HP ENVY 15

Maintenance and Service Guide

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Safety warning notice

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

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1 Product description

Category	Description
Product Name	HP ENVY 15
Processors	Intel® Quad Core® i7-3612QM 2.10-GHz processor (SC turbo up to 3.10-GHz), 6.0-MB L3 cache, 1600-MHz FSB, 35 W
	Intel Quad Core i7-3610QM 2.30-GHz processor (SC turbo up to 3.30-GHz), 6.0-MB L3 cache, 1600-MHz FSB, 45 W
	Intel Quad Core i7-2860QM 2.50-GHz processor (SC turbo up to 3.60-GHz), 8.0-MB L3 cache, 1600-MHz FSB, 45 W)
	Intel Quad Core i7-2760QM 2.40-GHz processor (SC turbo up to 3.50-GHz), 6.0-MB L3 cache, 1600-MHz FSB, 45 W)
	Intel Quad Core i7-2670QM 2.40-GHz processor (SC turbo up to 3.50-GHz), 6.0-MB L3 cache, 1600-MHz FSB, 45 W)
	Intel Dual Core i7-2640M 2.80-GHz processor (SC turbo up to 3.40-GHz), 4.0-MB L3 cache, 1333-MHz FSB, 35 W)
	Intel Quad Core i5-3210M 2.50-GHz processor (SC turbo up to 3.10-GHz), 3.0-MB L3 cache, 1600-MHz FSB, 35 W
	Intel Dual Core i5-2450M 2.50-GHz processor (SC turbo up to 3.10-GHz), 3.0-MB L3 cache, 1333-MHz FSB, 35 W)
	Intel Dual Core i5-2430M 2.40-GHz processor (SC turbo up to 3.00-GHz), 3.0-MB L3 cache, 1333-MHz FSB, 35 W)
Chipset	Intel 7 series Express chipset, HM76 platform controller hub (PCH)
Graphics	**Intel graphics**: Intel HD Graphics
	Switchable discrete graphics: • AMD Radeon™ HD 7750M package with 1024-MB of graphics subsystem discrete memory (64-MB × 32 GDDR5 × 4 PCs, 5GBPS), 128-bit package • AMD Radeon HD 7670M package with 1024-MB of graphics subsystem discrete memory (64-MB × 32 GDDR5 × 4 PCs, 5GBPS)
	Support for playback with PX5 Muxless, switchable graphics, HD decode, and DX11

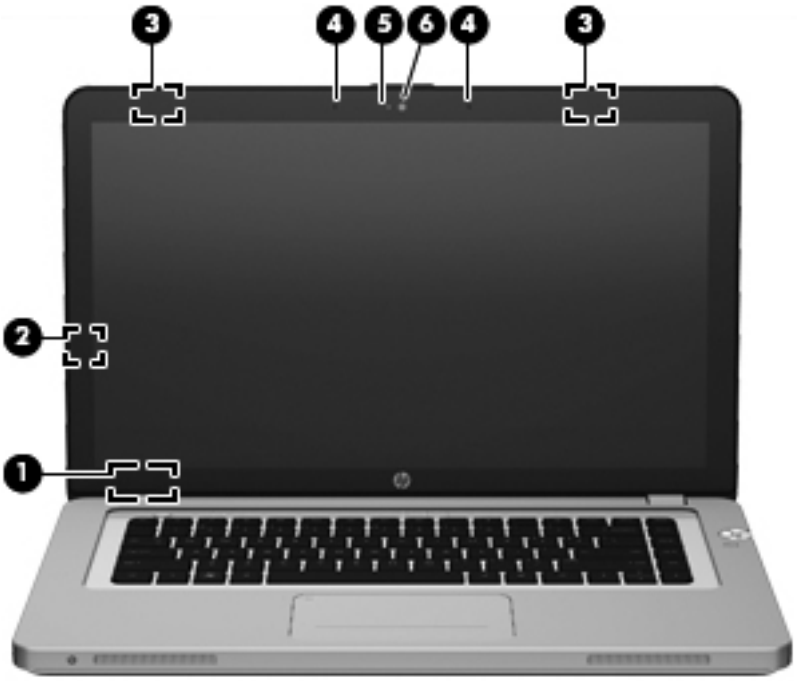
Category	Description
Panel	• 15.6-in, full high-definition (FHD), AntiGlare (AG), flush glass (FG), light-emitting diode (LED), (1920×1020 at 60% color gamut) UWVA display; typical brightness: 250 nits • 15.6-in, high-definition (HD), AG, FG, LED, (1366×768 at 45% color gamut) SVA display; typical brightness: 200 nits
	All display assemblies include 2 wireless local area network (WLAN) antenna cables
	Zero bright dot
	Supports 16:9 ultra wide aspect ratio
	Lighted logo on display enclosure
Memory	2 customer-accessible/upgradable memory module slots
	DDR3-1333-MHz and DDR3-1600-MHz dual channel support
	Supports up to 16384-GB of system RAM @ 1333-MHz, supports up to 8192-GB of system RAM @ 1600-MHz
	Supports the following configurations: • 16384-MB total system memory (8192 × 2 @ 1600- and 1333-MHz) • 12288-MB total system memory (8192 + 4096 @ 1600- and 1333-MHz) • 8192-MB total system memory (8192×1 @ 1600- and 1333-MHz) • 8192-MB total system memory (4096×2 @ 1600- and 1333-MHz) • 6144-MB total system memory (4096 + 2048 @ 1600-MHz) • 4096-MB total system memory (4096×1 @ 1600- and 1333-MHz)
Hard drives	Supports **6.35-cm** (2.5-in) hard drives in **9.5-mm** (.37-in) and **7.0-mm** (.28-in) thicknesses
	Customer-accessible
	Serial ATA (SATA)
	Supports Accelerometer hard drive protection
	Supports a 300-GB, 256-GB, or 160-GB solid-state drive
	Supports the following hard drives: • 1-TB, 5400-rpm, 9.5-mm • 750-GB, 7200-rpm, 9.5-mm • 750-GB, 7200-rpm, 9.5-mm, hybrid • 500-GB, 7200-rpm, 9.5-mm • 320-GB, 7200-rpm, 9.5-mm
Optical drive	Fixed, with eject button on the keyboard area
	SATA
	No support for 8-cm media

Category	Description
	9.5-mm slot load
	Supports DVD±RW and CD-RW Super Multi Double-Layer FX Combo Drive
Audio and video	2 digital, dual-array microphones with appropriate beam-forming, echo-cancellation, noise-suppression software
	HD audio (IDT92HD91B1), supports Microsoft Premium requirements
	High-performance Envy-branded speakers mounted in bass reflex enclosures
	Subwoofer
	Supports wireless audio via SMSC wireless audio module
	Separate discrete amplifiers for headphone and speaker out
	Beats signature audio profile applied to both headphones and external speakers
	Supports jog dial controls for volume and mute
	HP TrueVision high-definition webcam with activity light (fixed, no tilt, 1280×720 by 24 frames per second)
Ethernet	Integrated 10/100/1000 network interface controller (NIC) (AR8151)
Wireless	Integrated WLAN options by way of wireless module
	Two WLAN antennas built into display assembly
	Supports Intel Wireless Display (Wi-Di)
	Supports the following WLAN formats: • Intel Centrino Advanced-N 6235 WLAN module • Intel Centrino Advanced-N 6230 WLAN module • Intel Centrino Ultimate-N 6300 WLAN module
External media card	Push-push insertion/removal
	2-in-1 Digital Media Reader (push/push insertion and removal) supports the following digital card formats: • MultiMediaCard • Secure Digital (SD) Memory Card • Secure Digital High Capacity Memory Card

Category	Description
Ports	• 3-pin AC power • Audio-in (mono microphone) • Audio-out (stereo headphone), Beats-branded in red • DisplayPort supporting super high-definition external displays up to 2560×1600 resolution (f4 key incorporates all 3 video out modes: HDMI, DP, LCD) • HDMI v1.4a supporting up to 1920×1200 @ 60-Hz with HDCP key • RJ-45 (Ethernet) • USB 3.0 and USB 2.0 ports (all USB ports support USB sleep and charge) **NOTE:** HP ENVY 15 model numbers 15-3200 through 15-3299 are equipped only with USB 3.0 ports.
Keyboard/pointing devices	Full-size, island-style, radiance backlight, UV painted keyboard
	f5 to turn keyboard backlight on/off
	TouchPad with image sensor
	TouchPad with gesture support enabled (HP-defined: scroll and pinch,)
	Taps enabled as default
Power requirements	Supports the following AC adapters: • 120-W HP Slim AC adapter (PFC, 3-wire) • 90-W HP Travel AC adapter (PFC, 3-wire)
	Supports an 8-cell, 72-Wh, 2.45-Ah, Li-ion battery
Security	Supports a security cable slot
Operating system	**Preinstalled:** • Windows 7 Home Premium 64 • Windows 7 Professional 64 • Windows 7 Ultimate 64
Serviceability	**End-user replaceable parts:** • AC adapter • Hard drive • Memory modules (2) • WLAN module

2 External component identification

Display

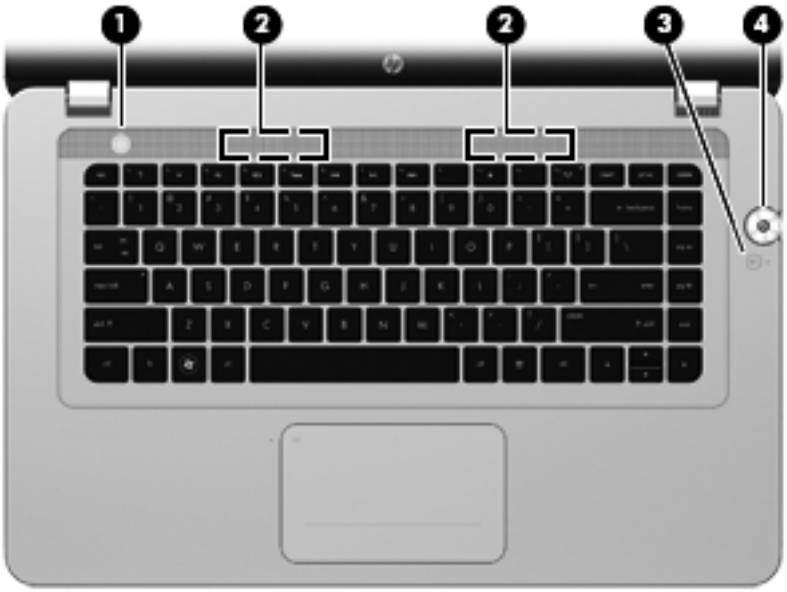


Item	Component	Description
(1)	Internal display switch	Turns off the display and initiates Sleep if the display is closed while the power is on. **NOTE:** The internal display switch is not visible from the outside of the computer.
(2)	Proximity sensor	Detects your presence in front of the computer and turns the radiance keyboard feature off or on based on your proximity to the computer.
(3)	WLAN antennas (2)*	Send and receive networking signals using up to three integrated antennas to a local wireless router or hub.
(4)	Internal microphones (2)	Records audio using the integrated microphones by specific applications. The microphones will automatically improve the audio to reduce ambient noise and provide echo cancellation.

Item	Component	Description
(5)	Webcam light	On: The webcam is active.
(6)	HP TrueVision HD Webcam	Records video and captures still photographs. To access the webcam, select **Start** > **All Programs** > **CyberLink** > **CyberLink YouCam**.

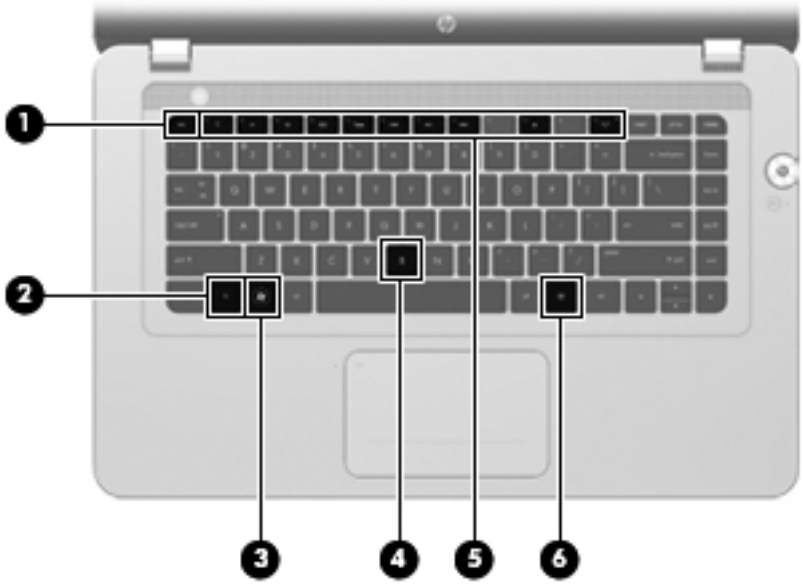
*The antennas and IR emitters are not visible from the outside of the computer. For optimal transmission, keep the areas immediately around the antennas and IR emitters free from obstructions. To see wireless regulatory notices, see the section of the *Regulatory, Safety, and Environmental Notices* that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

Buttons and speakers



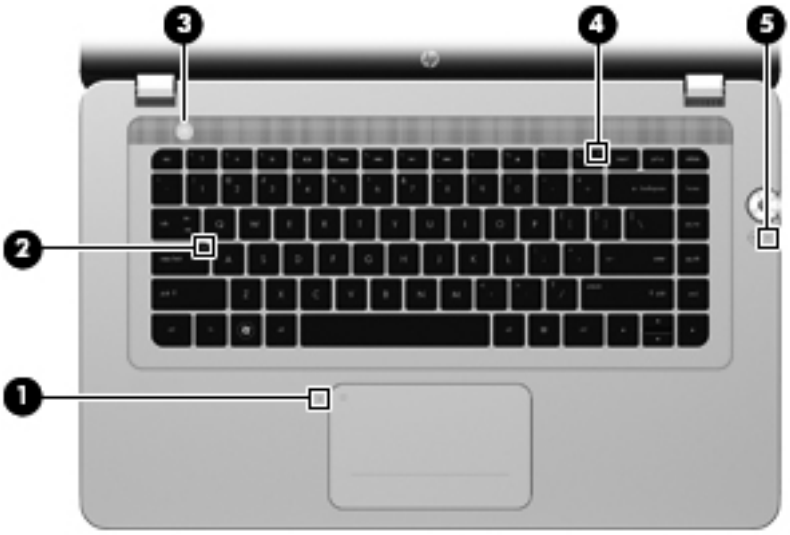
Item	Component	Description
(1)	Power button	• When the computer is off, press the button to turn on the computer. • When the computer is on, press the button briefly to initiate Sleep. • When the computer is in the Sleep state, press the button briefly to exit Sleep. • When the computer is in Hibernation, press the button briefly to exit Hibernation. If the computer has stopped responding and Windows shutdown procedures are ineffective, press and hold the power button for at least 5 seconds to turn off the computer. To learn more about your power settings, select **Start** > **Control Panel** > **System and Security** > **Power Options**, or refer to the *HP Notebook Reference Guide*.
(2)	Stereo speakers (2)	Produce sound with Beats Audio speakers.
(3)	Mute button	Mutes or restores speaker sound.
(4)	Beats Audio button	Opens Beats Audio Control Panel, which allows you to view and control the audio and bass settings. Beats Audio is an enhanced audio feature that provides a deep, controlled bass while maintaining a clear sound. **NOTE:** You can also open the Beats Audio Control Panel by selecting **Start** > **Control Panel** > **Hardware and Sound** > **Beats Audio Control Panel**.

Keys



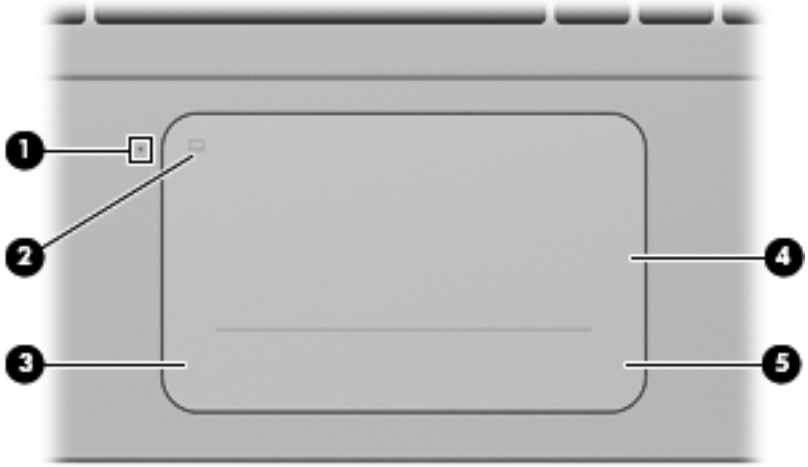
Item	Component	Description
(1)	esc key	Displays system information when pressed in combination with the fn key.
(2)	fn key	Executes the following functions: • When the key is pressed in combination with the esc key, system information is displayed. • When the key is pressed in combination with the b key, Beats Audio is enabled or disabled.
(3)	Windows logo key	Displays the Windows Start menu.
(4)	b key	Enables or disables Beats Audio when pressed in combination with the fn key.
(5)	Action keys	Execute frequently used system functions.
(6)	Windows applications key	Displays a shortcut menu for items beneath the pointer.

Lights



Item	Component	Description
(1)	ImagePad light	• Amber: The ImagePad is off. • Off: The ImagePad is on.
(2)	Caps lock light	• White: Caps lock is on. • Off: Caps lock is off.
(3)	Power light	• White: The computer is on. • Blinking white: The computer is in the Sleep state. • Off: The computer is off or in Hibernation.
(4)	Wireless light	• White: An integrated wireless device, such as a WLAN device and/or a Bluetooth device, is on. **NOTE:** Wireless devices are enabled at the factory. • Amber: All wireless devices are disabled.
(5)	Mute light	• Amber: Speaker sound is off. • Off: Speaker sound is on.

ImagePad



Item	Component	Description
(1)	ImagePad light	• Amber: The ImagePad is off. • Off: The ImagePad is on.
(2)	ImagePad on/off button	Quickly double-tap this button to turn the Imagepad off or on.
(3)	ImagePad left button	The bottom left corner of the Imagepad functions like the left button on an external mouse.
(4)	ImagePad zone	Moves the pointer and selects or activates items on the screen.
(5)	ImagePad right button	The bottom right corner of the Imagepad functions like the right button on an external mouse.

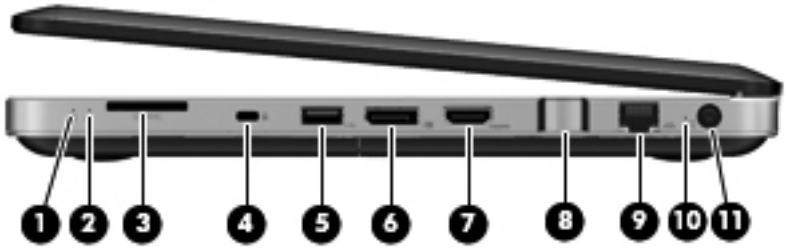
Front

Component	Description
Stereo speakers (4)	Produce sound with Beats Audio speakers.

Left side

Item	Component	Description
(1)	Optical drive	Reads and writes to an optical disc. **CAUTION:** To reduce the risk of damaging the computer, do not insert smaller (8 cm diameter) optical discs into the drive.
(2)	USB 3.0 charging port	Connects an optional USB 3.0 device and provides enhanced USB power performance. The USB 3.0 charging port can also charge select models of cell phones and MP3 players, even when the computer is off.
(3)	USB 3.0 ports (2)	Connect optional USB 3.0 devices and provides enhanced USB power performance. **NOTE:** The USB 3.0 port is also compatible with USB 1.0 and 2.0 devices.
(4)	Audio-in (microphone) jack	Connects an optional computer headset microphone, stereo array microphone, or monaural microphone.
(5)	Audio-out (headphone) jacks (2)	Produce sound when external audio devices are connected to either of these ports. Both stereo headphone jacks are connected to a signal amplifier to provide improved audio reproduction with external speakers, headphones, and other optional accessories. **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*. **NOTE:** When a device is connected to either jack, the computer speakers are disabled.

