HP EliteBook 8740w 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).

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1 Product description

Category	Description
Product Name	HP EliteBook 8740w Mobile Workstation
Processors	Intel® Quad Core™ processors (support Intel Turbo Boost Technology): • Intel Quad Core i7-920XM Extreme 2.00-GHz processor (turbo up to 3.20-GHz), 8-MB L2 cache, 8 threads (55W) • Intel Quad Core i7-820QM, Extreme 1.73-GHz processor (turbo up to 3.06-GHz), 8-MB L2 cache, 8 threads (45W) • Intel Quad Core i7-720QM Extreme 1.66-GHz processor (turbo up to 2.80-GHz), 6-MB L2 cache, 8 threads (45W)
	Intel Dual Core processors (support Intel Turbo Boost Technology): • Intel Dual Core i7-620M 2.66-GHz processor, (turbo up to 3.33-GHz), 4-MB L2 cache, 4 threads (35W) • Intel Dual Core i5-540M 2.53-GHz processor, (turbo up to 3.06-GHz), 3-MB L2 cache, 4 threads (35W) • Intel Dual Core i5-520M 2.40-GHz processor, (turbo up to 2.93-GHz), 3-MB L2 cache, 4 threads (35W)
Chipset	Intel QM57 (Ibex peak enhanced PCH)
Graphics	Support for the following graphics subsystem graphics boards (all feature OpenGL driver support): • ATI Broadway FirePro M7820 XT-GL with 1-GB GDDR5 memory • nVidia Quadro FX 2800M N10E-GLM with 1-GB GDDR3 memory • nVidia Quadro FX 3800M N10E-GLM3 with 1-GB GDDR3 memory

Category	Description
Panel	All display assemblies include 3 wireless local area network (WLAN) antenna cables and 2 wireless wide area network (WWAN) antenna cables • 17.0-in WXGA+ light-emitting diode (LED) with webcam • 17.0-in WXGA+ LED without webcam • 17.0-in WSXGA+ WVA LED with webcam • 17.0-in WSXGA+ WVA LED without webcam • 17.0-in WUXGA+ WVA LED with webcam • 17.0-in WUXGA+ WVA LED without webcam Supports privacy filter Supports 16:10 aspect ratio panels
Memory	4 customer-accessible/upgradable memory module slots
	Supports dual-channel memory
	Supports up to 16,384 GB of system RAM
	DDR3 1333-MHz, PC3-10600
	1333-MHz bus speed on computer models equipped with Quad Core processors 1066-MHZ bus speed on computer models equipped with Dual Core processors
	Supports the following configurations: • 16384-MB total system memory (4096 × 4; only available on computer models equipped with a Quad Core processor and a 64-bit operating system) • 12288-MB total system memory (4096 × 2 + 2048 × 2; only available on computer models equipped with a Quad Core processor and a 64-bit operating system) • 8192-MB total system memory (2048 × 4; only available on computer models equipped with a Quad Core processor and a 64-bit operating system) • 8192-MB total system memory (4096 × 2; only available on computer models equipped with a 64-bit operating system) • 4096-MB total system memory (2048 × 2) • 4096-MB total system memory (4096 × 1) • 2048-MB total system memory (2048 × 1)
Hard drives and solid-state drive	Supports **9.5-mm** (2.5-in) hard drives
	Customer-accessible
	Serial ATA
	Accelerometer (HP Mobile Data Protection System 3D) RAID 0/1 Support

Category	Description
	Supports the following 7200-rpm drives: • 640 GB • 500 GB • 320 GB • 250 GB
	Supports **9.5-mm** (2.5-in), 256-GB solid-state drive
Optical drives	Fixed (removal of 1 screw required)
	Customer-accessible
	Serial ATA
	12.7-mm tray load
	Supports the following drives: • Blu-ray ROM with LightScribe DVD±RW Super Multi Double-Layer Drive • DVD±RW and CD-RW Super Multi Double-Layer Combo Drive with LightScribe • DVD±RW and CD-RW Super Multi Double-Layer Combo Drive • DVD-ROM Drive
Upgrade bay	Supports **9.5-mm** (2.5-in) hard drives
	Customer-accessible
	Serial ATA
	Supports the following 7200-rpm drives: • 640 GB • 500 GB
Diskette drive	Supports external USB diskette drive only
	Supports boot from external USB diskette drive
Audio and video	Integrated dual-array microphones
	IDT 92HD75B high-definition (HD) audio
	Supports 2 stereo speakers
	Integrated 2.0-megapixel webcam with macro focus for business card reader
Modem	56K V.92 1.5-inch data/fax modem
	Supports “no modem” option
	Modem cable not included
Ethernet	Intel 82577-LM 10/100/1000 GB network interface card (NIC) with iAMT 6.0 support
	S3/S4/S5 wake on LAN: DC - no
	S3/S4/S5 wake on LAN: AC - yes
	NIC power-down technology

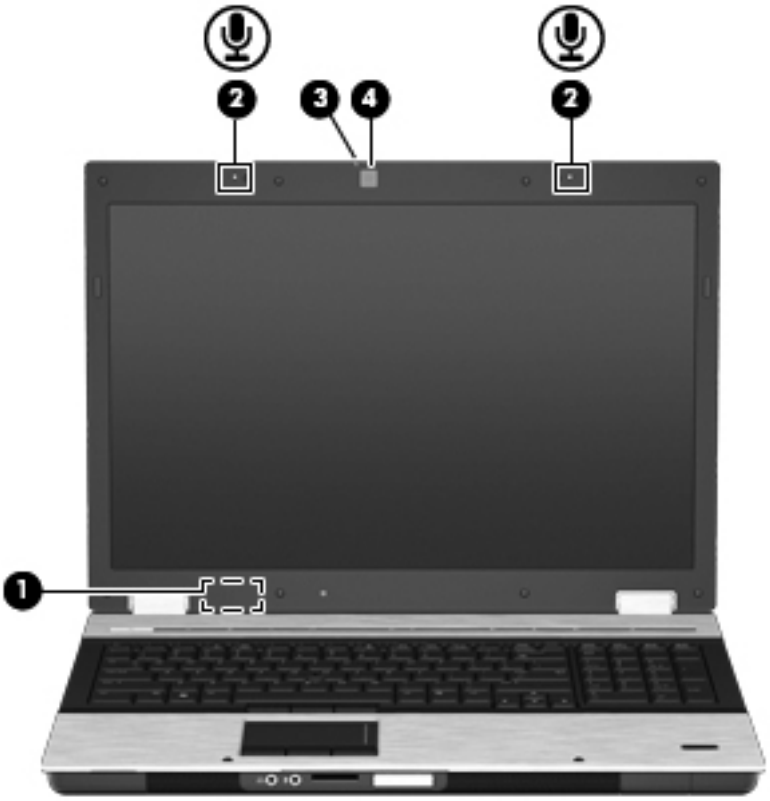
Category	Description
	Ethernet cable not included
Wireless	**Integrated wireless local area network (WLAN) options by way of wireless module:**
	Three WLAN antennas built into display assembly
	Support for no WLAN option
	Support for the following WLAN formats: • Intel Centrino Advanced-N 6200 802.11a/b/g WLAN module • Intel Centrino Ultimate-N 6300 802.11a/b/g/n WLAN module
	Integrated wireless wide area network (WWAN) options by way of wireless module:
	Two WLAN antennas built into display assembly (world-wide, 5-band)
	Support for no WWAN option
	Supports WWAN after market option
	Security provided by Subscriber Identify Module (SIM) located inside battery bay
	Support for the following WWAN formats: • High-Speed Packet Access (HSPA) WWAN module • HSPA Evolution-Data Optimized (EV-DO) WWAN module
	Integrated personal area network (PAN) options by way of Bluetooth® module:
	Support for no-WPAN option
	Broadcom Bluetooth
External media card	One ExpressCard slot, supporting 16-bit and 32-bit (Cardbus) ExpressCard modules
	One Digital Media Reader slot, supporting the following optional formats: • Memory Stick • Memory Stick Duo • Memory Stick Pro • MultiMediaCard • Secure Digital (SD) Memory Card • xD-Picture Card • xD-Picture Card Type H • xD-Picture Card Type M

Category	Description
Ports	• 1394a • 3-pin AC power • Audio-in (mono microphone) • Audio-out (stereo headphone) • DisplayPort • Docking • eSATA • RJ-11 (modem) • RJ-45 (Ethernet, includes link and activity lights) • USB 3.0 (2) • USB 2.0 (2) • VGA (Dsub 15-pin) supporting 1600 × 1200 external resolution at 75-GHz (hot plug/unplug with auto-detect)
Docking	HP 3-in-1 NAS Docking Station, HP Advanced Docking Station, and HP Docking Station
Keyboard/pointing devices	**36.5 cm** (14.4-in) keyboard with separate numeric keypad
	Dual point (pointing stick and TouchPad) with 3 pointing stick buttons and 3 TouchPad buttons and vertical scrolling (taps enabled as default)
	Spill-resistant DuraPad coating on TouchPad
	TouchPad gesture support (disabled by default)
Power requirements	230-W and 200-W AC adapters with localized cable plug support (3-wire plug with ground pin, supports 3-pin DC connector)
	Support for the following batteries: • 8-cell, 2.55-Ah (73-Wh) Li-ion battery • 8-cell, 2.55-Ah (68-Wh) Li-ion battery • 8-cell Extended Life Battery • 12-cell Ultra Capacity Battery
Security	Integrated fingerprint reader Integrated Smart Card reader (active) Preboot authentication (password, Smart Card, biometric) Security cable slot Trusted platform module (TPM) v.1.2

Category	Description
Operating system	**Preinstalled:** • Windows® 7 Home Premium 64 • Windows 7 Professional 32/64 • Windows Vista® Home Basic (Service Pack 2) • Windows XP Professional with Windows 7 Professional license • FreeDOS
	Preinstalled with Microsoft® Office (not supported in Japan): • Windows 7 Professional 32/64 with Office Ready • Windows Vista Business 32 with Office Ready • Windows XP Professional (Service Pack 3 with Office 2007 Ready (with Windows 7 Professional COA)
	Restore media: • Office Ready Restore DVD • Windows 7 Home Basic • Windows 7 Home Premium 32/64 • Windows 7 Professional 32/64 • Windows 7 DRDVD • Windows 7 DRDVD with WinDVD • Windows Vista Business 32 • Windows Vista DRDVD • Windows XP Professional 32/64 • Windows XP Professional DRDVD
	Supported: • Microsoft WHQL • Novell
	Web-only support: • Windows Vista Business 64 • Windows Vista Enterprise 32/64 • Windows XP Professional 64

2 External component identification

Display components



Item	Component	Description
(1)	Internal display switch	Turns off the display and initiates Sleep (in Windows 7 and Windows Vista) or Standby (in Windows XP) if the display is closed while the power is on. **NOTE:** The internal display switch is not visible from the outside of the computer.
(2)	Internal microphones (2)	Record sound. **NOTE:** If there is a microphone icon next to each microphone opening, your computer has internal microphones.

Item	Component	Description
(3)	Webcam light (select models only)	On: The webcam is in use.
(4)	Webcam (select models only)	Records audio and video and captures still photographs.

Wireless antenna locations

Item	Component	Description
(1)	WWAN antennas (2)* (select models only)	Send and receive wireless signals to communicate with wireless wide-area networks (WWANs).
(2)	WLAN antennas (3)* (select models only)	Send and receive wireless signals to communicate with wireless local area networks (WLANs).

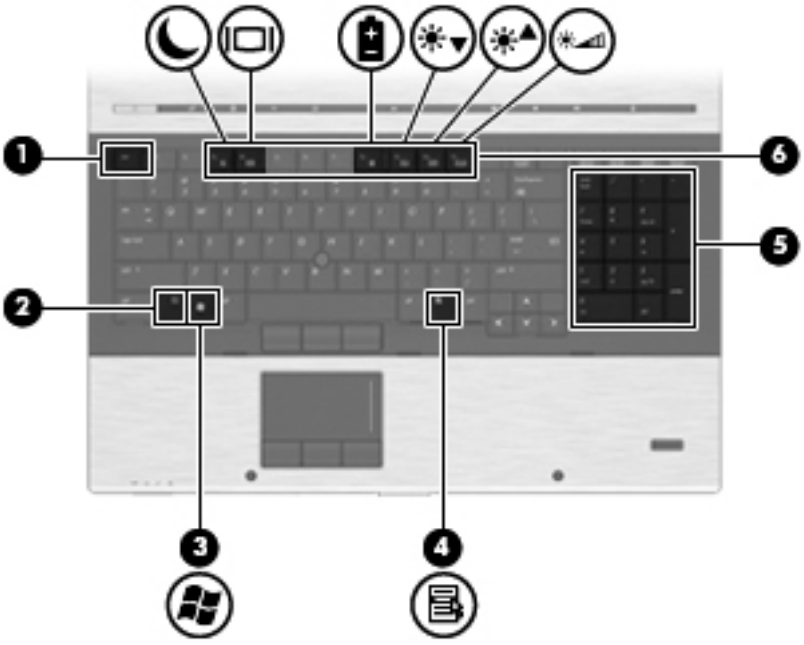
*The antennas are not visible from the outside of the computer. For optimal transmission, keep the areas immediately around the antennas free from obstructions.

Buttons, switches, and fingerprint reader

Item	Component	Description
(1)	Power button	• When the computer is off, press the button to turn on the computer. • When the computer is on, press the button to shut down the computer. • When the computer is in the Sleep state (in Windows 7 and Windows Vista) or Standby state (in Windows XP), press the button briefly to exit the Sleep state (in Windows 7 and Windows Vista) or Standby state (in Windows XP. • When the computer is in Hibernation, press the button briefly to exit Hibernation. If the computer has stopped responding and Windows shutdown procedures are ineffective, press and hold the power button for at least 5 seconds to turn off the computer. To learn more about your power settings: • In Windows 7 – select **Start > Control Panel > System and Security > Power Options**. • In Windows Vista – select **Start > Control Panel > System and Maintenance > Power Options**. • In Windows XP – select **Start > Control Panel > Performance and Maintenance > Power Options**.

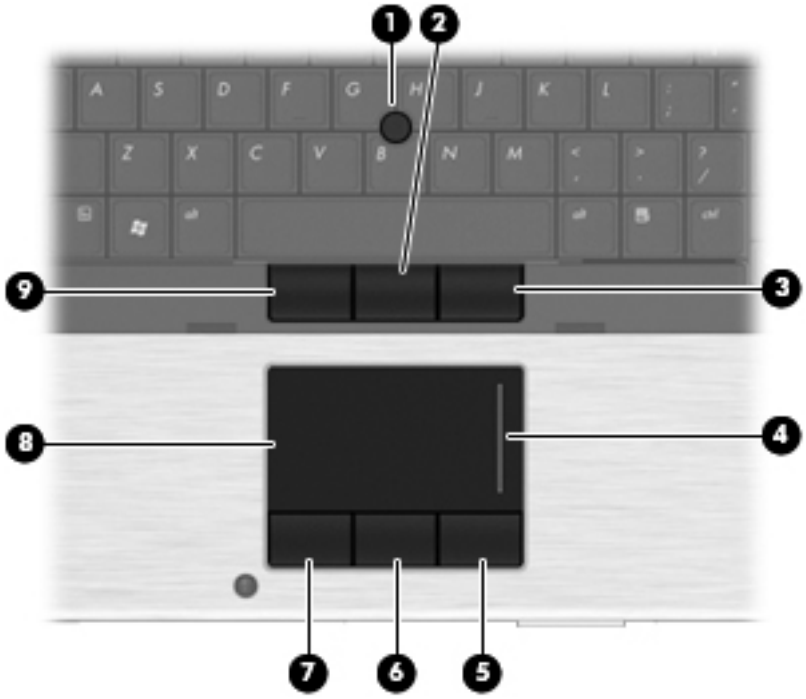
Item	Component	Description
(2)	QuickLook button	• When the computer is off, press the button to open HP QuickLook. • When the computer is on, press the button to open Software Setup. **NOTE:** If Software Setup is not available, the default Web browser opens.
(3)	Internal display switch	Turns off the display and initiates Sleep (in Windows 7 and Windows Vista) or Standby (in Windows XP if the display is closed while the power is on. **NOTE:** The internal display switch is not visible from the outside of the computer.
(4)	QuickWeb button	• When the computer is off, press the button to open HP QuickWeb. • When the computer is on, press the button to open the default Web browser.
(5)	Wireless button	Turns the wireless feature on or off but does not establish a wireless connection. **NOTE:** A wireless network must be set up in order to establish a wireless connection.
(6)	TouchPad button	Turns the TouchPad on or off.
(7)	Caps lock button	Turns caps lock on or off.
(8)	Num lock button	Turns num lock on or off.
(9)	Volume mute button	Mutes and restores speaker sound.
(10)	Volume down button	Decreases speaker volume.
(11)	Volume up button	Increases speaker volume.
(12)	Calculator button	Turns on the Windows calculator function.
(13)	Fingerprint reader (select models only)	Allows a fingerprint logon to Windows, instead of a password logon.

Keys



Item	Component	Description
(1)	esc key	Displays system information when pressed in combination with the fn key.
(2)	fn key	Executes frequently used system functions when pressed in combination with a function key or the esc key.
(3)	Windows logo key	Displays the Windows Start menu.
(4)	Windows applications key	Displays a shortcut menu for items beneath the pointer.
(5)	Integrated numeric keypad keys	Can be used like the keys on an external numeric keypad.
(6)	Function keys	Execute frequently used system functions when pressed in combination with the fn key.

Pointing device components

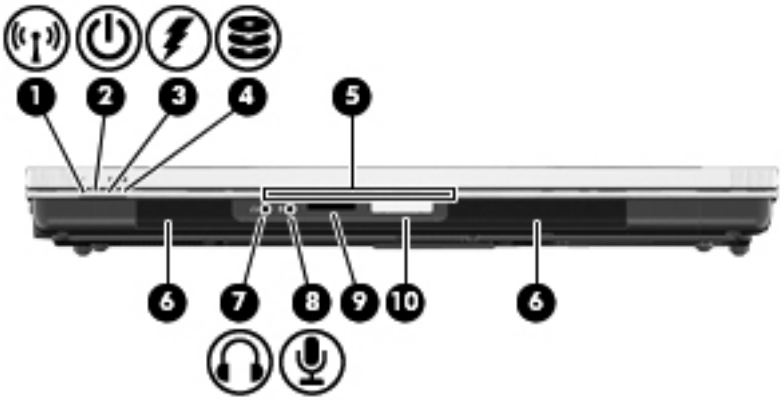


Item	Component	Description
(1)	Pointing stick*	Moves the pointer and selects or activates items on the screen.
(2)	Center pointing stick button*	Functions like the center button on an external mouse.
(3)	Right pointing stick button*	Functions like the right button on an external mouse.
(4)	TouchPad scroll zone	Scrolls up or down.
(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)	Left pointing stick button*	Functions like the left button on an external mouse.

*This table describes factory settings. To view or change pointing device preferences:

- In Windows 7 – select **Start > Devices and Printers**. Then, right-click the device representing your computer, and select **Mouse settings**
- In Windows Vista – select **Start > Control Panel > Hardware and Sound > Mouse**.
- In Windows XP – select **Start > Control Panel > Printers and Other Hardware > Mouse**.

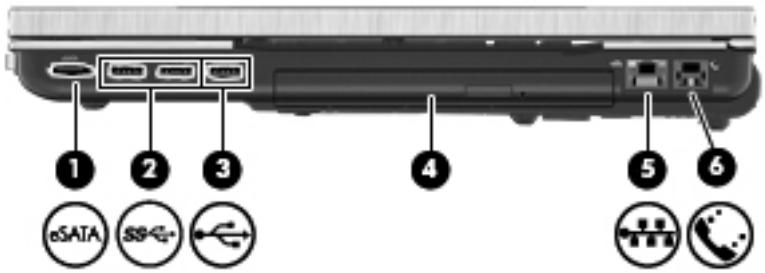
Front components



Item	Component	Description
(1)	Wireless light	• Blue: An integrated wireless device, such as a WLAN device, the HP Mobile Broadband Module, and/or a Bluetooth device, is on. • Amber: All wireless devices are off.
(2)	Power light	• On: The computer is on. • Blinking: The computer is in the Sleep state (in Windows 7 and Windows Vista) or Standby state (in Windows XP). • Blinking rapidly: An AC adapter with a higher power rating should be connected. • Off: The computer is off or in Hibernation.
(3)	Battery light	• Amber: A battery is charging. • Turquoise: A battery is close to full charge capacity. • 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: If the computer is plugged into an external power source, the light turns off when all batteries in the computer are fully charged. If the computer is not plugged into an external power source, the light stays off until the battery reaches a low battery level.
(4)	Drive light	• Blinking turquoise: The hard drive or optical drive is being accessed. • Amber: HP 3D DriveGuard has temporarily parked the internal hard drive, and if present, the hard drive in the Upgrade bay.
(5)	Business card slot	Holds a business card in position so that the webcam can capture an image.
(6)	Speakers (2)	Produce sound.

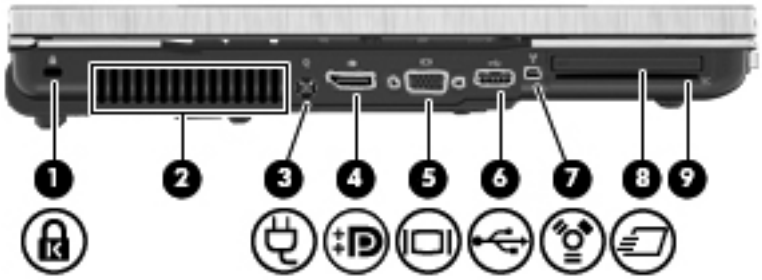
Item	Component	Description
(7)	Audio-out (headphone) jack	Produces sound when connected to optional powered stereo speakers, headphones, ear buds, a headset, or television audio. **NOTE:** When a device is connected to the headphone jack, the computer speakers are disabled.
(8)	Audio-in (microphone) jack	Connects an optional computer headset microphone, stereo array microphone, or monaural microphone.
(9)	Media Card Reader	Supports the following optional digital card formats: • Memory Stick • Memory Stick Duo • Memory Stick Pro • MultiMediaCard • SD Memory Card • xD-Picture Card • xD-Picture Card Type H • xD-Picture Card Type M
(10)	Display release button	Opens the computer.

Right-side components



Item	Component	Description
(1)	eSATA port	Connects high-performance eSATA components, such as an eSATA external hard drive.
(2)	3.0 SuperSpeed USB ports (2)	Connect optional USB devices and transfer data at a higher speed than a 2.0 USB device.
(3)	USB port	Connects an optional USB device.
(4)	Upgrade bay	Supports an optical drive or a hard drive.
(5)	RJ-45 (network) jack	Connects a network cable.
(6)	RJ-11 (modem) jack	Connects a modem cable (select models only).

Left-side components



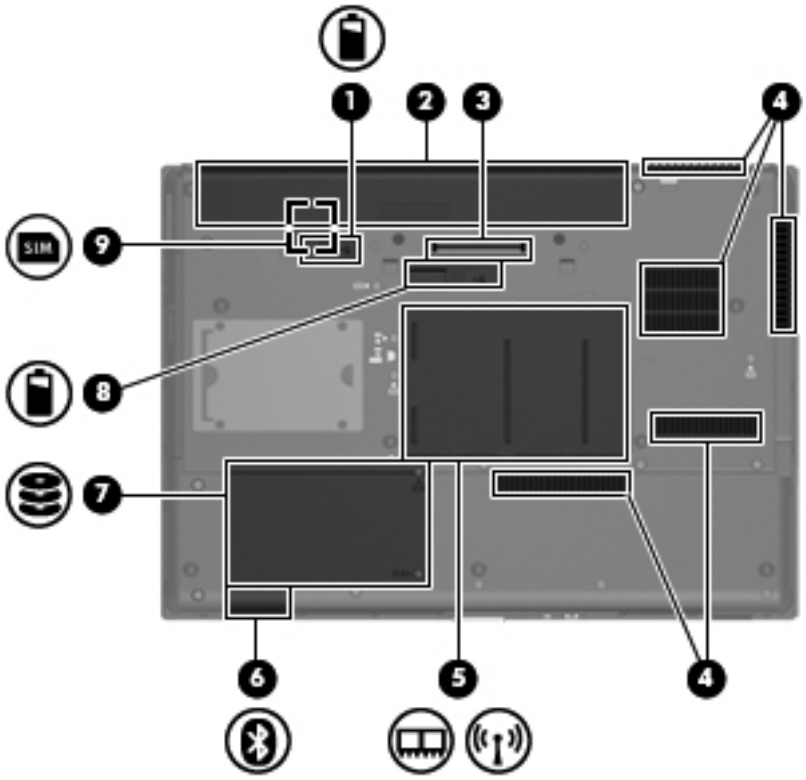
Item	Component	Description
(1)	Security cable slot	Attaches an optional security cable to the computer. **NOTE:** The security cable is designed to act as a deterrent, but it may not prevent the computer from being mishandled or stolen.
(2)	Vent	Enables airflow to cool internal components. **NOTE:** The computer fan starts up automatically to cool internal components and prevent overheating. It is normal for the internal fan to cycle on and off during routine operation.
(3)	Power connector	Connects an AC adapter.
(4)	DisplayPort	Connects an optional digital display device such as a high-performance monitor or projector.
(5)	External monitor port	Connects an external VGA monitor or projector.
(6)	USB port	Connects an optional USB device.
(7)	1394 port	Connects an optional IEEE 1394 or 1394a device, such as a camcorder.
(8)	ExpressCard slot	Supports optional ExpressCards.
(9)	Smart Card reader	Supports optional Smart Cards and Java™ Cards.

Rear component

The vent enables airflow to cool internal components.

NOTE: The computer fan starts up automatically to cool internal components and prevent overheating. It is normal for the internal fan to cycle on and off during routine operation.

Bottom components



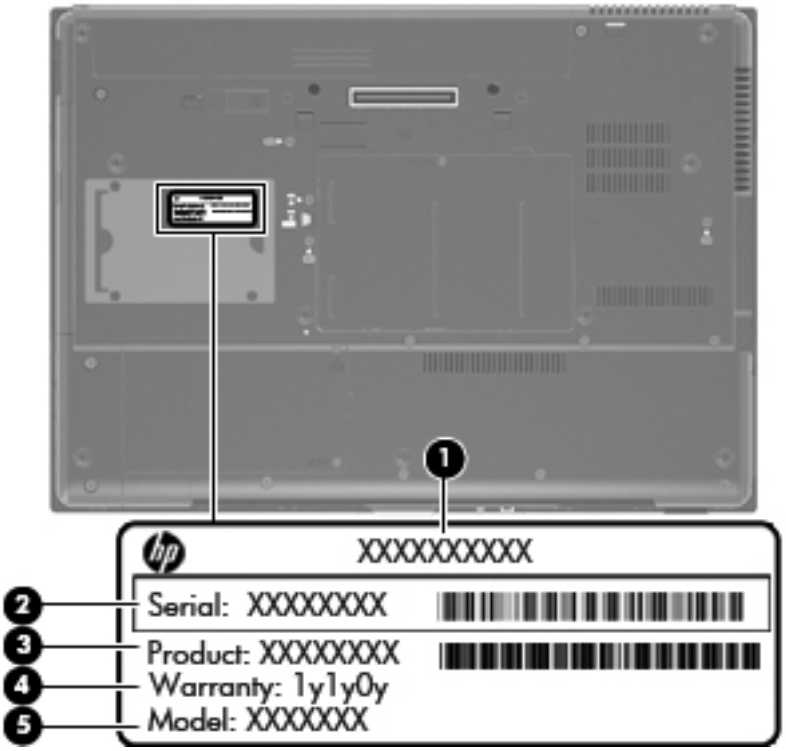
Item	Component	Description
(1)	Battery release latch	Releases the battery from the battery bay.
(2)	Battery bay	Holds the battery.
(3)	Docking connector	Connects an optional docking device.
(4)	Vents (5)	Enable airflow to cool internal components. **NOTE:** The computer fan starts up automatically to cool internal components and prevent overheating. It is normal for the internal fan to cycle on and off during routine operation.
(5)	Memory module/wireless module compartment	Contains the memory module slots, a WWAN module, and a WLAN module (select models only). **CAUTION:** To prevent an unresponsive system, replace the wireless module only with a wireless module authorized for use in the computer by the governmental agency that regulates wireless devices in your country or region. If you replace the module and then receive a warning message, remove the module to restore computer functionality, and then contact technical support through Help and Support.
(6)	Bluetooth module compartment (select models only)	Contains a Bluetooth device.
(7)	Hard drive bay	Holds the hard drive.

