



HP EliteBook 8770w Mobile Workstation

Maintenance and Service Guide

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Safety warning notice


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

Table of contents

1 Product description	1
2 External component identification	7
Top	7
Display — Windows models	8
Display — SUSE Linux models	9
TouchPad	10
Lights	11
Buttons and fingerprint reader (select models only)	12
Keys — Windows systems	14
Keys — SUSE Linux models	15
Front	15
Right	17
Left	18
Rear	19
Bottom	20
3 Illustrated parts catalog	22
Computer major components	22
Display components	29
Mass storage devices	31
Miscellaneous parts	33
Sequential part number listing	34
4 Removal and replacement procedures	44
Preliminary replacement requirements	44
Tools required	44
Service considerations	44
Plastic parts	44
Cables and pointing stick connectors	45
Drive handling	45
Grounding guidelines	46
Electrostatic discharge damage	46
Packaging and transporting guidelines	47
Workstation guidelines	47
Equipment guidelines	48

Component replacement procedures	49
Service tag and PCID label	49
Service tag	49
PCID label	49
Windows 8 models	50
Non Windows 8 models	50
Computer feet	51
Battery	51
SIM	52
Service access cover	52
Primary hard drive	54
Secondary hard drive	56
Smart Card reader	58
Bluetooth module	59
WLAN module	60
WWAN module	62
RTC battery	63
Optical drive	63
Upgrade bay hard drive	66
Primary memory module	67
Expansion memory module	69
Keyboard	71
Fan/graphics board heat sink assembly	75
Display bezel	78
Display panel	79
Display panel cable	81
Hinge brackets	81
Webcam module	82
Top cover	83
Display assembly	88
Power button board	91
Application button board	92
Fingerprint reader	93
Audio/USB 2.0 board	94
Speaker assembly	96
Modem module	97
Display (VGA) port	98
Modem module cable	100
Card reader/USB 3.0 board	102
Bluetooth module cable	103
System board	103

Network cable and jack	107
Power connector cable	107
Security lock	108
Processor heat sink	110
Processor	112
Fan/Heat sink	114
Graphics board	115
Fan	116
5 Computer Setup (BIOS) and Advanced System Diagnostics	118
Windows 8 — Computer Setup (BIOS) and Advanced System Diagnostics	118
Starting Computer Setup	118
Navigating and selecting in Computer Setup	118
Restoring factory settings in Computer Setup	119
Updating the BIOS	120
Determining the BIOS version	120
Downloading a BIOS update	120
Windows 7 — Computer Setup (BIOS) and Advanced System Diagnostics	121
Starting Computer Setup	121
Navigating and selecting in Computer Setup	121
Restoring factory settings in Computer Setup	123
Updating the BIOS	123
Determining the BIOS version	123
Downloading a BIOS update	124
Using Advanced System Diagnostics	125
SUSE Linux — Computer Setup (BIOS)	125
Starting Computer Setup	125
Using Computer Setup	126
Navigating and selecting in Computer Setup	126
Restoring factory settings in Computer Setup	126
Updating the BIOS	127
Determining the BIOS version	127
Downloading a BIOS update	128
Using Advanced Diagnostics	128
6 Specifications	130
Computer specifications	130
43.9 cm (17.3 in) WVA display specifications	131
Hard drive specifications	131
Blu-ray R/RE DVD±RW SuperMulti Double-Layer Drive specifications	132
Blu-ray ROM DVD±RW SuperMulti Double-Layer Drive specifications	132

DVD±RW SuperMulti Double-Layer Drive specifications	133
DVD-ROM Drive specifications	134
7 Backup and recovery	135
Windows 7 — Backup and recovery	135
Creating recovery media with HP Recovery Disc Creator	135
Creating recovery media	136
Backing up your information	136
Performing a system recovery	137
Using the Windows recovery tools	137
Using f11 recovery tools	137
Using a Windows 7 operating system DVD (purchased separately)	139
Windows 8 — Backup and recovery	139
Using the Windows recovery tools	139
Using f11 recovery tools	140
Using Windows 8 operating system media (purchased separately)	141
Using Windows Refresh for quick and easy recovery	142
Remove everything and reinstall Windows	142
Using HP Software Setup	143
SUSE Linux — Backup and recovery	143
Performing a system recovery	143
Backing up your information	144
8 Power cord set requirements	145
Requirements for all countries	145
Requirements for specific countries and regions	145
9 Recycling	147
Index	148

1 Product description

Category	Description
Product Name	HP EliteBook 8770w Mobile Workstation
Processors	<p>Next Generation Intel® Core™ i7 processors, (support Intel Turbo Boost Technology):</p> <ul style="list-style-type: none">• i7-3520M, 2.90 GHz (Turbo up to 3.60 GHz), 1600 MHz, 4 MB L3 Cache, 4 threads, 35W• i7-3610QM, 2.30 GHz (Turbo up to 3.30 GHz), 1600 MHz, 6 MB L3 Cache, 8 threads, 45W• i7-3720QM, 2.60 GHz (Turbo up to 3.60 GHz), 1600 MHz, 6 MB L3 Cache, 8 threads, 45W• i7-2820QM, 2.3 GHz (turbo up to 3.4 GHz) quad-core processor, 8 MB L3 cache, 8 threads, 45W• i7-3820QM, 2.70 GHz (Turbo up to 3.70 GHz), 1600 MHz, 8 MB L3 Cache, 8 threads, 45W <p>Next Generation Intel® Core™ i5 processors, (support Intel Turbo Boost Technology Technology):</p> <ul style="list-style-type: none">• i5-3320M, 2.60 GHz (Turbo up to 3.30 GHz), 1600 MHz, 3 MB L3 Cache, 4 threads, 35W• i5-3360M, 2.80 GHz (Turbo up to 3.50 GHz), 1600 MHz, 3 MB L3 Cache, 4 threads, 35W
Chipset	Mobile Intel QM77
Graphics	<p>Support for the following graphics subsystem graphics boards (all feature OpenGL driver support):</p> <ul style="list-style-type: none">• AMD FirePro M5950 XT-GL 1GB GDDR5 (DP 1.2 and Eyefinity Plus support)• NVIDIA Quadro 3000M, N14E-Q1 2 GB dedicated GDDR5 video memory• NVIDIA Quadro 4000M, N14E-Q3 2 GB dedicated GDDR5 video memory• NVIDIA Quadro 5010M, N14E-Q5 4 GB dedicated GDDR5 video memory
Display	<ul style="list-style-type: none">• Display panel, 43.9 cm (17.3 in), High Definition Plus (HD+) Anti-Glare (AG) LED WVA without webcam• Display panel, 43.9 cm (17.3 in), FHD AG LED WVA• Display assembly, 43.9 cm (17.3 in), FHD AG RGB LED UVVA Dream Color with webcam (not available with HP Mobile Broadband) (includes display panel cable, 3 WLAN antenna and cables, and 2 WWAN antenna and cables)• Display assembly, 43.9 cm (17.3 in), FHD AG RGB LED UVVA Dream Color without webcam (not available with HP Mobile Broadband) (includes display panel cable, 3 WLAN antenna and cables, and 2 WWAN antenna and cables)
Memory	<p>4 customer-accessible/upgradable memory module slots</p> <p>Supports dual-channel memory</p> <p>Supports up to 32,768 GB of system RAM</p> <p>DDR3 1600MHz PC3-12800 SODIMMS</p>

Category	Description
	<p>Supports the following configurations:</p> <ul style="list-style-type: none"> • 2048 MB total system memory (2048 × 1) • 4096 MB total system memory (4096 × 1) • 4096 MB total system memory (2048 × 2) • 8192 MB total system memory (8192 × 1) • 8192 MB total system memory (4096 × 2) • 8192 MB total system memory (2048 × 4); only available on computer models equipped with a quad-core processor • 12288MB Total System Memory (4096MB x 3) • 16384 MB total system memory (8192 x 2) • 16384 MB total system memory (4096 x 4); only available on computer models equipped with a quad-core processor • 32768 MB total system memory (8192 x 4); only available on computer models equipped with a quad-core processor
Primary and secondary storage	<p>Supports 7.0 mm (0.28 in), 9.5 mm (0.37 in) or 12.7 mm (0.5 in) hard drives and 6.35 cm (2.5 in) solid-state drive for primary and secondary storage.</p> <p>Support for RAID 0/1/5</p> <p>Supports the following Serial ATA (SATA), 7200-rpm drives:</p> <ul style="list-style-type: none"> • 750 GB • 500 GB • 320 GB • 500 GB self encrypting drive (SED) <p>Supports the following 6.35 cm (2.5 in), solid-state drives (SSD):</p> <ul style="list-style-type: none"> • 256 GB Self Encrypting Drive (SED) • 128 GB • 160 GB • 180 GB • 24 GB
Upgrade bay	<p>Supports the following 12.7 mm 6.35 cm (0.5 in) tray load SATA optical drives:</p> <ul style="list-style-type: none"> • Blu-ray R/RE DVD±RW SuperMulti Double-Layer (DL) Drive • ±RW SuperMulti Double-Layer Drive • DVD±RW SuperMulti Double-Layer Drive • DVD-ROM Drive (defeatured combo) <p>Supports a 7.0 mm, 9.5 mm, or 12.7 mm 500 GB hard drive, 7200 rpm</p> <p>Supports "No Drive" option</p>
Audio and video	<p>Integrated dual-array microphone</p> <p>High-definition (HD) audio with SRS premium sound</p>

Category	Description
	2 stereo speakers
	Integrated 720p HD webcam
Modem	56K V.92 data/fax modem
	Supports “no modem” option
	Modem cable not included
Ethernet	Intel® 82579LM Gigabit Network Connection
	S3/S4/S5 wake on LAN
	NIC power-down technology
	Ethernet cable not included
Wireless	Integrated wireless local area network (WLAN) options by way of the following wireless modules:
	<ul style="list-style-type: none"> • Intel® Centrino™ Advanced-N 6205, 802.11a/b/g/n WLAN module • Intel Centrino Ultimate-N 6300, 802.11a/b/g/n WLAN module • Broadcom 802.11a/b/g/n 2x2WiFi Adapter
	Three WLAN antennas (3) built into display assembly
	Support for “no WLAN” option
	Integrated wireless wide area network (WWAN) options by way of the following wireless modules: (not available on computer models with Dream Color displays)
	<ul style="list-style-type: none"> • HP hs2340 HSPA+ Mobile Broadband Module • HP un2430 EV-DO/HSPA Mobile Broadband Module • HP hs2350 HSPA+ Mobile Broadband Module (not available with Win8 or Win7 downgrade) • HP hs2350 HSPA+ Mobile Broadband Module (not available with Win8 or Win7 downgrade)
	WWAN antennas (2) built into display assembly (worldwide, 5-band)
	Support for “no WWAN” option
	Security provided by subscriber identify module (SIM) located inside battery bay
	HP Integrated Module with Bluetooth 4.0
	Support for “no WPAN” option
External media card	One ExpressCard slot, supporting 16-bit and 32-bit (Cardbus) ExpressCard modules
	Digital Media Card reader, supporting the following formats: <ul style="list-style-type: none"> • MultiMediaCard (MMC) • MultiMediaCard Plus (MMC+) • Secure Digital (SD) Memory Card • Secure Digital High-Capacity (SDHC) Memory Card • Secure Digital Extended Capacity (SDXC) Memory Card

Category	Description
Ports	<ul style="list-style-type: none"> • 1394a (1) • Multi-pin AC port • Audio in (mono microphone) • Microphone input (stereo) • Audio-out (stereo headphone) • Display port (1.1a for NVIDIA, 1.2 for AMD) • Docking connector • eSATA/USB 2.0 combo • RJ-11 (modem) • RJ-45 (Ethernet, includes link and activity lights) • USB 3.0 (2) • USB 2.0 (2) 1 port with USB charging support • VGA (Dsub 15-pin) supporting 1600 × 1200 external resolution at 75 GHz (hot plug/unplug with auto-detect)
Docking	<p>Supports the following docking stations:</p> <ul style="list-style-type: none"> • HP 230W Docking Station • HP 230W Advanced Docking Station • HP USB 2.0 Docking Station • HP Essential USB 2.0 Port Replicator • HP LAN and USB Travel Hub
Keyboard/pointing devices	<p>36.5 cm (14.4 in) full-size keyboard with separate numeric keypad, Dual Point (3 pointing stick buttons and 3 TouchPad buttons) without backlight</p> <hr/> <p>36.5 cm (14.4 in) full-size keyboard with separate numeric keypad, Dual Point (3 pointing stick buttons and 3 TouchPad buttons) with backlight (not supported in Japan or Brazil)</p> <hr/> <p>Spill-resistant DuraKeys coating</p> <hr/> <p>Spill-resistant DuraPad coating on TouchPad</p> <hr/> <p>Gestures enabled by default - 2 finger scrolling, 2 finger zoom (pinch)</p> <hr/> <p>TouchPad supports vertical scroll zone</p> <hr/> <p>Taps enabled as default</p>
Power requirements	<p>Supports the following AC adapters with localized cable plug support:</p> <ul style="list-style-type: none"> • 200W Slim Smart AC adapter • 230W Slim Smart AC adapter • 230W Smart AC adapter • 3-wire plug (with ground pin)

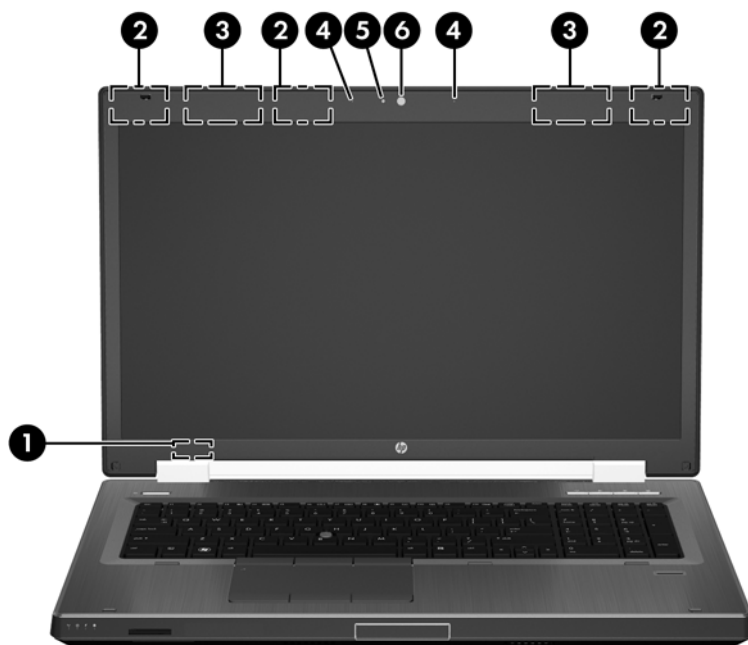
Category	Description
	<p>Support for the following batteries:</p> <ul style="list-style-type: none"> • 8-cell, 2.8 Ah (83 WHr) Li-ion battery • 8-cell, 2.8 Ah (75 WHr) Li-ion battery (available with 3 year warranty only) • Supports 9-cell (73 WHr) polymer, HP ST09 Extended Life Battery (does not support HP Fast Charge) • Supports 9-cell 3.0 Ah (100 WHr) cylindrical battery, HP BB09 Ultra-Capacity Extended Life Battery (does not support HP Fast Charge)
	HP Fast Charge Technology
Security	<p>Integrated fingerprint reader</p> <p>Integrated Smart Card reader</p> <p>Preboot authentication (password, Smart Card)</p> <p>Supports security lock</p> <p>Trusted platform module (TPM) v.1.2 and TPM enhanced drive lock</p> <p>Full volume encryption</p>
Operating system	<p>Preinstalled operating systems:</p> <ul style="list-style-type: none"> • Windows® 7 Home Premium 64 (select models only) • Windows 7 Professional 64 (select models only) • Windows 7 Professional 32 (select models only) • FreeDOS <p>Operating system and Microsoft® Office preinstalled (not supported in Japan):</p> <ul style="list-style-type: none"> • Windows 7 Professional 64 with Office 2010 Starter (select models only) • Windows 7 Professional 32 with Office 2010 Starter (select models only) <p>Restore media:</p> <ul style="list-style-type: none"> • Windows 7 Professional 64 (select models only) • Windows 7 Professional 32 (select models only) • Windows 7 Home Premium 64 (select models only) • Windows 7 DRDVD (select models only) • Windows XP Professional 64 (service only) <p>Certified:</p> <ul style="list-style-type: none"> • Microsoft WHQL • Novell • SuSE Linux

Category	Description
	<p data-bbox="475 222 667 245">Web-only support:</p> <ul data-bbox="475 268 999 520" style="list-style-type: none"><li data-bbox="475 268 999 294">• Windows XP Professional 64 (select models only)<li data-bbox="475 310 999 336">• Windows XP Professional 32 (select models only)<li data-bbox="475 352 999 378">• Windows 7 Ultimate 64 (select models only)<li data-bbox="475 394 999 420">• Windows 7 Ultimate 32 (select models only)<li data-bbox="475 436 999 462">• Windows 7 Enterprise 64 (select models only)<li data-bbox="475 478 999 504">• Windows 7 Enterprise 32 (select models only)
Serviceability	<p data-bbox="475 543 743 567">End-user replaceable parts:</p> <ul data-bbox="475 590 679 793" style="list-style-type: none"><li data-bbox="475 590 679 615">• Memory module<li data-bbox="475 632 647 657">• Optical drive<li data-bbox="475 674 568 699">• SIM<li data-bbox="475 716 663 741">• WLAN module<li data-bbox="475 758 679 783">• WWAN module

2 External component identification

[Top](#)

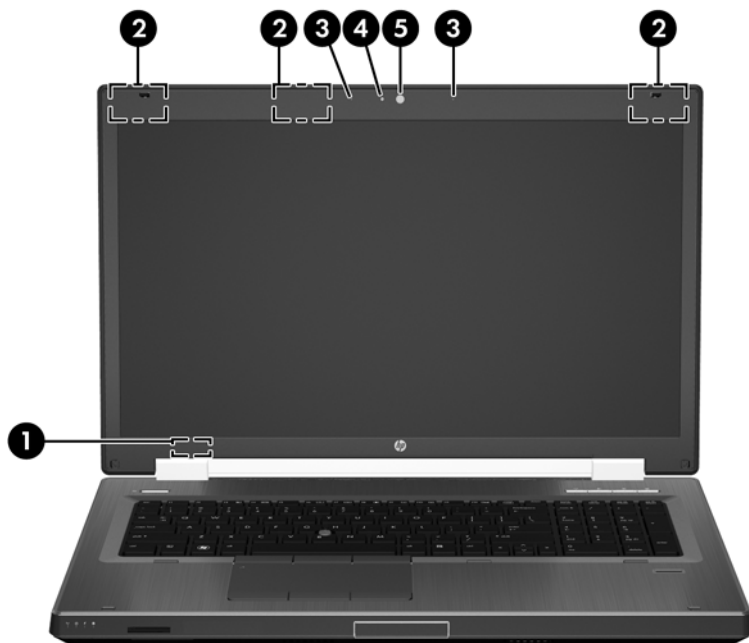
Display — Windows models



Component	Description
(1) Internal display switch	Turns off the display or initiates Sleep if the display is closed while the power is on. NOTE: The display switch is not visible from the outside of the computer.
(2) WLAN antennas (3)*	Send and receive wireless signals to communicate with wireless local area networks (WLAN).
(3) WWAN antennas (2)* (select models only)	Send and receive wireless signals to communicate with wireless wide area networks (WWAN).
(4) Internal microphones (2)	Record sound.
(5) Webcam light	On: The webcam is in use.
(6) Webcam	Records video and captures still photographs. To use the webcam on Windows 7 models, select Start > All Programs > Communication and Chat > HP Webcam . For information about using the webcam in Windows 8, access Help and Support. From the Start screen, type <code>help</code> , and then select Help and Support .

*The antennas are not visible from the outside of the computer. For optimal transmission, keep the areas immediately around the antennas free from obstructions. To see wireless regulatory notices, see the section of the *Regulatory, Safety, and Environmental Notices* that applies to your country or region. These notices are located in Help and Support. To access this guide in Windows 8, select the **HP Support Assistant** app on the Start screen, select **My computer**, and then select the **User guides**.

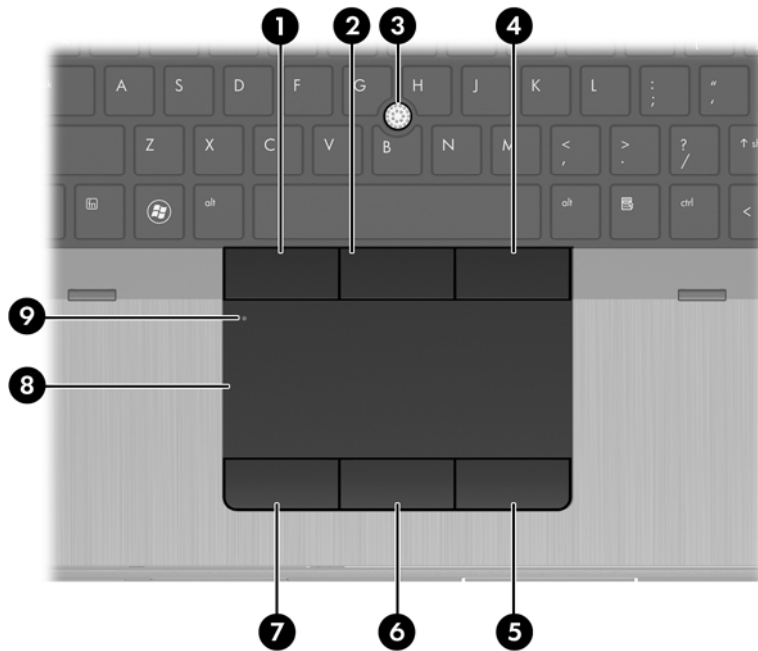
Display — SUSE Linux models



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

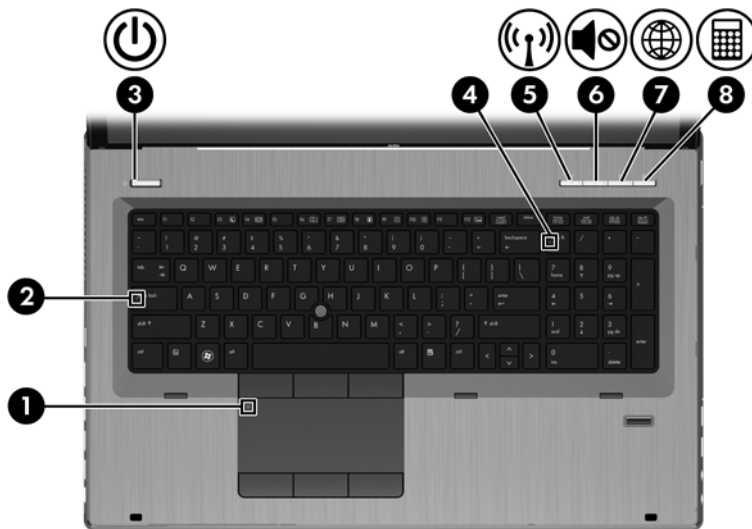
*The antennas are not visible from the outside of the computer. For optimal transmission, keep the areas immediately around the antennas free from obstructions. To see wireless regulatory notices, see the section of the *Regulatory, Safety, and Environmental Notices* that applies to your country or region.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






TouchPad



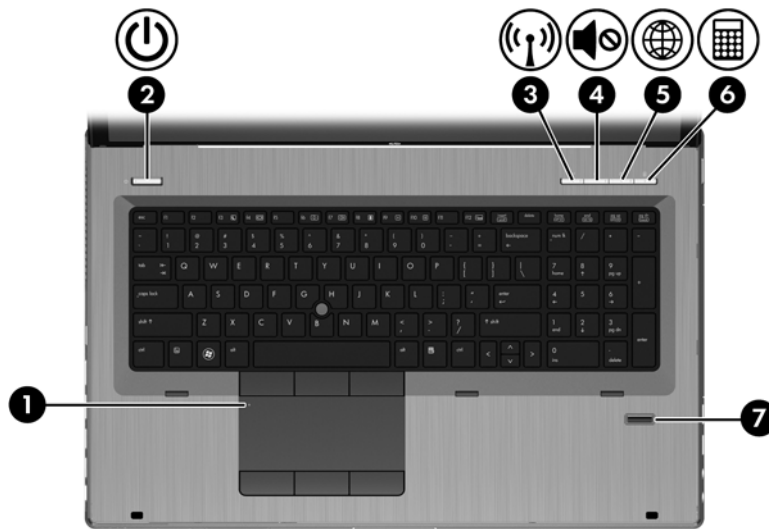
Component	Description
(1) Left pointing stick button	Can be used with the pointing stick and functions like the left button on an external mouse.
(2) Center pointing stick button	Can be used with the pointing stick and functions like the center button on an external mouse.
(3) Pointing stick	Moves the pointer and selects or activates items on the screen.
(4) Right pointing stick button	Can be used with the pointing stick and functions like the right button on an external mouse.
(5) Right TouchPad button	Functions like the right button on an external mouse.
(6) Center TouchPad button	Functions like the center button on an external mouse.
(7) Left TouchPad button	Functions like the left button on an external mouse.
(8) TouchPad	Moves the pointer and selects or activates items on the screen.
(9) TouchPad on/off button	Turns the TouchPad on and off.




Lights





Component	Description
(1) TouchPad on/off light	<ul style="list-style-type: none"> Off: The TouchPad is on. Amber: The TouchPad is off.
(2) Caps lock light	On: Caps lock is on.
(3)  Power light	<ul style="list-style-type: none"> On: The computer is on. Blinking: The computer is in the Sleep state. Off: The computer is off or in Hibernation.
(4) Num lock light	On: Num lock is on.
(5)  Wireless light	<ul style="list-style-type: none"> White: An integrated wireless device, such as a wireless local area network (WLAN) device and/or a Bluetooth® device, is on. Amber: All wireless devices are off.
(6)  Mute light	<ul style="list-style-type: none"> Amber: Computer sound is off. White: Computer sound is on.
(7)  Web browser light	<ul style="list-style-type: none"> On: The computer is on. In Windows: Off: The computer is off or in Hibernation. In SUSE Linux: Off: The computer is off, in the Suspend state, or in Hibernation.
(8)  Calculator light	<ul style="list-style-type: none"> On: The Windows® calculator function is on. Blinking: The calculator has been activated.

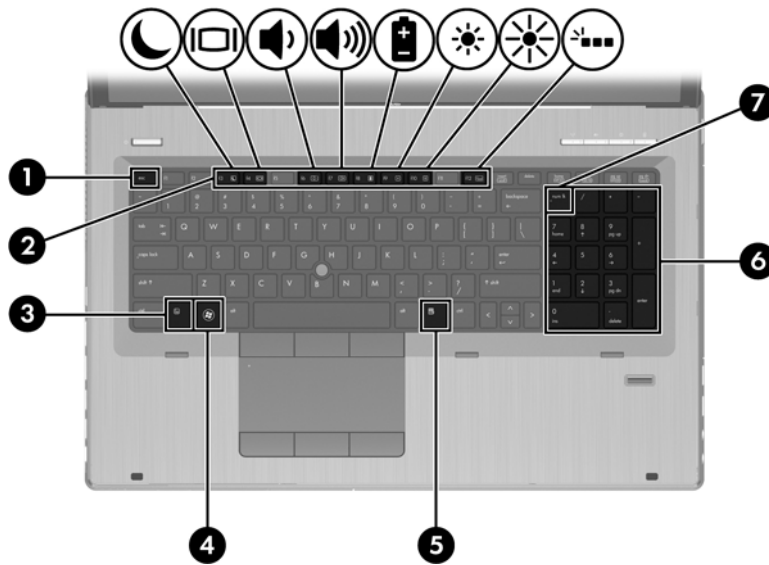
Buttons and fingerprint reader (select models only)







Component	Description
(1)	TouchPad on/off button
(2) 	<p>Power button</p> <ul style="list-style-type: none"> 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/Suspend. When the computer is in the Sleep/Suspend state, press the button briefly to exit Sleep/Suspend. When the computer is in Hibernation, press the button briefly to exit Hibernation. <p>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.</p> <p>To learn more about your power settings:</p> <ul style="list-style-type: none"> Windows 7—Select Start > Control Panel > System and Security > Power Options. Or refer to the <i>HP Notebook Reference Guide</i>. Windows 8—From the Start screen, type <code>power options</code>. Click Settings, and then select Power Options from the options displayed. SUSE Linux — <ol style="list-style-type: none"> Select Computer > Control Center. In the left pane, click System, and then click Power Management in the right pane.
(3) 	<p>Wireless button</p> <p>Turns the wireless feature on or off but does not establish a wireless connection.</p>
(4) 	<p>Volume mute button</p> <p>Mutes and restores speaker sound.</p>

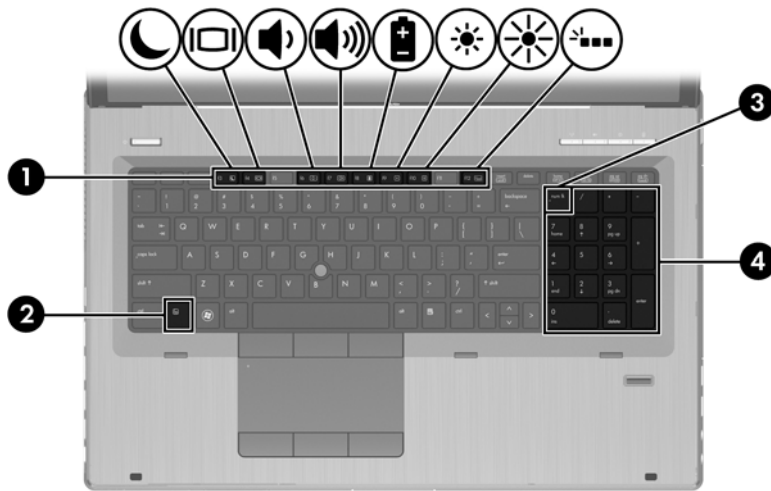
Component	Description
(5)  Web browser button	When Windows is running, press the button to open the default Web browser.
(6)  Calculator button	Opens the Windows calculator function.
(7) Fingerprint reader	Allows a fingerprint logon to Windows, instead of a password logon.

Keys — Windows systems



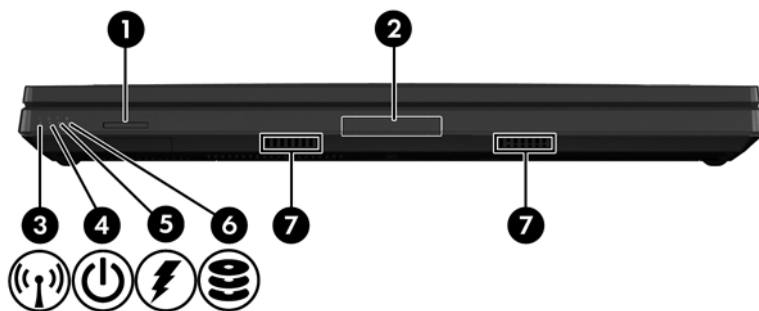
Component	Description
(1) <code>esc</code> key	Displays system information when pressed in combination with the <code>fn</code> key.
(2) Function keys	Execute frequently used system functions when pressed in combination with the <code>fn</code> key.
(3) <code>fn</code> key	Executes frequently used system functions when pressed in combination with a function key or the <code>esc</code> key.
(4)  Windows 7 button	Displays the Windows Start menu.
 Windows 8 button	
(5)  Windows 7 applications key	Windows 7: Displays a shortcut menu for items beneath the cursor.
 Windows 8 applications key	Windows 8: Displays the App bar and a shortcut menu for items beneath the cursor.
(6) Integrated numeric keypad	When the keypad has been enabled, the keys can be used like an external numeric keypad.
(7) <code>num lk</code> key	Enables/disables the integrated numeric keypad when pressed.

Keys — SUSE Linux models



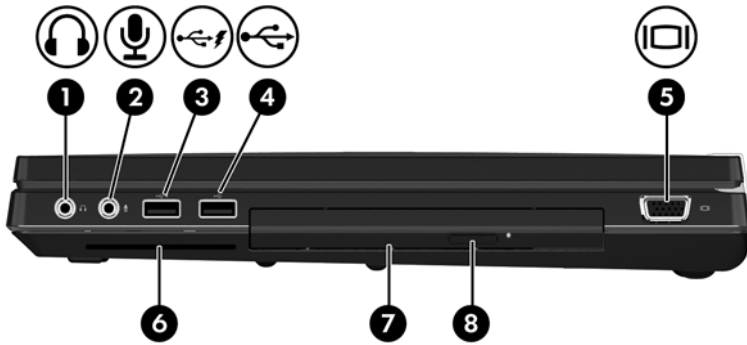
Component	Description
(1) Function keys	Execute frequently used system functions when pressed in combination with the <code>fn</code> key.
(2) <code>fn</code> key	Executes frequently used system functions when pressed in combination with a function key.
(3) Integrated numeric keypad	When <code>num lk</code> has been enabled, it can be used like an external numeric keypad. To alternate between this numeric function and the navigational function (indicated by the directional arrows on the keys), press the <code>num lk</code> key.
(4) <code>num lk</code> key	Alternates between the navigational and numeric functions on the integrated numeric keypad.






