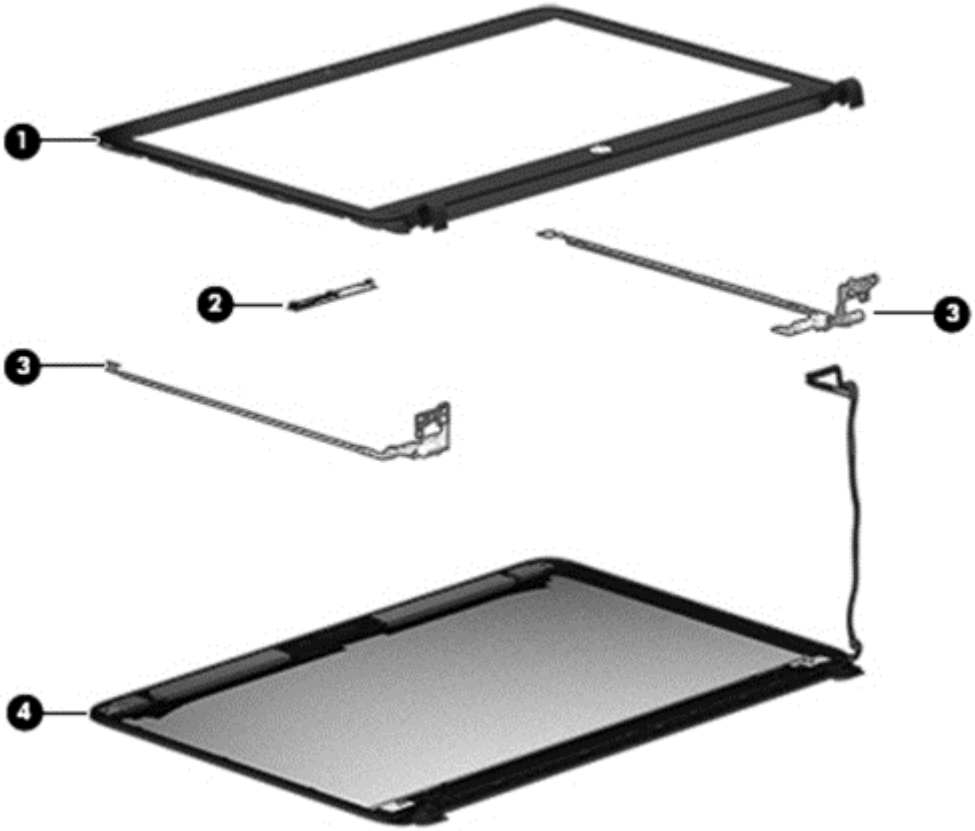
Computer major components



Item	Description	Spare part number
(1)	**Display panel**, 33.8-cm (13.3-inch) HD, anti-glare	
	For use in models without WWAN	727758-001
	For use in models with WWAN	731997-001
(2)	**Keyboard** (includes cable) **NOTE:** For a detailed list of available keyboards, see Sequential part number listing on page 26.	727765-xxx
(3)	**Hard drive**	
	500-GB, 5400-rpm	683802-001
	500-GB, 7200-rpm	703267-001
	128-GB solid-state drive	737584-001
	120-GB solid-state drive (M.2)	731998-001
(4)	**Top cover** (includes touchpad)	
	For use in models with a fingerprint reader	727753-001
	For use in models without a fingerprint reader	727754-001
(5)	**Power button board** (includes cable)	727760-001
(6)	**RTC battery**	684248-001
(7)	**Fingerprint reader assembly** (includes bracket, grommet, and screw)	727764-001
(8)	**Function board**	727768-001
(9)	**Audio board**	727759-001
(10)	**System board** (includes replacement thermal material)	
	For use in models with Intel Core i7-4500U processors:	
	• Non-Windows 8 models	727772-001
	• Windows 8 Standard models	727772-501
	• Windows 8 Professional models	727772-601
	For use in models with Intel Core i5-4250U processors:	
	• Non-Windows 8 models	727771-001
	• Windows 8 Standard models	727771-501
	• Windows 8 Professional models	727771-601
	For use in models with Intel Core i5-4200U processors:	
	• Non-Windows 8 models	727770-001
	• Windows 8 Standard models	727770-501
	• Windows 8 Professional models	727770-601

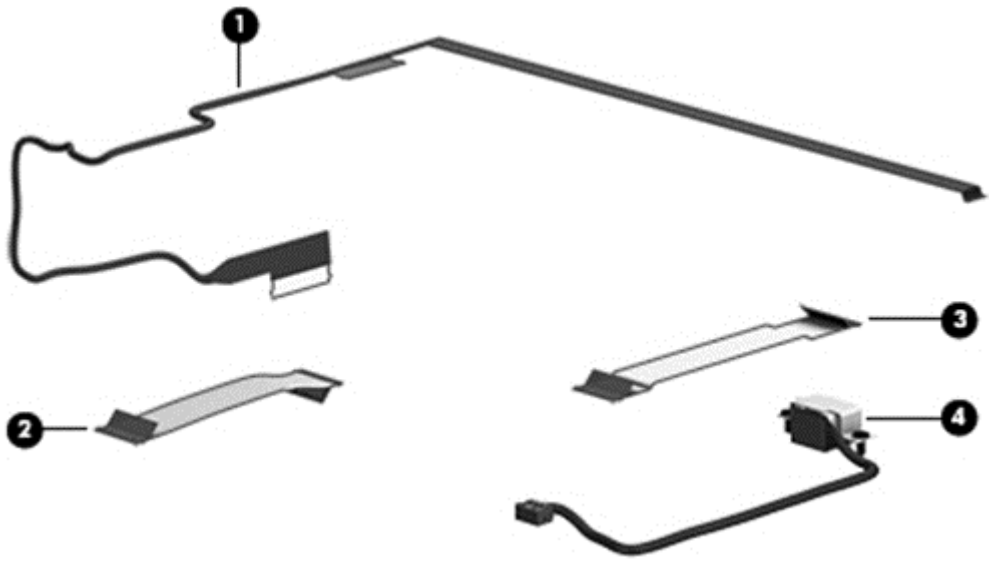
Item	Description	Spare part number
	For use in models with Intel Core i3-4010U processors:	
	• Non-Windows 8 models	727769-001
	• Windows 8 Standard models	727769-501
	• Windows 8 Professional models	727769-601
(11)	**Heat sink** (includes replacement thermal material)	727766-001
(12)	**Speaker assembly**	727761-001
(13)	**Base enclosure** (includes power connector bracket and latch)	727755-001
(14)	**Memory modules** (PC3L-12800, 1600-MHz, DDR3)	
	8-GB	693374-001
	4-GB	691740-001
	2-GB	691739-001
(15)	**WWAN modules**	
	HP lt4112 LTE/HSPA+ Gobi 4G Module	704031-001
	HP hs3110 HSPA+ Mobile Broadband Module	723895-001
(16)	**WLAN module**	
	Realtek RTL8188EE 802.11bgn Wi-Fi Adapter	709848-001
	Mediatek MT7630E 802.11bgn Wi-Fi Adapter and Mediatek Bluetooth 4.0 Adapter	710418-001
	Intel Dual Band Wireless-N 7260AN 802.11 a/b/g/n 2x2 WiFi + BT4.0	717381-001
	Broadcom BCM943228HMB 802.11abgn 2x2 Wi-Fi + BT 4.0 Combo Adapter	731550-001
	Atheros AR9485 802.11b/g/n 1x1 WiFi Adapter	675794-001
	Atheros AR9565 802.11bgn 1x1 WiFi + BT4.0 combo Adapter	690019-001
(17)	**Battery, Li-ion**, 4-cell, 44WHr, 3.0 Ah	708459-001
(18)	**Service door**	727756-001

Display components



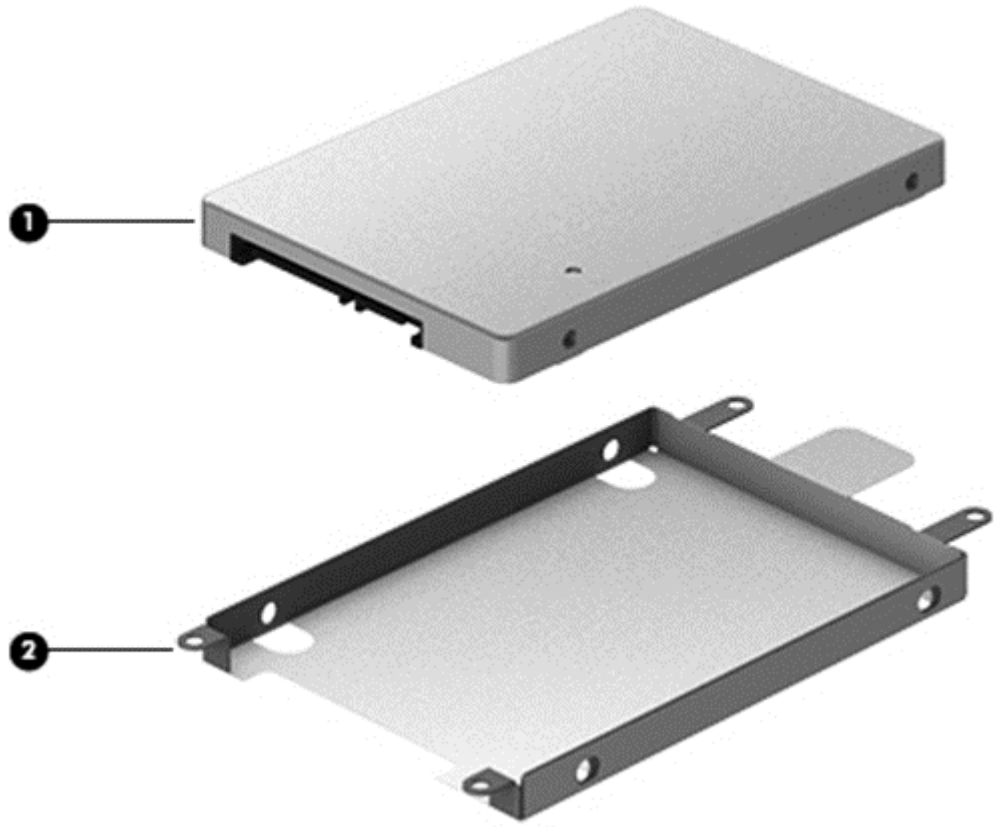
Item	Description	Spare part number
(1)	**Display bezel**	731994-001
(2)	**Webcam module**	721543-001
(3)	**Display Hinge Kit** (includes left and right hinges)	731996-001
(4)	**Display rear cover** (includes WLAN and WWAN antennas and transceivers)	731995-001

Cable Kit



Item	Description	Spare part number
	Cable Kit	727757-001
(1)	Display (LVDS) cable	
(2)	Audio board cable	
(3)	RJ-45 network cable	
(4)	Power connector cable (DC-in)	

Mass storage devices



	Description	Spare part number
(1)	**Hard drives**	
	500-GB, 5400-rpm	683802-001
	500-GB, 7200-rpm	703267-001
	128-GB solid-state drive	737584-001
	120-GB solid-state drive (M.2)	731998-001
(2)	**Hard Drive Hardware Kit** (includes hard drive bracket and screws; bracket illustrated)	727763-001

Miscellaneous parts

Description	Spare part number
Plastics/Rubber Kit (includes card reader insert, display bezel screw covers, and bottom screw covers)	727762-001
Cases	
HP Essential Top Load Case	679921-001
Professional slim, top load case	703888-001
HP Business Top Load Case	718550-001
Mice	
Mouse, USB laser	674318-001
Mouse, USB, optical, travel	434594-001
Mouse, HP Comfort Grip wireless	691922-001
AC adapters	
65-W AC adapter for use in India and the People's Republic of China	693710-001
45-W AC adapter	696694-001
Power cords:	
For use in Argentina	490371-D01
For use in Australia	490371-011
For use in the People's Republic of China	490371-AA1
For use in Denmark	490371-081
For use in Europe, the Middle East, and Africa	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 South Africa	490371-AR1
For use in South Korea	490371-AD1
For use in Switzerland	490371-111
For use in Taiwan	490371-AB1
For use in Thailand	490371-201
For use in the United Kingdom	490371-031
For use in the United States	490371-001
Screw Kit	727767-001

Sequential part number listing

CSR flag designations:

A = Mandatory

B = Optional

C = Service technician recommended

N = Non-user replaceable

Spare part number	CSR flag	Description
434594-001	A	Mouse, USB, optical, travel
490371-001	A	Power cord for use in North America
490371-011	A	Power for cord use in Australia
490371-021	A	Power for cord use in Europe, the Middle East, and Africa
490371-031	A	Power cord for use in the United Kingdom
490371-061	A	Power cord for use in Italy
490371-081	A	Power cord for use in Denmark
490371-111	A	Power for cord use in Switzerland
490371-201	A	Power cord for use in Thailand
490371-291	A	Power for cord use in Japan
490371-AA1	A	Power for cord use in the People's Republic of China
490371-AB1	A	Power for cord use in Taiwan
490371-AD1	A	Power for cord use in South Korea
490371-AR1	A	Power for cord use in South Africa
490371-BB1	A	Power cord for use in Israel
490371-D01	A	Power cord for use in Argentina
490371-D61	A	Power cord for use in India
674318-001	A	Mouse, HP USB laser
675794-001	A	Atheros AR9485 802.11b/g/n 1x1 WiFi Adapter
679921-001	A	HP Essential Top Load Case
683802-001	A	500-GB, 5400-rpm hard drive, 7 mm
684248-001	N	RTC battery
690019-001	A	Atheros AR9565 802.11bgn 1x1 WiFi + BT4.0 combo Adapter
691739-001	A	2-GB memory module (PC3L-12800, 1600-MHz, DDR3)

Spare part number	CSR flag	Description
691740-001	A	4-GB memory module (PC3L-12800, 1600-MHz, DDR3)
691922-001	A	Mouse, HP Comfort Grip wireless
693374-001	A	8-GB memory module (PC3L-12800, 1600-MHz, DDR3)
693710-001	A	65-W AC adapter for use in India and the People's Republic of China)
696694-001	A	45-W AC adapter
703267-001	A	320-GB, 7200-rpm hard drive, 7 mm
703888-001	A	Professional slim, top load case
704031-001	A	HP lt4112 LTE/HSPA+ Gobi 4G Module
708459-001	A	4-cell, 44WHr, 3.0 Ah Li-ion battery
709848-001	A	Realtek RTL8188EE 802.11bgn Wi-Fi Adapter
710418-001	A	Mediatek MT7630E 802.11bgn Wi-Fi Adapter and Mediatek Bluetooth 4.0 Adapter WLAN card
717381-001	A	Intel Dual Band Wireless-N 7260AN 802.11 a/b/g/n 2x2 WiFi + BT4.0
718550-001	A	HP Business Top Load Case
721543-001	B	Webcam module
723895-001	A	HP hs3110 HSPA+ Mobile Broadband Module
727753-001	C	Top cover for use in models with a fingerprint reader (includes touchpad)
727754-001	C	Top cover for use in models without a fingerprint reader (includes touchpad)
727755-001	N	Base enclosure (includes power connector bracket and latch)
727756-001	A	Service door
727757-001	N	Cable Kit
727758-001	N	Display panel, 33.8-cm (13.3-inch), anti-glare for use in models without WWAN
727759-001	C	Audio board
727760-001	C	Power button board (includes cable)
727761-001	C	Speaker assembly
727762-001	A	Plastics/Rubber Kit (includes card reader insert, display bezel screw covers, and bottom screw covers)
727763-001	A	Hard Drive Hardware Kit (includes hard drive bracket and screws)
727764-001	C	Fingerprint reader assembly (includes bracket, grommet, and screw)
727765-001	B	Keyboard for use in the United States
727765-031	B	Keyboard for use in the United Kingdom
727765-041	B	Keyboard for use in Germany
727765-051	B	Keyboard for use in France
727765-061	B	Keyboard for use in Italy

Spare part number	CSR flag	Description
727765-071	B	Keyboard for use in Spain
727765-081	B	Keyboard for use in Denmark
727765-091	B	Keyboard for use in Norway
727765-131	B	Keyboard for use in Portugal
727765-141	B	Keyboard for use in Turkey
727765-151	B	Keyboard for use in Greece
727765-161	B	Keyboard for use in Latin America
727765-171	B	Keyboard for use in Saudi Arabia
727765-211	B	Keyboard for use in Hungary
727765-251	B	Keyboard for use in Russia
727765-261	B	Keyboard for use in Bulgaria
727765-271	B	Keyboard for use in Romania
727765-281	B	Keyboard for use in Thailand
727765-291	B	Keyboard for use in Japan
727765-A41	B	Keyboard for use in Belgium
727765-AB1	B	Keyboard for use in Taiwan
727765-AD1	B	Keyboard for use in South Korea
727765-B31	B	Keyboard for use in the Netherlands and Europe
727765-B71	B	Keyboard for use in Sweden and Finland
727765-BA1	B	Keyboard for use in Slovakia
727765-BB1	B	Keyboard for use in Israel
727765-BG1	B	Keyboard for use in Switzerland
727765-DB1	B	Keyboard for use in Canada (English)
727765-D61	B	Keyboard for use in India
727765-DD1	B	Keyboard for use in Iceland
727765-DH1	B	Keyboard for use in the Netherlands
727765-FL1	B	Keyboard for use in the Czech Republic and Slovakia
727765-FP1	B	Keyboard for use in Africa
727766-001	N	Heat sink (includes replacement thermal material)
727767-001	C	Screw Kit
727768-001	C	Function board

Spare part number	CSR flag	Description
727769-001	N	System board for use in models without Windows 8 and an Intel Core i3-4010U processor (includes replacement thermal material)
727769-501	N	System board for use in models with Windows 8 Standard and an Intel Core i3-4010U processor (includes replacement thermal material)
727769-601	N	System board for use in models with Windows 8 Professional and an Intel Core i3-4010U processor (includes replacement thermal material)
727770-001	N	System board for use in models without Windows 8 and an Intel Core i5-4200U processor (includes replacement thermal material)
727770-501	N	System board for use in models with Windows 8 Standard and an Intel Core i5-4200U processor (includes replacement thermal material)
727770-601	N	System board for use in models with Windows 8 Professional and an Intel Core i5-4200U processor (includes replacement thermal material)
727771-001	N	System board for use in models without Windows 8 and an Intel Core i5-4250U processor (includes replacement thermal material)
727771-501	N	System board for use in models with Windows 8 Standard and an Intel Core i5-4250U processor (includes replacement thermal material)
727771-601	N	System board for use in models with Windows 8 Professional and an Intel Core i5-4250U processor (includes replacement thermal material)
727772-001	N	System board for use in models without Windows 8 and an Intel Core i7-4500U processor (includes replacement thermal material)
727772-501	N	System board for use in models with Windows 8 Standard and an Intel Core i7-4500U processor (includes replacement thermal material)
727772-601	N	System board for use in models with Windows 8 Professional and an Intel Core i7-4500U processor (includes replacement thermal material)
731550-001	A	Broadcom BCM943228HMB 802.11abgn 2x2 Wi-Fi + BT 4.0 Combo Adapter
731994-001	C	Display bezel (includes screw covers)
731995-001	C	Display rear cover (includes WLAN and WWAN antennas and transceivers)
731996-001	C	Display Hinge Kit (includes left and right display hinges)
731997-001	N	Display panel, 33.8-cm (13.3-inch), anti-glare for use in models with WWAN
731998-001	B	120-GB solid-state drive (M.2)
737584-001	B	128-GB solid-state drive

4 Removal and replacement procedures preliminary requirements

Tools required

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

- Flat-bladed screwdriver
- Phillips P0 and P1 screwdrivers
- Torx T8 screwdriver

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 a 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, and 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.