Item	Component	Description
(8)	Accessory battery connector	Connects an optional accessory battery.
(9)	SIM slot (select models only)	Contains a wireless SIM. The SIM slot is located inside the battery bay.

3 Illustrated parts catalog

Service tag

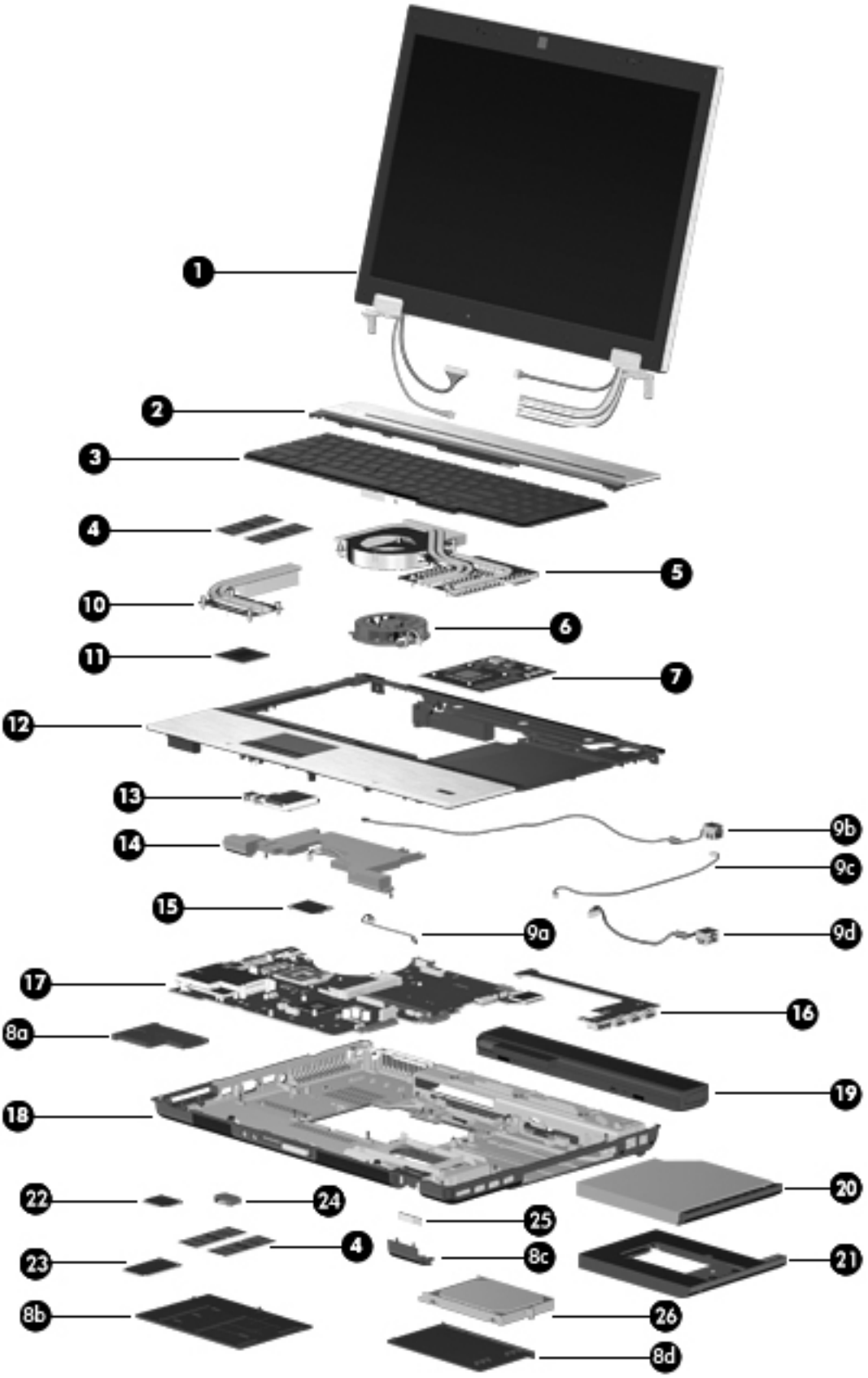
When ordering parts or requesting information, provide the computer serial number and model number provided on the service tag.



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.

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

Computer major components



Item	Description	Spare part number
(1)	**Display assembly** (includes display panel cable, 3 WLAN antenna transceivers and cables, and 2 WWAN antenna transceivers and cables):	
	17.0-in, WUXGA+ WVA AntiGlare LED display assembly with webcam	595708-001
	17.0-in, WUXGA+ WVA AntiGlare LED display assembly without webcam	595704-001
	17.0-in, WSXGA+ WVA AntiGlare LED display assembly with webcam	595707-001
	17.0-in, WSXGA+ WVA AntiGlare LED display assembly without webcam	595703-001
	17.0-in, WXGA+ WVA AntiGlare LED display assembly with webcam	595706-001
	17.0-in, WXGA+ WVA AntiGlare LED display assembly without webcam	595702-001
	NOTE: See Display components on page 28 for more display component information and spare part numbers.	
(2)	**Switch cover** (includes capacitive board and cable and power button board and cable)	596045-001
(3)	**Keyboard with backlight** (includes keyboard cable, pointing stick and pointing stick cable):	
	For use in Belgium	597581-A41
	For use in Bulgaria	597581-261
	For use in Denmark	597581-081
	For use in Finland and Sweden	597581-B71
	For use in France	597581-051
	For use in French Canada	597581-121
	For use in Germany	597581-041
	For use in Greece	597581-DJ1
	For use in Hungary	597581-211
	For use in Iceland	597581-DD1
	For use in Israel	597581-BB1
	For use in Italy	597581-061
	For use in Japan	597581-291
	For use in Latin America	597581-161
	For use in the Netherlands	597581-B31
	For use in Norway	597581-091
	For use in Portugal	597581-131
	For use in Russia	597581-251
	For use in Saudi Arabia	597581-171
	For use in Slovakia	597581-231
	For use in Slovenia	597581-BA1
	For use in South Korea	597581-AD1
	For use in Spain	597581-071

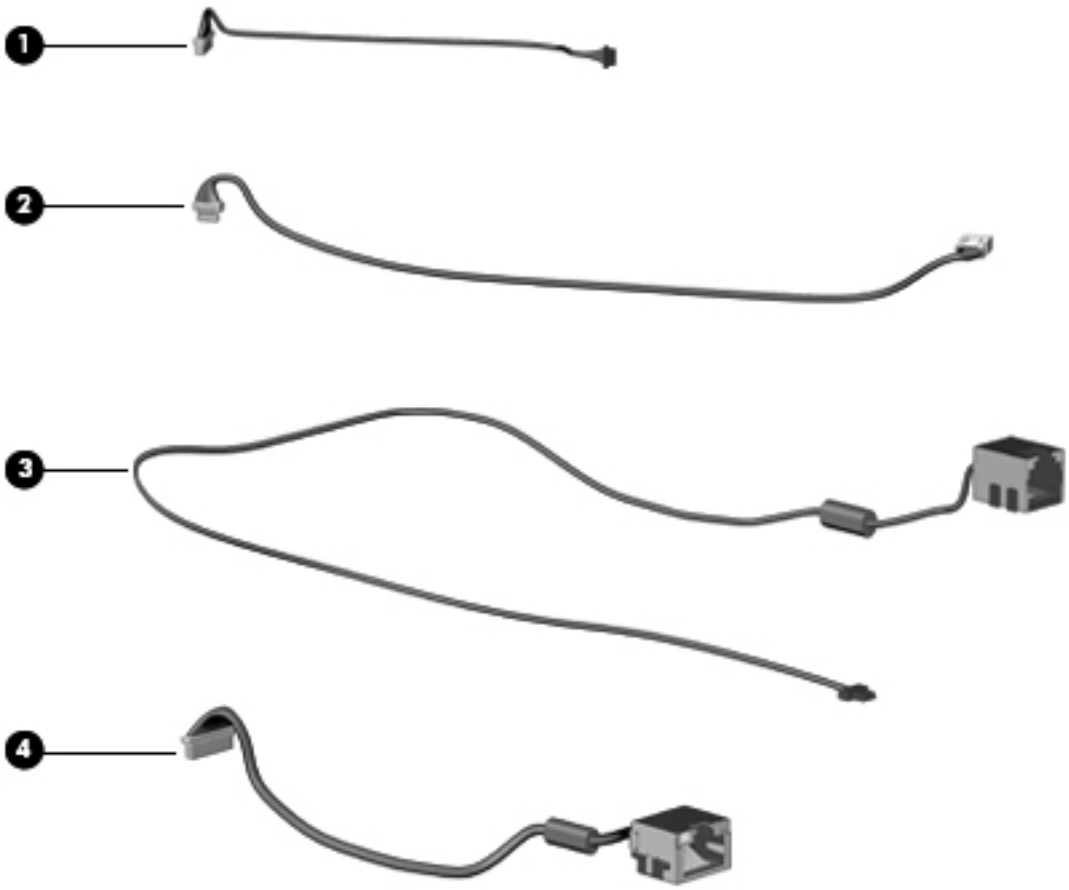
Item	Description	Spare part number
	For use in Switzerland	597581-111
	For use in Taiwan	597581-AB1
	For use in Thailand	597581-281
	For use in Turkey	597581-141
	For use in the United Kingdom	597581-031
	For use in the United States	597581-001
	Keyboard without backlight (includes cable, pointing stick, and pointing stick cable):	
	For use in Belgium	597582-A41
	For use in Brazil	1597582-201
	For use in the Bulgaria	597582-221
	For use in Denmark	597582-081
	For use in Finland and Sweden	597582-B71
	For use in France	597582-051
	For use in French Canada	597582-121
	For use in Germany	597582-041
	For use in Greece	597582-DJ1
	For use in Hungary	597582-211
	For use in Iceland	597582-DD1
	For use in Israel	597582-BB1
	For use in Italy	597582-061
	For use in Japan	597582-291
	For use in Latin America	597582-161
	For use in the Netherlands	597582-B31
	For use in Norway	597582-091
	For use in Portugal	597582-131
	For use in Russia	597582-251
	For use in Saudi Arabia	597582-171
	For use in Slovakia	597582-231
	For use in Slovenia	597582-BA1
	For use in South Korea	597582-AD1
	For use in Spain	597582-071
	For use in Switzerland	597582-BG1
	For use in Taiwan	597582-AB1
	For use in Thailand	597582-281

Item	Description	Spare part number
	For use in Turkey	597582-141
	For use in the United Kingdom	597582-031
	For use in the United States	597582-001
(4)	**Memory modules** (4, PC3-10600, 1333-MHz, DDR3):	
	4096-MB memory module	599092-001
	2048-MB memory module	598856-001
(5)	**Graphics board heat sink** (includes replacement thermal material):	
	For use only with computer models equipped with ATi graphics subsystems (includes 5 replacement thermal pads)	596046-001
	For use only with computer models equipped with nVidia graphics subsystems (includes replacement thermal pads and thermal paste)	597571-001
(6)	**Fan**	596047-001
(7)	**Graphics board** (includes replacement thermal material):	
	ATi XT-GL graphics board with 1-GB GDDR4 memory	596061-001
	nVidia GLM3 graphics board with 1-GB GDDR3 memory	596063-001
	nVidia GLM3 graphics board with 1-GB GDDR3 memory	596062-001
	Plastics Kit, includes:	596044-001
(8a)	ExpressCard slot bezel	
(8b)	Memory module/wireless module compartment cover (includes 3 captive screws, secured by C-clips)	
(8c)	Bluetooth module compartment cover	
(8d)	Hard drive cover (includes 2 captive screws, secured by C-clips)	
	NOTE: See Plastics kit on page 31 for more Plastics Kit spare part information.	
	Cable Kit, includes:	596040-001
(9a)	Bluetooth module cable	
(9b)	Modem module cable (includes RJ-11 jack)	
(9c)	Audio cable	
(9d)	Network cable (includes RJ-45 jack)	
	NOTE: See Cable Kit on page 27 for more Cable Kit spare part information.	
(10)	**Processor heat sink** (includes replacement thermal material):	
	For use only with computer models equipped with Quad Core processors	597570-001
	For use only with computer models equipped with Dual Core processors	596048-001
(11)	**Processor** (supports Intel Turbo Boost Technology, includes replacement thermal material):	
	Intel Quad Core i7 920XM 2.00-GHz (turbo up to 3.20-GHz) extreme processor, 8-MB L2 cache, 8 threads, 55-W	590663-001
	Intel Quad Core i7 820QM 1.73-GHz (turbo up to 3.06-GHz) processor, 8-MB L2 cache, 8 threads, 45-W	583053-001

Item	Description	Spare part number
	Intel Quad Core i7 720Qm 1.66-GHz (turbo up to 2.80-GHz) processor, 8-MB L2 cache, 8 threads, 45-W	586170-001
	Intel Dual Core i7 620M 2.66-GHz (turbo up to 3.33-GHz) processor, 4-MB L2 cache, 4 threads, 35-W	587259-001
	Intel Dual Core i5 540M 2.53-GHz (turbo up to 3.06-GHz) processor, 3-MB L2 cache, 4 threads, 35-W	594188-001
	Intel Dual Core i5 520M 2.40-GHz (turbo up to 2.93-GHz) processor, 3-MB L2 cache, 4 threads, 35-W	594187-001
(12)	**Top cover** (includes fingerprint reader board and cable, pointing stick buttons and cable, TouchPad and cable)	597580-001
(13)	**Audio board** (includes Digital Media slot and cable)	596055-001
(14)	**Speaker assembly**	494029-001
(15)	**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 596040-001.	
	For use in all countries and regions except Australia and New Zealand	510099-001
	For use only in Australia and New Zealand	510099-011
(16)	**USB board**	597572-001
(17)	**System board** (includes replacement thermal material)	
	For use in all countries and regions except the People's Republic of China and Russia:	
	• For use with computer models equipped with Intel Quad Core processors	595700-001
	• For use with computer models equipped with Intel Dual Core processors	595698-001
	For use only in the People's Republic of China and Russia:	
	• For use with computer models equipped with Intel Quad Core processors	598446-001
	• For use with computer models equipped with Intel Dual Core processors	598445-001
(18)	**Base enclosure** (includes Smart Card bezel and rubber feet)	596053-001
(19)	**Battery:**	
	8-cell, 73-Wh, Li-ion battery	493976-001
	8-cell, 68-Wh, Li-ion battery	592078-001
(20)	**Optical drive** (includes bezel and bracket):	
	Blu-ray ROM with LightScribe DVD±RW Super Multi Double-Layer Drive	606374-001
	DVD±RW and CD-RW Super Multi Double-Layer Combo Drive with LightScribe	606373-001
	DVD±RW and CD-RW Super Multi Double-Layer Combo Drive	606371-001
	DVD-ROM Drive	606372-001
(21)	**Hard drive carrier**	613682-001
(22)	**WLAN module:**	
	Intel Centrino Advanced-N 6200 802.11a/b/g WLAN module	572509-001

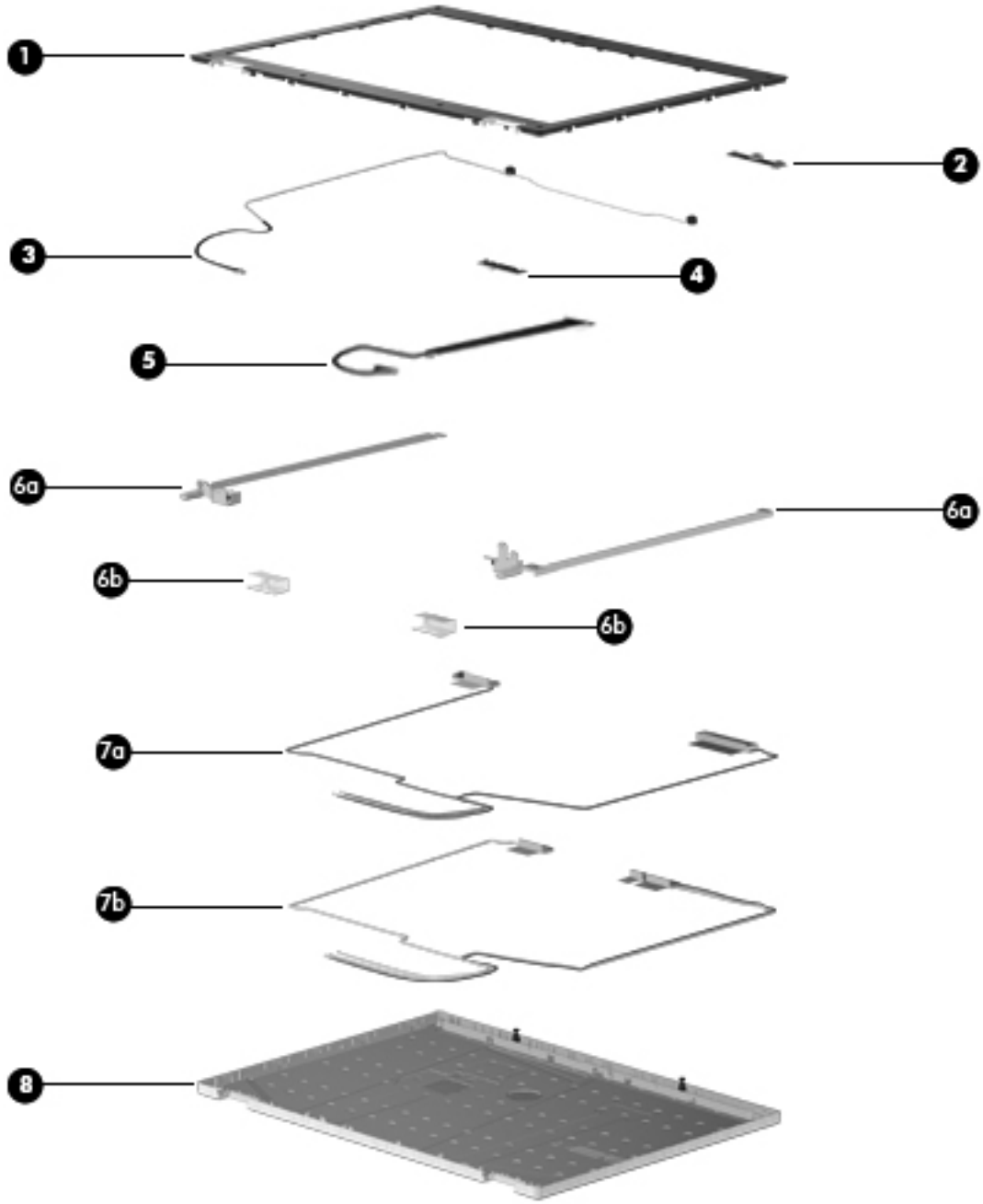
Item	Description	Spare part number
	Intel Centrino Ultimate-N 6300 802.11a/b/g/n AGN WLAN module	572511-001
(23)	**WWAN module:**	
	HSPA WWAN module	574249-001
	HSPA EV-DO WWAN module	531993-001
(24)	**RTC battery**	449137-001
(25)	**Bluetooth module** **NOTE:** The Bluetooth module spare part kit does not include a Bluetooth module cable. The Bluetooth module cable is included in the Cable Kit, spare part number 596040-001.	537921-001
(26)	**Mass storage device**	
	6.35-cm (2.50-in) hard drive (includes bracket):	
	• 640-GB, 7200-rpm	596418-001
	• 500-GB, 7200-rpm	596417-001
	• 320-GB, 7200-rpm	596416-001
	• 250-GB, 7200-rpm	596415-001
	256-GB solid-state drive (includes bracket)	596419-001

Cable Kit



Item	Description	Spare part number
	Cable Kit:	596040-001
(1)	Bluetooth module cable	
(2)	Audio cable	
(3)	Modem module cable (includes RJ-11 jack)	
(4)	Network cable (includes RJ-45 jack)	

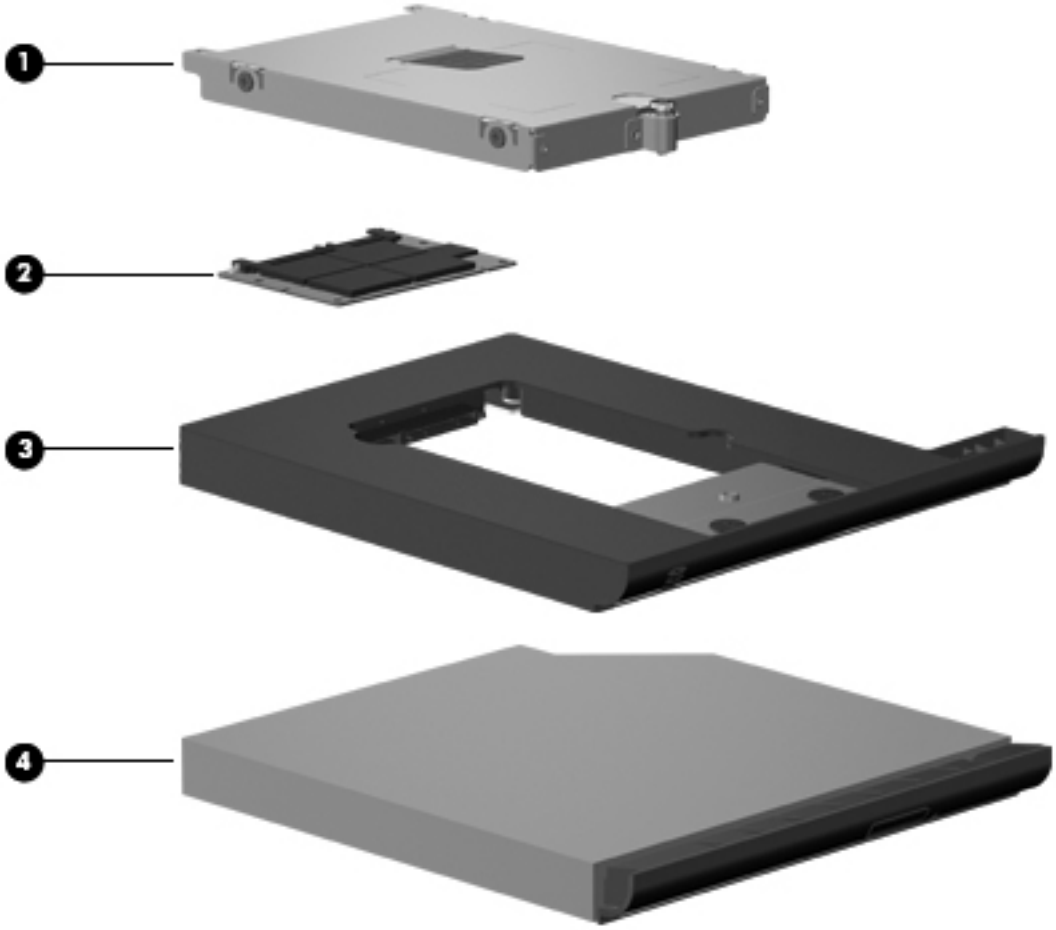
Display components



Item	Description	Spare part number
(1)	**Display bezel:**	
	For use only with computer models equipped with a webcam	597579-001
	For use only with computer models not equipped with a webcam	597578-001
(2)	**Webcam module**	596050-001
(3)	**Microphones**	596043-001

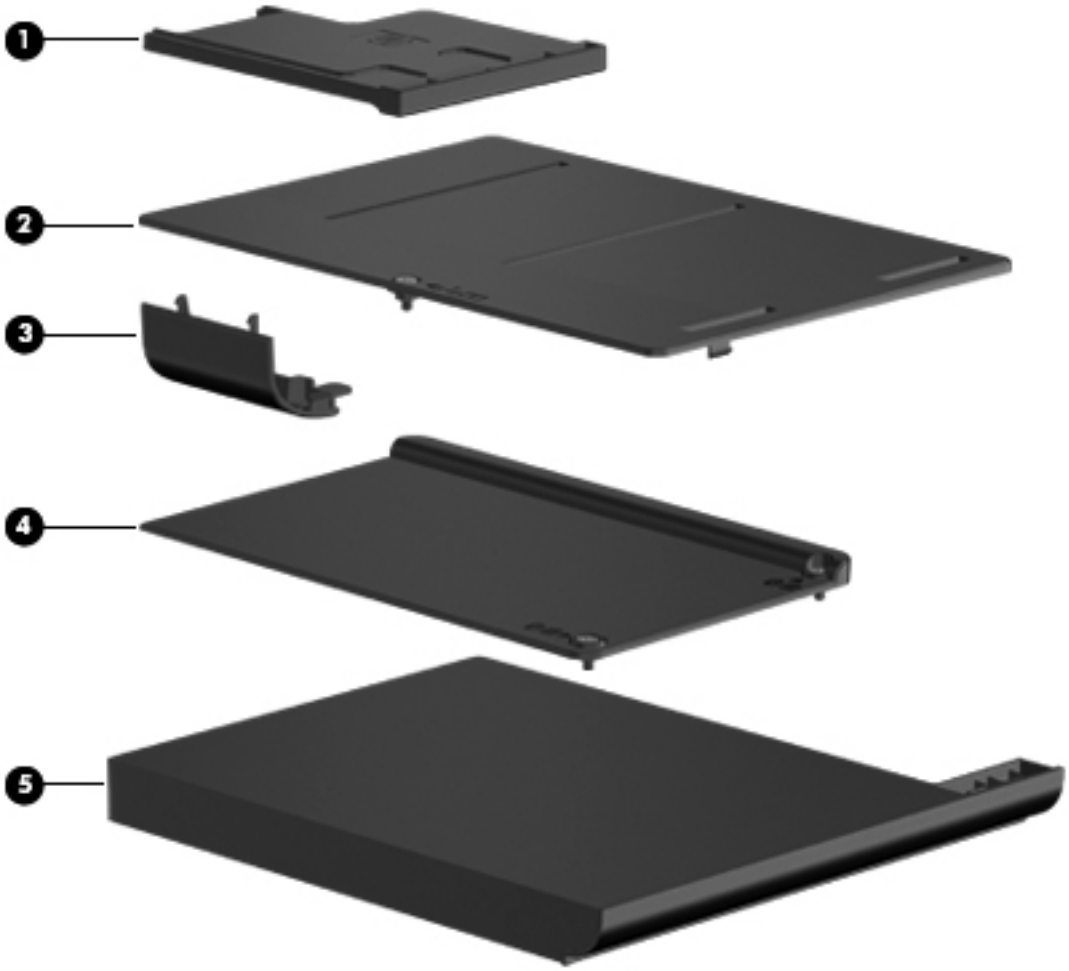
Item	Description	Spare part number
(4)	**Ambient light sensor board** (includes double-sided tape)	596051-001
(5)	**Display panel cable** (includes webcam module cable and ambient light sensor board cable)	596042-001
	Display Hinge Kit, includes:	596052-001
(6a)	Left and right hinges and brackets	
(6b)	Left and right hinge covers	
	Wireless Antenna Kit, includes:	596041-001
(7a)	WLAN antenna transceivers and cables	
(7b)	WWAN antenna transceivers and cables	
(8)	**Display enclosure** (includes logo)	597576-001
	Display Rubber Kit (not illustrated, includes 2 bezel rubber bumpers and 8 rubber screw covers	596049-001
	Display Screw Kit (not illustrated)	597573-001