Front



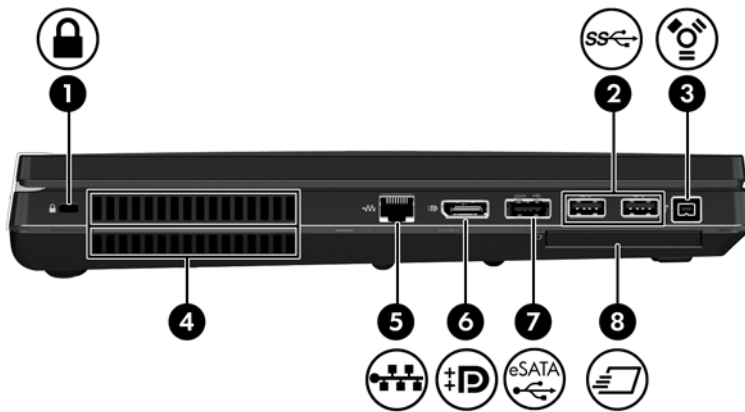
Component	Description
(1) Media Card reader	Supports the following digital card formats: <ul style="list-style-type: none"> • Secure Digital (SD) Card • Secure Digital HC (SDHC) Card • Secure Digital XC (SDXC) Card • MultiMediaCard (MMC) • MultiMediaCardplus (MMC+)
(2) Display release latch	Opens the computer.
(3) Wireless light	<ul style="list-style-type: none"> • White: An integrated wireless device, such as a wireless local area network (WLAN) device and/or a Bluetooth® device, is on. • Amber: All wireless devices are off.
(4) Power light	<ul style="list-style-type: none"> • On: The computer is on. • Blinking: The computer is in the Sleep state. • Off: The computer is off or in Hibernation.
(5) AC adapter/Battery light	<ul style="list-style-type: none"> • Amber: The computer is connected to external power and the battery is charged from 0 – 90%. • White: The computer is connected to external power and the battery is charged from 90 – 99%. • Blinking Amber: A battery that is the only available power source has reached a low battery level. When the battery reaches a critical battery level, the battery light begins blinking rapidly. • Off: The battery is fully charged.
(6) Hard drive light	<ul style="list-style-type: none"> • Blinking white: The hard drive is being accessed. • Amber: HP 3D DriveGuard has temporarily parked the hard drive. <p>NOTE: For information on HP 3D DriveGuard, see the <i>HP Notebook Reference Guide</i>.</p>
(7) Speakers (2)	Produce sound. <p>NOTE: To use the SRS Premium Sound software in Windows 7, select Start > All Programs > SRS Premium Sound.</p> <p>To use the SRS Premium Sound software in Windows 8, from the Start screen, type <i>SRS</i>, and then select SRS Premium Sound.</p>








Right



Component	Description
(1)  Audio-out (headphone) jack	Produces sound when connected to optional powered stereo speakers, headphones, ear buds, a headset, or television audio. WARNING! To reduce the risk of personal injury, adjust the volume before putting on headphones, earbuds, or a headset. For additional safety information, refer to the <i>Regulatory, Safety and Environmental Notices</i> . To access this guide in Windows 8, select the HP Support Assistant app on the Start screen, select My computer , and then select the User guides . NOTE: When a device is connected to the headphone jack, the computer speakers are disabled.
(2)  Audio in (microphone) jack	Connects an optional computer headset microphone, stereo array microphone, or monaural microphone.
(3)  USB charging port	Connects an optional USB device. The USB 2.0 charging port can also charge select models of cell phones and MP3 players, even when the computer is off. For more information about USB devices, see the <i>HP Notebook Reference Guide</i> .
(4)  USB 2.0 port <div data-bbox="352 1335 620 1535" style="background-color: black; color: white; padding: 5px; text-align: center;"> Image not Available ssusb_icon.jpg </div>	Connects optional USB devices.
(5)  External monitor port	Connects an external VGA monitor or projector.
(6) Smart Card reader	Supports optional Smart Cards.
(7) Upgrade bay (optical drive shown)	The upgrade bay can hold a weight-saver option, a hard drive, or an optical drive that reads an optical disc. NOTE: On select models, the optical drive also writes to an optical disc.
(8) Optical drive eject button	Releases the disc tray.



Left



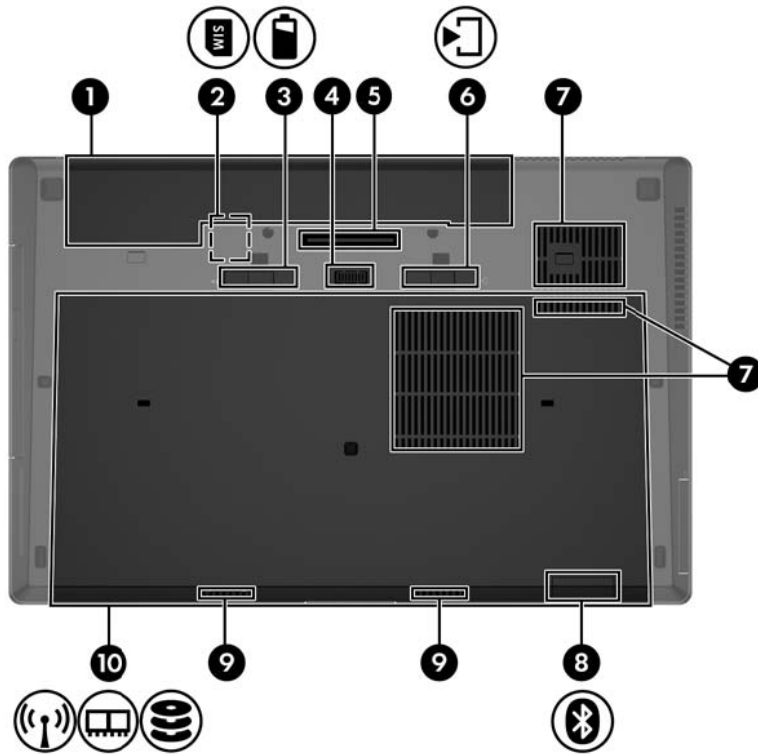
Component	Description
(1) 	Security cable slot Attaches an optional security cable to the computer. NOTE: The security cable is designed to act as a deterrent, but it may not prevent the computer from being mishandled or stolen.
(2) 	USB 3.0 ports (2) Connect optional USB 3.0 devices and provide enhanced USB power performance.
(3) 	1394 port Connects an optional IEEE 1394 or 1394a device, such as a camcorder.
(4)	Vents (2) Enable airflow to cool internal components. NOTE: The computer fan starts up automatically to cool internal components and prevent overheating. It is normal for the internal fan to cycle on and off during routine operation.
(5) 	RJ-45 (network) jack Connects a network cable.
(6) 	DisplayPort Connects an optional digital display device, such as a high-performance monitor or projector.
(7) 	eSATA/USB 2.0 combo port Connects a high-performance eSATA component, such as an eSATA external hard drive, or connects an optional USB device.
(8) 	ExpressCard slot Supports optional ExpressCards.





Rear

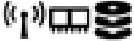


Component	Description
(1) 	RJ-11 (modem) jack Connects a modem cable.
(2)	Vents (2) Enable airflow to cool internal components. NOTE: The computer fan starts up automatically to cool internal components and prevent overheating. It is normal for the internal fan to cycle on and off during routine operation.
(3) 	Power connector Connects an AC adapter.

Bottom

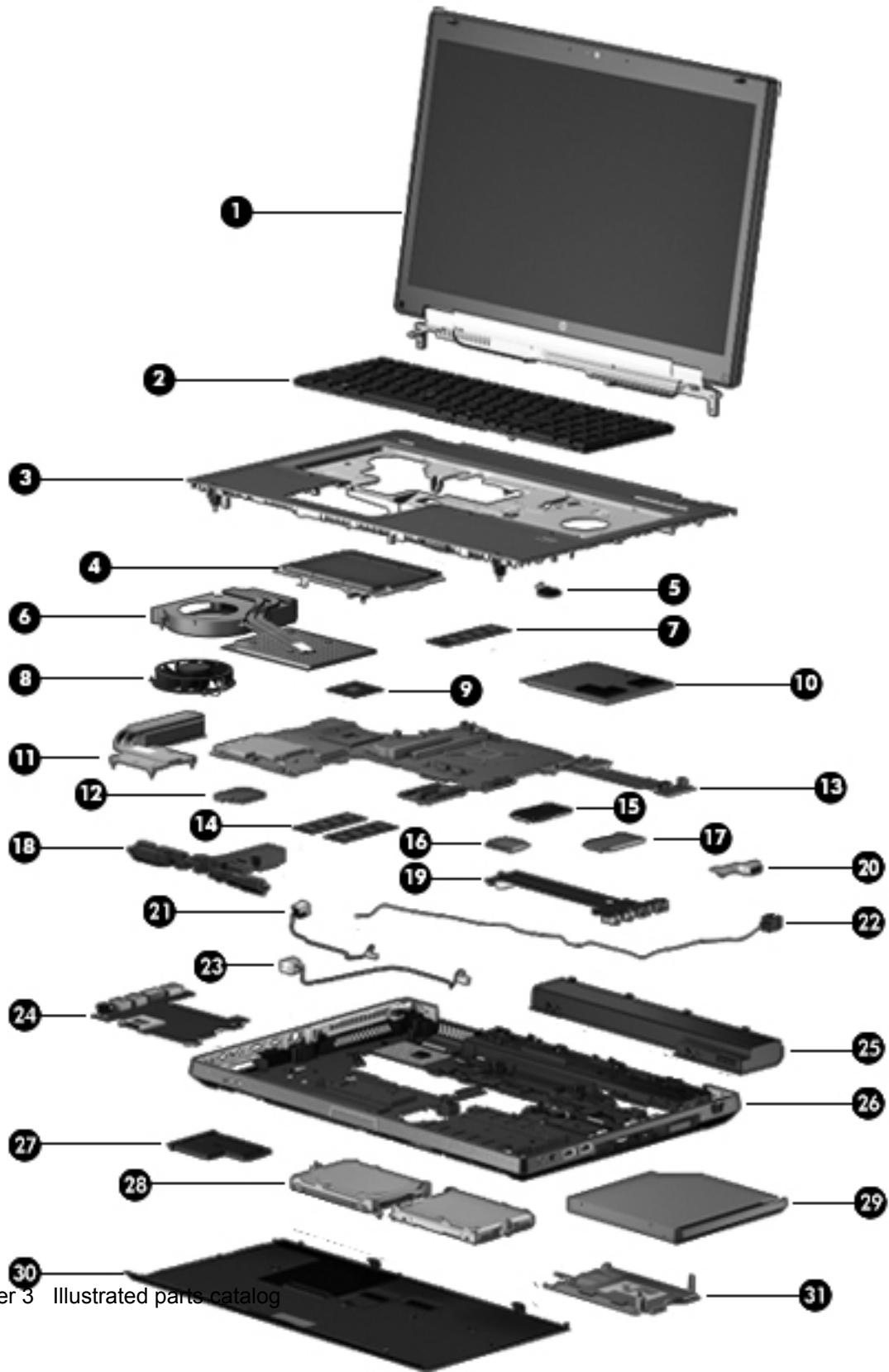


Component	Description
(1)	Battery bay Holds the battery.
(2) 	SIM slot Supports a wireless subscriber identity module (SIM). The SIM slot is located inside the battery bay.
(3) 	Battery release latch Releases the battery.
(4)	Accessory battery connector Connects an optional accessory battery.
(5)	Docking connector Connects an optional docking device.
(6) 	Service door release latch Releases the service door from the computer.
(7)	Vents (3) 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.
(8) 	Bluetooth compartment Contains a Bluetooth device (select models only).

Component	Description
(9) Speakers (2)	Produce sound. NOTE: To use the SRS Premium Sound software, select Start > All Programs > SRS Premium Sound .
(10)  Service door	Provides access to the hard drive bay, the wireless LAN (WLAN) module slot, the WWAN module slot, and the memory module slots. NOTE: To prevent an unresponsive system, replace the wireless module only with a wireless module authorized for use in the computer by the governmental agency that regulates wireless devices in your country or region. If you replace the module and then receive a warning message, remove the module to restore computer functionality, and then contact technical support through Help and Support.

3 Illustrated parts catalog

Computer major components



Item	Description	Spare part number
(1)	Display	
	Display panel, 43.9 cm (17.3 in), High Definition Plus (HD+) Anti-Glare (AG) WVA	691223-001
	Display panel, 43.9 cm (17.3 in), FHD AG LED WVA	691224-001
	Display assembly, 43.9 cm (17.3 in), FHD AG RGB LED UVWA Dream Color with webcam (not available with HP Mobile Broadband) (includes display panel cable, 3 WLAN antenna and cables, and 2 WWAN antenna and cables)	688736-001
	Display assembly, 43.9 cm (17.3 in), FHD AG RGB LED UVWA Dream Color without webcam (not available with HP Mobile Broadband) (includes display panel cable, 3 WLAN antenna and cables, and 2 WWAN antenna and cables)	688735-001
	NOTE: See Display components on page 29 for more display component information and spare part numbers.	
(2)	Keyboard (includes keyboard cable, pointing stick and pointing stick cable):	
	Without backlight, for use in Belgium	688737-A41
	With backlight, for use in Belgium	688738-A41
	Without backlight, for use in Brazil	688737-201
	Without backlight, for use in Canada	688737-DB1
	With backlight for use in Canada	688738-DB1
	Without backlight, for use in Bulgaria	688737-261
	Without backlight, for use in Taiwan	688737-AB1
	With backlight, for use in Taiwan	688738-AB1
	Without backlight, for use in Denmark	688737-081
	With backlight, for use in Denmark	688738-081
	Without backlight, for use in Finland and Sweden	688737-B71
	With backlight, for use in Finland and Sweden	688738-B71
	Without backlight, for use in France	688737-051
	With backlight, for use in France	688738-051
	Without backlight, for use in Romania	688737-271
	Without backlight, for use in Germany	688737-041
	With backlight, for use in Germany	688738-041
	Without backlight, for use in Czechoslovakia	688737-FL1
	With backlight, for use in Czechoslovakia	688738-FL1
	Without backlight, for use in Hungary	688737-211
	Without backlight, for use in Iceland	688737-DD1
	Without backlight, for use in Israel	688737-BB1
	Without backlight, for use in Italy	688737-061
	With backlight, for use in Italy	688738-061
	Without backlight, for use in Japan	688737-291

Item	Description	Spare part number
	Without backlight, for use in Latin America	688737-161
	With backlight, for use in Latin America	688738-161
	Without backlight, for international use	688737-B31
	With backlight, for international use	688738-B31
	Without backlight, for use in Northwest Africa	688737-FP1
	Without backlight, for use in Norway	688737-091
	With backlight, for use in Norway	688738-091
	Without backlight, for use in Portugal	688737-131
	Without backlight, for use in Russia	688737-251
	With backlight, for use in Russia	688738-251
	Without backlight, for use in Saudi Arabia	688737-171
	Without backlight, for use in Slovenia	688737-BA1
	Without backlight, for use in South Korea	688737-AD1
	With backlight, for use in South Korea	688738-AD1
	Without backlight, for use in Spain	688737-071
	Without backlight, for use in Switzerland	688737-BG1
	With backlight, for use in Switzerland	688738-BG1
	Without backlight, for use in Greece	688737-151
	Without backlight, for use in Thailand	688737-281
	With backlight, for use in Thailand	688738-281
	Without backlight, for use in Turkey	688737-141
	Without backlight, for use in the United Kingdom and Singapore	688737-031
	With backlight, for use in the United Kingdom and Singapore	688738-031
	Without backlight, for use in the United States	688737-001
	With backlight, for use in the United States	688738-001
	Without backlight (Windows 8) for use in the United States	701977-001
	With backlight (Windows 8) for use in the United States	701978-001
	With backlight (Windows 8) for use in The United Kingdom and Singapore	701978-031
	With backlight (Windows 8) for use in Germany	701978-041
	With backlight (Windows 8) for use in France	701978-051
	With backlight (Windows 8) for use in Italy	701978-061
	With backlight (Windows 8) for use in Denmark	701978-081
	With backlight (Windows 8) for use in Norway	701978-091
	With backlight (Windows 8) for use in Latin America	701978-161

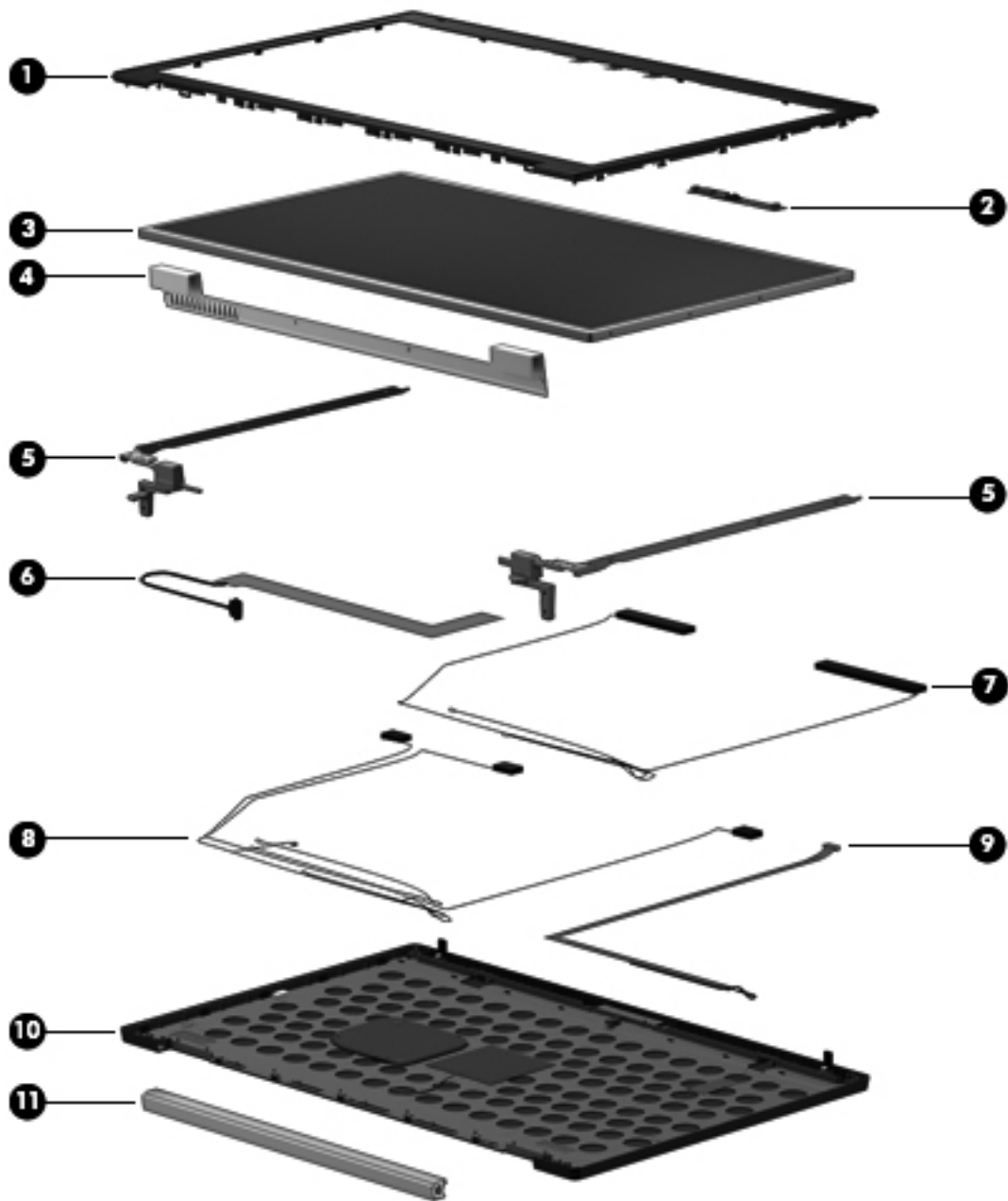
Item	Description	Spare part number
	With backlight (Windows 8) for use in Russia	701978-251
	With backlight (Windows 8) for use in Thailand	701978-281
	With backlight (Windows 8) for use in Belgium	701978-A41
	With backlight (Windows 8) for use in Taiwan	701978-AB1
	With backlight (Windows 8) for use in South Korea	701978-AD1
	With backlight (Windows 8) for use internationally	701978-B31
	With backlight (Windows 8) for use in Sweden and Finland	701978-B71
	With backlight (Windows 8) for use in Switzerland	701978-BG1
	With backlight (Windows 8) for use in India	701978-D61
	With backlight (Windows 8) for use in Canada	701978-DB1
	With backlight (Windows 8) for use in Czechoslovakia	701978-FL1
	Without backlight for use in India	688737-D61
	With backlight for use in India	688738-D61
	Without backlight, with pointing stick (Windows 8) for use in The United Kingdom and Singapore	701977-031
	Without backlight, with pointing stick (Windows 8) for use in Germany	701977-041
	Without backlight, with pointing stick (Windows 8) for use in France	701977-051
	Without backlight, with pointing stick (Windows 8) for use in Italy	701977-061
	Without backlight, with pointing stick (Windows 8) for use in Spain	701977-071
	Without backlight, with pointing stick (Windows 8) for use in Denmark	701977-081
	Without backlight, with pointing stick (Windows 8) for use in Norway	701977-091
	Without backlight, with pointing stick (Windows 8) for use in Portugal	701977-131
	Without backlight, with pointing stick (Windows 8) for use in Turkey	701977-141
	Without backlight, with pointing stick (Windows 8) for use in Greece	701977-151
	Without backlight, with pointing stick (Windows 8) for use in Latin America	701977-161
	Without backlight, with pointing stick (Windows 8) for use in Saudi Arabia	701977-171
	Without backlight, with pointing stick (Windows 8) for use in Brazil	701977-201
	Without backlight, with pointing stick (Windows 8) for use in Hungary	701977-211
	Without backlight, with pointing stick (Windows 8) for use in Russia	701977-251
	Without backlight, with pointing stick (Windows 8) for use in Bulgaria	701977-261
	Without backlight, with pointing stick (Windows 8) for use in Romania	701977-271
	Without backlight, with pointing stick (Windows 8) for use in Thailand	701977-281
	Without backlight, with pointing stick (Windows 8) for use in Japan	701977-291
	Without backlight, with pointing stick (Windows 8) for use in Belgium	701977-A41
	Without backlight, with pointing stick (Windows 8) for use in Taiwan	701977-AB1

Item	Description	Spare part number
	Without backlight, with pointing stick (Windows 8) for use in South Korea	701977-AD1
	Without backlight, with pointing stick (Windows 8) for use in Internationally	701977-B31
	Without backlight, with pointing stick (Windows 8) for use in Sweden and Finland	701977-B71
	Without backlight, with pointing stick (Windows 8) for use in Slovenia	701977-BA1
	Without backlight, with pointing stick (Windows 8) for use in Israel	701977-BB1
	Without backlight, with pointing stick (Windows 8) for use in Switzerland	701977-BG1
	Without backlight, with pointing stick (Windows 8) for use in India	701977-D61
	Without backlight, with pointing stick (Windows 8) for use in Canada	701977-DB1
	Without backlight, with pointing stick (Windows 8) for use in Iceland	701977-DD1
	Without backlight, with pointing stick (Windows 8) for use in Czechoslovakia	701977-FL1
	Without backlight, with pointing stick (Windows 8) for use in Northwest Africa	701977-FP1
	Without backlight, with pointing stick (Windows 8) for use in Romania	701977-261
(3)	Top cover (includes TouchPad)	688747-001
(4)	TouchPad (included with top cover)	
(5)	RTC battery	651948-001
(6)	Fan/graphics board heat sink assembly (includes replacement thermal material):	
	For use with AMD graphics subsystem	688733-001
	For use with NVIDIA graphics subsystem	696435-001
(7)	Primary memory modules (PC3-10600, 1333 MHz, shared):	
	2 GB — 2048 MB memory module (PC3-12800, 1600 MHz, DDR3)	652792-001
	4 GB — 4096 MB memory module (PC3-12800, 1600 MHz, DDR3)	641369-001
	8 GB — 8192 MB memory module (PC3-12800, 1600 MHz, DDR3)	670034-001
(8)	Fan/heat sink assembly (includes replacement thermal material):	
		653629-001
		688762-001
(9)	Processor (includes replacement thermal material):	
	Next Generation Intel® Core™ processors (support Intel Turbo Boost Technology):	
	i7-3520M, 2.90 GHz (Turbo up to 3.60 GHz), 1600 MHz, 4 MB L3 Cache, 4 threads, 35W	681954-001
	i7-3610QM, 2.30 GHz (Turbo up to 3.30 GHz), 1600 MHz, 6 MB L3 Cache, 8 threads, 45W	680646-001
	i7-3720QM, 2.60 GHz (Turbo up to 3.60 GHz), 1600 MHz, 6 MB L3 Cache, 8 threads, 45W	681283-001
	i7-3820QM, 2.70 GHz (Turbo up to 3.70 GHz), 1600 MHz, 8 MB L3 Cache, 8 threads, 45W	681284-001
	i7-3920XM, 2.90 GHz (Turbo up to 3.80 GHz), 1600 MHz, 8 MB L3 Cache, 8 threads, 55W/55W	691351-001
	Next Generation Intel® Core™ i5 processors (support Intel Turbo Boost Technology):	
	i5-3320M, 2.60 GHz (Turbo up to 3.30 GHz), 1600 MHz, 3 MB L3 Cache, 4 threads, 35W	681952-001
	i5-3360M, 2.80 GHz (Turbo up to 3.50 GHz), 1600 MHz, 3 MB L3 Cache, 4 threads, 35W	681953-001

Item	Description	Spare part number
(10)	Graphics board (includes replacement thermal material):	
	AMD FirePro M5950 XT-GL 1GB GDDR5 (DP 1.2 and Eyefinity Plus support)	689279-001
	NVIDIA Quadro 3000M, N14E-Q1 2 GB dedicated GDDR5 video memory	689280-001
	NVIDIA Quadro 4000M, N14E-Q3 2 GB dedicated GDDR5 video memory	689281-001
	NVIDIA Quadro 5010M, N14E-Q5 4 GB dedicated GDDR5 video memory	689282-001
(11)	Processor heat sink	
	For use only with computer models equipped with dual-core processors	652542-001
	For use only with computer models equipped with quad-core processors	653629-001
(12)	Modem module 56K V.92 data/fax modem	628824-001
	NOTE: The modem module spare part kit does not include a modem module cable. The modem module cable is included in the Cable Kit, spare part number 652545-001.	
(13)	System board (includes replacement thermal material)	
	For use in all countries and regions except the People's Republic of China:	
	<ul style="list-style-type: none"> For use with computer models equipped with Intel quad-core processors 	688746-001
	<ul style="list-style-type: none"> For use with computer models equipped with Intel dual-core processors 	688745-001
	For use only in the People's Republic of China:	
	<ul style="list-style-type: none"> For use with computer models equipped with Intel quad-core processors 	690035-001
	<ul style="list-style-type: none"> For use with computer models equipped with Intel dual-core processors 	690034-001
(14)	Expansion memory modules (PC3-10600, 1333 MHz, shared):	
	2 GB — 2048 MB memory module (PC3-12800, 1600 MHz, DDR3)	652972-001
	4 GB — 4096 MB memory module (PC3-12800, 1600 MHz, DDR3)	641369-001
	8 GB— 8192 MB memory module (PC3-12800, 1600 MHz, DDR3)	670034-001
(15)	Solid-state drive (includes bracket and screws)	
	<ul style="list-style-type: none"> 256 GB solid-state drive Self-Encrypting drive (SED) 	688767-001
	<ul style="list-style-type: none"> 128 GB solid-state drive 	688766-001
	<ul style="list-style-type: none"> 160 GB solid-state drive 	688768-001
	<ul style="list-style-type: none"> 180 GB solid-state drive 	700373-001
(16)	WLAN module:	
	Intel® Centrino™ Advanced-N 6205, 802.11a/b/g/n WLAN module	695915-001
	Intel Centrino Ultimate-N 6300, 802.11a/b/g/n WLAN module	698588-001
	Broadcom 802.11a/b/g/n 2x2WiFi Adapter	669832-001
(17)	WWAN module:	
	HP un2430 EV-DO/HSPA Mobile Broadband Module	634400-001
	HP hs2340 HSPA+ Mobile Broadband Module	668969-001
(18)	Speaker assembly	652540-001

Item	Description	Spare part number
(19)	Audio/USB 2.0 board	689284-001
(20)	Display (VGA) port	696435-001
(21)	Power connector cable NOTE: The power connector cable is included in the Cable Kit, spare part number 652545-001.	
(22)	Modem cable	628824-001
(23)	Network cable (includes RJ-45 jack) NOTE: The network cable is included in the Cable Kit, spare part number 652545-001.	652545-001
(24)	USB 3.0 board	689283-001
(25)	Battery:	
	9-cell, Li-ion, 2.2 Ah (73 WHr)	634089-001
	9-cell, Li-ion, 3.0 Ah (100 WHr)	634087-001
	8-cell, Li-ion, 2.8 Ah (75 WHr)	632425-001
	8-cell, Li-ion, 2.8 Ah (83 WHr)	632427-001
(26)	Base enclosure (includes computer feet)	688765-001
(27)	ExpressCard (plastic insert)	655546-001
(28)	Mass storage device Supports 7.0 mm (0.28 in), 9.5 mm (0.37 in) or 12.7 mm (0.5 in) hard drives and 6.35 cm (2.5 in) solid-state drive for primary and secondary storage: NOTE: The hard drive bracket and screws are included in the Hard Drive Hardware Kit, spare part number 642774-001.	
	• 750 GB, SATA, 7200-rpm	633252-001
	• 500 GB, SATA, 7200-rpm	634925-001
	• 320 GB, SATA, 7200-rpm	634862-001
	• 500 GB SATA SED (Self-Encrypting Drive), 7200-rpm	683801-001
(29)	Optical drive (includes bezel and bracket) supported in upgrade bay	
	Blu-ray R/RE DVD±RW SuperMulti Double-Layer Drive	688772-001
	Blu-ray ROM DVD±RW SuperMulti Double-Layer Drive	688771-001
	DVD±RW SuperMulti Double-Layer Drive	688770-001
	DVD-ROM Drive	688769-001
	Also supported in upgrade bay:	
	500 GB, 7200 rpm hard drive	634925-001
(30)	Service access cover	698410-001 699467-001 (RCTO)
(31)	Smart Card reader (includes cable)	688742-001

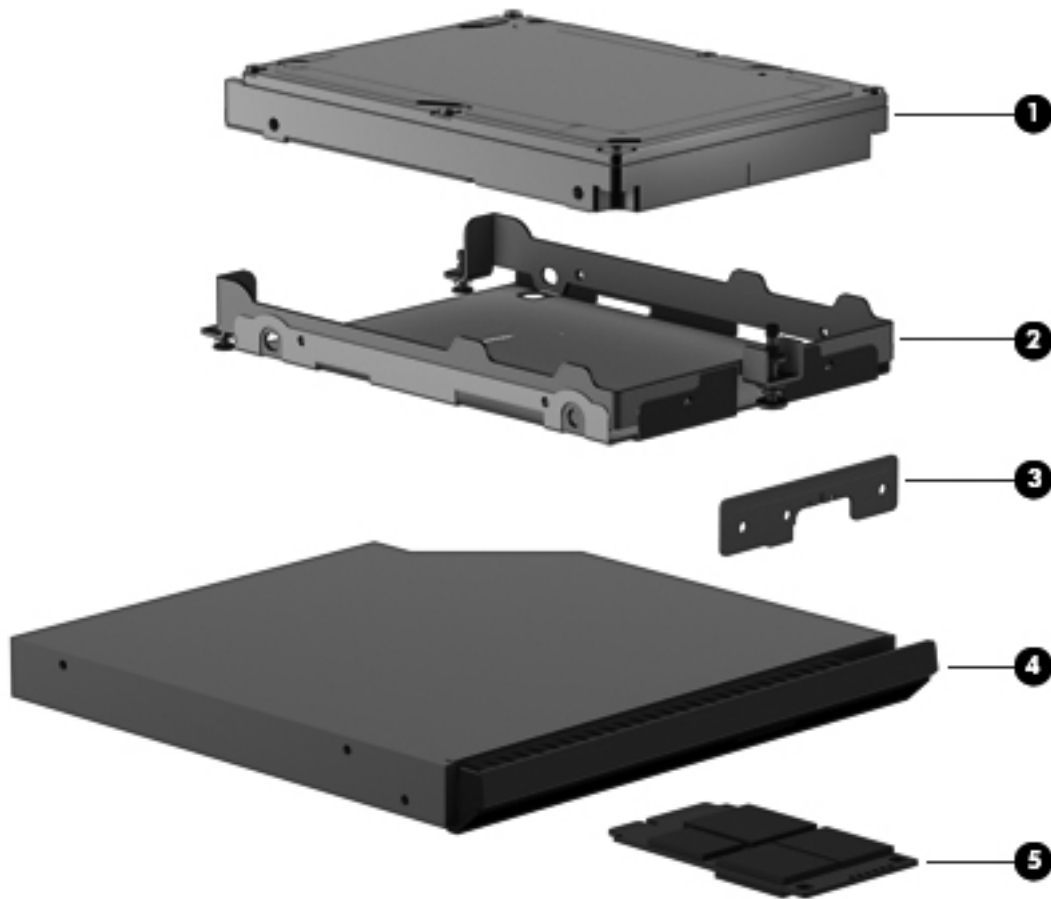
Display components



Item	Description	Spare part number
(1)	Display bezel	
	Display bezel	688763-001
(2)	Webcam module	
		688752-001
(3)	Display	
	Display panel, 43.9 cm (17.3 in), FHD AG WVA	691224-001
	Display panel, 43.9 cm (17.3 in), HD+ AG WVA	691223-001

Item	Description	Spare part number
	Display assembly, 43.9 cm (17.3 in), FHD AG RGB LED UVVA Dream Color with webcam (not available with HP Mobile Broadband) (includes display panel cable, 3 WLAN antenna and cables, and 2 WWAN antenna and cables)	688736-001
	Display assembly, 43.9 cm (17.3 in), FHD AG RGB LED UVVA Dream Color without webcam (not available with HP Mobile Broadband) (includes display panel cable, 3 WLAN antenna and cables, and 2 WWAN antenna and cables)	688735-001
(4)	Display hinge cover	652529-001
(5)	Display Hinge Brackets (included in Display Hinge Kit, left and right hinges and brackets)	652528-001
(6)	WWAN antenna and cables (included in the Antenna Kit, spare part number 652530-001)	
(7)	WLAN antenna and cables (included in the Antenna Kit, spare part number 652530-001)	
(8)	Display panel cable (includes webcam module cable)	688761-001
(9)	Webcam cable	652527-001
(10)	Display enclosure	652524-001
(11)	Hinge Pipe (included in Display Hinge Kit)	652528-001
	Antenna Kit (includes WLAN and WWAN antennas) (not illustrated)	652530-001
	Microphone (not illustrated)	655312-001
	CRT board (not illustrated)	688741-001

Mass storage devices



Item	Description	Spare part number
(1)	7.0 mm (0.28 in), 9.5 mm (0.37 in), or 12.7 mm (0.5 in) hard drive: NOTE: The hard drive bracket is included in the Hard Drive Hardware Kit, spare part number 642774-001.	
	• 750 GB, 7200-rpm	633252-001
	• 500 GB, 7200-rpm	634925-001
	• 320 GB, 7200-rpm	634862-001
	• 320 GB, 7200-rpm SATA SED (Self-Encrypting Drive)	683801-001
(2)	Hard drive bracket (Included only with solid-state drives. See spare part numbers below in this table.)	
(3)	Optical drive bracket (Included with optical drive. See spare part numbers below in this table.)	688769-001
(4)	Optical drive (includes bezel and bracket)	
	Blu-ray R/RE DVD±RW SuperMulti Double-Layer Drive	688772-001
	DVD±RW SuperMulti Double-Layer Drive	688771-001
	Blu-ray ROM DVD±RW SuperMulti Double-Layer Drive	688770-001

Item	Description	Spare part number
	DVD-ROM Drive	688769-001
(5)	6.35 cm (2.50 in) Solid-state drive (includes bracket):	
	<ul style="list-style-type: none"> 256 GB solid-state drive Self-Encrypting drive (SED) 	688767-001
	<ul style="list-style-type: none"> 128 GB solid-state drive 688766-001 	
	<ul style="list-style-type: none"> 160 GB solid-state drive 	688768-001
	<ul style="list-style-type: none"> 180 GB solid-state drive 	700373-001
	<ul style="list-style-type: none"> 2 701479-001 4 G B s o l i d - s t a t e d r i v e 	