Use nonmagnetic tools.

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

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

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

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

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

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

Packaging and transporting guidelines

Follow these grounding guidelines when packaging and transporting equipment:

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

Workstation guidelines

Follow these grounding workstation guidelines:

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

Equipment guidelines

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

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

The following grounding equipment is recommended to prevent electrostatic damage:

- Antistatic tapes
- 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 plastic	Bags	1,500 V
Carbon-loaded plastic	Floor mats	7,500 V
Metallized laminate	Floor mats	5,000 V

5 Removal and replacement procedures for Customer Self-Repair parts

CAUTION: 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 and PCID label on page 17 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, or loosened when servicing Customer Self-Repair parts. Make special note of each screw size and location during removal and replacement.

Battery

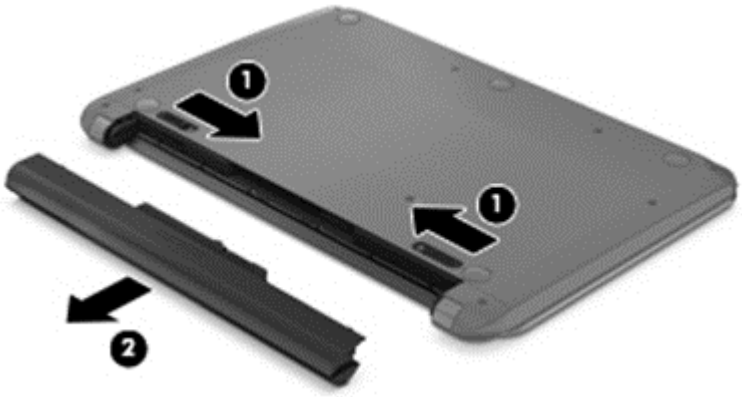
Description	Spare part number
4-cell, 44 WHr, 3.0 Ah Li-ion battery	708459-001

Before disassembling the computer, follow these steps:

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

Remove the battery:

1. Position the computer upside-down on a flat surface.
2. Slide the battery release latches **(1)** at the same time to release the battery.
3. Remove the battery **(2)** from the computer.



Install the battery by inserting it into the battery bay until you hear a click.

Keyboard

NOTE: For a detailed list of available keyboards, see Sequential part number listing on page 26.

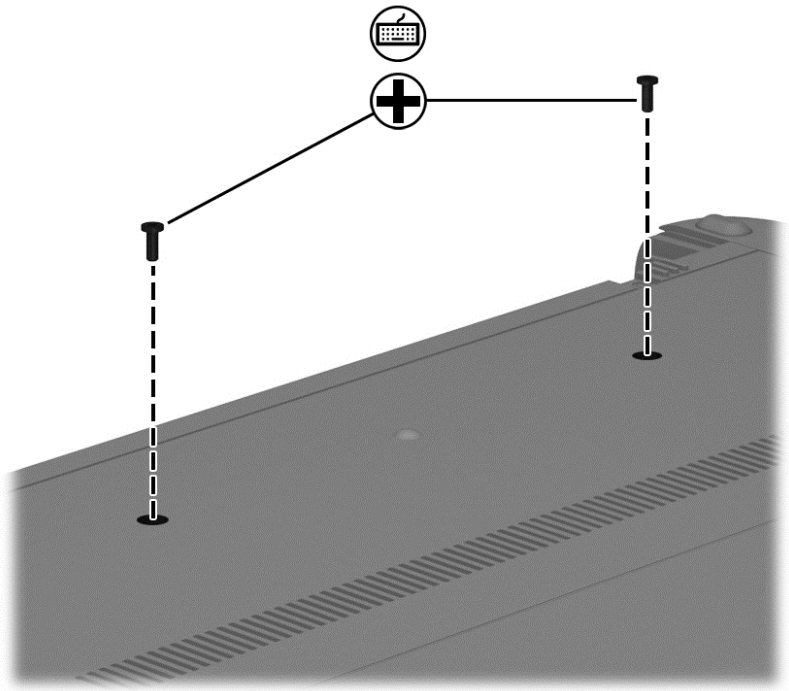
Description	Spare part number
Keyboard	727765-xx1

Before removing the keyboard, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 35).

Remove the keyboard:

1. Position the computer upside-down with the front toward you.
2. Remove the 2 Phillips PM2.5×6.0 screws that secure the keyboard to the computer.



3. Position the computer right-side up with the front toward you.
4. Open the computer as far as possible.

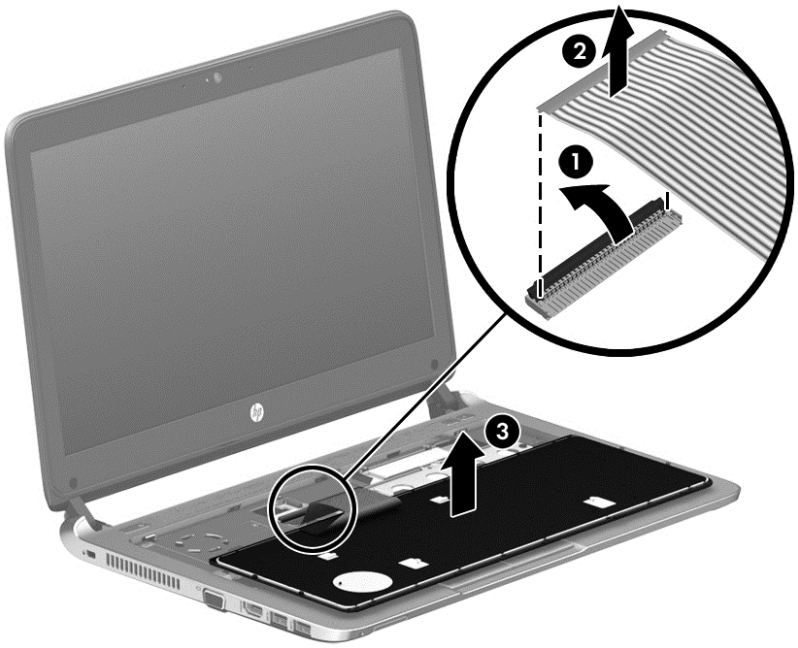
5. With the keyboard toward you, press down on the keyboard while sliding the keyboard toward the palm rest releasing it from the retention clips.

6. Lift the top of the keyboard at an angle, and then pull the keyboard up to remove it from the palm rest.

NOTE: Only pull the keyboard up enough to release it from the computer and flip it over onto the palm rest. The keyboard is connected to the system board via a ribbon cable and a zero insertion force (ZIF) connector.

7. Release the ZIF connector **(1)** by lifting the latch.

8. Disconnect the keyboard cable by pulling the ribbon cable **(2)** out of the ZIF connector and then lift the keyboard **(3)** up and out of the computer.



9. Remove the keyboard.

Reverse this procedure to install the keyboard.

Hard drive

NOTE: All hard drive spare part kits include a hard drive bracket and screws.

Description	Spare part number
500-GB, 5400-rpm hard drive	683802-001
500-GB, 7200-rpm hard drive	703267-001
128-GB solid-state drive	737584-001
120-GB solid-state drive (M.2)	731998-001
Hard Drive Hardware Kit (includes hard drive bracket and screws)	727763-001

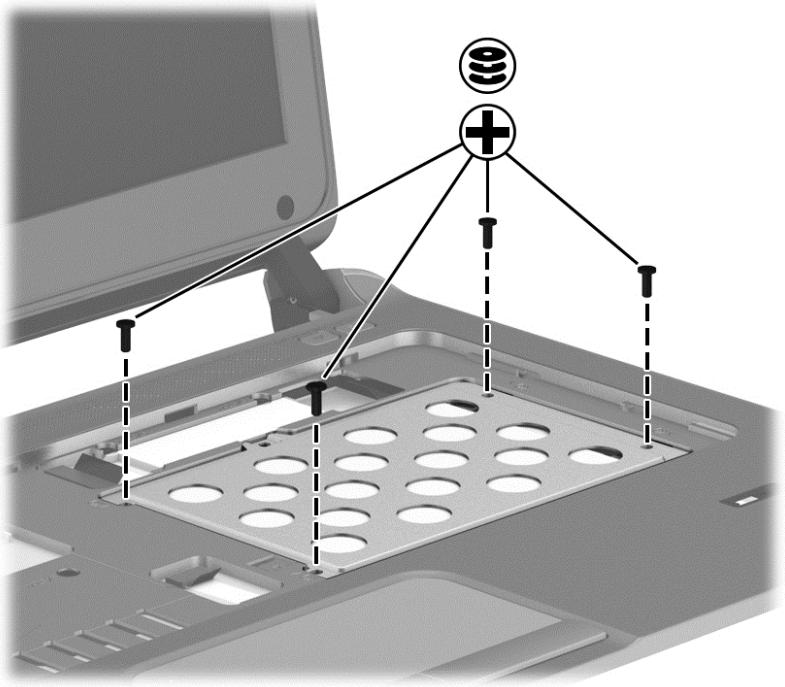
Before disassembling the computer, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 35).
5. Remove the keyboard (see Keyboard on page 37).

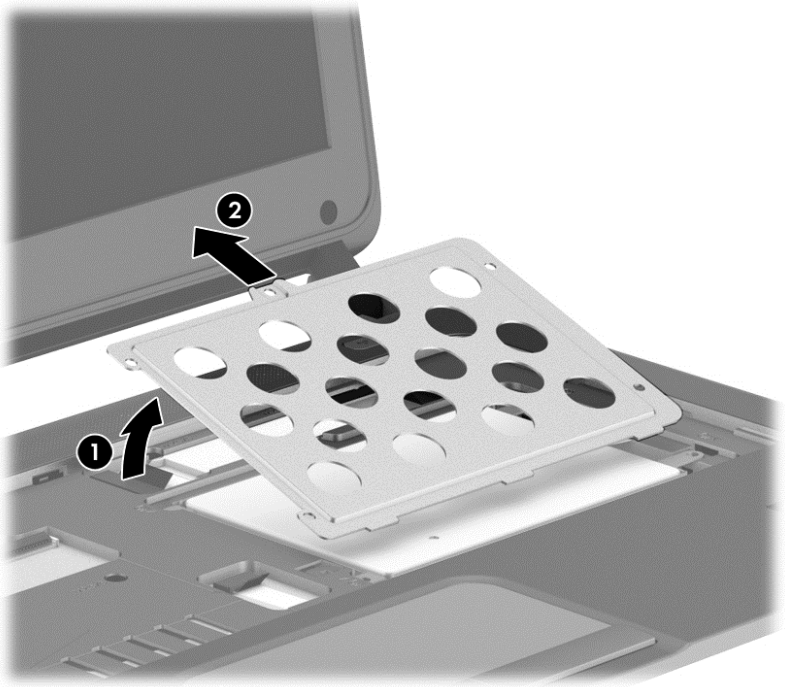
Remove the hard drive:

1. Position the upright.

2. Loosen and remove the 4 Phillips PM2.5×6.0 hard drive retaining plate screws.

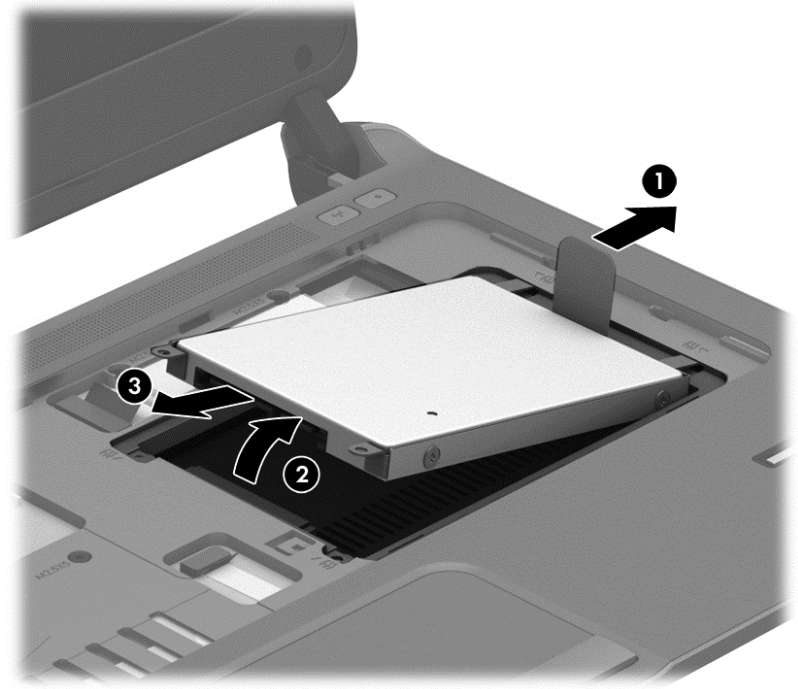


3. Lift the top edge of the hard drive retaining plate **(1)** up, and then pull the retaining plate **(2)** up at an angle to remove it from the computer.

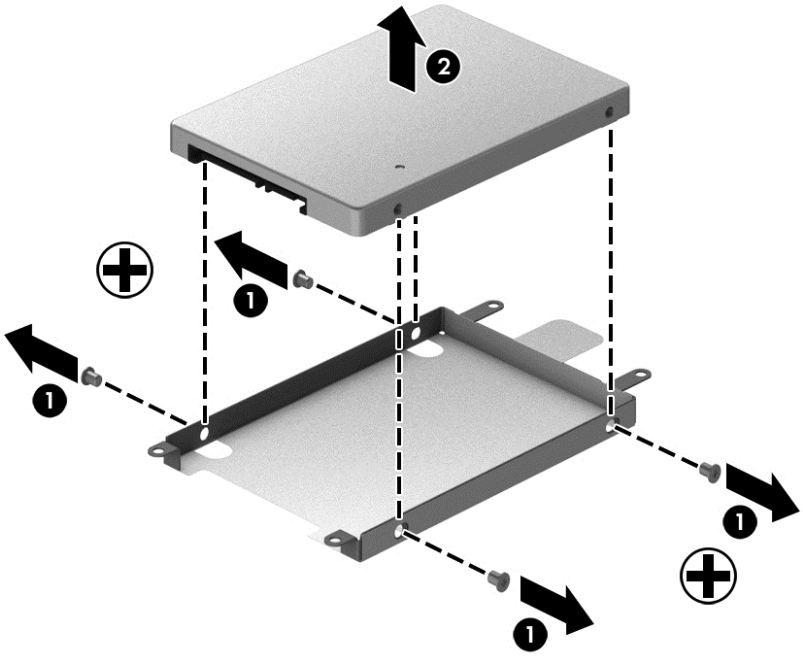


4. Pull the hard drive tab **(1)** toward the edge of the computer to disconnect the hard drive.

5. Lift the hard drive **(2)** up at an angle, and then pull the hard drive **(3)** out of the hard drive bay.



6. If you need to remove the hard drive cover from the hard drive, remove the 4 Phillips PM2.5×4.0 screws **(1)** that secure the cover to the hard drive, and the lift the hard drive from the cover **(2)**.



Reverse this procedure to reassemble and install the hard drive.

Service door

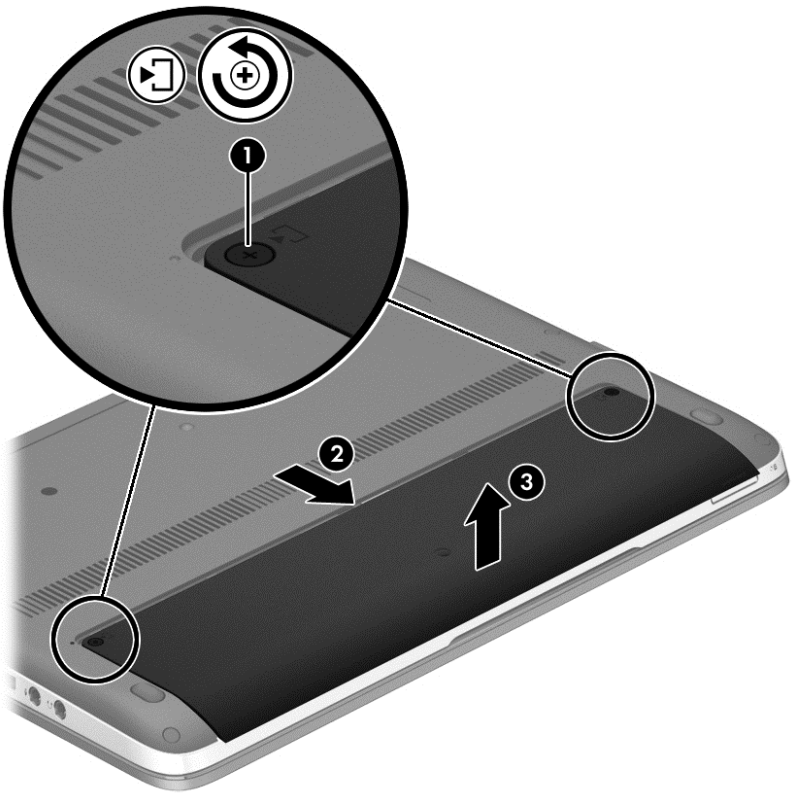
Description	Spare part number
Service door	727756-001

Before disassembling the computer, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 35).