Mass storage devices



Item	Description	Spare part number
(1)	**6.35-cm (2.50-in) hard drive** (includes hard drive bracket):	
	• 640-GB, 7200-rpm	596418-001
	• 500-GB, 7200-rpm	596417-001
	• 320-GB, 7200-rpm	596416-001
	• 250-GB, 7200-rpm	596415-001
(2)	**6.35-cm (2.50-in) 256-GB solid-state drive** (includes bracket)	596419-001
(3)	**Hard drive carrier**	613682-001
(4)	**Optical drive** (includes bezel and bracket)	
	Blu-ray ROM with LightScribe DVD±RW Super Multi Double-Layer Drive	606374-001
	DVD±RW and CD-RW Super Multi Double-Layer Combo Drive with LightScribe	606373-001
	DVD±RW and CD-RW Super Multi Double-Layer Combo Drive	606371-001
	DVD-ROM Drive	606372-001

Plastics kit



Item	Description	Spare part number
	Plastics Kit:	596044-001
(1)	ExpressCard slot bezel	
(2)	Memory module/wireless module compartment cover (includes one captive screw, secured by a C-clip)	
(3)	Bluetooth module compartment cover	
(4)	Hard drive cover (includes 2 captive screws, secured by C-clips)	

Miscellaneous parts

Description	Spare part number
230-W RC/V AC adapter	535592-001
Power cord:	
For use in Argentina	490371-D01
For use in Australia and New Zealand	490371-011
For use in Brazil	490371-201
For use in Canada and the United States	490371-001
For use in Denmark	490371-081
For use in Europe, the Middle East, and Africa	490371-021
For use in India	490371-D61
For use in Israel	490371-BB1
For use in Italy	490371-061
For use in Japan	490371-291
For use in the People's Republic of China	490371-AA1
For use in South Africa	490371-AR1
For use in South Korea	490371-AD1
For use in Switzerland	490371-111
For use in Taiwan	490371-AB1
For use in the United Kingdom	490371-031
Screw Kit	596039-001

Sequential part number listing

Spare part number	Description
449137-001	RTC battery
490371-001	Power cord for use in Canada and the United States
490371-011	Power cord for use in Australia and New Zealand
490371-021	Power cord for use in Europe, the Middle East, and Africa
490371-031	Power cord for use in Singapore and the United Kingdom
490371-061	Power cord for use in Italy
490371-081	Power cord for use in Norway
490371-111	Power cord for use in Switzerland
490371-201	Power cord for use in Brazil
490371-291	Power cord for use in Japan
490371-AA1	Power cord for use in the People's Republic of China
490371-AB1	Power cord for use in Taiwan
490371-AD1	Power cord for use in South Korea
490371-AR1	Power cord for use in South Africa
490371-BB1	Power cord for use in Israel
490371-D01	Power cord for use in Argentina
490371-D61	Power cord for use in India
493976-001	8-cell, 73-Wh, Li-ion battery
494029-001	Speaker assembly
510099-001	Modem module for use in all countries and regions except Australia and New Zealand **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 596040-001.
510099-011	Modem module for use only in Australia and New Zealand **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 596040-001.
531993-001	HSPA EV-DO WWAN module
535592-001	230-W RC/V AC adapter
537921-001	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 596040-001.
572509-001	Intel Centrino Advanced-N 6200 802.11a/b/g WLAN module
572511-001	Intel Centrino Ultimate-N 6300 802.11a/b/g/n AGN WLAN module
574249-001	HSPA WWAN module

Spare part number	Description
583053-001	Intel Quad Core i7 820QM 1.73-GHz (turbo up to 3.06-GHz) processor, 8-MB L2 cache, 8 threads, 45-W (supports Intel Turbo Boost Technology, includes replacement thermal material)
586170-001	Intel Quad Core i7 720Qm 1.66-GHz (turbo up to 2.80-GHz) processor, 8-MB L2 cache, 8 threads, 45-W (supports Intel Turbo Boost Technology, includes replacement thermal material)
587259-001	Intel Dual Core i7 620M 2.66-GHz (turbo up to 3.33-GHz) processor, 4-MB L2 cache, 4 threads, 35-W (supports Intel Turbo Boost Technology, includes replacement thermal material)
590663-001	Intel Quad Core i7 920XM 2.00-GHz (turbo up to 3.20-GHz) extreme processor, 8-MB L2 cache, 8 threads, 55-W (supports Intel Turbo Boost Technology, includes replacement thermal material)
592078-001	8-cell, 68-Wh, Li-ion battery
594187-001	Intel Dual Core i5 520M 2.40-GHz (turbo up to 2.93-GHz) processor, 3-MB L2 cache, 4 threads, 35-W (supports Intel Turbo Boost Technology, includes replacement thermal material)
594188-001	Intel Dual Core i5 540M 2.53-GHz (turbo up to 3.06-GHz) processor, 3-MB L2 cache, 4 threads, 35-W (supports Intel Turbo Boost Technology, includes replacement thermal material)
595698-001	System board for use with computer models equipped with Intel Dual Core processors in all countries and regions except the People's Republic of China and Russia: (includes replacement thermal material)
595700-001	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 and Russia: (includes replacement thermal material)
595702-001	17.0-in, WXGA+ WVA AntiGlare LED display assembly without webcam (includes the display panel cable, 3 WLAN antenna transceivers and cables, and 2 WWAN antenna transceivers and cables)
595703-001	17.0-in, WSXGA+ WVA AntiGlare LED display assembly without webcam (includes the display panel cable, 3 WLAN antenna transceivers and cables, and 2 WWAN antenna transceivers and cables)
595704-001	17.0-in, WUXGA+ WVA AntiGlare LED display assembly without webcam (includes the display panel cable, 3 WLAN antenna transceivers and cables, and 2 WWAN antenna transceivers and cables)
595706-001	17.0-in, WXGA+ WVA AntiGlare LED display assembly with webcam (includes the display panel cable, 3 WLAN antenna transceivers and cables, and 2 WWAN antenna transceivers and cables)
595707-001	17.0-in, WSXGA+ WVA AntiGlare LED display assembly with webcam (includes the display panel cable, 3 WLAN antenna transceivers and cables, and 2 WWAN antenna transceivers and cables)
595708-001	17.0-in, WUXGA+ WVA AntiGlare LED display assembly with webcam (includes the display panel cable, 3 WLAN antenna transceivers and cables, and 2 WWAN antenna transceivers and cables)
596039-001	Screw Kit
596040-001	Cable Kit **NOTE:** See Cable Kit on page 27 for more Cable Kit spare part information.
596041-001	Wireless Antenna Kit (includes WLAN antenna transceivers and cables and WWAN antenna transceivers and cables)
596042-001	Display panel cable (includes webcam module cable and ambient light sensor board cable)
596043-001	Microphone
596044-001	Plastics Kit **NOTE:** See Plastics kit on page 31 for more Plastics Kit spare part information.
596045-001	Switch cover (includes capacitive board and cable and power button board and cable)
596046-001	Graphics board heat sink for use only with computer models equipped with ATi graphics subsystems (includes 5 replacement thermal pads)

Spare part number	Description
596047-001	Fan
596048-001	Processor heat sink for use only with computer models equipped with Dual Core processors (includes replacement thermal material)
596049-001	Display Rubber Kit (includes 2 bezel rubber bumpers and 6 rubber screw covers
596050-001	Webcam module
596051-001	Ambient light sensor board (includes double-sided tape)
596052-001	Display Hinge Kit (includes left and right hinges and brackets)
596053-001	Base enclosure (includes Smart Card bezel and rubber feet)
596055-001	Audio board (includes Digital Media slot and cable)
596057-001	Smart Card reader
596061-001	ATi XT-GL graphics board with 1-GB GDDR4 memory (includes replacement thermal material)
596062-001	nVidia GLM3 graphics board with 1-GB GDDR3 memory (includes replacement thermal material)
596063-001	nVidia GLM3 graphics board with 1-GB GDDR3 memory (includes replacement thermal material)
596415-001	**6.35-cm** (2.50-in), 250-GB, 7200-rpm hard drive (includes bracket)
596416-001	**6.35-cm** (2.50-in), 320-GB, 7200-rpm hard drive (includes bracket)
596417-001	**6.35-cm** (2.50-in), 500-GB, 7200-rpm hard drive (includes bracket)
596418-001	**6.35-cm** (2.50-in), 640-GB, 7200-rpm hard drive (includes bracket)
596419-001	256-GB solid-state drive (includes bracket)
597570-001	Processor heat sink for use only with computer models equipped with Quad Core processors (includes replacement thermal material)
597571-001	Graphics board heat sink for use only with computer models equipped with nVidia graphics subsystems (includes replacement thermal pads and thermal paste)
597572-001	USB board (includes cable)
597573-001	Display Screw Kit
597576-001	Display enclosure (includes logo)
597578-001	Display bezel for use only with computer models not equipped with a webcam
597579-001	Display bezel for use only with computer models equipped with a webcam
597580-001	Top cover (includes fingerprint reader board and cable, pointing stick buttons and cable, TouchPad and cable)
597581-001	Keyboard with backlight for use in Canada and the United States (includes keyboard cable, pointing stick and pointing stick cable)
597581-031	Keyboard with backlight for use in Singapore and the United Kingdom (includes keyboard cable, pointing stick and pointing stick cable)
597581-041	Keyboard with backlight for use in Germany (includes keyboard cable, pointing stick and pointing stick cable)
597581-051	Keyboard with backlight for use in France (includes keyboard cable, pointing stick and pointing stick cable)
597581-061	Keyboard with backlight for use in Italy (includes keyboard cable, pointing stick and pointing stick cable)

Spare part number	Description
597581-071	Keyboard with backlight for use in Spain (includes keyboard cable, pointing stick and pointing stick cable)
597581-081	Keyboard with backlight for use in Denmark (includes keyboard cable, pointing stick and pointing stick cable)
597581-091	Keyboard with backlight for use in Norway (includes keyboard cable, pointing stick and pointing stick cable)
597581-121	Keyboard with backlight for use in French Canada (includes keyboard cable, pointing stick and pointing stick cable)
597581-131	Keyboard with backlight for use in Portugal (includes keyboard cable, pointing stick and pointing stick cable)
597581-141	Keyboard with backlight for use in Turkey (includes keyboard cable, pointing stick and pointing stick cable)
597581-161	Keyboard with backlight for use in Latin America (includes keyboard cable, pointing stick and pointing stick cable)
597581-171	Keyboard with backlight for use in Saudi Arabia (includes keyboard cable, pointing stick and pointing stick cable)
597581-211	Keyboard with backlight for use in Hungary (includes keyboard cable, pointing stick and pointing stick cable)
597581-251	Keyboard with backlight for use in Russia (includes keyboard cable, pointing stick and pointing stick cable)
597581-261	Keyboard with backlight for use in Bulgaria (includes keyboard cable, pointing stick and pointing stick cable)
597581-281	Keyboard with backlight for use in Thailand (includes keyboard cable, pointing stick and pointing stick cable)
597581-291	Keyboard with backlight for use in Japan (includes keyboard cable, pointing stick and pointing stick cable)
597581-A41	Keyboard with backlight for use in Belgium (includes keyboard cable, pointing stick and pointing stick cable)
597581-A81	Keyboard with backlight for use in Slovenia (includes keyboard cable, pointing stick and pointing stick cable)
597581-AB1	Keyboard with backlight for use in Taiwan (includes keyboard cable, pointing stick and pointing stick cable)
597581-AD1	Keyboard with backlight for use in South Korea (includes keyboard cable, pointing stick and pointing stick cable)
597581-B31	Keyboard with backlight for use in the Netherlands (includes keyboard cable, pointing stick and pointing stick cable)
597581-B71	Keyboard with backlight for use in Finland and Sweden (includes keyboard cable, pointing stick and pointing stick cable)
597581-BA1	Keyboard with backlight for use in Slovakia (includes keyboard cable, pointing stick and pointing stick cable)
597581-BB1	Keyboard with backlight for use in Israel (includes keyboard cable, pointing stick and pointing stick cable)
597581-BG1	Keyboard with backlight for use in Switzerland (includes keyboard cable, pointing stick and pointing stick cable)
597581-DD1	Keyboard with backlight for use in Iceland (includes keyboard cable, pointing stick and pointing stick cable)
597581-DJ1	Keyboard with backlight for use in Greece (includes keyboard cable, pointing stick and pointing stick cable)
597582-001	Keyboard without backlight for use in Canada and the United States (includes keyboard cable, pointing stick and pointing stick cable)

Spare part number	Description
597582-031	Keyboard without backlight for use in Singapore and the United Kingdom (includes keyboard cable, pointing stick and pointing stick cable)
597582-041	Keyboard without backlight for use in Germany (includes keyboard cable, pointing stick and pointing stick cable)
597582-051	Keyboard without backlight for use in France (includes keyboard cable, pointing stick and pointing stick cable)
597582-061	Keyboard without backlight for use in Italy (includes keyboard cable, pointing stick and pointing stick cable)
597582-071	Keyboard without backlight for use in Spain (includes keyboard cable, pointing stick and pointing stick cable)
597582-081	Keyboard without backlight for use in Denmark (includes keyboard cable, pointing stick and pointing stick cable)
597582-091	Keyboard without backlight for use in Norway (includes keyboard cable, pointing stick and pointing stick cable)
597582-121	Keyboard without backlight for use in French Canada (includes keyboard cable, pointing stick and pointing stick cable)
597582-131	Keyboard without backlight for use in Portugal (includes keyboard cable, pointing stick and pointing stick cable)
597582-141	Keyboard without backlight for use in Turkey (includes keyboard cable, pointing stick and pointing stick cable)
597582-161	Keyboard without backlight for use in Latin America (includes keyboard cable, pointing stick and pointing stick cable)
597582-171	Keyboard without backlight for use in Saudi Arabia (includes keyboard cable, pointing stick and pointing stick cable)
597582-201	Keyboard without backlight for use in Brazil (includes keyboard cable, pointing stick and pointing stick cable)
597582-211	Keyboard without backlight for use in Hungary (includes keyboard cable, pointing stick and pointing stick cable)
597582-251	Keyboard without backlight for use in Russia (includes keyboard cable, pointing stick and pointing stick cable)
597582-261	Keyboard without backlight for use in Bulgaria (includes keyboard cable, pointing stick and pointing stick cable)
597582-281	Keyboard without backlight for use in Thailand (includes keyboard cable, pointing stick and pointing stick cable)
597582-291	Keyboard without backlight for use in Japan (includes keyboard cable, pointing stick and pointing stick cable)
597582-A41	Keyboard without backlight for use in Belgium (includes keyboard cable, pointing stick and pointing stick cable)
597582-AB1	Keyboard without backlight for use in Taiwan (includes keyboard cable, pointing stick and pointing stick cable)
597582-AD1	Keyboard without backlight for use in South Korea (includes keyboard cable, pointing stick and pointing stick cable)
597582-B31	Keyboard without backlight for use in the Netherlands (includes keyboard cable, pointing stick and pointing stick cable)

Spare part number	Description
597582-B71	Keyboard without backlight for use in Finland and Sweden (includes keyboard cable, pointing stick and pointing stick cable)
597582-BA1	Keyboard without backlight for use in Slovakia (includes keyboard cable, pointing stick and pointing stick cable)
597582-BB1	Keyboard without backlight for use in Israel (includes keyboard cable, pointing stick and pointing stick cable)
597582-BG1	Keyboard without backlight for use in Switzerland (includes keyboard cable, pointing stick and pointing stick cable)
597582-DD1	Keyboard without backlight for use in Iceland (includes keyboard cable, pointing stick and pointing stick cable)
597582-DJ1	Keyboard without backlight for use in Greece (includes keyboard cable, pointing stick and pointing stick cable)
598445-001	System board for use with computer models equipped with Intel Dual Core processors only in the People's Republic of China and Russia (includes replacement thermal material)
598446-001	System board for use with computer models equipped with Intel Quad Core processors only in the People's Republic of China and Russia (includes replacement thermal material)
598856-001	2048-MB memory module (PC3-10600, 1333-MHz, DDR3)
599092-001	4096-MB memory module (PC3-10600, 1333-MHz, DDR3)
606371-001	DVD±RW and CD-RW Super Multi Double-Layer Combo Drive
606372-001	DVD-ROM Drive
606373-001	DVD±RW and CD-RW Super Multi Double-Layer Combo Drive with LightScribe
606374-001	Blu-ray ROM with LightScribe DVD±RW Super Multi Double-Layer Drive
613682-001	Hard drive carrier

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 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 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 area 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 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

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

Packaging and transporting guidelines

Follow these grounding guidelines when packaging and transporting equipment:

- To avoid hand 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 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 nonconductive materials, such as ordinary plastic assembly aids and Styrofoam.
- Handle ESD-sensitive components, parts, and assemblies by the case or PCM laminate. Handle these items only at static-free workstations.
- Avoid 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 ±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
- Nonconductive plastic bags, tubes, or boxes
- Metal tote boxes
- Electrostatic voltage levels and protective materials

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

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

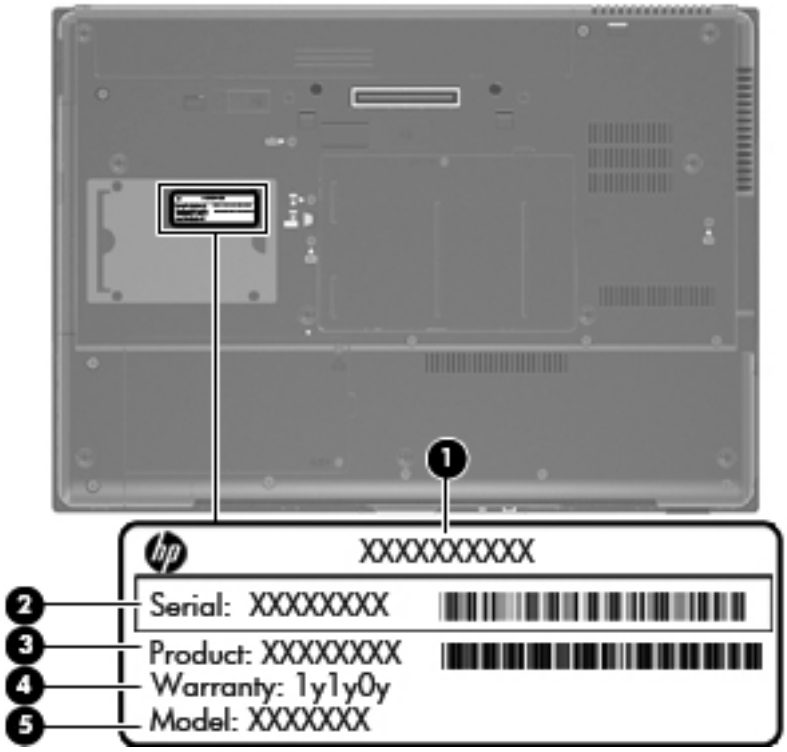
Component replacement procedures

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

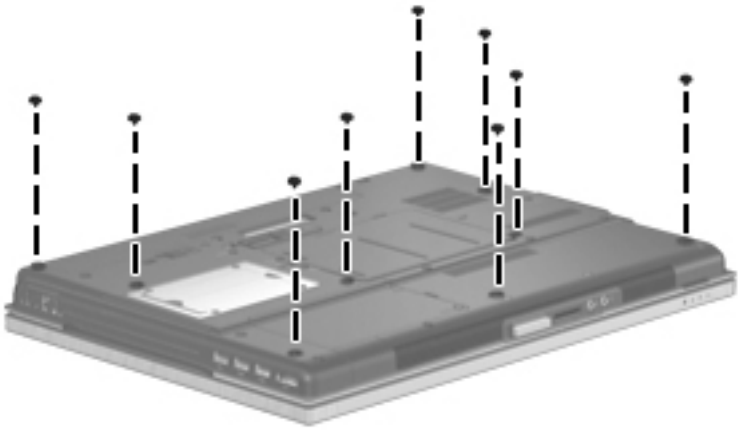
When ordering parts or requesting information, provide the computer serial number and model number provided on the service tag.



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.
(5)	Model description	This is the alphanumeric identifier used to locate documents, drivers, and support for the computer.

Computer feet

The computer feet are adhesive-backed rubber pads. The feet are included in the base enclosure spare part kit, spare part number 596053-001. There are 9 rubber feet that attach to the base enclosure in the locations illustrated below.



Battery

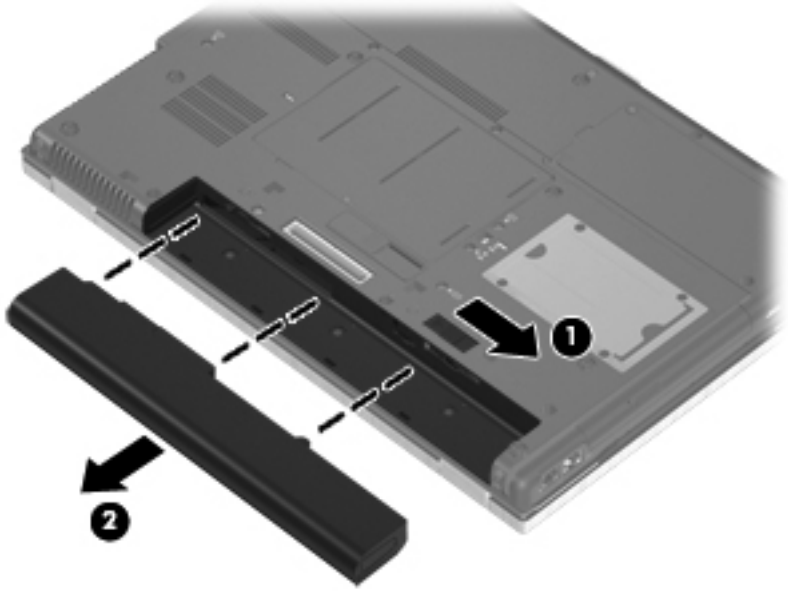
Description	Spare part number
8-cell, 73-Wh, Li-ion battery	493976-001
8-cell, 68-Wh, Li-ion battery	592078-001

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



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

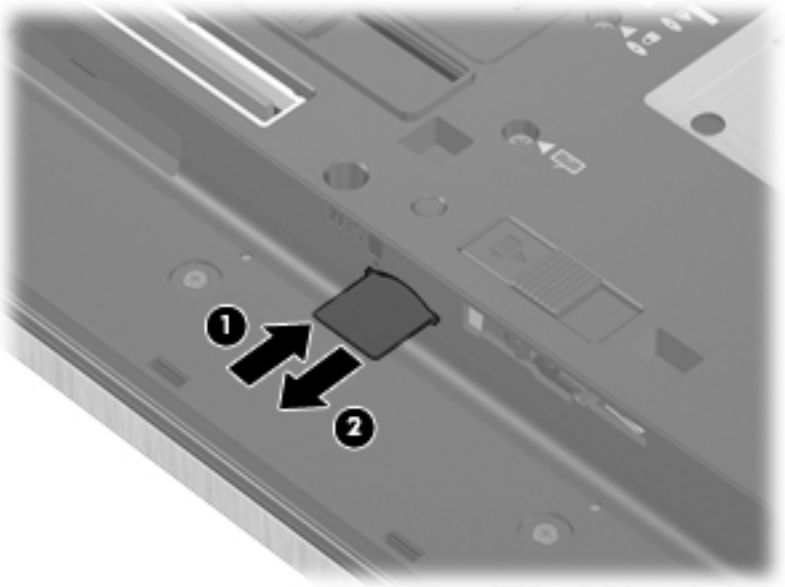
SIM

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 46).

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.

Primary hard drive

NOTE: The hard drive spare part kit includes a hard drive bracket.

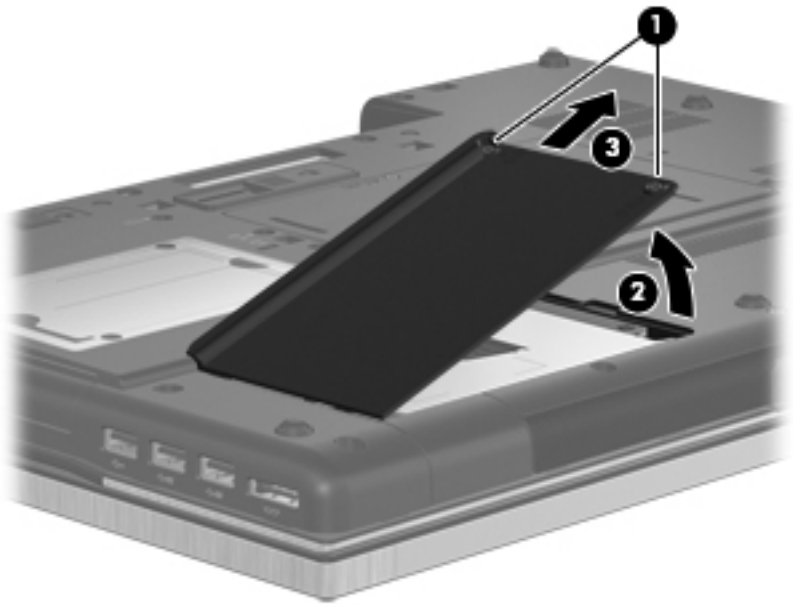
Description	Spare part number
6.35-cm (2.50-in) 640-GB, 7200-rpm hard drive	596418-001
6.35-cm (2.50-in) 500-GB, 7200-rpm hard drive	596417-001
6.35-cm (2.50-in) 320-GB, 7200-rpm hard drive	596416-001
6.35-cm (2.50-in) 250-GB, 7200-rpm hard drive	596415-001
6.35-cm (2.50-in) 256-GB solid-state drive (includes bracket)	596419-001

Before removing the primary hard drive, follow these steps:

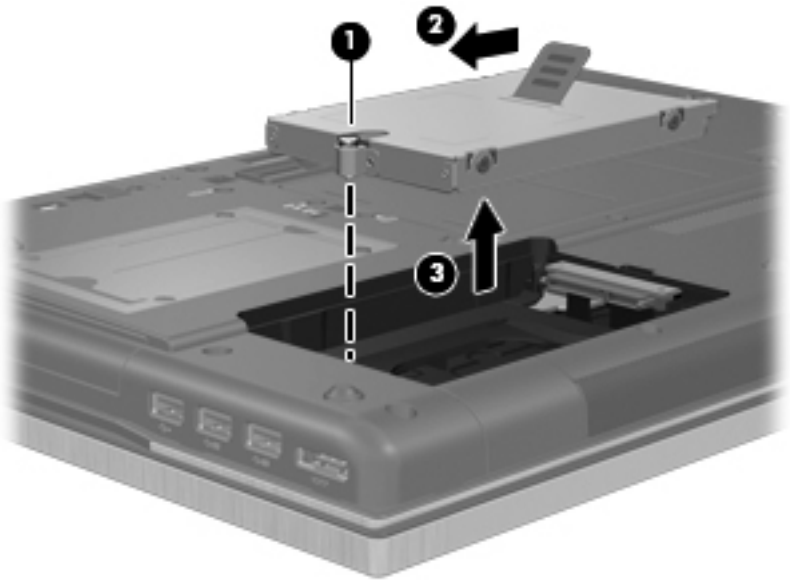
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 46).