Miscellaneous parts

Description	Spare part number
AC Adapter	
200W PFC Slim AC Smart Adapter	693708-001
230W PFC AC Smart Adapter	693714-001
Power cord (3 conductor, black, 1.83 m):	
For use in Argentina	491683-D01
For use in Australia	491683-011
For use in Brazil	491683-202
For use in Denmark	491683-081
For use in Europe, the Middle East, and Africa	491683-021
For use in India	491683-D61
For use in Israel	491683-BB1
For use in Saudi Arabia	491683-171
For use in Japan	491683-291
For use in North America	491683-001
For use in the People's Republic of China	491683-AA1
For use in South Africa	491683-AR1
For use in South Korea	491683-AD1
For use in Switzerland	491683-111
For use in Taiwan	491683-AB1
For use in Thailand	491683-201
For use in the United Kingdom and Singapore	491683-031
Hard Drive Hardware Kit (includes hard drive bracket and screws)	642774-001
Hard drive upgrade bay	655547-001
Screw Kit	
ExpressCard socket	652547-001

Sequential part number listing

CSR flag designations:

A = Mandatory

B = Optional

C = Service technician recommended

N = Non-user replaceable

Spare part number	CSR flag	Description
434594-001	A	Optical USB travel mouse
491683-001	A	Power cord for use in North America (3 conductor, black, 1.83 m)
491683-011	A	Power cord for use in Australia (3 conductor, black, 1.83 m)
491683-021	A	Power cord for use in Europe, the Middle East, and Africa (3 conductor, black, 1.83 m)
491683-031	A	Power cord for use in Singapore and the United Kingdom (3 conductor, black, 1.83 m)
491683-081	A	Power cord for use in Denmark (3 conductor, black, 1.83 m)
491683-111	A	Power cord for use in Switzerland (3 conductor, black, 1.83 m)
491683-171	A	Power cord for use in Saudi Arabia (3 conductor, black, 1.83 m)
491683-201	A	Power cord for use in Thailand (3 conductor, black, 1.83 m)
491683-202	A	Power cord for use in Brazil (3 conductor, black, 1.83 m)
491683-291	A	Power cord for use in Japan (3 conductor, black, 1.83 m)
491683-AA1	A	Power cord for use in the People's Republic of China (3 conductor, black, 1.83 m)
491683-AB1	A	Power cord for use in Taiwan (3 conductor, black, 1.83 m)
491683-AD1	A	Power cord for use in South Korea (3 conductor, black, 1.83 m)
491683-AR1	A	Power cord for use in South Africa (3 conductor, black, 1.83 m)
491683-BB1	A	Power cord for use in Israel (3 conductor, black, 1.83 m)
491683-D01	A	Power cord for use in Argentina (3 conductor, black, 1.83 m)
491683-D61	A	Power cord for use in India (3 conductor, black, 1.83 m)
591699-001	A	Notebook combination lock
592923-001	A	Professional Slim Top Load notebook case
626729-002	A	Keyed cable lock
628824-001	A	Modem, 56K V.92 data/fax modem
632425-001	A	Battery, 8-cell, Li-ion, 2.8 Ah (75 WHr)
632427-001	A	Battery, 8-cell, Li-ion, 2.8 Ah (83 WHr)
633252-001	A	Hard drive, 750GB 7200-RPM SATA Hard drive, 750 GB, 7200-rpm SATA
634087-001	A	Battery, 9-cell, Li-ion, 3.0 Ah (100 WHr)

Spare part number	CSR flag	Description
634089-001	A	Battery, 9-cell, Li-ion, 2.2 Ah (73 WHr)
634400-001	A	WWAN, HP un2430 EV-DO/HSPA Mobile Broadband Module
634862-001	A	Hard drive, 320 GB, 7200-rpm SATA
634925-001	A	Hard drive, 500GB, 7200-rpm SATA
641369-001	A	Memory module, 4GB (PC3-12800, 1600 MHz)
642774-001	A	Hard Drive Hardware Kit (includes hard drive bracket and screws)
651948-001	N	RTC battery
652524-001	N	Display enclosure
652527-001	N	Webcam cable
652528-001	N	Display Hinge Kit (includes left and right hinges, hinge pipe, and brackets)
652529-001	N	Display hinge covers
652530-001	N	Antenna Kit (includes WLAN antenna and cables and WWAN antenna and cables)
652532-001	N	Display Rubber Kit (includes 2 bezel rubber bumpers and 8 rubber screw covers)
652533-001	N	Display Miscellaneous Kit
652540-001	N	Speaker assembly
652542-001	N	Processor heat sink for use only with computer models equipped with dual-core processors (includes replacement thermal material)
652545-001	N	Cable Kit (includes DC-jack cable, RJ-45 cable, modem module cable, Bluetooth cable)
652546-001	N	Smart Card cover
652547-001	N	ExpressCard socket
652972-001	A	Memory module, 2 GB (PC3-12800, 1600 MHz)
653629-001	N	Processor heat sink for use only with computer models equipped with quad-core processors (includes replacement thermal material)
655312-001	N	Microphone
655546-001	N	Plastics Kit (includes optical drive compartment cover, RJ-11 (modem) jack cover, SD Card cover, and Express Card slot cover)
655547-001	N	Upgrade bay hard drive
655792-001	A	Bluetooth module, HP Integrated Module with Bluetooth 4.0+ ENH Data Rate Wireless Technology NOTE: The Bluetooth module spare part kit does not include a Bluetooth module cable. The Bluetooth module cable is included in the Cable Kit, spare part number 652545-001.
656840-001	A	Wireless mouse 2.4-GHZ
658265-001	N	Display Panel Support Kit (includes display enclosure, WLAN antenna cables, WWAN antenna cables, and webcam cable)
660578-001	A	Upgrade bay bezel 15/17W
668969-001	A	WWAN, HP hs2340 HSPA+ Mobile Broadband Module

Spare part number	CSR flag	Description
669832-001	A	Broadcom 802.11a/b/g/n 2x2WiFi Adapter
670034-001	A	Memory module, 8 GB (PC3-12800, 1600 MHz)
674318-001		Laser USB travel mouse
680646-001	N	Next Generation Intel® Core™ i7 Processor i7-3610QM, 2.30 GHz (Turbo up to 3.30 GHz), 1600 MHz, 6 MB L3 Cache, 8 threads, 45W
681283-001	N	Next Generation Intel® Core™ i7 Processor, i7-3720QM, 2.60 GHz (Turbo up to 3.60 GHz), 1600 MHz, 6 MB L3 Cache, 8 threads, 45W
681284-001	N	Next Generation Intel® Core™ i7 Processor, i7-3820QM, 2.70 GHz (Turbo up to 3.70 GHz), 1600 MHz, 8 MB L3 Cache, 8 threads, 45W
681952-001	N	Next Generation Intel® Core™ i5 Processor, i5-3320M, 2.60 GHz (Turbo up to 3.30 GHz), 1600 MHz, 3 MB L3 Cache, 4 threads, 35W
681953-001	N	Next Generation Intel® Core™ i5 Processor, i5-3360M, 2.80 GHz (Turbo up to 3.50 GHz), 1600 MHz, 3 MB L3 Cache, 4 threads, 35W
681954-001	N	Next Generation Intel® Core™ i7 Processor, i7-3520M, 2.90 GHz (Turbo up to 3.60 GHz), 1600 MHz, 4 MB L3 Cache, 4 threads, 35W
683801-001	A	Hard drive, 500 GB, 7200-rpm SATA SED (Self-Encrypting Drive)
688169-001	A	Docking station/Expansion base
688733-001	N	Fan/graphics board heat sink assembly for use only with computer models equipped with AMD graphics subsystems (includes replacement thermal material)
688735-001	N	Display assembly, 43.9 cm (17.3 in), FHD AG RGB LED UVVA Dream Color without webcam (not available with HP Mobile Broadband) (includes display panel cable, 3 WLAN antenna and cables, and 2 WWAN antenna and cables)
688736-001	N	Display assembly, 43.9 cm (17.3 in), FHD AG RGB LED UVVA Dream Color with webcam (not available with HP Mobile Broadband) (includes display panel cable, 3 WLAN antenna and cables, and 2 WWAN antenna and cables)
688737-001	A	Keyboard without backlight for use in the United States (includes keyboard cable, pointing stick and pointing stick cable)
688737-031	A	Keyboard without backlight for use in Singapore and the United Kingdom (includes keyboard cable, pointing stick and pointing stick cable)
688737-041	A	Keyboard without backlight for use in Germany (includes keyboard cable, pointing stick and pointing stick cable)
688737-051	A	Keyboard without backlight for use in France (includes keyboard cable, pointing stick and pointing stick cable)
688737-061	A	Keyboard without backlight for use in Italy (includes keyboard cable, pointing stick and pointing stick cable)
688737-071	A	Keyboard without backlight for use in Spain (includes keyboard cable, pointing stick and pointing stick cable)
688737-081	A	Keyboard without backlight for use in Denmark (includes keyboard cable, pointing stick and pointing stick cable)
688737-091	A	Keyboard without backlight for use in Norway (includes keyboard cable, pointing stick and pointing stick cable)
688737-131	A	Keyboard without backlight for use in Portugal (includes keyboard cable, pointing stick and pointing stick cable)

Spare part number	CSR flag	Description
688737-141	A	Keyboard without backlight for use in Turkey (includes keyboard cable, pointing stick and pointing stick cable)
688737-151	A	Keyboard without backlight for use in Greece (includes keyboard cable, pointing stick and pointing stick cable)
688737-161	A	Keyboard without backlight for use in Latin America (includes keyboard cable, pointing stick and pointing stick cable)
688737-171	A	Keyboard without backlight for use in Saudi Arabia (includes keyboard cable, pointing stick and pointing stick cable)
688737-201	A	Keyboard without backlight for use in Brazil (includes keyboard cable, pointing stick and pointing stick cable)
688737-211	A	Keyboard without backlight for use in Hungary (includes keyboard cable, pointing stick and pointing stick cable)
688737-251	X2	Keyboard without backlight for use in Russia (includes keyboard cable, pointing stick and pointing stick cable)
688737-261	A	Keyboard without backlight for use in Bulgaria (includes keyboard cable, pointing stick and pointing stick cable)
688737-271	A	Keyboard without backlight for use in Romania (includes keyboard cable, pointing stick and pointing stick cable)
688737-281	A	Keyboard without backlight for use in Thailand (includes keyboard cable, pointing stick and pointing stick cable)
688737-291	A	Keyboard without backlight for use in Japan (includes keyboard cable, pointing stick and pointing stick cable)
688737-A41	A	Keyboard without backlight for use in Belgium (includes keyboard cable, pointing stick and pointing stick cable)
688737-AB1	A	Keyboard without backlight for use in the Czech Republic and Slovakia (includes keyboard cable, pointing stick and pointing stick cable)
688737-AD1	A	Keyboard without backlight for use in South Korea (includes keyboard cable, pointing stick and pointing stick cable)
688737-B31	A	Keyboard without backlight for international use (includes keyboard cable, pointing stick and pointing stick cable)
688737-B71	A	Keyboard without backlight for use in Finland and Sweden (includes keyboard cable, pointing stick and pointing stick cable)
688737-BA1	A	Keyboard without backlight for use in Slovenia (includes keyboard cable, pointing stick and pointing stick cable)
688737-BB1	A	Keyboard without backlight for use in Israel (includes keyboard cable, pointing stick and pointing stick cable)
688737-BG1	A	Keyboard without backlight for use in Switzerland (includes keyboard cable, pointing stick and pointing stick cable)
688737-D61	A	Keyboard without backlight for use in India (includes keyboard cable, pointing stick and pointing stick cable)
688737-DB1	A	Keyboard without backlight for use in Canada (includes keyboard cable, pointing stick and pointing stick cable)
688737-DD1	A	Keyboard without backlight for use in Iceland (includes keyboard cable, pointing stick and pointing stick cable)

Spare part number	CSR flag	Description
688737-FL1	A	Keyboard without backlight for use in Czechoslovakia (includes keyboard cable, pointing stick and pointing stick cable)
688737-FP1	A	Keyboard without backlight for use in Northwest Africa (includes keyboard cable, pointing stick and pointing stick cable)
688738-001	A	Keyboard with backlight for use in the United States (includes keyboard cable, pointing stick and pointing stick cable)
688738-031	A	Keyboard with backlight for use in the United Kingdom (includes keyboard cable, pointing stick and pointing stick cable)
688738-041	A	Keyboard with backlight for use in Germany (includes keyboard cable, pointing stick and pointing stick cable)
688738-051	A	Keyboard with backlight for use in France (includes keyboard cable, pointing stick and pointing stick cable)
688738-061	A	Keyboard with backlight for use in Italy (includes keyboard cable, pointing stick and pointing stick cable)
688738-081	A	Keyboard with backlight for use in Denmark (includes keyboard cable, pointing stick and pointing stick cable)
688738-091	A	Keyboard with backlight for use in Norway (includes keyboard cable, pointing stick and pointing stick cable)
688738-161	A	Keyboard with backlight for use in Latin America (includes keyboard cable, pointing stick and pointing stick cable)
688738-251	A	Keyboard with backlight for use in Russia (includes keyboard cable, pointing stick and pointing stick cable)
688738-281	A	Keyboard with backlight for use in Thailand (includes keyboard cable, pointing stick and pointing stick cable)
688738-A41	A	Keyboard with backlight for use in Belgium (includes keyboard cable, pointing stick and pointing stick cable)
688738-AB1	A	Keyboard with backlight for use in Taiwan (includes keyboard cable, pointing stick and pointing stick cable)
688738-AD1	A	Keyboard with backlight for use in South Korea (includes keyboard cable, pointing stick and pointing stick cable)
688738-B31	A	Keyboard with backlight for use in Europe (includes keyboard cable, pointing stick and pointing stick cable)
688738-B71	A	Keyboard with backlight for use in Finland and Sweden (includes keyboard cable, pointing stick and pointing stick cable)
688738-BG1	X2	Keyboard with backlight for use in Switzerland (includes keyboard cable, pointing stick and pointing stick cable)
688738-D61	A	Keyboard with backlight for use in India (includes keyboard cable, pointing stick and pointing stick cable)
688738-DB1	A	Keyboard with backlight for use in Canada (includes keyboard cable, pointing stick and pointing stick cable)
688738-FL1	A	Keyboard with backlight for use in Czechoslovakia (includes keyboard cable, pointing stick and pointing stick cable)
688741-001	N	CRT board

Spare part number	CSR flag	Description
688742-001	A	Smart Card (includes cable)
688743-001	N	Fingerprint reader (includes cable)
688744-001	A	Screw Kit
688745-001	N	System board for use with computer models equipped with Intel quad-core processors in all countries and regions except the People's Republic of China (includes replacement thermal material)
688745-501	N	System board for use with computer models equipped with Intel quad-core processors in all countries and regions for Windows 8 standard except the People's Republic of China (includes replacement thermal material)
688745-601	N	System board for use with computer models equipped with Intel quad-core processors in all countries and regions for Windows 8 professional except the People's Republic of China (includes replacement thermal material)
688746-001	N	System board for use with computer models equipped with Intel quad-core processors in all countries and regions except the People's Republic of China (includes replacement thermal material)
688746-501	N	System board for use with computer models equipped with Intel quad-core processors for Windows 8 standard in all countries and regions except the People's Republic of China (includes replacement thermal material)
688746-601	N	System board for use with computer models equipped with Intel quad-core processors for Windows 8 professional in all countries and regions except the People's Republic of China (includes replacement thermal material)
688747-001	C	Top cover (includes TouchPad)
688749-001	N	Power button board
688752-001	N	Webcam module with microphone
688760-001	N	Latch kit (includes door and battery latches)
688761-001	N	Display panel cable (includes webcam module cable)
688762-001	B	Fan
688763-001	N	Display bezel
688765-001	N	Base enclosure (includes computer feet)
688766-001	N	128 GB solid-state drive (includes bracket)
688767-001	N	256 GB solid-state drive (includes bracket)
688768-001	N	160 GB solid-state drive (includes bracket)
688769-001	A	DVD-ROM Drive
688770-001	A	Optical drive, DVD±RW SuperMulti Double-Layer Drive
688771-001	A	Optical drive, Blu-ray ROM DVD±RW SuperMulti Double-Layer Drive
688772-001	A	Optical drive, Blu-ray R/RE DVD±RW SuperMulti Double-Layer Drive
689279-001	N	Graphics board, AMD Firepro M2 XT GL
689280-001	N	Graphics board, NVIDIA Quadro 3000M, N14E-Q1 2 GB dedicated GDDR5 video memory

Spare part number	CSR flag	Description
689281-001	N	Graphics board, NVIDIA Quadro 4000M, N14E-Q3 2 GB dedicated GDDR5 video memory
689282-001	N	Graphics board, NVIDIA Quadro 5010M, N14E-Q5 4 GB dedicated GDDR5 video memory
689283-001	N	USB 3.0 board (includes cable)
689284-001	N	Audio/USB 2.0 board
690034-001	N	System board for use with computer models equipped with Intel quad-core processors in the People's Republic of China (includes replacement thermal material)
690035-001	N	System board for use with computer models equipped with Intel quad-core processors in the People's Republic of China (includes replacement thermal material)
691223-001	N	Display panel, 43.9 cm (17.3 in), HD+ AG WVA
691224-001	N	Display panel, 43.9 cm (17.3 in), FHD AG WVA
691351-001	N	Next Generation Intel® Core i7-3920XM, 2.90 GHz (Turbo up to 3.80 GHz), 1600 MHz, 8 MB L3 Cache, 8 threads, 55W
693708-001	A	AC adapter, 200 W PFC Slim AC Smart adapter
693714-001	A	AC adapter, 230 W PFC AC Smart adapter
695915-001	A	Intel® Centrino™ Advanced-N 6205, 802.11a/b/g/n WLAN module
696435-001	N	Fan/graphics board heat sink assembly, for use only with computer models equipped with NVIDIA Quadro graphics subsystems (includes replacement thermal material)
696901-001	N	Application board
698410-001	N	Service access door
698588-001	A	Intel Centrino Ultimate-N 6300 802.11a/b/g/n 3x3WiFi NMA Adapter
699467-001	A	Service access door (RCTO)
700373-001	N	180 GB solid-state drive (includes bracket)
701479-001	N	24 GB solid-state drive (includes bracket)
701977-001	A	Keyboard (Windows 8) without backlight for use in the United States (includes keyboard cable, pointing stick and pointing stick cable)
701977-031	A	Keyboard (Windows 8) without backlight for use in The United Kingdom and Singapore (includes keyboard cable, pointing stick and pointing stick cable)
701977-041	A	Keyboard (Windows 8) without backlight for use in Germany (includes keyboard cable, pointing stick and pointing stick cable)
701977-051	A	Keyboard (Windows 8) without backlight for use in France (includes keyboard cable, pointing stick and pointing stick cable)
701977-061	A	Keyboard (Windows 8) without backlight for use in Italy (includes keyboard cable, pointing stick and pointing stick cable)
701977-071	A	Keyboard (Windows 8) without backlight for use in Spain (includes keyboard cable, pointing stick and pointing stick cable)
701977-081	A	Keyboard (Windows 8) without backlight for use in Denmark (includes keyboard cable, pointing stick and pointing stick cable)

Spare part number	CSR flag	Description
701977-091	A	Keyboard (Windows 8) without backlight for use in Norway (includes keyboard cable, pointing stick and pointing stick cable)
701977-131	A	Keyboard (Windows 8) without backlight for use in Portugal (includes keyboard cable, pointing stick and pointing stick cable)
701977-141	A	Keyboard (Windows 8) without backlight for use in Turkey (includes keyboard cable, pointing stick and pointing stick cable)
701977-151	A	Keyboard (Windows 8) without backlight for use in Greece (includes keyboard cable, pointing stick and pointing stick cable)
701977-161	A	Keyboard (Windows 8) without backlight for use in Latin America (includes keyboard cable, pointing stick and pointing stick cable)
701977-171	A	Keyboard (Windows 8) without backlight for use in Saudi Arabia (includes keyboard cable, pointing stick and pointing stick cable)
701977-201	A	Keyboard (Windows 8) without backlight for use in Brazil (includes keyboard cable, pointing stick and pointing stick cable)
701977-211	A	Keyboard (Windows 8) without backlight for use in Hungary (includes keyboard cable, pointing stick and pointing stick cable)
701977-251	A	Keyboard (Windows 8) without backlight for use in Russia (includes keyboard cable, pointing stick and pointing stick cable)
701977-261	A	Keyboard (Windows 8) without backlight for use in Bulgaria (includes keyboard cable, pointing stick and pointing stick cable)
701977-271	A	Keyboard (Windows 8) without backlight for use in Romania (includes keyboard cable, pointing stick and pointing stick cable)
701977-281	A	Keyboard (Windows 8) without backlight for use in Thailand (includes keyboard cable, pointing stick and pointing stick cable)
701977-291	A	Keyboard (Windows 8) without backlight for use in Japan (includes keyboard cable, pointing stick and pointing stick cable)
701977-A41	A	Keyboard (Windows 8) without backlight for use in Belgium (includes keyboard cable, pointing stick and pointing stick cable)
701977-AB1	A	Keyboard (Windows 8) without backlight for use in Taiwan (includes keyboard cable, pointing stick and pointing stick cable)
701977-AD1	A	Keyboard (Windows 8) without backlight for use in South Korea (includes keyboard cable, pointing stick and pointing stick cable)
701977-B31	A	Keyboard (Windows 8) without backlight for use internationally (includes keyboard cable, pointing stick and pointing stick cable)
701977-B71	A	Keyboard (Windows 8) without backlight for use in Finland and Sweden (includes keyboard cable, pointing stick and pointing stick cable)
701977-BA1	A	Keyboard (Windows 8) without backlight for use in Slovenia (includes keyboard cable, pointing stick and pointing stick cable)
701977-BB1	A	Keyboard (Windows 8) without backlight for use in Israel (includes keyboard cable, pointing stick and pointing stick cable)
701977-BG1	A	Keyboard (Windows 8) without backlight for use in Switzerland (includes keyboard cable, pointing stick and pointing stick cable)
701977-D61	A	Keyboard (Windows 8) without backlight for use in India (includes keyboard cable, pointing stick and pointing stick cable)

Spare part number	CSR flag	Description
701977-DB1	A	Keyboard (Windows 8) without backlight for use in Canada (includes keyboard cable, pointing stick and pointing stick cable)
701977-DD1	A	Keyboard (Windows 8) without backlight for use in Iceland (includes keyboard cable, pointing stick and pointing stick cable)
701977-FL1	A	Keyboard (Windows 8) without backlight for use in Czechoslovakia (includes keyboard cable, pointing stick and pointing stick cable)
701977-FP1	A	Keyboard (Windows 8) without backlight for use in Northwest Africa (includes keyboard cable, pointing stick and pointing stick cable)
701978-001	A	Keyboard (Windows 8) with backlight for use in The United States (includes keyboard cable, pointing stick and pointing stick cable)
701978-031	A	Keyboard (Windows 8) with backlight for use in The United Kingdom and Singapore (includes keyboard cable, pointing stick and pointing stick cable)
701978-041	A	Keyboard (Windows 8) with backlight for use in Germany (includes keyboard cable, pointing stick and pointing stick cable)
701978-051	A	Keyboard (Windows 8) with backlight for use in France (includes keyboard cable, pointing stick and pointing stick cable)
701978-061	A	Keyboard (Windows 8) with backlight for use in Italy (includes keyboard cable, pointing stick and pointing stick cable)
701978-081	A	Keyboard (Windows 8) with backlight for use in Denmark (includes keyboard cable, pointing stick and pointing stick cable)
701978-091	A	Keyboard (Windows 8) with backlight for use in Denmark (includes keyboard cable, pointing stick and pointing stick cable)
701978-161	A	Keyboard (Windows 8) with backlight for use in Latin America (includes keyboard cable, pointing stick and pointing stick cable)
701978-251	A	Keyboard (Windows 8) with backlight for use in Russia (includes keyboard cable, pointing stick and pointing stick cable)
701978-281	A	Keyboard (Windows 8) with backlight for use in Thailand (includes keyboard cable, pointing stick and pointing stick cable)
701978-A41	A	Keyboard (Windows 8) with backlight for use in Belgium (includes keyboard cable, pointing stick and pointing stick cable)
701978-AB1	A	Keyboard (Windows 8) with backlight for use in Czech Republic and Slovakia (includes keyboard cable, pointing stick and pointing stick cable)
701978-AD1	A	Keyboard (Windows 8) with backlight for use in South Korea (includes keyboard cable, pointing stick and pointing stick cable)
701978-B31	A	Keyboard (Windows 8) with backlight for use in Internationally (includes keyboard cable, pointing stick and pointing stick cable)
701978-B71	A	Keyboard (Windows 8) with backlight for use in Finland and Sweden (includes keyboard cable, pointing stick and pointing stick cable)
701978-BG1	A	Keyboard (Windows 8) with backlight for use in Switzerland (includes keyboard cable, pointing stick and pointing stick cable)
701978-D61	A	Keyboard (Windows 8) with backlight for use in India (includes keyboard cable, pointing stick and pointing stick cable)
701978-DB1	A	Keyboard (Windows 8) with backlight for use in Canada (includes keyboard cable, pointing stick and pointing stick cable)

Spare part number	CSR flag	Description
701978-FL1	A	Keyboard (Windows 8) with backlight for use in Czechoslovakia (includes keyboard cable, pointing stick and pointing stick cable)
702080-001	A	Intel® Centrino™ 2430, EV-DO/HSPA minicard WLAN module
705053-001	N	128 GB solid-state drive (includes bracket)
710788-001	A	F5321GWX HSPA + with GPS mini

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
- Torx T8 screwdriver
- 5.0 mm hex socket driver

Service considerations

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



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

Plastic parts

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 pointing stick connectors

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

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

Drive handling

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

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

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

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

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

Avoid dropping drives from any height onto any surface.

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

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

Avoid exposing a drive to temperature extremes or liquids.

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

Grounding guidelines

Electrostatic discharge damage

Electronic components are sensitive to electrostatic discharge (ESD). Circuitry design and structure determine the degree of sensitivity. Networks built into many integrated and pointing stick 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 pointing stick 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.

Use nonmagnetic tools.

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

Avoid touching pins, leads, and pointing stick 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			
Event	Relative humidity		
	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 and pointing stick contact, transport products in static-safe tubes, bags, or boxes.
- Protect ESD-sensitive parts and assemblies with conductive or approved and pointing stick 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 pointing stick 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 non conductive 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 and pointing stick 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 $\pm 10\%$ resistance in the ground and pointing stick cords. To provide proper ground, wear a strap snugly against the skin at all times. On grounded mats with banana-plug connectors, use alligator clips to connect a wrist strap.
- When standing, use foot straps and a grounded floor mat. Foot straps (heel, toe, or boot straps) can be used at standing workstations and are compatible with most types of shoes or boots. On conductive floors or dissipative floor mats, use foot straps on both feet with a minimum of one megohm resistance between the operator and ground. To be effective, the conductive strips must be worn in contact with the skin.

The following grounding equipment is recommended to prevent electrostatic damage:

- Antistatic tape
- Antistatic smocks, aprons, and sleeve protectors
- Conductive bins and other assembly or soldering aids
- Nonconductive foam
- Conductive tabletop workstations with ground and pointing stick 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
- Non conductive plastic bags, tubes, or boxes
- Metal tote boxes
- Electrostatic voltage levels and protective materials

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

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

Component replacement procedures

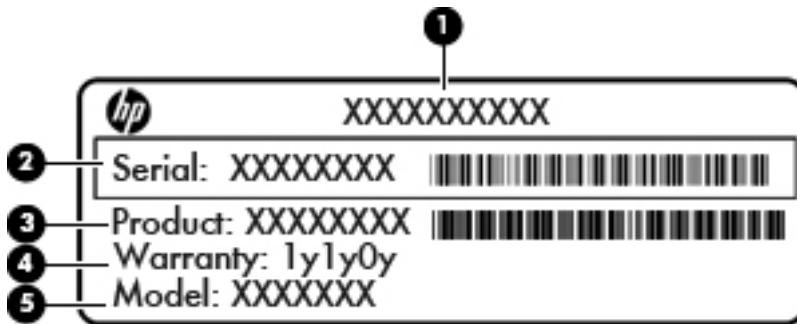
This chapter provides removal and replacement procedures.

There are as many as 98 screws and screw locks that must be removed, replaced, or loosened when servicing the computer. Make special note of each screw and screw lock size and location during removal and replacement.

Service tag and PCID label

Service tag


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



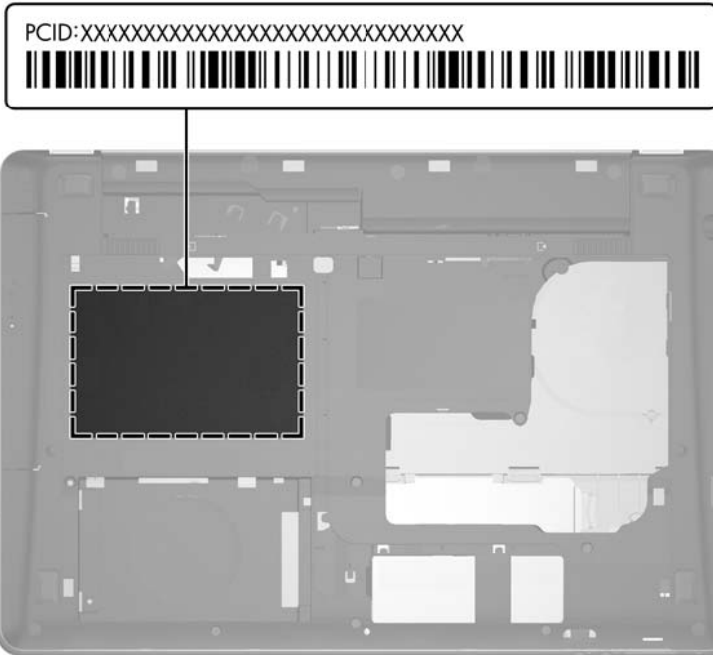
Item	Component	Description
(1)	Product name	This is the product name affixed to the front of the computer.
(2)	Serial number (s/n)	This is an alphanumeric identifier that is unique to each product.
(3)	Part number/Product number (p/n)	This number provides specific information about the product's hardware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

PCID label

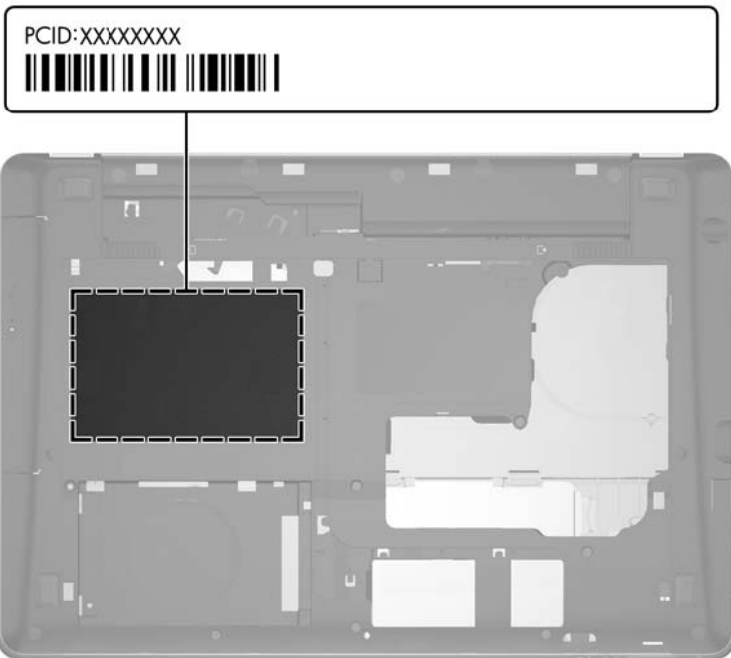
The PCID label provides the information required to properly reset the notebook firmware (BIOS) back to factory shipped specifications when replacing the system board. The label may have a different number of characters depending on the operating system on the computer.

 **NOTE:** Computer details may vary from images.

Windows 8 models



Non Windows 8 models



Computer feet

The computer feet (not illustrated) are adhesive-backed rubber pads. The feet are included in the base enclosure spare part kit, spare part number 688765-001. The rubber feet that attach to the base enclosure in the locations illustrated below.

Battery

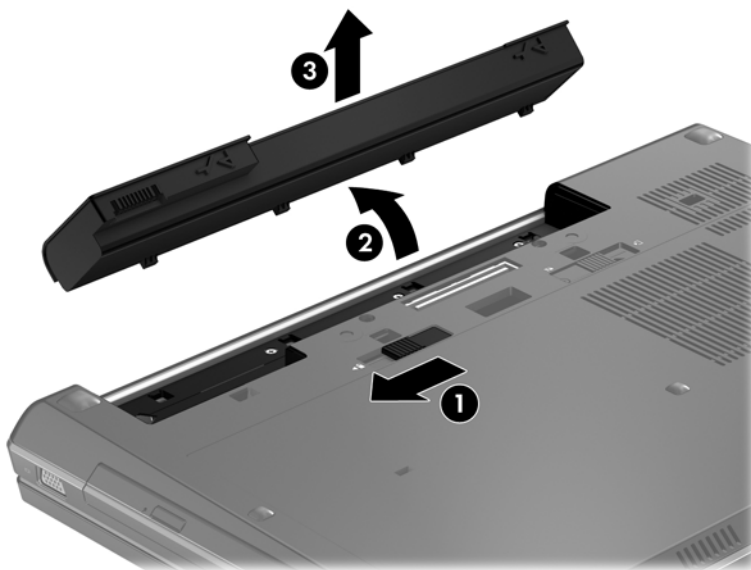
Description	Spare part number
8-cell, Li-ion 2.8 Ah (75 WHr)	632425-001
8-cell, Li-ion 2.8 Ah (83 WHr)	632427-001
9-cell, Li-ion 3.0 Ah (100 WHr)	634087-001
9-cell, Li-ion 2.2 Ah (73 WHr)	634089-001

Before disassembling the computer, follow these steps:

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

Remove the battery:

1. Position the computer upside down on a flat surface, with the front toward you.
2. Slide the battery release latch to the left **(1)** to release the battery.
3. Pivot the battery **(2)** upward and lift it out of the computer **(3)**.