Remove the service door:

1. Position the computer upside-down on a flat surface.
2. Loosen the two service door screws **(1)**.
3. Slide the service door towards the front of the computer **(2)** and lift **(3)** to remove the service



Reverse the removal procedures to install the service door.

SIM

NOTE: This section applies only to computer models with WWAN capability.

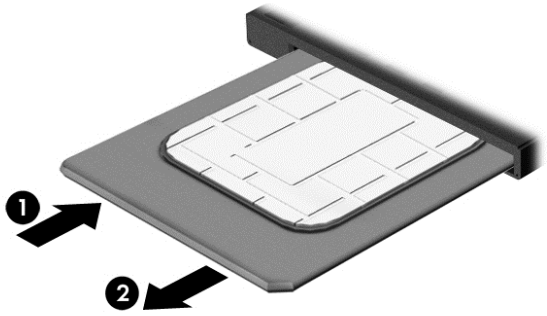
NOTE: The SIM is provided by the end-user as a security measure for the WWAN module. The SIM should be removed, placed into a static-dissipative container, and then replaced when the computer is reassembled.

Before removing the SIM, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 35).
5. Remove the service door (see Service door on page 43).

Remove the SIM:

- Push the SIM slightly into the slot to disengage it **(1)**, and then pull it out of the slot **(2)**.



Memory modules

Description	Spare part number
2-GB memory module (PC3L-12800, 1600-MHz, DDR3)	691739-001
4-GB memory module (PC3L-12800, 1600-MHz, DDR3)	691740-001
8-GB memory module (PC3L-12800, 1600-MHz, DDR3)	693374-001

Before removing the memory module, follow these steps:

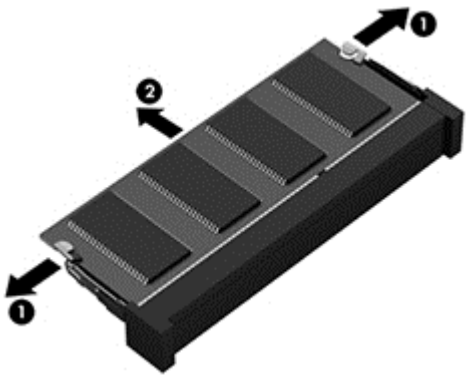
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 35).
5. Remove the service door (see Service door on page 43).

Remove the memory module:

1. Position the computer upside-down with the battery bay toward you.
2. Spread the retaining tabs **(1)** on each side of the memory module slot to release the memory module. (The edge of the module opposite the slot rises away from the computer.)
3. Remove the memory module **(2)** by pulling the module away from the slot at an angle.

NOTE: Memory modules are designed with a notch to prevent incorrect insertion into the memory module slot.

NOTE: The computer uses two memory sockets. The removal procedure is the same for both memory sockets.



Reverse this procedure to install a memory module.

WWAN module

CAUTION: The WWAN module and the WLAN module are not interchangeable.

NOTE: M.2 SSD and WWAN devices share the same connector; therefore, you cannot install both devices at the same time.

Description	Spare part number
HP lt4112 LTE/HSPA+ Gobi 4G Module	704031-001
HP hs3110 HSPA+ Mobile Broadband Module	723895-001

Before removing the WWAN module, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 35).
5. Remove the service door (see Service door on page 43).

Remove the WWAN module:

1. Position the computer upside-down.
2. Disconnect the WWAN antenna cables **(1)** from the terminals on the WWAN module.

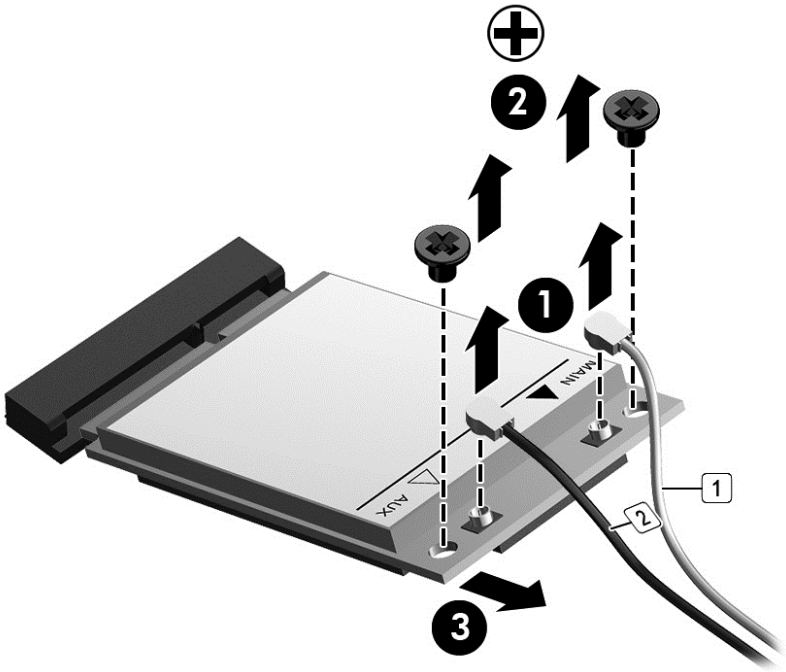
NOTE: The red WWAN antenna cable is connected to the WWAN module “Main” terminal. The blue WWAN antenna cable is connected to the WWAN module “Aux” terminal.

3. Remove the two Phillips PM2.5×3.0 screws **(2)** that secure the WWAN module to the computer. (The edge of the module opposite the slot rises away from the computer.)

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

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

Figure 5-1 Removing the WWAN module



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

Reverse this procedure to install the WWAN module.

WLAN/Bluetooth combo card

The computer uses a card that provides both WLAN and Bluetooth functionality.

⚠ **CAUTION:** The WLAN module and the WWAN module are not interchangeable.

Description	Spare part number
Realtek RTL8188EE 802.11bgn Wi-Fi Adapter	709848-001
Mediatek MT7630E 802.11bgn Wi-Fi Adapter and Mediatek Bluetooth 4.0 Adapter	710418-001
Intel Dual Band Wireless-N 7260AN 802.11 a/b/g/n 2x2 WiFi + BT4.0	717381-001
Broadcom BCM943228HMB 802.11abgn 2x2 Wi-Fi + BT 4.0 Combo Adapter	731550-001
Atheros AR9485 802.11b/g/n 1x1 WiFi Adapter	675794-001
Atheros AR9565 802.11bgn 1x1 WiFi + BT4.0 combo Adapter	690019-001

Before removing the WLAN module, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 35).
5. Remove the service door (see Service door on page 43).

Remove the WLAN module:

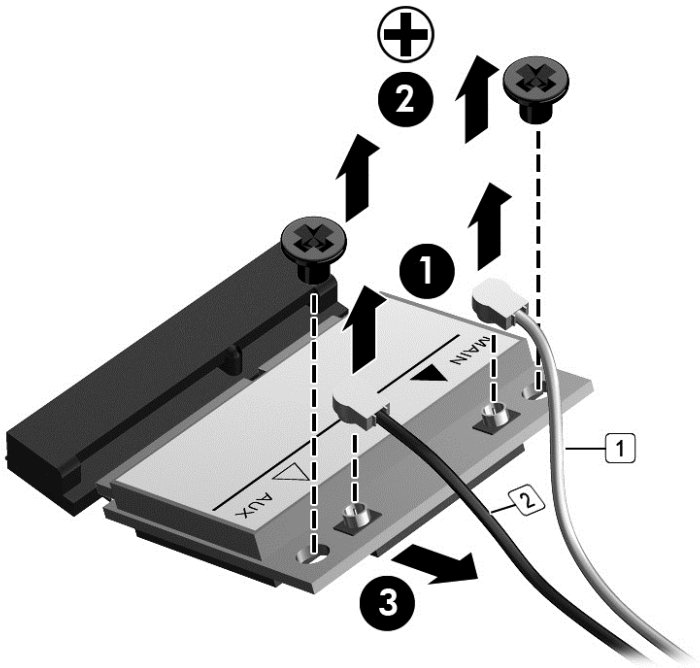
1. Position the computer upside-down.
2. Disconnect the WLAN antenna cables **(1)** from the terminals on the WLAN module.

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

3. Remove the two Phillips PM2.5×3.0 screws **(2)** that secure the WLAN module to the computer. (The edge of the module opposite the slot rises away from the computer.)

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

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



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

Reverse this procedure to install the WLAN module.

6 Removal and replacement procedures for Authorized Service Provider parts

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

Component replacement procedures

NOTE: Details about your computer, including model, serial number, product key, and length of warranty, are on the service tag at the bottom of your computer. See Service tag and PCID label on page 17 for details.

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

There are as many as 47 screws that must be removed, replaced, or loosened when servicing Authorized Service Provider only parts. Make special note of each screw size and location during removal and replacement.

Top cover

NOTE: All top cover spare part kits include a touchpad.

Description	Spare part number
Top cover for use in models with a fingerprint reader (includes touchpad)	727753-001
Top cover for use in models without a fingerprint reader (includes touchpad)	727754-001

Before removing the top cover, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.

3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 35).
5. Remove the following components:
   a. Service door (see Service door on page 43).
   b. Keyboard (see Keyboard on page 37)
   c. Hard drive (see Hard drive on page 40)

Remove the top cover:

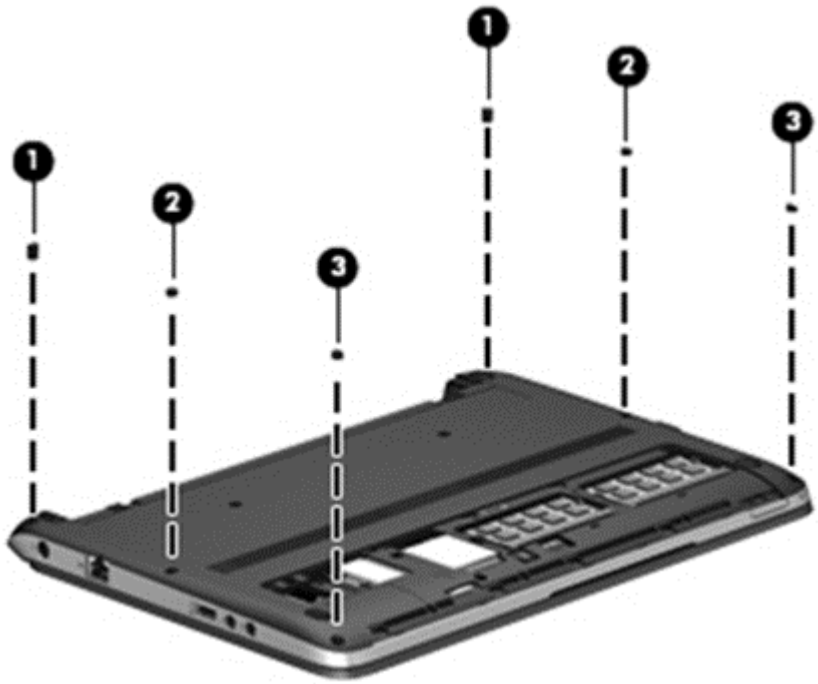
1. Position the computer upside-down with the front toward you.
2. Remove the following screw covers from atop the screws on the bottom of the computer:

   (1) 2 rear rubber screw covers

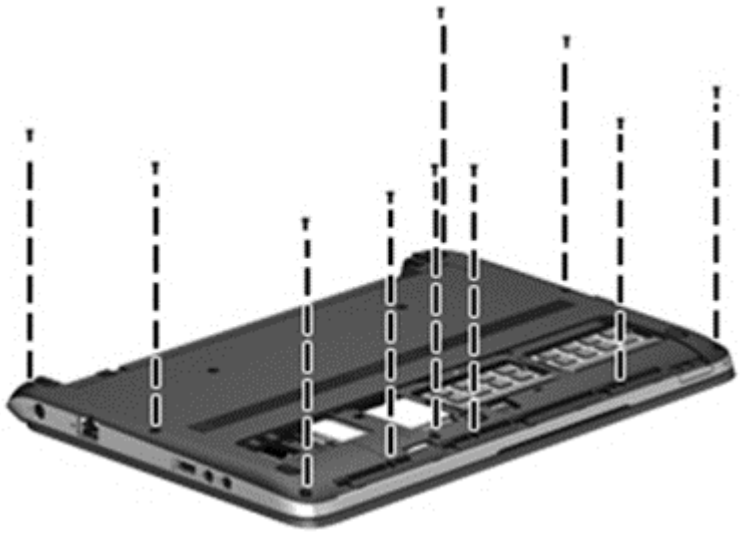
   (2) 2 middle rubber screw covers

   (3) 2 front rubber screw covers

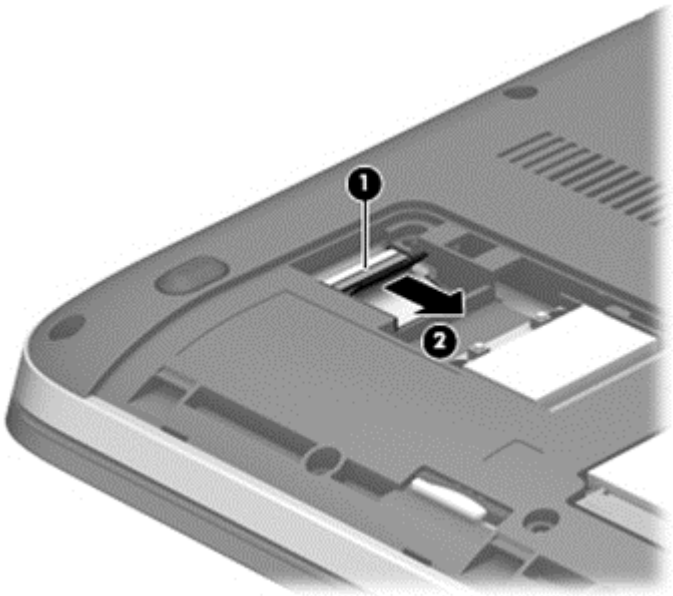
NOTE: Rubber screw covers are available in the Rubber/Plastics Kit, spare part number 727762-001.



3. Remove the 10 Torx T8M2.5×5.0 screws that secure the top cover to the computer.

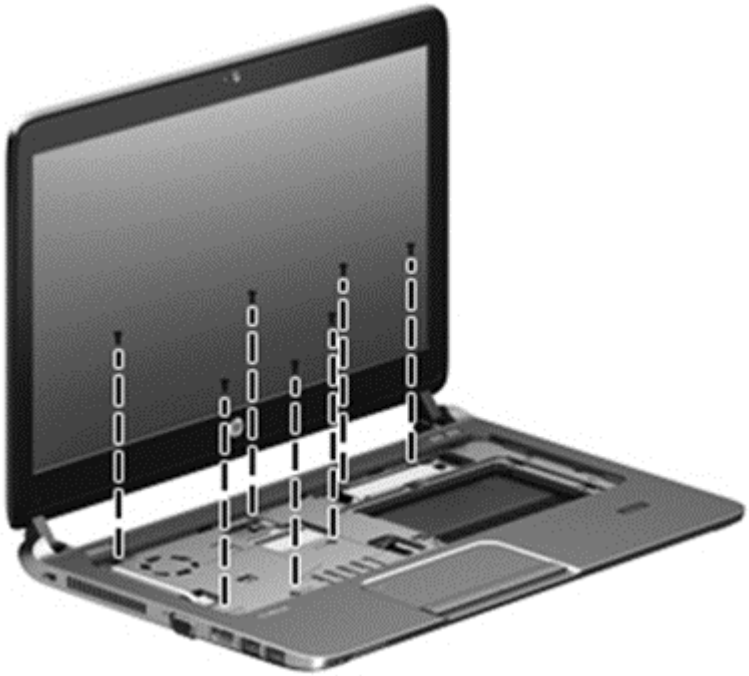


4. Disconnect the audio board cable from the system board.



5. Position the computer upright with the front toward you.

6. Remove the 7 Torx T8M2.5×5.0 screws that secure the top cover to the computer.

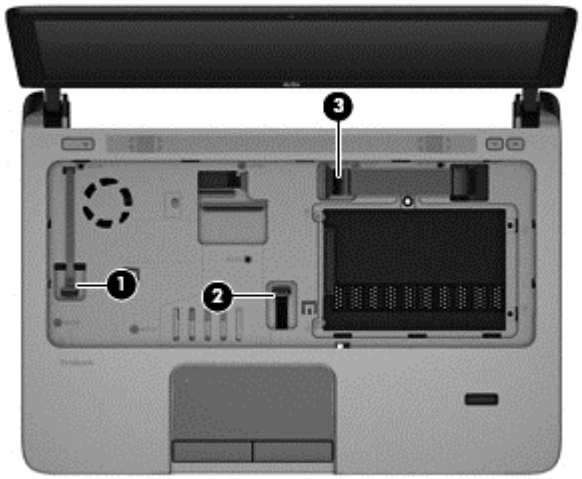


7. Disconnect the following cables from the system board:

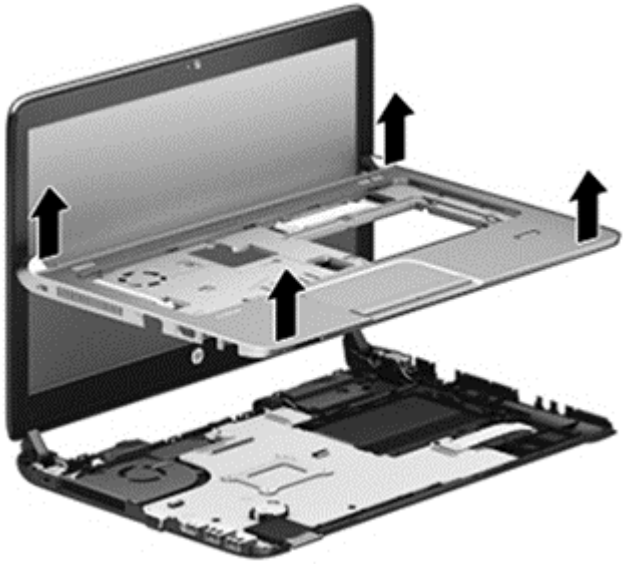
   (1) Power button cable

   (2) Touchpad board cable

   (3) Function board cable



8. Pry up on the top of the top cover (start near the hard drive) to disengage it from the computer, and then remove the top cover from the computer.