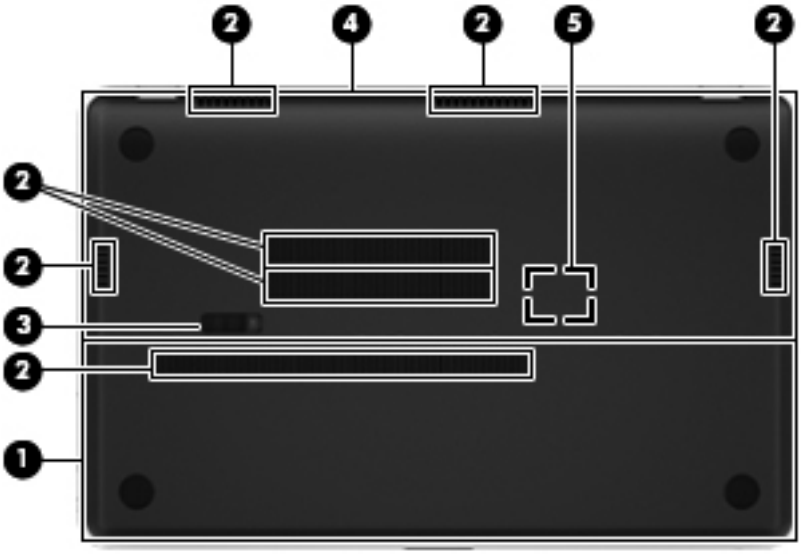
Right side



Item	Component	Description
(1)	Hard drive light	• Blinking white: The hard drive is being accessed. • Amber: HP ProtectSmart Hard Drive Protection has temporarily parked the hard drive. **NOTE:** For information about HP ProtectSmart Hard Drive Protection, see the *HP Notebook Reference Guide*.
(2)	Power light	• White: The computer is on. • Blinking white: The computer is in the Sleep state. • Off: The computer is off or in Hibernation.
(3)	Digital Media Slot	Supports the following digital card formats: • MultiMediaCard • Secure Digital (SD) Memory Card • Secure Digital High Capacity Memory Card
(4)	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.
(5)	USB 2.0 port	Connects an optional USB device.
(6)	DisplayPort	Connects an optional digital display device, such as a high-performance monitor or projector.
(7)	HDMI port	Connects an optional video or audio device, such as a highdefinition television, any compatible digital or audio component, or a high-speed HDMI 1.4 device.
(8)	Volume dial	Adjusts the speaker volume. Rotate the dial clockwise to increase the volume or rotate the dial counter-clockwise to decrease the volume.
(9)	RJ-45 (network) jack	Connects a network cable.

Item	Component	Description
(10)	AC adapter light	• White: The computer is connected to external power, and the battery is fully charged. • Amber: The computer is connected to external power, and the battery is charging. • Blinking amber: The computer is connected to external power and there is a battery error or the battery has reached a low or critical battery level. • Off: The computer is running on battery power.
(11)	Power connector	Connects an AC adapter.

Bottom

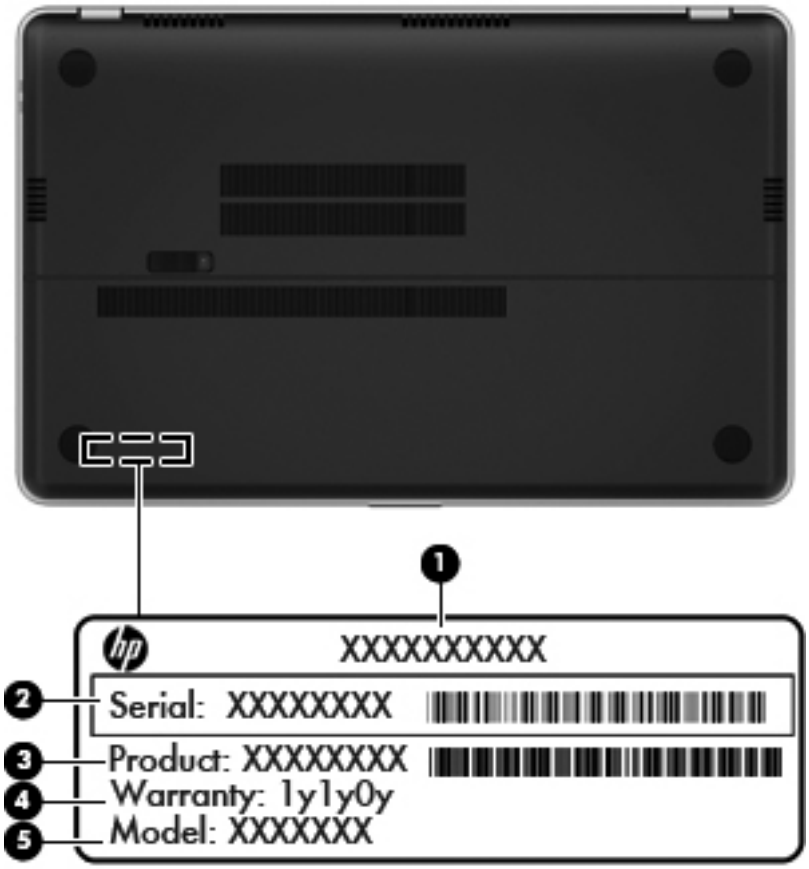


Item	Component	Description
(1)	Battery/hard drive cover	Provides access to the battery and the hard drive.
(2)	Vents (7)	Enable airflow to cool internal components. **NOTE:** The computer fan starts up automatically to cool internal components and prevent overheating. It is normal for the internal fan to cycle on and off during routine operation.
(3)	Release latch	Releases the hard drive cover.
(4)	Service cover	Provides access to the memory module slots.
(5)	HP Triple Bass Reflex Subwoofers	Provide superior bass sound.

3 Illustrated parts catalog

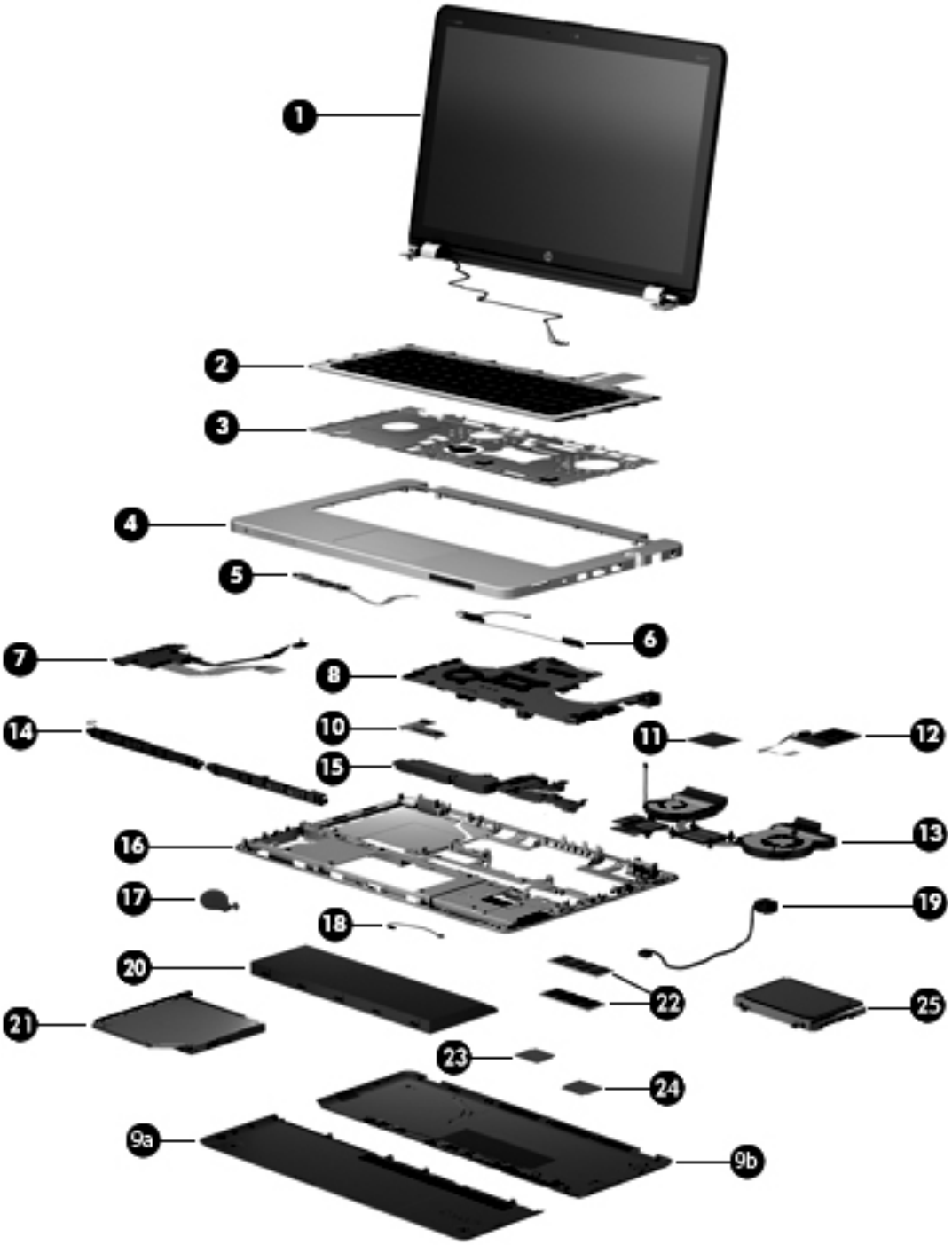
Service tag

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



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

Computer major components



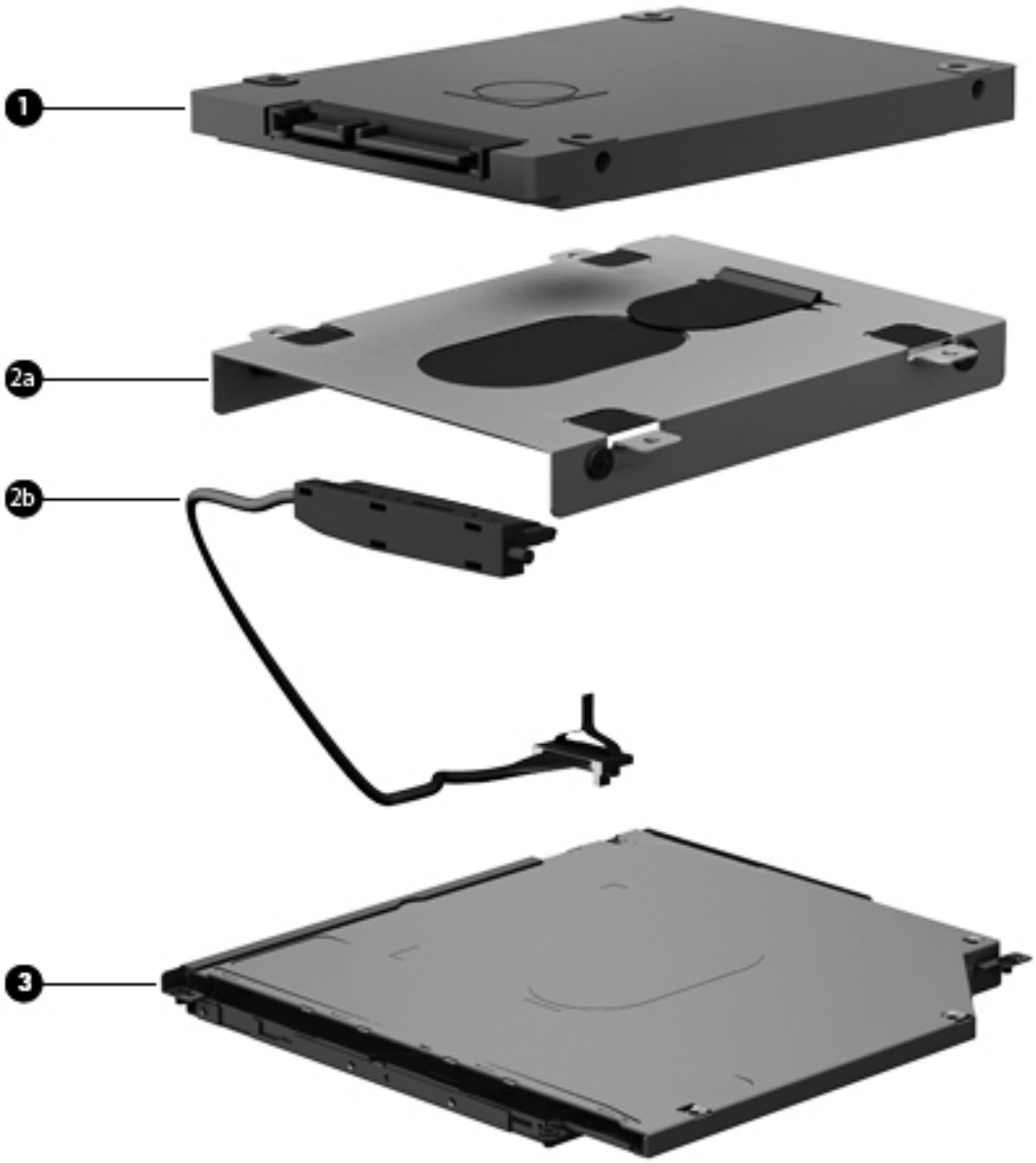
Item	Component	Spare part number
(1)	**15.6-in, AG, FG, LED, display assembly** in aluminum finish (includes display panel cable, webcamera/ microphone module and cable, 2 wireless antenna cables and transceivers, and wireless audio module antenna and cable)	

Item	Component	Spare part number
	FHD display assembly equipped with Bluetooth (includes a Bluetooth module and cable)	668833-001
	FHD display assembly	668831-001
	HD display assembly equipped with Bluetooth (includes a Bluetooth module and cable)	668832-001
	HD display assembly	668830-001
(2)	**Keyboard** with backlight (includes keyboard cable and backlight cable):	
	For use in Brazil	668834-201
	For use in Canada	668834-121
	For use in India	668834-D61
	For use in Latin America	668834-161
	For use in South Korea	668834-AD1
	For use in Taiwan	668834-AB1
	For use in Thailand	668834-281
	For use in the United States	668834-001
(3)	**Keyboard bracket**	668829-001
(4)	**Top cover** (includes TouchPad button board and cable and TouchPad and cable)	
	For use on computer models equipped with USB 3.0 capability	684366-001
	For use on computer models equipped with USB 2.0 capability	668849-001
(5)	**Power button board** (includes cable)	668836-001
(6)	**Top speakers** (include cables)	668842-001
(7)	**Audio/USB board** (includes 2 cables)	
	For use on computer models equipped with USB 3.0 capability	689591-001
	For use on computer models equipped with USB 2.0 capability	668839-001
(8)	**System board** equipped with the Intel HM65 PCH (includes replacement thermal material):	
	Equipped with the Intel 7750M chipset for use in all countries and regions except the People's Republic of China (includes 1 GB of discrete graphics subsystem memory)	679814-001
	Equipped with the Intel 7750M chipset for use only in the People's Republic of China (includes 1 GB of discrete graphics subsystem memory and replacement thermal material)	694500-001
	Equipped with the Intel 7670M chipset (includes 1 GB of discrete graphics subsystem memory)	668847-001
	Thermal Material Kit (not illustrated, includes replacement thermal paste and thermal pads)	668848-001
	Cover Kit, includes:	668840-001
(9a)	Battery/hard drive cover (includes two rubber feet)	

Item	Component	Spare part number
(9b)	Service cover (includes two rubber feet and battery/hard drive cover release latch)	
	NOTE: See Cover Kit on page 22 for more Cover Kit spare part information.	
(10)	**Wireless audio module connector board** (includes cable)	668837-001
(11)	**Intel Core processor** (includes replacement thermal material):	
	Intel Quad Core i7-3612QM 2.10-GHz processor (SC turbo up to 3.10-GHz), 6.0-MB L3 cache, 1600-MHz FSB, 35 W)	680647-001
	Intel Quad Core i7-3610QM 2.30-GHz processor (SC turbo up to 3.30-GHz), 6.0-MB L3 cache, 1600-MHz FSB, 45 W)	680646-001
	Intel Quad Core i7-2860QM 2.50-GHz processor (SC turbo up to 3.60-GHz), 8.0-MB L3 cache, 1600-MHz FSB, 45 W)	666175-001
	Intel Quad Core i7-2760QM 2.40-GHz processor (SC turbo up to 3.50-GHz), 6.0-MB L3 cache, 1600-MHz FSB, 45 W)	666174-001
	Intel Quad Core i7-2670QM 2.40-GHz processor (SC turbo up to 3.50-GHz), 6.0-MB L3 cache, 1600-MHz FSB, 45 W)	665116-001
	Intel Dual Core i7-2640M 2.80-GHz processor (SC turbo up to 3.40-GHz), 4.0-MB L3 cache, 1333-MHz FSB, 35 W)	666173-001
	Intel Quad Core i5-3210M 2.50-GHz processor (SC turbo up to 3.10-GHz), 3.0-MB L3 cache, 1600-MHz FSB, 35 W)	680645-001
	Intel Dual Core i5-2450M 2.50-GHz processor (SC turbo up to 3.10-GHz), 3.0-MB L3 cache, 1333-MHz FSB, 35 W)	676359-001
	Intel Dual Core i5-2430M 2.40-GHz processor (SC turbo up to 3.00-GHz), 3.0-MB L3 cache, 1333-MHz FSB, 35 W)	653341-001
(12)	**Card Reader board** (includes cable)	
	For use on computer models equipped with USB 3.0 capability	689592-001
	For use on computer models equipped with USB 2.0 capability	668838-001
(13)	**Fan/heat sink assembly** (includes replacement thermal material)	
	For use on computer models equipped with USB 3.0 capability	690006-001
	For use on computer models equipped with USB 2.0 capability	668827-001
(14)	**Front speakers** (include cables and 4 rubber grommets)	668843-001
(15)	**Subwoofer** (includes cables and 2 grommets)	668844-001
(16)	**Base enclosure**	668825-001
(17)	**RTC battery** (includes double-sided tape and cable)	651948-001
(18)	**TouchPad LED board** (includes cable)	675232-001
(19)	**Power connector cable** (includes bracket)	668826-001
(20)	**8-cell, 72-Wh, 2.45-Ah, Li-ion battery**	660152-001
(21)	**DVD±RW and CD-RW Super Multi Double-Layer FX Combo Drive** (includes mounting brackets, connector board, and connector cable)	668835-001

Item	Component	Spare part number
(22)	**Memory modules** (2):	
	PC3, 12800, 1600-MHz	
	8 MB	670034-001
	4 MB	641369-001
	2 MB	652972-001
	PC3, 10600, 1333-MHz	
	8 MB	634091-001
	4 GB	621569-001
(23)	**WLAN module:**	
	Intel Centrino Advanced-N 6235 WLAN module	670292-001
	Intel Centrino Advanced-N 6230 WLAN module	636672-001
	Intel Centrino Ultimate-N 6300 WLAN module	572511-001
(24)	**Wireless audio module**	668115-001
(25)	**Hard drive** (does not include hard drive bracket, connector cable, or screws): **NOTE:** The hard drive bracket, connector cable, and screws are included in the Hard Drive Hardware Kit, spare part number 668828-001.	
	1-TB, 5400-rpm, 9.5-mm	676521-001
	750-GB, 7200-rpm, 9.5-mm	633252-001
	750-GB, 7200-rpm, 9.5-mm hybrid	684506-001
	500-GB, 7200-rpm, 9.5-mm	634925-001
	320-GB, 7200-rpm, 9.5-mm	641672-001

Mass storage devices



Item	Component	Spare part number
(1)	**Hard drive** (does not include hard drive bracket, cable, or screws):	
	1-TB, 5400-rpm, 9.5-mm	676521-001
	750-GB, 7200-rpm, 9.5-mm	633252-001
	750-GB, 7200-rpm, 9.5-mm hybrid	684506-001
	500-GB, 7200-rpm, 9.5-mm	634925-001
	320-GB, 7200-rpm, 9.0-mm	641672-001
	Hard Drive Hardware Kit, includes:	668828-001

Item	Component	Spare part number
(2a)	Hard drive bracket	
(2b)	Hard drive connector cable	
	Hard drive screws (not illustrated)	
(3)	**DVD±RW and CD-RW Super Multi Double-Layer FX Combo Drive** (includes mounting brackets, connector board, and connector cable)	668835-001
(4)	**Solid-state drive:**	
	300-GB solid-state drive	668846-001
	256-GB solid-state drive	679865-001
	160-GB solid-state drive	668845-001

Cover Kit

Item	Component	Spare part number
	Cover Kit, includes:	668840-001
(1)	Battery/hard drive cover (includes two rubber feet)	
(2)	Service cover (includes two rubber feet and battery/hard drive cover release latch)	

Miscellaneous parts

Component	Spare part number
AC adapter:	
120-W HP Slim AC adapter (PFC, 3-wire)	693709-001
90-W HP Travel AC adapter (PFC, 3-wire)	644240-001
15.6-in. protective cover	667665-001
HDMI-to-VGA adapter	530607-001
Power cord (3-pin, black, 1.83-m):	
For use in Argentina	490371-D01
For use in Australia	490371-011
For use in Brazil	490371-202
For use in Europe	490371-021
For use in India	490371-D61
For use in Japan	490371-291
For use in North America	490371-001
For use in the People's Republic of China	490371-AA1
For use in South Korea	490371-AD1
For use in Taiwan	490371-AB1
For use in Thailand	490371-201
For use in the United Kingdom and Singapore	490371-031
Screw Kit	668841-001
Tote bag with zipper	675458-001