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

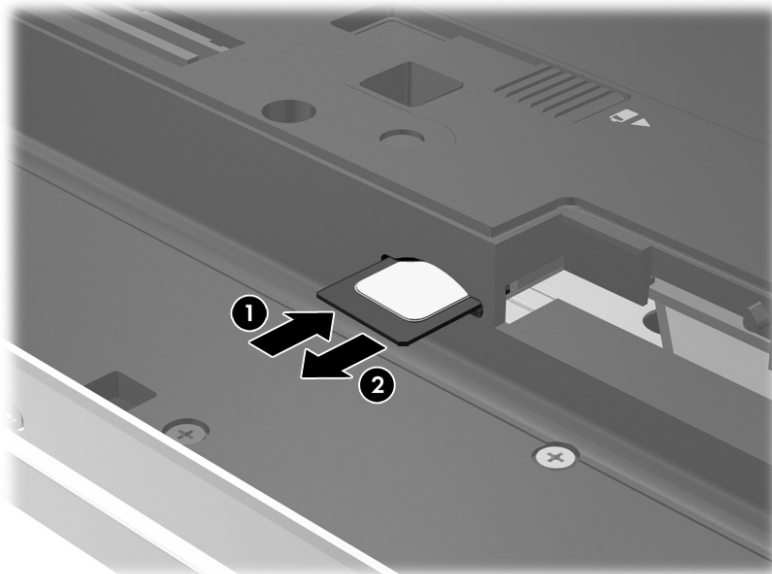
SIM

Before removing the SIM, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 51](#)).

Remove the SIM:

1. Press in on the SIM **(1)** to release it from the SIM slot.
2. Remove the SIM **(2)** from the SIM slot.



Install the SIM by inserting it into the SIM slot until you hear a click.

Service access cover

Description	Spare part number
Service access cover	698410-001
Service access cover (RCTO)	699467-001

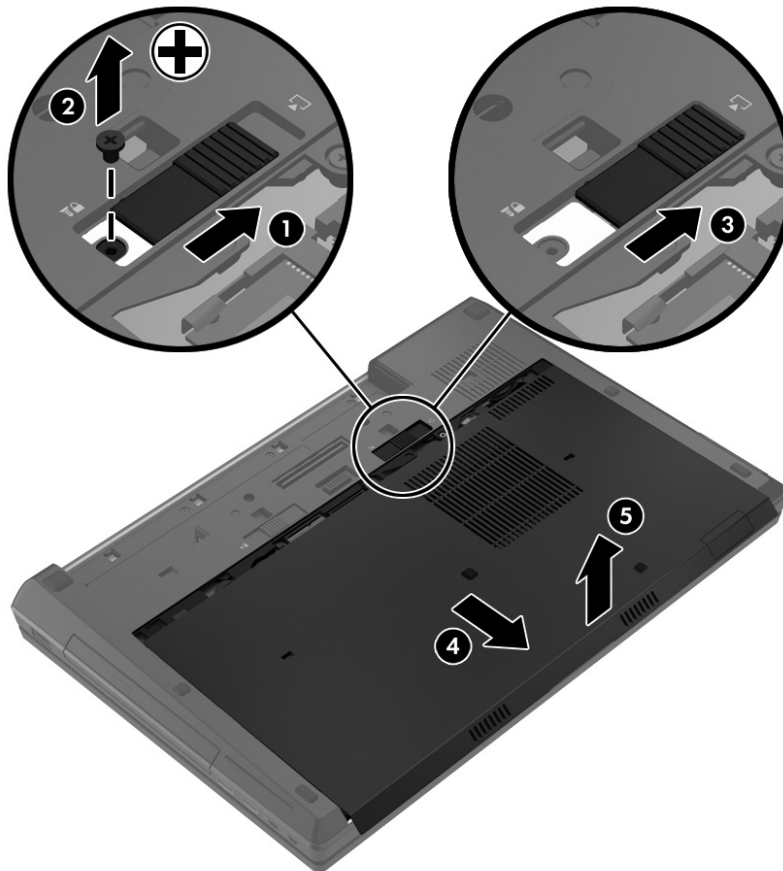
Before removing the service access cover, follow these steps:

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.

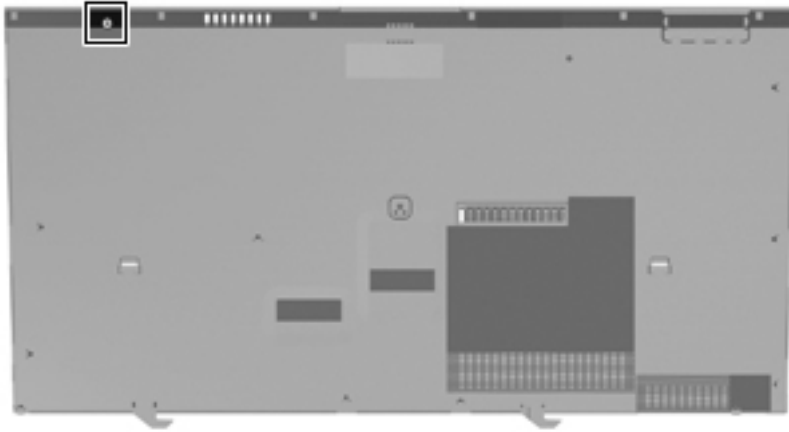
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 51](#)).

Remove the service access cover:

1. Position the computer upside down on a flat surface, with the front toward you.
2. Slide the service cover release latch to the right (1), and remove the single security screw (2), if it has been installed.
3. Slide the service access cover release latch to the right (3) to release the service access cover.
4. Slide the service access cover toward the front of the computer (4) and then remove the cover (5).



Reverse this procedure to reassemble and install the service cover. When reinstalling the service cover, install the security screw in the area that is adjacent to the service cover release latch. The security screw is located on the service cover.



Primary hard drive



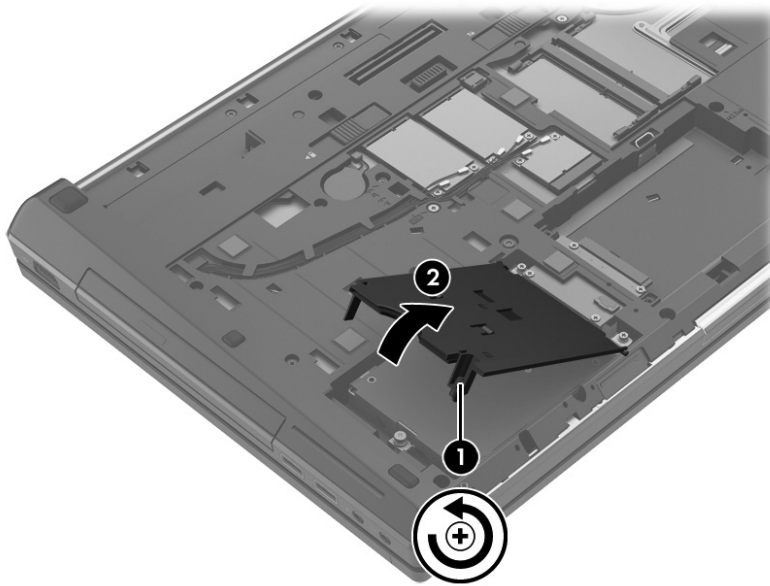
NOTE: The hard drive bracket is included in the Hard Drive Hardware Kit, spare part number 642774-001.

Description	Spare part number
750 GB, 7200-rpm SATA hard drive	633252-001
500 GB, 7200-rpm SATA hard drive	634925-001
500 GB, 7200-rpm SATA SED hard drive	634862-001
24 GB solid-state drive (includes bracket and screws)	701479-001

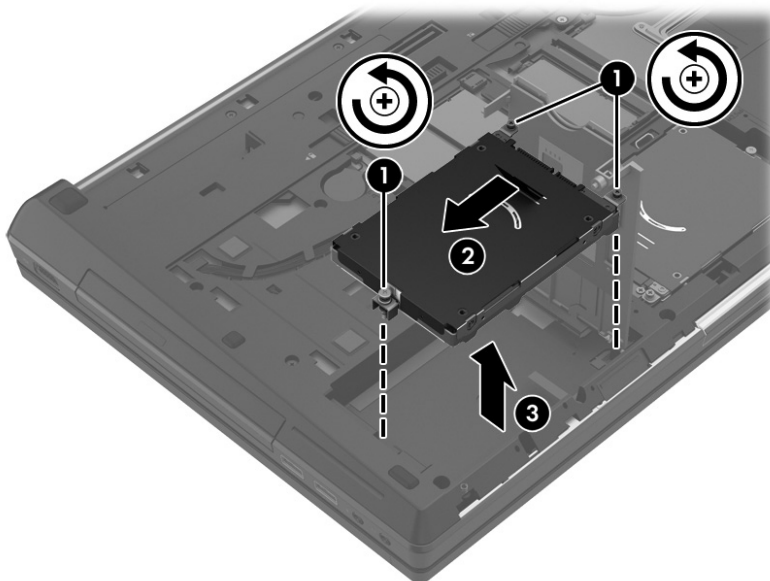
Before removing the primary hard drive, follow these steps:

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 51](#)).
5. Remove the service access cover (see [Service access cover on page 52](#)).
6. Position the computer with the front toward you.
7. Loosen the captive screw on the Smart Card reader **(1)**.

8. Lift the Smart Card reader to the upright position (2).

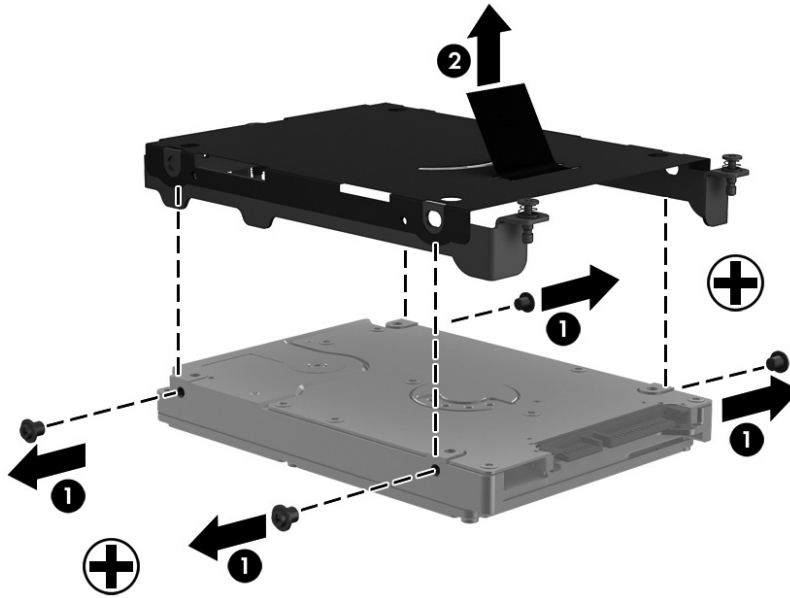


9. Loosen the Phillips M2.5x10.5 captive screws (1) that secure the hard drive to the computer.
10. Grasp the tab on the hard drive and slide the hard drive (2) to disconnect it from the system board.
11. Lift the left side of the hard drive and remove the hard drive at an angle from the hard drive bay (3).




12. If it is necessary to remove the hard drive bracket, follow these steps:
 - a. Remove the four Phillips M3.0x3.0 screws (1) that secure the hard drive bracket to the hard drive.

- b. Lift the bracket (2) straight up to remove it from the hard drive.



Reverse this procedure to reassemble and install the hard drive.

Secondary hard drive

 **NOTE:** The hard drive bracket is included in the Hard Drive Hardware Kit, spare part number 642774-001.

Description	Spare part number
750 GB, 7200-rpm SATA hard drive	633252-001
500 GB, 7200-rpm SATA hard drive	634925-001
320 GB, 7200-rpm SATA hard drive	634862-001
24 GB solid-state drive (includes bracket and screws)	701479-001

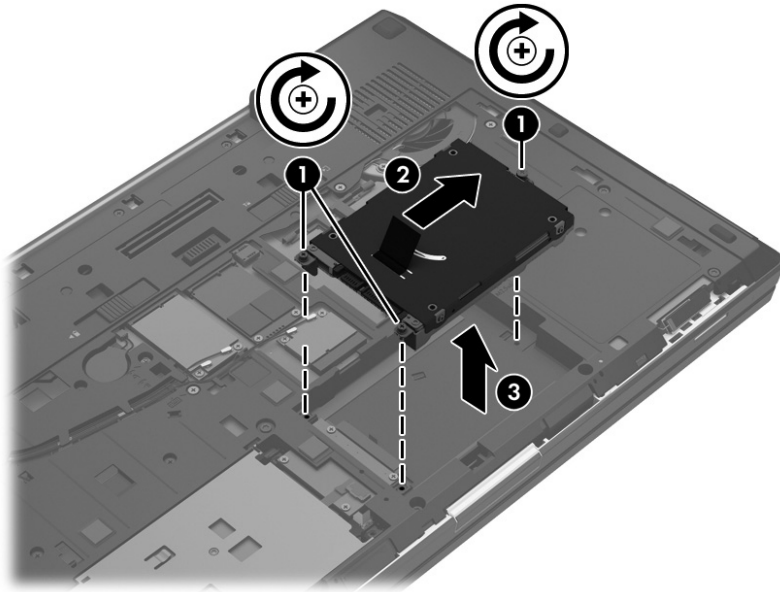
Before removing the secondary hard drive, follow these steps:

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 51](#)).
5. Remove the service access cover (see [Service access cover on page 52](#)).

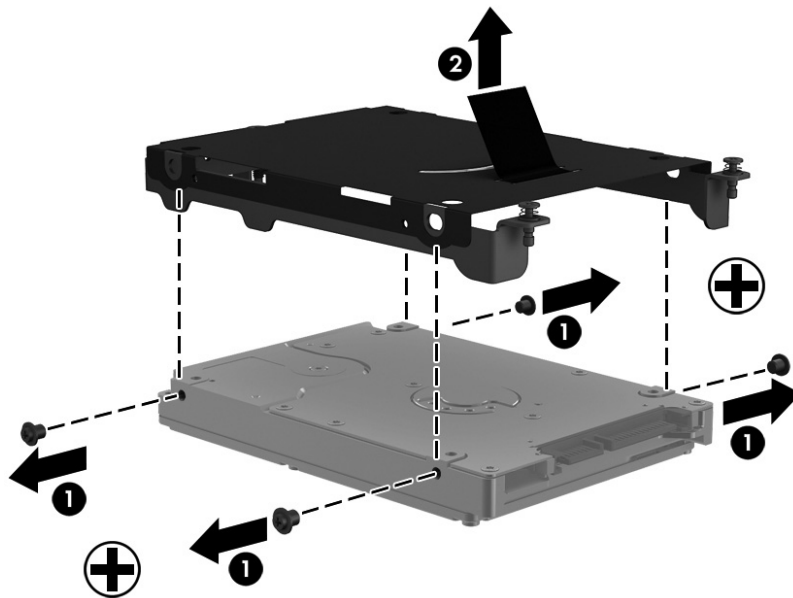
Remove the secondary hard drive:

1. Position the computer with the front toward you.
2. Loosen the Phillips M2.5x10.5 captive screws (1) that secure the hard drive to the computer.

3. Grasp the tab and slide the hard drive (2) to the right. Lift the hard drive up to remove it from the hard drive bay (3).



4. If it is necessary to remove the hard drive bracket, follow these steps:
 - a. Remove the four Phillips M3.0x3.0 screws (1) that secure the hard drive bracket to the hard drive.
 - b. Lift the bracket (2) straight up to remove it.



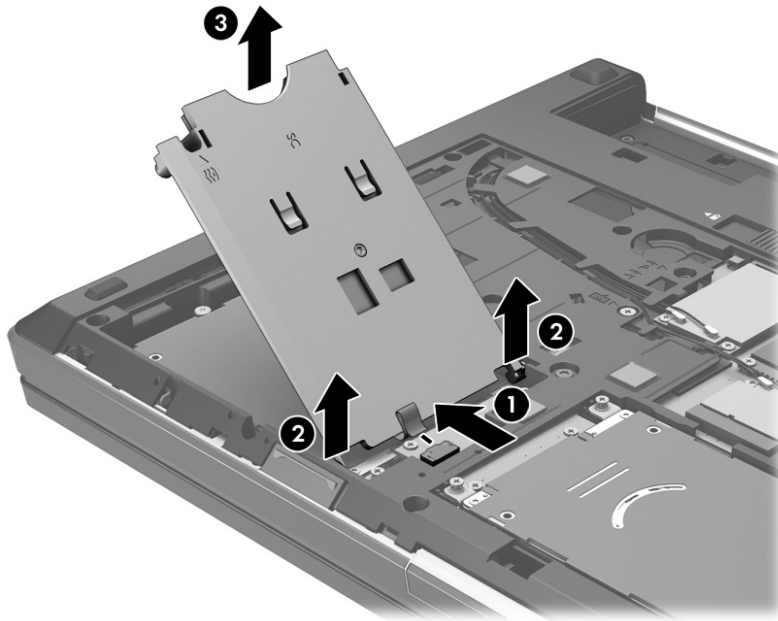
Reverse this procedure to reassemble and install the secondary hard drive.

Smart Card reader

Description	Spare part number
Smart Card reader (with cable)	688742-001
Smart Card reader cover	652546-001

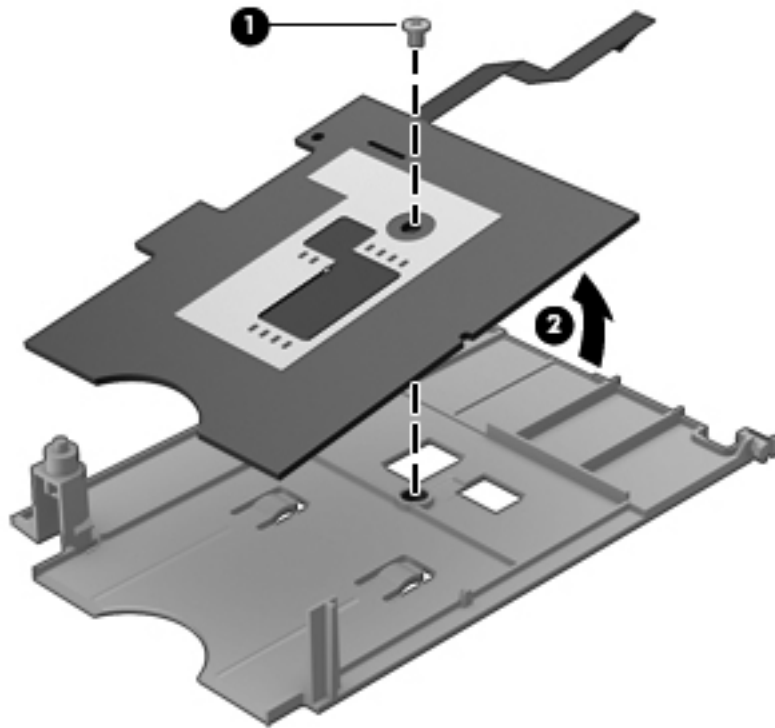
Before removing the Smart Card reader, follow these steps:

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 51](#)).
5. Remove the service access cover (see [Service access cover on page 52](#)).
6. Position the computer with the front toward you.
7. Disconnect the zero insertion force (ZIF) connector **(1)**, lift up the smart card reader until it is almost vertical **(2)**, and then remove the smart card reader **(3)**.




8. Remove the Phillips M3.0x2.5 screw **(1)** that secures the Smart Card reader board to the Smart Card reader cover.

- Slide the Smart Card reader back toward the hinges on the Smart Card reader cover, and remove the Smart Card reader board (2).



Reverse this procedure to reassemble and install the Smart Card reader.

Bluetooth module

 **NOTE:** The Bluetooth module spare part kit does not include a Bluetooth module cable. The Bluetooth module cable is included in the Cable Kit, spare part number 652545-001. See [Bluetooth module cable on page 103](#) for information on replacing the Bluetooth module cable.

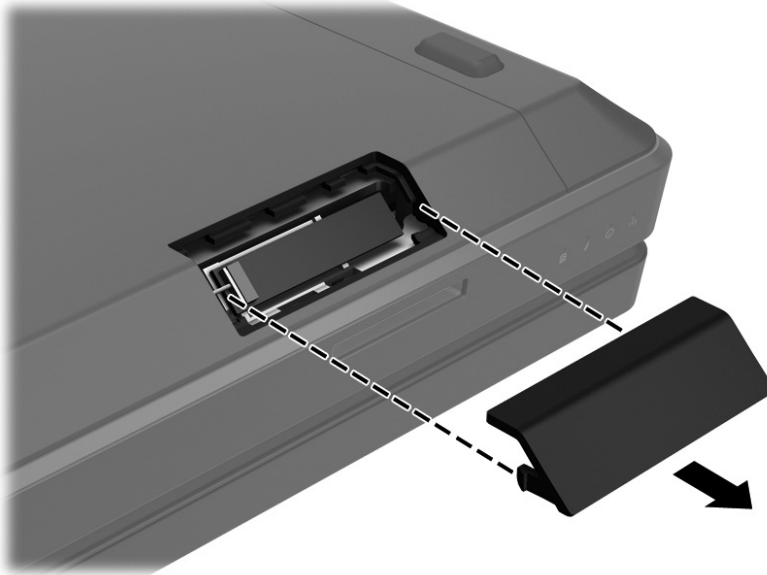
Description	Spare part number
Bluetooth module	655792-001

Before removing the Bluetooth module, follow these steps:

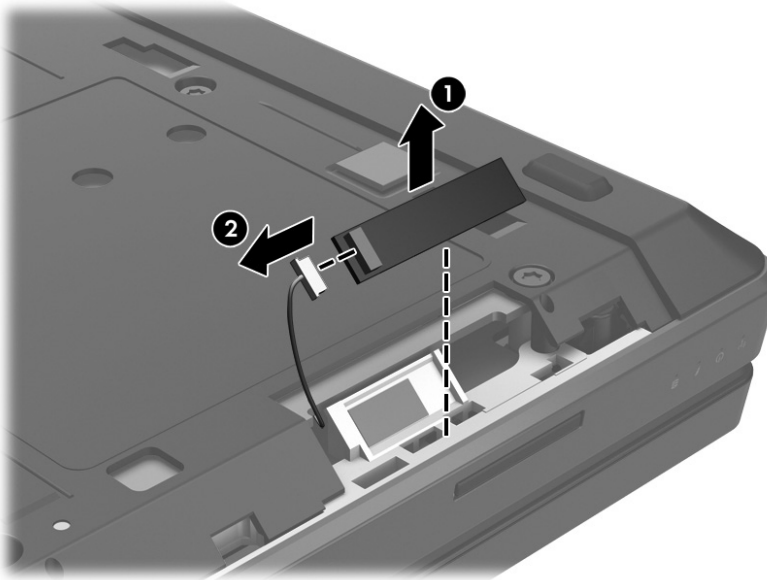
- Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
- Disconnect all external devices connected to the computer.
- Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
- Remove the battery (see [Battery on page 51](#)).
- Remove the service access cover (see [Service access cover on page 52](#)).

Remove the Bluetooth module:

1. Remove the Bluetooth module cover.



2. Gently pry the Bluetooth module away from the adhesive in the base enclosure and lift the Bluetooth module (1).
3. Disconnect the Bluetooth module from the Bluetooth cable (2), and remove the module.



Reverse this procedure to install the Bluetooth module.

WLAN module

Description	Spare part number
Intel® Centrino™ Advanced-N 6205, 802.11a/b/g/n WLAN module	695915-001

Description	Spare part number
Intel Centrino Ultimate-N 6300, 802.11a/b/g/n WLAN module	698588-001
Broadcom 802.11a/b/g/n 2x2WiFi Adapter	669832-001

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

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 51](#)).
5. Remove the service access cover (see [Service access cover on page 52](#)).

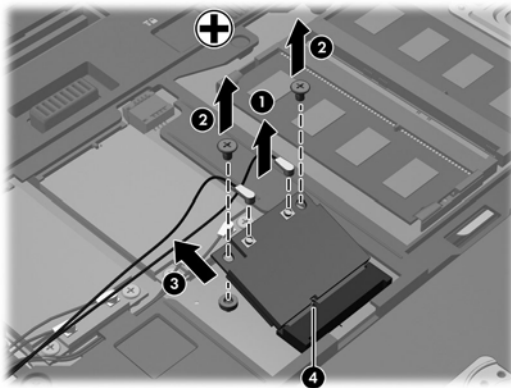
Remove the WLAN module:

1. Position the computer with the front toward you.
2. Disconnect the WLAN antenna cables (1) from the terminals on the WLAN module.

NOTE: The WLAN antenna cables are numbered and connect from left to right on the WLAN module.

3. Remove the two Phillips M2.0×2.0 screws (2) that secure the WLAN module to the system board. (The WLAN module tilts up.)
4. Remove the WLAN module (3) by pulling the module away from the slot at an angle.

NOTE: WLAN modules are designed with a notch (4) to prevent incorrect insertion of the WLAN module into the WLAN module slot.



Reverse this procedure to install the WLAN module.

WWAN module

Description	Spare part number
HP un2430 EV-DO/HSPA Mobile Broadband Module	634400-001
HP hs2340 HSPA+ Mobile Broadband Module	668969-001
HP un2430 EV-DO/HSPA minicard9999	702080-001
HSPA+ with GPS minicard	710788-001

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

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

Before removing the WWAN module, follow these steps:

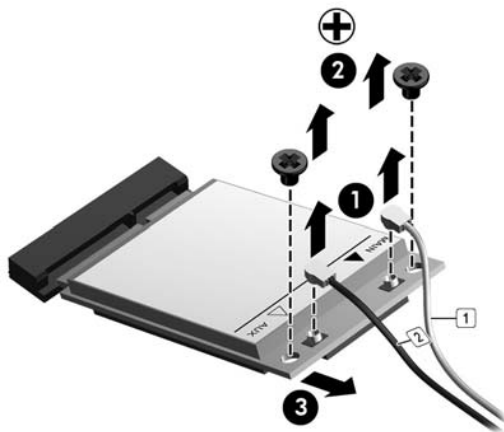
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 51](#)).
5. Remove the service access cover (see [Service access cover on page 52](#)).

Remove the WWAN module:

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

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

2. Remove the two Phillips M2.0×2.0 screws (2) that secure the WWAN module to the system board. (The WWAN module tilts up.)
3. Remove the WWAN module (3) by pulling the module away from the slot at an angle.



Reverse this procedure to install the WWAN module.

RTC battery


Description	Spare part number
RTC battery	651948-001

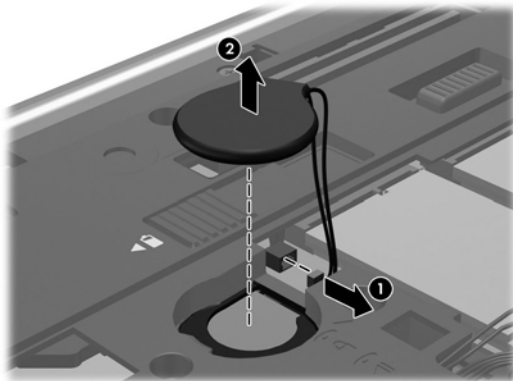
Before removing the RTC battery, follow these steps:

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 51](#)).
5. Remove the service access cover (see [Service access cover on page 52](#)).

Remove the RTC battery:


- ▲ Disconnect the RTC battery cable (1) from the system board and remove the RTC battery (2).

 **NOTE:** You may need to remove some double-sided adhesive.



Reverse this procedure to install the RTC battery.

Optical drive

 **NOTE:** The upgrade bay supports both optical drives and hard drives. If you switch from a hard drive to an optical drive in the upgrade bay, you will need to remove four additional screws that secure the hard drive carrier.

Description	Spare part number
Blu-ray R/RE DVD±RW SuperMulti Double-Layer Drive	688772-001
DVD±RW SuperMulti Double-Layer Drive	688770-001

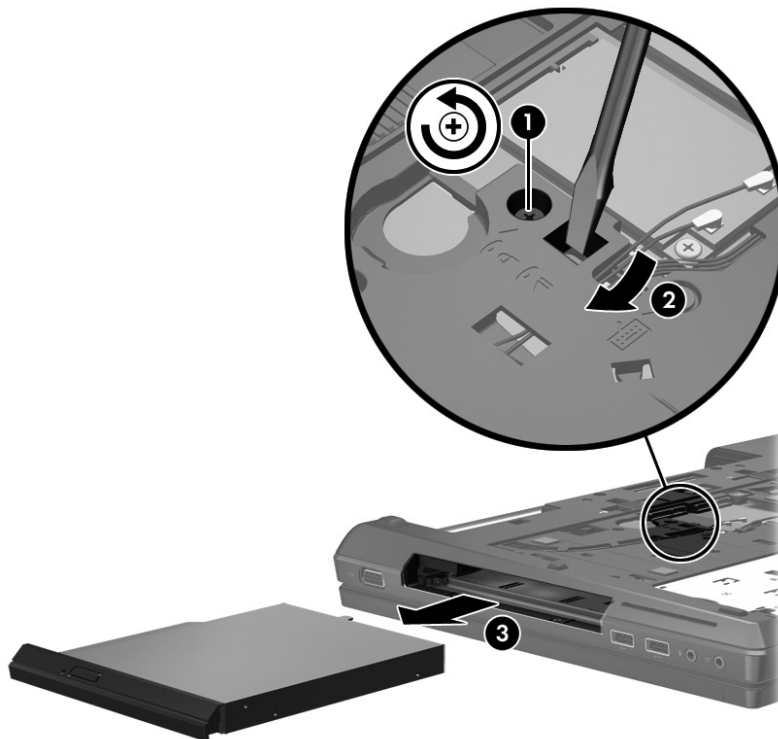
Description	Spare part number
Blu-ray ROM DVD±RW SuperMulti Double-Layer Drive	688771-001
DVD-ROM Drive	688769-001

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 51](#)).
5. Remove the service access cover (see [Service access cover on page 52](#)).

Remove the optical drive:

1. Position the computer with the front toward you.
2. Loosen the Phillips captive screw (1) that secures the optical drive to the computer.
3. Insert a flat-bladed screwdriver or similar tool into the optical drive tab access (2) and press the tab to the left to release the optical drive from the computer.
4. Remove the optical drive (3).



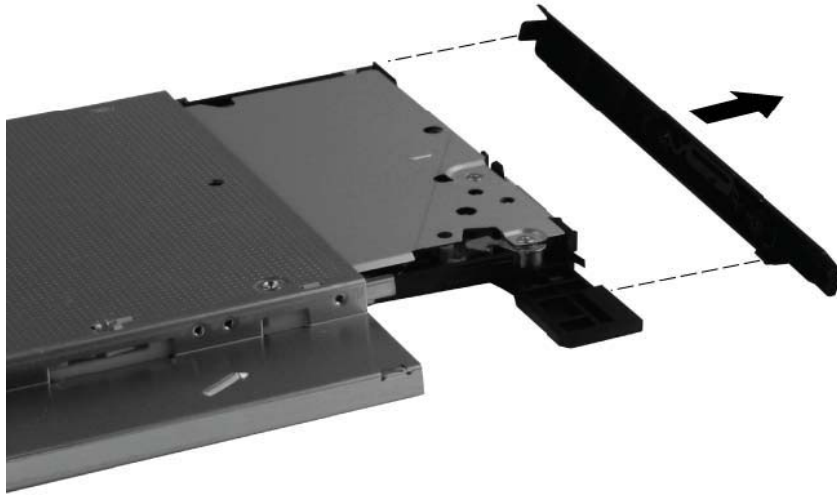
5. If it is necessary to replace the optical drive bracket:
 - a. Position the optical drive with the rear toward you.
 - b. Remove the three Phillips M2.0×3.0 screws (1) that secure the optical drive bracket to the optical drive.
 - c. Remove the optical drive bracket (2).



6. If it is necessary to remove the optical drive bezel:
 - a. Insert the end of a paper clip into the release access hole (1) in the optical drive bezel. Press in gently until the tray is released.
 - b. Firmly pull outward on the open tray (2) until the optical drive slides out.




- c. Firmly pull outward on the bezel to remove the bezel from the optical drive tray.



Reverse this procedure to reassemble and install the optical drive.

Upgrade bay hard drive

 **NOTE:** The hard drive bracket is included in the Hard Drive Hardware Kit, spare part number 642774-001.

Description	Spare part number
7.0 mm, 9.5 mm, or 12.7 mm 500 GB hard drive, 7200 rpm	634925-001

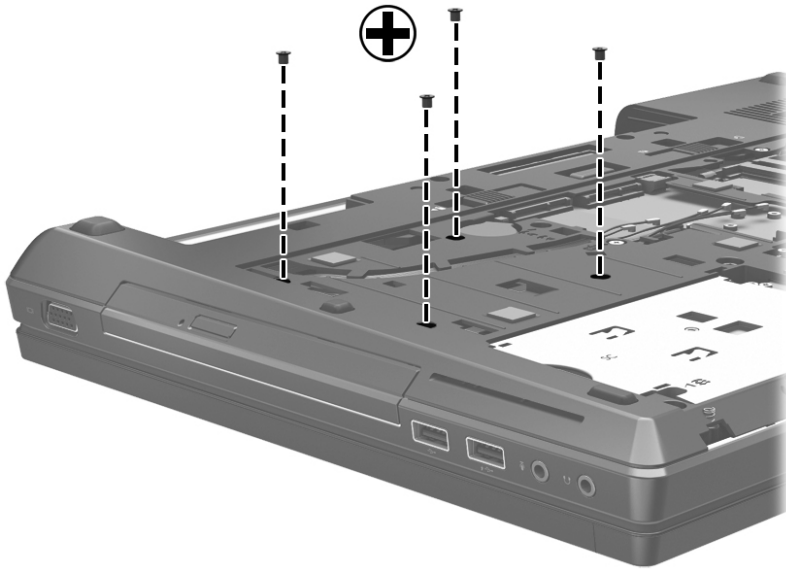
Before removing the upgrade bay hard drive, follow these steps:

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 51](#)).
5. Remove the service access cover (see [Service access cover on page 52](#)).

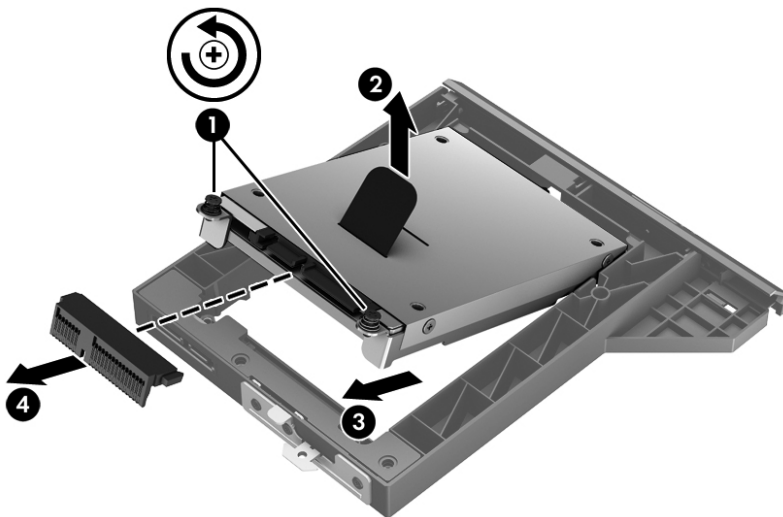
Remove the upgrade bay hard drive:

1. Position the computer with the front toward you.

2. Remove the four Phillips PM3.0×3.0 screws that secure the upgrade bay hard drive carrier to the computer.



3. Loosen the 2 Phillips captive screws (1) that secure the hard drive to the carrier.
4. Insert a flat-bladed screwdriver or similar tool into the upgrade bay hard drive tab access (2) and press the tab to the left to release the upgrade bay hard drive from the computer.
5. Lift and remove the upgrade bay hard drive (3), and then remove the hard disk drive interface connector (4).