Reverse this procedure to install the top cover.

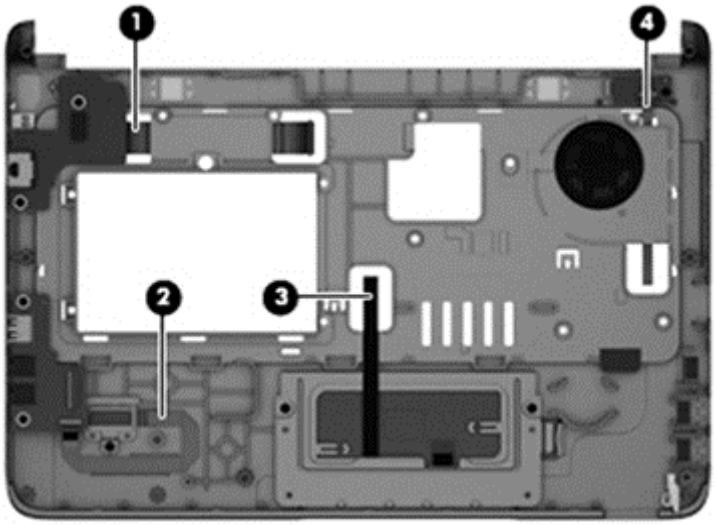
Use the following illustration to determine proper routing of top cover cables.

(1): Function board cable

(2): Fingerprint reader board cable

(3): Touchpad board cable

(4): Power button board cable



RTC battery

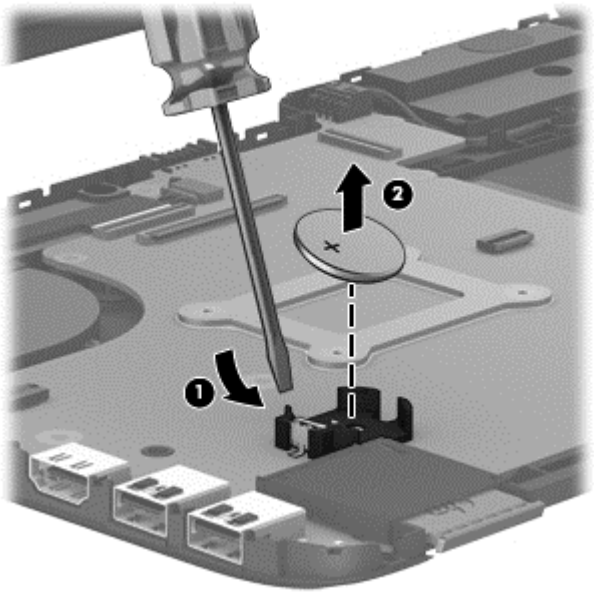
Description	Spare part number
RTC battery	684248-001

Before removing the RTC battery, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 35).
5. Remove the following components:
   a. Service door (see Service door on page 43).
   b. Keyboard (see Keyboard on page 37)
   c. Top cover (see Top cover on page 50)

Remove the RTC battery:

1. Position the computer upright with the front toward you.
2. Use a screwdriver to loosen the battery from the socket **(1)**.
3. Lift the battery from the system board **(2)**.



Reverse this procedure to install the RTC battery.

Fingerprint reader board

NOTE: All fingerprint reader assembly spare part kits include cable, bracket, grommet, and screw)

Description	Spare part number
Fingerprint reader board (includes cable, bracket, grommet, and screw)	727764-001

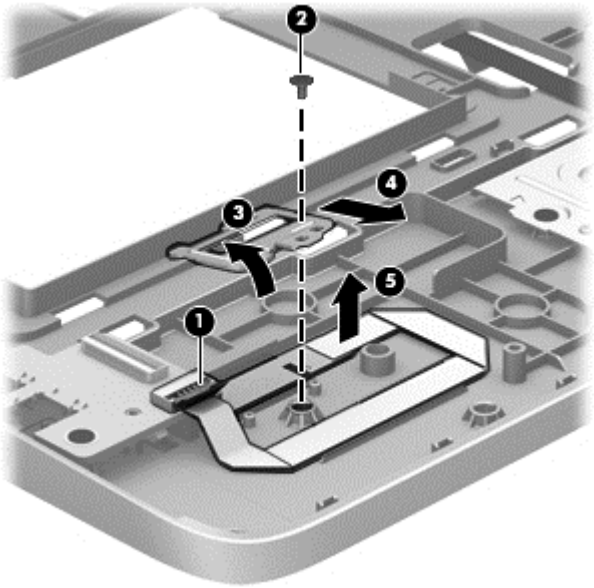
Before removing the fingerprint reader board, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 35).
5. Remove the following components:
   a. Service door (see Service door on page 43).
   b. Keyboard (see Keyboard on page 37)
   c. Top cover (see Top cover on page 50)

Remove the fingerprint reader board:

1. Position the top cover upside-down.
2. Disconnect the fingerprint reader board cable from the audio board **(1)**.
3. Remove the Phillips PM2.0×3.0 screw **(2)** that secures the fingerprint reader board bracket to the top cover.
4. Pull the bracket toward bottom edge of the top cover to pull it out from slot **(3)**, and remove it from the top cover **(4)**.

5. Remove the reader board and cable assembly from the top cover **(5)**.



Reverse this procedure to install the fingerprint reader board.

Audio board

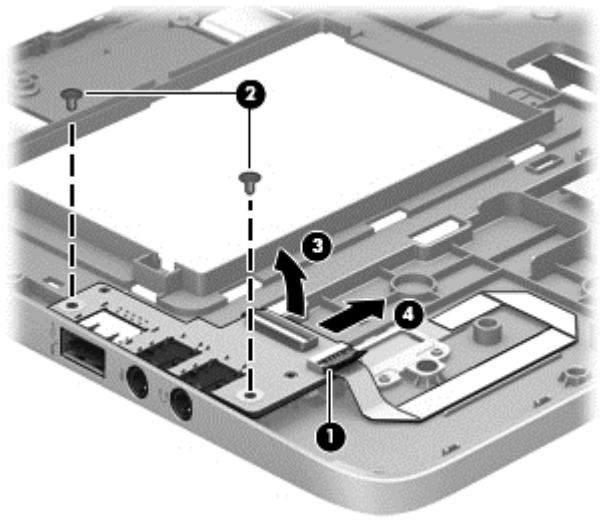
Description	Spare part number
Audio board	727759-001

Before removing the audio board, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 35).
5. Remove the following components:
   a. Service door (see Service door on page 43).
   b. Keyboard (see Keyboard on page 37)
   c. Top cover (see Top cover on page 50)

Remove the audio board:

1. Position the top cover upside-down.
2. Disconnect the fingerprint reader board cable **(1)** from the audio board.
3. Remove the two Phillips PM2.0×3.0 screws **(2)** that secure the audio board to the top cover.
4. Rotate the board upward **(3)**, and then pull the board into the top cover to remove it **(4)**.



Reverse this procedure to install the audio board.

Function board

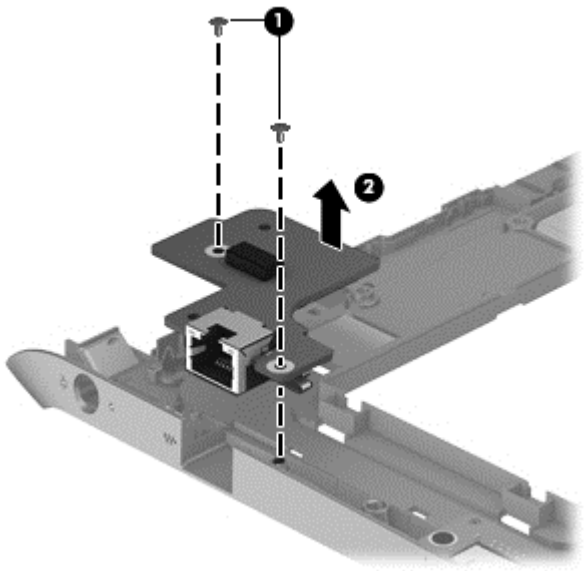
Description	Spare part number
Function board	727768-001

Before removing the function board, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 35).
5. Remove the following components:
   a. Service door (see Service door on page 43).
   b. Keyboard (see Keyboard on page 37)
   c. Top cover (see Top cover on page 50)

Remove the function board assembly:

1. Position the top cover upside-down.
2. Remove the 2 Phillips PM2.0×3.0 screws **(1)** that secure the board to the top cover.
3. Lift the function board straight up and off the top cover **(2)**.



Reverse this procedure to install the function board.

Power button board

Description	Spare part number
Power button board (includes cable)	727760-001

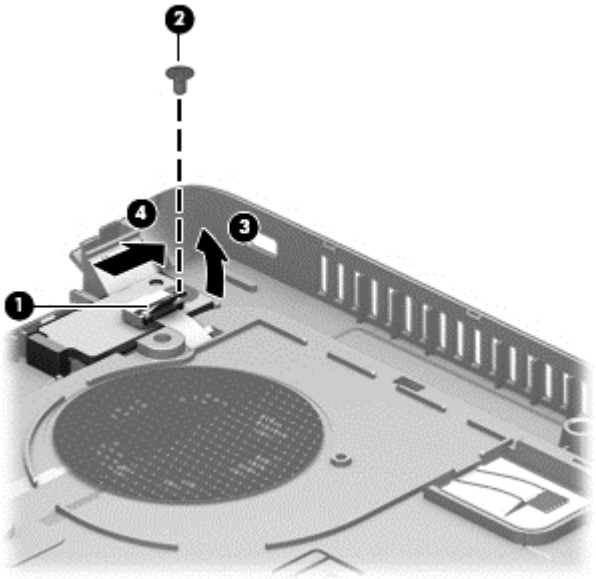
Before removing the power button board, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 35).
5. Remove the following components:
   a. Service door (see Service door on page 43).
   b. Keyboard (see Keyboard on page 37)
   c. Top cover (see Top cover on page 50)

Remove the power button board assembly:

1. Position the top cover upside-down.
2. Disconnect the cable from the board **(1)**.
3. Remove the Phillips PM2.0×3.0 screw **(2)** that secures the board to the top cover.

4. Lift the side of board up at an angle **(3)**, slide the board out from under the tab, and remove the board from the top cover **(4)**.



Reverse this procedure to install the power button board.

Speaker assembly

Description	Spare part number
Speaker assembly	727761-001

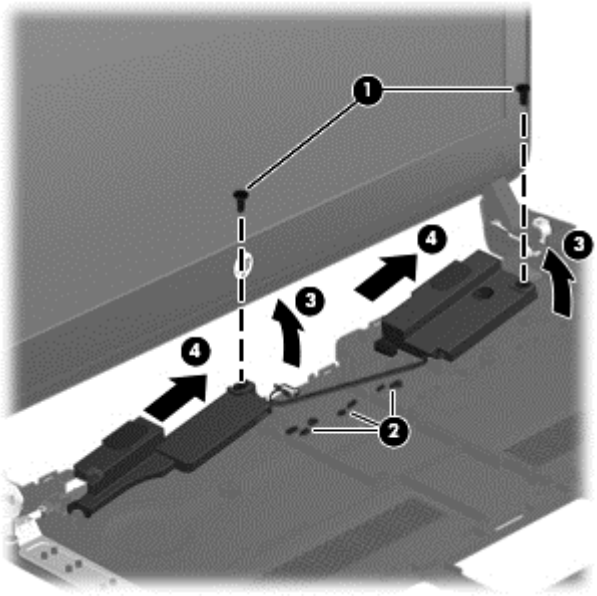
Before removing the speaker assembly, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 35).
5. Remove the following components:
   a. Service door (see Service door on page 43).
   b. Keyboard (see Keyboard on page 37)
   c. Top cover (see Top cover on page 50)
   d. System board (see System board on page 71)

Remove the speaker assembly:

1. Position the computer upright with the front toward you.
2. Remove the 2 Phillips PM2.0×6.0 shoulder screws **(1)** that secure the speaker assembly to the computer.
3. Remove the speaker cables from the clips and routing path in the base enclosure **(2)**.

4. Lift up the right side of each speaker **(3)**, and then pull the speakers toward the right **(4)** to remove the speaker tab out from under the holder in the enclosure to remove the speakers from the computer.



Reverse this procedure to install the speaker assembly.

Display assembly

All display assemblies include WLAN antenna transceivers and cables. WWAN models include 2 WWAN antenna transceivers and cables.

Description	Spare part number
Display assembly for use in models without WWAN	727758-001
Display assembly for use in models with WWAN	731997-001

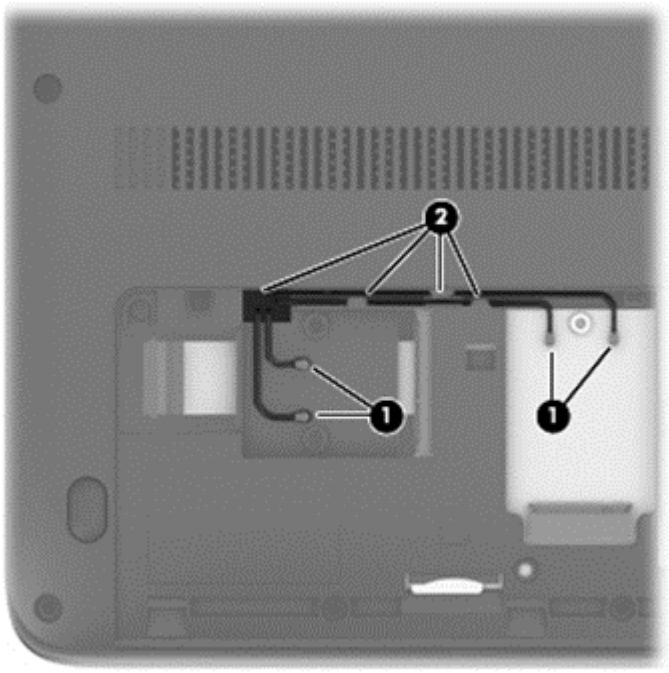
Before removing the display assembly, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 35).
5. Remove the following components:
   a. Service door (see Service door on page 43).
   b. WLAN module (see WLAN/Bluetooth combo card on page 48)
   c. WWAN module (see WWAN module on page 46)
   d. Keyboard (see Keyboard on page 37)
   e. Top cover (see Top cover on page 50)
   f. Power connector cable (see Power connector cable on page 70)

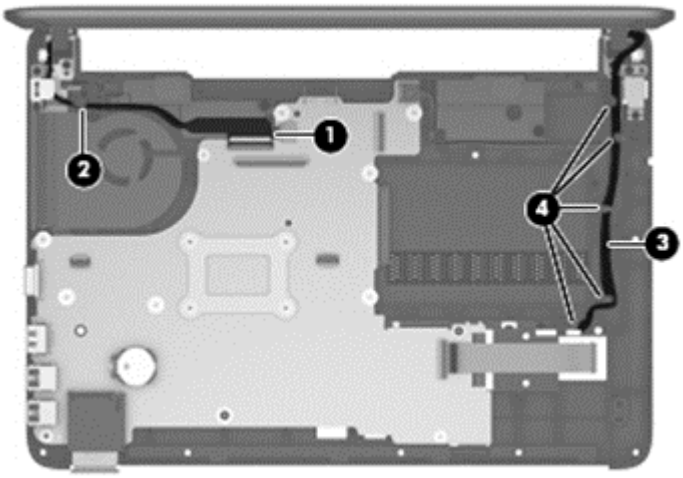
Remove the display assembly:

1. Position the computer upside down.

2. Remove the WLAN and WWAN antennas **(1)** from the routing path **(2)** on the bottom of the computer.

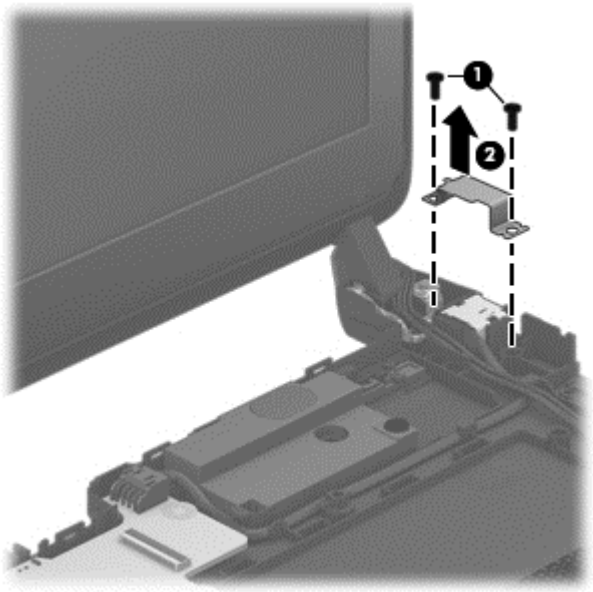


3. Pull the antennas through the hole that leads to the top of the computer.
4. Position the computer upright and open the computer as far as possible.
5. Disconnect the display cable **(1)** from the system board and remove the cable from the routing path in the base enclosure **(2)**.
6. Remove the WLAN and WWAN antennas **(3)** from the routing path on the top of the base enclosure **(4)**, and pull the antenna cables through the hole that routes to the bottom of the computer.