Sequential part number listing

Spare part number	Description
490371-001	Power cord for use in North America (3-pin, black, 1.83-m)
490371-011	Power cord for use in Australia (3-pin, black, 1.83-m)
490371-021	Power cord for use in Europe (3-pin, black, 1.83-m)
490371-031	Power cord for use in the United Kingdom and Singapore (3-pin, black, 1.83-m)
490371-201	Power cord for use in Thailand (3-pin, black, 1.83-m)
490371-202	Power cord for use in Brazil (3-pin, black, 1.83-m)
490371-291	Power cord for use in Japan (3-pin, black, 1.83-m)
490371-AA1	Power cord for use in the People's Republic of China (3-pin, black, 1.83-m)
490371-AB1	Power cord for use in Taiwan (3-pin, black, 1.83-m)
490371-AD1	Power cord for use in South Korea (3-pin, black, 1.83-m)
490371-D01	Power cord for use in Argentina (3-pin, black, 1.83-m)
490371-D61	Power cord for use in India (3-pin, black, 1.83-m)
530607-001	HDMI-to-VGA adapter
572511-001	Intel Centrino Ultimate-N 6300 WLAN module
621569-001	4-GB memory module (PC3, 10600, 1333-MHz)
633252-001	750-GB, 7200-rpm, 9.5-mm hard drive (does not include hard drive bracket, connector cable, or screws)
634091-001	8-GB memory module (PC3, 10600, 1333-MHz)
634925-001	500-GB, 7200-rpm, 9.5-mm hard drive (does not include hard drive bracket, connector cable, or screws)
636672-001	Intel Centrino Advanced-N 6230 WLAN module
641369-001	4-GB memory module (PC3, 12800, 1600-MHz)
641672-001	320-GB, 7200-rpm, 9.5-mm hard drive (does not include hard drive bracket, connector cable, or screws)
644240-001	90-W HP Travel AC adapter (PFC, 3-wire)
651948-001	RTC battery (includes double-sided tape and cable)
652972-001	2-GB memory module (PC3, 12800, 1600-MHz)
653341-001	Intel Dual Core i5-2430M 2.40-GHz processor (SC turbo up to 3.00-GHz), 3.0-MB L3 cache, 1333-MHz FSB, 35 W (includes replacement thermal material)
660152-001	8-cell, 72-Wh, 2.6-Ah, Li-ion battery
665116-001	Intel Quad Core i7-2670QM 2.40-GHz processor (SC turbo up to 3.50-GHz), 6.0-MB L3 cache, 1600-MHz FSB, 45 W (includes replacement thermal material)
666173-001	Intel Quad Core i7-2640M 2.80-GHz processor (SC turbo up to 3.10-GHz), 4.0-MB L3 cache, 1333-MHz FSB, 35 W (includes replacement thermal material)

Spare part number	Description
666174-001	Intel Quad Core i7-2760QM 2.40-GHz processor (SC turbo up to 3.50-GHz), 6.0-MB L3 cache, 1600-MHz FSB, 45 W (includes replacement thermal material)
666175-001	Intel Quad Core i7-2860QM 2.50-GHz processor (SC turbo up to 3.60-GHz), 8.0-MB L3 cache, 1600-MHz FSB, 45 W (includes replacement thermal material)
667665-001	HP 15.6-in protective cover
668115-001	Wireless audio module
668825-001	Base enclosure
668826-001	Power connector cable (includes bracket)
668827-001	Fan/heat sink assembly for use on computer models equipped with USB 2.0 capability (includes replacement thermal material)
668828-001	Hard Drive Hardware Kit (includes hard drive bracket, hard drive connector cable, and screws) **NOTE:** See Mass storage devices on page 21 for more Hard Drive Hardware Kit component information.
668829-001	Keyboard bracket
668830-001	15.6-in, HD, AG, LED, FG, display assembly in aluminum finish (includes display panel cable, webcamera/microphone module and cable, 2 wireless antenna cables and transceivers, and wireless audio module antenna and cable)
668831-001	15.6-in, FHD, AG, LED, FG, display assembly in aluminum finish (includes display panel cable, webcamera/microphone module and cable, 2 wireless antenna cables and transceivers, and wireless audio module antenna and cable)
668832-001	15.6-in, HD, AG, LED, FG, display assembly in aluminum finish equipped with Bluetooth (includes display panel cable, Bluetooth module and cable, webcamera/microphone module and cable, 2 wireless antenna cables and transceivers, and wireless audio module antenna and cable)
668833-001	15.6-in, FHD, AG, LED, FG, display assembly in aluminum finish equipped with Bluetooth (includes display panel cable, Bluetooth module and cable, webcamera/microphone module and cable, 2 wireless antenna cables and transceivers, and wireless audio module antenna and cable)
668834-001	Keyboard with backlight for use in the United States (includes keyboard cable and keyboard backlight cable)
668834-121	Keyboard with backlight for use Canada (includes keyboard cable and keyboard backlight cable)
668834-161	Keyboard with backlight for use Latin America (includes keyboard cable and keyboard backlight cable)
668834-201	Keyboard with backlight for use Brazil (includes keyboard cable and keyboard backlight cable)
668834-281	Keyboard with backlight for use Thailand (includes keyboard cable and keyboard backlight cable)
668834-AB1	Keyboard with backlight for use Taiwan (includes keyboard cable and keyboard backlight cable)
668834-AD1	Keyboard with backlight for use South Korea (includes keyboard cable and keyboard backlight cable)
668834-D61	Keyboard with backlight for use India (includes keyboard cable and keyboard backlight cable)
668835-001	DVD±RW and CD-RW Super Multi Double-Layer FX Combo Drive (includes mounting brackets, connector board, and connector cable)
668836-001	Power connector cable (includes cable)

Spare part number	Description
668837-001	Wireless audio module connector board (includes cable)
668838-001	Card Reader board for use on computer models equipped with USB 2.0 capability (includes cable)
668839-001	Audio/USB board for use on computer models equipped with USB 2.0 capability (includes 2 cables)
668840-001	Cover Kit (includes the battery cover and the memory cover) **NOTE:** See Cover Kit on page 22 for more Cover Kit component information.
668841-001	Screw Kit
668842-001	Top speakers (include cables)
668843-001	Front speakers (include cables and 4 rubber grommets)
668844-001	Subwoofer (includes cables and 2 grommets)
668845-001	160-GB solid-state drive (does not include bracket, cable, or screws)
668846-001	300-GB solid-state drive (does not include bracket, cable, or screws)
668847-001	System board equipped with the Intel HM65 PCH and 7670M chipset (includes 1 GB of discrete graphics subsystem memory and replacement thermal material)
668848-001	Thermal Material Kit (includes replacement thermal paste and thermal pads)
668849-001	Top cover for use on computer models equipped with USB 2.0 capability (includes TouchPad button board and cable and TouchPad and cable)
670034-001	8-GB memory module (PC3, 12800, 1600-MHz)
670292-001	Intel Centrino Advanced-N 6235 WLAN module
675232-001	TouchPad LED board (includes cable)
675458-001	Tote bag with zipper
676359-001	Intel Dual Core i5-2450M 2.50-GHz processor (SC turbo up to 3.10-GHz), 3.0-MB L3 cache, 1333-MHz FSB, 35 W (includes replacement thermal material)
676521-001	1-TB, 5400-rpm, 9.5-mm hard drive (does not include hard drive bracket, connector cable, or screws)
679814-001	System board equipped with the Intel HM65 PCH and 7750M chipset for use in all countries and regions except the People's Republic of China (includes 1 GB of discrete graphics subsystem memory and replacement thermal material)
679865-001	256-GB solid-state drive (does not include bracket, cable, or screws)
680645-001	Intel Dual Core i5-3210M 2.50-GHz processor (turbo up to 3.10-GHz; 1600-MHz FSB, 3.0-MB L3 cache, 35 W; includes replacement thermal material)
680646-001	Intel Quad Core i7-3610QM 2.30-GHz processor (turbo up to 3.30-GHz; 1600-MHz FSB, 6.0-MB L3 cache, 45 W; includes replacement thermal material)
680647-001	Intel Quad Core i7-3612QM 2.10-GHz processor (turbo up to 3.10-GHz; 1600-MHz FSB, 6.0-MB L3 cache, 35 W; includes replacement thermal material)
684366-001	Top cover for use on computer models equipped with USB 3.0 capability (includes TouchPad button board and cable and TouchPad and cable)

Spare part number	Description
684506-001	750-GB, 7200-rpm, 9.5-mm hybrid hard drive (does not include hard drive bracket, connector cable, or screws)
689591-001	Audio/USB board for use on computer models equipped with USB 3.0 capability (includes 2 cables)
689592-001	Card Reader board for use on computer models equipped with USB 3.0 capability (includes cable)
690006-001	Fan/heat sink assembly for use on computer models equipped with USB 3.0 capability (includes replacement thermal material)
693709-001	120-W HP Slim AC adapter (PFC, 3-wire)
694500-001	System board equipped with the Intel HM76 PCH and 7750M chipset for use only in the People's Republic of China (includes 1 GB of discrete graphics subsystem memory and replacement thermal material)

4 Removal and replacement procedures

Preliminary replacement requirements

Tools required

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

- Flat-bladed screwdriver
- Magnetic screwdriver
- Phillips P0 and P1 screwdrivers

Service considerations

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

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

Plastic parts

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

Cables and connectors

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

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

Drive handling

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

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

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

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

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

Avoid dropping drives from any height onto any surface.

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

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

Avoid exposing a drive to temperature extremes or liquids.

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

Grounding guidelines

Electrostatic discharge damage

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

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

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

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

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

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

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

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

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

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

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

Packaging and transporting guidelines

Follow these grounding guidelines when packaging and transporting equipment:

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

Workstation guidelines

Follow these grounding workstation guidelines:

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

Equipment guidelines

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

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

The following grounding equipment is recommended to prevent electrostatic damage:

- Antistatic tape
- Antistatic smocks, aprons, and sleeve protectors
- Conductive bins and other assembly or soldering aids
- Nonconductive foam
- Conductive tabletop workstations with ground cords of one megohm resistance
- Static-dissipative tables or floor mats with hard ties to the ground
- Field service kits
- Static awareness labels
- Material-handling packages
- Nonconductive plastic bags, tubes, or boxes
- Metal tote boxes
- Electrostatic voltage levels and protective materials

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

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

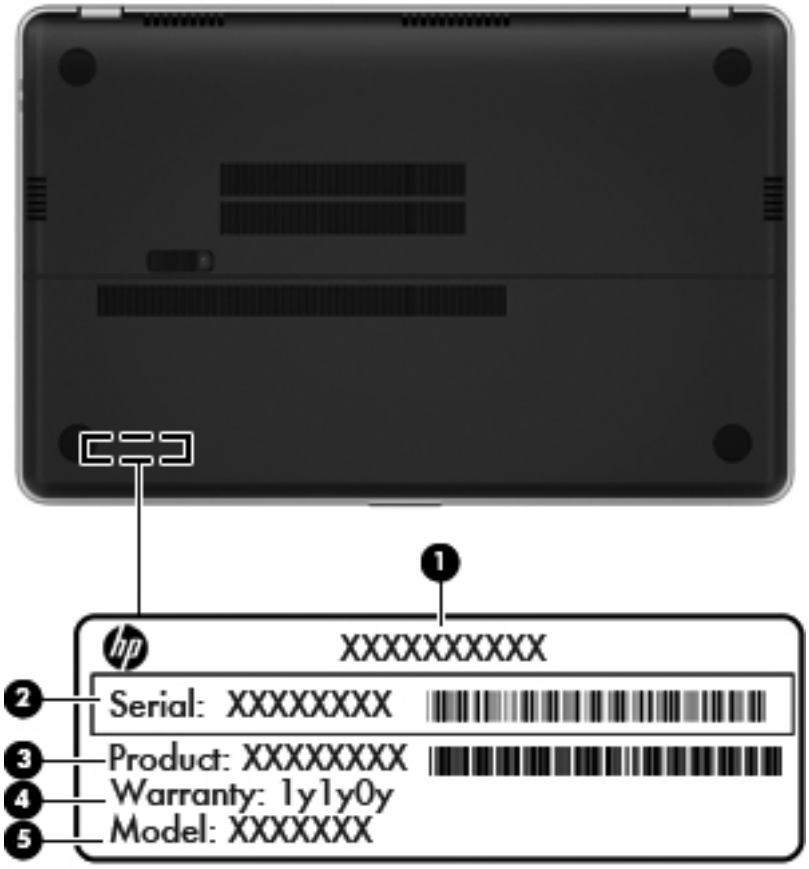
Component replacement procedures

This chapter provides removal and replacement procedures.

There are as many as 111 screws that must be removed, replaced, or loosened when servicing the computer. Make special note of each screw size and location during removal and replacement.

Service tag

When ordering parts or requesting information, provide the computer serial number and model number provided on the service tag. The battery must be removed to access the service tag. See Battery on page 35 for battery removal procedures.



Item	Component	Description
(1)	Product name	This is the product name affixed to the front of the computer.
(2)	Serial number (s/n)	This is an alphanumeric identifier that is unique to each product.
(3)	Part number/Product number (p/n)	This number provides specific information about the product's hardware components. The part number helps a service technician determine what components and parts are needed.

Item	Component	Description
(4)	Warranty period	This number describes the duration of the warranty period for the computer.
(5)	Model description	This is the alphanumeric identifier used to locate documents, drivers, and support for the computer.

Battery

Description	Spare part number
8-cell, 72-Wh, 2.45-Ah, Li-ion battery	660152-001

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.

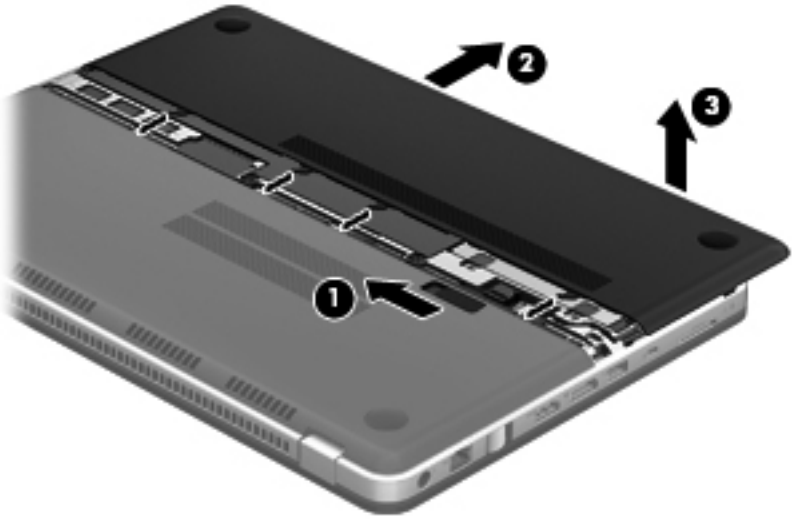
Remove the battery:

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

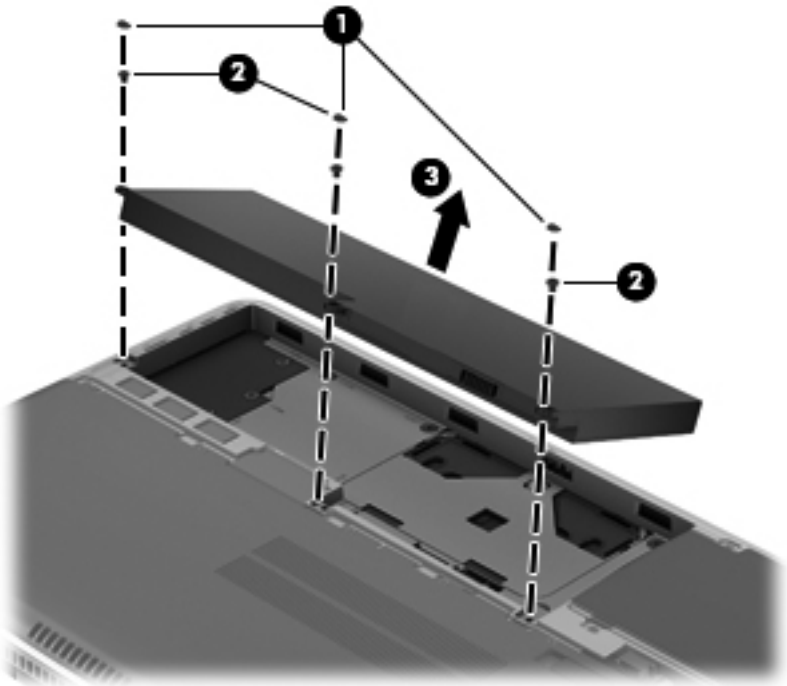
1. Turn the computer upside down on a flat surface.
2. Slide the battery/hard drive cover release latch **(1)** to release the battery/hard drive cover.

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

3. Release the battery/hard drive cover **(2)** by sliding it away from the computer, and then remove the cover **(3)**. The battery/hard drive cover is available in the Cover Kit, spare part number 668840-001.



4. Remove the three screw covers **(1)** and the three Torx T8M2.5×3.7 screws **(2)** that secure the battery to the computer.
5. Remove the battery **(3)**.



6. Remove the battery.

Reverse this procedure to install the battery.

Hard drive

NOTE: The hard drive spare part kit does not include the hard drive bracket, hard drive connector cable, or screws. These components are included in the Hard Drive Hardware Kit, spare part number 668828-001.

Description	Spare part number
1-TB, 5400-rpm, 9.5-mm	676521-001
750-GB, 7200-rpm, 9.5-mm	633252-001
750-GB, 7200-rpm, 9.5-mm hybrid	684506-001
500-GB, 7200-rpm, 9.5-mm	634925-001
320-GB, 7200-rpm, 9.5-mm	641672-001

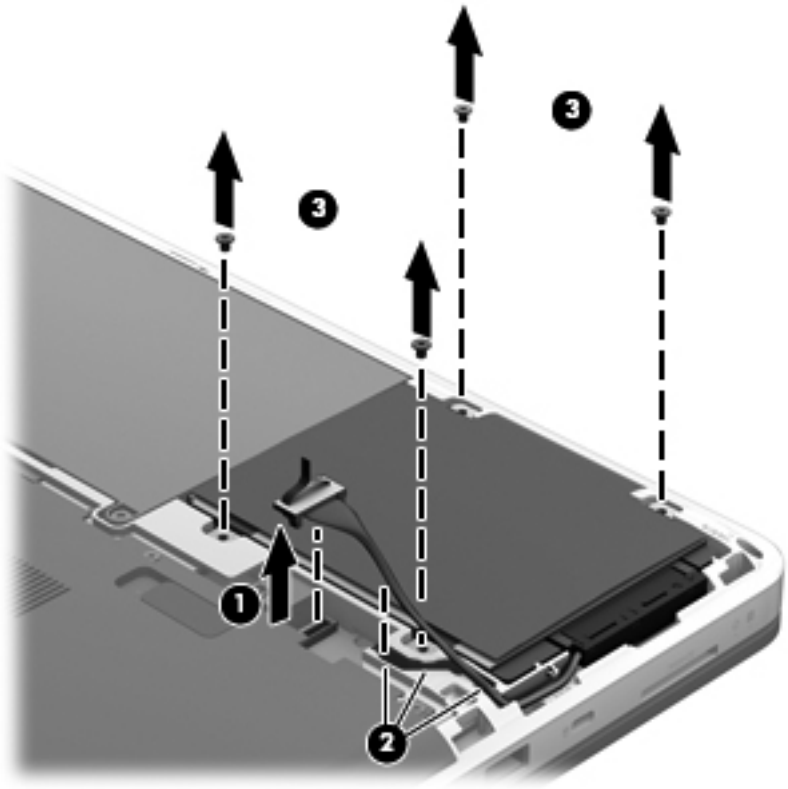
Before removing the hard drive, follow these steps:

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

Remove the hard drive:

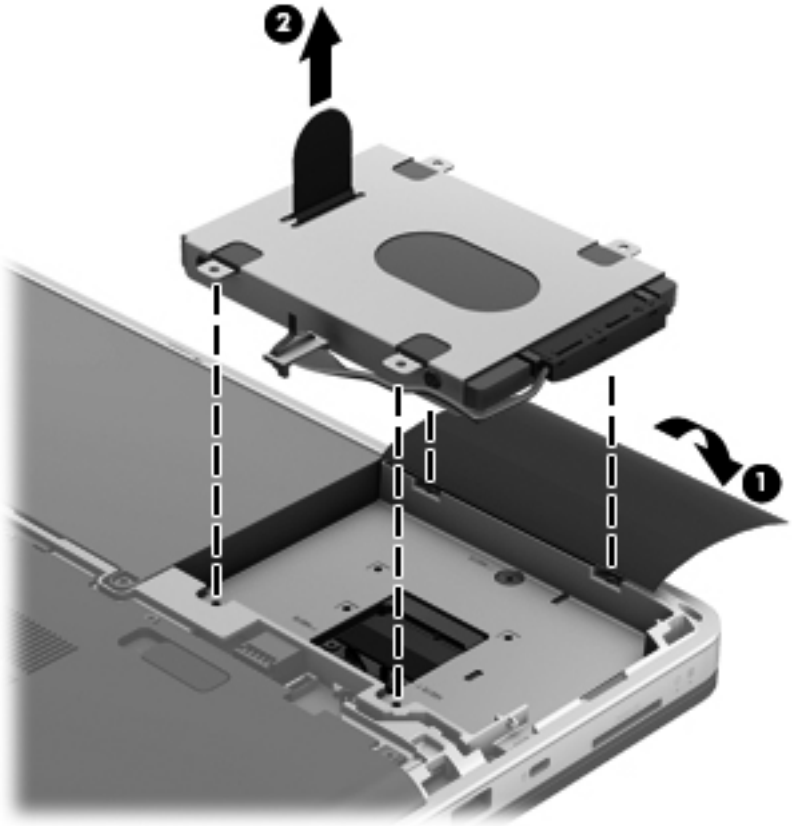
1. Disconnect the hard drive connector cable **(1)** from the system board.
2. Release the hard drive connector cable **(2)** from the clips built into the base enclosure.