Reverse this procedure to reassemble and install the upgrade bay hard drive and upgrade bay hard drive carrier.

Primary memory module




NOTE: Primary memory is installed under the keyboard.

A computer having a system board with spare part number 690034-001 or 688745-001 has two memory slots (primary memory slots). When adding or replacing memory modules, slot 1 must be populated before slot 2 is populated.

A computer having a system board with spare part number 688746-001 or 690035-001 has four memory slots (expansion memory slots) (on the bottom of the computer) and the primary memory slots (under the keyboard). Slot 2 cannot be populated if slot 1 is not populated.

Description	Spare part number
8192 MB memory module (PC3-12800, 1600 MHz, DDR3)	670034-001
4096 MB memory module (PC3-12800, 1600 MHz, DDR3)	641369-001
2048 MB memory module (PC3-12800, 1600 MHz, DDR3)	652972-001


 **NOTE:** A memory module must be installed in the bottom primary memory module slot before a memory module is installed in the top primary memory module slot.

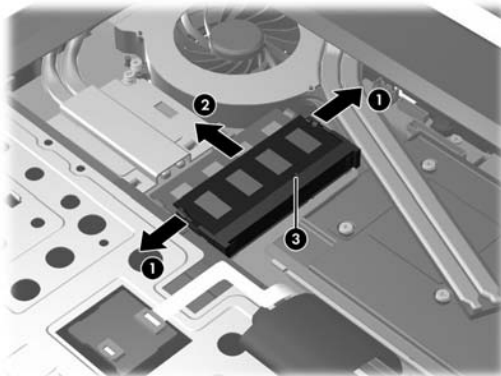
Before removing a primary memory module, follow these steps:

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 51](#)).
5. Remove the service access cover (see [Service access cover on page 52](#)).
6. Remove the hard drive (see [Primary hard drive on page 54](#)).
7. Remove the keyboard (see [Keyboard on page 71](#)).

Remove the primary memory module:

1. Spread the retaining tabs **(1)** on each side of the primary memory module slot to release the primary memory module. (The edge of the module opposite the slot rises away from the computer.)
2. Remove the primary memory module **(2)** by pulling the module away from the slot at an angle.

 **NOTE:** Memory modules are designed with a notch **(3)** to prevent incorrect installation into the primary memory module slots.



Reverse this procedure to install a primary memory module.

Expansion memory module



NOTE: Expansion memory slots are located in a compartment on the bottom of the computer.

A computer having a system board with spare part number 690034-001 or 688745-001 has two memory slots, which are called primary memory slots in this MSG. When you add or replace memory modules, slot 1 must be populated before slot 2 is populated.

A computer having a system board with spare part number 688746-001 or 690035-001 has four memory slots. On these computers, in both the expansion memory slots (on the bottom of the computer) and the primary memory slots (under the keyboard), slot 1 must be populated before slot 2 is populated.

Description	Spare part number
8192 MB memory module (PC3-12800, 1600 MHz, DDR3)	670034-001
4096 MB memory module (PC3-12800, 1600 MHz, DDR3)	641369-001
2048 MB memory module (PC3-12800, 1600 MHz, DDR3)	652972-001



NOTE: A memory module must be installed in the right expansion memory module slot before a memory module is installed in the left expansion memory module slot.


Before removing an expansion memory module, follow these steps:

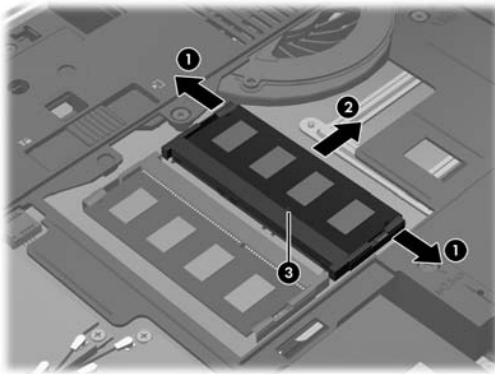
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 51](#)).
5. Remove the service access cover (see [Service access cover on page 52](#)).

Remove an expansion memory module:

1. Spread the retaining tabs **(1)** on each side of the expansion memory module slot to release the expansion memory module. (The edge of the module opposite the slot rises away from the computer.)

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

 **NOTE:** Memory modules are designed with a notch **(3)** to prevent incorrect installation into the expansion memory module slots.



Reverse this procedure to install an expansion memory module.

Keyboard


For use in:	Spare part number	For use in:	Spare part number
Keyboard with backlight (includes keyboard cable, pointing stick and pointing stick cable):			
Belgium	688738-A41	Norway	688738-091
Denmark	688738-081	Russia	688738-251
Finland and Sweden	688738-B71	France	688738-051
Germany	688738-041	South Korea	688738-AD1
Thailand	688738-281	Switzerland	688738-BG1
International	688738-B31	Taiwan	688738-AB1
The United States	688738-001	The United Kingdom and Singapore	688738-031
Italy	688738-061	Latin America	688738-161
India	688738-D61	Canada	688738-DB1
Czech Republic and Slovakia	688738-FL1		
Keyboard without backlight (includes keyboard cable, pointing stick and pointing stick cable):			
Belgium	688737-A41	Greece	688737-151
Brazil	688737-201	Norway	688737-091
Bulgaria	688737-261	Portugal	688737-131
Taiwan	688737-AB1	Russia	688737-251
Denmark	688737-081	Saudi Arabia	688737-171
Finland and Sweden	688737-B71	Slovenia	688737-BA1
France	688737-051	South Korea	688737-AD1
Latin America	688737-161	Spain	688737-071
Germany	688737-041	Switzerland	688737-BG1
Romania	688737-271	Northwest Africa	688737-FP1
Hungary	688737-211	Thailand	688737-281
Iceland	688737-DD1	Turkey	688737-141
International	688737-B31	The United Kingdom and Singapore	688737-031
Israel	688737-BB1	The United States	688737-001
Italy	688737-061	India	688737-D61
Japan	688737-291	Canada	688737-DB1
Czech Republic and Slovakia	688737-FL1		
Windows 8 Keyboard without backlight (includes keyboard cable, pointing stick and pointing stick cable):			
United States	701977-001	Northwest Africa	701977-FP1
The United Kingdom and Singapore	701977-031	Germany	701977-041
France	701977-051	Italy	701977-061

For use in:	Spare part number	For use in:	Spare part number
Spain	701977-071	Denmark	701977-081
Norway	701977-091	Portugal	701977-131
Turkey	701977-141	Greece	701977-151
Latin America	701977-161	Saudi Arabia	701977-171
Brazil	701977-201	Hungary	701977-211
Russia	701977-251	Bulgaria	701977-261
Romania	701977-271	Thailand	701977-281
Japan	701977-291	Belgium	701977-A41
Taiwan	701977-AB1	South Korea	701977-AD1
Internationally	701977-B31	Finland and Sweden	701977-B71
Slovenia	701977-BA1	Israel	701977-BB1
Switzerland	701977-BG1	India	701977-D61
Canada	701977-DB1	Iceland	701977-DD1
Czech Republic and Slovakia	701977-FL1		
Windows 8 Keyboard with backlight (includes keyboard cable, pointing stick and pointing stick cable):			
The United States	701978-001	The United Kingdom and Singapore	701978-031
Germany	701978-041	France	701978-051
Italy	701978-061	Denmark	701978-081
Norway	701978-091	Latin America	701978-161
Russia	701978-251	Thailand	701978-281
Belgium	701978-A41	Taiwan	701978-AB1
South Korea	701978-AD1	Internationally	701978-B31
Sweden and Finland	701978-B71	Switzerland	701978-BG1
India	701978-D61	Canada	701978-DB1
Czech Republic and Slovakia	701978-FL1		

Before removing the keyboard, follow these steps:

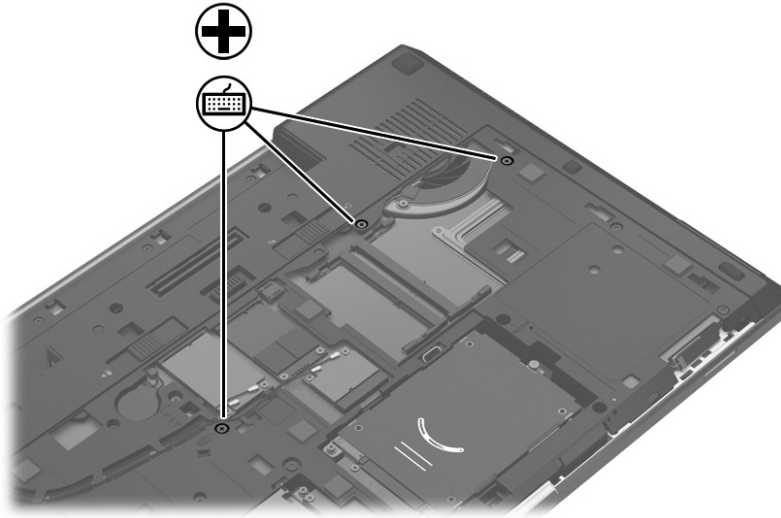
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 51](#)).

5. Remove the service access cover (see [Service access cover on page 52](#)).
6. Remove the optical drive (see [Optical drive on page 63](#)) or upgrade bay hard drive (see [Upgrade bay hard drive on page 66](#)).

 **NOTE:** The optical drive or hard drive carrier in the upgrade bay must be removed in order to remove the keyboard.


Remove the keyboard:

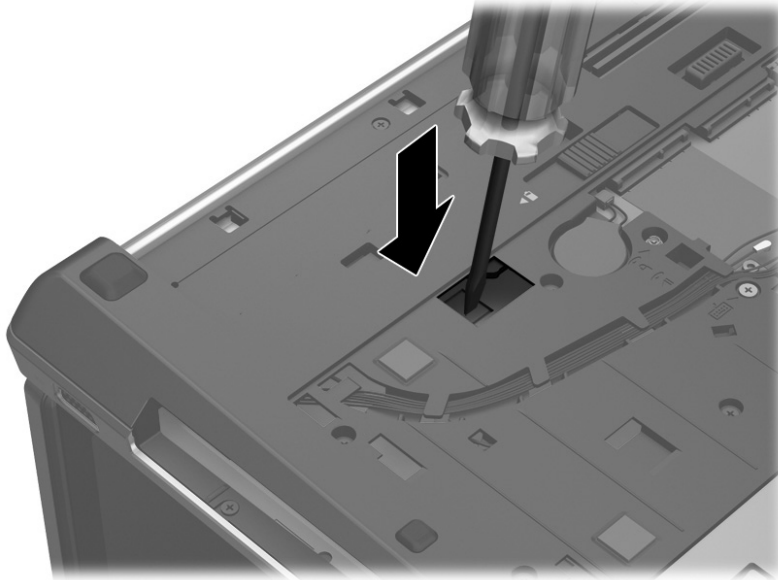
1. Position the computer with the front toward you.
2. Loosen the three Phillips captive screws that secure the keyboard to the computer.



3. Position the computer on its side with the display open at a 90 degree angle.

4. Insert a small tool at an angle through the hole in the optical drive bay at an angle to push out the top edge of the keyboard. This gives you access to the back of the keyboard and releases the top edge of the keyboard.

 **NOTE:** Make sure that the optical drive or upgrade hard drive have been removed before performing this procedure.

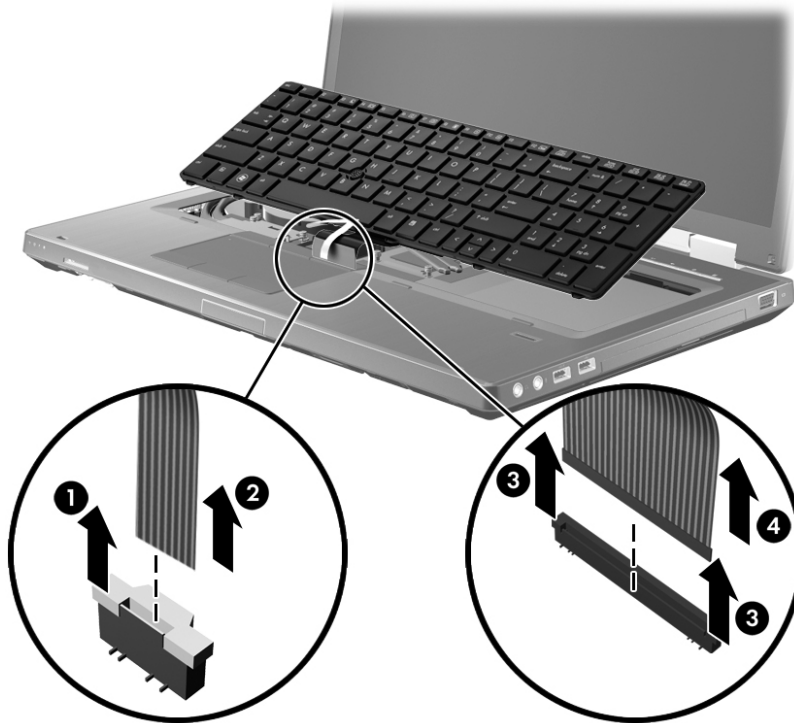


5. Turn the computer right-side up, with the front toward you.
6. Open the display as far as it will open.
7. Lift the top edge **(1)** of the keyboard until it rests at an angle.
8. Slide the keyboard back toward the display **(2)**.




9. Release the keyboard ZIF connector **(1)** and lift the keyboard cable **(2)** to release it.

- Release the pointing stick ZIF connector (3) and lift the cable (4) to release it.




Reverse this procedure to install the keyboard.

Fan/graphics board heat sink assembly

 **NOTE:** The fan/graphics board heat sink assemblies include replacement thermal material.

Description	Spare part number
For use only with computer models equipped with AMD graphics subsystems	688733-001
For use only with computer models equipped with NVIDIA graphics subsystems	696435-001

 **NOTE:** To properly ventilate the computer, allow at least a 7.6-cm (3-inch) 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 graphics board heat sink, follow these steps:

- 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.
- Disconnect all external devices connected to the computer.
- 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 (see [Battery on page 51](#)).

5. Remove the service access cover (see [Service access cover](#)).
6. Remove the optical drive (see [Optical drive on page 63](#)) or upgrade bay hard drive (see [Upgrade bay hard drive on page 66](#)).
7. Remove the keyboard (see [Keyboard on page 71](#)).
8. Remove the top cover (see [Top cover on page 83](#)).
9. Remove the display assembly (see [Display assembly on page 88](#)).


Remove the fan/graphics board heat sink assembly:

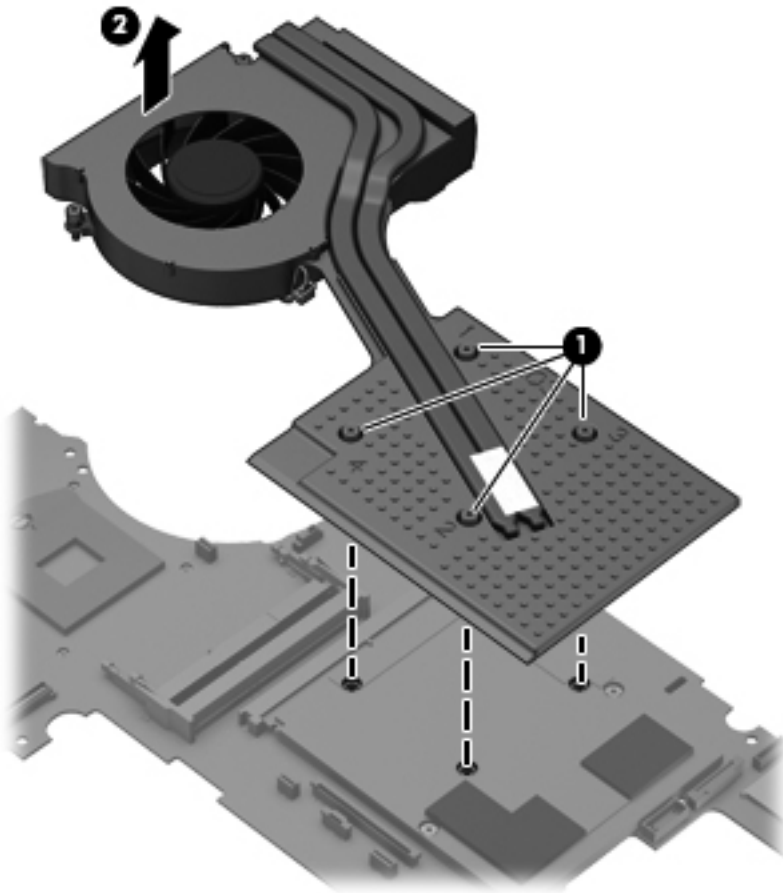



NOTE: Before proceeding, make sure you disconnect the power button board cable and the RJ-45 cable.

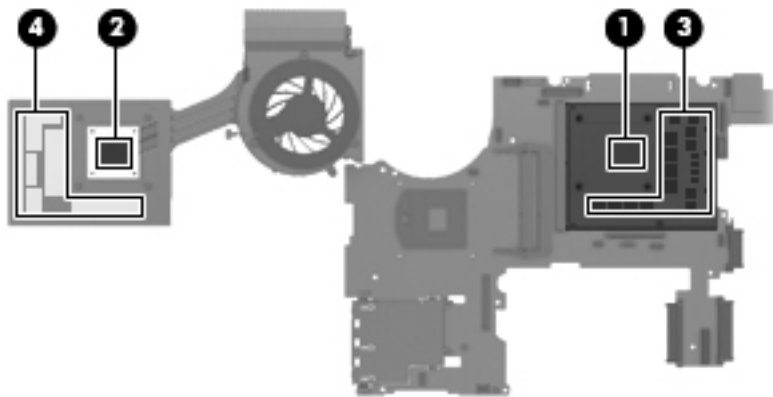
1. Following the sequence stamped into the graphics board heat sink, loosen the 4 Phillips captive screws **(1)** that secure the graphics board heat sink/fan assembly to the system board.

- Lift the heat sink/fan assembly (2) straight up to remove it.

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



 **NOTE:** The thermal material must be thoroughly cleaned from the surfaces of the graphics board heat sink and the graphics board each time the graphics board heat sink is removed: Thermal paste is used on the largest component (1) and (2) on the graphics board and the graphics board heat sink section (3) and (4) that service it.



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

Display bezel

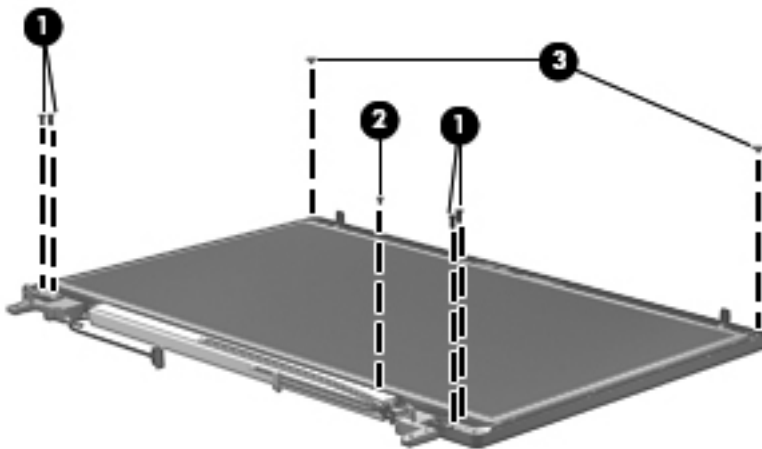
Description	Spare part number
Display bezel for use with computer models without a webcam	688763-001

Before removing the display bezel, 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 display assembly (see [Display assembly on page 88](#)).

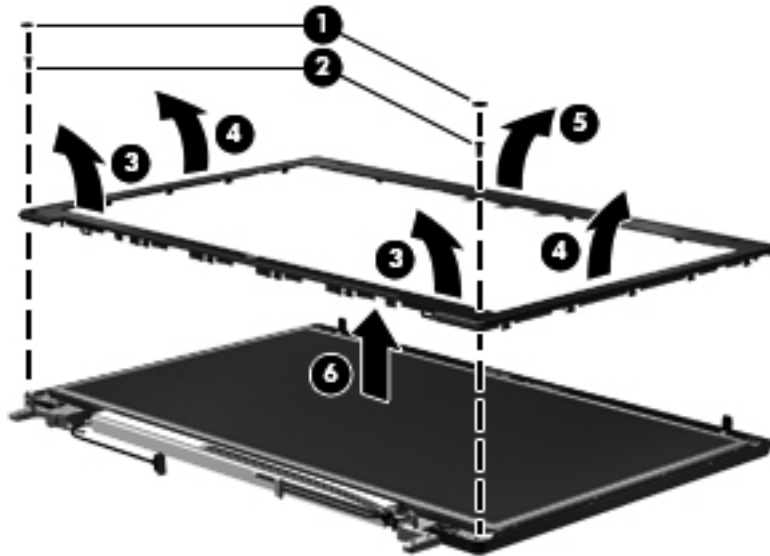
Remove the display bezel:

1. Remove the screw covers (1), the captive screw (2), and the two screws (3) that secure the display bezel to the display enclosure.



2. Remove the screw covers securing the bezel to the display panel (1), and then remove the screws (2).

3. Flex the inside edges of the top edge (3), the left and right sides (4), and the bottom edge (5) of the display bezel until the bezel disengages from the display enclosure and then remove the bezel (6).



Reverse this procedure to install the display bezel.

Display panel

Description	Spare part number
43.9 cm (17.3 in), HD+ AG LED WVA	691223-001
43.9 cm (17.3 in), FHD AG WVA	691224-001

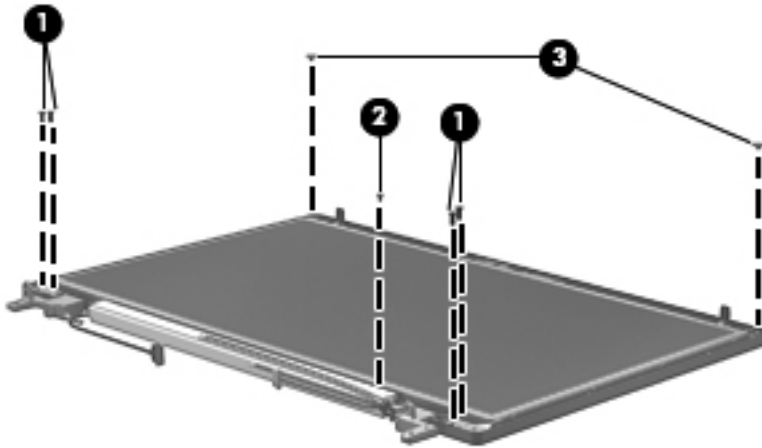
Before removing the display panel, follow these steps:

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 display assembly (see [Display assembly on page 88](#)).
5. Remove the display bezel (see [Display bezel on page 78](#)).


Remove the display panel:

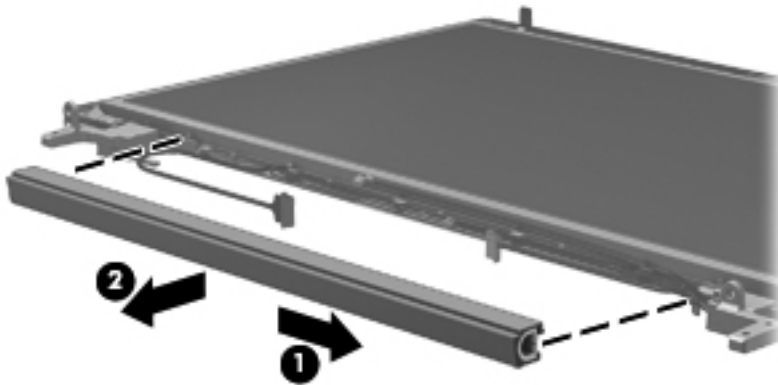
1. Remove the 2 Torx screws on each hinge (1).
2. Remove the two Phillips rawhead screws (2) on the upper left and right corners of the display panel.

3. Remove the 1 Phillips screws (3) that secure the display panel brackets to the hinge pipe.

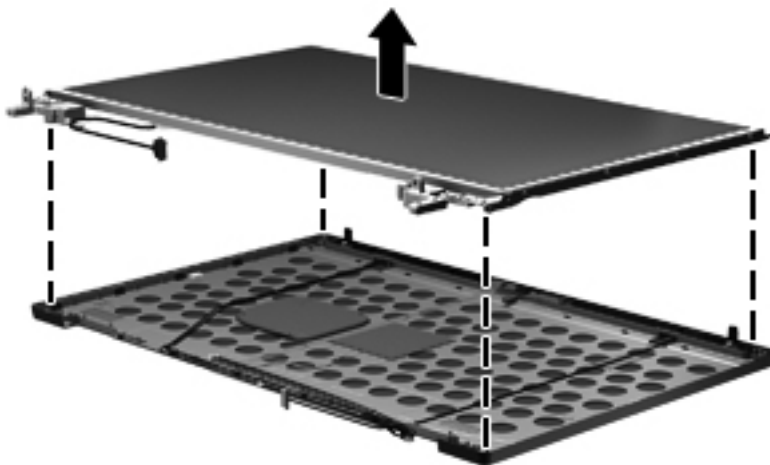


4. Slide the hinge pipe to the right (1) and remove the hinge pipe (2).

 **NOTE:** Make sure you pull back the antenna cables when removing the hinge pipe.



5. Remove the display panel.



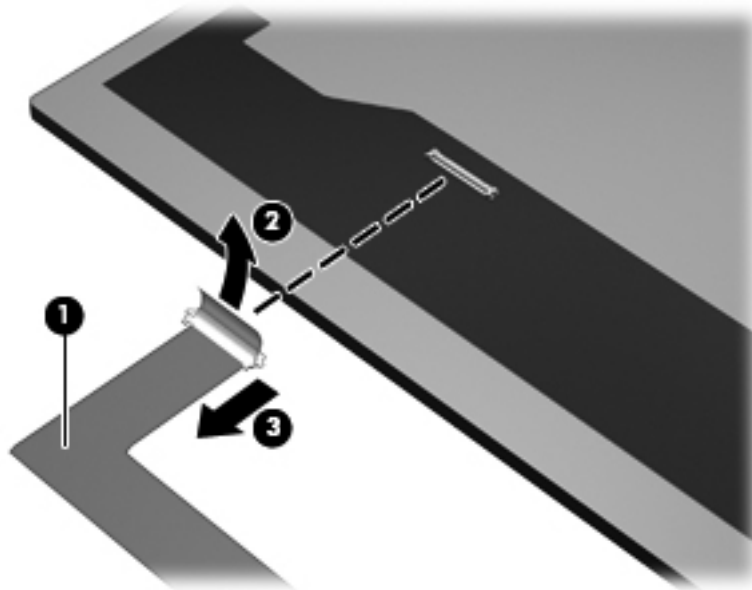
Reverse this procedure to reassemble and to install the display panel.

Display panel cable

Description	Spare part number
Display panel cable (select models only)	688761-001

To remove the display panel cable:

- ▲ Release the adhesive tape that secures the display panel cable to the display panel **(1)**. Disconnect the cable **(2)**, and then remove the cable **(3)**.

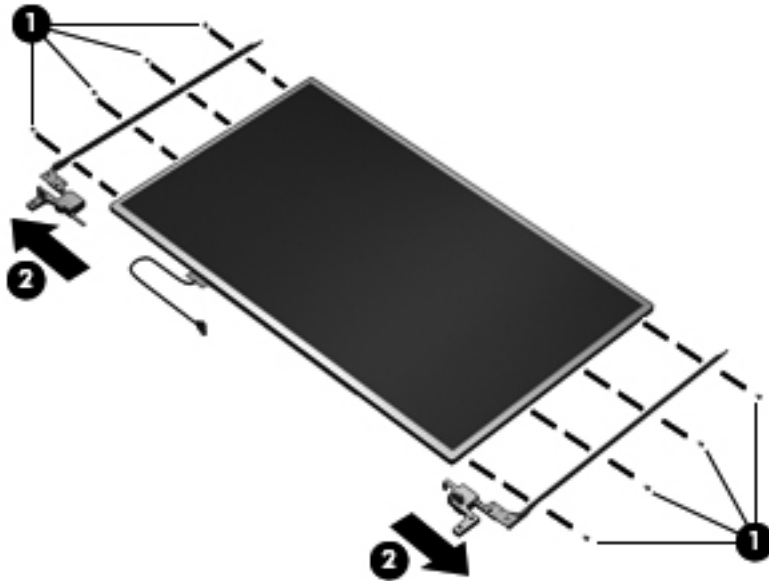


Hinge brackets

Description	Spare part number
Display hinge brackets (consists of the hinge piece and the vertical support brackets for the left and right sides)	652528-001

To remove the display panel hinge brackets:

- ▲ Remove the 4 screws that secure each hinge assembly to the panel (1), and then remove the hinge brackets (2).



Webcam module

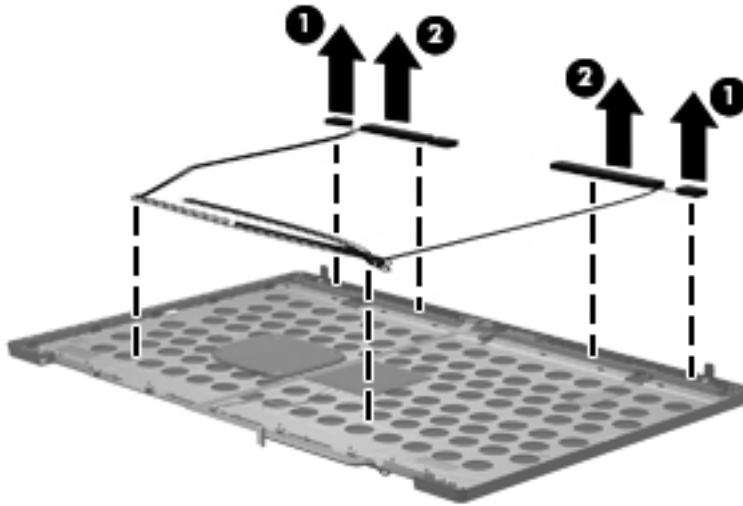
Description	Spare part number
Webcam module with microphone	688752-001

Before removing the webcam module, follow these steps:

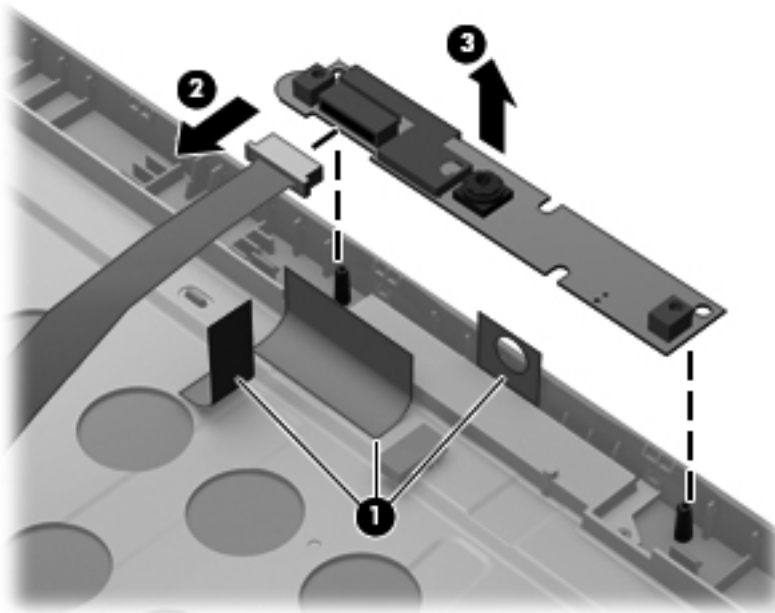
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the display assembly (see [Display assembly on page 88](#)).
5. Remove the display panel (see [Display panel on page 79](#)).

Remove the webcam module:

1. Lift the WLAN antenna cables (1), and then remove the WWAN antenna cables (2).



2. Remove the webcam cable (1) from the hinges and then disconnect the webcam cable from the display enclosure (2).
3. Remove the webcam module from the display enclosure (3).



Reverse this procedure to install the webcam module.

Top cover

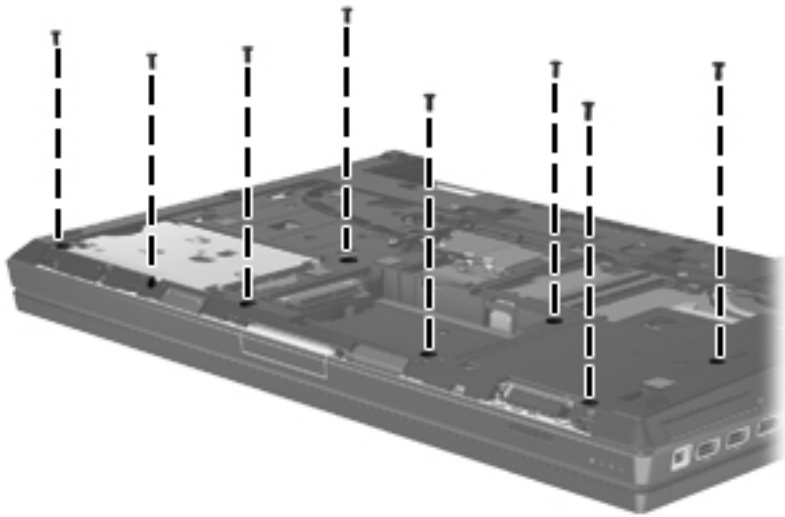
Description	Spare part number
Top cover (includes TouchPad)	688747-001

Before removing the top cover, follow these steps:

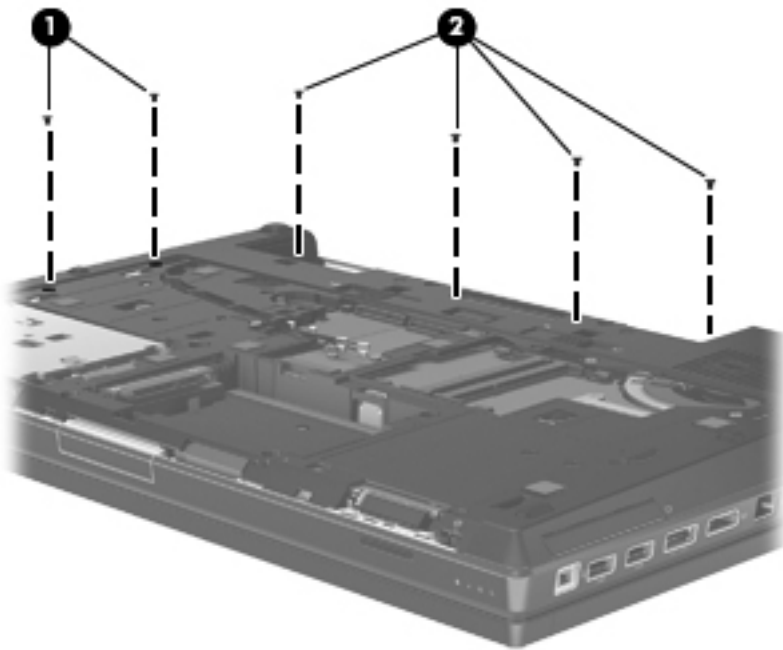
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 51](#)).
5. Remove the service access cover (see [Service access cover on page 52](#)).
6. Remove the optical drive (see [Optical drive on page 63](#)) or upgrade bay hard drive (see [Upgrade bay hard drive on page 66](#)).
7. Remove the keyboard (see [Keyboard on page 71](#)).