Remove the primary hard drive:

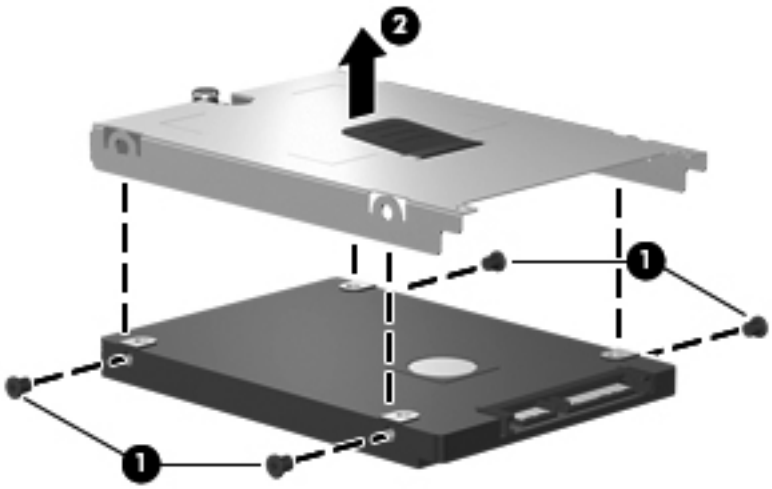
1. Position the computer with the front toward you.
2. Loosen the two captive Phillips screws **(1)** that secure the hard drive cover to the computer.
3. Lift the right side of the hard drive cover **(2)**, swing it up and to the left, and then remove the cover **(3)**. The hard drive cover is included in the Plastics Kit, spare part number 596044-001.



4. Loosen the captive Phillips screw **(1)** that secures the hard drive to the computer.
5. Grasp the Mylar tab on the hard drive and slide the hard drive **(2)** to the left to disconnect it from the system board.
6. Remove the hard drive **(3)** from the hard drive bay.



7. If it is necessary to replace the hard drive bracket, remove the four Phillips PM3.0×3.0 screws **(1)** that secure the bracket to the hard drive.
8. Lift the bracket **(2)** straight up to remove it from the hard drive.



Reverse this procedure to reassemble and install the hard drive.

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 596040-001. See Bluetooth module cable on page 86 for information on replacing the Bluetooth module cable.

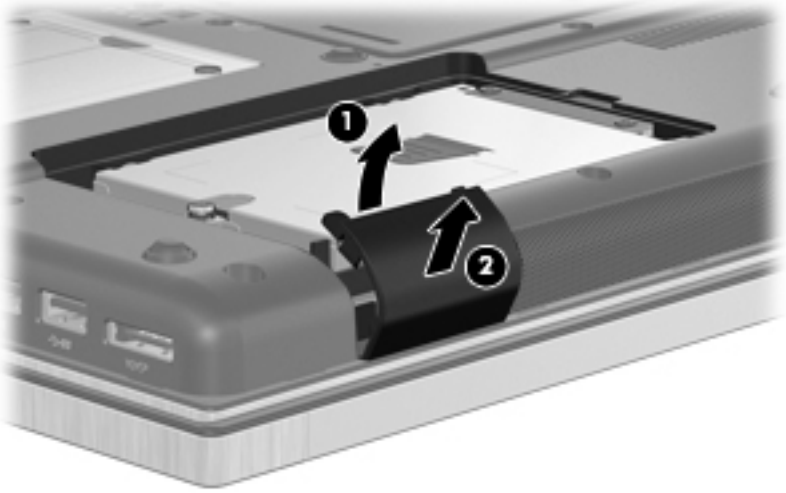
Description	Spare part number
Bluetooth module	537921-001

Before removing the Bluetooth 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 46).
5. Remove the hard drive cover (see Primary hard drive on page 48).

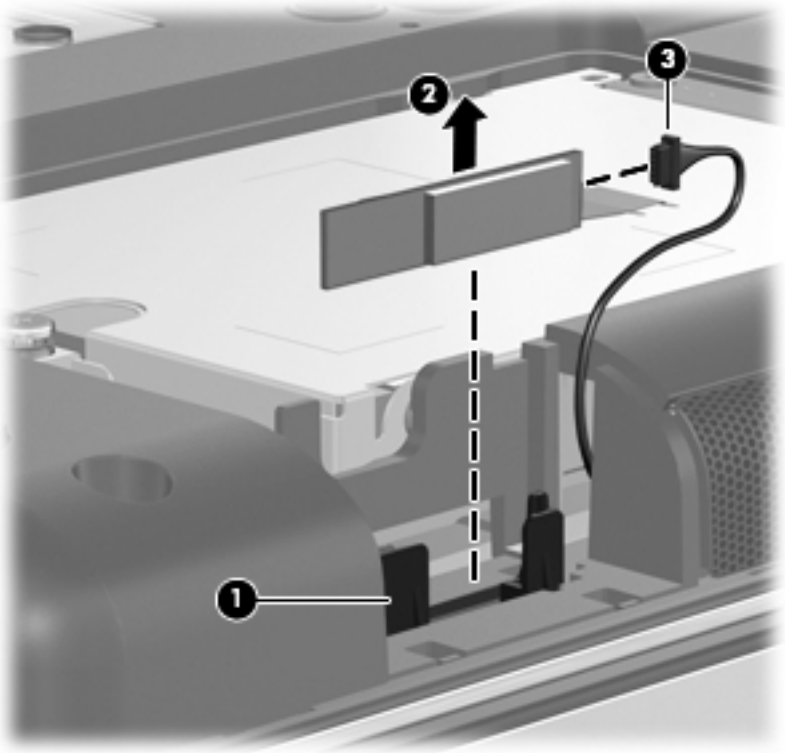
Remove the Bluetooth module:

1. Lift the rear edge of the Bluetooth module compartment cover **(1)** until it detaches from the base enclosure.
2. Remove the Bluetooth module compartment cover **(2)**. The Bluetooth module compartment cover is included in the Plastics Kit, spare part number 596044-001.



3. Release the clip **(1)** built into the base enclosure that secures the Bluetooth module.
4. Release the Bluetooth module **(2)** as far as the Bluetooth module cable allows.

5. Disconnect the Bluetooth module cable **(3)** from the Bluetooth module.



6. Remove the Bluetooth module.

Reverse this procedure to install the Bluetooth module and Bluetooth module compartment cover.

Optical drive

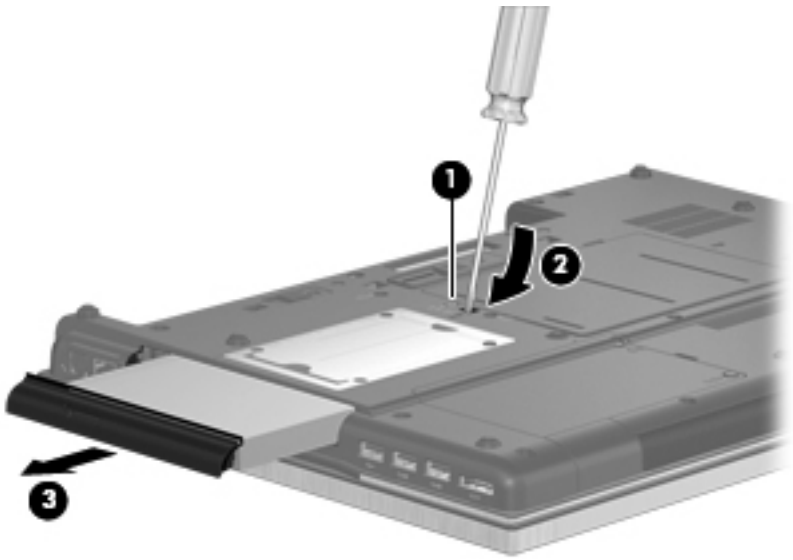
Description	Spare part number
Blu-ray ROM with LightScribe DVD±RW Super Multi Double-Layer Drive	606374-001
DVD±RW and CD-RW Super Multi Double-Layer Combo Drive with LightScribe	606373-001
DVD±RW and CD-RW Super Multi Double-Layer Combo Drive	606371-001
DVD-ROM Drive	606372-001

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 46).

Remove the optical drive:

1. Position the computer with the left side toward you.
2. Loosen the captive Phillips 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, position the optical drive with the rear toward you.

6. Remove the three Phillips PM2.0×4.0 screws **(1)** that secure the optical drive bracket to the optical drive.
7. Remove the optical drive bracket **(2)**.

Reverse this procedure to reassemble and install the optical drive.

Secondary hard drive

NOTE: The hard drive spare part kit includes a hard drive bracket.

Description	Spare part number
6.35-cm (2.50-in) 640-GB, 7200-rpm hard drive	596418-001
6.35-cm (2.50-in) 500-GB, 7200-rpm hard drive	596417-001
Hard drive carrier	613682-001

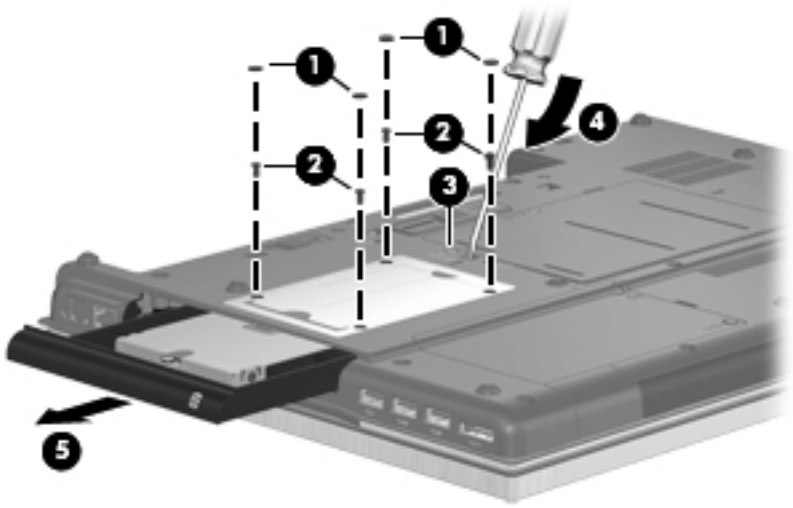
Before removing the secondary hard drive, follow these steps:

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 46).

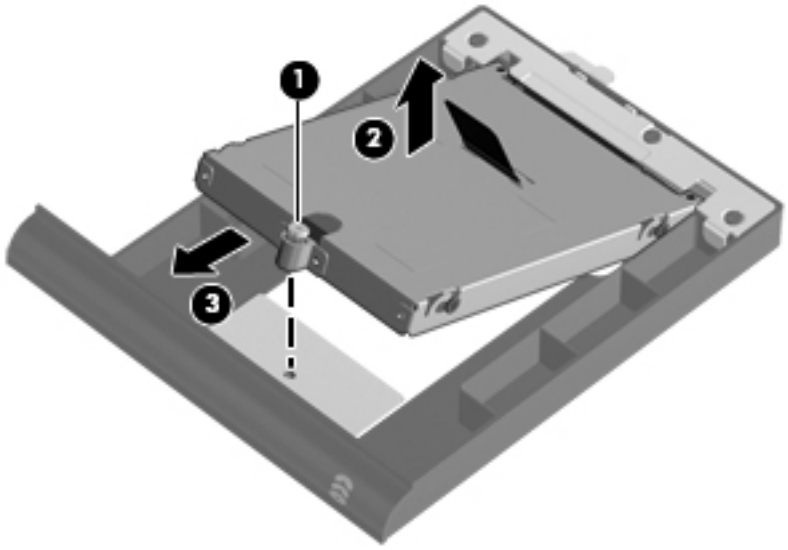
Remove the secondary hard drive:

1. Position the computer with the left side toward you.
2. Remove the four Mylar screw covers **(1)** that conceal the secondary hard drive carrier retention screws.
3. Remove the four Phillips PM3.0×3.0 screws **(2)** that secure the secondary hard drive carrier to the computer.
4. Loosen the captive Phillips screw **(3)** that secures the secondary hard drive carrier to the computer.
5. Insert a flat-bladed screwdriver or similar tool into the secondary hard drive carrier tab access **(4)** and press the tab to the left to release the secondary hard drive carrier from the computer.

6. Remove the secondary hard drive **(5)**.



7. Loosen the captive Phillips screw **(1)** that secures the secondary hard drive to the secondary hard drive carrier.
8. Use the Mylar tab to lift the front edge of the secondary hard drive **(2)** until it rests at an angle.
9. Release the secondary hard drive **(3)** by sliding it up and forward at an angle.



10. Remove the secondary hard drive.

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

WLAN module

Description	Spare part number
Intel Centrino Advanced-N 6200 802.11a/b/g WLAN module	572509-001
Intel Centrino Ultimate-N 6300 802.11a/b/g/n AGN WLAN module	572511-001

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

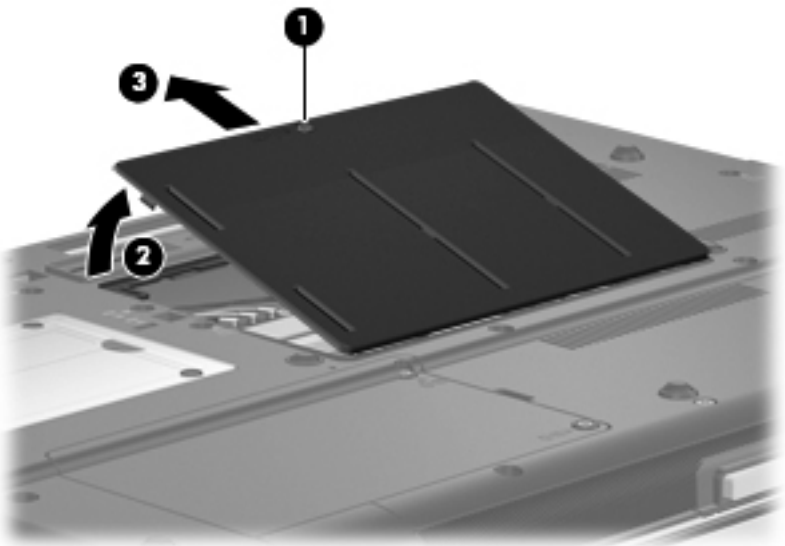
To prevent an unresponsive system, replace the wireless module only with a wireless module authorized for use in the computer by the governmental agency that regulates wireless devices in your country or region. If you replace the module and then receive a warning message, remove the module to restore 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 46).

Remove the WLAN module:

1. Position the computer with the front toward you.
2. Loosen the captive Phillips screw **(1)** that secures the memory module/wireless module compartment cover to the computer.
3. Lift the rear edge of the memory module/wireless module compartment cover **(2)**, swing it up and forward, and then remove the cover **(3)**. The memory module/wireless module compartment cover is included in the Plastics Kit, spare part number 596044-001.



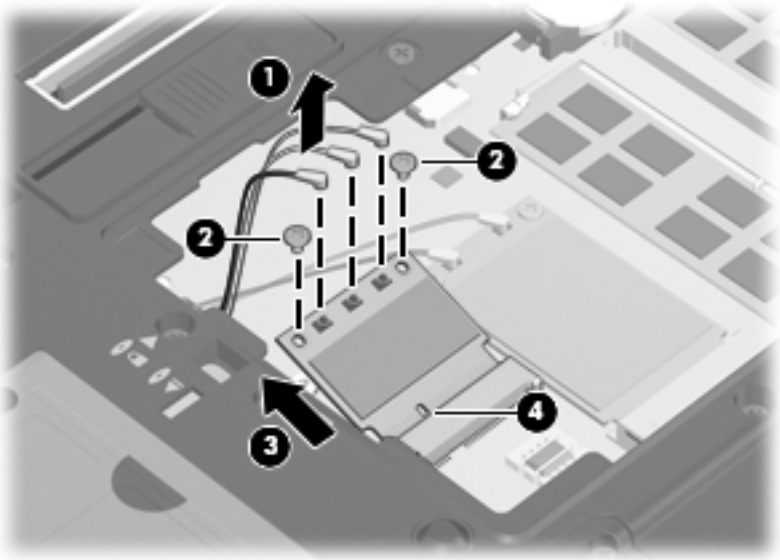
4. Disconnect the WLAN antenna cables **(1)** from the terminals on the WLAN module.

NOTE: The black WLAN antenna cable is connected to the WLAN module “Main” terminal. The white WLAN antenna cable is connected to the WLAN module “Aux” terminal. If there are three WLAN antenna cables, the yellow WLAN antenna cable is connected to the WLAN module “3” (or middle) terminal.

5. Remove the two Phillips PM2.0×4.0 screws **(2)** that secure the WLAN module to the system board. (The WLAN module tilts up.)

6. 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
HSPA WWAN module	574249-001
HSPA EV-DO WWAN module	531993-001

△ **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 46).
5. Remove the memory module/wireless module compartment cover (see WLAN module on page 55).

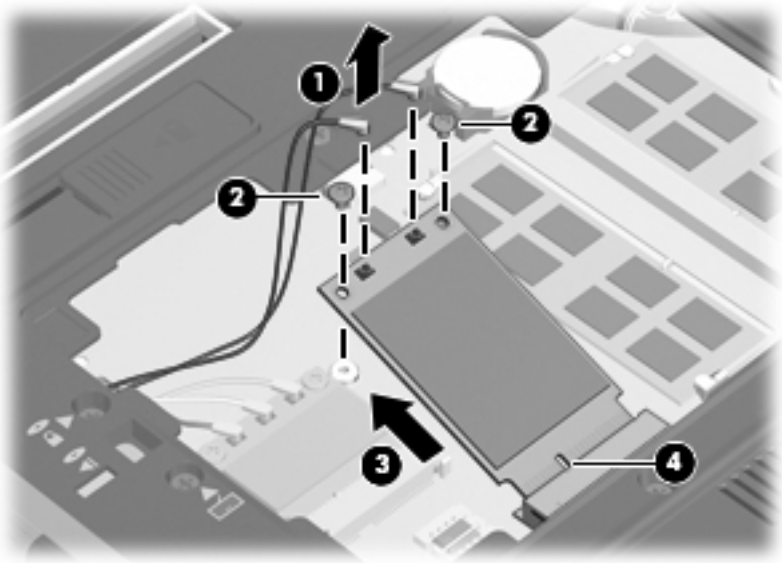
Remove the WWAN module:

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 PM2.0×4.0 screws **(2)** that secure the WWAN module to the system board. (The WLAN module tilts up.)
3. Remove the WWAN module **(3)** by pulling the module away from the slot at an angle.

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



Reverse this procedure to install the WWAN module.

Expansion memory module

Description	Spare part number
4096-MB memory module (PC3-10600, 1333-MHz, DDR3)	599092-001
2048-MB memory module (PC3-10600, 1333-MHz, DDR3)	598856-001

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:

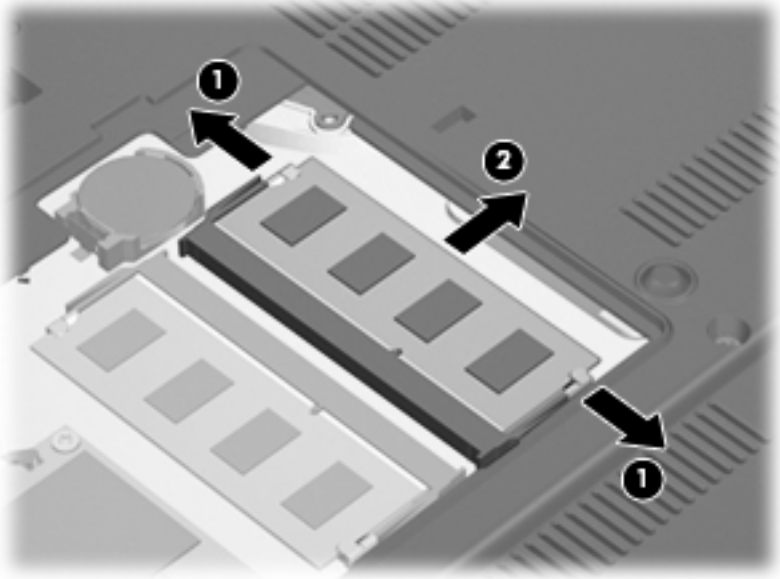
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 46).
5. Remove the memory module/wireless module compartment cover (see WLAN module on page 55).

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.

RTC battery

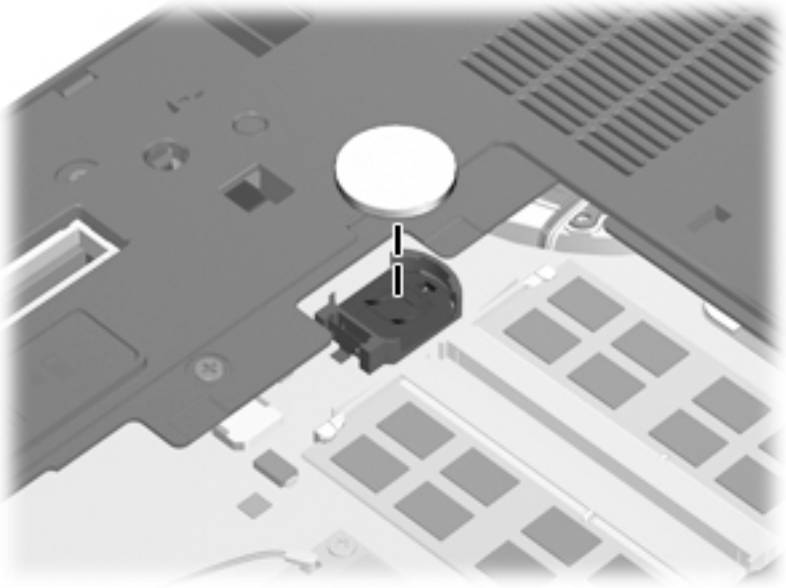
Description	Spare part number
RTC battery	449137-001

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 46).
5. Remove the memory module/wireless module compartment cover (see WLAN module on page 55).

Remove the RTC battery:

▲ Remove the RTC battery from the socket on the system board.



Reverse this procedure to install the RTC battery. When installing the RTC battery, make sure the “+” sign faces up.

Keyboard

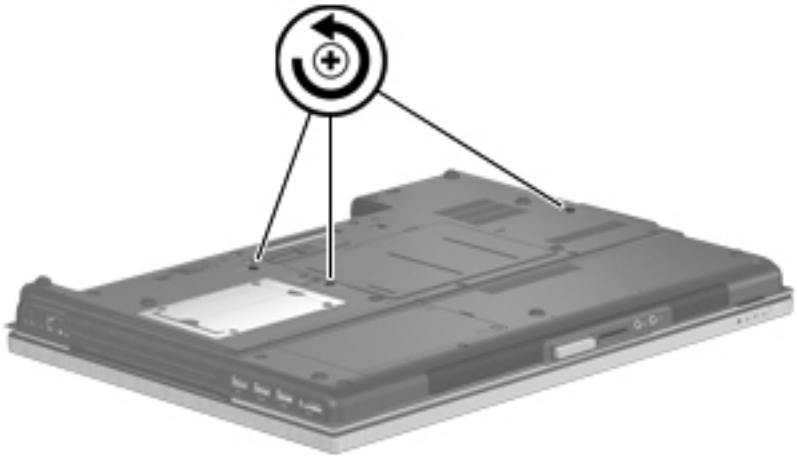
For use in:	Spare part number	For use in:	Spare part number
Keyboard with backlight (includes keyboard cable, pointing stick and pointing stick cable):			
Belgium	597581-A41	Norway	597581-091
Bulgaria	597581-261	Portugal	597581-131
Denmark	597581-081	Russia	597581-251
Finland and Sweden	597581-B71	Saudi Arabia	597581-171
France	597581-051	Slovakia	597581-231
French Canada	597581-121	Slovenia	597581-BA1
Germany	597581-041	South Korea	597581-AD1
Greece	597581-DJ1	Spain	597581-071
Hungary	597581-211	Switzerland	597581-111
Iceland	597581-DD1	Taiwan	597581-AB1
Israel	597581-BB1	Thailand	597581-281
Italy	597581-061	Turkey	597581-141
Japan	597581-291	The United Kingdom	597581-031
Latin America	597581-161	The United States	597581-001
The Netherlands	597581-B31		
Keyboard without backlight (includes keyboard cable, pointing stick and pointing stick cable):			
Belgium	597582-A41	The Netherlands	597582-B31
Brazil	597582-281	Norway	597582-091
Bulgaria	597582-261	Portugal	597582-131
Denmark	597582-081	Russia	597582-251
Finland and Sweden	597582-B71	Saudi Arabia	597582-171
France	597582-051	Slovakia	597582-231
French Canada	597582-121	Slovenia	597582-BA1
Germany	597582-041	South Korea	597582-AD1
Greece	597582-DJ1	Spain	597582-071
Hungary	597582-211	Switzerland	597582-111
Iceland	597582-DD1	Taiwan	597582-AB1
Israel	597582-BB1	Thailand	597582-281
Italy	597582-061	Turkey	597582-141
Japan	597582-291	The United Kingdom	597582-031
Latin America	597582-161	The United States	597582-001

Before removing the keyboard, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 46).