3. Remove the four Phillips PM2.0×2.8 screws **(3)** that secure the hard drive to the system board.

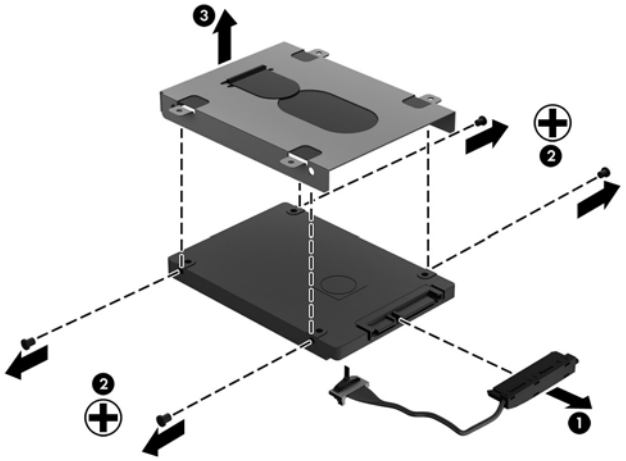


4. Fold back the shield **(1)** that covers the hard drive.

5. Use the pull tab **(2)** to remove the hard drive from the hard drive bay.



6. If it is necessary to replace the hard drive connector cable **(1)**, screws **(2)**, or hard drive bracket **(3)**, remove the components and replace them. These components are available in the Hard Drive Hardware Kit, spare part number 668828-001.



Reverse this procedure to install the hard drive.

Wireless audio module

Description	Spare part number
Wireless audio module	668115-001

Before removing the wireless audio module, follow these steps:

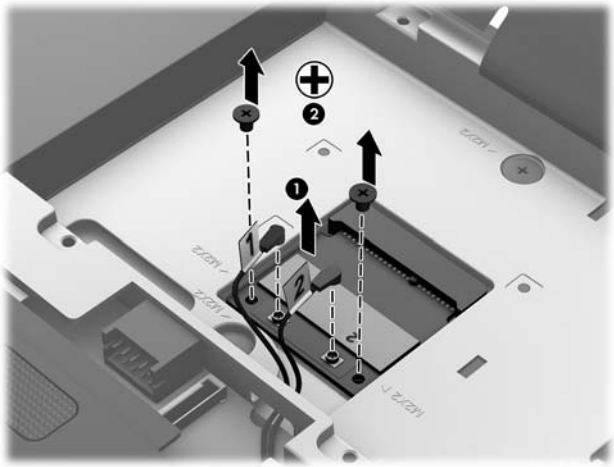
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord 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 hard drive (see Hard drive on page 37).

Remove the wireless audio module:

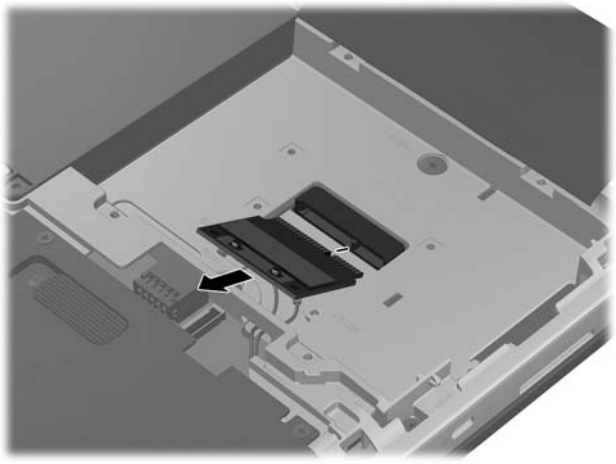
1. Disconnect the wireless audio module antenna cables **(1)** from the terminals on the wireless audio module.

NOTE: The wireless audio module "1" antenna cable is connected to the wireless audio module Main terminal. The wireless audio module "2" antenna cable is connected to the wireless audio module Aux terminal.

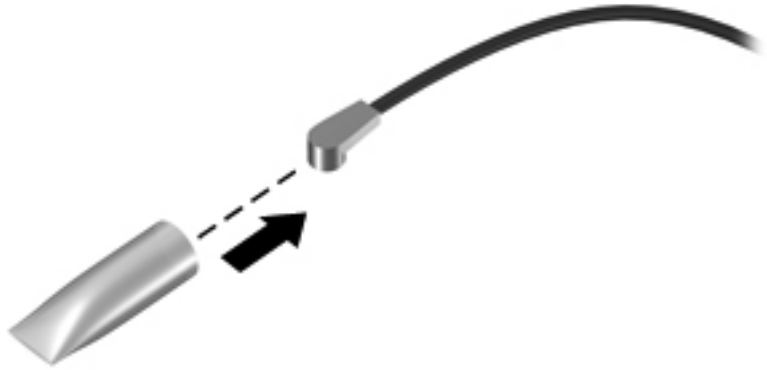
2. Remove the two Phillips PM2.0×2.8 screws **(2)** that secure the wireless audio module to the system board. (The wireless audio module tilts up.)



3. Remove the wireless audio module by pulling the module away from the slot at an angle.



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



Reverse this procedure to install the wireless audio module.

WLAN module

Description	Spare part number
Intel Centrino Advanced-N 6235 WLAN module	670292-001
Intel Centrino Advanced-N 6230 WLAN module	636672-001
Intel Centrino Ultimate-N 6300 WLAN module	572511-001

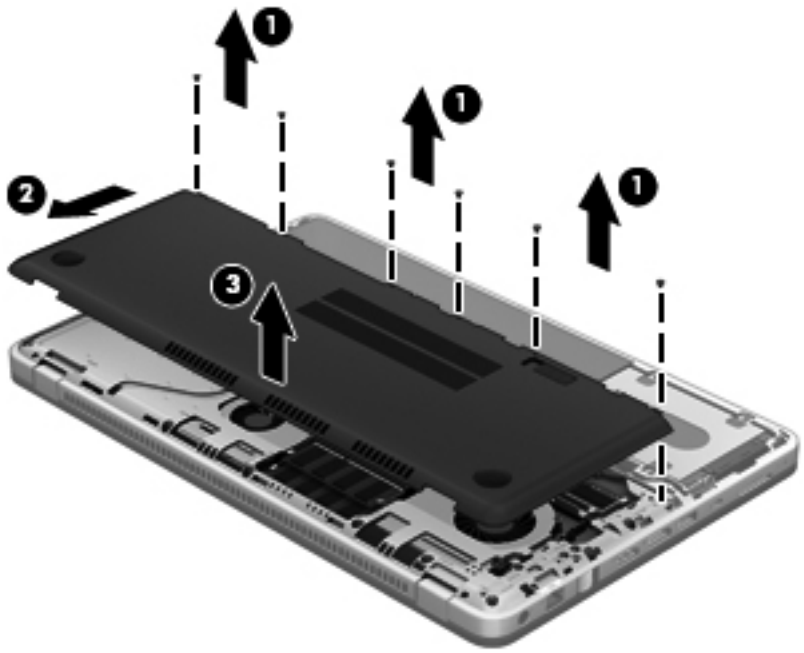
⚠ **CAUTION:** To prevent an unresponsive system, replace the wireless module only with a wireless module authorized for use in the computer by the governmental agency that regulates wireless devices in your country or region. If you replace the module and then receive a warning message, remove the module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

Before removing the WLAN module, follow these steps:

1. 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).

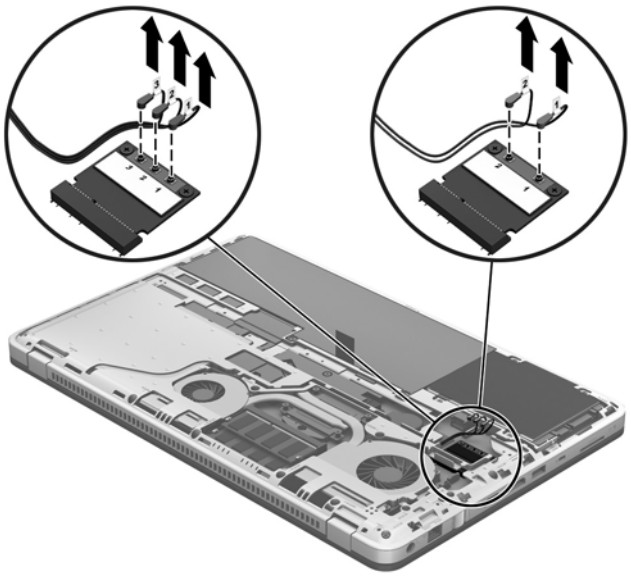
Remove the WLAN module:

1. Remove the six Phillips PM2.0×2.8 screws **(1)** that secure the service cover to the computer.
2. Release the service cover by sliding it away from the computer **(2)**, and then remove the cover **(3)**. The service cover is available in the Cover Kit, spare part number 668840-001.

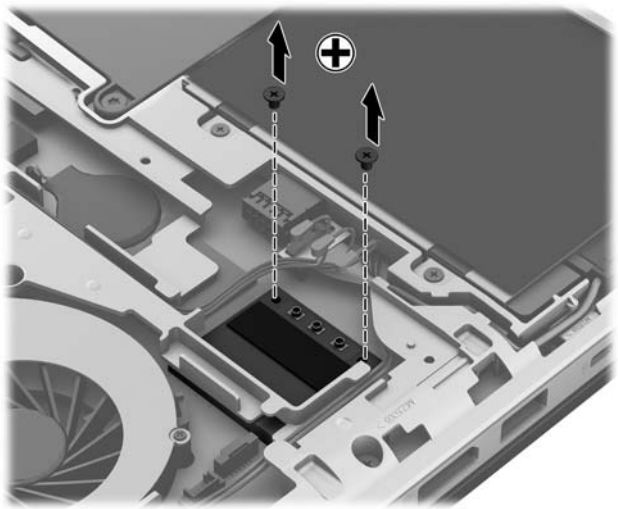


3. Disconnect the wireless antenna cables from the terminals on the WLAN module.

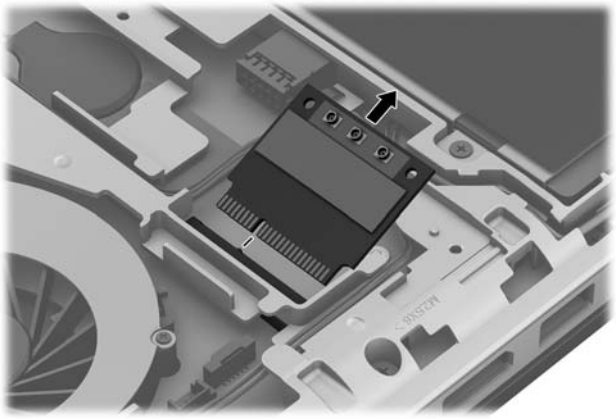
NOTE: The “1” wireless antenna cable is connected to the WLAN module Main terminal. The “2” wireless antenna cable is connected to the WLAN module Aux terminal. If a third wireless antenna cable is present, it is connected to the WLAN module middle terminal.



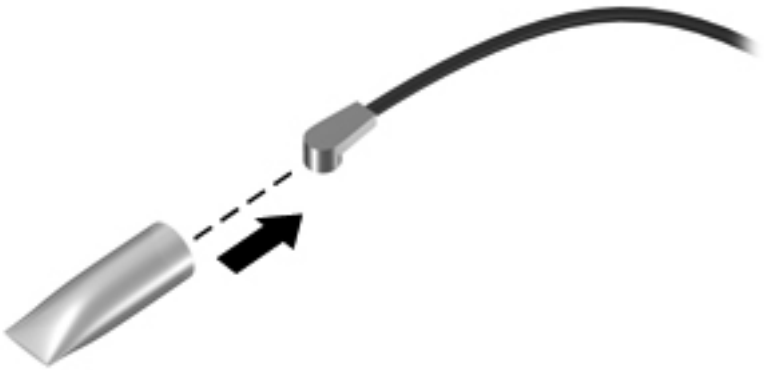
4. Remove the two Phillips PM2.0×2.8 screws that secure the WLAN module to the system board. (The WLAN module tilts up.)



5. Remove the WLAN module by pulling the module away from the slot at an angle.



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



Reverse this procedure to install the WLAN module.

RTC battery

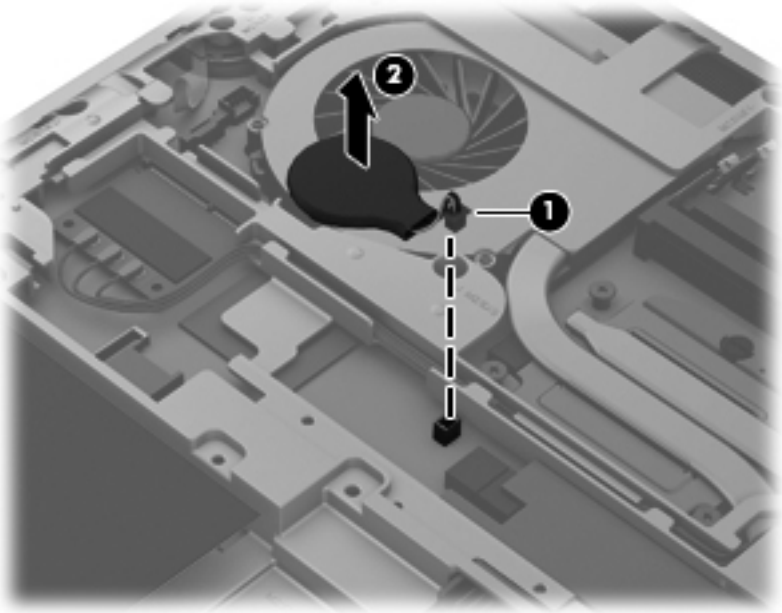
Description	Spare part number
RTC battery (includes double-sided tape and cable)	651948-001

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 service cover (see WLAN module on page 42).

Remove the RTC battery:

1. Disconnect the RTC battery cable **(1)** from the system board.
2. Detach the RTC battery **(2)** from the system board. (The RTC battery is attached to the system board with double-sided tape).



3. Remove the RTC battery.

Reverse this procedure to install the RTC battery.

Memory module

Description	Spare part number
PC3, 12800, 1600-MHz	
8 MB	670034-001
4 MB	641369-001
2 MB	652972-001
PC3, 10600, 1333-MHz	
8 MB	634091-001
4 GB	621569-001

Before removing a memory module, follow these steps:

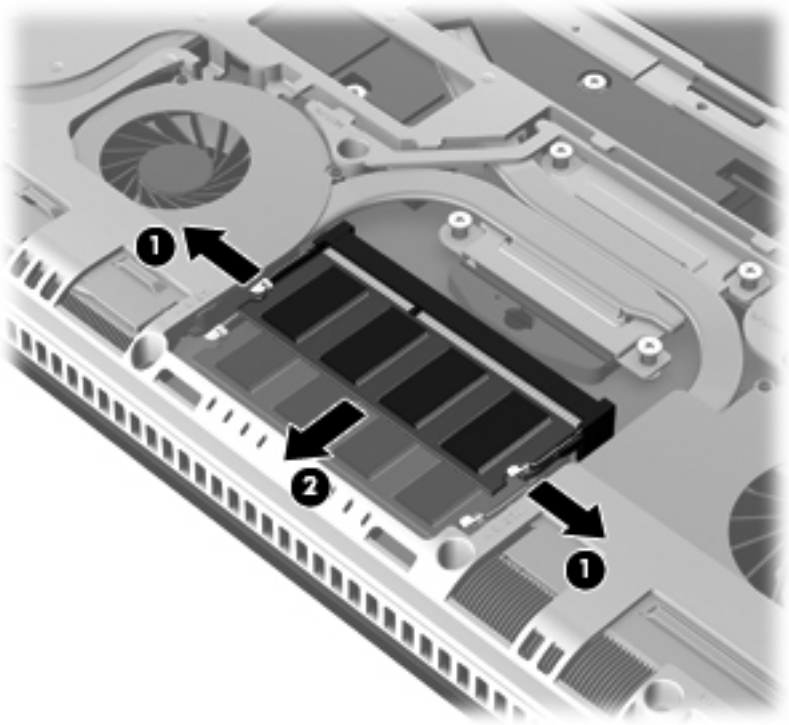
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord 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 cover (see WLAN module on page 42).

Remove the memory module:

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

CAUTION: To prevent damage to the memory module, hold it by the edges only. Do not touch the components on the memory module.

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



Reverse this procedure to install a memory module.

Top cover

NOTE: The top cover spare part kit includes the TouchPad button board and cable and the TouchPad and cable.

Description	Spare part number
For use on computer models equipped with USB 3.0 capability	684366-001
For use on computer models equipped with USB 2.0 capability	668849-001

Before removing the top cover, follow these steps:

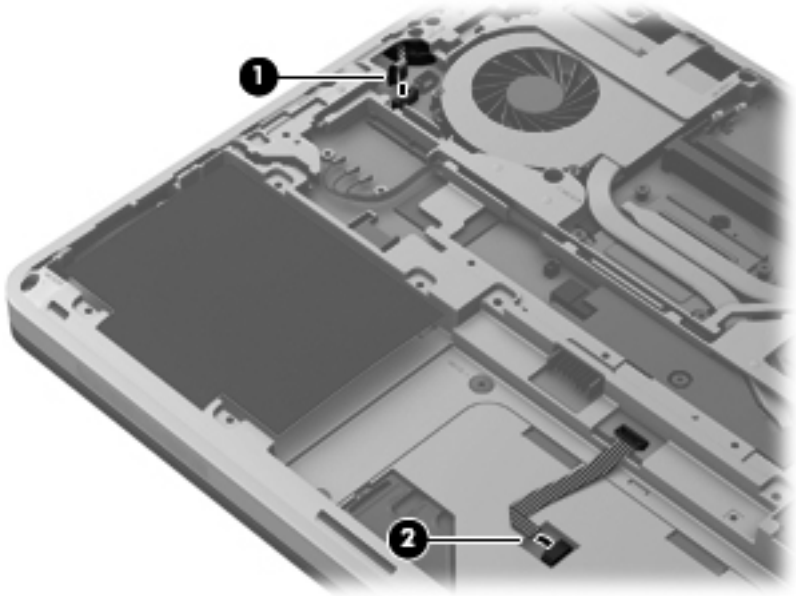
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord 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 service cover (see WLAN module on page 42).

When replacing the top cover, be sure that the following components are removed from the defective top cover and installed on the replacement top cover:

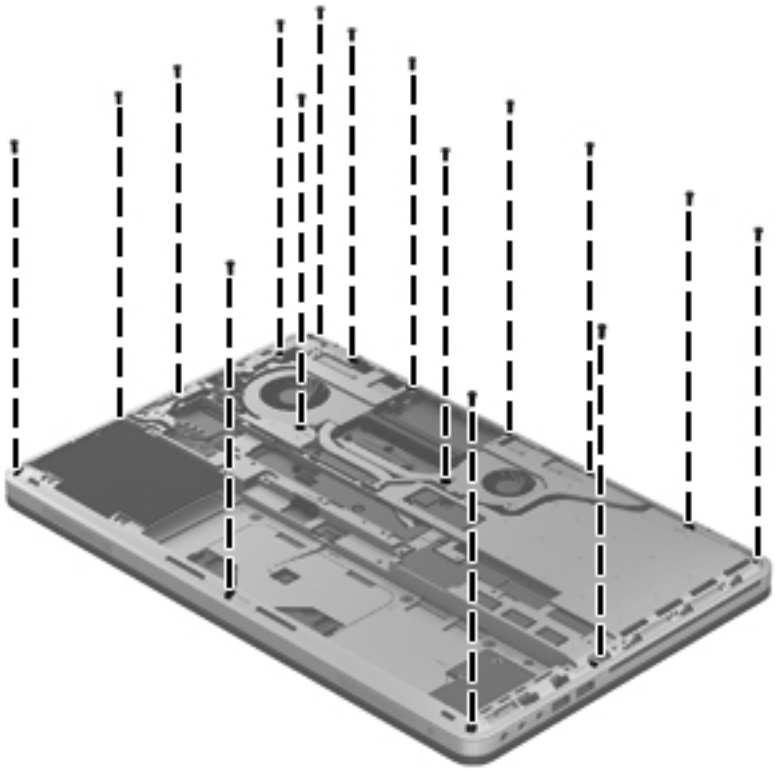
1. Power button board (see Power button board on page 52)
2. Top speakers (see Top speakers on page 69)
3. Keyboard and keyboard shield (see Keyboard on page 53)

Remove the top cover:

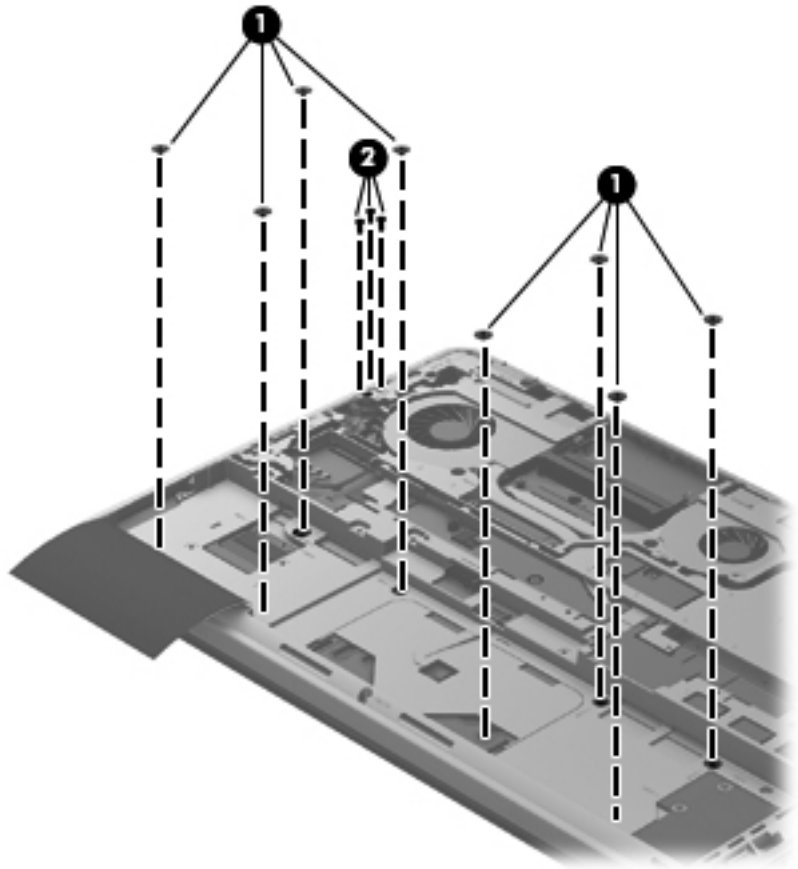
1. Release the zero insertion force (ZIF) connector to which the volume adjustment cable is connected, and then disconnect the cable **(1)** from the system board.
2. Release the ZIF connector to which the TouchPad cable is connected, and then disconnect the cable **(2)** from the system board.