Remove the top cover:

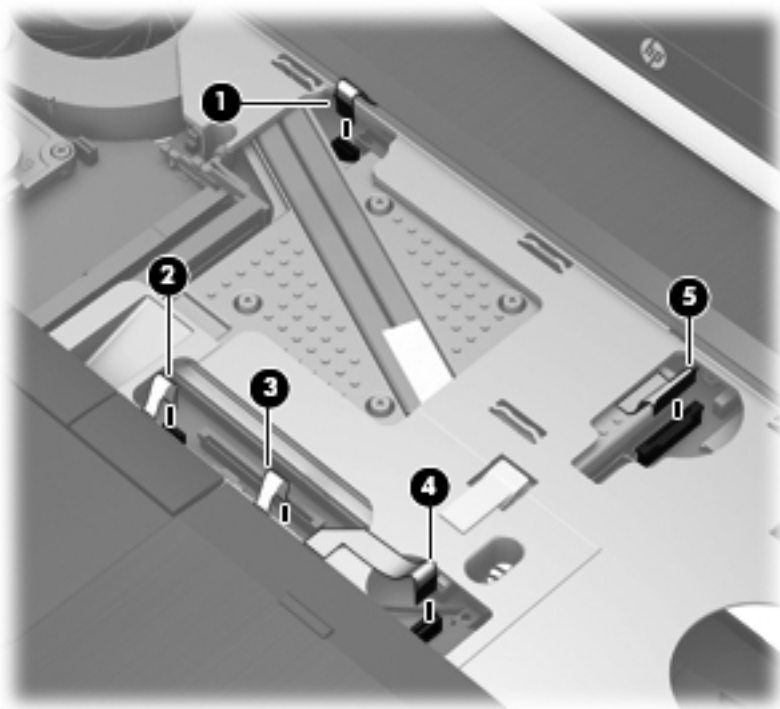
1. Position the computer right-side up, with the front toward you.
2. Remove the 8 Torx M2.5x6.0 screws that secure the base enclosure to the top cover.



3. Remove the two Phillips M2.5x3 screws in the optical drive/upgrade drive bay (1) and the four Phillips M2.5x3.0 screws inside the battery bay (2).

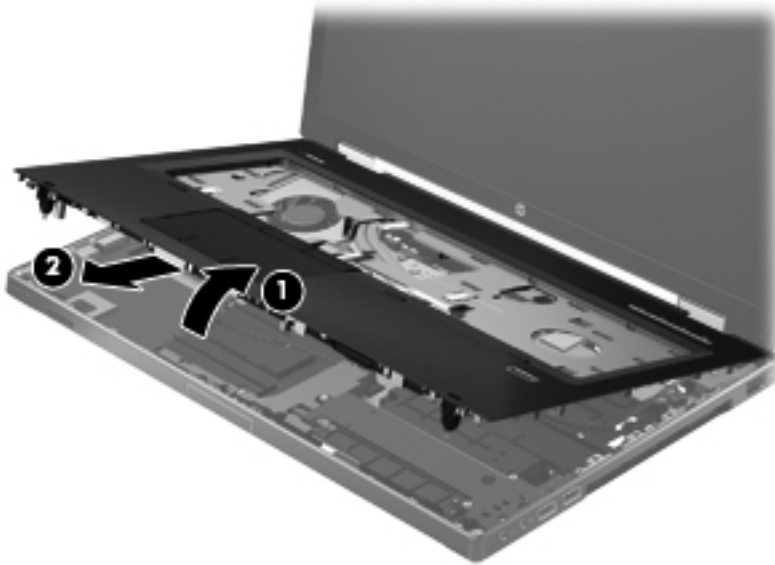


4. Disconnect the power button board cable (1). Disconnect the TouchPad cable on the left (2) and the right sides (3).
5. Disconnect the fingerprint reader cable (4) and then disconnect the application board cable (5).

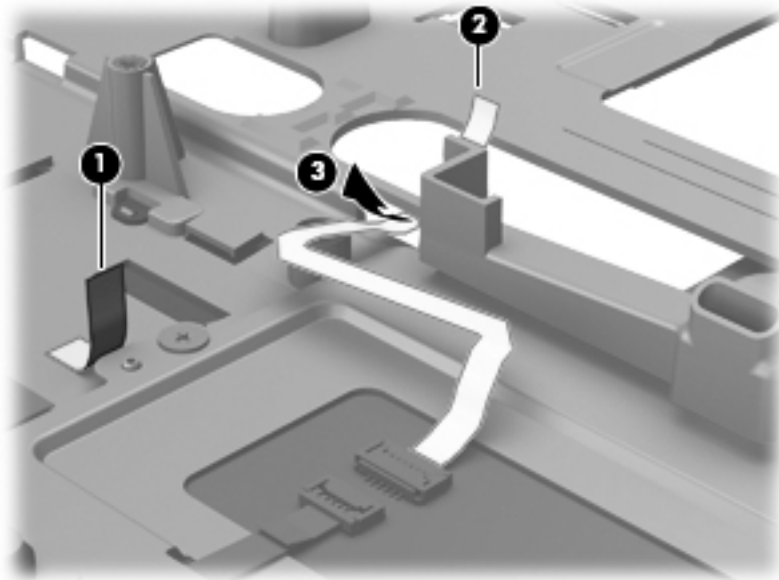


6. Position the computer right-side up.

7. Grasp the top cover by the hole in the optical disk drive/upgrade drive bay and lift up the front edge of the top cover (1).
8. Remove the top cover from the base enclosure (2).

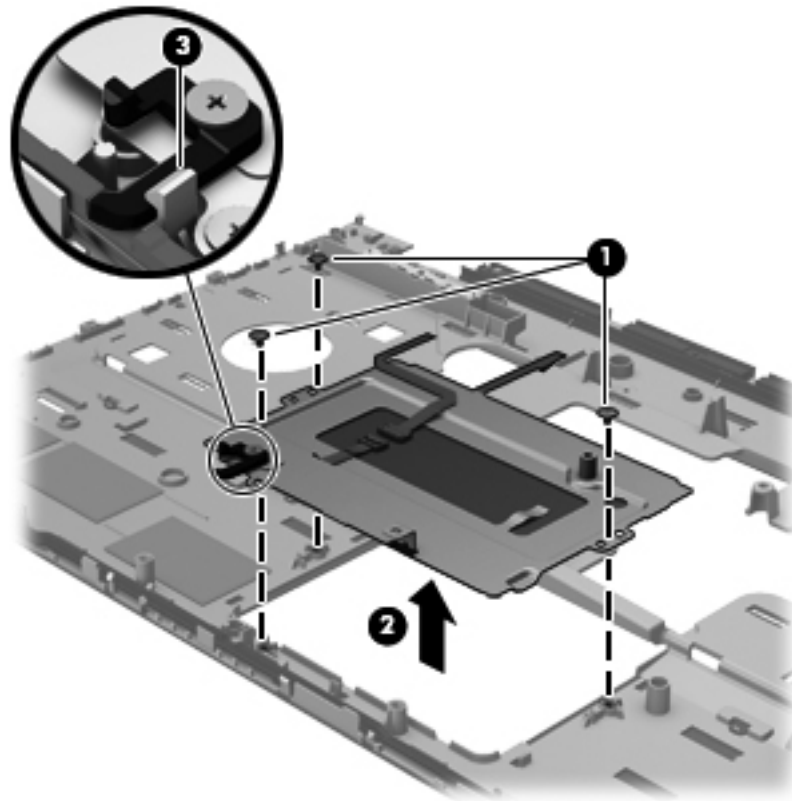


9. If it is necessary to replace the TouchPad:
 - a. Lift the adhesive tape (1), lift and release the TouchPad cable from the opening in top cover (2), and then release the TouchPad cable (3).




- b. Remove the three screws (1) securing the TouchPad to the top cover.
 - c. Release the TouchPad from the front clip (2) securing the TouchPad to the top cover.

- d. Release the TouchPad from the front right side clip (3) and then remove the TouchPad from the top cover.



Reverse this procedure to install the top cover and TouchPad.

 **NOTE:** In reversing this procedure, make sure that the display latch assembly actuator lines up correctly with the top cover to avoid damaging any components.

Display assembly

Description	Spare part number
Display panel, 43.9 cm (17.3 in), High Definition Plus (HD+) Anti-Glare (AG) LED WVA without webcam	691223-001
Display panel, 43.9 cm (17.3 in), FHD AG LED WVA	691224-001
43.9 cm (17.3 in), FHD AG RGB LED UVVA Dream Color with webcam (not available with HP Mobile Broadband)	688736-001
43.9 cm (17.3 in), FHD AG RGB LED UVVA Dream Color without webcam (not available with HP Mobile Broadband)	688735-001
Display Hinge Kit	652528-001
Display hinge covers	652529-001

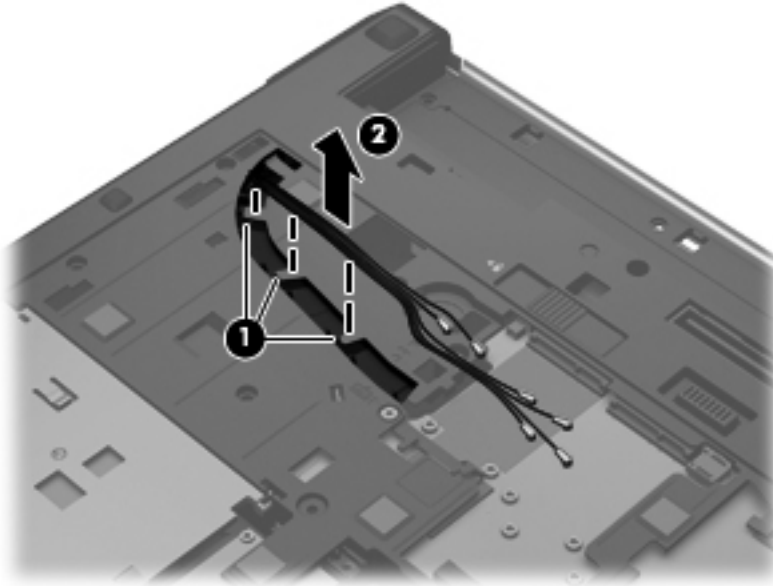
Before removing the display assembly, follow these steps:

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 51](#)).
5. Remove the service access cover (see [Service access cover on page 52](#)).
6. Remove the optical drive (see [Optical drive on page 63](#)) or upgrade bay hard drive (see [Upgrade bay hard drive on page 66](#)).
7. Remove the keyboard (see [Keyboard on page 71](#)).
8. Remove the top cover (see [Top cover on page 83](#)).

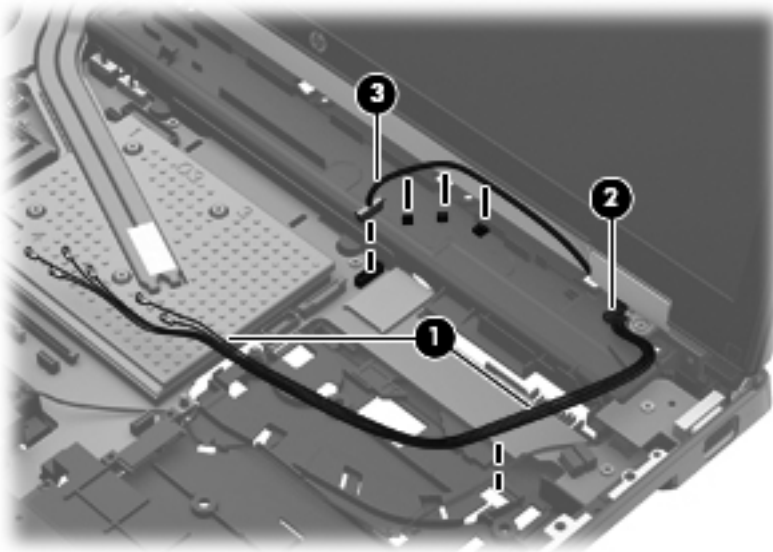
Remove the display assembly:

1. Position the computer upside down.

2. Remove the tape (1) that secures the WLAN and WWAN cables to the system board. (2).




3. Turn the computer right side up, facing you. Feed the WLAN and WWAN cables through the hole next to the keyboard screw (1), and then lift the cable free of the routing areas (2). Disconnect the webcam cable (3).

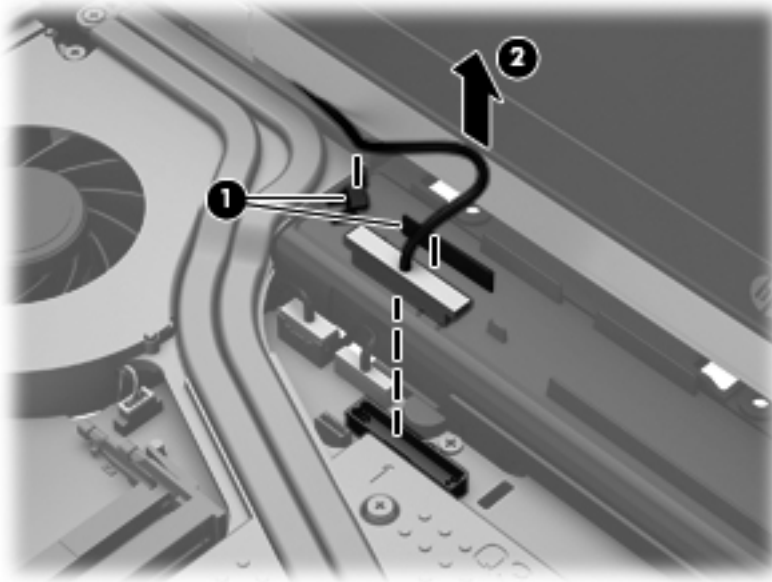


4. Position the computer with the rear towards you.

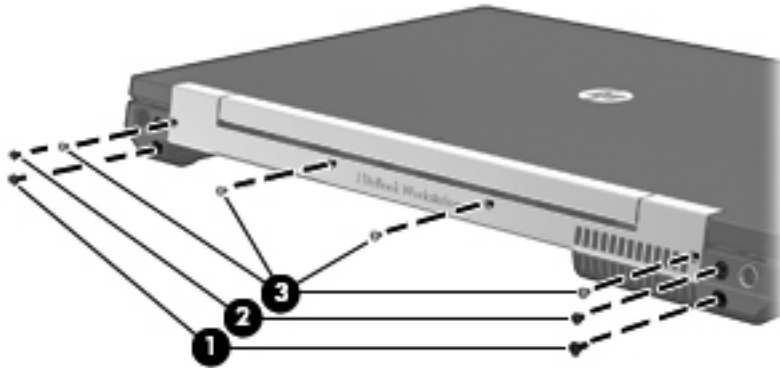
⚠ CAUTION: Support the display assembly when removing the display screws in the following steps. Failure to support the display assembly can result in damage to the assembly and other components.

5. Disconnect the display panel cable (1), and then remove the cable (2).

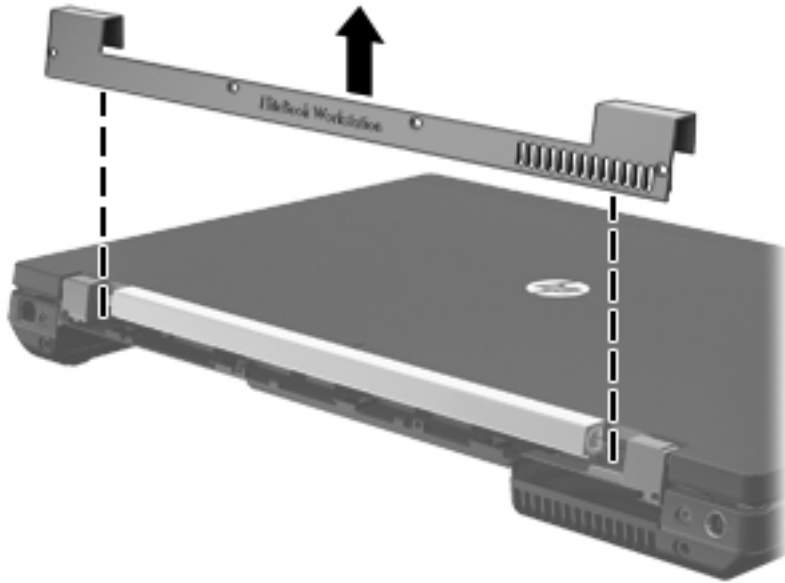
 **NOTE:** Make sure all cables are freed from the clips in the routing channel.



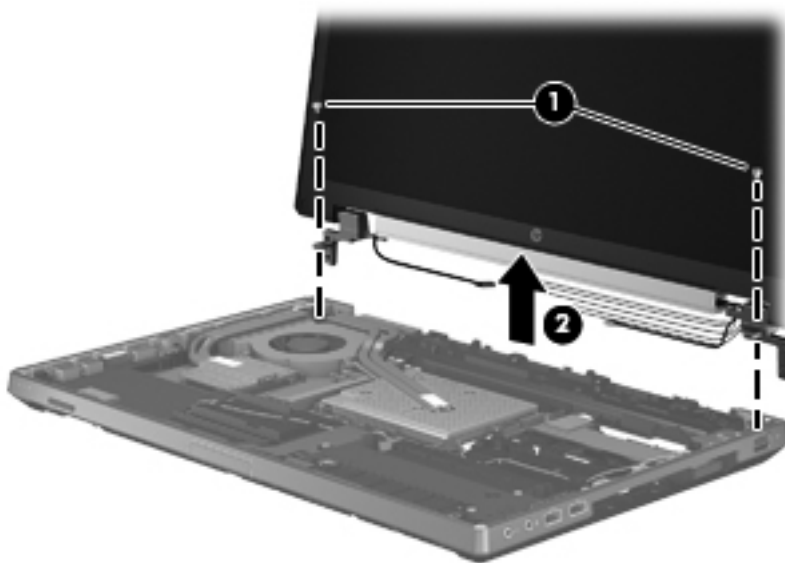
6. Turn the unit around, and then remove the Torx M2.5x7.0 screws (1) that secure the display hinges to the base enclosure. Next, remove the Torx M2.5x3.0 screws (2) that secure the hinge cover to the base enclosure. Remove the four 8 millimeter Torx screws (3) that secure the hinge cover to the base enclosure.



7. Position the computer with the rear toward you. Lift the rear hinges and remove.



8. Remove the two 6 millimeter Torx screws securing the display panel to the base enclosure (1), and then remove the display panel (2).



Reverse this procedure to reassemble and to install the display assembly.

Power button board

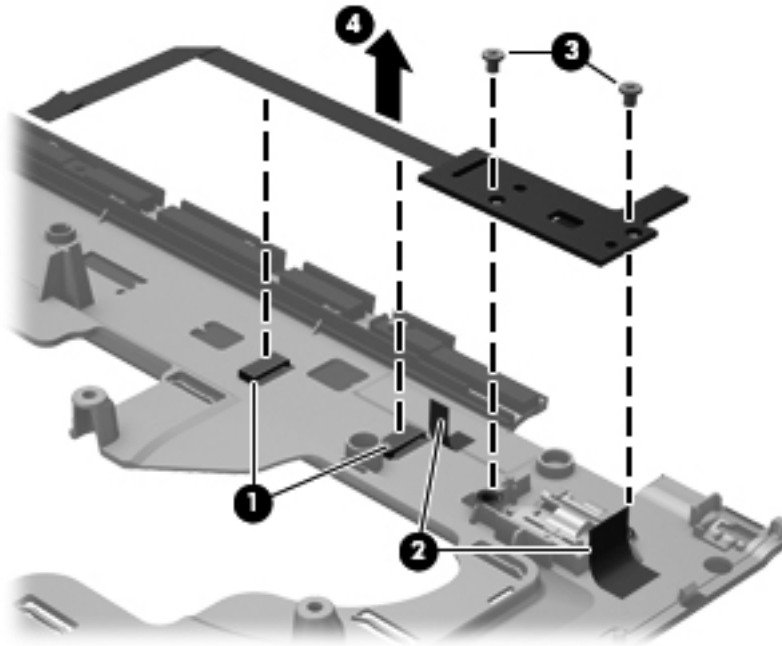
Description	Spare part number
Power button board	688749-001

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 51](#))
5. Remove the service access cover (see [Service access cover on page 52](#)).
6. Remove the optical drive (see [Optical drive on page 63](#)) or upgrade bay hard drive (see [Upgrade bay hard drive on page 66](#)).
7. Remove the keyboard (see [Keyboard on page 71](#)).
8. Remove the top cover (see [Top cover on page 83](#)).

Remove the power button board:

1. Position the top cover upside down with the front toward you.
2. Slide the power button board cable out from the clips in the top cover **(1)**.
3. Remove the conductive tape **(2)** that secures the power button board cable to the top cover.
4. Remove the two Phillips M2.5x3.0 screws **(3)** that secure the power button board to the top cover, and then remove the power button board **(4)**.



Reverse this procedure to install the power button board.

Application button board

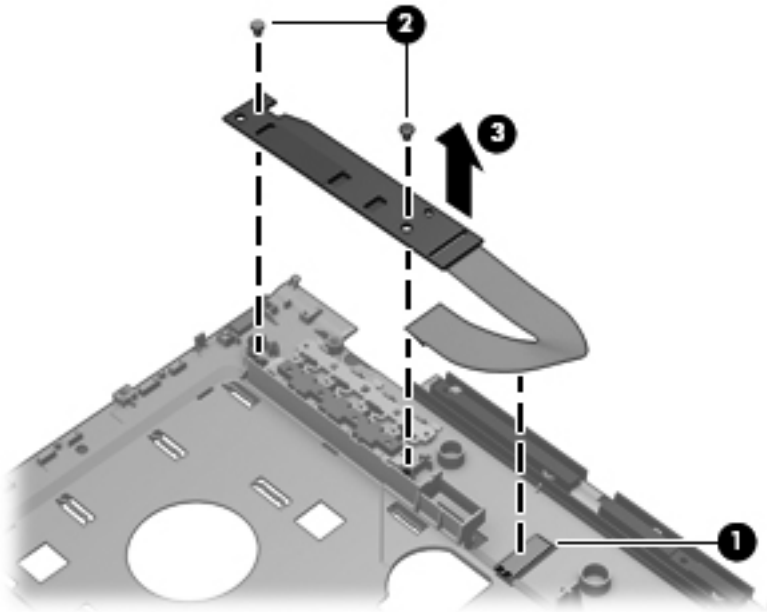
Description	Spare part number
Application button board	696901-001

Before removing the application 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 51](#)).
5. Remove the service access cover (see [Service access cover on page 52](#)).
6. Remove the optical drive (see [Optical drive on page 63](#)) or upgrade bay hard drive (see [Upgrade bay hard drive on page 66](#)).
7. Remove the keyboard (see [Keyboard on page 71](#)).
8. Remove the top cover (see [Top cover on page 83](#)).

Remove the application button board:

1. Position the top cover upside down with the front toward you.
2. Slide the application button board cable (1) out from the clip in the top cover.
3. Remove the two Phillips M2.5x3.0 screws (2) that secure the application button board to the top cover.
4. Remove the application button board (3).



Reverse this procedure to install the application button board.

Fingerprint reader

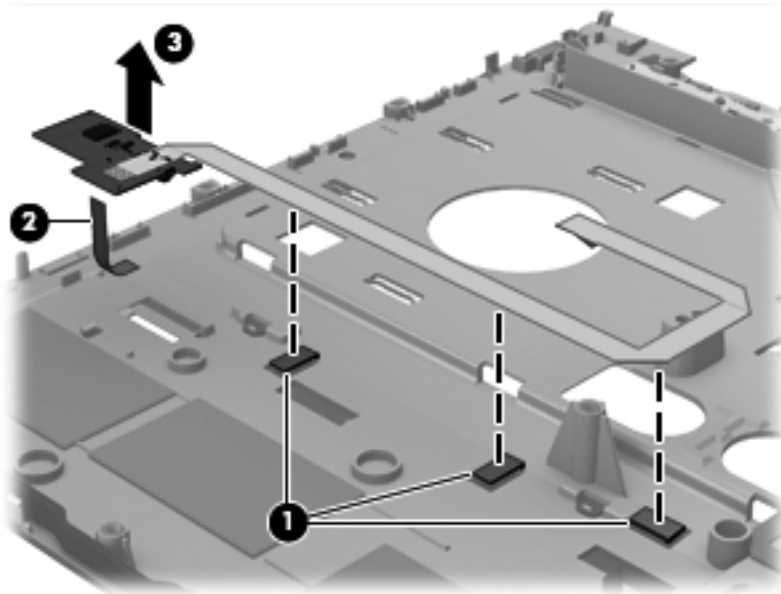
Description	Spare part number
Fingerprint reader	688743-001

Before removing the fingerprint reader, 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 51](#))
5. Remove the service access cover (see [Service access cover on page 52](#)).
6. Remove the optical drive (see [Optical drive on page 63](#)) or upgrade bay hard drive (see [Upgrade bay hard drive on page 66](#)).
7. Remove the keyboard (see [Keyboard on page 71](#)).
8. Remove the top cover (see [Top cover on page 83](#)).

Remove the fingerprint reader:

1. Position the top cover upside down with the front toward you.
2. Slide the fingerprint reader cable (1) out from the 3 clips in the top cover and remove it.
3. Peel off the tape (2) that secures the fingerprint reader to the top cover.
4. Lift the fingerprint reader (3) from the top cover.



Reverse this procedure to install the fingerprint reader.

Audio/USB 2.0 board

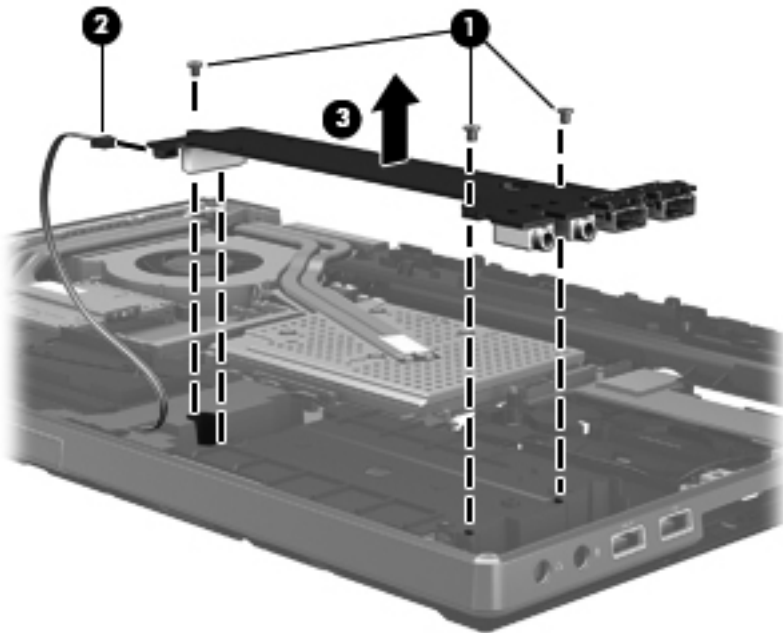
Description	Spare part number
Audio/USB 2.0 board	689284-001

Before removing the Audio/USB 2.0 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 51](#)),
5. Remove the service access cover (see [Service access cover on page 52](#)).
6. Remove the optical drive (see [Optical drive on page 63](#)) or upgrade bay hard drive (see [Upgrade bay hard drive on page 66](#)).
7. Remove the keyboard (see [Keyboard on page 71](#)).
8. Remove the top cover (see [Top cover on page 83](#)).

Remove the audio/USB 2.0 board:

1. Position the computer right-side up with the front toward you.
2. Remove the three Phillips M2.5x3.0 screws (1) that secure the audio/USB 2.0 board to the base enclosure.
3. Disconnect the speaker cable (2) from the Audio/USB 2.0 board.
4. Lift the left edge of the audio/USB 2.0 board to disconnect it from the system board and remove the audio/USB 2.0 board (3) at an angle to the left from the base enclosure



Reverse this procedure to install the audio/USB 2.0 board.

Speaker assembly

Description	Spare part number
Speaker assembly	652540-001

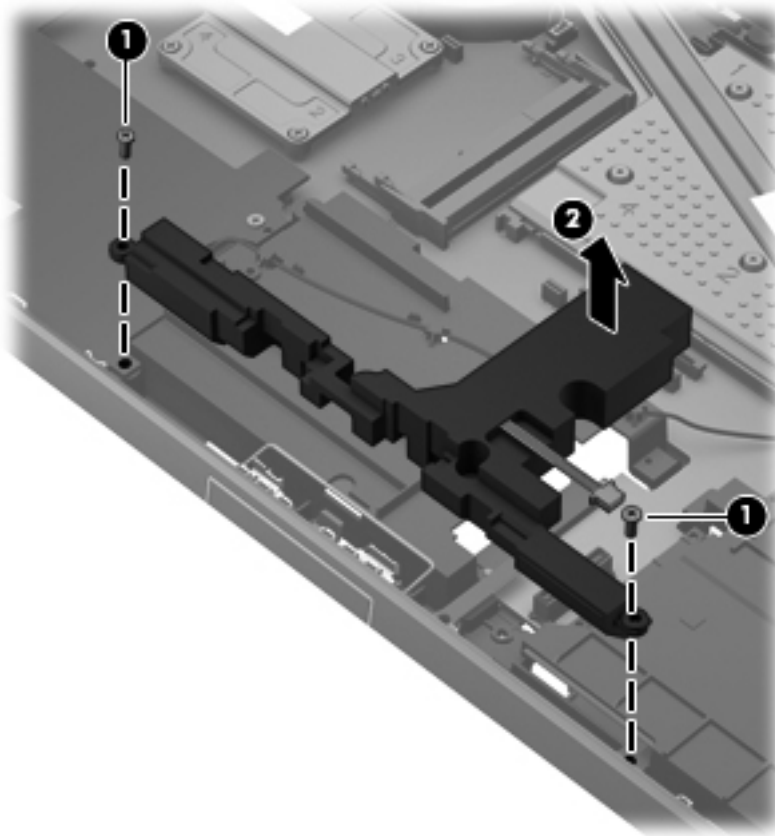
Before removing the speaker assembly, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 51](#)).
5. Remove the service access cover (see [Service access cover on page 52](#)).
6. Remove the optical drive (see [Optical drive on page 63](#)) or upgrade bay hard drive (see [Upgrade bay hard drive on page 66](#)).
7. Remove the keyboard (see [Keyboard on page 71](#)).
8. Remove the top cover (see [Top cover on page 83](#)).
9. Remove the Smart Card reader (see [Smart Card reader on page 58](#)).
10. Remove the Audio/USB 2.0 board (see [Audio/USB 2.0 board on page 94](#)).

Remove the speaker assembly:


1. Remove the two Phillips M2.5x6.0 screws **(1)** that secure the speaker assembly to the base enclosure.

2. Gently flex the band on the base enclosure next to the speaker assembly, and remove the speaker assembly (2).



Reverse this procedure to install the speaker assembly.

Modem module

 **NOTE:** The modem module spare part kit does not include a modem module cable. The modem module cable is included in the Cable Kit, spare part number 652545-001. See [Modem module cable on page 100](#) for information on replacing the modem module cable.

Description	Spare part number
56K V.92 1data/fax modem	628824-001

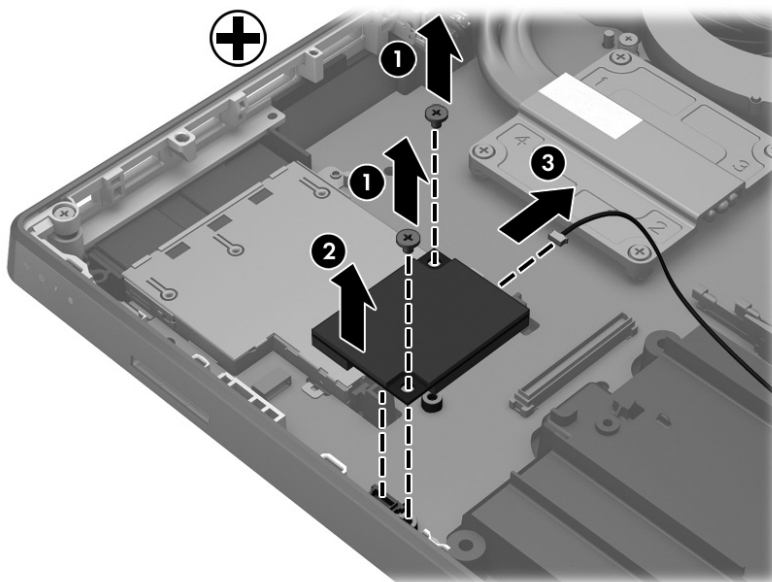
Before removing the modem module, follow these steps:

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 51](#)).
5. Remove the service access cover (see [Service access cover on page 52](#)).

6. Remove the optical drive (see [Optical drive on page 63](#)) or upgrade bay hard drive (see [Upgrade bay hard drive on page 66](#)).
7. Remove the keyboard (see [Keyboard on page 71](#)).
8. Remove the top cover (see [Top cover on page 83](#)).
9. Remove the Smart Card reader (see [Smart Card reader on page 58](#)).
10. Remove the Audio/USB 2.0 board (see [Audio/USB 2.0 board on page 94](#)).

Remove the modem module:

1. Position the computer right-side up with the front toward you.
2. Remove the two Phillips M2.0x3.0 screws (1) that secure the modem to the system board.
3. Lift the modem upwards (2).
4. Disconnect the modem cable (3) from the modem.



Reverse this procedure to install the modem module.