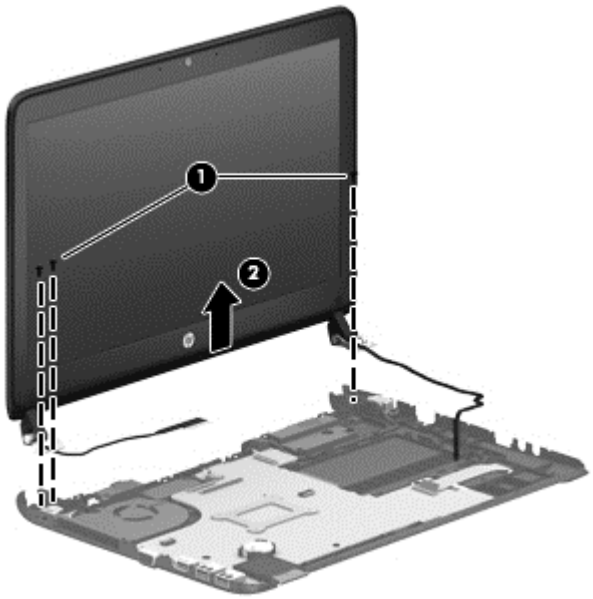


7. Remove the 2 Phillips PM2.0×4.0 screws **(1)** that secure the power connector bracket to the computer.

8. Lift the bracket **(2)** up and out of the base enclosure.



9. Remove the 3 Phillips PM2.5×5.0 screws **(1)** that secure the display to the computer.
10. Lift the display assembly straight up and remove it **(2)**.



⚠ **CAUTION:** When reinstalling the display assembly, be sure that the wireless antenna cables are routed and arranged properly.

Failure to properly route the antennas can result in degradation of the computer's WLAN and WWAN performance.

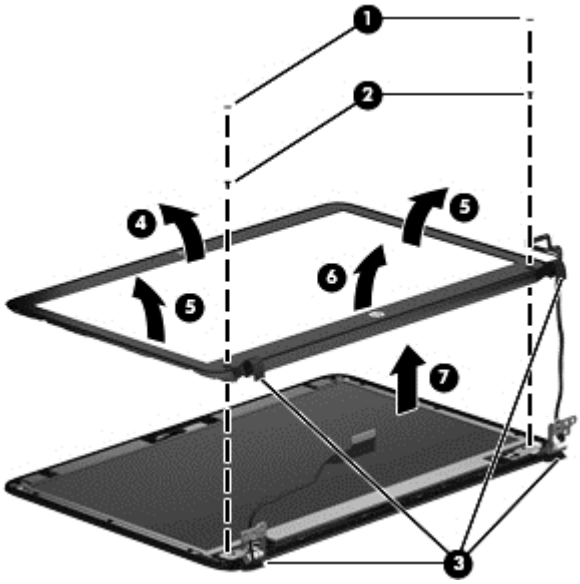
11. To replace the display bezel, remove the 2 screw covers **(1)** and the 2 Phillips PM2.5×4.0 screws **(2)** from the bottom corners of the display bezel.
12. Release the hooks **(3)** that secure the bezel to the display enclosure.

13. Flex the top **(4)** of the bezel, the inside edges of the left and right sides **(5)**, and then the bottom **(6)** of the bezel until it disengages from the display enclosure.

14. Remove the display bezel **(7)**.

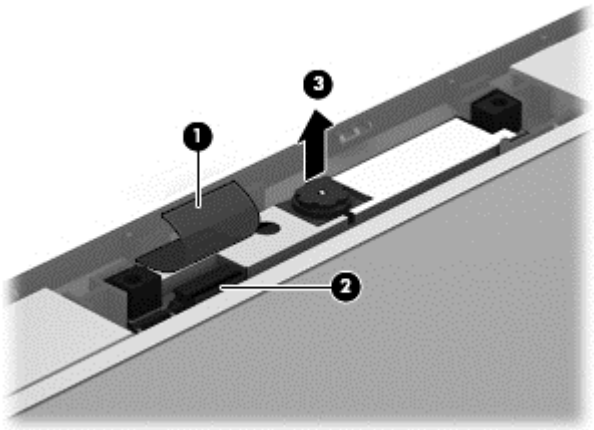
    The bezel is available using spare part number 731994-001.

    Screw covers are available in the Rubber/Plastics Kit, spare part number 727762-001.

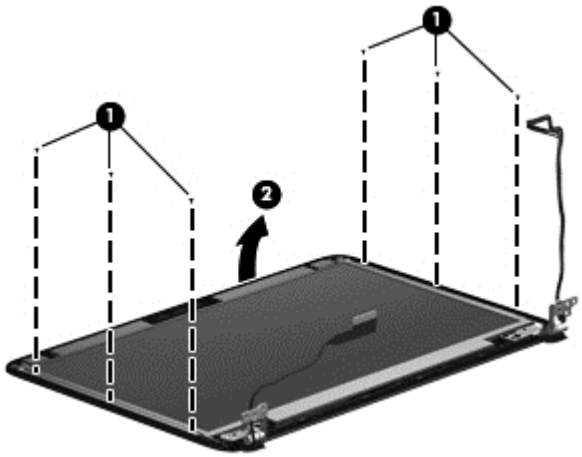


15. If it is necessary to replace the webcam module from the display enclosure, remove the tape from atop the module **(1)**, disconnect the cable from the module **(2)**, and then gently pull the module away from the double-sided tape on the display enclosure **(3)**.

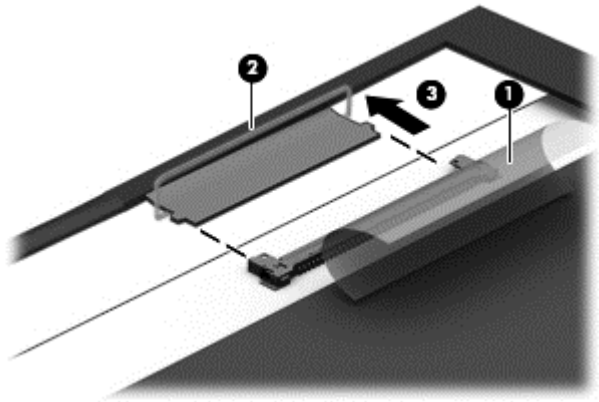
    The webcam module is available using spare part number 721543-001.



16. If you need to remove the display panel, remove the 6 Phillips PM1.5×3.0 screws **(1)** that secure the display panel to the display enclosure, and then rotate the top of the panel up to remove it **(2)**.

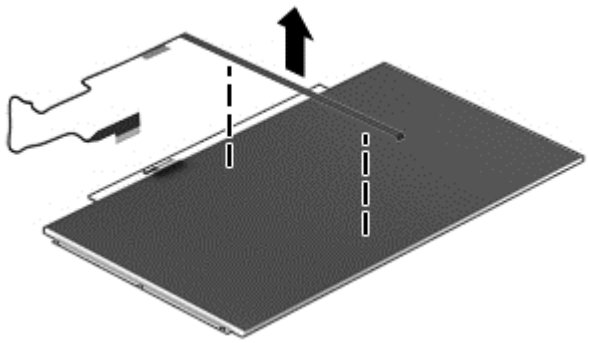


17. If you need to remove the display panel/webcam cable, disconnect the cable by lifting the tape **(1)** that covers the connector, lifting the cable lock **(2)**, and then disconnecting the cable from the panel **(3)**.



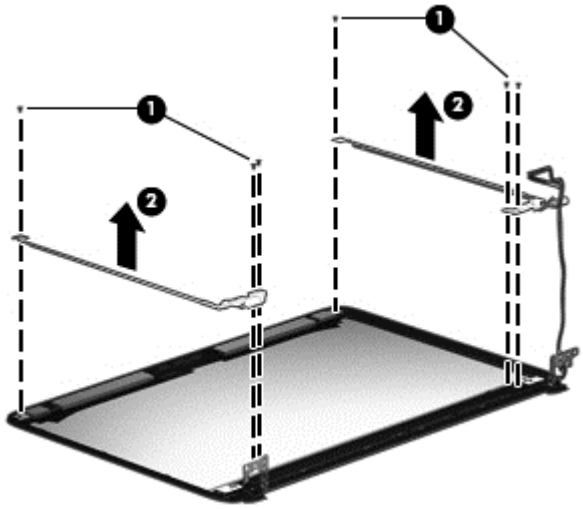
18. Remove the display/webcam cable from the back of the display panel.

    The display/webcam cable is available in the Cable Kit, spare part number 727757-001.



19. If it is necessary to replace the display hinges, remove the 6 Phillips PM2.5×3.0 screws **(1)** that secure the display hinges to the display enclosure, and then lift the hinges from the enclosure **(2)**.

    Display hinges are available using spare part number 731996-001.



    The display rear cover kit, spare part number 731995-001, includes WLAN and WWAN antennas and transceivers.

Reverse this procedure to reassemble and install the display assembly.

Power connector cable

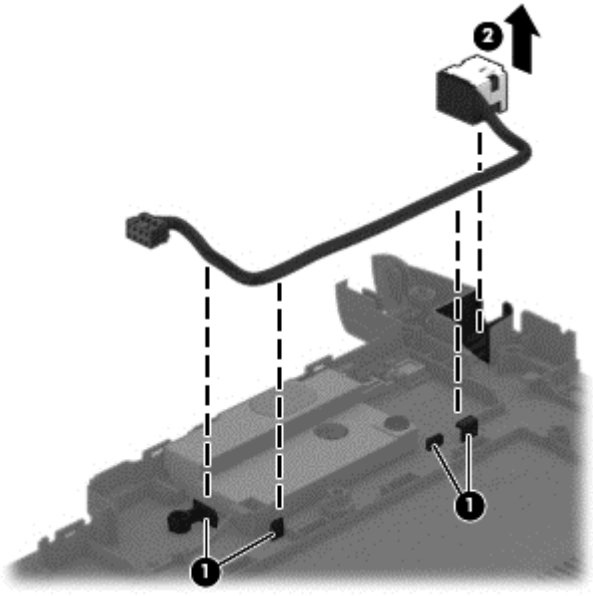
The power connector cable is included in the Cable Kit, spare part number 727757-001.

Before removing the power connector cable, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 35).
5. Remove the following components:
   a. Service door (see Service door on page 43).
   b. Keyboard (see Keyboard on page 37)
   c. Top cover (see Top cover on page 50)
   d. Display (see Display assembly on page 64)

Remove the power cable:

1. Position the computer upright and open with the front toward you.
2. Remove the cable from the clips in the base enclosure **(1)**.
3. Remove the power cable from the computer **(2)**.



Reverse this procedure to install the power connector cable.

System board

NOTE: All system board spare part kits include replacement thermal material.

Description	Spare part number
System board for use in models with Intel Core i7 4500u processors:	
Non-Windows 8 models	727772-001
Windows 8 Standard models	727772-501
Windows 8 Professional models	727772-601
System board for use in models with Intel Core i5 4250u processors:	
Non-Windows 8 models	727771-001
Windows 8 Standard models	727771-501
Windows 8 Professional models	727771-601
System board for use in models with Intel Core i5 4200u processors:	
Non-Windows 8 models	727770-001
Windows 8 Standard models	727770-501
Windows 8 Professional models	727770-601
System board for use in models with Intel Core i3 4010u processors:	
Non-Windows 8 models	727769-001
Windows 8 Standard models	727769-501
Windows 8 Professional models	727769-601

Before removing the system board, follow these steps:

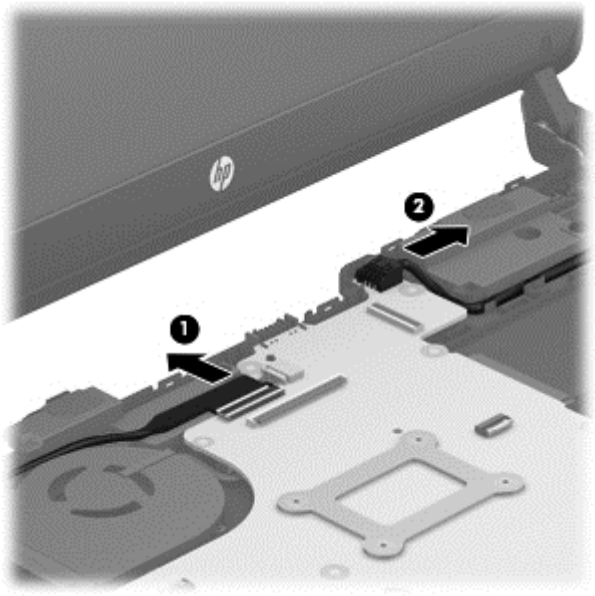
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 35).
5. Remove the following components:
   a. Service door (see Service door on page 43).
   b. Hard drive (see Hard drive on page 40)
   c. Keyboard (see Keyboard on page 37)
   d. Top cover (see Top cover on page 50)

When replacing the system board, be sure to remove the following components from the defective system board and install on the replacement system board:

- SIM card (see SIM on page 44)
- Memory module (see Memory modules on page 45)
- WLAN module (see WLAN/Bluetooth combo card on page 48)
- WWAN module (see WWAN module on page 46)

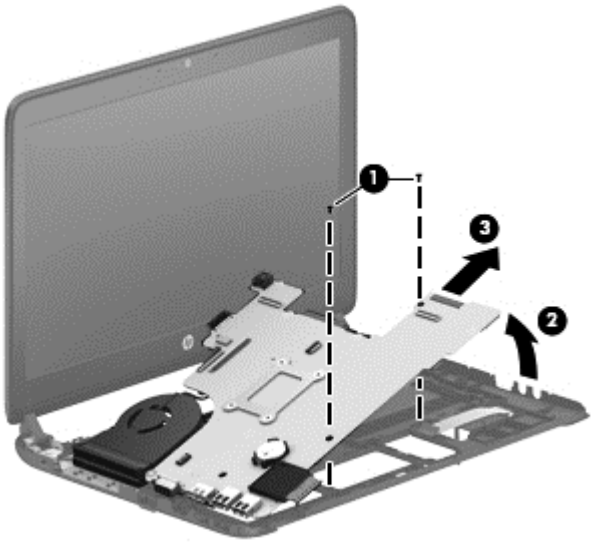
Remove the system board:

1. Position the computer upright with the front toward you.
2. Disconnect the display cable **(1)** and the power cable **(2)** from the system board.

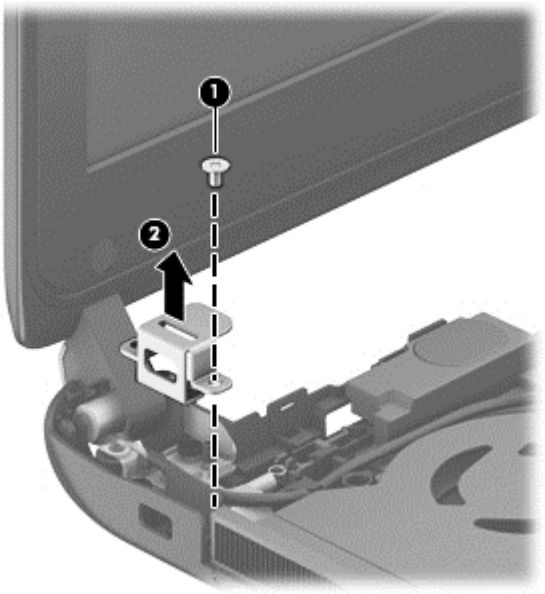


3. Remove the 2 Phillips PM2.0×4.0 screws **(1)** that secure the system board to the base enclosure.

4. Lift the right side of the system board up at an angle **(2)**, and then lift the system board up and to the right to remove it **(3)**.



5. If you need to remove the security bracket from the computer, remove the Phillips PM2.0×3.0 screw **(1)** that secures the brakcet to the base enclosure, and then lift the bracket straight up and off the computer **(2)**.



Reverse this procedure to install the system board.

Heat sink

NOTE: The fan and heat sink are combined into one assembly. All fan/heat sink spare part kits contain replacement thermal material.

Description	Spare part number
Heat sink	727766-001

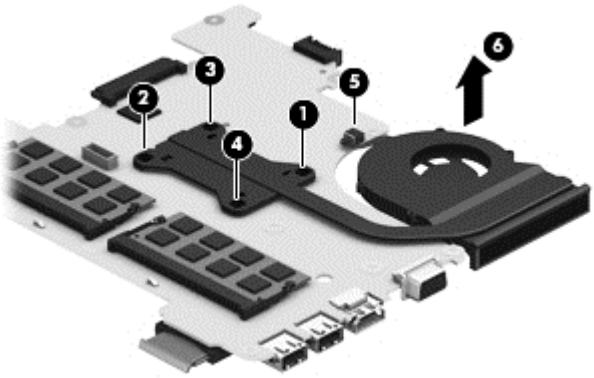
Before removing the heat sink, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 35).
5. Remove the following components:
   a. Service door (see Service door on page 43).
   b. Hard drive (see Hard drive on page 40)
   c. Keyboard (see Keyboard on page 37)
   d. Top cover (see Top cover on page 50)
   e. System board (see System board on page 71)

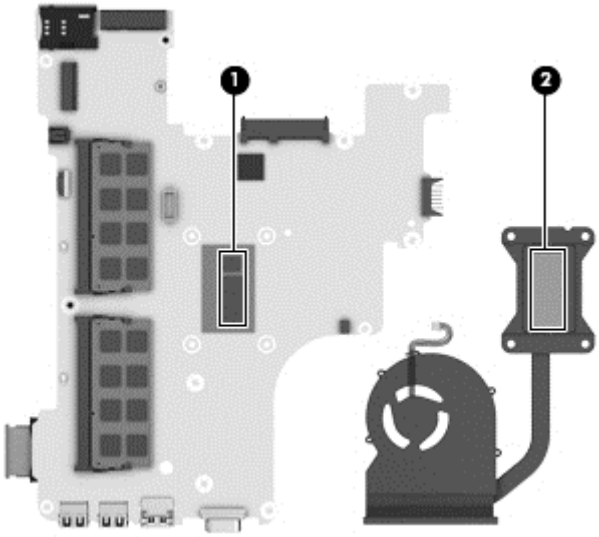
Remove the heat sink:

1. Position the system board upside-down with the front toward you.
2. In the order indicated, loosen the 4 captive Phillips screws **(1)-(4)** that secure the heat sink to the system board.
3. Disconnect the fan cable **(5)** from the system board.

4. Lift the heat sink off the system board **(6)**.



NOTE: Thoroughly clean thermal material from the surface of the system board **(1)** and heat sink **(2)** each time you remove the heat sink. All heat sink and processor spare part kits include thermal material.



Reverse this procedure to install the heat sink.

NOTE: To properly ventilate the computer, allow at least a 7.6-cm (3-in) clearance on the left side of the computer.

The computer uses an electric fan for ventilation. The fan is controlled by a temperature sensor and is designed to turn on automatically when high temperature conditions exist. These conditions are affected by high external temperatures, system power consumption, power management/battery conservation configurations, battery fast charging, and software requirements. Exhaust air is displaced through the ventilation grill located on the left side of the computer.