3. Remove the sixteen Phillips PM2.5×6.7 screws that secure the top cover to the base enclosure.

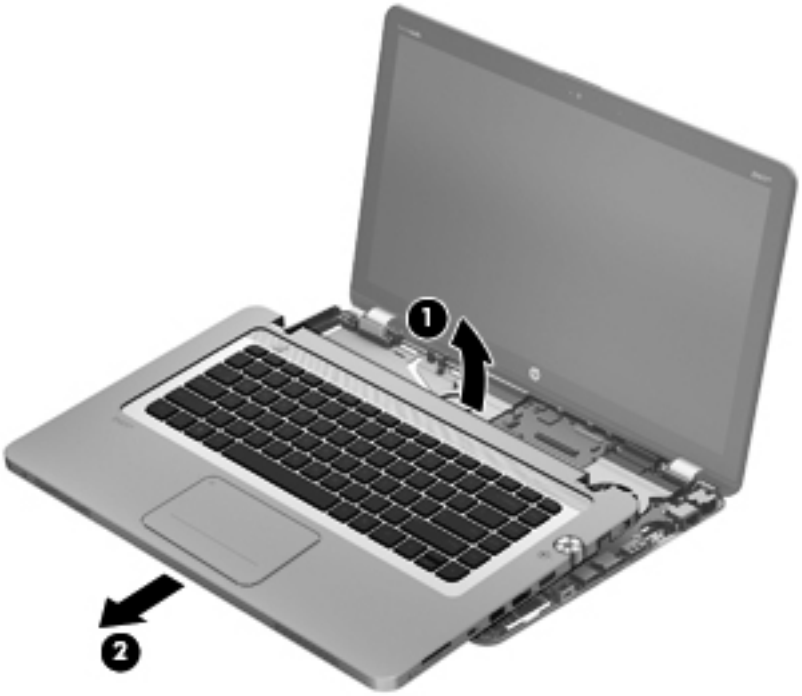


4. Remove the eight Phillips PM2.0×2.5 broad head screws **(1)** from the battery bay and the three Phillips PM2.0×2.9 screws **(2)** near the volume adjustment cable that secure the top cover to the computer.



5. Turn the computer display-side up, with the front toward you.
6. Open the computer as far as it will open.
7. Lift the rear edge of the top cover **(1)** until the top cover disengages from the base enclosure.

8. Gently slide the top cover **(2)** forward until the top speaker, power button board, keyboard light, and keyboard cables are accessible.

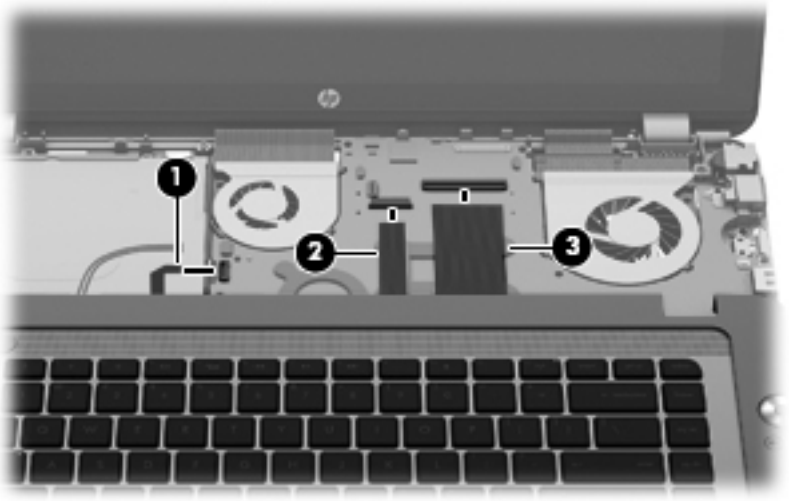


9. Disconnect the following ribbon cables from the corresponding ZIF connectors:

   (1) Power button board cable

   (2) Keyboard backlight cable

   (3) Keyboard cable



10. Remove the top cover.

Reverse this procedure to install the top cover.

Power button board

Description	Spare part number
Power button board (includes cable)	668836-001

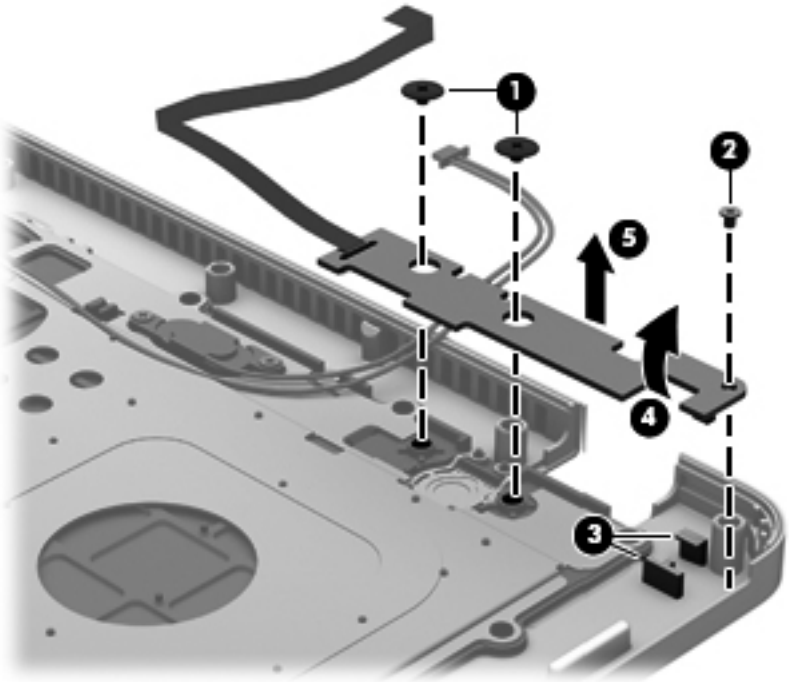
Before removing the power button board, follow these steps:

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 service cover (see WLAN module on page 42).
6. Remove the top cover (see Top cover on page 47).

Remove the power button board:

1. Turn the top cover upside down, with the front toward you.
2. Remove the two Phillips PM2.0×2.5 broad head screws **(1)** and the Phillips PM2.0×2.8 screw **(2)** that secure the power button board to the top cover.
3. Release the clips **(3)** built into the top cover that secure the power button board.
4. Release the power button board **(4)** by lifting the right side of the board.

5. Remove the power button board **(5)**.



Reverse this procedure to install the power button board and cable.

Keyboard

For use in country or region:	Spare part number:	For use in country or region:	Spare part number:
Keyboard for use in Brazil	668834-201	Keyboard for use in South Korea	668834-AD1
Keyboard for use in Canada	668834-121	Keyboard for use in Taiwan	668834-AB1
Keyboard for use in India	668834-D61	Keyboard for use in Thailand	668834-281
Keyboard for use in Latin America	668834-161	Keyboard for use in the United States	668834-001
Keyboard bracket			668829-001

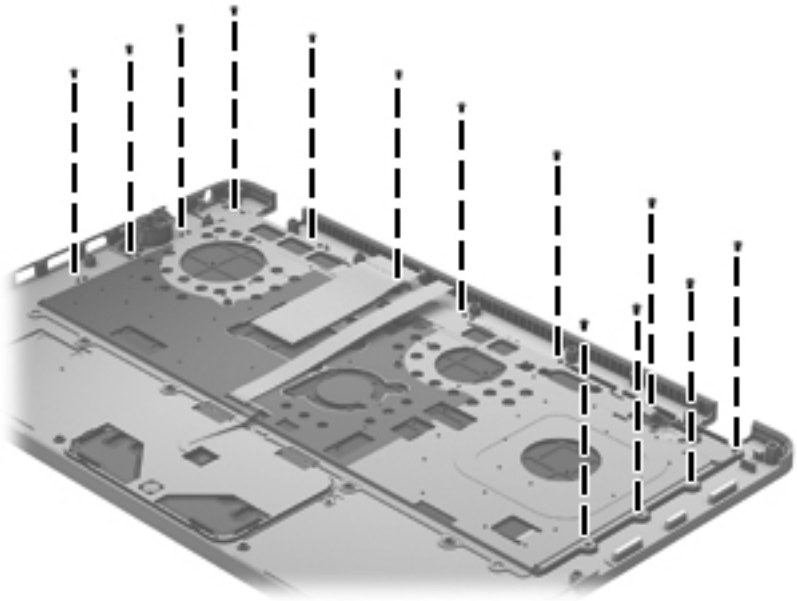
Before removing the keyboard, follow these steps:

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), and then remove the following components:
   a. Service cover (see WLAN module on page 42)
   b. Top cover (see Top cover on page 47)
   c. Power button board (see Power button board on page 52)

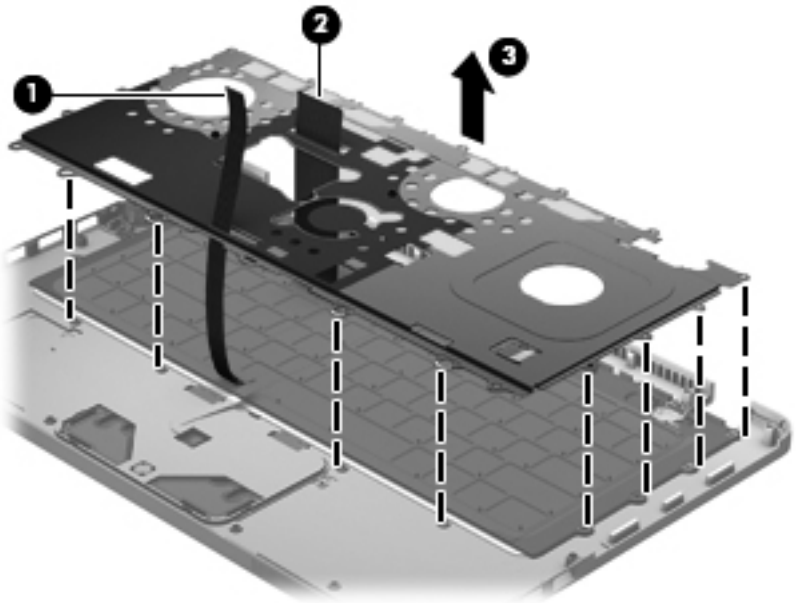
Remove the keyboard:

1. Turn the top cover upside down, with the front toward you.
2. Remove the thirteen Phillips PM2.0×2.8 screws that secure the keyboard shield to the top cover.

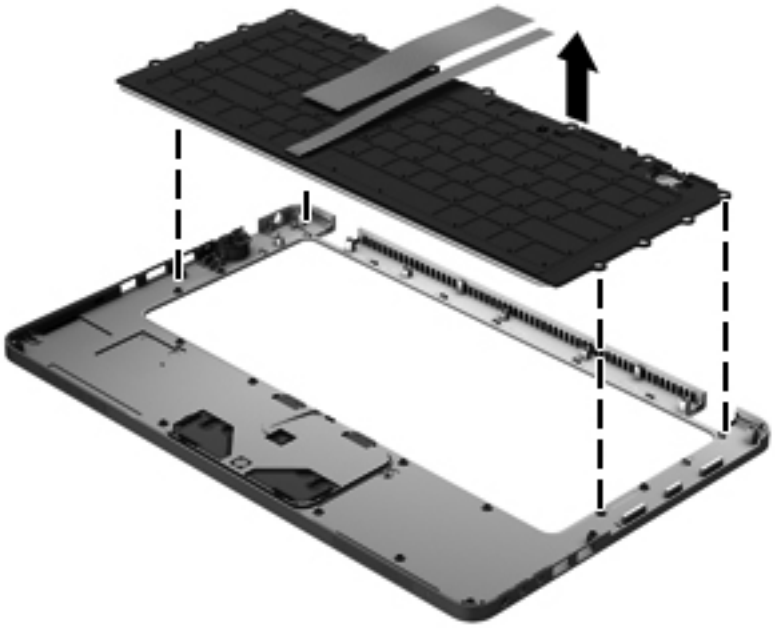


3. Route the keyboard backlight cable **(1)** and keyboard cable **(2)** through the openings in the keyboard shield.

4. Remove the keyboard shield **(3)**.



5. Remove the keyboard.



Reverse this procedure to install the keyboard and shield.

Display assembly

NOTE: The display assembly spare part kit includes a display panel cable, webcamera/microphone module and cable, 2 wireless antenna cables and transceivers, and wireless audio module antenna and cable.

Description	Spare part number
15.6-in, FHD, AG, LED, FG, display assembly in aluminum finish equipped with Bluetooth (includes a Bluetooth module and cable)	668833-001
15.6-in, FHD, AG, LED, FG, display assembly in aluminum finish	668831-001
15.6-in, HD, AG, LED, FG, display assembly in aluminum finish equipped with Bluetooth (includes a Bluetooth module and cable)	668832-001
15.6-in, HD, AG, LED, FG, display assembly in aluminum finish	668830-001

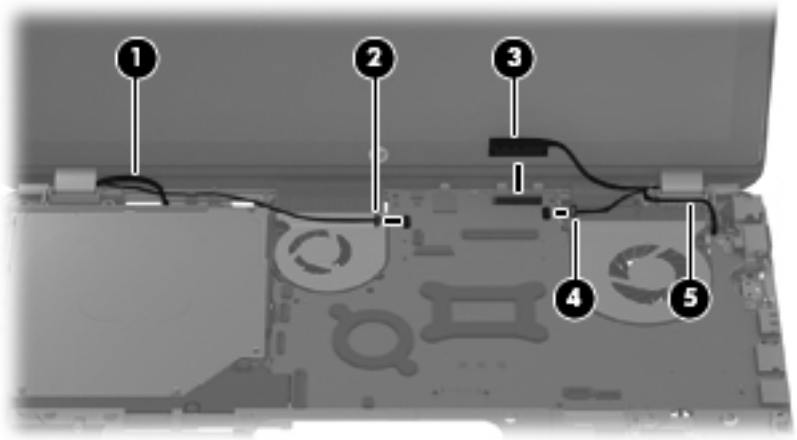
Before removing the display assembly, follow these steps:

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. Disconnect the antenna cables from the wireless audio module (see Wireless audio module on page 40).
6. Remove the service cover (see WLAN module on page 42).
7. Disconnect the antenna cables from the the WLAN module (see WLAN module on page 42).
8. Remove the top cover (see Top cover on page 47).

Remove the display assembly:

1. Close the computer.
2. Turn the computer upside down, with the front toward you.

3. Release the wireless audio module antenna cables **(1)** and the wireless antenna cables **(2)** from the clips and routing channels built into the base enclosure.



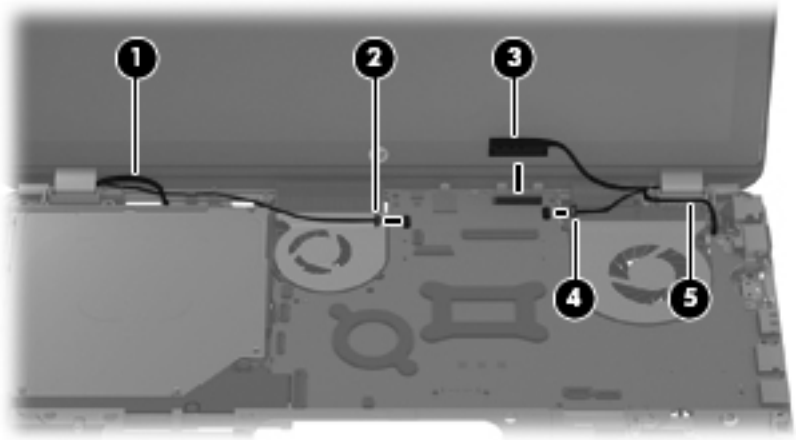
4. Turn the computer right side up, with the front toward you.
5. Open the computer as far as it will open.
6. Disconnect the following cables from the system board:

   (1) Display proximity sensor cable

   (2) Display panel cable

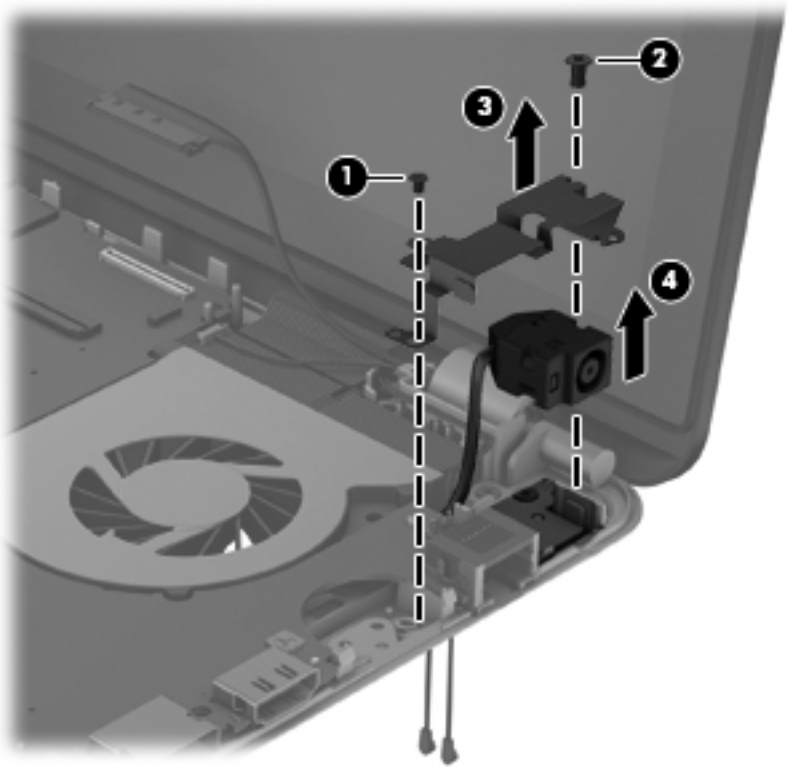
   (3) Bluetooth module cable (only on computer models equipped with a Bluetooth module)

7. Release the wireless antenna cables **(4)** from the openings in the system board and base enclosure.



8. Remove the Phillips PM2.0×2.8 screw **(1)** and the Phillips PM2.5×4.9 screw **(2)** that secure the power connector bracket and power connector to the base enclosure.
9. Remove the power connector bracket **(3)**.

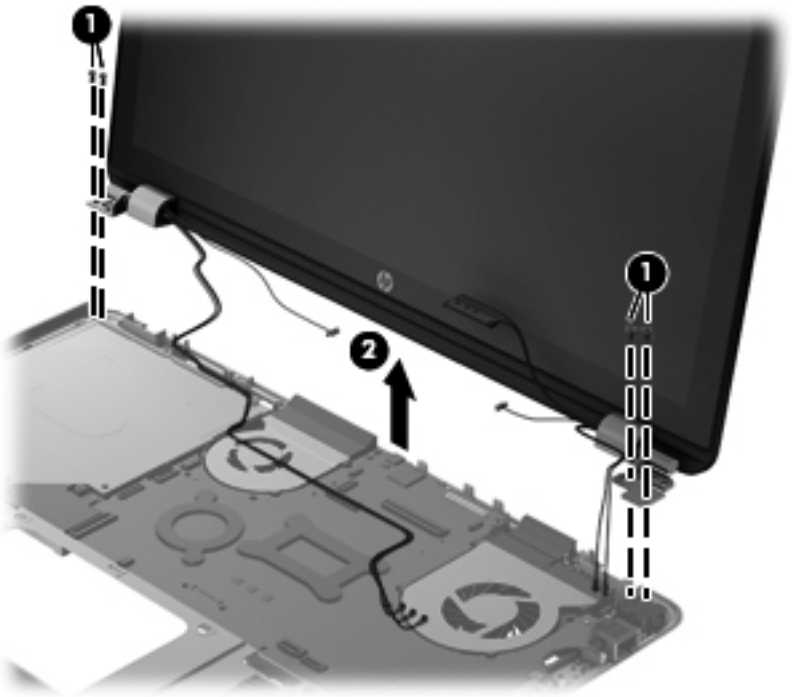
10. Release the power connector **(4)** from the clip built into the base enclosure.



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

11. Remove the four Phillips PM2.5×5.0 screws **(3)** that secure the display assembly to the computer.

12. Remove the display assembly **(4)**.



Reverse this procedure to reassemble and install the display assembly.