Display (VGA) port

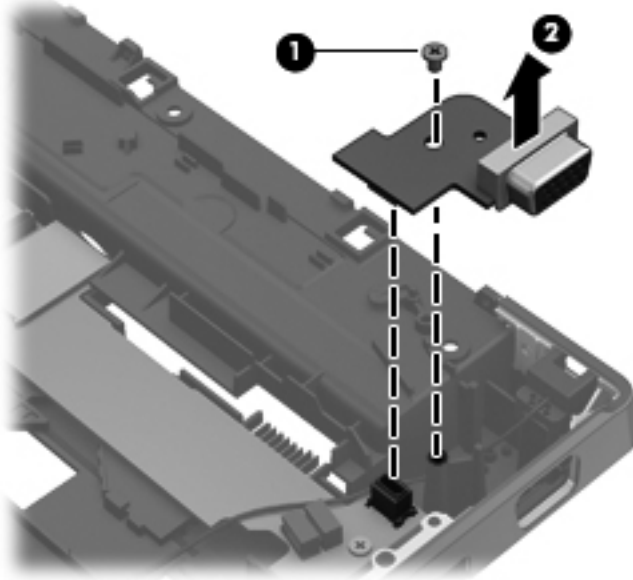
Before removing the modem module cable, follow these steps:

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 51](#)).
5. Remove the service access cover (see [Service access cover on page 52](#)).
6. Remove the optical drive (see [Optical drive on page 63](#)) or upgrade bay hard drive (see [Upgrade bay hard drive on page 66](#)).


7. Remove the keyboard (see [Keyboard on page 71](#)).
8. Remove the top cover (see [Top cover on page 83](#)).
9. Remove the Smart Card reader (see [Smart Card reader on page 58](#)).
10. Remove the Audio/USB 2.0 board (see [Audio/USB 2.0 board on page 94](#)).

Remove the VGA port:

- ▲ Remove the Phillips screw **(1)** that secures the display (VGA) port to the base enclosure. Lift the port **(2)** up at an angle to remove it.



Modem module cable

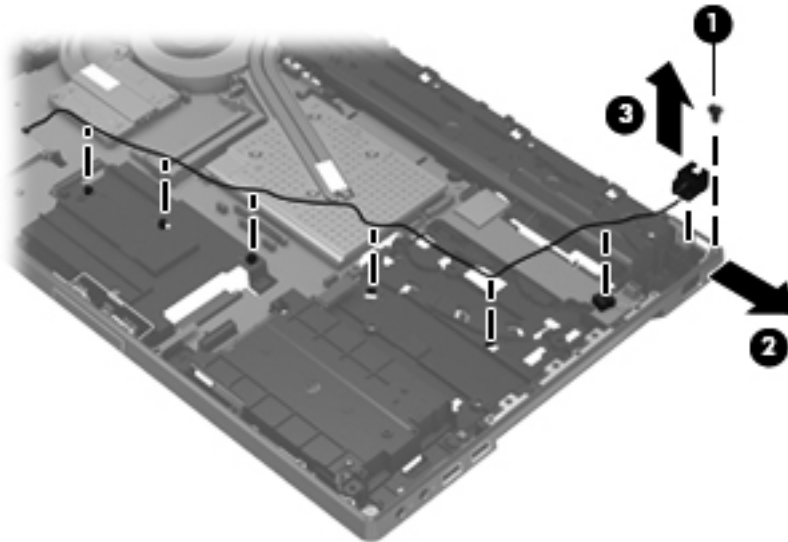
 **NOTE:** The modem module cable is included in the Cable Kit, spare part number 652545-001.

Before removing the modem module 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 51](#)).
5. Remove the service access cover (see [Service access cover on page 52](#)).
6. Remove the optical drive (see [Optical drive on page 63](#)) or upgrade bay hard drive (see [Upgrade bay hard drive on page 66](#)).
7. Remove the keyboard (see [Keyboard on page 71](#)).
8. Remove the top cover (see [Top cover on page 83](#)).
9. Remove the Smart Card reader (see [Smart Card reader on page 58](#)).
- 10.
1. Remove the Audio/USB 2.0 board (see [Audio/USB 2.0 board on page 94](#)).
2. Remove the modem module (see [Modem module on page 97](#)).

Remove the modem module cable:

1. Position the computer right side-up with the front toward you.
2. Remove the modem cable from the routing clips in the base enclosure.
3. Loosen the Torx M2.0x3.0 screw from the side black trim piece (1).
4. Gently pry the modem module cable out from the base enclosure (2), and then remove cable (3).



Reverse this procedure to install the modem module cable.

Card reader/USB 3.0 board

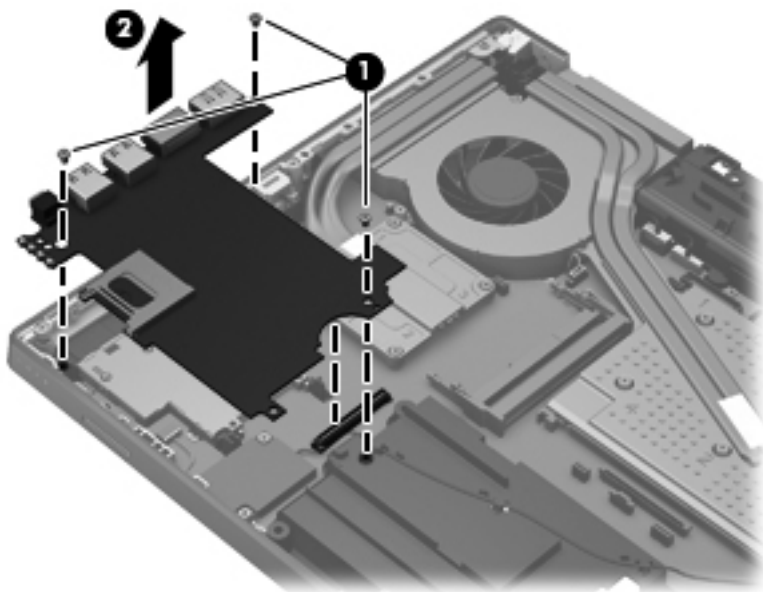
Description	Spare part number
Card reader/USB 3.0 board	689283-001

Before removing the card reader/USB 3.0 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 51](#)).
5. Remove the service access cover (see [Service access cover on page 52](#)).
6. Remove the optical drive (see [Optical drive on page 63](#)) or upgrade bay hard drive (see [Upgrade bay hard drive on page 66](#)).
7. Remove the keyboard (see [Keyboard on page 71](#)).
8. Remove the top cover (see [Top cover on page 83](#)).


Remove the card reader/USB 3.0 board:

1. Position the computer right-side up with the front toward you.
2. Remove any plastic blanks in the card reader slots.
3. Remove the 3 Phillips M2.5x3.0 screws (1) that secure the card reader/USB 3.0 board to the base enclosure.
4. Lift the left side (2) of the card reader/USB 3.0 board to disconnect it from the system board.



Reverse this procedure to install the card reader/USB 3.0 board.

Bluetooth module cable

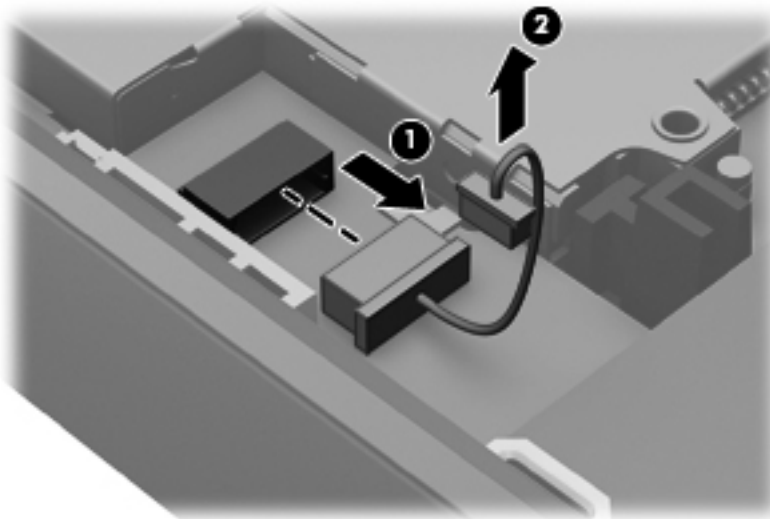
 **NOTE:** The Bluetooth module cable is included in the Cable Kit, spare part number 652545-001.

Before removing the Bluetooth module 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 51](#)).
5. Remove the service access cover (see [Service access cover on page 52](#)).
6. Remove the optical drive (see [Optical drive on page 63](#)) or upgrade bay hard drive (see [Upgrade bay hard drive on page 66](#)).
7. Remove the keyboard (see [Keyboard on page 71](#)).
8. Remove the top cover (see [Top cover on page 83](#)).
9. Remove the bluetooth module (see [Bluetooth module on page 59](#)).
10. Remove the card reader/USB 3.0 board (see [Card reader/USB 3.0 board on page 102](#)).

Remove the Bluetooth module cable:

1. Position the computer right-side up with the front toward you.
2. Disconnect the Bluetooth cable (1) from the system board.
3. Remove the Bluetooth cable (2).



Reverse this procedure to install the Bluetooth module cable.

System board

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



NOTE: Models that support quad-core processors have four memory slots. Models that support dual-core processors have two memory slots.

Description	Spare part number
For use in all countries and regions except the People's Republic of China:	
<ul style="list-style-type: none">For use with computer models equipped with Intel quad-core processors	688746-001
<ul style="list-style-type: none">For use with computer models equipped with Intel dual-core processors	688745-001
For use only in the People's Republic of China:	
<ul style="list-style-type: none">For use with computer models equipped with Intel quad-core processors	690035-001
<ul style="list-style-type: none">For use with computer models equipped with Intel dual-core processors	690034-001

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 51](#)).
5. Remove the service access cover (see [Service access cover on page 52](#)).
6. Remove the optical drive (see [Optical drive on page 63](#)) or upgrade bay hard drive (see [Upgrade bay hard drive on page 66](#)).
7. Remove the keyboard (see [Keyboard on page 71](#)).
8. Remove the top cover (see [Top cover on page 83](#)).
9. Remove the display assembly (see [Display assembly on page 88](#)).
10. Remove the fan/graphics board heat sink (see [Fan/graphics board heat sink assembly on page 75](#)).
11. Remove the processor heat sink (see [Processor heat sink on page 110](#)).
12. Remove the audio/USB 2.0 board (see [Audio/USB 2.0 board on page 94](#)).
13. Remove the speaker assembly (see [Speaker assembly on page 96](#)).
14. Remove the Card reader/USB 3.0 board (see [Card reader/USB 3.0 board on page 102](#)).

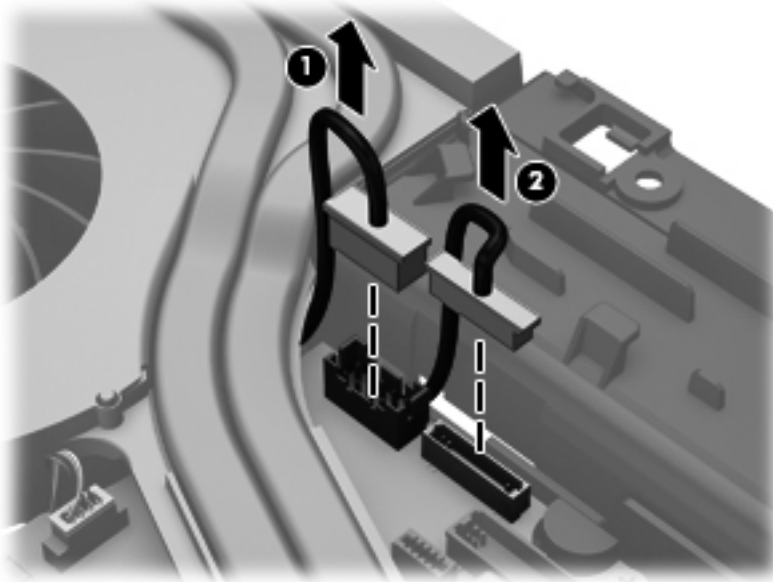
When replacing the system board, be sure that the following additional components are removed from the defective system board and installed on the replacement system board:

- SIM (see [SIM on page 52](#))
- Bluetooth module and cable (see [Bluetooth module on page 59](#) and [Bluetooth module cable on page 103](#))
- WLAN module (see [WLAN module on page 60](#))
- WWAN module (see [WWAN module on page 62](#))
- RTC battery (see [RTC battery on page 63](#))

- Primary memory modules (see [Primary memory module on page 67](#))
- Expansion memory modules (see [Expansion memory module on page 69](#))
- Graphics board (see [Graphics board on page 115](#))
- Processor heat sink (see [Processor heat sink on page 110](#))
- Processor (see [Processor on page 112](#))
- Modem module (see [Modem module on page 97](#))

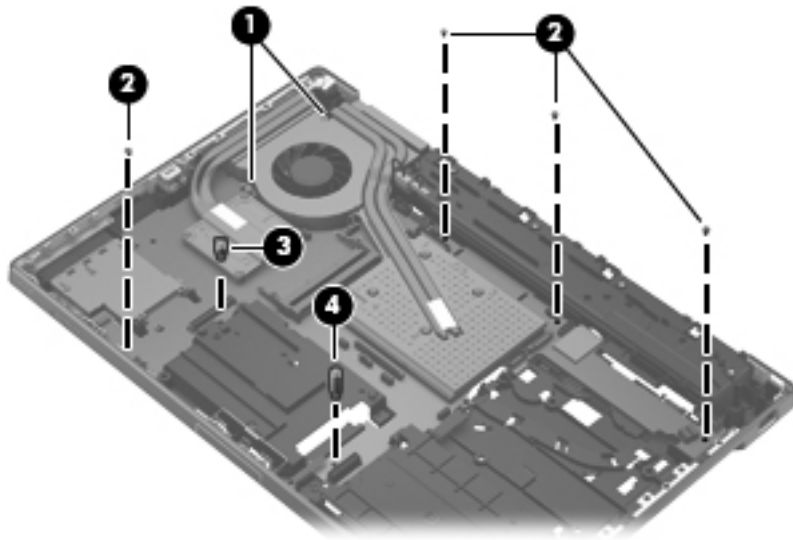
Remove the system board:

1. Disconnect the power connector cable **(1)** from the system board.
2. Disconnect the network cable **(2)** from the system board.

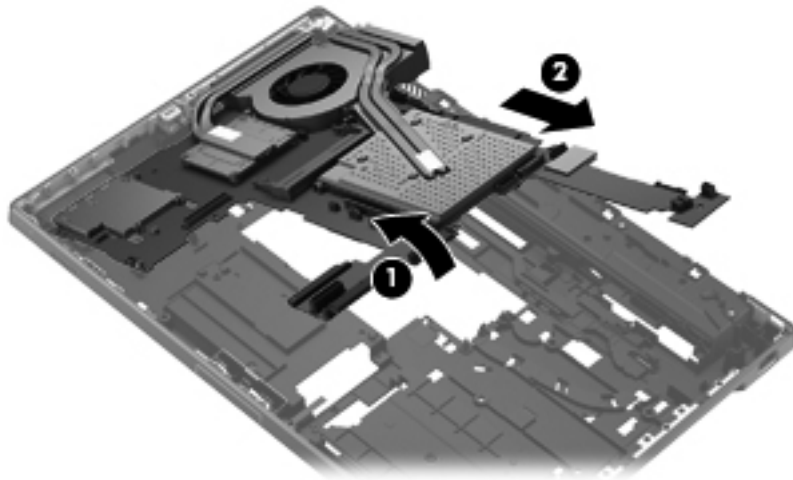


3. Remove the 2 captive screws securing the fan **(1)**.

4. Remove the 4 Phillips M2.5x3.0 screws (marked with a triangle icon) that secure the system board to the base enclosure (2), and then remove the short stand off screw (3) and the tall stand off screw (4).




5. Lift up on the right side of the system board (1), and then remove the system board (2) by sliding it out.



Reverse this procedure to install the system board.

Network cable and jack

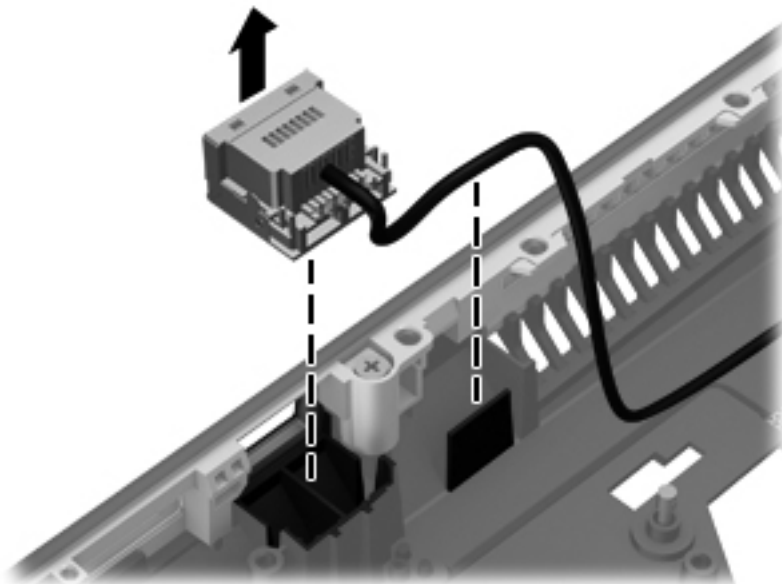
 **NOTE:** The network cable is included in the Cable Kit, spare part number 652545-001.

Before removing the network 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 51](#)).
5. Remove the service access cover (see [Service access cover on page 52](#)).
6. Remove the optical drive (see [Optical drive on page 63](#)) or upgrade bay hard drive (see [Upgrade bay hard drive on page 66](#)).
7. Remove the keyboard (see [Keyboard on page 71](#)).
8. Remove the top cover (see [Top cover on page 83](#)).
9. Remove the display assembly (see [Display assembly on page 88](#)).
10. Remove the fan/graphics board heat sink (see [Fan/graphics board heat sink assembly on page 75](#)).
11. Remove the processor heat sink (see [Processor heat sink on page 110](#)).

Remove the network cable:

- ▲ Remove the network cable from the sideband on the base enclosure.



Reverse this procedure to install the network cable.

Power connector cable

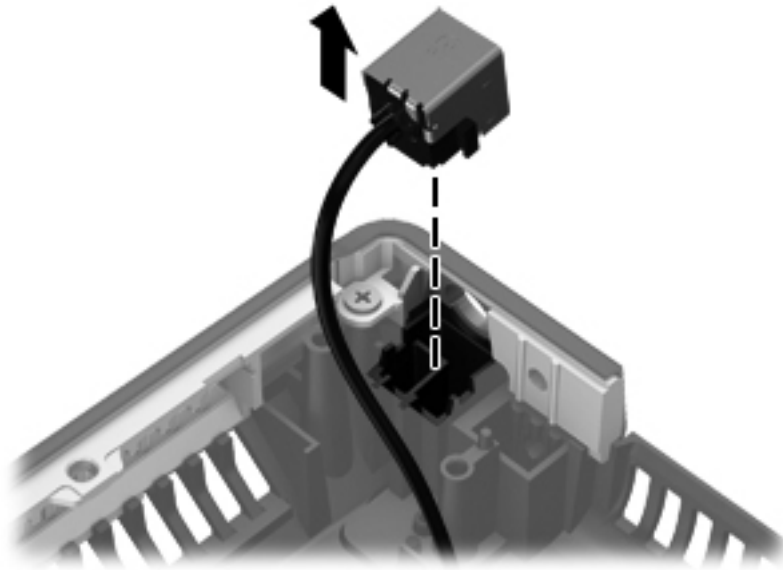
The power connector cable is included in the Cable Kit, spare part number 652545-001.

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 51](#)).
5. Remove the service access cover (see [Service access cover on page 52](#)).
6. Remove the optical drive (see [Optical drive on page 63](#)) or upgrade bay hard drive (see [Upgrade bay hard drive on page 66](#)).
7. Remove the keyboard (see [Keyboard on page 71](#)).
8. Remove the top cover (see [Top cover on page 83](#)).
9. Remove the display assembly (see [Display assembly on page 88](#)).
10. Remove the fan/graphics board heat sink (see [Fan/graphics board heat sink assembly on page 75](#)).
11. Remove the processor heat sink (see [Processor heat sink on page 110](#)).

Remove the power connector cable:

- ▲ Remove the power connector cable jack from the base enclosure.



Reverse this procedure to install the Power connector cable.

Security lock

The security lock is included with the base enclosure assembly, spare part number 652535-001.

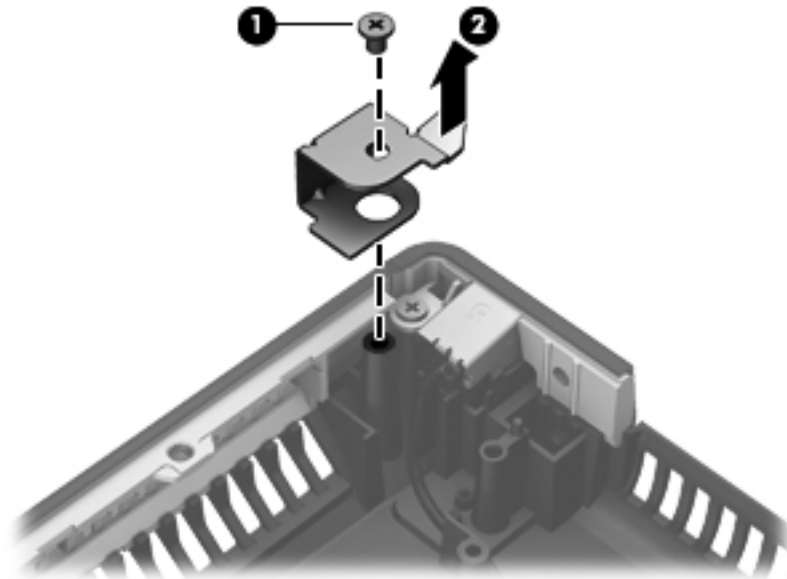
Before removing the security lock, follow these steps:

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 51](#)).
5. Remove the service access cover (see [Service access cover on page 52](#)).
6. Remove the optical drive (see [Optical drive on page 63](#)) or upgrade bay hard drive (see [Upgrade bay hard drive on page 66](#)).
7. Remove the keyboard (see [Keyboard on page 71](#)).
8. Remove the top cover (see [Top cover on page 83](#)).
9. Remove the display assembly (see [Display assembly on page 88](#)).
10. Remove the fan/graphics board heat sink (see [Fan/graphics board heat sink assembly on page 75](#)).
11. Remove the processor heat sink (see [Processor heat sink on page 110](#)).
12. Remove the audio/USB 2.0 board (see [Audio/USB 2.0 board on page 94](#)).
13. Remove the speaker assembly (see [Speaker assembly on page 96](#)).
14. Remove the Card reader/USB 3.0 board (see [Card reader/USB 3.0 board on page 102](#)).
15. Remove the system board (see [System board on page 103](#)).

Remove the security lock:

1. Position the computer right-side up with the front toward you.
2. Remove the Torx T9M2.5×6.0 screw **(1)** that secures the security lock to the base enclosure.

3. Rotate the security lock away from the base enclosure and remove the security lock from the base enclosure (2).



Reverse this procedure to install the security lock.

Processor heat sink


Description	Spare part number
For use only with computer models equipped with quad-core processors	653629-001
For use only with computer models equipped with dual-core processors	652542-001

Before removing the processor heat sink, follow these steps:

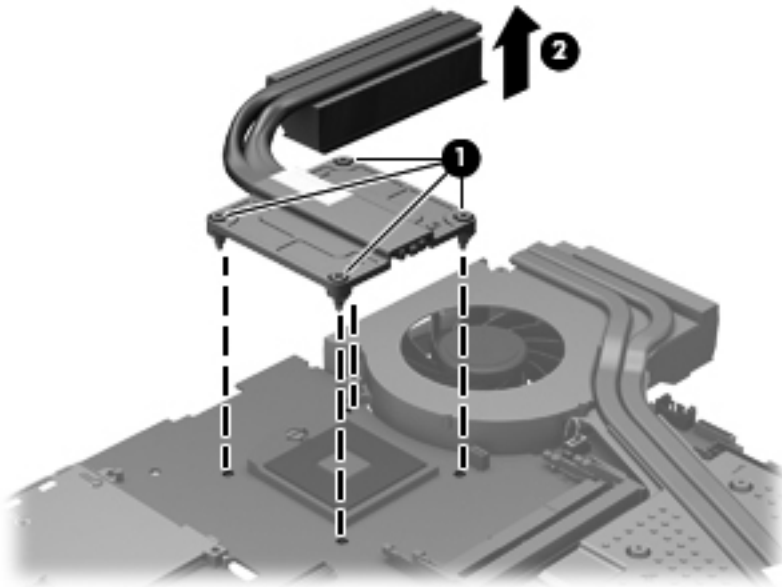
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 51](#))
5. Remove the service access cover (see [Service access cover on page 52](#)).
6. Remove the optical drive (see [Optical drive on page 63](#)) or upgrade bay hard drive (see [Upgrade bay hard drive on page 66](#)).
7. Remove the keyboard (see [Keyboard on page 71](#)).
8. Remove the top cover (see [Top cover on page 83](#)).
9. Remove the fan/graphics board heat sink assembly (see [Fan/graphics board heat sink assembly on page 75](#)).


Remove the processor heat sink:

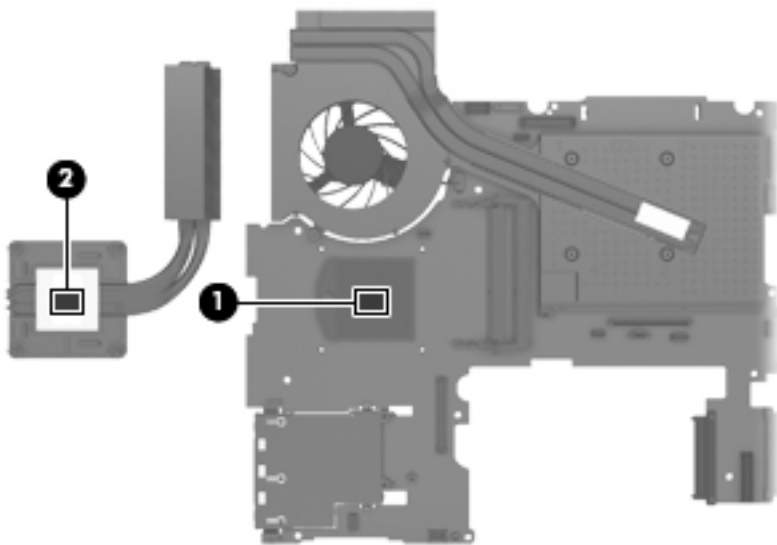
1. Following the sequence stamped into the processor heat sink, loosen the four Phillips captive screws (1) that secure the processor heat sink to the system board.

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

2. Lift the processor heat sink up and to the right at an angle and remove it from the base enclosure (2).



 **NOTE:** Thermal paste located on the surfaces of the processor (1) and the processor heat sink (2) must be thoroughly removed and replaced each time the processor heat sink is removed. Replacement thermal paste is included in the processor heat sink and processor spare part kits.



Reverse this procedure to install the processor heat sink.

Processor



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

Description	Spare part number
Next Generation Intel® Core™ processors , (support Intel Turbo Boost Technology) (includes replacement thermal material):	
i7-3610QM, 2.30 GHz (Turbo up to 3.30 GHz), 1600 MHz, 6 MB L3 Cache, 8 threads, 45W	680646-001
i7-3720QM, 2.60 GHz (Turbo up to 3.60 GHz), 1600 MHz, 6 MB L3 Cache, 8 threads, 45W	681283-001
i7-3820QM, 2.70 GHz (Turbo up to 3.70 GHz), 1600 MHz, 8 MB L3 Cache, 8 threads, 45W	681284-001
i7-3520M, 2.90 GHz (Turbo up to 3.60 GHz), 1600 MHz, 4 MB L3 Cache, 4 threads, 35W	681954-001
i7-3920XM, 2.90 GHz (Turbo up to 3.80 GHz), 1600 MHz, 8 MB L3 Cache, 8 threads, 55W	691351-001
Next Generation Intel® Core™ i5 processors , (support Intel Turbo Boost Technology) (includes replacement thermal material):	
i5-3360M, 2.80 GHz (Turbo up to 3.50 GHz), 1600 MHz, 3 MB L3 Cache, 4 threads, 35W	681953-001
i5-3320M, 2.60 GHz (Turbo up to 3.30 GHz), 1600 MHz, 3 MB L3 Cache, 4 threads, 35W	681952-001


Before removing the processor, follow these steps:

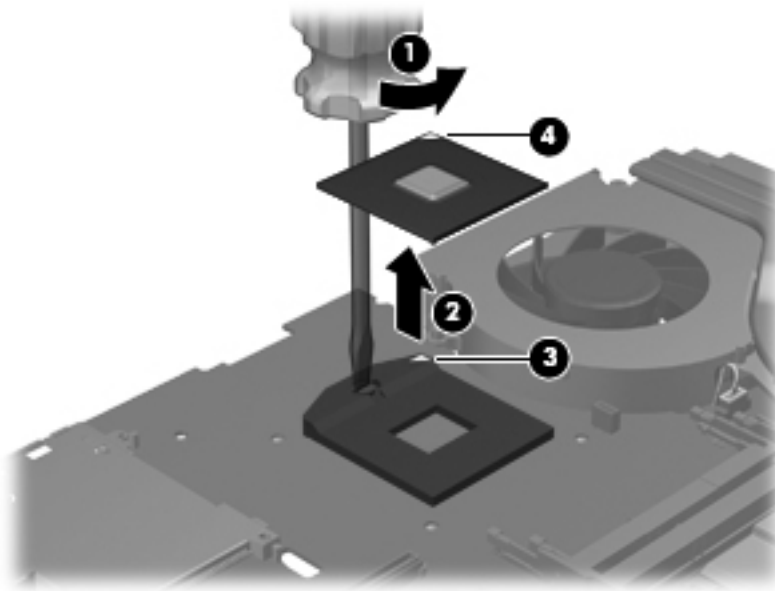
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 51](#))
5. Remove the service access cover (see [Service access cover on page 52](#)).
6. Remove the optical drive (see [Optical drive on page 63](#)) or upgrade bay hard drive (see [Upgrade bay hard drive on page 66](#)).
7. Remove the keyboard (see [Keyboard on page 71](#)).
8. Remove the top cover (see [Top cover on page 83](#)).
9. Remove the fan/graphics board heat sink assembly (see [Fan/graphics board heat sink assembly on page 75](#)).
10. Remove the processor heat sink (see [Processor heat sink on page 110](#)).

Remove the processor:

1. Use a flat-bladed screwdriver to 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:** When you install the processor, the gold triangle (3) on the processor must be aligned with the triangle (4) embossed on the processor socket.

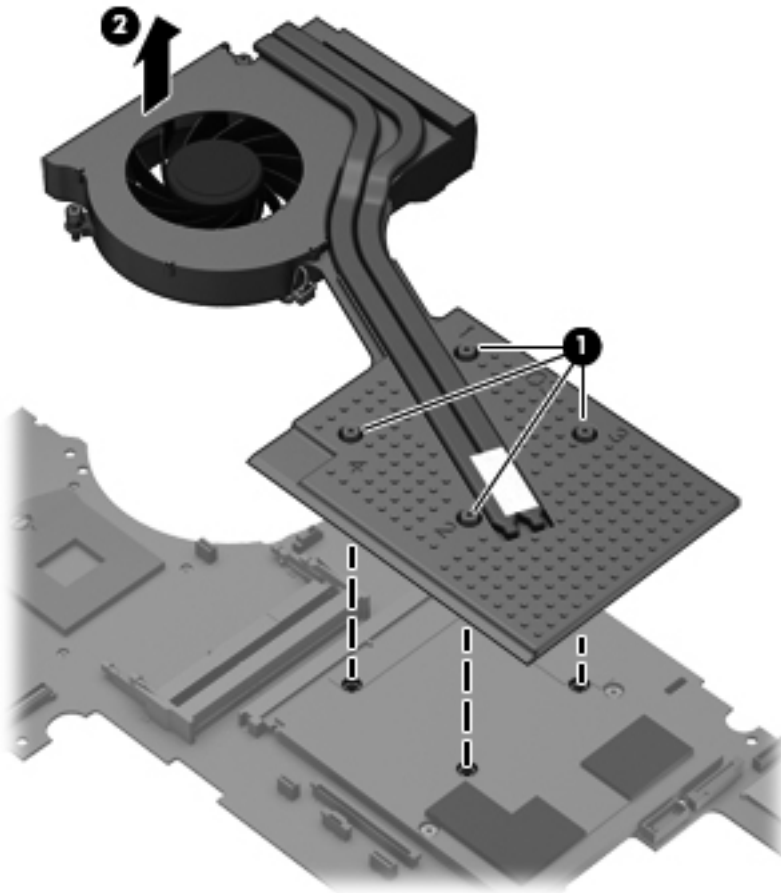



Reverse this procedure to install the processor.

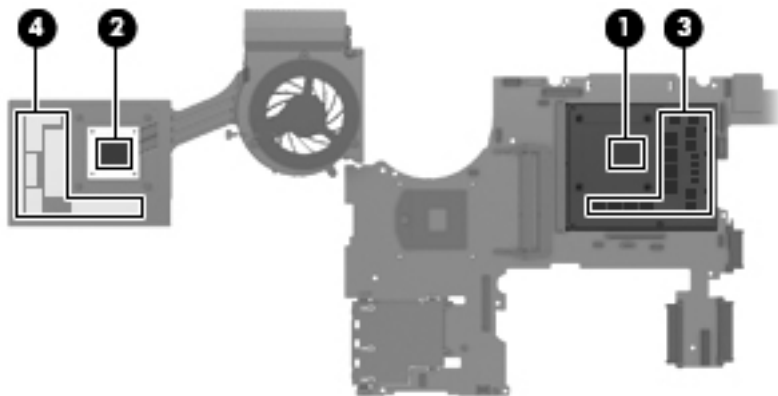
Fan/Heat sink

- ▲ Remove the 4 screws securing the fan/heat sink (1), and then remove the fan/heat sink (2).

 **NOTE:** Make sure the fan cable is disconnected from the system board.



 **NOTE:** This diagram shows a view of of the processor (1) the paste (2), the board components (3), and the pads (4). Thermal paste must be thoroughly removed and replaced each time the processor heat sink is removed. Replacement thermal paste is included in the processor heat sink and processor spare part kits.