7 Computer Setup (BIOS) and Advanced System Diagnostics

Windows 7 – Computer Setup (BIOS) and Advanced System Diagnostics

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.

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

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 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-left corner of the screen, and then follow the on-screen instructions.

  – or –

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

- To save your changes and exit Computer Setup menus:

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

  – or –

  Use the tab key and the arrow keys to select **File > 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 **File > Restore Defaults**.

4. Follow the on-screen instructions.
5. To save your changes and exit, 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 **File > 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

The next sections describe different ways of updating the BIOS.

Downloading *SoftPaqs* to update the BIOS

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

To install BIOS updates from the HP website, follow the steps below:

1. Download the *SoftPaq* from the HP website.
2. Click **Run**, and then follow the on-screen instructions to update the BIOS.

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

BIOS management using system diagnostics

1. Download the *SoftPaq* from the HP website.

   NOTE: Verify that the UEFI system diagnostics is installed on your computer (or USB flash drive).

2. Click **Run**, and then click **Cancel** at the Update/USB bootable dialog box.
3. Navigate to the folder located in c:\swsetup that corresponds to your *SoftPaq* number.
4. Locate the .bin file in the ROMpaq folder (for example, 68CDD.bin) and then copy it to the Hewlett-Packard\BIOS\New\ folder in either the HP_Tools partition of the hard drive, or the USB flash drive.
5. Locate the .sig file in the ROM.cab file and rename it with the same prefix as the .bin file (for example, 68CDD.sig). Copy the renamed file to the Hewlett-Packard\BIOS\New\ folder in either the HP_Tools partition of the hard drive, or the USB flash drive.
6. 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.
7. Press f2 to enter Computer Setup.
8. Click **BIOS Management** from the menu and then select **Update BIOS**.

Using f10 setup to update the BIOS

1. Download the *SoftPaq* from the HP website.

   NOTE: Verify that the UEFI system diagnostics is installed on your computer (or USB flash drive).

2. Click **Run**, and then click **Cancel** at the Update/USB bootable dialog box.
3. Navigate to the folder located in c:\swsetup that corresponds to your *SoftPaq* number.
4. Locate the .bin file in the ROMpaq folder (for example, 68CDD.bin) and then copy it to the Hewlett-Packard\BIOS\New\ folder in either the HP_Tools partition of the hard drive, or the USB flash drive.
5. Locate the .sig file in the ROM.cab file and rename it with the same prefix as the .bin file (for example, 68CDD.sig). Copy the renamed file to the Hewlett-Packard\BIOS\New\ folder in either the HP_Tools partition of the hard drive, or the USB flash drive.
6. 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.
7. Press f10 to enter Computer Setup.
8. Click **Update System BIOS**, and then click **Accept** to update the BIOS.

Determining the BIOS version

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

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

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

   – or –

   Use the tab key and the arrow keys to select **File > 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 from the computer by unplugging the power cord from the AC outlet.

Do not shut down the computer or initiate Sleep or Hibernation.

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

1. Select **Start > Help and Support > Maintain**.
2. Follow the on-screen instructions to identify your computer and access the BIOS update you want to download.
3. At the download area, follow these steps:
   a. Identify the BIOS update that is later than 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 displayed on the screen after the download is complete. If no instructions are displayed, follow these steps:

1. Open Windows Explorer by selecting **Start > Computer**.
2. Double-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.

BIOS Setup Menu

The tables in this section provide an overview of the BIOS Setup menu options.

Main menu

Select	To do this
System information	• View and change the system time and date. • View identification information about your computer. • View specification information about the processor, memory size, and system BIOS.

Security menu

Select	To do this
Administrator password	Control access to Setup Utility.
Power-on password	Control access to your computer.

Diagnostics menu

Select	To do this
Primary Hard Disk Self Test	Run a quick or comprehensive self-test on the hard drive.
Memory Test	Run a diagnostic test on the system memory.

Using Advanced System Diagnostics

Advanced System Diagnostics allows you to run diagnostic tests to determine if the computer hardware is functioning properly. The following diagnostic tests are available in Advanced System Diagnostics:

- Start-up test—This test analyzes the main computer components that are required to start the computer.
- Run-in test—This test repeats the start-up test and checks for intermittent problems that the start-up test does not detect.
- System Tune-Up—This group of additional tests checks your computer to make sure that the main components are functioning correctly. System Tune-Up runs longer and more comprehensive tests on memory modules, hard drive SMART attributes, the hard drive surface, the battery (and battery calibration), video memory, and the WLAN module status.
- Hard disk test—This test analyzes the physical condition of the hard drive, and then checks all data in every sector of the hard drive. If the test detects a damaged sector, it attempts to move the data to a good sector.

- Memory test—This test analyzes the physical condition of the memory modules. If it reports an error, replace the memory modules immediately.
- Battery test—This test analyzes the condition of the battery and calibrates the battery if necessary. If the battery fails the test, contact support to report the issue and purchase a replacement battery.

You can view system information and error logs in the Advanced System Diagnostics window.

To start Advanced System Diagnostics:

1. Turn on or restart the computer. While the "Press the ESC key for Startup Menu" message is displayed in the lower-left corner of the screen, press esc. When the Startup Menu is displayed, press f2.
2. Click the diagnostic test you want to run, and then follow the on-screen instructions.

NOTE: If you need to stop a diagnostics test while it is running, press esc.

Windows 8 – Computer Setup (BIOS) and Advanced System Diagnostics

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 tab key and the arrow keys to select **File > Ignore Changes and Exit**, and then press enter.

- To save your changes and exit Computer Setup menus:

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

  – or –

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

Your changes go into effect when the computer restarts.

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

Updating the BIOS

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

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

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

Determining the BIOS version

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

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

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

   – or –

   Use the tab key and the arrow keys to select **File > 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, select the HP Support Assistant app.
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 displayed on the screen after the download is complete. If no instructions are displayed, follow these steps:

1. From the Start screen, type e, and then click **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 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 **File > 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 **File > 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 System Diagnostics

System Diagnostics allows you to run diagnostic tests to determine if the computer hardware is functioning properly. The following diagnostic tests may be available in System Diagnostics:

- System Tune-Up—This group of additional tests checks your computer to make sure that the main components are functioning correctly. System Tune-Up runs longer and more comprehensive tests on memory modules, hard drive SMART attributes, the hard drive surface, the battery (and battery calibration), video memory, and the WLAN module status.
- Start-up test—This test analyzes the main computer components that are required to start the computer.
- Run-in test—This test repeats the start-up test and checks for intermittent problems that the start-up test does not detect.
- Hard disk test—This test analyzes the physical condition of the hard drive, and then checks all data in every sector of the hard drive. If the test detects a damaged sector, it attempts to move the data to a good sector.
- Memory test—This test analyzes the physical condition of the memory modules. If it reports an error, replace the memory modules immediately.
- Battery test—This test analyzes the condition of the battery and calibrates the battery if necessary. If the battery fails the test, contact HP support to report the issue and purchase a replacement battery.
- BIOS Management—You can update or rollback the version of the BIOS on the system. Do not shut down or remove external power during the process. You will be given a confirmation screen

before your BIOS is modified. Select **BIOS update**, **BIOS Rollback**, or **Back to main menu**.

You can view system information and error logs or select languages in the System Diagnostics window.

To start System Diagnostics:

1. Turn on or restart the computer. While the "Press the ESC key for Startup Menu" message is displayed in the lower-left corner of the screen, press esc. When the Startup Menu is displayed, press f2.
2. Click the diagnostic test you want to run, and then follow the on-screen instructions.

NOTE: If you need to stop a diagnostics test while it is running, press esc.

SLED – Computer Setup (BIOS) and Advanced System Diagnostics

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 peripherals 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.

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

   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 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-left corner of the screen, and then follow the on-screen instructions.

  – or –

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

  – or –

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

  – or –

  Use the tab key and the arrow keys to select **File > 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 **File > Restore Defaults**.
4. Follow the on-screen instructions.
5. To save your changes and exit, 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 **File > 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 Web site.

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

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

Determining the BIOS version

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

BIOS version information (also known as *ROM date* and *System BIOS*) can be displayed as follows:

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

   – or –

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

NOTE: You can also determine the BIOS version by turning on or restarting the computer, pressing the esc key while the "Press the ESC key for Startup Menu" message is displayed at the bottom of the screen, and then pressing the f1 key. Follow the on-screen instructions to exit this screen.

Downloading a BIOS update

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

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

Do not shut down the computer or initiate Suspend or Hibernation.

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

1. Open your web browser. For U.S. support, go to http://www.hp.com/go/contactHP. For worldwide support, go to http://welcome.hp.com/country/us/en/wwcontact_us.html.
2. Follow the on-screen instructions to identify your computer and access the BIOS update you want to download.
3. Click the option for software and driver downloads, type your computer model number in the product box, and then press enter. Follow the on-screen instructions to identify your computer and access the BIOS update you want to download.
4. Click your specific product from the models listed.
5. Click the appropriate operating system.

6. Go to the BIOS section and download the BIOS software package.
7. Follow the installation instructions as provided with the downloaded BIOS software package.

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

Using Advanced System Diagnostics

Advanced System Diagnostics allows you to run diagnostic tests to determine if the computer hardware is functioning properly. The following diagnostic tests are available in Advanced System Diagnostics:

- Start-up test—This test analyzes the main computer components that are required to start the computer.
- Run-in test—This test repeats the start-up test and checks for intermittent problems that the start-up test does not detect.
- Hard disk test—This test analyzes the physical condition of the hard drive, and then checks all data in every sector of the hard drive. If the test detects a damaged sector, it attempts to move the data to a good sector.
- Memory test—This test analyzes the physical condition of the memory modules. If it reports an error, replace the memory modules immediately.
- Battery test—This test analyzes the condition of the battery and calibrates the battery if necessary. If the battery fails the test, contact support to report the issue and purchase a replacement battery.
- System Tune-Up—This group of additional tests checks your computer to make sure that the main components are functioning correctly. System Tune-Up runs longer and more comprehensive tests on memory modules, hard drive SMART attributes, the hard drive surface, the battery (and battery calibration), video memory, and the WLAN module status.

You can view system information and error logs in the Advanced System Diagnostics window.

To start Advanced System Diagnostics:

1. Turn on or restart the computer. While the “Press the ESC key for Startup Menu” message is displayed in the lower-left corner of the screen, press esc. When the Startup Menu is displayed, press f2.
2. Click the diagnostic test you want to run, and then follow the on-screen instructions.

NOTE: If you need to stop a diagnostics test while it is running, press esc.

8 Specifications

Computer specifications

	Metric	U.S.
Dimensions		
Length	23.4 cm	9.19 in
Width	32.6 cm	12.83 in
Height	2.1 cm	0.83 in
Weight (equipped with 1 SODIMM, SSD, WLAN module, 4-cell battery, webcam)	1.5 kg	3.01 lbs
Input power		
Operating voltage	19.0 V dc @ 4.74 A – 90 W or 18.5 V dc @ 3.5 A - 65 W	
Operating current	4.74 A or 3.5 A	
Temperature		
Operating (not writing to optical disc)	0°C to 35°C	32°F to 95°F
Operating (writing to optical disc)	5°C to 35°C	41°F to 95°F
Nonoperating	-20°C to 60°C	-4°F to 140°F
Relative humidity		
Operating	10% to 90%	
Nonoperating	5% to 95%	
Maximum altitude (unpressurized)		
Operating (14.7 to 10.1 psia)	-15 m to 3,048 m	50 ft to 10,000 ft
Nonoperating (14.7 to 4.4 psia)	-15 m to 12,192 m	-50 ft to 40,000 ft
Shock		
Operating	125 g, 2 ms, half-sine	
Nonoperating	200 g, 2 ms, half-sine	
Random vibration		

	Metric	U.S.
Operating	0.75 g zero-to-peak, 10 Hz to 500 Hz, 0.25 oct/min sweep rate	
Nonoperating	1.50 g zero-to-peak, 10 Hz to 500 Hz, 0.5 oct/min sweep rate	

NOTE: Applicable product safety standards specify thermal limits for plastic surfaces. The computer operates well within this range of temperatures.

33.8-cm (13.3-in), HD display specifications

	Metric	U.S.
Active diagonal size	33.8-cm	13.3-in
Resolution	1366x768 (HD)	
Active area	293.38x165.02	
PPI	118	
Surface treatment	Anti-glare	
Contrast ratio	300:1 (typical) – Anti-glare	
Response time	16 ms	
Brightness	200 nits (typical)	
Viewing angle	SVA	
Backlight	LED	
Luminance uniformity @ 13 points	1.4 (typ), 1.6 (max)	
Lifetime (1/2 luminance)	12,000 hours	
Color coordinate (white)	(0.313, 0.329)	
Color tolerance (white)	+/- 0.02	
Color tolerance (R, G, B)	+/- 0.03	
Color gamut	45% NTSC @CIE1931	

Hard drive specifications

	320-GB*	500-GB*
Dimensions		
Height	9.5 mm	9.5 mm
Width	70 mm	70 mm
Weight	92 g	101 g
Interface type	SATA	
Transfer rate	100 MB/sec	
Security	ATA security	
Seek times (typical read, including setting)		
Single track	1.5 ms	3 ms
Average	13 ms	13 ms
Maximum	27 ms	24 ms
Logical blocks	625,142,448	1,048,576,000
Disc rotational speed	5400 rpm	5400 rpm or 7200 rpm
Operating temperature	5°C to 55°C (41°F to 131°F)	
*1 GB = 1 billion bytes when referring to hard drive storage capacity. Actual accessible capacity is less. Actual drive specifications may differ slightly.		
NOTE: Certain restrictions and exclusions apply. Contact technical support for details.		

Specification information in Device Manager

Device Manager allows you to view and control the hardware attached to the computer, as well as provides hardware specification information.

You can also add hardware or modify device configurations using Device Manager.

NOTE: Windows 7 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 Windows Help and Support for more information.

After you open Device Manager, drill-down to a device and double-click it to access its properties.

To access Device Manager in Windows 8:

1. From the Start screen, type `control`, and then select **Control Panel**.
2. Select **System and Security**, and then in the System area, click **Device Manager**.

   A list display all the devices installed in your computer.

To access Device Manager in Windows 7:

1. Select **Start > Computer > System properties**.
2. In the left pane, click **Device Manager**.

9 Backup and recovery in Windows 7

To protect your information, use Windows Backup and Restore to 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, or create system restore points. In case of system failure, you can use the backup files to restore the contents of your computer.

Windows Backup and Restore provides the following options:

- Creating a system repair disc (select models only) by using the installed optical drive (select models only) or an optional external optical drive
- Backing up your information
- Creating a system image (select models only)
- Scheduling automatic backups (select models only)
- Creating system restore points
- Recovering individual files
- Restoring the computer to a previous state
- Recovering information using recovery tools

NOTE: For detailed instructions, perform a search for these topics in 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. See Help and Support for more information.

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 performs a system recovery if the hard drive becomes corrupted. A system recovery reinstalls the original operating system and the software programs installed at the factory, and then configures the settings for the programs.

HP Recovery Disc Creator can create two kinds of recovery DVDs as follows:

- Windows DVD—Installs the operating system without additional drivers or applications. Choosing this selection creates a DVD that restores the original operating system and the software programs installed at the factory.
- Driver 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: Operating system recovery media can be created only once. Thereafter, the option to create that media will not be available.

1. Select **Start > All Programs > Security and Protection > HP Recovery Disc Creator**.
2. Select **Driver DVD** or **Windows DVD**.
3. From the drop-down menu, select the drive for burning the recovery media.
4. Click the **Burn** button to start the burning process.

Backing up your information

Recovery after a system failure is as good as your most recent backup. Immediately after software setup, you should create system repair discs (select models only) using HP Recovery Disc Creator using the installed optical drive (select models only) or an optional external optical drive and back up your system. 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. The system repair discs (select models only) are 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 programs.

- 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, use any of the following types of discs (purchased separately): CD-R, CD-RW, 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.

NOTE: DVDs and DVDs with double-layer (DL) support store more information than CDs, so using them for backup reduces the number of recovery discs required.

- When backing up to discs, number each disc before inserting it into the external drive.

To create a backup using Backup and Restore:

NOTE: Be sure that the computer is connected to AC power before you start the backup process.

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 a system repair disc (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: 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 discs you previously created (select models only), you must purchase a Windows 7 operating system DVD to reboot the computer and repair the operating system. For additional information, see Using a Windows 7 operating system DVD (purchased separately) on page 102.

Using the Windows recovery tools

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: Using Startup Repair completely erases hard drive contents and reformats 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 and the HP Recovery partition.

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

   To check for the HP Recovery partition, click **Start**, right-click **Computer**, click **Manage**, and then click **Disk Management**.

   NOTE: If the HP Recovery partition has been deleted, the f11 restore option will not function. You must recover your operating system and programs using the Windows 7 operating system DVD and the *Driver Recovery* disc (both purchased separately) if the Windows partition and the HP Recovery partition are not listed. For additional information, see Using a Windows 7 operating system DVD (purchased separately) on page 102.
3. If the Windows partition and the HP Recovery partition are 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, perform a search for these topics in Help and Support.

Using f11 recovery tools

CAUTION: Using f11 recovery tools completely erases hard drive contents and reformats the hard drive. All files you have created and any software 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 DVD and the *Driver Recovery* disc (both purchased separately). For additional information, see Using a Windows 7 operating system DVD (purchased separately) on page 102.
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 a Windows 7 operating system DVD (purchased separately)

To order a Windows 7 operating system DVD, go to the HP website. For U.S. support, go to http://www.hp.com/go/contactHP. 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 you have created and any software 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* disc.
2. Install the Hardware Enabling Drivers first, and then install Recommended Applications.

10 Backup and recovery in Windows 8

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

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

NOTE: For detailed instructions on various backup and restore options, perform a search for these topics in HP Support Assistant. To access HP Support Assistant on the Start screen, select the **HP Support Assistant** app.

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. Refer to HP Support Assistant. To access HP Support Assistant on the Start screen, select the **HP Support Assistant** app.

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. The system repair media (select models only) are 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.

On Start screen, type `backup`, click **Settings**, and then select **Save backup copies of your files with File History**.