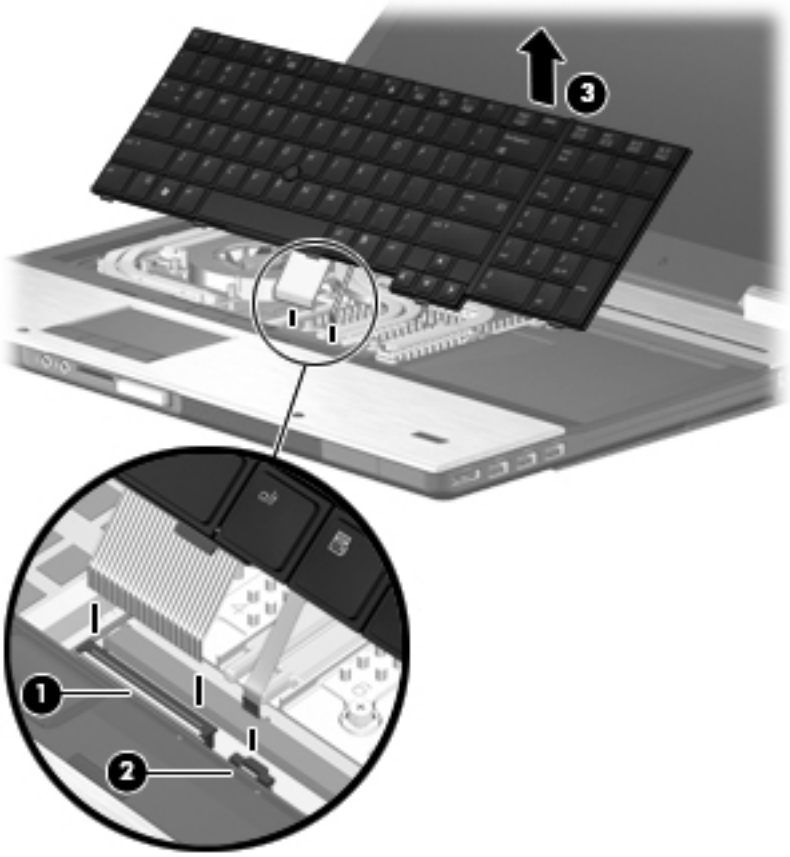
Remove the keyboard:

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



3. Turn the computer right-side up, with the front toward you.
4. Open the computer as far as it will open.
5. Lift the rear edge of the keyboard **(1)** until it rests at an angle.
6. Slide the keyboard back **(2)** until the keyboard cable and pointing stick cable are accessible.

7. Release the zero insertion force (ZIF) connector **(1)** to which the keyboard cable is attached, and then disconnect the keyboard cable from the system board.
8. Release the ZIF connector **(2)** to which the pointing stick cable is attached, and then disconnect the pointing stick cable from the system board.
9. Remove the keyboard **(3)**.



Reverse this procedure to install the keyboard.

Primary memory module

Description	Spare part number
4096-MB memory module (PC3-10600, 1333-MHz, DDR3)	599092-001
2048-MB memory module (PC3-10600, 1333-MHz, DDR3)	598856-001

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.

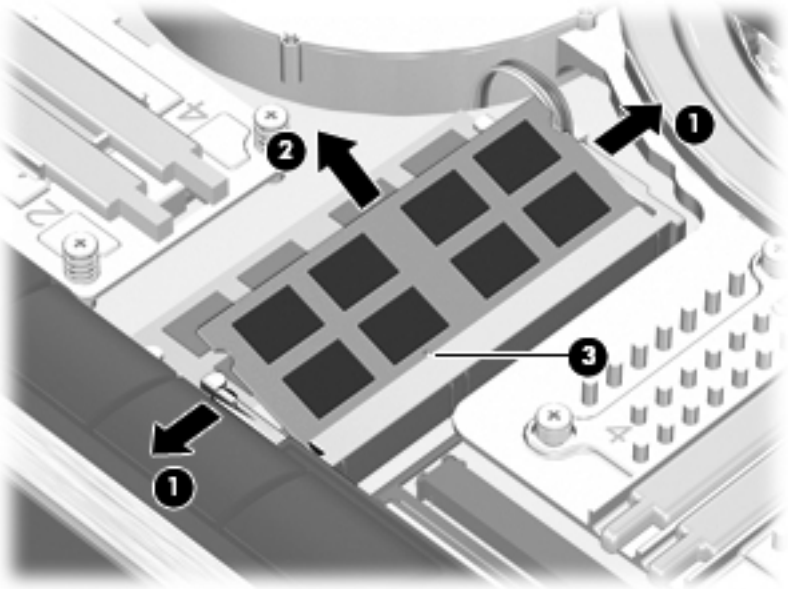
Before removing a primary memory module, follow these steps:

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 46).
5. Remove the keyboard (see Keyboard on page 61).

Remove the primary memory modules:

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.

Switch cover

Description	Spare part number
Switch cover (includes capacitive board and cable and power button board and cable)	596045-001

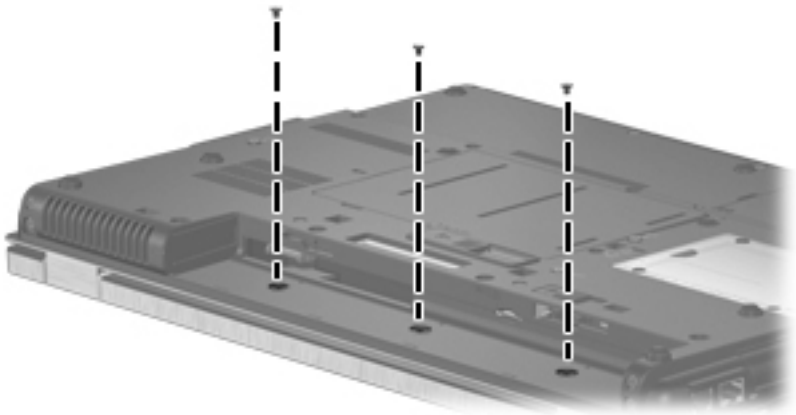
Before removing the switch cover, follow these steps:

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 46).
5. Remove the keyboard (see Keyboard on page 61).

Remove the switch cover:

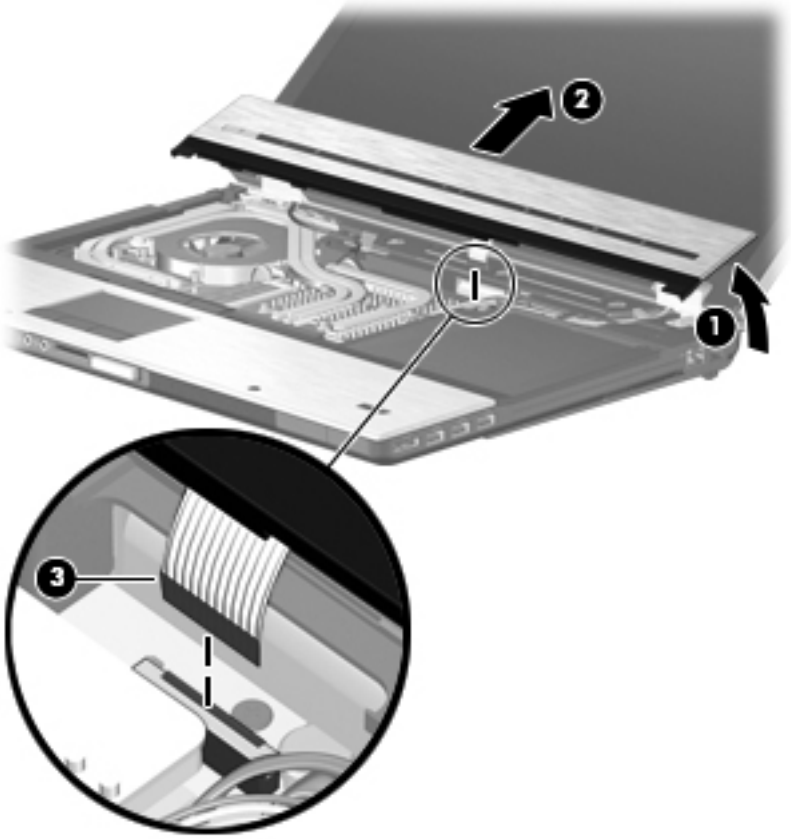
1. Close the computer.
2. Turn the computer upside down, with the rear panel toward you.
3. Turn the computer right-side up, with the front toward you.
4. Open the computer as far as it will open.
5. Remove the three Phillips PM2.0×4.0 broad head screws that secure the switch cover to the computer.

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



6. Release the switch cover **(1)** until it detaches from the computer, and then slide the switch cover **(2)** back as far as the capacitive board cable allows.

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



8. Remove the switch cover.

Reverse this procedure to install the switch cover.

Graphics board heat sink

Description	Spare part number
For use only with computer models equipped with ATi graphics subsystems (includes 5 replacement thermal pads)	596046-001
For use only with computer models equipped with nVidia graphics subsystems (includes replacement thermal pads and thermal paste)	597571-001

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:

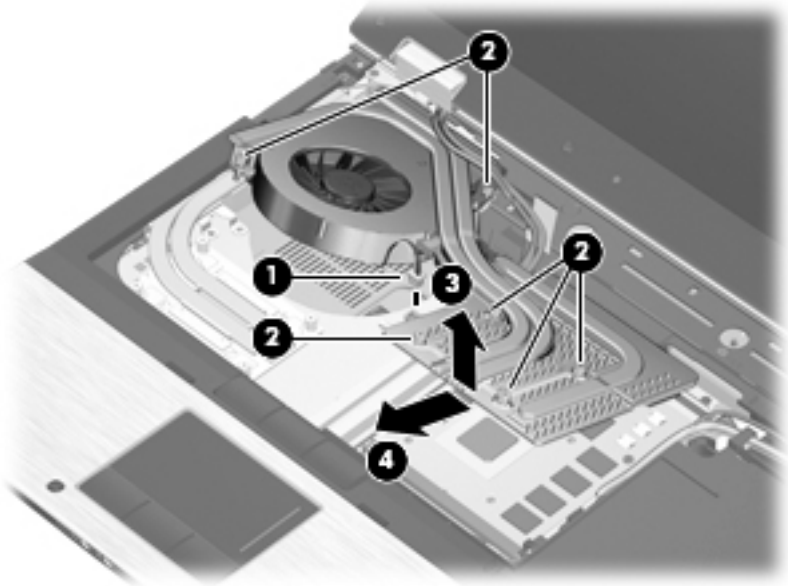
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 46).
5. Remove the keyboard (see Keyboard on page 61).
6. Remove the switch cover (see Switch cover on page 65).

Remove the graphics board heat sink:

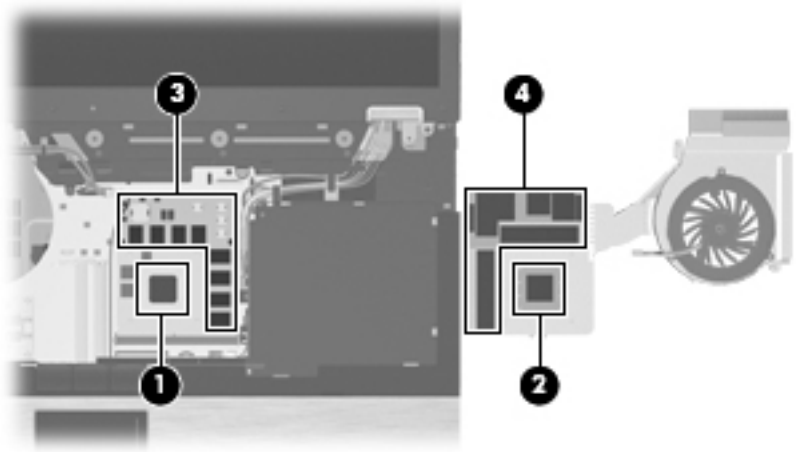
1. Disconnect the fan cable **(1)** from the system board.
2. Following the 1, 2, 3, 4, 5, 6 sequence stamped into the graphics board heat sink, loosen the six Phillips captive screws **(2)** that secure the graphics board heat sink to the system board.
3. Lift the front edge of the graphics board heat sink **(3)** until it rests at an angle.

NOTE: Due to the adhesive quality of the thermal material located between the graphics board heat sink 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.

4. Slide the graphics board heat sink **(4)** up and forward at an angle and remove it.



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)** on the graphics board and the graphics board heat sink section **(2)** that services it. Thermal pads are used on the other graphics board components **(3)** and the graphics board heat sink sections **(4)** that service them.



Reverse this procedure to install the graphics board heat sink.

Fan

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

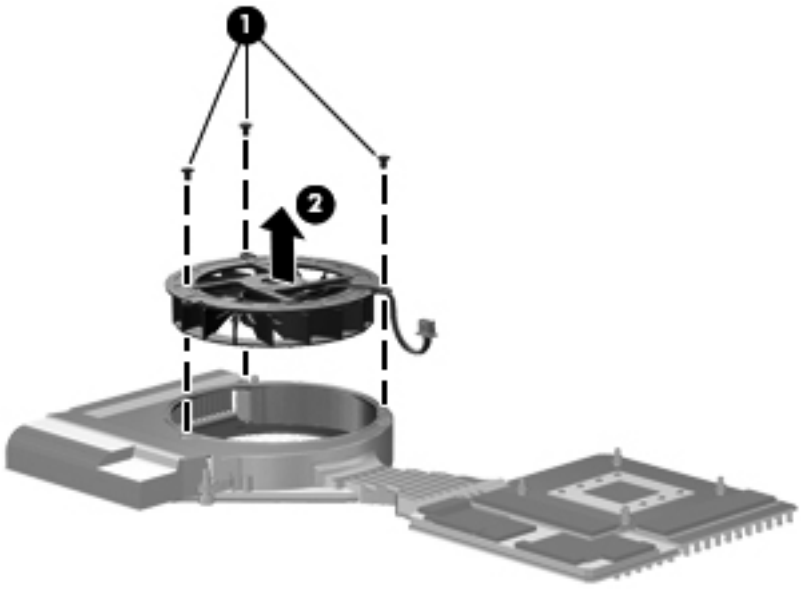
Description	Spare part number
Fan	596047-001

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 46), and then remove the following components:
   a. Keyboard (see Keyboard on page 61)
   b. Switch cover (see Switch cover on page 65)
   c. Graphics board heat sink (see Graphics board heat sink on page 67)

Remove the fan:

1. Turn the graphics board heat sink upside down, with the fan toward you.
2. Remove the three Phillips PM2.0×3.0 screws **(1)** that secure the fan to the graphics board heat sink.
3. Remove the fan **(2)**.



Reverse this procedure to install the fan.

Graphics board

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

Description	Spare part number
ATi XT-GL graphics board with 1-GB GDDR4 memory	596061-001
nVidia GLM3 graphics board with 1-GB GDDR3 memory	596063-001
nVidia GLM3 graphics board with 1-GB GDDR3 memory	596062-001

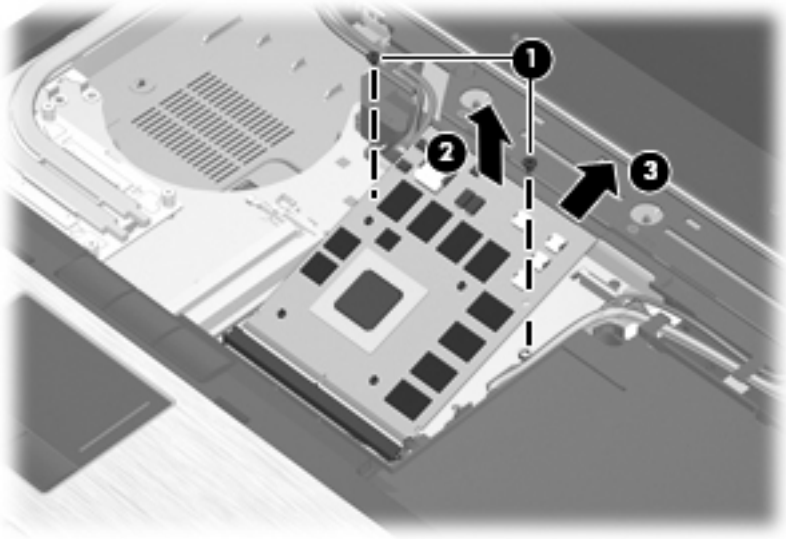
Before removing the graphics board, follow these steps:

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 46), and then remove the following components:
   a. Keyboard (see Keyboard on page 61)
   b. Switch cover (see Switch cover on page 65)
   c. Graphics board heat sink (see Graphics board heat sink on page 67)

Remove the graphics board:

1. Remove the two Phillips PM2.5×4.0 screws **(1)** that secure the graphics board to the system board.
2. Lift the rear edge of the graphics board **(2)** until it rests at an angle.

3. Slide the graphics board **(3)** back at an angle.



4. Remove the graphics board.

Reverse this procedure to install the graphics board.

Processor heat sink

Description	Spare part number
For use only with computer models equipped with Quad Core processors	597570-001
For use only with computer models equipped with Dual Core processors	596048-001

Before removing the processor heat sink, follow these steps:

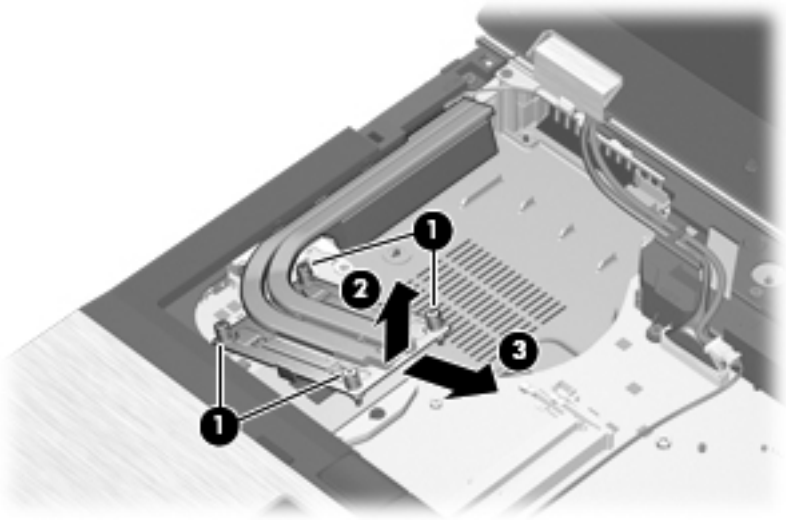
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 46), and then remove the following components:
   a. Keyboard (see Keyboard on page 61)
   b. Switch cover (see Switch cover on page 65)
   c. Graphics board heat sink (see Graphics board heat sink on page 67)

Remove the processor heat sink:

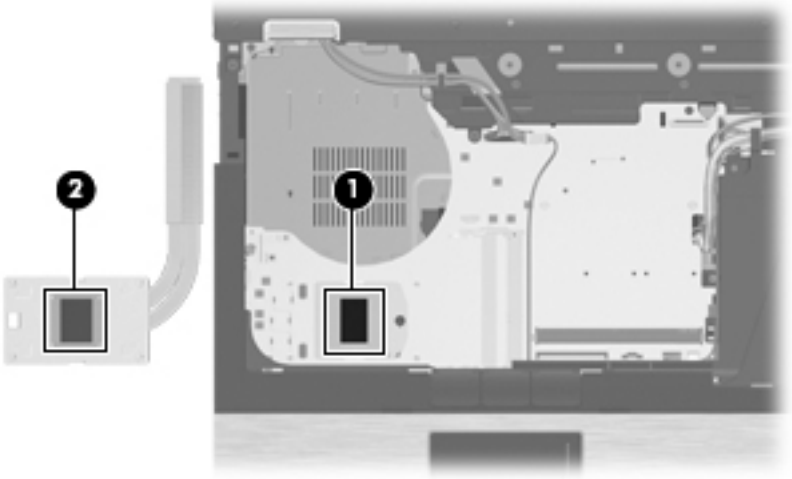
1. Following the 1, 2, 3, 4 sequence stamped into the processor heat sink, loosen the four Phillips captive screws **(1)** that secure the processor heat sink to the system board.
2. Lift the right side of the processor heat sink **(2)** until it rests at an angle.

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

3. Slide the processor heat sink **(3)** up and to the right at an angle and remove it.



NOTE: Thermal paste located on the surfaces of the processor **(1)** and 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: All processors support Intel Turbo Boost Technology. The processor spare part kit include replacement thermal material.

Description	Spare part number
Intel Quad Core i7 920XM 2.00-GHz (turbo up to 3.20-GHz) extreme processor, 8-MB L2 cache, 8 threads, 55-W	590663-001
Intel Quad Core i7 820QM 1.73-GHz (turbo up to 3.06-GHz) processor, 8-MB L2 cache, 8 threads, 45-W	583053-001
Intel Quad Core i7 720Qm 1.66-GHz (turbo up to 2.80-GHz) processor, 8-MB L2 cache, 8 threads, 45-W	586170-001
Intel Dual Core i7 620M 2.66-GHz (turbo up to 3.33-GHz) processor, 4-MB L2 cache, 4 threads, 35-W	587259-001
Intel Dual Core i5 540M 2.53-GHz (turbo up to 3.06-GHz) processor, 3-MB L2 cache, 4 threads, 35-W	594188-001
Intel Dual Core i5 520M 2.40-GHz (turbo up to 2.93-GHz) processor, 3-MB L2 cache, 4 threads, 35-W	594187-001

Before removing the processor, follow these steps:

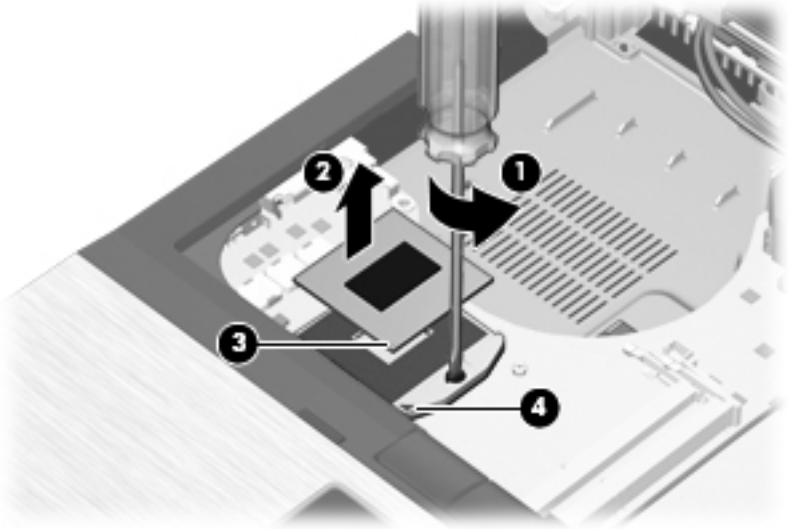
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 46), and then remove the following components:
   a. Keyboard (see Keyboard on page 61)
   b. Switch cover (see Switch cover on page 65)
   c. Graphics board heat sink (see Graphics board heat sink on page 67)
   d. Processor heat sink (see Processor heat sink on page 71)

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.

Display assembly

NOTE: The display assembly spare part kit includes the display panel cable, 3 WLAN antenna transceivers and cables, and 2 WWAN antenna transceivers and cables.

Description	Spare part number
17.0-in, WUXGA+ WVA AntiGlare LED display assembly with webcam	595708-001
17.0-in, WUXGA+ WVA AntiGlare LED display assembly without webcam	595704-001
17.0-in, WSXGA+ WVA AntiGlare LED display assembly with webcam	595707-001
17.0-in, WSXGA+ WVA AntiGlare LED display assembly without webcam	595703-001
17.0-in, WXGA+ WVA AntiGlare LED display assembly with webcam	595706-001
17.0-in, WXGA+ WVA AntiGlare LED display assembly without webcam	595702-001

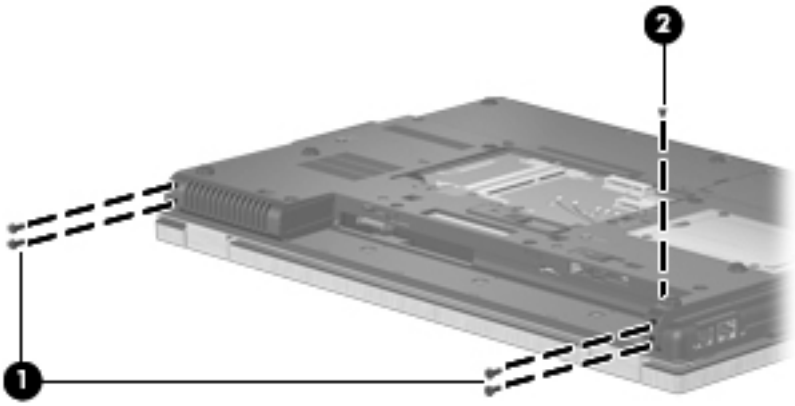
Before removing the display assembly, follow these steps:

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 46).

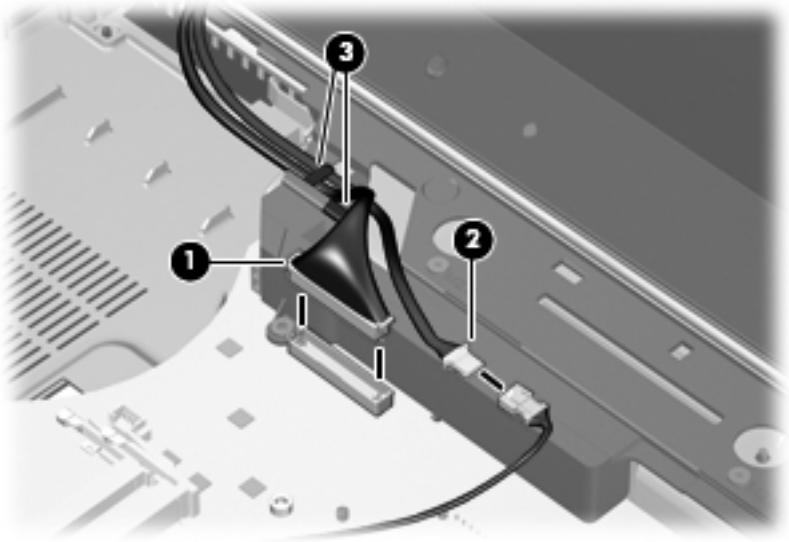
5. Disconnect the wireless antenna cables from the WLAN module (see WLAN module on page 55) and the WWAN module (see WWAN module on page 56).
6. Remove the keyboard (see Keyboard on page 61).
7. Remove the switch cover (see Switch cover on page 65).

Remove the display assembly:

1. Close the computer.
2. Turn the computer upside down, with the rear panel toward you.
3. Remove the four Torx T8M2.5×8.0 screws **(1)** and the Phillips PM2.5×4.0 screw **(2)** that secure the display assembly to the computer.

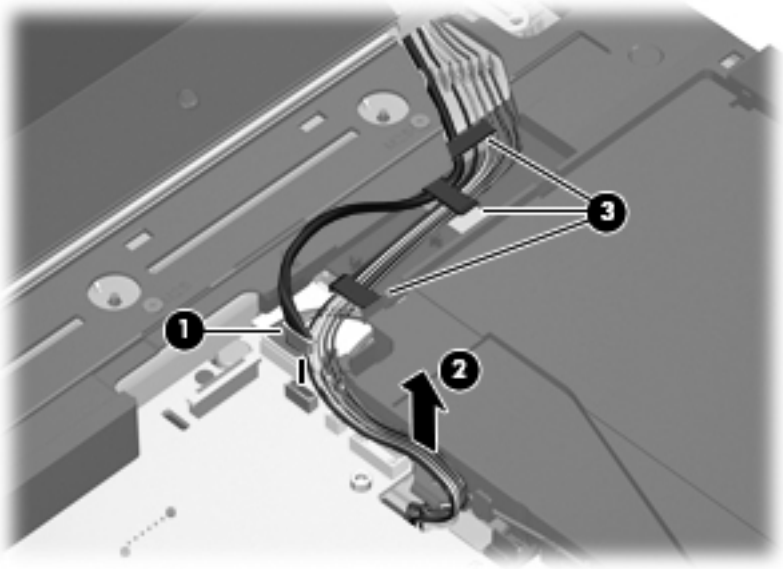


4. Disconnect the display panel cable **(1)** from the system board.
5. Disconnect the microphone cable **(2)** from the audio cable.
6. Release the display panel cable and microphone cable from the clips **(3)** built into the top cover.