Front speakers

Description	Spare part number
Front speakers (include cables and 4 rubber grommets)	668843-001

Before removing the front speakers, follow these steps:

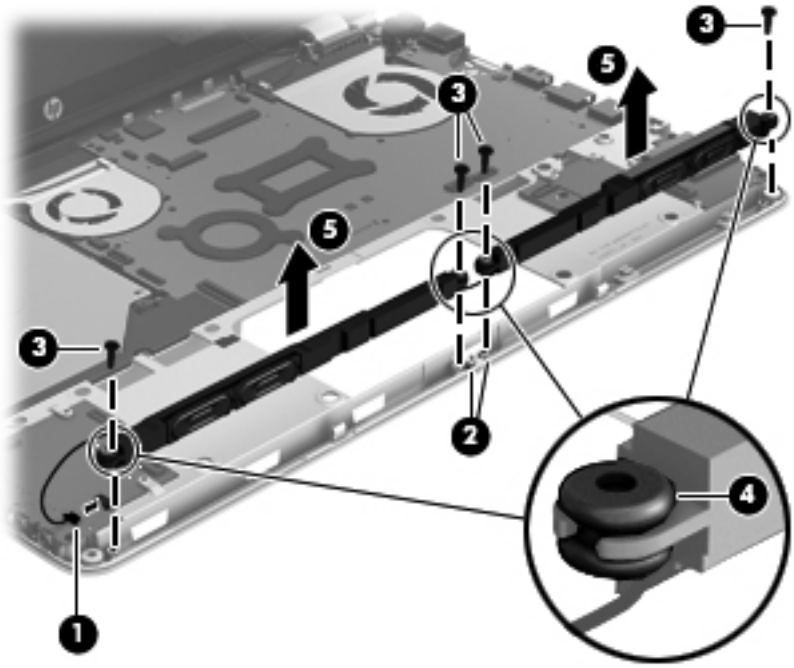
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord 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 cover (see WLAN module on page 42).
6. Remove the top cover (see Top cover on page 47).

Remove the front speakers:

1. Disconnect the front speaker cable **(1)** from the audio/USB board.
2. Release the front speaker cables from the clips **(2)** built into the base enclosure.
3. Remove the four Phillips PM2.0×6.4 screws **(3)** that secure the front speakers to the base enclosure.

NOTE: When removing the front speakers, make note of the location of the four rubber isolators **(4)** that are installed in the screw holes as indicated in the following illustration.

4. Remove the front speakers **(5)**.



Reverse this procedure to install the front speakers and cable.

Audio/USB board

NOTE: The audio/USB board spare part kit includes 2 cables.

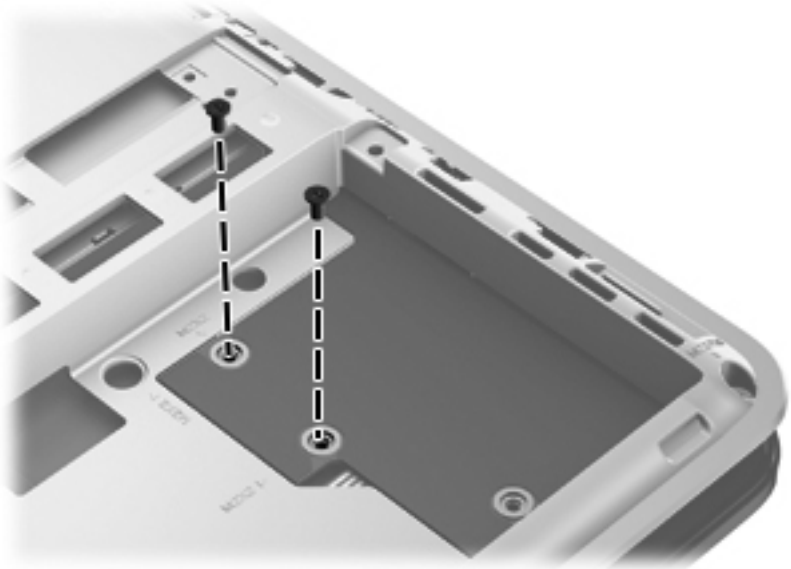
Description	Spare part number
For use on computer models equipped with USB 3.0 capability	689591-001
For use on computer models equipped with USB 2.0 capability	668839-001

Before removing the audio/USB board, follow these steps:

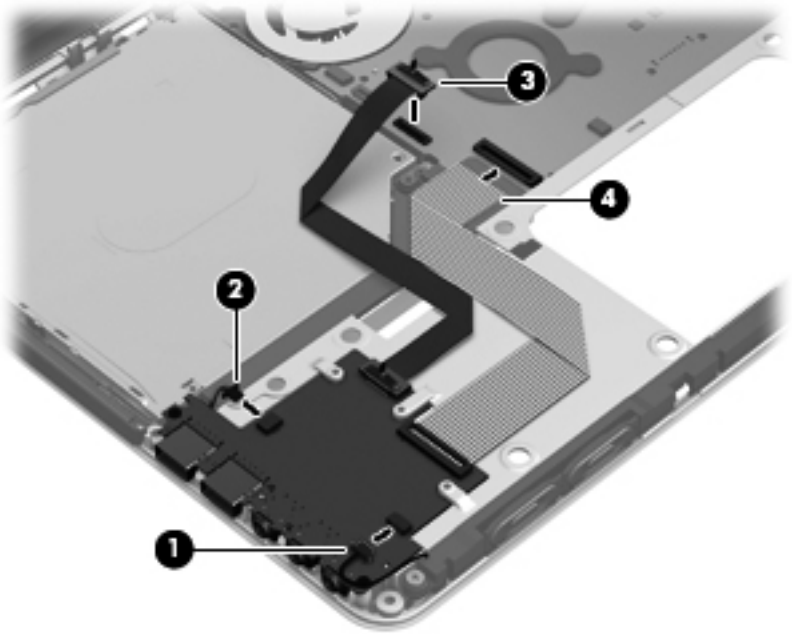
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord 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 service cover (see WLAN module on page 42).
6. Remove the top cover (see Top cover on page 47).

Remove the audio/USB board:

1. Close the computer.
2. Turn the computer upside down, with the front toward you.
3. Remove the two Phillips PM2.0×2.8 screws that secure the audio/USB board to the base enclosure.

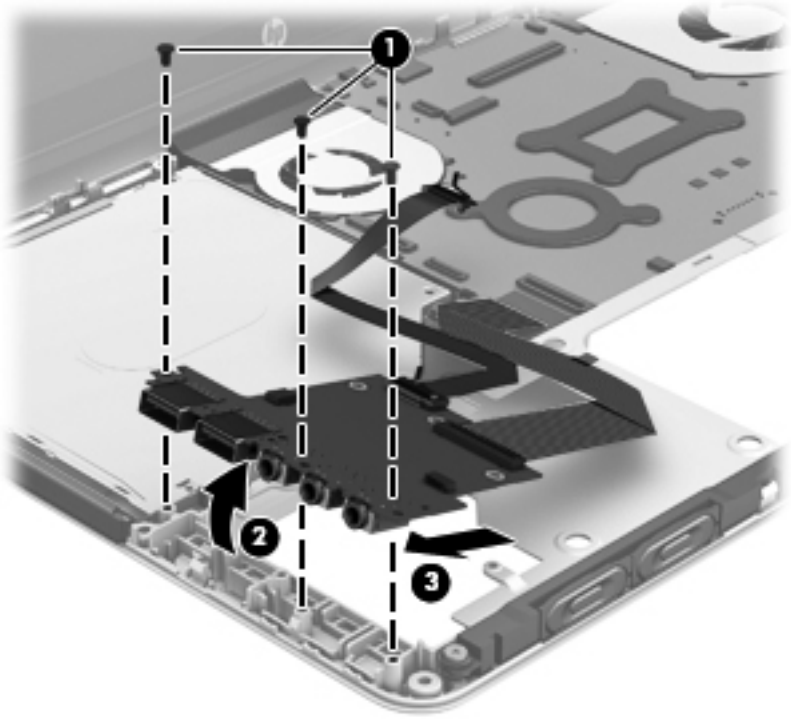


4. Turn the computer right side up, with the front toward you.
5. Open the computer as far as it will open.
6. Disconnect the front speaker cable **(1)** and the subwoofer cable **(2)** from the audio/USB board.
7. Disconnect the audio/USB board cable **(3)** from the system board.
8. Release the ZIF connector to which the audio/USB board ribbon cable is connected, and then disconnect the audio/USB board ribbon cable **(4)** from the system board.



9. Remove the three Phillips PM2.0×2.8 screws **(1)** that secure the audio/USB board to the base enclosure.
10. Lift the left side of the audio/USB board **(2)** until the audio connectors are clear of the base enclosure.

11. Remove the audio/USB board **(3)** by sliding it up and to the left at an angle.



Reverse this procedure to install the audio/USB board and cable.

TouchPad LED board

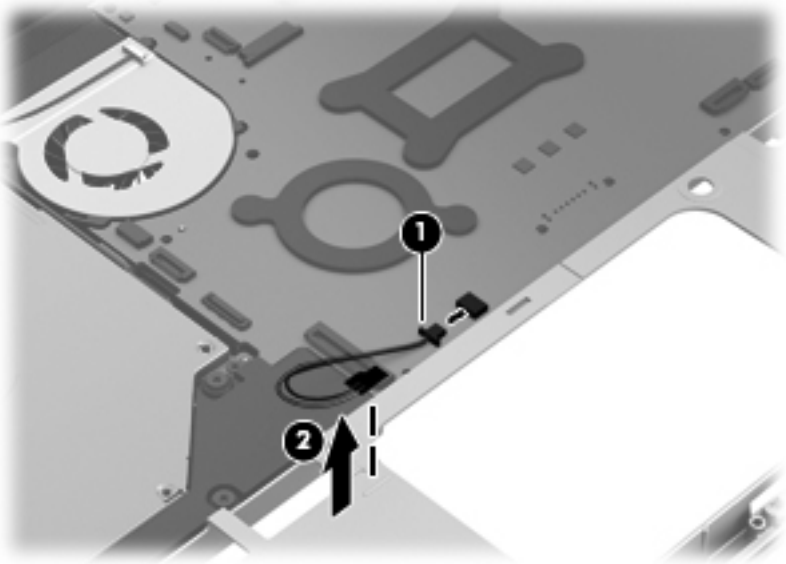
Description	Spare part number
TouchPad LED board (includes cable)	675232-001

Before removing the TouchPad LED 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 service over (see WLAN module on page 42).
6. Remove the top cover (see Top cover on page 47).

Remove the TouchPad LED board:

1. Disconnect the TouchPad LED board cable **(1)** from the system board.
2. Detach the TouchPad LED board **(2)** from the base enclosure. (The TouchPad LED board is attached to the base enclosure with double-sided tape).



3. Remove the TouchPad LED board and cable.

Reverse this procedure to install the TouchPad LED board and cable.

Wireless audio module connector board

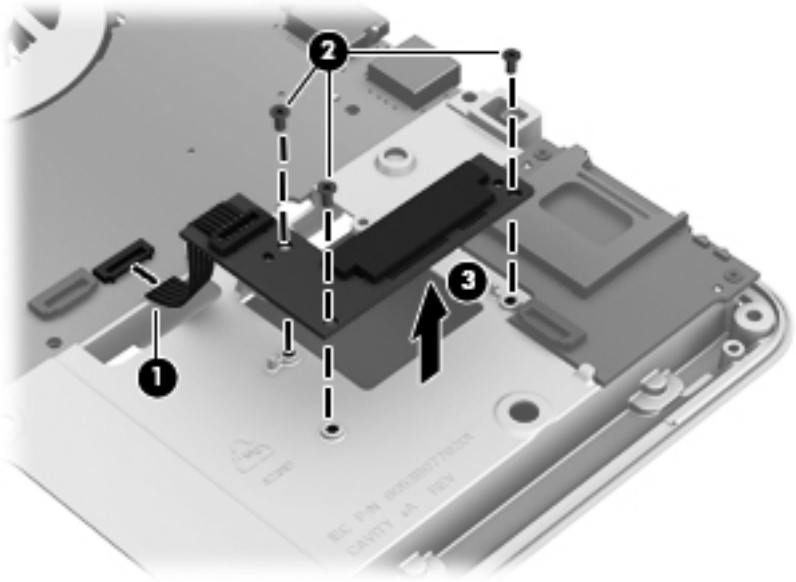
Description	Spare part number
Wireless audio module connector board (includes cable)	668837-001

Before removing the wireless audio module connector 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 service cover (see WLAN module on page 42).
6. Remove the top cover (see Top cover on page 47).

Remove the wireless audio module connector board:

1. Release the ZIF connector to which the wireless audio module connector board cable is connected, and then disconnect the wireless audio module connector board cable **(1)** from the system board.
2. Remove the two Phillips PM2.0×2.8 screws **(2)** that secure the wireless audio module connector board to the base enclosure.
3. Remove the wireless audio module connector board **(3)**.



Reverse this procedure to install the wireless audio module connector board and cable.

Card Reader board

NOTE: The Card Reader board spare part kit includes the Card Reader board cable.

Description	Spare part number
For use on computer models equipped with USB 3.0 capability	689592-001
For use on computer models equipped with USB 2.0 capability	668838-001

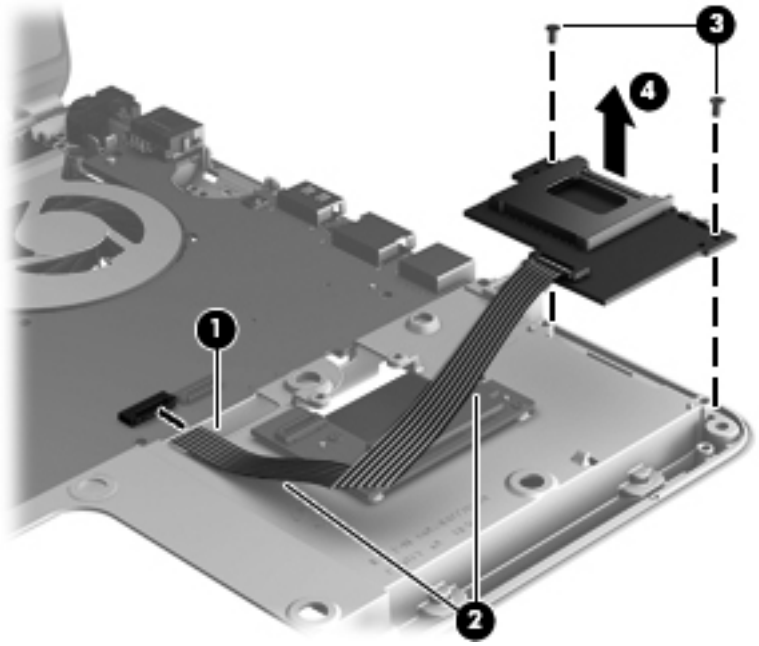
Before removing the Card Reader board, follow these steps:

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 service cover (see WLAN module on page 42).
6. Remove the top cover (see Top cover on page 47).

Remove the Card Reader board:

1. Release the ZIF connector to which the Card Reader board cable is connected, and then disconnect the Card Reader board cable **(1)** from the system board.
2. Detach the Card Reader board cable **(2)** from the base enclosure. (The Card Reader board cable is attached to the base enclosure with double-sided tape).
3. Remove the two Phillips PM2.0×2.8 screws **(3)** that secure the Card Reader board to the base enclosure.

4. Remove the Card Reader board **(4)**.



Reverse this procedure to install the Card Reader board and cable.

Top speakers

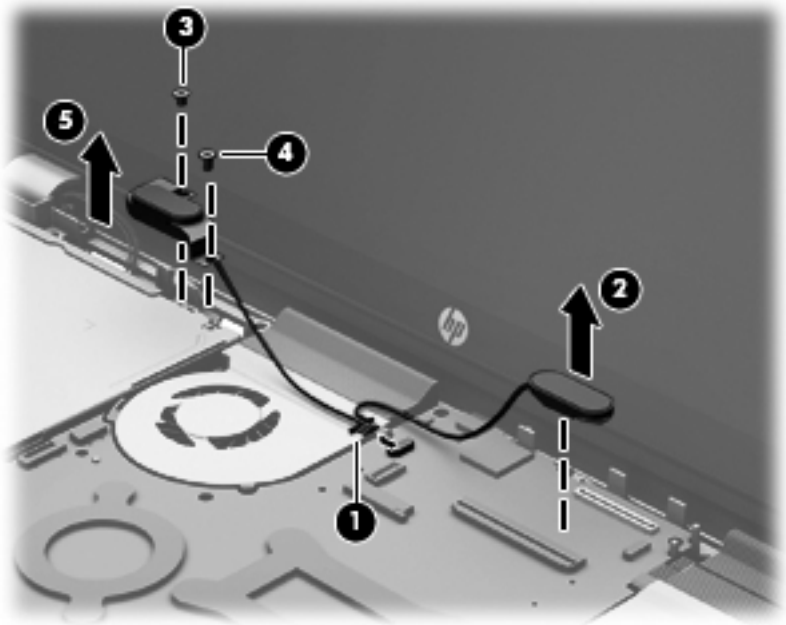
Description	Spare part number
Top speakers (includes cable and double-sided tape)	668842-001

Before removing the top speakers, 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 cover (see WLAN module on page 42).
6. Remove the top cover (see Top cover on page 47).

Remove the top speakers:

1. Disconnect the top speaker cable from the system board **(1)**.
2. Detach the right top speaker **(2)** from the system board. (The right top speaker is attached to the system board with double-sided tape.)
3. Remove the Phillips PM2.0×2.8 screw **(3)** and the Phillips PM2.5×6.7 screw **(4)** that secure the left top speaker to the base enclosure.
4. Remove the top speakers **(5)**.



Reverse this procedure to install the top speakers and cable.

Optical drive

Description	Spare part number
DVD±RW and CD-RW Super Multi Double-Layer FX Combo Drive (includes mounting brackets, connector board, and connector cable)	668835-001

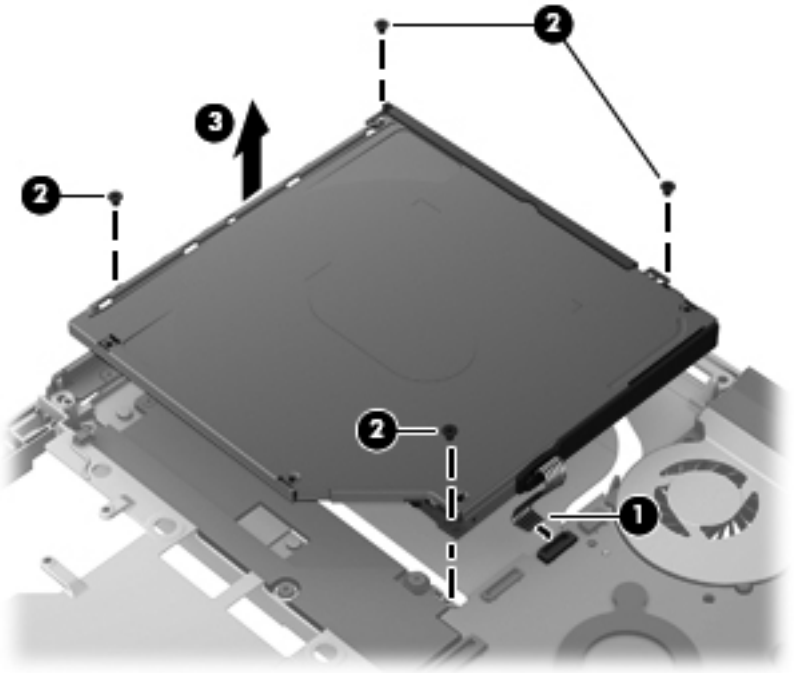
Before removing the optical drive, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 35), and then remove the following components:
   a. Sservice cover (see WLAN module on page 42)
   b. Top cover (see Top cover on page 47)
   c. Top speakers (see Top speakers on page 69)

Remove the optical drive:

1. Release the ZIF connector to which the optical drive cable is connected, and then disconnect the optical drive cable **(1)** from the system board.
2. Remove the four Phillips PM2.0×2.8 screws **(2)** that secure the optical drive to the computer.

3. Remove the optical drive **(3)** from the computer.



Reverse this procedure to reassemble and install the optical drive.

System board

NOTE: The system board spare part kit includes replacement thermal material. Replacement thermal material is also available in the Thermal Material Kit, spare part number 668848-001.

NOTE: The system board spare part kit includes 1 GB of discrete graphics subsystem memory.