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

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 programs.
- 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.

To create a backup using Backup and Restore:

NOTE: Be sure that the computer is connected to AC power before you start the backup process.

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

1. From the Start screen, type `backup`, click **Settings**, and then select from the list of displayed options.
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 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 8 operating system media to reboot the computer and repair the operating system. For additional information, see Using Windows 8 operating system media (purchased separately) on page 106.

Using the Windows recovery tools

To recover information you previously backed up:

▲ Access HP Support Assistant. To access HP Support Assistant on the Start screen, select the **HP Support Assistant** app.

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

CAUTION: Some Automatic 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 HP Recovery partition and the Windows partition.

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

   – or –

   From the Start screen, type c, and then select **Computer**.

   NOTE: If the Windows partition and the HP Recovery partition are not listed, you must recover your operating system and programs using the Windows 8 operating system DVD and the *Driver Recovery* media (both purchased separately). For additional information, see Using Windows 8 operating system media (purchased separately) on page 106.
3. If the Windows partition and the HP Recovery partition are listed, restart the computer. After Windows has loaded, press and hold the shift key while clicking **Restart**.
4. Select **Troubleshoot**, then select **Advanced Options**, and then select **Automatic 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 HP Support Assistant. To access HP Support Assistant on the Start screen, select the **HP Support Assistant** app.

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 HP Recovery partition: From the Start screen, type c, and then select **Computer**.

   NOTE: If the HP Recovery partition is not listed, you must recover your operating system and programs using the Windows 8 operating system media and the *Driver Recovery* media (both purchased separately). For additional information, see Using Windows 8 operating system media (purchased separately) on page 106.
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 8 operating system media (purchased separately)

To order a Windows 8 operating system DVD, go to http://www.hp.com/support, select your country or region, and follow the on-screen instructions. 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 8 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 recovery using a Windows 8 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 8 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.

After the repair is completed:

1. Eject the Windows 8 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 for quick and easy recovery

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.

IMPORTANT: Refresh removes any traditional applications that were not originally installed on the system at the factory.

NOTE: During Refresh, a list of removed traditional applications will be saved so that you have a quick way to see what you might need to reinstall. See HP Support Assistant for instructions on reinstalling traditional applications. To access HP Support Assistant on the Start screen, select the **HP Support Assistant** app.

NOTE: You may be prompted for your permission or password when using Refresh. See HP Support Assistant for more information. To access HP Support Assistant on the Start screen, select the **HP Support Assistant** app.

To start Refresh:

1. From the Start screen, point to the far-right upper or lower corner of the screen to display the charms.
2. Click **Settings**.
3. Click **Change PC settings** in the bottom-right corner of the screen, and then select **General** from the PC settings screen.
4. Scroll the right-side choices down to display **Refresh your PC without affecting your files**.
5. Under **Refresh your PC without affecting your files**, select **Get started**, and follow the on-screen instructions.

Remove everything and reinstall Windows

Sometimes you want to perform detailed reformatting of your computer, or you want to remove personal information before you give away or recycle your computer. The process described in this section provides a speedy, simple way to return the computer to its original state. This option removes all personal data, apps, and settings from your computer, and reinstalls Windows.

IMPORTANT: This option does not provide backups of your information. Before using this option, back up any personal information you wish to retain.

You can initiate this option by using the f11 key or from the Start screen.

To use the f11 key:

1. Press f11 while the computer boots.

   – or –

   Press and hold f11 as you press the power button.
2. Choose your language.
3. Choose your keyboard layout.
4. Select **Troubleshoot** from the boot options menu.
5. Select **Reset your PC**, and follow the on-screen instructions.

To use the Start screen:

1. From the Start screen, point to the far-right upper or lower corner of the screen to display the charms.
2. Click **Settings**.
3. Click **Change PC settings** in the bottom-right corner of the screen, and then select **General** from the PC settings screen.

4. Scroll the right-side choices down to display **Remove everything and reinstall Windows**.
5. Under **Remove everything and reinstall Windows**, select **Get started**, and follow the on-screen instructions.

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`, and select **Apps**.
2. Open HP Software Setup.
3. Follow the on-screen directions to reinstall drivers or select software.

11 Backup and Recovery in SLED

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

Your computer includes tools provided by HP to help you safeguard your information and retrieve it if ever needed.

Creating backups

1. Create restore media immediately after you set up the computer. For more information, see Performing a system recovery on page 110.
2. As you add files, routinely create a backup of your system and personal information.

Backing up your information

You should back up your computer files on a regular schedule to maintain a current backup. You can manually back up your information to an optional external drive, a network drive, or discs. Back up your system at the following times:

- At regularly scheduled times
- Before the computer is repaired or restored
- Before you add or modify hardware or software

To back up your home directory files using **Backup Manager Settings**:

1. Select **Computer > More Applications > Tools > Backup Manager Settings**, and click **Backup my home directory**.
2. Click **Storage Destination Location**, and then select a location to back up your information.
3. Click **Schedule**, and then select a time schedule to perform backups at a regularly scheduled time.

   To immediately back up your information, click the **Backup Now** check box.

NOTE: Before you back up your information, be sure you have designated a location to save the backup files.

4. Click **Save and Backup** to start the backup and to save the backup settings.

To restore backup files:

1. Select **Computer > More Applications > Tools > Backup Manager Restore**.
2. Click **Backup Source**, and then select the location of the backup files.
3. Click **Restore Destination**, and then select the destination to restore the files.
4. To restore all files from the selected location, click **Restore all files**. To restore select files only, click **Restore selected files**, click **Select Files** and then select the files to be restored.
5. Under **Restore Point**, click the time and date of the backup.

NOTE: If multiple backups have been performed, click **Use the latest version** to restore the latest version.

6. Click **Restore** to start restoring the files, or click **Cancel** to cancel the operation.

Performing a system recovery

Recovery allows you to repair or restore the computer to its original factory state. You can create an HP Factory Image Restore DVD, using an installed or an external DVD±RW optical drive.

CAUTION: Using Recovery completely erases hard drive contents and reformats the hard drive. All files you have created and any software installed on the computer are permanently removed. The recovery tool reinstalls the original operating system and HP programs and drivers that were installed at the factory. Software, drivers, and updates not installed by HP must be manually reinstalled. Personal files must be restored from a backup.

To restore the computer using the HP Factory Image Restore DVD, you must first create the recovery disc. To create the recovery disc:

NOTE: HP recommends that you create the HP Factory Image Restore DVD in the event of a system failure.

1. Select **Computer > More Applications**.
2. In the left pane, click **Tools**, and then click **Create HP Factory Image Restore DVD** in the right pane.
3. Follow the on-screen instructions to create an image file to burn a recovery disc.

To restore the computer from the recovery disc, follow these steps:

1. If possible, back up all personal files.
2. Insert the HP Factory Image Restore DVD into the optical drive and restart the computer.
3. As the computer is restarting, press f9 to open the Computer Setup boot option menu.

4. Press the down arrow to select **Restore SLED HP-BNB preload image** from the **Linux boot** menu, and then press enter.
5. Using the arrow keys, select **Yes** when prompted: **Do you want to start the System-Restore?**
6. Follow the on-screen instructions.

USB Recovery option (select models only)

The USB Recovery Disk On Key (flash drive) option allows you to create a backup image of the SLED operating system installed on select HP Business Notebooks. This Disk On Key may be used to restore the system to the original factory state when the F11 recovery option is not available. This process should be done on first obtaining the computer.

CAUTION: The USB recovery option does not preserve data present on the computer's hard drive or on the Disk On Key used for the recovery process. Back up any data on the Disk on Key or the notebook that will be recovered before starting.

NOTE: HP recommends that you create the USB Recovery Disk in the event of a system failure. The Disk On Key used for this process should be 4 GB or larger.

Creating a USB Recovery Disk On Key

1. Connect the USB Disk On Key to a USB port on the computer.
2. Select **Computer > More applications > Tools > Create Recovery USB**.
3. Enter the root password when prompted.
4. Select **USB Disk On Key** from the list.
5. Click **OK**.
6. A question dialog will remind you that the data on the USB key will be destroyed. To continue, click **OK**. Otherwise, click **Cancel** and back up the contents of the Disk On Key on another computer.
7. The backup process will display a status dialog box while the backup is in progress.

NOTE: A file browser window with the Disk On Key Contents displayed will pop up when the key is mounted. You may close the file browser window if desired. Once the USB Recovery Key has been created, the status dialog will close. The USB Recovery Key is ready for use.

Recovering from a USB Recovery Disk On Key

CAUTION: Before starting the Recovery process, make sure any data on the system to be recovered has been backed up. The recovery process destroys all data on the system to be recovered.

1. Turn off the computer.
2. Connect the USB Disk On Key to a USB port on the computer.
3. Turn on the computer while holding down the f9 key.

4. Once the system has booted, the **Boot Options** menu should appear.
5. Using the arrow keys, select **USB Disk On Key** and press enter.

NOTE: The description may vary from one USB key to another. Any entry other than Optical Disk Drive, Notebook Hard Drive or Notebook Ethernet should be the USB Recovery Disk On Key.

6. Once the USB Recovery Disk On Key has been selected, press enter. The USB Recovery Disk On Key will boot.
7. Once the USB Recovery Disk On Key has booted, a dialog box will prompt, "Do you want to start the System-Restore?" If data on the computer has not been backed up, use the tab key and select **No**. The system will reboot. Back up the system data and repeat the previous steps. If no data should be saved from the computer, use the tab key to select **Yes**. Press enter to begin the recovery process.
8. After the files are copied to the system, follow the on-screen instructions.

Remove everything and reinstall SLED

Sometimes you want to perform detailed reformatting of your computer, or you want to remove personal information before you give away or recycle your computer. The process described in this section provides a speedy, simple way to return the computer to its original state. This option removes all personal data, applications, and settings from your computer, and reinstalls the Linux operating system.

IMPORTANT: This option does not provide backups of your information. Before using this option, back up any personal information you wish to retain.

You can initiate this option by using the f11 key.

To use the f11 key:

Press f11 while the computer boots.

– or –

Press and hold f11 as you press the power button.

The following options are available:

- Cancel/Reboot—Reboots the system. No recovery or restore activity is performed.
- Recover/Repair System—This option repairs a system that is not working properly and preserves user data.
- Restore Factory System—This option restores the system back to the original factory state. User data is not preserved.

Select an option and follow the on-screen instructions.

12 Statement of Volatility

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

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

Following system shutdown and removal of all power sources from an HP Business Notebook PC system, personal data can remain on volatile system memory (DIMMs) for a finite period of time and will also remain in nonvolatile memory. The steps below will remove personal data from the notebook PC, including the nonvolatile memory found in Intel-based and AMD-based system boards. Some of these steps are disclosed in the Maintenance & Service Guides available for HP PC products available on the product support pages at www.hp.com.

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

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

   b. Select the **File** menu, then **Restore Defaults**.

   c. Select the **System Configuration** menu, then **Restore Security 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 the tag that has been set. Press the spacebar once to clear the tag, then press Enter to return to the prior menu.

   e. If a DriveLock password is set, select the **Security** menu, scroll down to **DriveLock**, then select **DriveLock password**. Select the desired hard drive. Click **Disable protection**, enter the existing master DriveLock password, then press Enter to confirm and return to the prior menu. Repeat this procedure if more than one hard drive has a DriveLock password.

f. If an Automatic DriveLock password is set, select the **Security** menu, scroll down to **Automatic DriveLock**, then select the desired hard drive and disable protection. Repeat this procedure if more than one hard drive has an Automatic DriveLock password.

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

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

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

If the HP notebook model number ends in a 'p' or 'w' and includes Intel® Centrino with VProTM, reboot the PC and enter BIOS Setup by pressing F10 when prompted. Select **System Configuration**, then **AMT Options**. Then select **Un-configure AMT on next boot**. Select **Save** then **Yes**. Select the **File** menu, and then select **Save Changes and Exit**. Reboot the system and confirm that you want to un-configure AMT.

j. If the optional Intel® Anti-Theft Technology (AT) was activated, contact the provider to de-activate it.

k. If the optional Absolute® Software Computrace® management and tracking service was activated on the notebook PC, contact the provider to deactivate it.

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

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

a. **Hard Disk Drive (HDD)**

Clear the HDD contents by using the HP Disk Sanitizer® utility or a third party application that, ideally, is U.S. Department of Defense (DOD) 5220.22-M approved.

To run HP Disk Sanitizer, enter BIOS Setup by powering on the system and pressing F10 when prompted near the bottom of the display, or press ESC to display the start up menu, then press F10. Select the **Security** menu and scroll down to the **Utilities** menu. Select **Disk Sanitizer** and select the desired drive. For a higher level of protection, select **Optimum**.

NOTE: This process will take a long time, and the amount of time varies based on the hard drive capacity.

b. **Solid State Drive (SSD)**

Clear the SSD contents by using the BIOS Setup Secure Erase command option, or by using a third party utility designed to erase data from an SSD. To run Secure Erase, enter BIOS Setup by powering on the system and pressing F10 when prompted near the bottom of the display. Select the **Security** menu and scroll down to the **Utilities** menu. Select **Secure Erase** and select the desired hard drive.

Non-volatile memory usage

Non Volatile Memory Type	Amount (Size)	Does this memory store customer data?	Does this memory retain data when power is removed?	What is the purpose of this memory?	How is data input into this memory?	How is this memory write protected?
Real Time Clock (RTC) battery backed-up CMOS configuration memory (CMOS)	256 Bytes	No	Yes	Stores system date and time and limited keyboard controller data.	Using the F10 Setup utility or changing the Microsoft® Windows® date & time.	This memory is not write-protected. HP recommends password protecting the F10 Setup utility.
Controller (NIC) EEPROM	64 Kbytes (not customer accessible)	No	Yes	Store NIC configuration and NIC firmware.	Using a utility from the NIC vendor that can be run from DOS.	A utility is required to write data to this memory and is available from NIC vendor. Writing data to this ROM in an inappropriate manner will render the NIC non-functional.
Keyboard ROM	64 Kbytes (not customer accessible)	No	Yes	Stores firmware code (keyboard, mouse, & battery management).	Programmed at the factory. Code is updated when the system BIOS is updated.	A utility is required for writing data to this memory and is available on the HP website. Writing data to this ROM in an inappropriate manner can render the PC non-functional.
DIMM Serial Presence Detect (SPD) configuration data	256 Bytes per memory module, 128 Bytes programmable (not customer accessible)	No	Yes	Stores memory module information.	Programmed by the memory vendor.	Data cannot be written to this memory when the module is installed in a PC. The specific write protection method varies by memory vendor.
System BIOS	4 to 5 MBytes	Yes	Yes	Store system BIOS code and PC configuration data.	System BIOS code is programmed at the factory. Code is updated when the system BIOS is updated. Configuration data and settings are input using the F10 setup utility or a custom utility.	A utility is required for writing data to this memory and is available on the HP website. Writing data to this ROM in an inappropriate manner can render the PC non-functional.

Non Volatile Memory Type	Amount (Size)	Does this memory store customer data?	Does this memory retain data when power is removed?	What is the purpose of this memory?	How is data input into this memory?	How is this memory write protected?
Intel Management Engine Firmware (present only in models ending in a 'p' or 'w' or with Intel Centrino Pro technology)	1.5 or 5MByte	Yes	Yes	Stores Management Engine Code, Settings, Provisioning Data and iAMT third party data store.	Management Engine Code is programmed at the factory. Code is updated via Intel secure firmware update utility. Unique Provisioning Data can be entered at the factory or by an administrator using the Management Engine (MEBx) setup utility. The third party data store contents can populated by a remote management console or local applications registered by an administrator to have access to the space.	The Intel chipset is configured to enforce HW protection to block all direct read/write access to this area. An Intel utility is required for updating the firmware. Only firmware updates digitally signed by Intel can be applied using this utility.
Bluetooth flash	2Mbit	No	Yes	Stores Bluetooth configuration and firmware.	Programmed at the factory. Tools for writing data to this memory are not publicly available but can be obtained from the silicon vendor.	A utility is required for writing data to this memory and is made available through newer versions of the driver if the flash requires an upgrade.
802.11 WLAN EEPROM	4kb to 8kb	No	Yes	Stores configuration and calibration data.	Programmed at the factory. Tools for writing data to this memory are not made public.	A utility is required for writing data to this memory and is typically not made available to the public unless a firmware upgrade is necessary to address a unique issue.
Web Camera	64K bit	No	Yes	Store Web Cam configuration and firmware.	Using a utility from the device manufacturer that can be run from Windows.	A utility is required for writing data to this memory and is typically not made available to the public unless a firmware upgrade is necessary to address a unique issue.
Fingerprint Reader	512kByte Flash	Yes	Yes	Stores fingerprint templates.	By enrolling in HP ProtectTools Security Manager.	Only a digitally signed application can make the call to write to the flash.

Questions and answers

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

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

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

   c. Follow the on-screen instructions.

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

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

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

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

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

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

   Yes, they are flash memory chips.

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

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

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

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

13 Power cord set requirements

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

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

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

Requirements for all countries and regions

The following requirements are applicable to all countries and regions:

- The length of the power cord set must be at least **1.5 m** (5.0 ft) and no more than **2.0 m** (6.5 ft).
- All power cord sets must be approved by an acceptable accredited agency responsible for evaluation in the country or region where the power cord set will be used.
- The power cord sets must have a minimum current capacity of 10 A and a nominal voltage rating of 125 or 250 V ac, as required by the power system of each country or region.
- The appliance coupler must meet the mechanical configuration of an EN 60 320/IEC 320 Standard Sheet C13 connector for mating with the appliance inlet on the back of the computer.