Graphics board



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

Description	Spare part number
AMD FirePro M5950 XT-GL 1GB GDDR5 (DP 1.2 and Eyefinity Plus support)	689279-001
NVIDIA Quadro 5010M, N14E-Q5 4 GB dedicated GDDR5 video memory	689282-001
NVIDIA Quadro 4000M, N14E-Q3 2 GB dedicated GDDR5 video memory	689281-001
NVIDIA Quadro 3000M, N14E-Q1 2 GB dedicated GDDR5 video memory	689280-001

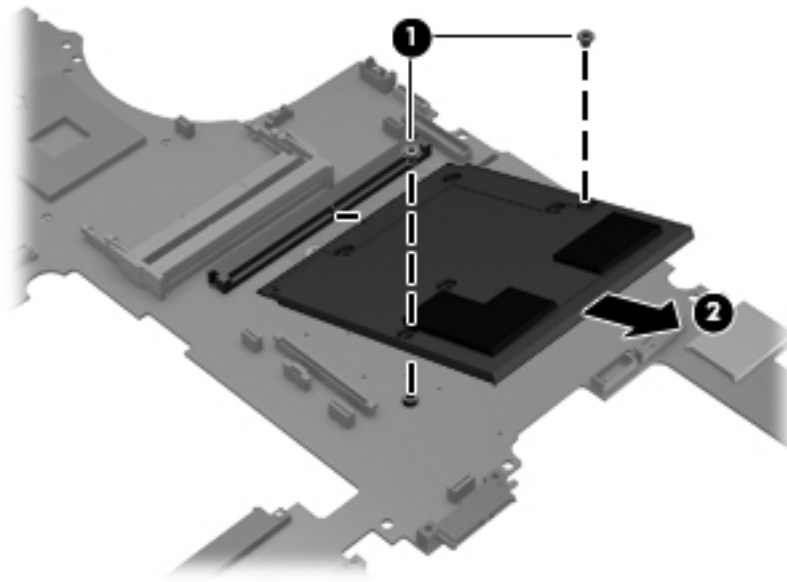
Before removing the graphics board, follow these steps:

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 51](#)).
5. Remove the service access cover (see [Service access cover on page 52](#)).
6. Remove the optical drive (see [Optical drive on page 63](#)) or upgrade bay hard drive (see [Upgrade bay hard drive on page 66](#)).
7. Remove the keyboard (see [Keyboard on page 71](#)).
8. Remove the top cover (see [Top cover on page 83](#)).
9. Remove the fan/graphics board heat sink assembly (see [Fan/graphics board heat sink assembly on page 75](#)).

Remove the graphics board:

1. Remove the 2 Phillips M2.5×3.0 screws **(1)** that secure the graphics board to the system board.

2. Lift the right edge of the graphics board until it rests at an angle and remove (2).



Reverse this procedure to install the graphics board.

Fan

Description	Spare part number
Fan	688762-001

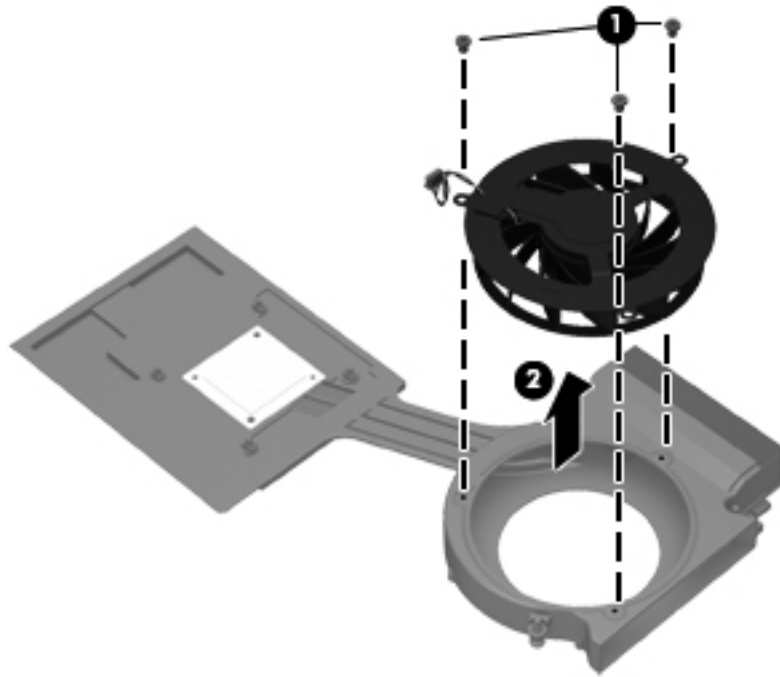
Before removing the fan, follow these steps:

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 51](#)).
5. Remove the service access cover (see [Service access cover on page 52](#)).
6. Remove the optical drive (see [Optical drive on page 63](#)) or upgrade bay hard drive (see [Upgrade bay hard drive on page 66](#)).
7. Remove the keyboard (see [Keyboard on page 71](#)).
8. Remove the top cover (see [Top cover on page 83](#)).
9. Remove the fan/graphics board heat sink assembly (see [Fan/graphics board heat sink assembly on page 75](#)).

Remove the fan from the fan/graphics board heat sink assembly:

1. Remove the 3 Phillips PM2.0×3.0 screws (1) that secure the fan to the fan/graphics board heat sink assembly.


2. Remove the fan (2).



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


5 Computer Setup (BIOS) and Advanced System Diagnostics

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


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

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

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

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

Starting Computer Setup

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


To start Computer Setup, follow these steps:

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

Navigating and selecting in Computer Setup

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

1. Turn on or restart the computer, and then press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
 - To select a menu or a menu item, use the **tab** key and the keyboard arrow keys and then press **enter**, or use a pointing device to click the item.
 - To scroll up and down, click the up arrow or the down arrow in the upper-right corner of the screen, or use the up arrow key or the down arrow key.
 - To close open dialog boxes and return to the main Computer Setup screen, press **esc**, and then follow the on-screen instructions.

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

2. Press **f10** to enter Computer Setup.

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

- To exit Computer Setup menus without saving your changes:

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

– or –

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

- To save your changes and exit Computer Setup menus:


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

– or –

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

Your changes go into effect when the computer restarts.

Restoring factory settings in Computer Setup

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


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

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

– or –

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

Your changes go into effect when the computer restarts.

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

Updating the BIOS

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

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

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

Determining the BIOS version

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


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

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

– or –

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

Downloading a BIOS update

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

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

Do not shut down the computer or initiate Sleep.

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

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


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



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


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

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

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

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

Starting Computer Setup

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


To start Computer Setup, follow these steps:

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

Navigating and selecting in Computer Setup

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

1. Turn on or restart the computer, and then press `esc` while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
 - To select a menu or a menu item, use the `tab` key and the keyboard arrow keys and then press `enter`, or use a pointing device to click the item.
 - To scroll up and down, click the up arrow or the down arrow in the upper-right corner of the screen, or use the up arrow key or the down arrow key.
 - To close open dialog boxes and return to the main Computer Setup screen, press `esc`, and then follow the on-screen instructions.

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

2. Press `f10` to enter Computer Setup.

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

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

– or –

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

– or –


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

– or –

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

Your changes go into effect when the computer restarts.

Restoring factory settings in Computer Setup

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


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

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

– or –

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

Your changes go into effect when the computer restarts.

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

Updating the BIOS

Updated versions of the BIOS may be available on the HP Web site.

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

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

Determining the BIOS version


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

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


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

– or –

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

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

Downloading a BIOS update


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

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

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

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

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

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

Using Advanced System Diagnostics


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

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


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

To start Advanced System Diagnostics:

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

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


SUSE Linux — Computer Setup (BIOS)

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

To start Computer Setup, follow these steps:

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

Starting Computer Setup

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

To start Computer Setup, follow these steps:

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

Using Computer Setup

Navigating and selecting in Computer Setup

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

1. Turn on or restart the computer, and then press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
 - To select a menu or a menu item, use the **tab** key and the keyboard arrow keys and then press **enter**, or use a pointing device to click the item.
 - To scroll up and down, click the up arrow or the down arrow in the upper-right corner of the screen, or use the up arrow key or the down arrow key.
 - To close open dialog boxes and return to the main Computer Setup screen, press **esc**, and then follow the on-screen instructions.



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

2. Press **f10** to enter Computer Setup.

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

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

– or –

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

– or –

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

– or –

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

Your changes go into effect when the computer restarts.

Restoring factory settings in Computer Setup



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

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

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

3. Use a pointing device or the arrow keys to select **File > Restore Defaults**.
4. Follow the on-screen instructions.
5. To save your changes and exit, click the **Save** icon in the lower-left corner of the screen, and then follow the on-screen instructions.

– or –

Use the arrow keys to select **File > Save Changes and Exit**, and then press [enter](#).

Your changes go into effect when the computer restarts.



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

Updating the BIOS

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

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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.

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


– or –

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



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

Downloading a BIOS update


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

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

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

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

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

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

Using Advanced Diagnostics

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

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

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

To start Advanced System Diagnostics:

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



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

6 Specifications

Computer specifications

	Metric	U.S.
Dimensions		
Width	41.70 cm	16.40 in
Depth	27.20 cm	10.70 in
Height (front to back)	3.70 cm to 4.30 cm	1.47 in to 1.68 in
Weight		
	3.60 kg	7.96 lbs
Input power		
Operating voltage	19.5 V dc @ 4.74 A – 120 W	
Operating current	4.74 A	
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%	10% to 90%
Nonoperating	5% to 95%	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
Shock		
Operating	125 g, 2 ms, half-sine	
Nonoperating	200 g, 2 ms, half-sine	
Random vibration		
Operating	0.75 g zero-to-peak, 10 Hz to 500 Hz, 0.25 oct/min sweep rate	
Nonoperating	1.50 g zero-to-peak, 10 Hz to 500 Hz, 0.5 oct/min sweep rate	

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

43.9 cm (17.3 in) WVA display specifications

	Metric	U.S.
Dimensions		
Width	24.4 cm	9.65 in
Depth	38.1 cm	15.0 in
Diagonal	43.9 cm	17.3 in
Number of colors	Up to 16.8 million	
Contrast ratio	200:1 (typical)	
Brightness	180 nits (typical)	
Backlight	LED	
Character display	80 × 25	
Total power consumption	6.0 W	
Viewing angle	+/-65 horizontal, +/-50° vertical (typical)	

Hard drive specifications

	750 GB*	500 GB*	320 GB*
Dimensions			
Height	9.5 mm	9.5 mm	9.5 mm
Width	7.0 mm	7.0 mm	7.0 mm
Weight	101 g	101 g	101 g
Interface type	SATA	SATA	SATA
Transfer rate	100 MB/sec	100 MB/sec	100 MB/sec
Security	ATA security	ATA security	ATA security
Seek times (typical read, including setting)			
Single track	3 ms	3 ms	3 ms
Average	13 ms	13 ms	13 ms
Maximum	24 ms	24 ms	24 ms
Logical blocks	1,250,242,867	976,752,240	625,121.433
Disk rotational speed	7200 rpm	7200 rpm	7200 rpm
Operating temperature	5°C to 55°C (41°F to 131°F)		

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

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

Blu-ray R/RE DVD±RW SuperMulti Double-Layer Drive specifications

Applicable disc	Read:	Write:
	BD-ROM, BD-ROM-DL, BD-R, BD-R-DL, BD-RE, BD-RE-DL, DVD-ROM, DVD+R, DVD+R-DL, DVD+RW, DVD-R, DVD-R-DL, DVD-RW, DVD-RAM (Ver.2), CD-DA, CD-ROM (mode 1 and mode 2), CD-ROM XA (mode 2, form 1 and form 2), Photo CD (single and multiple sessions), CD Extra, CD-R, CD-RW, and CD-TEXT	DVD-RAM (Ver.2), DVD+R, DVD-R, CD-R, and CD-ROM
Access time	BD	DVD
Random	< 230 ms	< 180 ms
Cache buffer	4.5 MB	
Data transfer rate		
2X BD-RAM	9 MB/sec	
8X DVD	2,400 KB/sec	
16X CD-R	2,400 KB/sec	
16X CD-RW	2,400 KB/sec	

Blu-ray ROM DVD±RW SuperMulti Double-Layer Drive specifications

Applicable disc	Read:	Write:	
	CD-DA, CD+(E)G, CD-MIDI, CDTEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio, CD-R, CD-RW), CD-R, CD-RW, DVDROM (DVD-5, DVD-9, DVD-10, DVD-18), DVD-R, DVD-RW, DVD+R, DVD+RW, DVD-RAM, HD-ROM (Single Layer), HD-ROM (Dual Layer), HD DVD-R, HD DVD-R for Dual Layer, HD DVD-RW	CD-R and CD-RW DVD+R, DVD+R(9), DVD+RW, DVD-R, DVD-R(9), DVD-RW, DVD-RAM	
Access time	CD	DVD	HD
Random	170 ms	170 ms	230 ms
Cache buffer	8 MB		
Data transfer rate			
24X CD-ROM	3,600 KB/sec		
8X DVD	10,800 KB/sec		

Applicable disc	Read:	Write:
24X CD-R	3,600 KB/sec	
16X CD-RW	2,400 KB/sec	
8X DVD+R	10,800 KB/sec	
4X DVD+RW	5,400 KB/sec	
8X DVD-R	10,800 KB/sec	
4X DVD-RW	5,400 KB/sec	
2.4X DVD+R(9)	2,700 KB/sec	
5X DVD-RAM	6,750 KB/sec	
1X BD-ROM	4,500 KB/sec	
1X BD-R read	4,500 KB/sec	
1X BD-RE read	4,500 KB/sec	
Transfer mode	Multiword DMA Mode	

DVD±RW SuperMulti Double-Layer Drive specifications

Applicable disc	Read:	Write:
	CD-DA, CD+(E)G, CD mIDI, CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo cD, Video CD), Multisession CD, CD-EXTRA, Portfolio, CD-R, CD-RW), CD-R, CD-RW, DVD-ROM (DVD-5, DVD-9, DVD-10, DVD-18), DVD-R, DVD-RW, DVD+R, DVD+RW, DVD-RAM	CD-R and CD-RW DVD+R, DVD+RW, DVD-R, DVD-RW, DVD-RAM
Access time	CD	DVD
Random	< 175 ms	< 230 ms
Cache buffer	2.5 MB	
Data transfer rate		
24X CD-ROM	3,600 KB/sec	
8X DVD	10,800 KB/sec	
24X CD-R	3,600 KB/sec	
16X CD-RW	2,400 KB/sec	
8X DVD+R	10,800 KB/sec	
4X DVD+RW	5,400 KB/sec	
8X DVD-R	10,800 KB/sec	
4X DVD-RW	5,400 KB/sec	
2.4X DVD+R(9)	2,700 KB/sec	

Applicable disc	Read:	Write:
5X DVD-RAM	6,750 KB/sec	
Transfer mode	Multiword DMA Mode	

DVD-ROM Drive specifications


Applicable disc	Read:	Write:
	CD-DA, CD+(E)G, CD mIDI, CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo cD, Video CD), Multisession CD (Photo cD, CDEXTRA, Portfolio, CD-R, CD-RW), CDR, CD-RW, DVD-ROM (DVD-5, DVD-9, DVD-10, DVD-18), DVD-R, DVD-RW, DVD+R, DVD+RW, DVD-RAM	CD-R and CD-RW
Access time	CD	DVD
Random	< 110 ms	< 130 ms
Cache buffer	2 MB	
Data transfer rate		
24X CD-ROM	3,600 KB/sec	
8X DVD	10,800 KB/sec	
24X CD-R	3,600 KB/sec	
16X CD-RW	3,600 KB/sec	

7 Backup and recovery


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

Windows Backup and Restore provides the following options:

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

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

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

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

Windows 7 — Backup and recovery


Creating recovery media with HP Recovery Disc Creator

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

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

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

Creating recovery media

 **NOTE:** The Windows DVD can be created only once. Thereafter, the option to create that media will not be available.

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


Backing up your information

Recovery after a system failure is as good as your most recent backup. Immediately after setting up the computer, you should create system repair discs (select models only) using the installed optical drive (select models only) or an optional external optical drive and back up your system. As you add new software and data files, you should continue to back up your system on a regular basis to maintain a reasonably current backup. The system repair discs (select models only) are used to start up (boot) the computer and repair the operating system in case of system instability or failure. Your initial and subsequent backups allow you to restore your data and settings if a failure occurs.

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


Note the following when backing up:


- Store personal files in the Documents library, and back it up regularly.
- Back up templates that are stored in their associated programs.
- Save customized settings that appear in a window, toolbar, or menu bar by taking a screen shot of your settings. The screen shot can be a time-saver if you have to reset your preferences.
- When backing up to discs, use any of the following types of discs (purchased separately): CD-R, CD-RW, DVD+R, DVD+R DL, DVD-R, DVD-R DL, or DVD±RW. The discs you use will depend on the type of optical drive you are using.

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

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

To create a backup using Backup and Restore:

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


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

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

Performing a system recovery

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

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


 **NOTE:** If you are unable to boot (start up) your computer and you cannot use the system repair discs you previously created (select models only), you must purchase a Windows 7 operating system DVD to reboot the computer and repair the operating system. For additional information, see the Using a Windows 7 operating system DVD (purchased separately) section.

Using the Windows recovery tools


To recover information you previously backed up:

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


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

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

1. If possible, back up all personal files.
2. If possible, check for the presence of the Windows partition.
To check for the Windows partition, select **Start > Computer**.
3. If the Windows partition is listed, restart the computer, and then press **f8** before the Windows operating system loads.
4. Select **Startup Repair**.
5. Follow the on-screen instructions.

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

Using f11 recovery tools

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

To recover the original hard drive image using **f11**:

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




NOTE: If the HP Recovery partition has been deleted, the **f11** restore option will not function. You must recover your operating system and programs using the Windows 7 operating system DVD and the Driver Recovery disc (both purchased separately) if the Windows partition and the HP Recovery partition are not listed. For additional information, see the Using a Windows 7 operating system DVD (purchased separately) section.


3. If the HP Recovery partition is listed, restart the computer, and then press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
4. Press **f11** while the “Press <F11>” for recovery” message is displayed on the screen.
5. Follow the on-screen instructions.

Using a Windows 7 operating system DVD (purchased separately)

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

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

To initiate recovery using a Windows 7 operating system DVD:

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

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


After the repair is completed:

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

Windows 8 — Backup and recovery

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

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


 **NOTE:** If you are unable to boot (start up) your computer and you cannot use the system repair media you previously created (select models only), you must purchase Windows 8 operating system media to reboot the computer and repair the operating system. For additional information, see

Using the Windows recovery tools

To recover information you previously backed up:

- ▲ From the Start screen, type **h**, and then select **Help and Support**.

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


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

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


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

– or –


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

 **NOTE:** If the Windows partition and the HP Recovery partition are not listed, you must recover your operating system and programs using the Windows 8 operating system DVD and the *Driver Recovery* media (both purchased separately). For additional information, see [Using Windows 8 operating system media \(purchased separately\) on page 141](#).

3. If the Windows partition and the HP Recovery partition are listed, restart the computer. After Windows has loaded, press and hold the **shift** key while clicking **Restart**.
4. Select **Troubleshoot**, then select **Advanced Options**, and then select **Automatic Repair**.
5. Follow the on-screen instructions.


 **NOTE:** For additional information on recovering information using the Windows tools, perform a search for these topics in Help and Support. From the Start screen, type **h**, and then select **Help and Support**.

Using f11 recovery tools

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

To recover the original hard drive image using **f11**:


1. If possible, back up all personal files.
2. If possible, check for the presence of the HP Recovery partition: From the Start screen, type **c**, and then select **Computer**.

 **NOTE:** If the HP Recovery partition is not listed, you must recover your operating system and programs using the Windows 8 operating system media and the *Driver Recovery* media (both purchased separately). For additional information, see [Using Windows 8 operating system media \(purchased separately\) on page 141](#).


3. If the HP Recovery partition is listed, restart the computer, and then press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
4. Press **f11** while the “Press <F11> for recovery” message is displayed on the screen.
5. Follow the on-screen instructions.

Using Windows 8 operating system media (purchased separately)

To order a Windows 8 operating system DVD, go to <http://www.hp.com/support>, select your country or region, and follow the on-screen instructions. You can also order the DVD by calling support. For contact information, see the *Worldwide Telephone Numbers* booklet included with the computer.

 **CAUTION:** Using a Windows 8 operating system media completely erases hard drive contents and reformats the hard drive. All files that you have created and any software that you have installed on the computer are permanently removed. When reformatting is complete, the recovery process helps you restore the operating system, as well as drivers, software, and utilities.

To initiate recovery using a Windows 8 operating system DVD:

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


1. If possible, back up all personal files.
2. Restart the computer, and then insert the Windows 8 operating system DVD into the optical drive before the Windows operating system loads.
3. When prompted, press any keyboard key.
4. Follow the on-screen instructions.


After the repair is completed:


1. Eject the Windows 8 operating system media and then insert the *Driver Recovery* media.
2. Install the Hardware Enabling Drivers first, and then install Recommended Applications.

Using Windows Refresh for quick and easy recovery

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

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

 **NOTE:** During Refresh, a list of removed traditional applications will be saved so that you have a quick way to see what you might need to reinstall. See Help and Support for instructions on reinstalling traditional applications. From the Start screen, type h, and then select **Help and Support**.


 **NOTE:** You may be prompted for your permission or password when using Refresh. See Windows Help and Support for more information. From the Start screen, type h, and then select **Help and Support**.

To start Refresh:

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

Remove everything and reinstall Windows

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

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

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

To use the **f11** key:

1. Press **f11** while the computer boots.
– or –
Press and hold **f11** as you press the power button.
2. Select **Troubleshoot** from the boot options menu.
3. Select **Reset your PC**, and follow the on-screen instructions.

To use the Start screen:

1. On the Start screen, point to the far-right upper or lower corner of the screen to display the charms.
2. Click **Settings**.

3. Click **Change PC settings** in the bottom-right corner of the screen, and then select **General** from the PC settings screen.
4. Under **Remove everything and reinstall Windows**, select **Get started**, and follow the on-screen instructions.

Using HP Software Setup

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


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

SUSE Linux — Backup and recovery


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

Performing a system recovery

Recovery allows you to repair or restore the computer to its original factory state. You can create an HP factory image restore DVD, using an installed or an external DVD±RW optical drive. You can also restore the computer to its factory condition from the HP dedicated recovery partition on the hard drive.

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

To restore the computer using the HP factory image restore DVD, you must first create the recovery disc. To create the recovery disc:


 **NOTE:** HP recommends that you create the HP factory image restore DVD in the event of a system failure.


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

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

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

5. Using the arrow keys, select **Yes** when prompted: **Do you want to start the System-Restore?**
6. Follow the on-screen instructions.

 **NOTE:** You can also restore the computer from the partition by restarting the computer, and then pressing the **f11** key.

 **NOTE:** If you are unable to boot (start up) your computer from the hard drive partition with the primary operating system or from the recovery partition, and you did not create a system recovery disc, you must purchase a *SUSE Linux Enterprise Desktop Operating System* DVD to reinstall the operating system. For additional information, see the *Worldwide Telephone Numbers* booklet.

Backing up your information


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

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

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

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


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

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

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

To restore backup files:

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

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

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

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

Requirements for specific countries and regions

Country/region	Accredited agency	Applicable note number
Australia	EANSW	1
Austria	OVE	1
Belgium	CEBC	1
Canada	CSA	2
Denmark	DEMKO	1
Finland	FIMKO	1
France	UTE	1
Germany	VDE	1
Italy	IMQ	1
Japan	METI	3
The Netherlands	KEMA	1
Norway	NEMKO	1
The People's Republic of China	COC	5
South Korea	EK	4

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

1. The flexible cord must be Type HO5VV-F, 3-conductor, 1.0-mm² conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country or region where it will be used.
2. The flexible cord must be Type SPT-3 or equivalent, No. 18 AWG, 3-conductor. The wall plug must be a two-pole grounding type with a NEMA 5-15P (15 A, 125 V) or NEMA 6-15P (15 A, 250 V) configuration.
3. The appliance coupler, flexible cord, and wall plug must bear a “T” mark and registration number in accordance with the Japanese Dentori Law. The flexible cord must be Type VCT or VCTF, 3-conductor, 1.00-mm² conductor size. The wall plug must be a two-pole grounding type with a Japanese Industrial Standard C8303 (7 A, 125 V) configuration.
4. The flexible cord must be Type RVV, 3-conductor, 0.75-mm² conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country or region where it will be used.
5. The flexible cord must be Type VCTF, 3-conductor, 0.75-mm² conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country or region where it will be used.

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>.

Index

Symbols/Numerics

1394 port, identifying 18

A

AC adapter, spare part numbers
33, 40

accessory battery connector,
identifying 20

Antenna Kit

spare part number 30, 35

application button board
removal 92

spare part number 92

audio in (microphone) jack 17

audio, product description 2

audio-out (headphone) jack 17

audio/USB 2.0 board

removal 94

spare part number 28, 40, 94

B

base enclosure

spare part number 28, 39

battery

removal 51

spare part numbers 28, 34,
35, 51

battery bay, identifying 20

battery light 16

battery release latch 20

bezel, upgrade bay
35

BIOS

determining version 120, 127

downloading an update 120,
128

updating 120

Blu-ray Disc ROM with SuperMulti
DVD±R/RW DL Drive
specifications 132

Blu-ray R/RE DVD±RW SuperMulti
Double-Layer Drive
precautions 45

spare part number 28, 31, 39,
63

specifications 132

Blu-ray ROM DVD±RW SuperMulti
Double-Layer Drive

spare part number 28, 31, 39,
64

Bluetooth module

removal 59

spare part number 35, 59

Bluetooth module cable

removal 103

Bluetooth module compartment
cover

removal 60

board, application

spare part numbers 40

buttons

calculator 13

center TouchPad 10

left TouchPad 10

optical drive eject 17

pointing stick 10

power 12

right TouchPad 10

TouchPad 10, 12

volume mute 12

wireless 12

C

Cable Kit

spare part number 35

cables, service considerations 45

calculator button, identifying 13

calculator light 11

caps lock light, identifying 11

card reader/USB 3.0 board

removal 102

spare part number 102

case, notebook slim top load

spare part number 34

chipset, product description 1

components

bottom 20

display 8

front 15

left side 18

rear 19

right side 17

top 7

computer feet, locations 51

computer part number 49

computer reset 142

Computer Setup

navigating and selecting 118

restoring factory settings 119,
126

computer setup

restoring factory settings 126

computer specifications 130

connector, power 19

connector, service

considerations 45

CRT board

spare part number 30, 38

D

diskette drive

precautions 45

display assembly

removal 88

spare part numbers 23, 36, 88

display bezel

removal 78

spare part number 39

spare part numbers 29, 78

display enclosure

spare part number 30, 35

display hinge covers

spare part number 35

Display Hinge Kit, spare part

number 30, 35

Display Miscellaneous Kit, spare

part number 35

display panel

product description 1

removal 79

spare part number 35, 40, 79

display panel cable

spare part number 30, 39

display release latch 16
 Display Rubber Kit
 spare part number 35
 display specifications 131
 DisplayPort, identifying 18
 docking connector, identifying 20
 docking station
 spare part numbers 36
 docking support, product
 description 4
 drives, preventing damage 45
 DVD-ROM Drive
 precautions 45
 spare part number 28, 32, 39,
 64
 specifications 134
 DVD±RW and CD-RW SuperMulti
 Double-Layer combo Drive
 precautions 45
 specifications 133
 DVD±RW SuperMulti Double-
 Layer Drive
 spare part number 28, 31, 39,
 63
 specifications 133

E
 electrostatic discharge 46
 eSATA port, identifying 18
 esc key, identifying 14
 Ethernet, product description 3
 ExpressCard slot
 identifying 18
 spare part number 33
 ExpressCard socket
 spare part number 35
 external media cards, product
 description 3
 external monitor port 17

F
 f11 recovery 140
 fan
 removal 116
 spare part number 39, 116
 fan/graphics board heat sink
 assembly
 removal 75
 spare part number 26
 spare part numbers 36, 40, 75

feet, locations 51
 Fingerprint reader
 spare part numbers 39
 fingerprint reader
 identifying 13
 removal 93
 spare part number 93
 fn key, identifying 14, 15
 function keys
 identifying 14
 function keys, identifying 15

G
 graphics board
 removal 115
 spare part numbers 27, 39,
 40, 115
 graphics, product description 1
 grounding equipment and
 methods 48

H
 hard drive
 precautions 45
 product description 2
 removal 54, 56
 spare part numbers 28, 31,
 34, 35, 36, 54, 56
 specifications 131
 hard drive cover
 removal 55
 Hard Drive Hardware Kit
 spare part number 33, 35
 hard drive recovery 140
 hard drive upgrade bay
 spare part number 33
 heat sink
 spare part numbers 35
 hinge
 spare part number 30, 35
 hinge cover
 illustrated 30

I
 integrated numeric keypad,
 identifying 14, 15
 integrated webcam light,
 identifying 8, 9
 internal display switch 8, 9
 internal microphones, identifying
 8, 9

J
 jacks
 audio in (microphone) 17
 audio-out (headphone) 17
 network 18
 RJ-11 (modem) 19
 RJ-45 (network) 18

K
 keyboard
 product description 4
 removal 71
 spare part numbers 23, 36,
 37, 38, 40, 41, 42, 43, 71
 keypad
 integrated numeric 15
 keypad, integrated numeric 14
 keys
 esc 14
 fn 14, 15
 function 14, 15
 num lk 14
 Windows applications 14
 Windows button 14

L
 latch kit
 spare part number 39
 latches, battery release 20
 latches, service door release 20
 legacy support, USB 118, 125
 lights
 battery 16
 calculator 11
 caps lock 11
 mute 11
 num lock 11
 power 11, 16
 TouchPad 11
 Web browser light 11
 webcam 8, 9
 wireless 11, 16
 lock, keyed cable
 spare part number 34
 lock, notebook combination
 spare part number 34

M
 mass storage device
 spare part numbers 31

- mass storage device, spare part numbers 28
- Media Card reader, identifying 16
- memory module
 - product description 1
 - removal 67, 69
 - spare part number 36
 - spare part numbers 26, 27, 35, 67, 69
- microphone
 - product description 2
 - spare part number 30, 35
- miscellaneous parts
 - spare part numbers 33
- model name 1
- modem module
 - product description 3
 - removal 97
 - spare part number 27, 34, 97
- modem module cable
 - removal 100
- mouse, laser
 - spare part number 36
- mouse, travel
 - spare part number 34
- mouse, wireless
 - spare part number 35
- mute light, identifying 11

N

- network cable
 - removal 107
 - spare part number 28
- network jack, identifying 18
- num lk key, identifying 14
- num lock light 11

O

- operating system, product description 5
- optical drive
 - identifying 17
 - precautions 45
 - product description 2
 - removal 63
 - spare part number 39
 - spare part numbers 28, 31, 63
 - specifications 132, 133, 134
- optical drive bracket
 - spare part number 31

- optical drive eject button, identifying 17

P

- packing guidelines 47
- plastic parts 44
- Plastics Kit
 - spare part number 35
- pointing device
 - product description 4
- pointing stick 10
- pointing stick buttons 10
- ports
 - 1394 18
 - DisplayPort 18
 - eSATA 18
 - eSATA/USB 2.0 combo 18
 - external monitor 17
 - product description 4
 - USB 2.0 17, 18
 - USB charging 17
- power button board
 - removal 91
 - spare part number 39, 91
- power button, identifying 12
- power connector cable
 - removal 107
 - spare part number 28
- power connector, identifying 19
- power cord
 - set requirements 145
 - spare part numbers 33, 34
- power light 11, 16
- power requirements, product description 4
- processor
 - product description 1
 - removal 112
 - spare part number 36
 - spare part numbers 26, 36, 40, 112
- processor heat sink
 - removal 110
 - spare part number 35
 - spare part numbers 110
- processor heat sink, spare part numbers 27
- processor,
 - spare part numbers 36

- product description

- audio 2
- chipset 1
- display panel 1
- docking support 4
- Ethernet 3
- external media cards 3
- graphics 1
- hard drives 2
- keyboard 4
- memory module 1
- microphone 2
- modem module 3
- operating system 5
- optical drives 2
- pointing devices 4
- ports 4
- power requirements 4
- processors 1
- product name 1
- security 5
- serviceability 6
- solid state drive 2
- video 2
- wireless 3
- product name 1, 49
- product number 49

R

- recovery 142
- recovery partition 140
- recycle
 - computer 142
- refresh 142
- removal/replacement
 - preliminaries 44
 - procedures 49
- remove everything and reinstall Windows 142
- reset
 - computer 142
 - steps 142
- restoring the hard drive 140
- RJ-11 (modem) jack, identifying 19
- rj-11 modem cable
 - spare part numbers 28
- RJ-45 (network) jack, identifying 18

RTC battery
removal 63
spare part number 26, 35, 63

S

Screw Kit
spare part number 33, 39
security cable slot, identifying 18
security lock
removal 108
security, product description 5
sequential part numbers 34
serial number 49
service access cover
removal 52
spare part number 28, 52
service access door
spare part numbers 40
service considerations 44
service door release latch 20
service tag 49
serviceability, product
description 6
setup utility
navigating and selecting 118
restoring factory settings 119
SIM slot, identifying 20
SIM, removal 52
slots
ExpressCard 18
security cable 18
SIM 20
Smart Card
spare part number 39
Smart Card cover
spare part number 35
Smart Card reader
removal 58
spare part number 28, 58
solid-state drive
precautions 45
product description 2
spare part numbers 27, 32,
39, 40, 43
speaker assembly
removal 96
spare part number 35, 96
speakers, identifying 16

specifications
Blu-ray Disc ROM with
SuperMulti DVD±R/RW DL
Drive 132
Blu-ray R/RE DVD±RW
SuperMulti Double-Layer
Drive 132
computer 130
display 131
DVD-ROM Drive 134
DVD±RW SuperMulti Double-
Layer Drive 133
hard drive 131
optical drive 132, 133, 134
static-shielding materials 48
system board
removal 103
spare part number 39
spare part numbers 27, 40,
103

T

tools required 44
top cover
removal 83
spare part number 26, 39, 83
TouchPad
buttons 10
identifying 10
spare part number 26
TouchPad on/off button,
identifying 10, 12
TouchPad on/off light, identifying
11
transporting guidelines 47

U

upgrade bay
identifying 17
upgrade bay hard drive
removal 66
spare part number 66
spare part numbers 35
USB 3.0 board
spare part number 28
USB board
spare part number 40
USB legacy support 118, 125
USB port, identifying 17, 18

V

vents, identifying 18
video, product description 2
volume mute button, identifying
12

W

warranty period 49
Web browser light light 11
webcam 8, 9
removal 82
spare part number 29, 39, 82
webcam cable
spare part number 30, 35
webcam light, identifying 8, 9
webcam, identifying 8, 9
Windows
Refresh 142
reinstall 142
remove everything and reinstall
option 142
reset 142
Windows 8 operating system
DVD 141
Windows applications key,
identifying 14
Windows button, identifying 14
wireless
product description 3
wireless antenna
spare part number 35
wireless antennas, identifying 8
wireless button
identifying 12
wireless lights 11, 16
WLAN antenna and cables
spare part number 30
WLAN antennas, identifying 8, 9
WLAN module
removal 60
spare part numbers 27, 36, 60
workstation guidelines 47
WWAN antenna and cables
spare part number 30
WWAN antennas, identifying 8
WWAN module
removal 62
spare part numbers 27, 35, 62