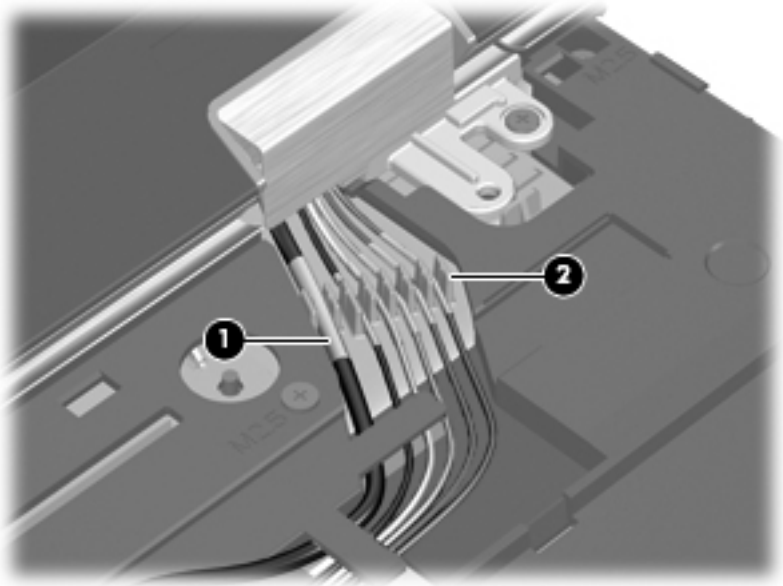
7. Disconnect the webcam cable **(1)** (when applicable) from the system board.
8. Release the wireless antenna cables **(2)** from the opening in the system board.

9. Release the webcam cable (when applicable) and the wireless antenna cables from the clips **(3)** built into the top cover.



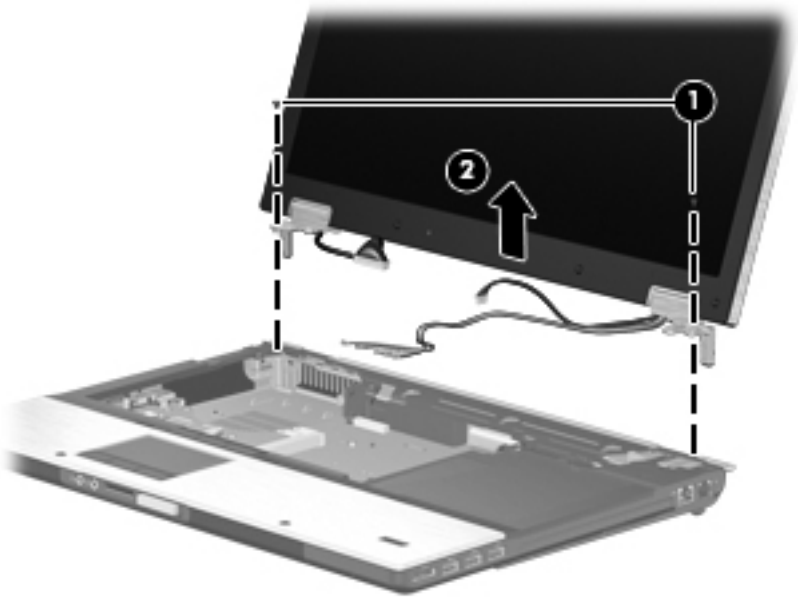
△ **CAUTION:** Support the display assembly when removing the following screws. Failure to support the display assembly can result in damage to the display assembly and other device components.

NOTE: When installing the display assembly, be sure the grounded sections of the webcam cable **(1)** and wireless antenna cables are securely routed through the clips **(2)** and routing channels built into the base enclosure.



10. Remove the two Torx T8M2.5×8.0 screws **(1)** that secure the display assembly to the computer.

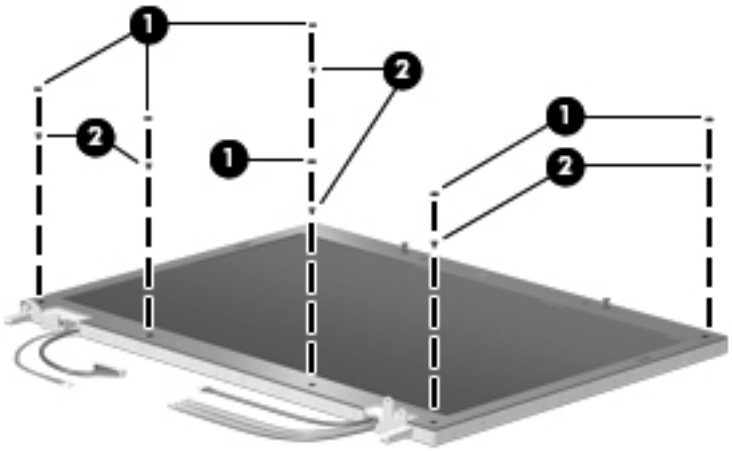
11. Remove the display assembly **(2)**.



12. If it is necessary to replace the display bezel or any of the display assembly internal components:

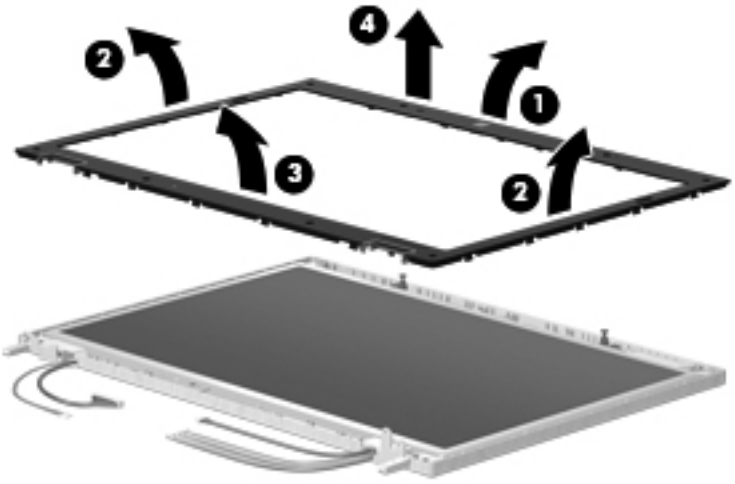
    a. Remove the six rubber screw covers **(1)** that conceal the display bezel screws. The rubber screw covers are included in the Display Rubber Kit, spare part number 596049-001.

    b. Remove the six Torx T8M2.5×8.0 screws **(2)** that secure the display bezel to the display assembly.



    c. Flex the inside edges of the top edge **(1)**, the left and right sides **(2)**, and the bottom edge **(3)** of the display bezel until the bezel disengages from the display enclosure.

d. Remove the display bezel **(4)**. The display bezel is available using spare part numbers 597579-001 (for use only with computer models equipped with a webcam) and 597578-001 (for use only with computer models not equipped with a webcam).

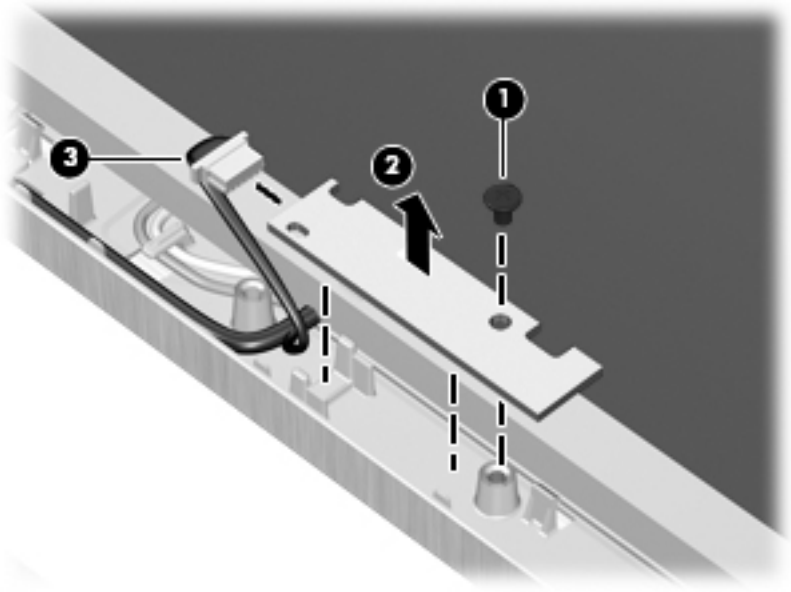


13. If it is necessary to replace the ambient light sensor board:

a. Remove the Phillips PM2.5×4.0 screw **(1)** that secures the ambient light sensor board to the display enclosure.

b. Release the ambient light sensor board **(2)** as far as the ambient light sensor board cable allows.

c. Disconnect the display panel cable **(3)** from the ambient light sensor board.



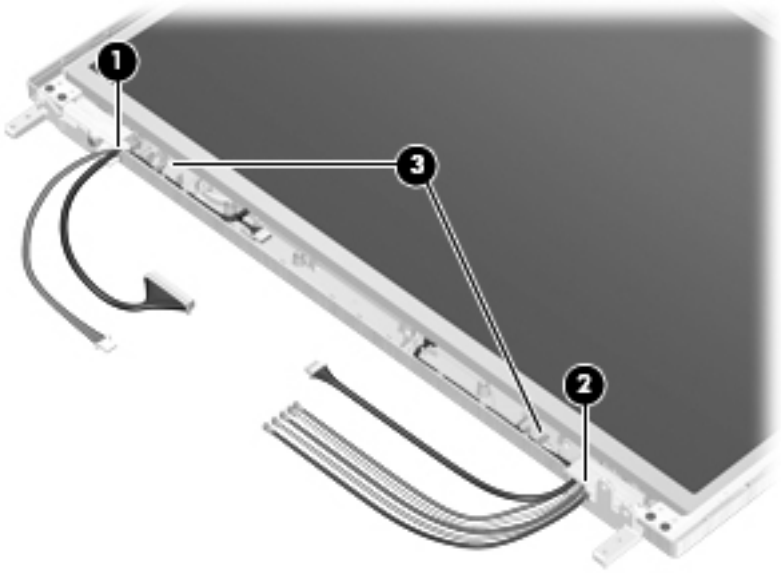
d. Remove the ambient light sensor board. The ambient light sensor board is available using spare part number 596051-001.

14. If it is necessary to replace the hinges and hinge covers:

    a. Release the display panel cable and the microphone cable from the display hinge cover on the display left hinge **(1)**.

    b. Release the webcam cable (when applicable) and the wireless antenna cables from the display hinge cover on the display right hinge **(2)**.

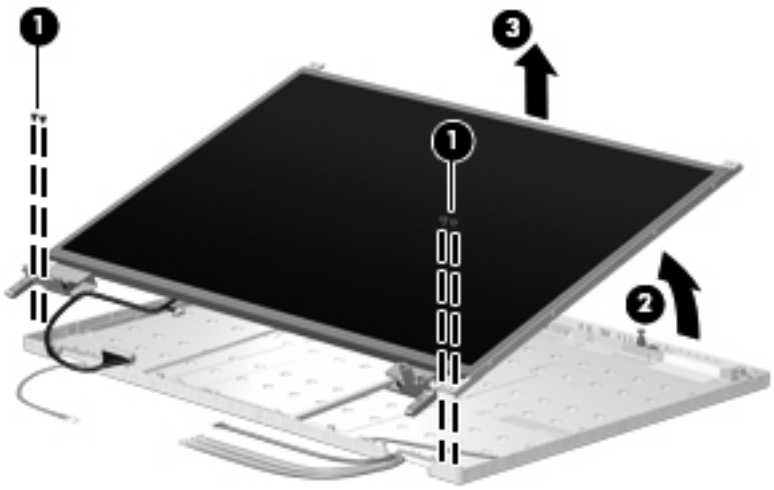
    c. Release the display panel cable and the webcam cable (when applicable) from the clips and routing channel built into the display enclosure **(3)**.



    d. Remove the four Torx T8M2.5×6.0 screws **(1)** that secure the display panel to the display enclosure.

    e. Lift the top edge of the display panel **(2)** until it rests at an angle.

    f. Lift the display panel **(3)** straight up and remove it.

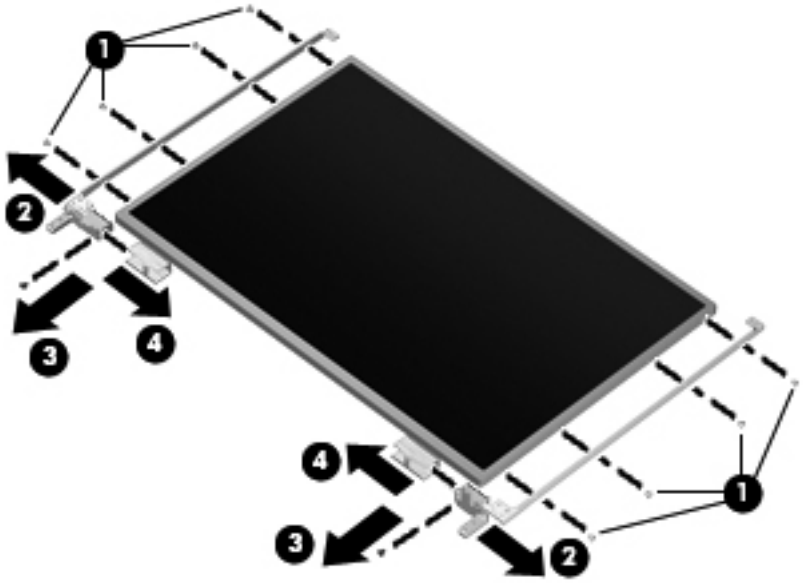


    g. Remove the eight Phillips PM2.0×4.0 screws **(1)** that secure the hinges to the display panel.

h. Remove the hinges **(2)**.

i. Remove the two Phillips PM2.0×4.0 screws **(3)** that secure the hinge covers to the hinges.

j. Slide the hinge covers **(4)** toward the middle of the display panel and remove them. The hinges and hinge covers are included in the Display Hinge Kit, spare part number 596052-001.



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

a. Remove the display panel from the display enclosure.

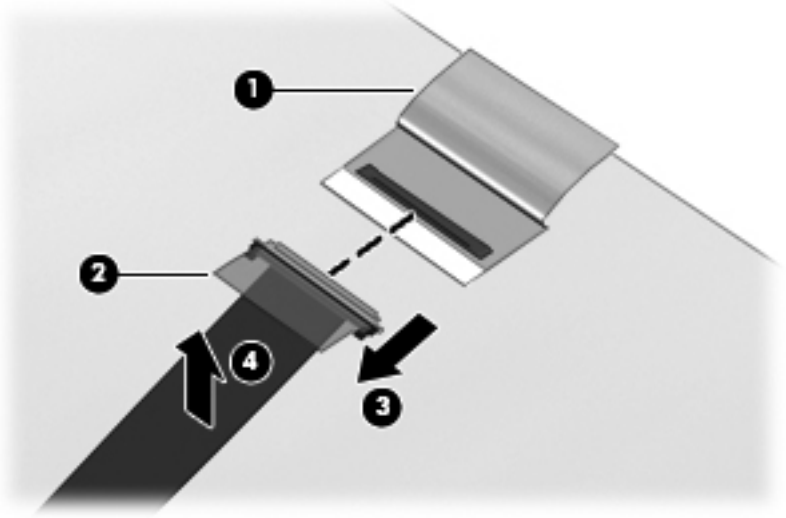
b. Turn the display panel upside down, with the bottom toward you.

c. Release the flap **(1)** built into the display panel shield.

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

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

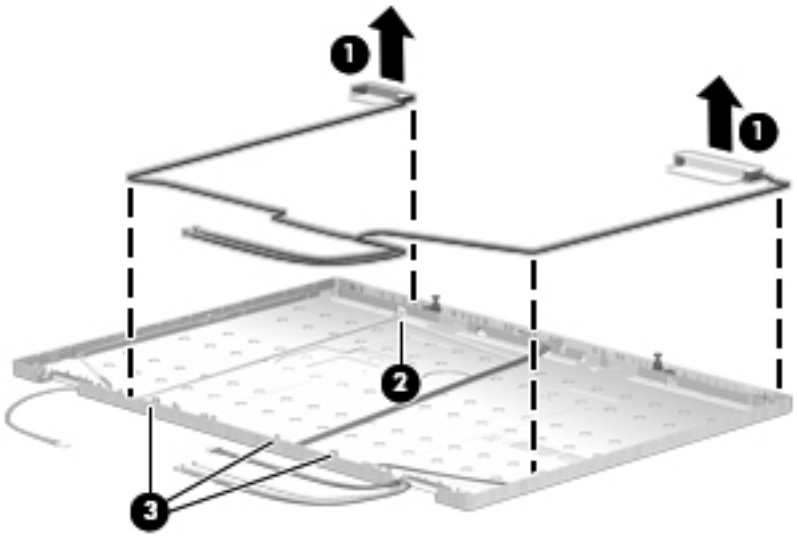
f. Remove the display panel cable **(4)**. The display panel cable is available using spare part number 596042-001.



16. If it is necessary to replace the WWAN antenna cables and transceivers:

a. Detach the WWAN antenna transceivers **(1)** from the display enclosure. The transceivers are attached to the display enclosure with double-sided tape.

b. Release the WWAN antenna cables from the clips **(2)** and **(3)** built into the display enclosure.

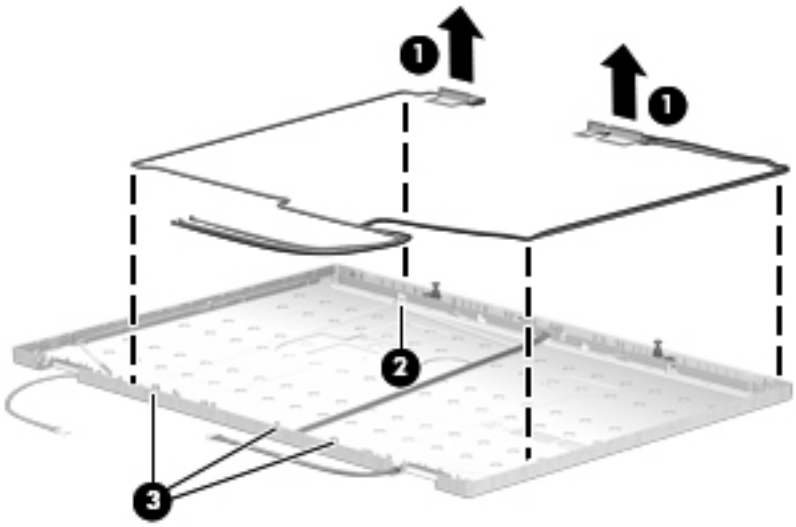


c. Remove the WWAN antenna cables and transceivers. The WWAN antenna cables and transceivers are available in the Wireless Antenna Kit, spare part number 596041-001.

17. If it is necessary to replace the WLAN antenna cables and transceivers:

a. Detach the WLAN antenna transceivers **(1)** from the display enclosure. The transceivers are attached to the display enclosure with double-sided tape.

b. Release the WLAN antenna cables from the clips **(2)** and **(3)** built into the display enclosure.

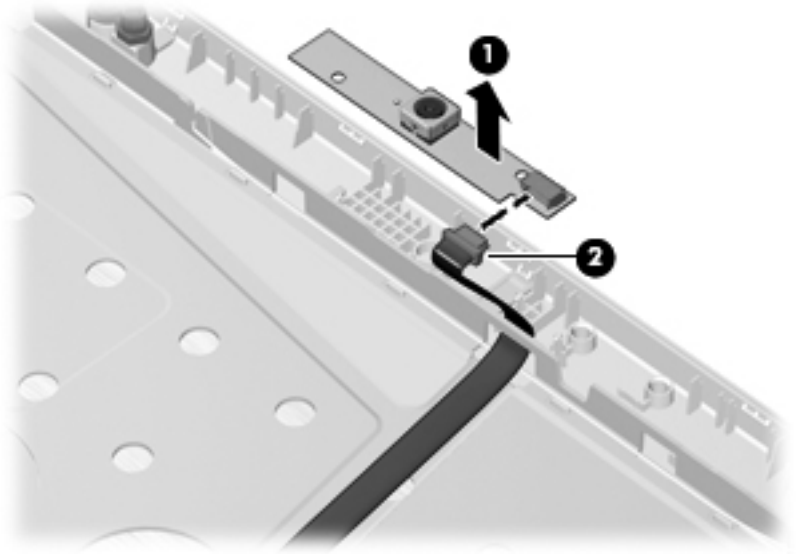


c. Remove the WLAN antenna cables and transceivers. The WLAN antenna cables and transceivers are available in the Wireless Antenna Kit, spare part number 596041-001.

18. If it is necessary to replace the webcam module:

a. Release the webcam module **(1)** as far from the display enclosure as the webcam module cable allows.

b. Disconnect the webcam module cable **(2)** from the webcam module.

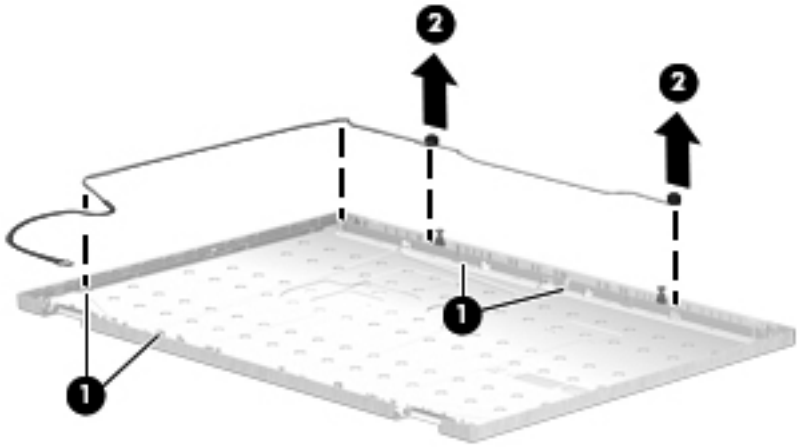


c. Remove the webcam module. The webcam module is available using spare part number 596050-001.

19. If it is necessary to replace the microphones:

a. Release the microphone cables from the clips **(1)** built into the display enclosure.

b. Release the microphone receivers **(2)** from the clips built into the display enclosure.



c. Remove the microphone receivers and cables. The microphone receivers and cables are available using spare part number 596043-001.

Reverse this procedure to install the processor.

Top cover

Description	Spare part number
Top cover (includes fingerprint reader board and cable, pointing stick buttons and cable, TouchPad and cable)	597580-001

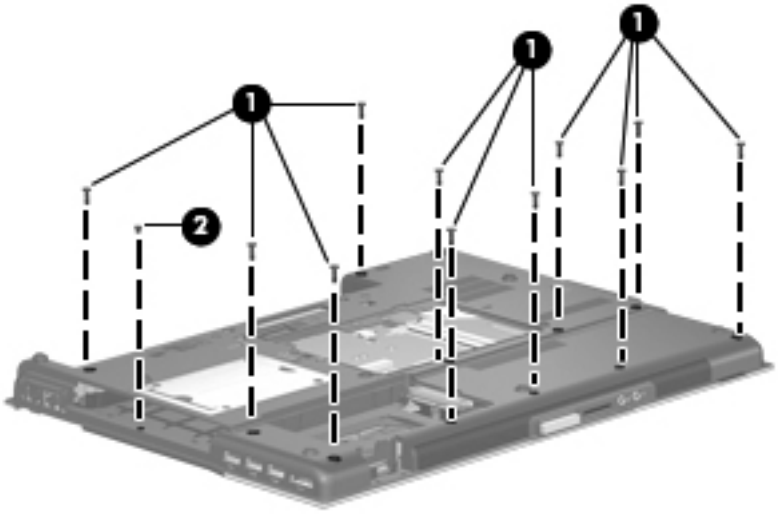
Before removing the top cover, follow these steps:

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 46), and then remove the following components:
   a. Optical drive (see Optical drive on page 52) or secondary hard drive (see Secondary hard drive on page 53)
   b. Keyboard (see Keyboard on page 61)
   c. Switch cover (see Switch cover on page 65)
   d. Display assembly (see Display assembly on page 74)

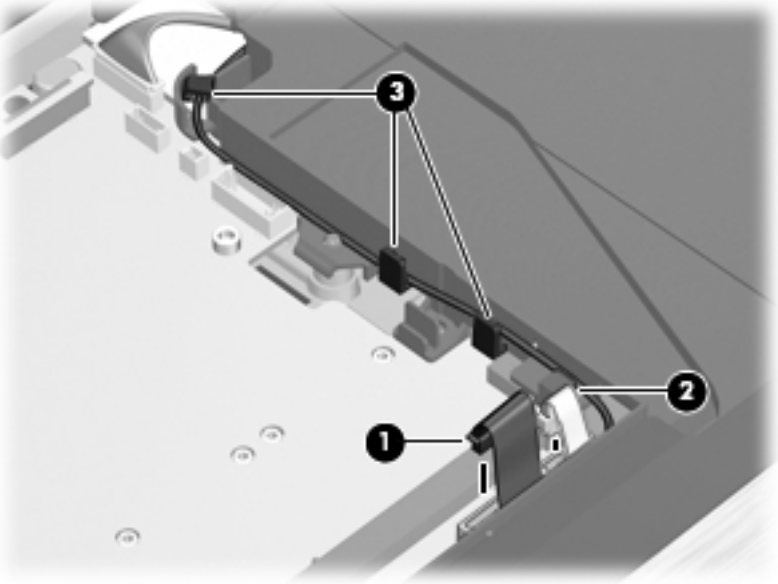
Remove the top cover:

1. Turn the computer upside down, with the front toward you.
2. Remove the eleven Torx T8M2.5×8.0 screws **(1)** that secure the top cover to the base enclosure.

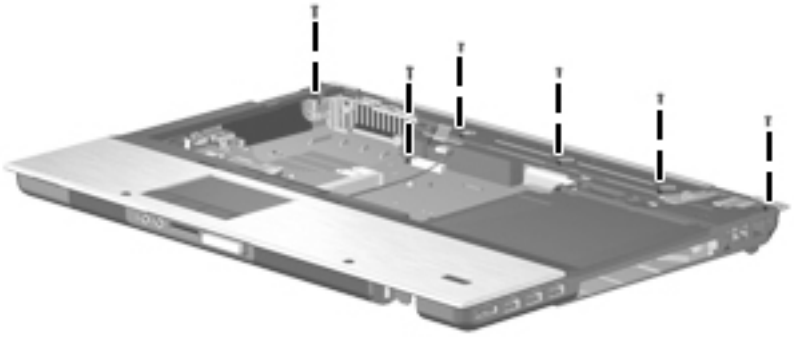
3. Remove the Phillips PM2.5×4.0 screw **(2)** that secures the top cover to the base enclosure.