Description	Spare part number
Equipped with the 7750M chipset for use in all countries and regions except the People's Republic of China	679814-001
Equipped with the 7750M chipset for use only in the People's Republic of China	694500-001
Equipped with the 7670M chipset	668847-001

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), and then remove the following components:
   a. Hard drive (see Hard drive on page 37)
   b. Wireless audio module (see Wireless audio module on page 40)
   c. WLAN module (see WLAN module on page 42)
   d. Top cover (see Top cover on page 47)
   e. Top speakers (see Top speakers on page 69)

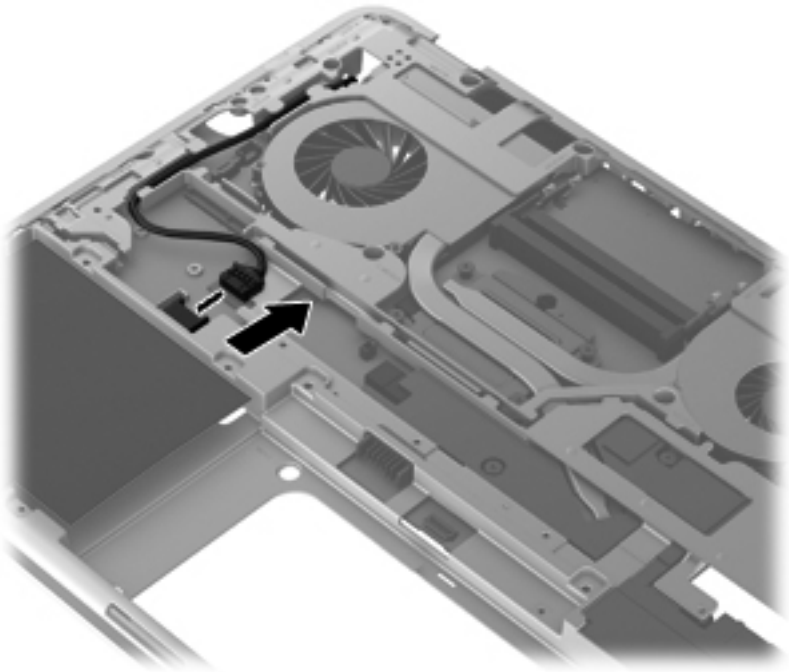
When replacing the system board, be sure that the following components are removed from the defective system board and installed on the replacement system board:

- RTC battery (see RTC battery on page 45)
- Memory module (see Memory module on page 46)
- Fan/heat sink assembly (see Fan/heat sink assembly on page 76)
- Processor (see Processor on page 80)

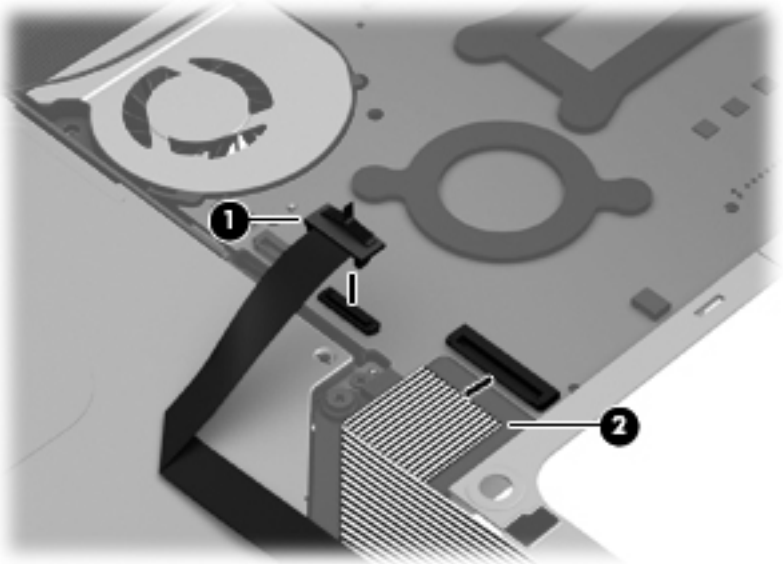
Remove the system board:

1. Close the computer.
2. Turn the computer upside down, with the front toward you.

3. Disconnect the power connector cable from the system board.

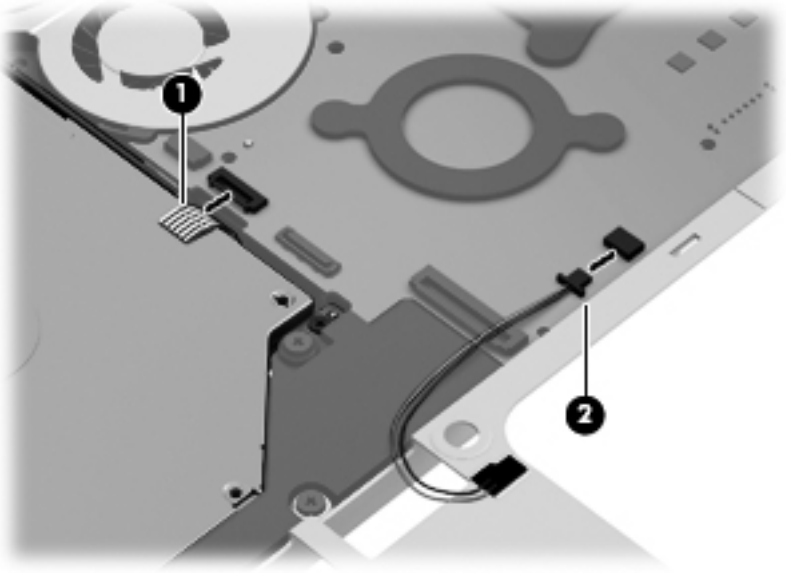


4. Turn the computer right-side up, with the front toward you.
5. Open the computer.
6. Disconnect the audio/USB cable **(1)** and the audio/USB ribbon cable **(2)** from the system board:



7. Release the ZIF connector to which the optical drive cable is connected, and then disconnect the optical drive cable **(2)** from the system board.

8. Disconnect the TouchPad LED board cable from the system board.



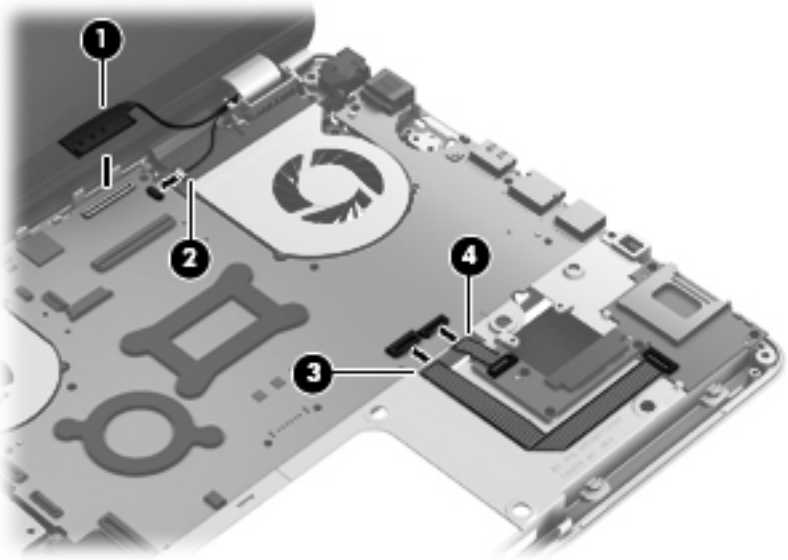
9. Disconnect the following cables:

   (1) Display panel cable

   (2) Bluetooth module cable (only on computer models equipped with a Bluetooth module)

   (3) Card Reader board cable

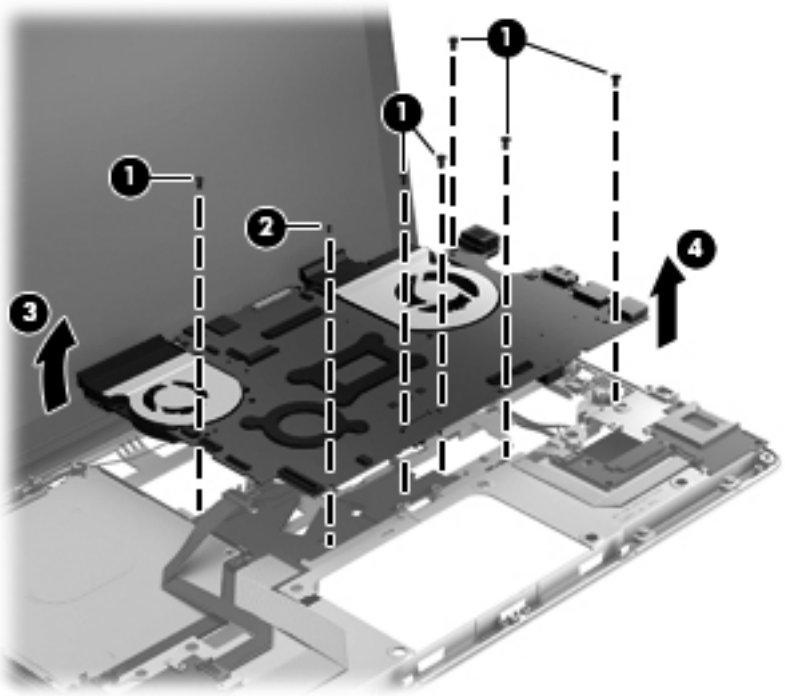
   (4) Wireless audio module connector board cable



10. Remove the six Phillips PM2.5×4.9 screws **(1)** and the Phillips PM2.0×2.8 screw **(2)** that secure the system board to the base enclosure.

11. Lift the rear edge of the system board **(3)** until it rests at an angle.

12. Remove the system board **(4)**.



Reverse this procedure to install the system board.

Fan/heat sink assembly

NOTE: The fan/heat sink assembly spare part kit includes replacement thermal material. Replacement thermal material is also available in the Thermal Material Kit, spare part number 668848-001.

Description	Spare part number
For use on computer models equipped with USB 3.0 capability	690006-001
For use on computer models equipped with USB 2.0 capability	668827-001

NOTE: To properly ventilate the computer, allow at least 7.6 cm (3 in) of 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.

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

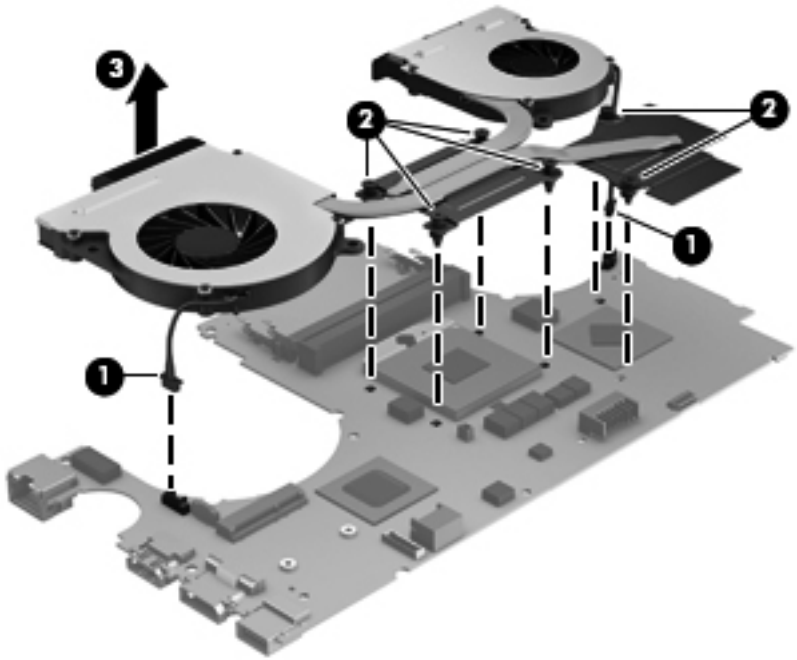
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 35), and then remove the following components:
   a. Service cover (see WLAN module on page 42)
   b. Top cover (see Top cover on page 47)
   c. Top speakers (see Top speakers on page 69)
   d. System board (see System board on page 72)

Remove the fan/heat sink assembly:

1. Turn the system board upside down, with the front toward you.
2. Disconnect the 2 fan cables from the system board.
3. Following the **1** through **6** sequence stamped into the fan/heat sink assembly, loosen the six captive screws **(2)** that secure the fan/heat sink assembly to the system board.

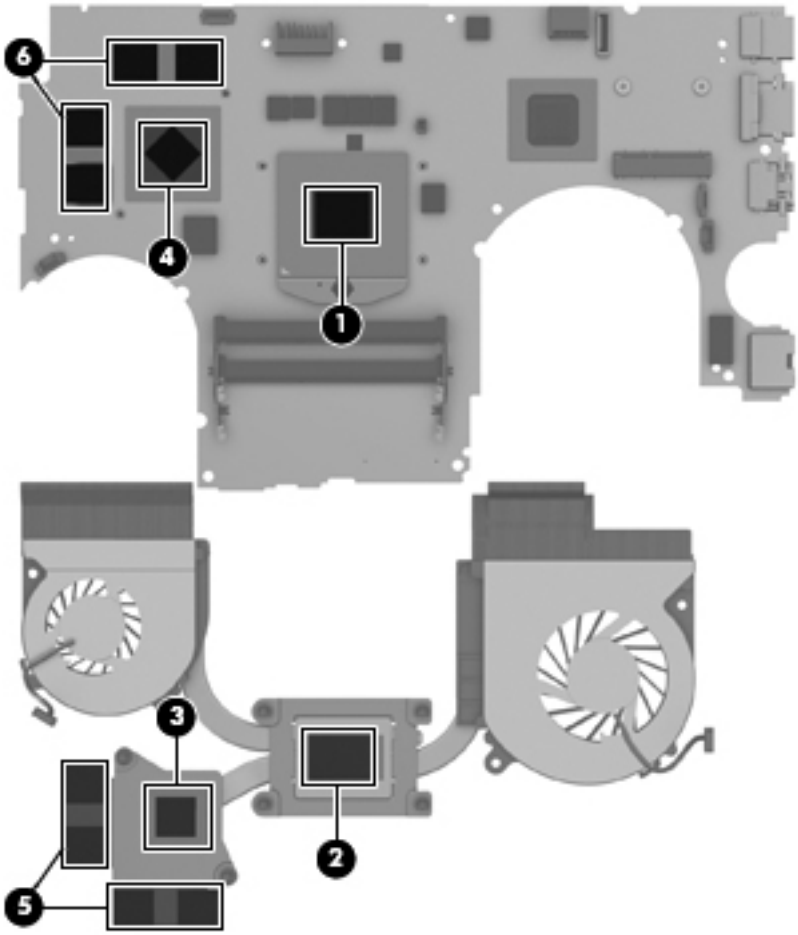
   NOTE: Due to the adhesive quality of the thermal material located between the heat sink and system board components, it may be necessary to move the fan/heat sink assembly from side to side to detach it.

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

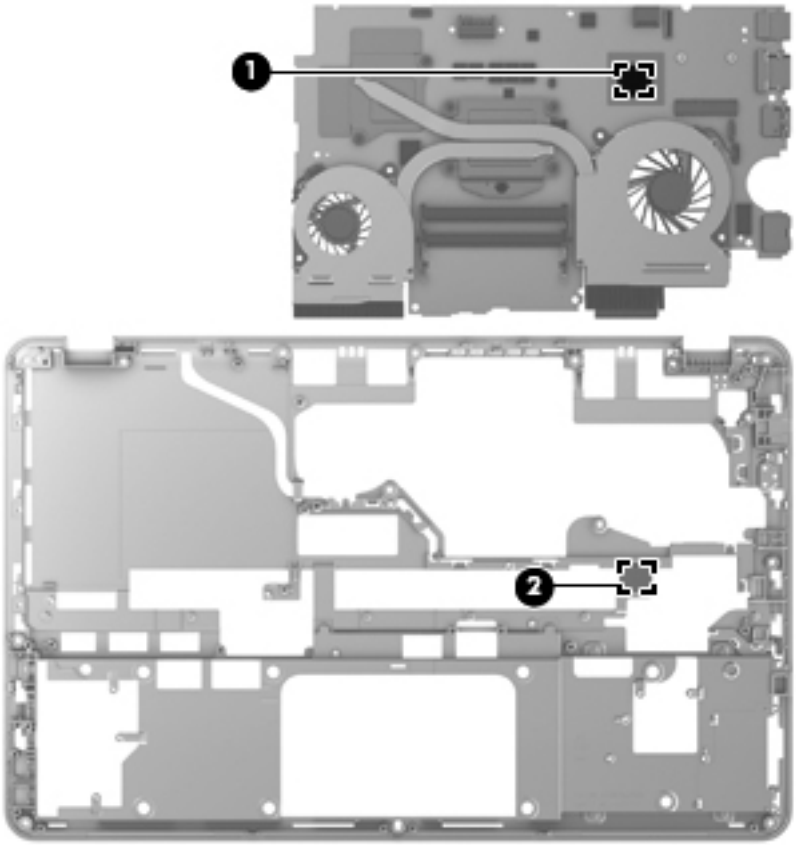


NOTE: The thermal material must be thoroughly cleaned from the surfaces of the fan/heat sink assembly and the system board components each time the fan/heat sink assembly is removed. Replacement thermal material is included with the fan/heat sink assembly and system board spare part kits. The following illustration shows the replacement thermal material locations.

- Thermal paste is used on the processor **(1)** and the heat sink component **(2)** that services it
- Thermal paste is used on the graphics subsystem chip **(3)** and the heat sink component **(4)** that services it.
- Thermal pads are used on the four system board capacitors **(5)** and the heat sink components **(6)** that service them



- A thermal pad is used on the PCH **(1)** and the heat sink component **(2)** built into the base enclosure that services it



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

Processor

NOTE: The processor spare part kit includes replacement thermal material. Replacement thermal material is also available in the Thermal Material Kit, spare part number 668848-001.

Description	Spare part number
Intel Quad Core i7-3612QM 2.10-GHz processor (SC turbo up to 3.10-GHz), 6.0-MB L3 cache, 1600-MHz FSB, 35 W)	680647-001
Intel Quad Core i7-3610QM 2.30-GHz processor (SC turbo up to 3.30-GHz), 6.0-MB L3 cache, 1600-MHz FSB, 45 W)	680646-001
Intel Quad Core i7-2860QM 2.50-GHz processor (SC turbo up to 3.60-GHz), 8.0-MB L3 cache, 1600-MHz FSB, 45 W)	666175-001
Intel Quad Core i7-2760QM 2.40-GHz processor (SC turbo up to 3.50-GHz), 6.0-MB L3 cache, 1600-MHz FSB, 45 W)	666174-001
Intel Quad Core i7-2670QM 2.40-GHz processor (SC turbo up to 3.50-GHz), 6.0-MB L3 cache, 1600-MHz FSB, 45 W)	665116-001
Intel Dual Core i7-2640M 2.80-GHz processor (SC turbo up to 3.40-GHz), 4.0-MB L3 cache, 1333-MHz FSB, 35 W)	666173-001
Intel Quad Core i5-3210M 2.50-GHz processor (SC turbo up to 3.10-GHz), 3.0-MB L3 cache, 1600-MHz FSB, 35 W)	680645-001
Intel Dual Core i5-2450M 2.50-GHz processor (SC turbo up to 3.10-GHz), 3.0-MB L3 cache, 1333-MHz FSB, 35 W)	676359-001
Intel Dual Core, i5-2430M 2.40-GHz processor (SC turbo up to 3.00-GHz), 3.0-MB L3 cache, 1333-MHz FSB, 35 W)	653341-001

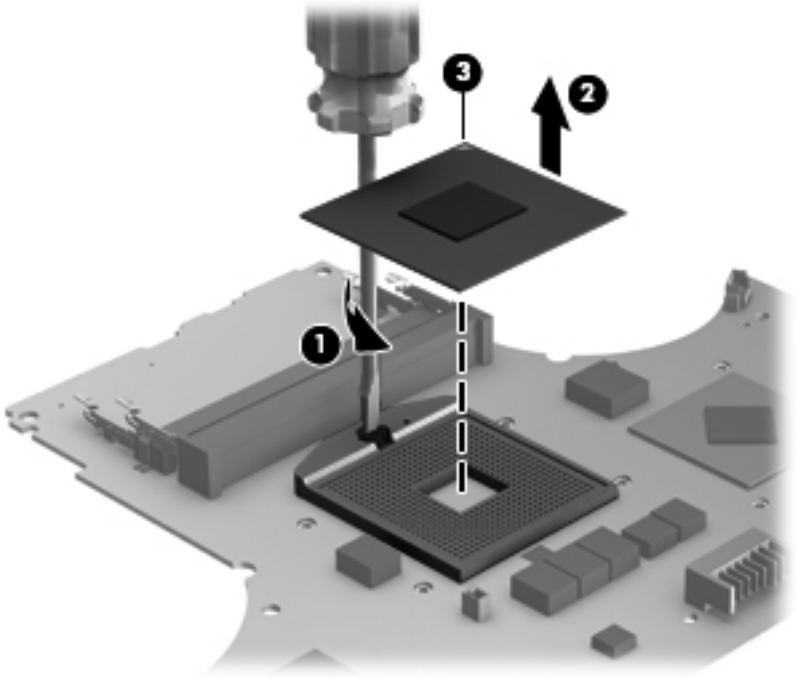
Before removing the processor, follow these steps:

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), and then remove the following components:
   a. Service cover (see WLAN module on page 42)
   b. Top cover (see Top cover on page 47)
   c. Top speakers (see Top speakers on page 69)
   d. System board (see System board on page 72)
   e. Fan/heat sink assembly (see Fan/heat sink assembly on page 76)

Remove the processor:

1. Turn the processor locking screw **(1)** one-half turn counterclockwise, until you hear a click.
2. Lift the processor **(2)** straight up, and remove it.

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



Reverse this procedure to install the processor.