Requirements for specific countries and regions

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

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

1. The flexible cord must be Type HO5VV-F, 3-conductor, 0.75mm2 conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country or region where it will be used.
2. The flexible cord must be Type SVT/SJT or equivalent, No. 18 AWG, 3-conductor. The wall plug must be a two-pole grounding type with a NEMA 5-15P (15 A, 125 V ac) or NEMA 6-15P (15 A, 250 V ac) configuration. CSA or C-UL mark. UL file number must be on each element.
3. The appliance coupler, flexible cord, and wall plug must bear a “T” mark and registration number in accordance with the Japanese Dentori Law. The flexible cord must be Type VCTF, 3-conductor, 0.75mm2 or 1.25mm2 conductor size. The wall plug must be a two-pole grounding type with a Japanese Industrial Standard C8303 (7 A, 125 V ac) configuration.
4. The flexible cord must be Type RVV, 3-conductor, 0.75mm2 conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the CCC certification mark.
5. The flexible cord must be Type H05VV-F 3X0.75mm2 conductor size. KTL logo and individual approval number must be on each element. Corset approval number and logo must be printed on a flag label.
6. The flexible cord must be Type HVCTF 3X1.25mm2 conductor size. Power cord set fittings (appliance coupler, cable, and wall plug) must bear the BSMI certification mark.
7. For 127 V ac, the flexible cord must be Type SVT or SJT 3 x 18 AWG, with plug NEMA 5-15P (15 A, 125 V ac), with UL and CSA or C-UL marks. For 240 V ac, the flexible cord must be Type H05VV-F 3X0.75/1.00mm2 conductor size, with plug BS 1363/A with BSI or ASTA marks.

14 Recycling

Battery

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.

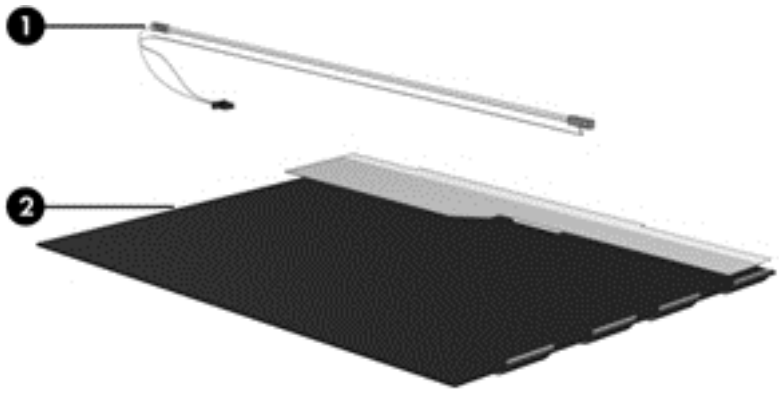
Display

WARNING! The backlight contains mercury. Exercise caution when removing and handling the backlight to avoid damaging this component and causing exposure to the mercury.

CAUTION: The procedures in this chapter can result in damage to display components. The only components intended for recycling purposes are the LCD panel and the backlight. When you remove these components, handle them carefully.

NOTE: **Materials Disposal**. This HP product contains mercury in the backlight in the display assembly that might require special handling at end-of-life. Disposal of mercury may be regulated because of environmental considerations. For disposal or recycling information, contact your local authorities, or see the Electronic Industries Alliance (EIA) Web site at http://www.eiae.org.

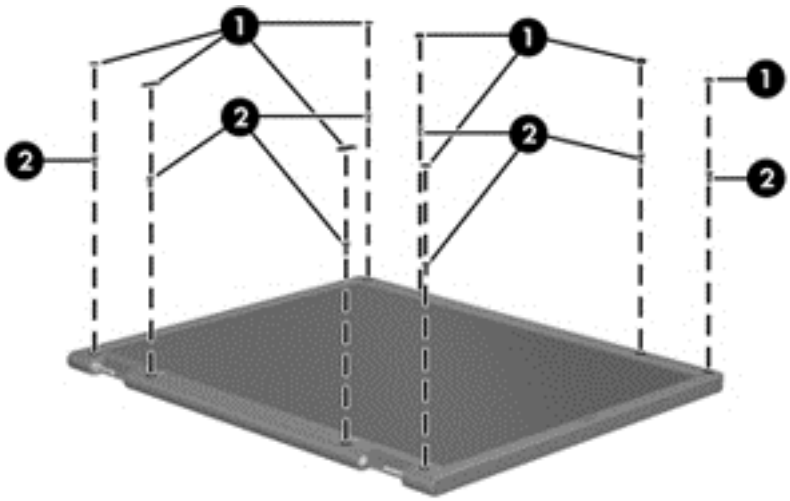
This section provides disassembly instructions for the display assembly. The display assembly must be disassembled to gain access to the backlight **(1)** and the liquid crystal display (LCD) panel **(2)**.



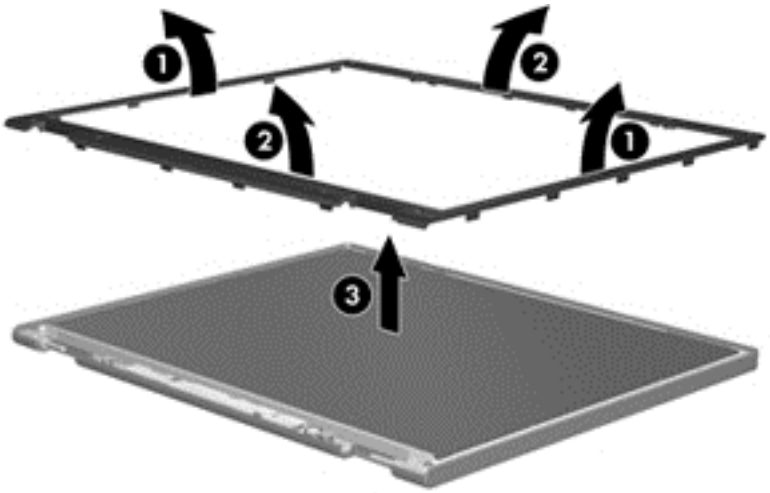
NOTE: The procedures provided in this chapter are general disassembly instructions. Specific details, such as screw sizes, quantities, and locations, and component shapes and sizes, can vary from one computer model to another.

Perform the following steps to disassemble the display assembly:

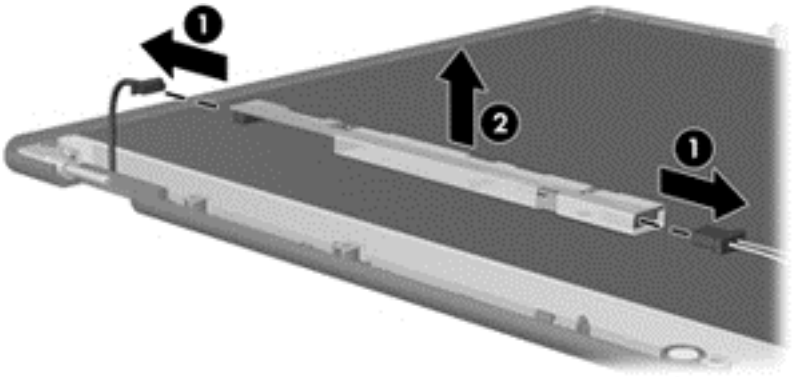
1. Remove all screw covers **(1)** and screws **(2)** that secure the display bezel to the display assembly.



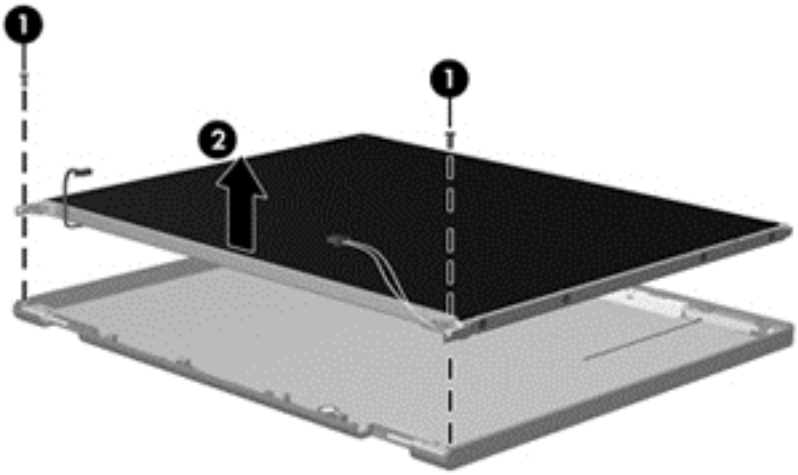
2. Lift up and out on the left and right inside edges **(1)** and the top and bottom inside edges **(2)** of the display bezel until the bezel disengages from the display assembly.
3. Remove the display bezel **(3)**.



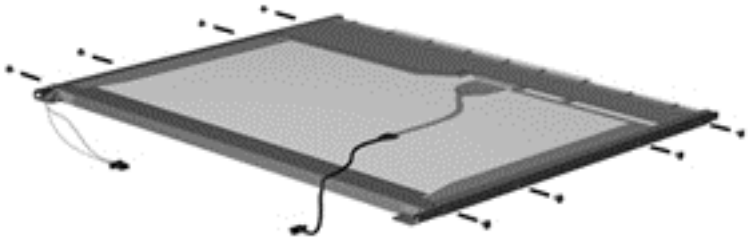
4. Disconnect all display panel cables **(1)** from the display inverter and remove the inverter **(2)**.



5. Remove all screws **(1)** that secure the display panel assembly to the display enclosure.
6. Remove the display panel assembly **(2)** from the display enclosure.

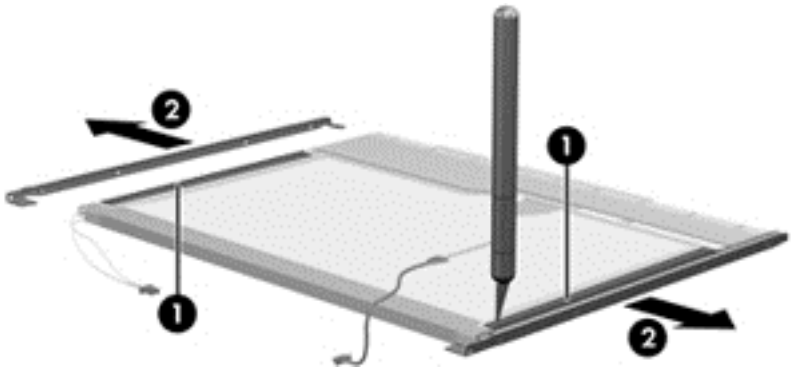


7. Position the display panel assembly upside-down.
8. Remove all screws that secure the display panel frame to the display panel.

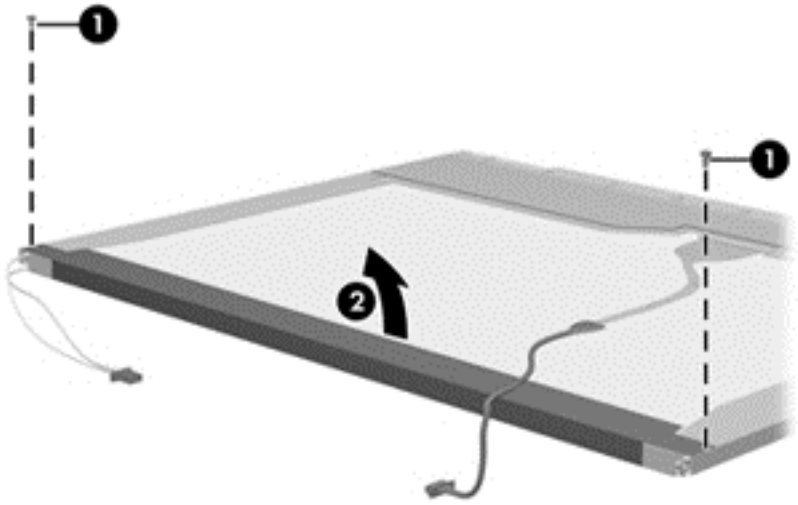


9. Use a sharp-edged tool to cut the tape **(1)** that secures the sides of the display panel to the display panel frame.

10. Remove the display panel frame **(2)** from the display panel.

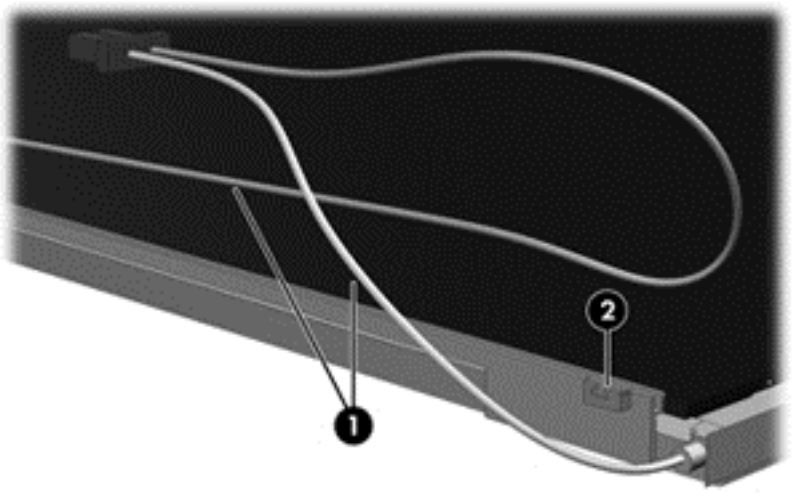


11. Remove the screws **(1)** that secure the backlight cover to the display panel.
12. Lift the top edge of the backlight cover **(2)** and swing it outward.



13. Remove the backlight cover.
14. Position the display panel right-side up.

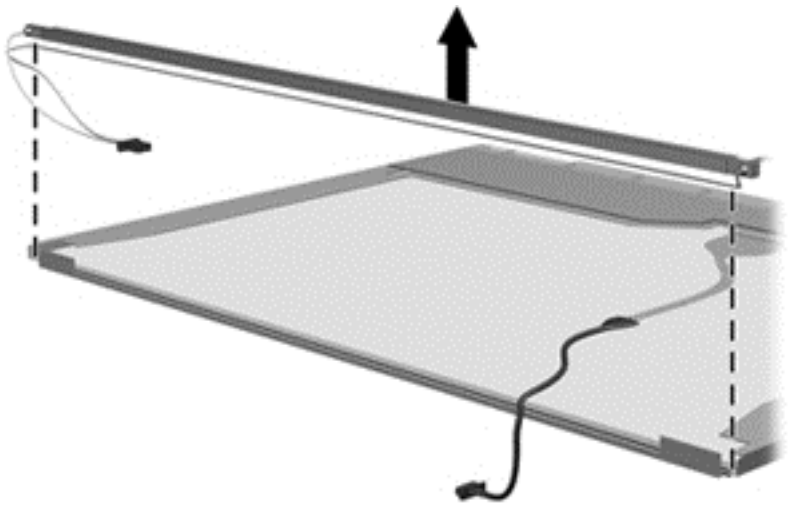
15. Remove the backlight cables **(1)** from the clip **(2)** in the display panel.



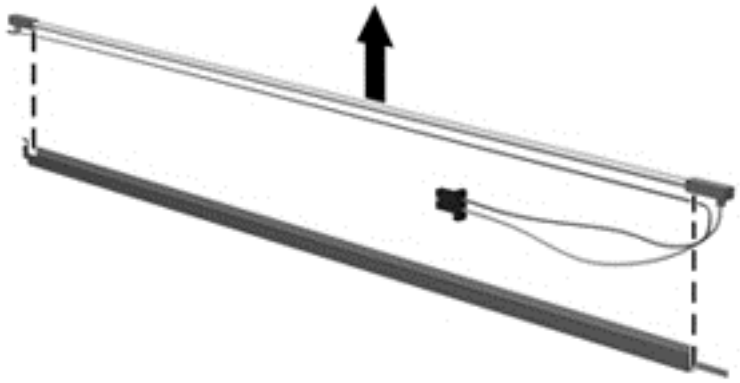
16. Position the display panel upside-down.

⚠ **WARNING!** The backlight contains mercury. Exercise caution when removing and handling the backlight to avoid damaging this component and causing exposure to the mercury.

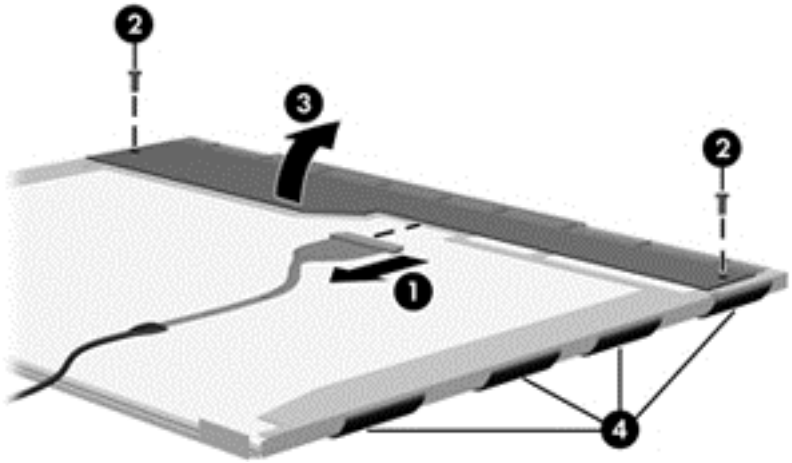
17. Remove the backlight frame from the display panel.



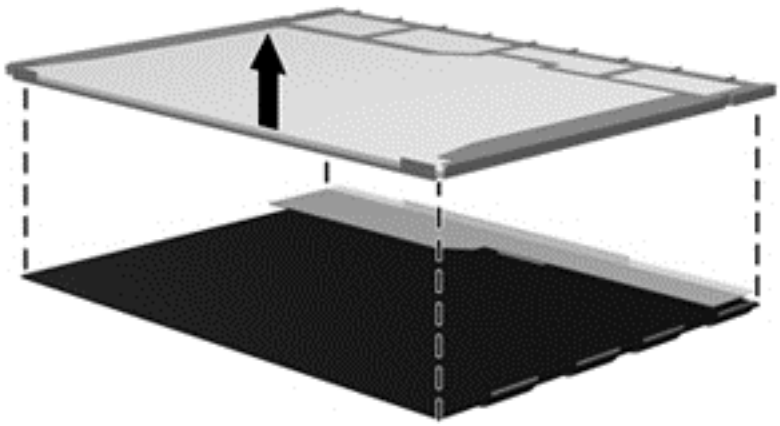
18. Remove the backlight from the backlight frame.



19. Disconnect the display panel cable **(1)** from the LCD panel.
20. Remove the screws **(2)** that secure the LCD panel to the display rear panel.
21. Release the LCD panel **(3)** from the display rear panel.
22. Release the tape **(4)** that secures the LCD panel to the display rear panel.



23. Remove the LCD panel.



24. Recycle the LCD panel and backlight.

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