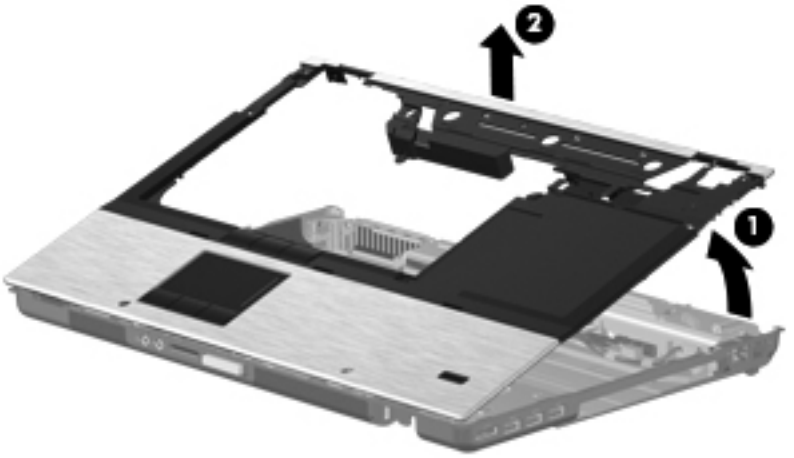
4. Turn the computer right-side up, with the front toward you.
5. Disconnect the TouchPad cable **(1)** and the fingerprint reader board cable **(2)** from the system board.
6. Release the modem module cable **(3)** from the clips built into the top cover.



7. Remove the six Phillips PM2.5×6.0 screws that secure the top cover to the base enclosure.



8. Lift the rear edge of the top cover **(1)** until the left and right sides and the rear edge of the top cover detach from the base enclosure.
9. Lift the top cover **(2)** straight up and remove it.



Reverse this procedure to install the top cover.

Bluetooth module cable

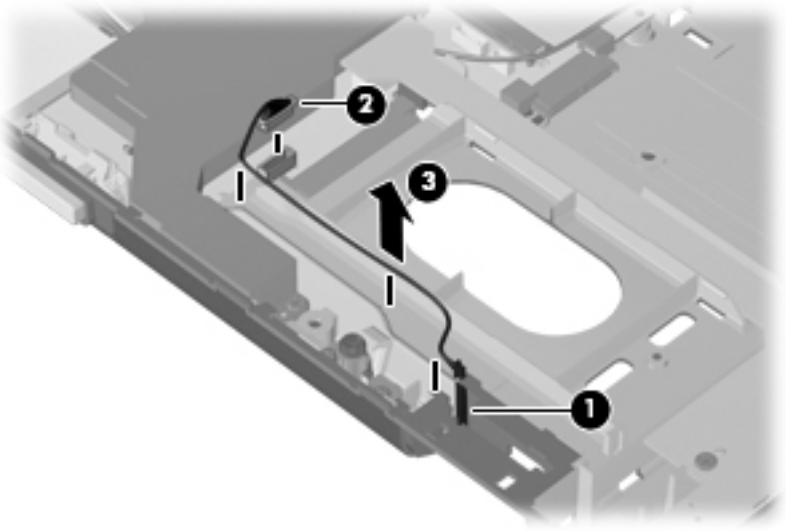
NOTE: The Bluetooth module cable is included in the Cable Kit, spare part number 596040-001.

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 46), and then remove the following components:
   a. Optical drive (see Optical drive on page 52) or secondary hard drive (see Secondary hard drive on page 53)
   b. Keyboard (see Keyboard on page 61)
   c. Switch cover (see Switch cover on page 65)
   d. Display assembly (see Display assembly on page 74)
   e. Top cover (see Top cover on page 83)

Remove the Bluetooth module cable:

1. Release the Bluetooth module cable **(1)** from the opening in the base enclosure.
2. Disconnect the Bluetooth module cable **(2)** from the system board.
3. Detach the Bluetooth module cable **(3)** from the base enclosure. The Bluetooth module cable is attached to the base enclosure with double-sided tape.



4. Remove the Bluetooth module cable.

Reverse this procedure to install the Bluetooth module cable.

Audio board

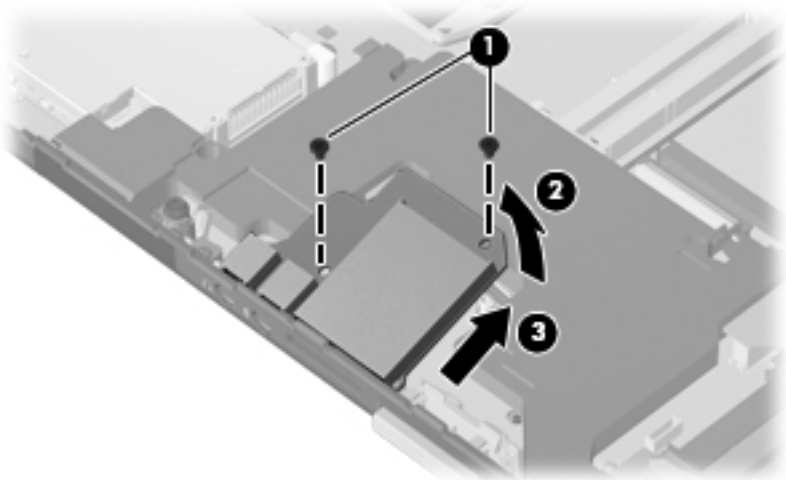
Description	Spare part number
Audio board (includes Digital Media slot and cable)	596055-001

Before removing the audio board, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 46), and then remove the following components:
   a. Optical drive (see Optical drive on page 52) or secondary hard drive (see Secondary hard drive on page 53)
   b. Keyboard (see Keyboard on page 61)
   c. Switch cover (see Switch cover on page 65)
   d. Display assembly (see Display assembly on page 74)
   e. Top cover (see Top cover on page 83)

Remove the audio board:

1. Remove the two Phillips PM2.5×4.0 screws **(1)** that secure the audio board to the base enclosure.
2. Lift the rear edge of the audio board **(2)** and disconnect it from the system board.
3. Release the audio board **(3)** from the base enclosure by sliding it toward the back of the base enclosure.



4. Remove the audio board.

Reverse this procedure to install the audio board.

Speaker assembly

Description	Spare part number
Speaker assembly	494029-001

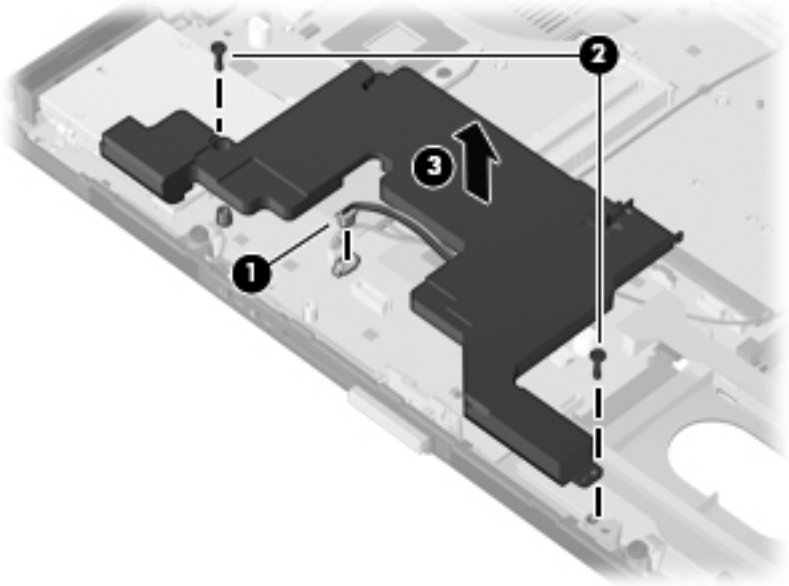
Before removing the speaker assembly, follow these steps:

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 46), and then remove the following components:
   a. Optical drive (see Optical drive on page 52) or secondary hard drive (see Secondary hard drive on page 53)
   b. Keyboard (see Keyboard on page 61)
   c. Switch cover (see Switch cover on page 65)
   d. Display assembly (see Display assembly on page 74)
   e. Top cover (see Top cover on page 83)

Remove the speaker assembly:

1. Disconnect the speaker assembly cable **(1)** from the system board.
2. Remove the two Phillips PM2.5×4.0 screws **(2)** that secure the speaker assembly to the base enclosure.

3. Remove the speaker assembly **(3)**.



Reverse this procedure to install the speaker assembly.

Audio cable

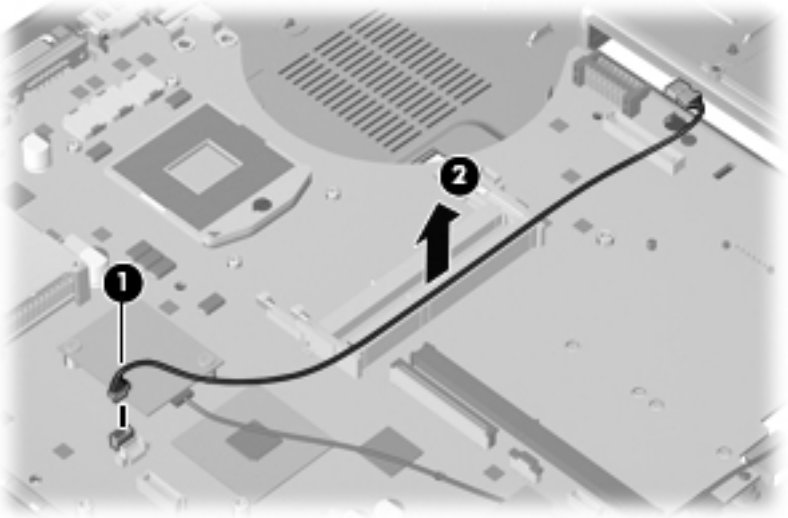
NOTE: The audio cable is included in the Cable Kit, spare part number 596040-001.

Before removing the audio 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 46), and then remove the following components:
   a. Optical drive (see Optical drive on page 52) or secondary hard drive (see Secondary hard drive on page 53)
   b. Keyboard (see Keyboard on page 61)
   c. Switch cover (see Switch cover on page 65)
   d. Display assembly (see Display assembly on page 74)
   e. Top cover (see Top cover on page 83)

Remove the audio cable:

1. Disconnect the audio cable **(1)** from the system board.
2. Release the audio cable **(2)** from the space between the primary memory module slot and the graphics board slot.



3. Remove the audio cable.

Reverse this procedure to install the audio cable.

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 596040-001. See Modem module cable on page 92 for information on replacing the modem module cable.

Description	Spare part number
For use in all countries and regions except Australia and New Zealand	510099-001
For use only in Australia and New Zealand	510099-011

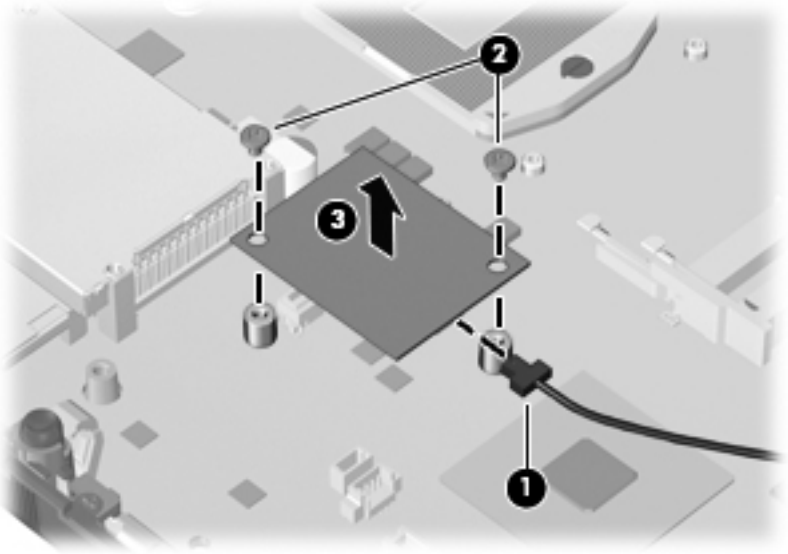
Before removing the modem module, follow these steps:

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 46), and then remove the following components:
   a. Optical drive (see Optical drive on page 52) or secondary hard drive (see Secondary hard drive on page 53)
   b. Keyboard (see Keyboard on page 61)
   c. Switch cover (see Switch cover on page 65)
   d. Display assembly (see Display assembly on page 74)
   e. Top cover (see Top cover on page 83)
   f. Speaker assembly (see Speaker assembly on page 88)

Remove the modem module:

1. Disconnect the modem module cable **(1)** from the modem module.
2. Remove the two Phillips PM2.5×4.0 screws **(2)** that secure the modem module to the system board.

3. Lift the modem module **(3)** straight up to disconnect it from the system board.



4. Remove the modem module.

Reverse this procedure to install the modem module.

Modem module cable

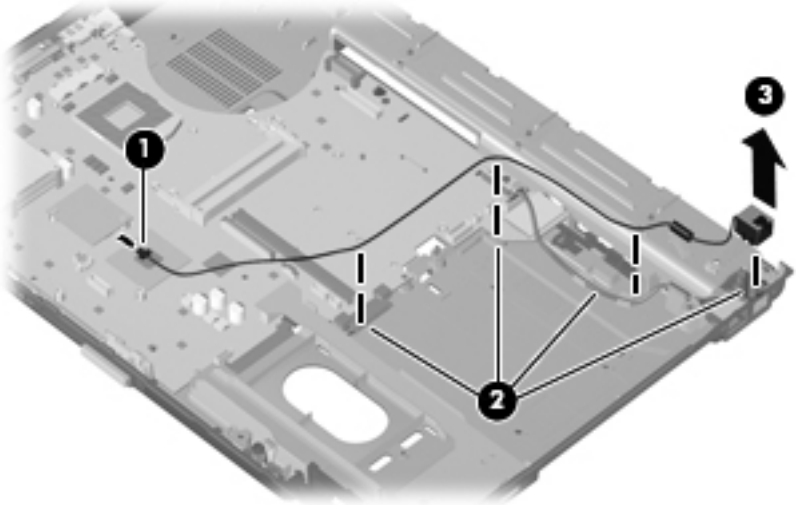
NOTE: The modem module cable is included in the Cable Kit, spare part number 596040-001.

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 46), and then remove the following components:
   a. Optical drive (see Optical drive on page 52) or secondary hard drive (see Secondary hard drive on page 53)
   b. Keyboard (see Keyboard on page 61)
   c. Switch cover (see Switch cover on page 65)
   d. Display assembly (see Display assembly on page 74)
   e. Top cover (see Top cover on page 83)
   f. Speaker assembly (see Speaker assembly on page 88)

Remove the modem module cable:

1. Disconnect the modem module cable **(1)** from the modem module.
2. Release the modem module cable from the clips **(2)** and routing channel built into the base enclosure.
3. Release the RJ-11 jack **(3)** from the clip built into the base enclosure.



4. Remove the modem module cable.

Reverse this procedure to install the modem module and the modem module cable.

USB board

Description	Spare part number
USB board	597572-001

Before removing the USB board, follow these steps:

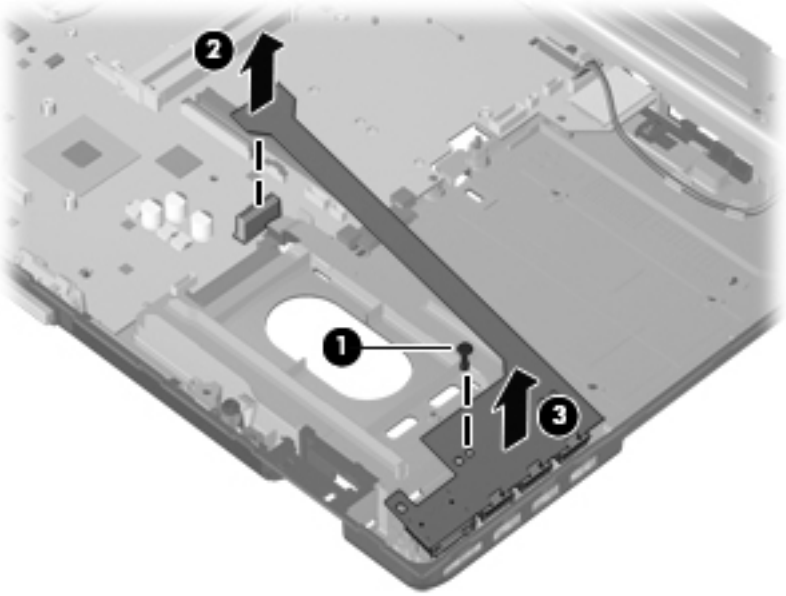
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 46), and then remove the following components:
   a. Optical drive (see Optical drive on page 52) or secondary hard drive (see Secondary hard drive on page 53)
   b. Keyboard (see Keyboard on page 61)
   c. Switch cover (see Switch cover on page 65)

d. Display assembly (see Display assembly on page 74)

e. Top cover (see Top cover on page 83)

Remove the USB board:

1. Remove the Phillips PM2.5×4.0 screw **(1)** that secures the USB board to the system board.
2. Lift the left side of the USB board **(2)** to disconnect it from the system board.
3. Lift the USB board **(3)** straight up and remove it.



4. Remove the USB board.

Reverse this procedure to install the USB board.

Network cable

NOTE: The network cable is included in the Cable Kit, spare part number 596040-001.

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 46), and then remove the following components:

   a. Optical drive (see Optical drive on page 52) or secondary hard drive (see Secondary hard drive on page 53)

   b. Keyboard (see Keyboard on page 61)

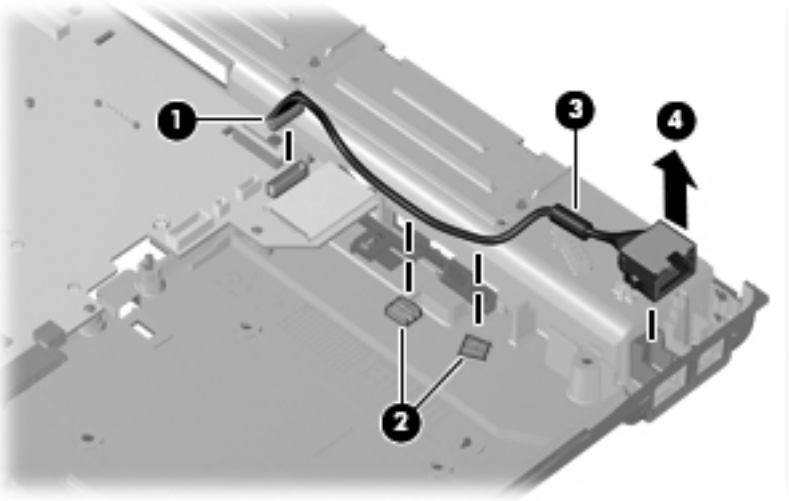
   c. Switch cover (see Switch cover on page 65)

d. Display assembly (see Display assembly on page 74)

e. Top cover (see Top cover on page 83)

Remove the network cable:

1. Disconnect the network cable **(1)** from the system board.
2. Release the network cable from the clips **(2)** built into the base enclosure.
3. Release the network cable ferrite **(3)** from the clip built into the base enclosure.
4. Release the RJ-45 jack **(4)** from the clip built into the base enclosure.



5. Remove the network cable.

Reverse this procedure to install the network cable.

System board

Description	Spare part number
For use in all countries and regions except the People's Republic of China and Russia:	
• For use with computer models equipped with Intel Quad Core processors	595700-001
• For use with computer models equipped with Intel Dual Core processors	595698-001
For use only in the People's Republic of China and Russia:	
• For use with computer models equipped with Intel Quad Core processors	598446-001
• For use with computer models equipped with Intel Dual Core processors	598445-001

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 46), and then remove the following components:
   a. Primary hard drive (see Primary hard drive on page 48)
   b. Optical drive (see Optical drive on page 52) or secondary hard drive (see Secondary hard drive on page 53)
   c. Keyboard (see Keyboard on page 61)
   d. Switch cover (see Switch cover on page 65)
   e. Graphics board heat sink (see Graphics board heat sink on page 67)
   f. Display assembly (see Display assembly on page 74)
   g. Top cover (see Top cover on page 83)
   h. Audio board (see Audio board on page 87)
   i. Speaker (see Speaker assembly on page 88)
   j. USB board (see USB board on page 93)

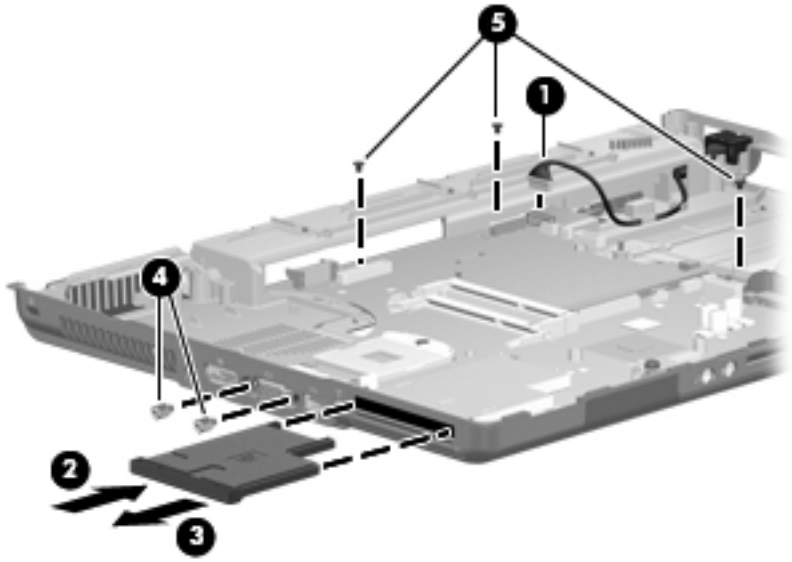
When replacing the system board, be sure that the following additional components are removed from the defective system board and installed on the replacement system board:

- SIM (see SIM on page 47)
- WLAN module (see WLAN module on page 55)
- WWAN module (see WWAN module on page 56)
- Expansion memory modules (see Expansion memory module on page 58)
- RTC battery (see RTC battery on page 60)
- Primary memory modules (see Primary memory module on page 64)
- Graphics board (see Graphics board on page 70)
- Processor heat sink (see Processor heat sink on page 71)
- Processor (see Processor on page 73)
- Bluetooth module cable (see Bluetooth module cable on page 86)
- Audio cable (see Audio cable on page 90)
- Modem module (see Modem module on page 91)

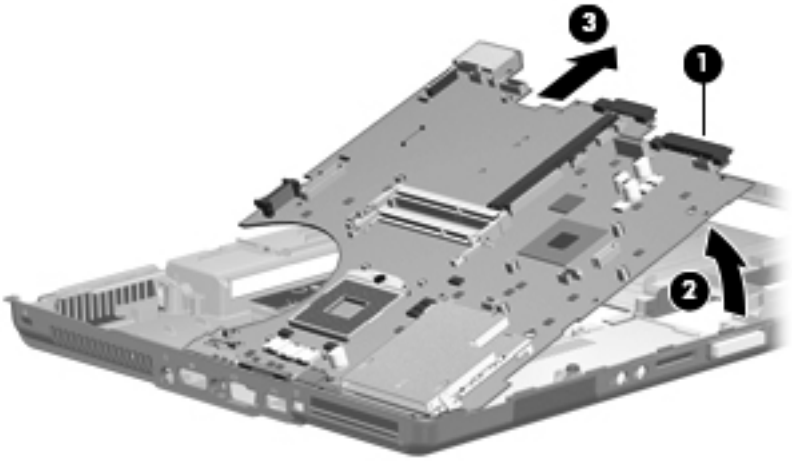
Remove the system board:

1. Disconnect the network cable **(1)** from the system board.
2. Press in on the ExpressCard slot bezel **(2)** to release it from the ExpressCard slot.
3. Remove the ExpressCard slot bezel **(3)** from the ExpressCard slot.

4. Remove the two HM5.0×10.0 screw locks **(4)** that secure the system board to the base enclosure.
5. Remove the three Phillips PM2.5×4.0 screws **(5)** that secure the system board to the base enclosure.



6. Use the optical drive connector **(1)** to lift the right side of the system board **(2)** until it rests at an angle.
7. Release the system board **(3)** by sliding it up and to the right at an angle.



8. Remove the system board.

Reverse this procedure to install the system board.

5 Computer Setup

Windows 7

Starting Computer Setup

Computer Setup is a preinstalled, ROM-based utility that can be used even when the operating system is not working or will not load.

NOTE: Some of the Computer Setup menu items listed in this guide may not be supported by your computer.

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 BIOS Setup.

Using Computer Setup

Navigating and selecting in Computer Setup

The information and settings in Computer Setup are accessed from the File, Security, Diagnostics, and System Configuration menus.

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 BIOS Setup.
3. Select the **File**, **Security**, or **System Configuration** menu.

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

   – or –

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

Your changes go into effect when the computer restarts.

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

Computer Setup menus

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

NOTE: Some of the Computer Setup menu items listed in this chapter may not be supported by your computer.

File menu

Select	To do this
System Information	• View identification information for the computer and the batteries in the system. • View specification information for the processor, cache and memory size, system ROM, video revision, and keyboard controller version.
Set System Date and Time	Set or change the date and time on the computer.
System Diagnostics	Displays the following information: • System Information ◦ Identification information for the computer and the batteries in the system. ◦ Specification information for the processor, cache and memory size, system ROM, video revision, and keyboard controller version. • Start-up Test–Verifies the system components needed for starting the computer. • Run-In Test–Runs a comprehensive check on system memory. • Hard Disk Test–Runs a comprehensive self-test on any hard drive in the system. • Memory Test–Runs a comprehensive test on any memory installed in the computer. • Battery Test–Runs a comprehensive test on any batteries installed in the computer. • Error Log–Displays a log file if any errors have occurred.
Restore defaults	Replace the configuration settings in Computer Setup with the original factory settings. (Hard drive mode, password settings, and security settings are not changed when you restore the factory settings.)
Reset BIOS security to factory default	Restore the BIOS security settings to the factory default.
Ignore changes and exit	Cancel any changes entered during the current session. Then exit and restart the computer.
Save changes and exit	Save any changes entered during the current session. Then exit and restart the computer. Your changes go into effect when the computer restarts.

Security menu

NOTE: Some of the menu items listed in this section may not be supported by your computer.

Select	To do this
Administrator Tools	
Setup BIOS Administrator Password	Set up a BIOS administrator password
User Management (requires a BIOS administrator password)	
Create New BIOS User Account	• Select from a list of BIOS users. • Select from a list of ProtectTools users.
Password Policy (requires a BIOS administrator password)	Revise password policy criteria.
HP SpareKey	Enable/disable HP SpareKey (enabled by default).
Always Prompt for HP SpareKey Enrollment	Enable/disable HP SpareKey enrollment (enabled by default).
Fingerprint Reset on Reboot (If Present)	Reset/clear the fingerprint reader ownership (select models only; disabled by default).
User Tools	
Change Password	Enter, change, or delete a BIOS administrator password.
HP SpareKey Enrollment	Enroll or reset HP SpareKey, which is a set of security questions and answers used if you forget your password.
Anti Theft	
AT-P	Enable/disable Anti-Theft Protection.
DriveLock Passwords	• Enable/disable DriveLock on any computer hard drive (enabled by default). • Change a DriveLock user password or master password. **NOTE:** DriveLock settings are accessible only when you enter Computer Setup by turning on (not restarting) the computer.
Automatic DriveLock	Enable/disable Automatic DriveLock support.
TPM Embedded Security	Enable/disable support for Trusted Platform Module (TPM) Embedded Security, which protects the computer from unauthorized access to owner functions available in Embedded Security for ProtectTools. For more information, refer to the ProtectTools software **NOTE:** You must have a setup password to change this setting.
Disk Sanitizer	Run Disk Sanitizer to destroy all existing data on the primary hard drive or the drive in the Upgrade bay. **CAUTION:** If you run Disk Sanitizer, the data on the selected drive is destroyed permanently.
System IDs	Enter a user-defined computer asset tracking number and ownership tag.