Power connector cable

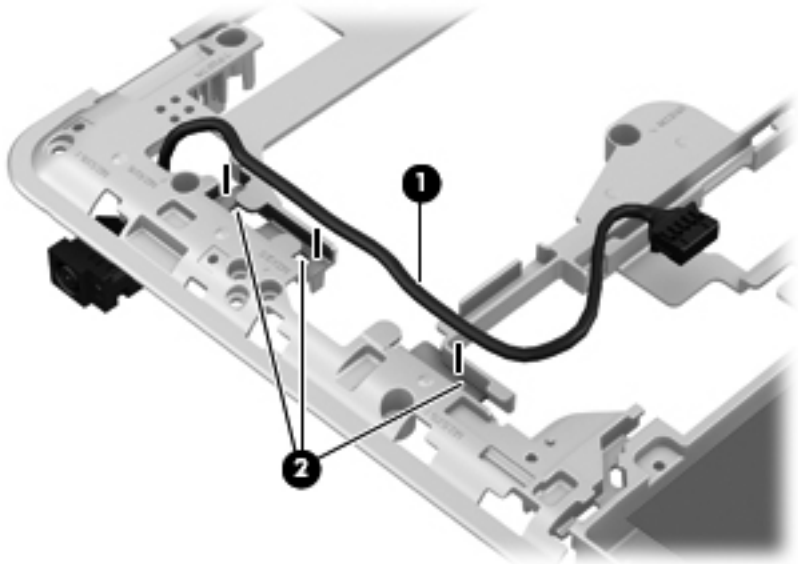
Description	Spare part number
Power connector cable (includes bracket)	668826-001

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), and then remove the following components:
   a. Service cover (see WLAN module on page 42)
   b. Top cover (see Top cover on page 47)
   c. Display assembly (see Display assembly on page 56)
   d. Top speakers (see Top speakers on page 69)
   e. System board (see System board on page 72)

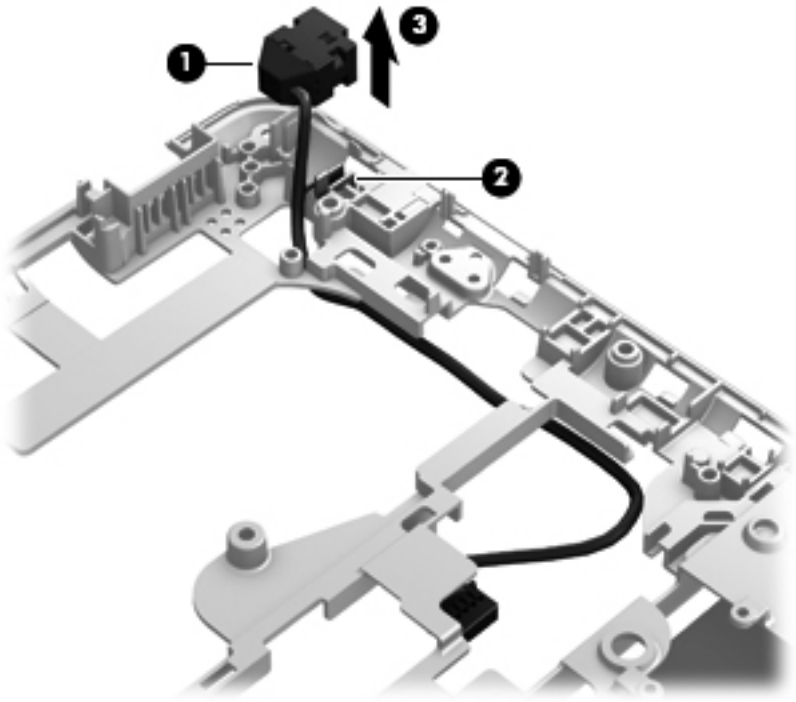
Remove the power connector cable:

1. Turn the base enclosure upside down, with the rear panel toward you.
2. Release the power connector cable **(1)** from the clips **(2)** and routing channel built into the base enclosure.



3. Turn the base enclosure right side up, with the front toward you. Remove the power connector **(1)** from the clip built into the base enclosure **(2)**.

4. Remove the power connector cable **(3)**.



Reverse this procedure to install the power connector cable.

Subwoofer

Description	Spare part number
Subwoofer (includes cables and 2 grommets)	668844-001

Before removing the subwoofer, follow these steps:

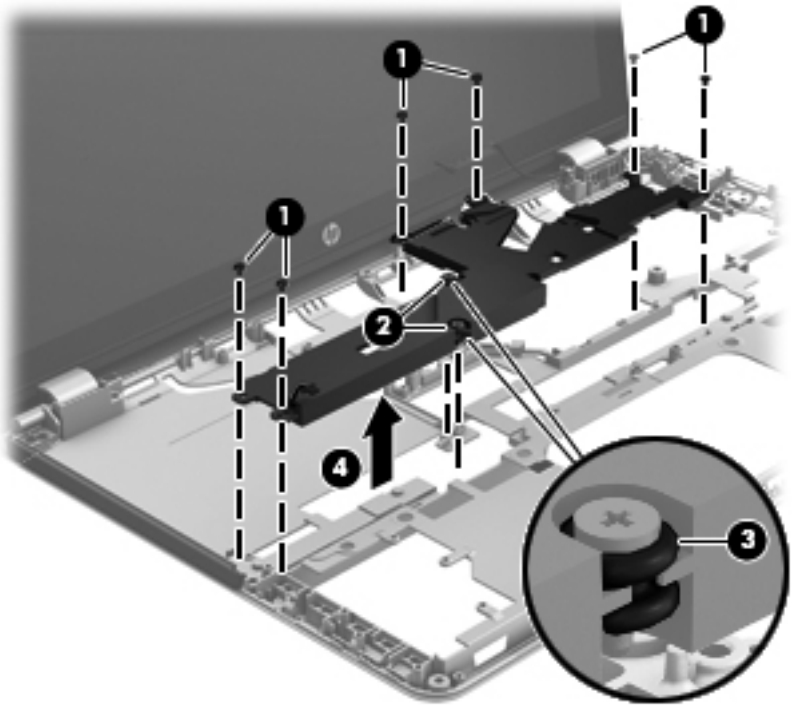
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 35), and then remove the following components:
   a. Service cover (see WLAN module on page 42)
   b. Top cover (see Top cover on page 47)
   c. Display assembly (see Display assembly on page 56)
   d. System board (see System board on page 72)
   e. Top speakers (see Top speakers on page 69)

Remove the subwoofer:

1. Remove the six Phillips PM2.0×2.8 screws **(1)** and the two Phillips PM2.5×6.4 screws **(2)** that secure the subwoofer to the base enclosure.

NOTE: When removing the subwoofer, make note of the location of the two rubber isolators **(2)** that are installed in the screw holes as indicated in the following illustration.

2. Remove the subwoofer **(4)**.



Reverse this procedure to install the subwoofer.

5 Setup Utility (BIOS) and System Diagnostics

Using Setup Utility

Setup Utility, or Basic Input/Output System (BIOS), controls communication between all the input and output devices on the system (such as disk drives, display, keyboard, mouse, and printer). Setup Utility 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 Setup Utility. Errors can prevent the computer from operating properly.

Starting Setup Utility

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

To start Setup Utility, 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 Setup Utility.

Changing the language of Setup Utility

1. Start Setup Utility.
2. Use the arrow keys to select **System Configuration > Language**, and then press enter.
3. Use the arrow keys to select a language, and then press enter.
4. When a confirmation prompt with your language selected is displayed, press enter.
5. To save your change and exit Setup Utility, use the arrow keys to select **Exit > Exit Saving Changes**, and then press enter.

Your change takes effect immediately.

Navigating and selecting in Setup Utility

To navigate and select in Setup Utility, 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 Setup Utility screen, press esc, and then follow the on-screen instructions.
2. Press f10 to enter Setup Utility.

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

- To exit Setup Utility menus without saving your changes, press the esc key, and then follow the on-screen instructions.

  – or –

  Use the arrow keys to select **Exit > Exit Discarding Changes**, and then press enter.
- To save your changes and exit Setup Utility menus, press f10, and then follow the on-screen instructions.

  – or –

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

Your changes go into effect when the computer restarts.

Displaying system information

1. Start Setup Utility.
2. Select the **Main menu**. System information such as the system time and date, and identification information about the computer is displayed.
3. To exit Setup Utility without changing any settings, use the arrow keys to select **Exit > Exit Discarding Changes**, and then press enter.

Restoring factory settings in Setup Utility

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

To return all settings in Setup Utility 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 Setup Utility.
3. Use the arrow keys to select **Exit > Load Setup Defaults**.
4. Follow the on-screen instructions.
5. To save your changes and exit, press f10, and then follow the on-screen instructions.

   – or –

   Use the arrow keys to select **Exit > Exit Saving Changes**, 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.

Exiting Setup Utility

- To exit Setup Utility and save your changes from the current session:

  If the Setup Utility menus are not visible, press esc to return to the menu display. Then use the arrow keys to select **Exit > Exit Saving Changes**, and then press enter.

- To exit Setup Utility without saving your changes from the current session:

  If the Setup Utility menus are not visible, press esc to return to the menu display. Then use the arrow keys to select **Exit > Exit Discarding Changes**, and then press enter.

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 by pressing fn +esc (if you are already in Windows) or by using Setup Utility.

1. Start Setup Utility (BIOS).
2. Use the arrow keys to select **Main**.
3. To exit Setup Utility (BIOS) without saving your changes, use the tab key and the arrow keys to select **Exit > Exit Discarding Changes**, 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. **Windows 7**—Select **Start > Help and Support > Maintain**.

   Windows XP—Select **Start > Help and Support**, and then select the software and drivers update.

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. **Windows 7**—Open Windows Explorer by selecting **Start > Computer**.

   Windows XP—Open Windows Explorer by selecting Start > **My 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.

Using System Diagnostics

System Diagnostics allows you to run diagnostic tests to determine if the computer hardware is functioning properly. The following diagnostic tests are available in 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. If the battery fails the test, contact HP support to report the issue and purchase a replacement battery.

You can also view system information and error logs 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.

6 Specifications

Computer specifications

	Metric	U.S.
Dimensions		
Width	**38.00 cm**	14.96 in
Depth	**24.40 cm**	9.61 in
Height	**2.83 cm**	1.11 in
Weight	**2.85 kg**	6.29 lb
Input power		
Operating voltage and current	119.5 V dc @ 6.15 A - 120 W 19.5 V dc @ 4.62 A - 90 W	
Temperature		
Operating	**5°C to 35°C**	41°F to 95°F
Nonoperating	**-20°C to 60°C**	-4°F to 140°F
Relative humidity (noncondensing)		
Operating	10% to 90%	
Nonoperating	5% to 95%	
Maximum altitude (unpressurized)		
Operating	**-15 m to 3,048 m**	-50 ft to 10,000 ft
Nonoperating	**-15 m to 12,192 m**	-50 ft to 40,000 ft

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

15.6-in display specifications

	Metric	U.S.
Dimensions		
Height	**19.6 cm**	7.72 in
Width	**34.7 cm**	13.66 in
Diagonal	**39.8 cm**	15.67 in
Number of colors	Up to 16.8 million	
Contrast ratio	200:1 (typical)	
Brightness	200 nits (typical)	
Backlight	LED	
Character display	80 × 25	
Total power consumption	2.0 W	
Viewing angle	±65° horizontal, ±50° vertical (typical)	

Hard drive specifications

	1-TB*	750-GB**	500-GB**	320-GB**
Dimensions				
Height	9.5 mm	9.5 mm	9.5 mm	9.5 mm
Length	100.2 mm	100.2 mm	100.4 mm	100.4 mm
Width	69.9 mm	69.9 mm	69.9 mm	69.9 mm
Weight	152 g	110 g	110 g	110 g
Interface type	SATA	SATA	SATA	SATA
Transfer rate				
Synchronous (maximum)	97 MB/sec	97 MB/sec	1.1 GB/sec	1.1 GB/sec
Security	ATA security	ATA security	ATA security	ATA security
Seek times (typical read, including setting)				
Single track	2.0 ms	2.0 ms	1.5 ms	1.5 ms
Average (read/write)	12/16 ms	12/16 ms	11/13 ms	11/13 ms
Maximum	21 ms	22 ms	22 ms	22 ms
Logical blocks	1,953,525,168	1,465,149,168	976,773,168	628,142,448
Disk rotational speed	5400 rpm	7200 rpm	7200 rpm	7200 rpm
Operating temperature	0°C to 60°C (32°F to 140°F)			

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

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

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

7 Backup and recovery

Your computer includes tools provided by the operating system and HP to help you safeguard your information and restore it if necessary.

This chapter provides information on the following topics:

- Creating a set of recovery discs or a recovery flash drive (Recovery Manager software feature)
- Performing a system restore (from the partition, recovery discs, or a recovery flash drive)
- Backing up your information
- Recovering a program or driver

Restore

In the event of hard drive failure, to restore your system to its factory image you must use a set of recovery discs or a recovery flash drive that you have created using HP Recovery Manager. HP recommends that you use HP Recovery Manager immediately after software setup to create either a set of recovery discs or a recovery flash drive.

If you need to restore your system for some other reason than hard drive failure, you can use the HP Recovery partition (select models only), without the need for recovery discs or a recovery flash drive. To check for the presence of a recovery partition, click **Start**, right-click **Computer**, click **Manage**, and then click Disk **Management**. If the recovery partition is present, a Recovery drive is listed in the window.

CAUTION: HP Recovery Manager (partition or discs/flash drive) restores only the software that was installed at the factory. Software not provided with this computer must be reinstalled manually.

NOTE: Recovery discs have been included if your computer does not have a recovery partition.

Creating recovery media

HP recommends that you create either a set of recovery discs or a recovery flash drive to be sure that you can restore your computer to its original factory state if the hard drive fails, or if for any reason you cannot restore using the recovery partition tools. Create these discs or the flash drive after setting up the computer for the first time.

NOTE: HP Recovery Manager allows the creation of only one set of recovery discs or one recovery flash drive. Handle these discs or the flash drive carefully and keep them in a safe place.

NOTE: If your computer does not include an integrated optical drive, you can use an optional external optical drive (purchased separately) to create recovery discs, or you can purchase recovery discs for your computer from the HP Web site. If you use an external optical drive, it must be connected directly to a USB port on the computer, not to a USB port on an external device, such as a USB hub.

Guidelines:

- Purchase high-quality DVD-R, DVD+R, DVD-R DL, or DVD+R DL discs.

  NOTE: Read-write discs, such as CD-RW, DVD±RW, double-layer DVD±RW, and BD-RE (rewritable Blu-ray) discs, are not compatible with the HP Recovery Manager software.

- The computer must be connected to AC power during this process.
- Only one set of recovery discs or one recovery flash drive can be created per computer.

  NOTE: If you are creating recovery discs, number each disc before inserting into the optical drive.

- If necessary, you can exit the program before you have finished creating the recovery discs or recovery flash drive. The next time you open HP Recovery Manager, you will be prompted to continue the backup creation process.

To create a set of recovery discs or a recovery flash drive:

1. Select **Start > All Programs > HP > HP Recovery Manager > HP Recovery Media Creation**.
2. Follow the on-screen instructions.

Performing a system restore

HP Recovery Manager software allows you to repair or restore the computer to its original factory state. HP Recovery Manager works from recovery discs, a recovery flash drive, or from a dedicated recovery partition (select models only) on the hard drive.

NOTE: A system restore must be performed if the computer hard drive has failed or if all attempts to correct any functional computer issues fail. A system restore should be used as a final attempt to correct computer issues.

Note the following when performing a system restore:

- You can restore only the system that you have previously backed up. HP recommends that you use HP Recovery Manager to create either a set of recovery discs or a recovery flash drive as soon as you set up the computer.
- Windows has its own built-in repair features, such as System Restore. If you have not already tried these features, try them before using HP Recovery Manager.
- HP Recovery Manager restores only software that was installed at the factory. Software not provided with this computer must be downloaded from the manufacturer's Web site or reinstalled from the disc provided by the manufacturer.

Restoring using the dedicated recovery partition (select models only)

When using the dedicated recovery partition, there is an option to back up pictures, music and other audio, videos and movies, recorded TV shows, documents, spreadsheets and presentations, e-mails, and Internet favorites and settings during this process.

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

1. Access HP Recovery Manager in either of the following ways:
   - Select **Start > All Programs > HP > HP Recovery Manager > HP Recovery Manager**.

     – or –
   - 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. Then, press f11 while the “F11 (System Recovery)” message is displayed on the screen.
2. Click **System Recovery** in the HP Recovery Manager window.
3. Follow the on-screen instructions.

Restoring using the recover media

1. If possible, back up all personal files.
2. Insert the first recovery disc into the optical drive on your computer or an optional external optical drive, and then restart the computer.

   – or –

   Insert the recovery flash drive into a USB port on your computer, and then restart the computer.

   NOTE: If the computer does not automatically restart in HP Recovery Manager, the computer boot order must be changed.

3. Press f9 at system bootup.
4. Select the optical drive or the flash drive.
5. Follow the on-screen instructions.

Changing the computer boot order

To change the boot order for recovery discs:

1. Restart the computer.
2. Press esc while the computer is restarting, and then press f9 for boot options.
3. Select **Internal CD/DVD ROM Drive** from the boot options window.

To change the boot order for recovery flash drive:

1. Insert the flash drive into a USB port.
2. Restart the computer.
3. Press esc while the computer is restarting, and then press f9 for boot options.
4. Select the flash drive from the boot options window.

Backing up and recovering your information

It is very important to back up your files and keep any new software in a safe place. As you add new software and data files, continue to create backups on a regular basis.

How completely you are able to recover your system depends on how recent your backup is.

NOTE: A recovery from your most recent backup should be performed if the computer is attacked by a virus or if any major system components fail. In order to correct computer issues, attempt a recovery before you attempt a system restore.

You can back up your information to an optional external hard drive, a network drive, or discs. Back up your system at the following times:

- At regularly scheduled times

  TIP: Set reminders to back up your information periodically.

- Before the computer is repaired or restored
- Before you add or modify hardware or software

Guidelines:

- Create system restore points using the Windows System Restore feature, and periodically copy them to an optical disc or an external hard drive. For more information on using system restore points, see **Using Windows system restore points**.
- Store personal files in the Documents library and back up this folder periodically.
- Save customized settings 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 re-enter your preferences.

To create a screen shot:

1. Display the screen you want to save.
2. Copy the screen image:

   To copy only the active window, press alt+prt sc.

   To copy the entire screen, press prt sc.
3. Open a word-processing document, and then select **Edit > Paste**. The screen image is added to the document.
4. Save and print the document.

Using Windows Backup and Restore

Guidelines:

- Be sure that the computer is connected to AC power before you start the backup process.
- Allow enough time to complete the backup process. Depending on file sizes, it may take over an hour.

To create a backup:

1. Select **Start > Control Panel > System and Security > Backup and Restore**.
2. Follow the on-screen instructions to schedule and create a backup.

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

Using Windows system restore points

A system restore point allows you to save and name a snapshot of your hard drive at a specific point in time. You can then recover back to that point if you want to reverse subsequent changes.

NOTE: Recovering to an earlier restore point does not affect data files saved or e-mails created since the last restore point.

You also can create additional restore points to provide increased protection for your files and settings.

When to create restore points

- Before you add or modify software or hardware
- Periodically, whenever the computer is functioning optimally

Create a system restore point

1. Select **Start > Control Panel > System and Security > System**.
2. In the left pane, click **System Protection**.
3. Click the **System Protection** tab.
4. Click **Create**.
5. Follow the on-screen instructions.

Restore to a previous date and time

To revert to a restore point (created at a previous date and time), when the computer was functioning optimally, follow these steps:

1. Select **Start > Control Panel > System and Security > System**.
2. In the left pane, click **System Protection**.
3. Click the **System Protection** tab.
4. Click **System Restore**.
5. Follow the on-screen instructions.

NOTE: If you revert to a restore point and then change your mind, you can reverse the restoration.

8 Power cord set requirements

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

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

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

Requirements for all countries

The following requirements are applicable to all countries and regions:

- The length of the power cord set must be at least **1.5 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, 0.75-mm² conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country or region where it will be used.
2. The flexible cord must be Type SVT/SJT or equivalent, No. 18 AWG, 3-conductor. The wall plug must be a two-pole grounding type with a NEMA 5-15P (15 A, 125 V) or NEMA 6-15P (15 A, 250 V ac) configuration. CSA or C-UL mark. UL file number must be on each element.
3. The appliance coupler, flexible cord, and wall plug must bear a "T" mark and registration number in accordance with the Japanese Dentori Law. The flexible cord must be Type VCTF, 3-conductor, 0.75-mm² or 1.25-mm² conductor size. The wall plug must be a two-pole grounding type with a Japanese Industrial Standard C8303 (7 A, 125 V ac) configuration.
4. The flexible cord must be Type RVV, 3-conductor, 0.75-mm² conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the CCC certification mark.
5. The flexible cord must be Type H05VV-F 3X0.75-mm² conductor size. KTL logo and individual approval number must be on each element. Corset approval number and logo must be printed on a flag label.
6. The flexible cord must be Type HVCTF 3×1.25-mm² conductor size. Power cord set fittings (appliance coupler, cable, and wall plug) must bear the BSMI certification mark.
7. For 127 V ac, the flexible cord must be Type SVT or SJT 3 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 3×0.75-/1.00-mm² conductor size, with plug BS 1363/A with BSI or ASTA marks.

9 Recycling

When a non-rechargeable or rechargeable battery has reached the end of its useful life, do not dispose of the battery in general household waste. Follow the local laws and regulations in your area for battery disposal.

HP encourages customers to recycle used electronic hardware, HP original print cartridges, and rechargeable batteries. For more information about recycling programs, see the HP Web site at http://www.hp.com/recycle.

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