System Configuration menu

NOTE: Some of the menu items listed in this section may not be supported by your computer.

Select	To do this
Language	Change the Computer Setup language.
Boot Options	• Set a Startup Menu delay (in seconds). • Set the MultiBook Express Boot Popup delay in seconds. • Enable/disable Custom Logo (disabled by default). • Enable/disable Display Diagnostic URL (enabled by default). • Enable/disable CD-ROM boot (disabled by default). • Enable/disable SD Card boot (enabled by default). • Enable/disable floppy boot (enabled by default). • Enable/disable PXE Internal NIC boot (enabled by default). • Enable/disable Unified Extensible Firmware Interface (UEFI) Boot Mode (disabled by default). • Set the Legacy Boot Order.
Device Configurations	• Enable/disable USB legacy support (enabled by default). When enabled, USB legacy support allows the following: ◦ Use of a USB keyboard in Computer Setup even when a Windows operating system is not running ◦ Startup from bootable USB devices, including a hard drive, diskette drive, or optical drive connected by a USB port to the computer • Select a parallel port mode: ECP (Enhanced Capabilities Port), standard, bidirectional, or EPP (Enhanced Parallel Port). • Enable/disable fan always on while connected to an AC outlet (enabled by default). • Enable/disable Data Execution Prevention (select models only). When enabled, the processor can disable some virus code execution, which helps to improve computer security (disabled by default). • SATA (Serial Advanced Technology Attachment) device mode. The following options are available: ◦ AHCI (Advanced Host Controller Interface) ◦ IDE (Integrated Drive Electronics) ◦ RAID (select models only) **NOTE:** Availability of these options varies by computer model.

Select	To do this
Device Configurations *(continued)*	• Enable/disable secondary battery fast charge (enabled by default). • Enable/disable HP QuickLook (enabled by default). • Enable/disable Preboot Authentication on HP QuickLook Boot (enabled by default). • Enable/disable HP QuickWeb (enabled by default). • Enable/disable HP QuickWeb Write Protect (disabled by default). • Enable/disable Virtualization Technology (select models only; disabled by default). • Enable/disable TXT (Intel Trusted Execution Technology) (select models only; disabled by default). • Multi Core CPU (enabled by default). • Intel HT Technology (enabled by default). • Enable/disable Wake on USB (enabled by default). • Enable/disable Num lock state at boot (disabled by default).

Select	To do this
Built-In Device Options	• Enable/disable the wireless button state (enabled by default). • Enable/disable embedded WLAN device radio (select models only; enabled by default). • Enable/disable the embedded Bluetooth device radio (enabled by default). • Enable/disable the Network Interface Controller (LAN) (enabled by default). • Enable/disable LAN/WLAN switching (disabled by default). • Set the wake on LAN state. Options include the following: ◦ Disabled ◦ Boot to Network ◦ Follow Boot Order • Enable/disable the Ambient Light Sensor. • Enable/disable the Notebook Upgrade bay device (enabled by default). • Enable/disable the fingerprint device (enabled by default). • Enable/disable the integrated camera (enabled by default). • Enable/disable the Power Monitor Circuit (enabled by default). • Enable/disable the audio device (enabled by default). • Enable/disable a modem device (enabled by default). • Enable/disable the microphone (enabled by default). • Enable/disable the internal speakers (enabled by default).

Select	To do this
Port Options	**NOTE:** NOTE: All port options are enabled by default. • Enable/disable the serial port. • Enable/disable the parallel port. • Enable/disable the flash media reader. • Enable/disable the USB port. **CAUTION:** Disabling the USB port also disables MultiBay devices and ExpressCard devices on the advanced port replicator. • Enable/disable the 1394 port. • Enable/disable the ExpressCard slot. • Enable/disable the Smart Card slot. • Enable/disable the eSATA port.
AMT Options	• Enable/disable Firmware Verbosity. • Enable/disable AMT Setup Prompt (Ctrl-P). • Enable/disable USB Key Provisioning Support. • Enable/disable Unconfigure AMT on next boot. • Select Terminal Emulation Mode. ◦ ANSI ◦ VT100 • Enable/disable Firmware Progress Event Support. • Enable/disable Initiate Intel CIRA.
Set Security Level	Change, view, or hide security levels for all BIOS menu items.
Restore Security Defaults	Restore the default security settings.

Windows Vista

Starting Computer Setup

Computer Setup is a preinstalled, ROM-based utility that can be used even when the operating system is not working or will not load.

NOTE: Some of the Computer Setup menu items listed in this guide may not be supported by your computer.

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 BIOS Setup.

Using Computer Setup

Navigating and selecting in Computer Setup

The information and settings in Computer Setup are accessed from the File, Security, Diagnostics, and System Configuration menus.

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 BIOS Setup.
3. Select the **File**, **Security**, or **System Configuration** menu.

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

   – or –

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

Your changes go into effect when the computer restarts.

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

Computer Setup menus

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

NOTE: Some of the Computer Setup menu items listed in this chapter may not be supported by your computer.

File menu

Select	To do this
System Information	• View identification information for the computer and the batteries in the system. • View specification information for the processor, cache and memory size, system ROM, video revision, and keyboard controller version.
Set System Date and Time	Set or change the date and time on the computer.
System Diagnostics	Displays the following information: • System Information ◦ Identification information for the computer and the batteries in the system. ◦ Specification information for the processor, cache and memory size, system ROM, video revision, and keyboard controller version. • Start-up Test–Verifies the system components needed for starting the computer. • Run-In Test–Runs a comprehensive check on system memory. • Hard Disk Test–Runs a comprehensive self-test on any hard drive in the system. • Memory Test–Runs a comprehensive test on any memory installed in the computer. • Battery Test–Runs a comprehensive test on any batteries installed in the computer. • Error Log–Displays a log file if any errors have occurred.
Restore defaults	Replace the configuration settings in Computer Setup with the original factory settings. (Hard drive mode, password settings, and security settings are not changed when you restore the factory settings.)
Reset BIOS security to factory default	Restore the BIOS security settings to the factory default.
Ignore changes and exit	Cancel any changes entered during the current session. Then exit and restart the computer.
Save changes and exit	Save any changes entered during the current session. Then exit and restart the computer. Your changes go into effect when the computer restarts.

Security menu

NOTE: Some of the menu items listed in this section may not be supported by your computer.

Select	To do this
Administrator Tools	
Setup BIOS Administrator Password	Set up a BIOS administrator password
User Management (requires a BIOS administrator password)	
Create New BIOS User Account	• Select from a list of BIOS users. • Select from a list of ProtectTools users.
Password Policy (requires a BIOS administrator password)	Revise password policy criteria.
HP SpareKey	Enable/disable HP SpareKey (enabled by default).
Always Prompt for HP SpareKey Enrollment	Enable/disable HP SpareKey enrollment (enabled by default).
Fingerprint Reset on Reboot (If Present)	Reset/clear the fingerprint reader ownership (select models only; disabled by default).
User Tools	
Change Password	Enter, change, or delete a BIOS administrator password.
HP SpareKey Enrollment	Enroll or reset HP SpareKey, which is a set of security questions and answers used if you forget your password.
Anti Theft	
AT-P	Enable/disable Anti-Theft Protection.
DriveLock Passwords	• Enable/disable DriveLock on any computer hard drive (enabled by default). • Change a DriveLock user password or master password. **NOTE:** DriveLock settings are accessible only when you enter Computer Setup by turning on (not restarting) the computer.
Automatic DriveLock	Enable/disable Automatic DriveLock support.
TPM Embedded Security	Enable/disable support for Trusted Platform Module (TPM) Embedded Security, which protects the computer from unauthorized access to owner functions available in Embedded Security for ProtectTools. For more information, refer to the ProtectTools software **NOTE:** You must have a setup password to change this setting.
Disk Sanitizer	Run Disk Sanitizer to destroy all existing data on the primary hard drive or the drive in the Upgrade bay. **CAUTION:** If you run Disk Sanitizer, the data on the selected drive is destroyed permanently.
System IDs	Enter a user-defined computer asset tracking number and ownership tag.

System Configuration menu

NOTE: Some of the menu items listed in this section may not be supported by your computer.

Select	To do this
Language	Change the Computer Setup language.
Boot Options	• Set a Startup Menu delay (in seconds). • Set the MultiBook Express Boot Popup delay in seconds. • Enable/disable Custom Logo (disabled by default). • Enable/disable Display Diagnostic URL (enabled by default). • Enable/disable CD-ROM boot (disabled by default). • Enable/disable SD Card boot (enabled by default). • Enable/disable floppy boot (enabled by default). • Enable/disable PXE Internal NIC boot (enabled by default). • Enable/disable Unified Extensible Firmware Interface (UEFI) Boot Mode (disabled by default). • Set the Legacy Boot Order.
Device Configurations	• Enable/disable USB legacy support (enabled by default). When enabled, USB legacy support allows the following: ◦ Use of a USB keyboard in Computer Setup even when a Windows operating system is not running ◦ Startup from bootable USB devices, including a hard drive, diskette drive, or optical drive connected by a USB port to the computer • Select a parallel port mode: ECP (Enhanced Capabilities Port), standard, bidirectional, or EPP (Enhanced Parallel Port). • Enable/disable fan always on while connected to an AC outlet (enabled by default). • Enable/disable Data Execution Prevention (select models only). When enabled, the processor can disable some virus code execution, which helps to improve computer security (disabled by default). • SATA (Serial Advanced Technology Attachment) device mode. The following options are available: ◦ AHCI (Advanced Host Controller Interface) ◦ IDE (Integrated Drive Electronics) ◦ RAID (select models only) **NOTE:** Availability of these options varies by computer model.

Select	To do this
Device Configurations *(continued)*	• Enable/disable secondary battery fast charge (enabled by default). • Enable/disable HP QuickLook (enabled by default). • Enable/disable Preboot Authentication on HP QuickLook Boot (enabled by default). • Enable/disable HP QuickWeb (enabled by default). • Enable/disable HP QuickWeb Write Protect (disabled by default). • Enable/disable Virtualization Technology (select models only; disabled by default). • Enable/disable TXT (Intel Trusted Execution Technology) (select models only; disabled by default). • Multi Core CPU (enabled by default). • Intel HT Technology (enabled by default). • Enable/disable Wake on USB (enabled by default). • Enable/disable Num lock state at boot (disabled by default).

Select	To do this
Built-In Device Options	• Enable/disable the wireless button state (enabled by default). • Enable/disable embedded WLAN device radio (select models only; enabled by default). • Enable/disable the embedded Bluetooth device radio (enabled by default). • Enable/disable the LAN (enabled by default). • Enable/disable LAN/WLAN switching (disabled by default). • Set the wake on LAN state. Options include the following: ◦ Disabled ◦ Boot to Network ◦ Follow Boot Order • Enable/disable the Ambient Light Sensor. • Enable/disable the Notebook Upgrade bay device (enabled by default). • Enable/disable the fingerprint device (enabled by default). • Enable/disable the integrated camera (enabled by default). • Enable/disable the Power Monitor Circuit (enabled by default). • Enable/disable the audio device (enabled by default). • Enable/disable a modem device (enabled by default). • Enable/disable the microphone (enabled by default). • Enable/disable the internal speakers (enabled by default).

Select	To do this
Port Options	**NOTE:** NOTE: All port options are enabled by default. • Enable/disable the serial port. • Enable/disable the parallel port. • Enable/disable the flash media reader. • Enable/disable the USB port. **CAUTION:** Disabling the USB port also disables MultiBay devices and ExpressCard devices on the advanced port replicator. • Enable/disable the 1394 port. • Enable/disable the ExpressCard slot. • Enable/disable the Smart Card slot. • Enable/disable the eSATA port.
AMT Options	• Enable/disable Firmware Verbosity. • Enable/disable AMT Setup Prompt (Ctrl-P). • Enable/disable USB Key Provisioning Support. • Enable/disable Unconfigure AMT on next boot. • Select Terminal Emulation Mode. ◦ ANSI ◦ VT100 • Enable/disable Firmware Progress Event Support. • Enable/disable Initiate Intel CIRA.
Set Security Level	Change, view, or hide security levels for all BIOS menu items.
Restore Security Defaults	Restore the default security settings.

Windows XP

Starting Computer Setup

Computer Setup is a preinstalled, ROM-based utility that can be used even when the operating system is not working or will not load.

NOTE: Some of the Computer Setup menu items listed in this guide may not be supported by your computer.

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 BIOS Setup.

Using Computer Setup

Navigating and selecting in Computer Setup

The information and settings in Computer Setup are accessed from the File, Security, Diagnostics, and System Configuration menus.

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 BIOS Setup.
3. Select the **File**, **Security**, or **System Configuration** menu.

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

   – or –

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

Your changes go into effect when the computer restarts.

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

Computer Setup menus

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

NOTE: Some of the Computer Setup menu items listed in this chapter may not be supported by your computer.

File menu

Select	To do this
System Information	• View identification information for the computer and the batteries in the system. • View specification information for the processor, cache and memory size, system ROM, video revision, and keyboard controller version.
Set System Date and Time	Set or change the date and time on the computer.
System Diagnostics	Displays the following information: • System Information ◦ Identification information for the computer and the batteries in the system. ◦ Specification information for the processor, cache and memory size, system ROM, video revision, and keyboard controller version. • Start-up Test–Verifies the system components needed for starting the computer. • Run-In Test–Runs a comprehensive check on system memory. • Hard Disk Test–Runs a comprehensive self-test on any hard drive in the system. • Memory Test–Runs a comprehensive test on any memory installed in the computer. • Battery Test–Runs a comprehensive test on any batteries installed in the computer. • Error Log–Displays a log file if any errors have occurred.
Restore defaults	Replace the configuration settings in Computer Setup with the original factory settings. (Hard drive mode, password settings, and security settings are not changed when you restore the factory settings.)
Reset BIOS security to factory default	Restore the BIOS security settings to the factory default.
Ignore changes and exit	Cancel any changes entered during the current session. Then exit and restart the computer.
Save changes and exit	Save any changes entered during the current session. Then exit and restart the computer. Your changes go into effect when the computer restarts.

Security menu

NOTE: Some of the menu items listed in this section may not be supported by your computer.

Select	To do this
Administrator Tools	
Setup BIOS Administrator Password	Set up a BIOS administrator password
User Management (requires a BIOS administrator password)	
Create New BIOS User Account	• Select from a list of BIOS users. • Select from a list of ProtectTools users.
Password Policy (requires a BIOS administrator password)	Revise password policy criteria.
HP SpareKey	Enable/disable HP SpareKey (enabled by default).
Always Prompt for HP SpareKey Enrollment	Enable/disable HP SpareKey enrollment (enabled by default).
Fingerprint Reset on Reboot (If Present)	Reset/clear the fingerprint reader ownership (select models only; disabled by default).
User Tools	
Change Password	Enter, change, or delete a BIOS administrator password.
HP SpareKey Enrollment	Enroll or reset HP SpareKey, which is a set of security questions and answers used if you forget your password.
Anti Theft	
AT-P	Enable/disable Anti-Theft Protection.
DriveLock Passwords	• Enable/disable DriveLock on any computer hard drive (enabled by default). • Change a DriveLock user password or master password. **NOTE:** DriveLock settings are accessible only when you enter Computer Setup by turning on (not restarting) the computer.
Automatic DriveLock	Enable/disable Automatic DriveLock support.
TPM Embedded Security	Enable/disable support for Trusted Platform Module (TPM) Embedded Security, which protects the computer from unauthorized access to owner functions available in Embedded Security for ProtectTools. For more information, refer to the ProtectTools software **NOTE:** You must have a setup password to change this setting.
Disk Sanitizer	Run Disk Sanitizer to destroy all existing data on the primary hard drive or the drive in the Upgrade bay. **CAUTION:** If you run Disk Sanitizer, the data on the selected drive is destroyed permanently.
System IDs	Enter a user-defined computer asset tracking number and ownership tag.

System Configuration menu

NOTE: Some of the menu items listed in this section may not be supported by your computer.

Select	To do this
Language	Change the Computer Setup language.
Boot Options	• Set a Startup Menu delay (in seconds). • Set the MultiBook Express Boot Popup delay in seconds. • Enable/disable Custom Logo (disabled by default). • Enable/disable Display Diagnostic URL (enabled by default). • Enable/disable CD-ROM boot (disabled by default). • Enable/disable SD Card boot (enabled by default). • Enable/disable floppy boot (enabled by default). • Enable/disable PXE Internal NIC boot (enabled by default). • Enable/disable Unified Extensible Firmware Interface (UEFI) Boot Mode (disabled by default). • Set the Legacy Boot Order.
Device Configurations	• Enable/disable USB legacy support (enabled by default). When enabled, USB legacy support allows the following: ◦ Use of a USB keyboard in Computer Setup even when a Windows operating system is not running ◦ Startup from bootable USB devices, including a hard drive, diskette drive, or optical drive connected by a USB port to the computer • Select a parallel port mode: ECP (Enhanced Capabilities Port), standard, bidirectional, or EPP (Enhanced Parallel Port). • Enable/disable fan always on while connected to an AC outlet (enabled by default). • Enable/disable Data Execution Prevention (select models only). When enabled, the processor can disable some virus code execution, which helps to improve computer security (disabled by default). • SATA (Serial Advanced Technology Attachment) device mode. The following options are available: ◦ AHCI (Advanced Host Controller Interface) ◦ IDE (Integrated Drive Electronics) ◦ RAID (select models only) **NOTE:** Availability of these options varies by computer model.

Select	To do this
Device Configurations *(continued)*	• Enable/disable secondary battery fast charge (enabled by default). • Enable/disable HP QuickLook (enabled by default). • Enable/disable Preboot Authentication on HP QuickLook Boot (enabled by default). • Enable/disable HP QuickWeb (enabled by default). • Enable/disable HP QuickWeb Write Protect (disabled by default). • Enable/disable Virtualization Technology (select models only; disabled by default). • Enable/disable TXT (Intel Trusted Execution Technology) (select models only; disabled by default). • Multi Core CPU (enabled by default). • Intel HT Technology (enabled by default). • Enable/disable Wake on USB (enabled by default). • Enable/disable Num lock state at boot (disabled by default).

Select	To do this
Built-In Device Options	• Enable/disable the wireless button state (enabled by default). • Enable/disable embedded WLAN device radio (select models only; enabled by default). • Enable/disable the embedded Bluetooth device radio (enabled by default). • Enable/disable the LAN (enabled by default). • Enable/disable LAN/WLAN switching (disabled by default). • Set the wake on LAN state. Options include the following: ◦ Disabled ◦ Boot to Network ◦ Follow Boot Order • Enable/disable the Ambient Light Sensor. • Enable/disable the Notebook Upgrade bay device (enabled by default). • Enable/disable the fingerprint device (enabled by default). • Enable/disable the integrated camera (enabled by default). • Enable/disable the Power Monitor Circuit (enabled by default). • Enable/disable the audio device (enabled by default). • Enable/disable a modem device (enabled by default). • Enable/disable the microphone (enabled by default). • Enable/disable the internal speakers (enabled by default).

Select	To do this
Port Options	**NOTE:** NOTE: All port options are enabled by default. • Enable/disable the serial port. • Enable/disable the parallel port. • Enable/disable the flash media reader. • Enable/disable the USB port. **CAUTION:** Disabling the USB port also disables MultiBay devices and ExpressCard devices on the advanced port replicator. • Enable/disable the 1394 port. • Enable/disable the ExpressCard slot. • Enable/disable the Smart Card slot. • Enable/disable the eSATA port.
AMT Options	• Enable/disable Firmware Verbosity. • Enable/disable AMT Setup Prompt (Ctrl-P). • Enable/disable USB Key Provisioning Support. • Enable/disable Unconfigure AMT on next boot. • Select Terminal Emulation Mode. ◦ ANSI ◦ VT100 • Enable/disable Firmware Progress Event Support. • Enable/disable Initiate Intel CIRA.
Set Security Level	Change, view, or hide security levels for all BIOS menu items.
Restore Security Defaults	Restore the default security settings.

6 Specifications

Computer specifications

	Metric	U.S.
Dimensions		
Width	**39.75 cm**	15.64 in
Depth	**28.55 cm**	11.24 in
Height (front to back)	**3.65 cm to 4.16 cm**	1.44 in to 1.64 in
Weight	**3.365 kg**	7.42 lbs
Input power		
Operating voltage	19.0 V dc @ 4.74 A – 120 W	
Operating current	4.74 A	
Temperature		
Operating (not writing to optical disc)	**0°C to 35°C**	32°F to 95°F
Operating (writing to optical disc)	**5°C to 35°C**	41°F to 95°F
Nonoperating	**-20°C to 60°C**	-4°F to 140°F
Relative humidity		
Operating	10% to 90%	
Nonoperating	5% to 90%	
Maximum altitude (unpressurized)		
Operating (14.7 to 10.1 psia)	**-15 m to 3,048 m**	-50 ft to 10,000 ft
Nonoperating (14.7 to 4.4 psia)	**-15 m to 12,192 m**	-50 ft to 40,000 ft
Shock		
Operating	125 g, 2 ms, half-sine	
Nonoperating	200 g, 2 ms, half-sine	
Random vibration		
Operating	0.75 g zero-to-peak, 10 Hz to 500 Hz, 0.25 oct/min sweep rate	

	Metric	U.S.
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.

17.0-inch, WUXGA+WVA display specifications

	Metric	U.S.
Dimensions		
Width	**24.4 cm**	9.65 in
Depth	**38.1 cm**	15.0 in
Diagonal	**43.2 cm**	17.0 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

	640-GB*	500-GB*	320-GB*	250-GB*
Dimensions				
Height	9.5 mm	9.5 mm	9.5 mm	9.5 mm
Width	70 mm	70 mm	70 mm	70 mm
Weight	101 g	101 g	101 g	101 g
Interface type	SATA	SATA	SATA	SATA
Transfer rate	100 MB/sec	100 MB/sec	100 MB/sec	100 MB/sec
Security	ATA security	ATA security	ATA security	ATA security
Seek times (typical read, including setting)				
Single track	3 ms	3 ms	3 ms	3 ms
Average	13 ms	13 ms	13 ms	13 ms
Maximum	24 ms	24 ms	24 ms	24 ms
Logical blocks	1,250,242,867	976,752,240	625,121.433	488,376,120
Disk rotational speed	7200 rpm	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 ROM with LightScribe DVD±RW Super Multi 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	

DVD±RW and CD-RW Super Multi Double-Layer Combo 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	
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

Windows 7

To protect your information, use Windows Backup and Restore to back up individual files and folders, back up your entire hard drive (select models only), create system repair discs (select models only), 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)
- Backing up individual files and folders
- 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.

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

Backing up your information

Recovery after a system failure is as complete as your most current backup. You should create system repair discs (select models only) and your initial backup immediately after software setup. As you add new software and data files, you should continue to back up your system on a regular basis to maintain a reasonably current backup. The system repair 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.

To create a screen shot:

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

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

   To copy the entire screen, press fn+prt sc.
3. Open a word-processing document, and then select **Edit > Paste**.

   The screen image is added to the document.
4. Save the document.

- 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 installed in your computer.

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 optical drive of the computer.

To create a backup using Backup and Restore, follow these steps:

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).

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

Performing a 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, refer to the "Using a Windows 7 operating system DVD (purchased separately)" section in this guide.

Using the Windows recovery tools

To recover information you previously backed up, follow these steps:

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.

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

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

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

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

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

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

   NOTE: If the Windows partition or the HP Recovery partition is not listed, you must recover your operating system and programs using the Windows 7 operating system DVD and the *Driver Recovery* disc (both purchased separately). For additional information, refer to the "Using a Windows 7 operating system DVD (purchased separately)" section.

3. If the Windows partition and the HP Recovery partition are listed, restart the computer, and then press f8 before the Windows operating system loads.
4. Select **Startup Repair**.
5. Follow the on-screen instructions.

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

Using f11 recovery tools

CAUTION: Using f11 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. Personal files must be restored from a backup.

To recover the original hard drive image using f11, follow these steps:

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

   NOTE: If the HP Recovery partition is not listed, you must recover your operating system and programs using the Windows 7 operating system DVD and the *Driver Recovery* disc (both purchased separately). For additional information, refer to 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)

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. Be sure that your most recent backup (stored on discs or on an external drive) is easily accessible. To order a Windows 7 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 technical support. For contact information, refer to 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, follow these steps:

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.

Windows Vista

To protect your information, use the Backup and Restore Center to back up individual files and folders, back up your entire hard drive (select models only), or create system restore points. In case of system failure, you can use the backup files to restore the contents of your computer.

The Backup and Restore Center provides the following options:

- Backing up individual files and folders
- Backing up the entire hard drive (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.

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

Backing up your information

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

You 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 folder, and back it up regularly.
- Back up templates that are stored in their associated programs.
- Save customized settings that appear in a window, toolbar, or menu bar by taking a screen shot of your settings. The screen shot can be a time-saver if you have to reset your preferences.

To create a screen shot:

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

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

   To copy the entire screen, press fn+prt sc.
3. Open a word-processing document, and then select **Edit > Paste**.

The screen image is added to the document.

4. Save the document.

- 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 installed in your computer.

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 optical drive of the computer.

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 Center**.
2. Follow the on-screen instructions to back up your entire computer (select models only) or your files.

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

Performing a recovery

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

- Windows recovery tools: You can use the Backup and Restore Center 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, you must purchase a Windows Vista operating system DVD to reboot the computer and repair the operating system. For additional information, refer to the “Using a Windows Vista operating system DVD (purchased separately)” section in this guide.

Using the Windows recovery tools

To recover information you previously backed up, follow these steps:

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

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

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

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

1. If possible, back up all personal files.
2. If possible, check for the presence of the Windows partition or the HP Recovery partition. To find the partitions, select **Start > Computer**.

   NOTE: If the Windows partition and the HP Recovery partition have been deleted, you must recover your operating system and programs using the Windows Vista operating system DVD and the *Driver Recovery* disc (both purchased separately). For additional information, refer to the “Using a Windows Vista operating system DVD (purchased separately)” section.

3. Restart the computer, and then press f8 before the Windows operating system loads.
4. Select **Repair your computer**.
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 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. Personal files must be restored from a backup.

NOTE: If your computer includes a solid-state drive (SSD), you may not have a recovery partition. Recovery discs have been included for computers that do not have a partition. Use these discs to recover your operating system and software. To check for the presence of a recovery partition, select **Start > Computer**. If the partition is present, an HP Recovery drive is listed in the Hard Disk Drives section of the window.

To recover the original hard drive image using f11, follow these steps:

1. If possible, back up all personal files.
2. If possible, check for the presence of the HP Recovery partition. To find the partition, select **Start > Computer**.

   NOTE: If the HP Recovery partition has been deleted, you must recover your operating system and programs using the Windows Vista operating system DVD and the *Driver Recovery* disc (both purchased separately). For additional information, refer to the “Using a Windows Vista operating system DVD (purchased separately)” section.
3. 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.
4. Press f11 while the “Press <F11> for recovery” message is displayed on the screen.
5. Follow the on-screen instructions.

Using a Windows Vista operating system DVD (purchased separately)

If you are unable to boot (start up) your computer, you must purchase a Windows Vista operating system DVD to reboot the computer and repair the operating system. Be sure that your most recent backup (stored on discs or on an external drive) is easily accessible. To order a Windows Vista 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 technical support. For contact information, refer to the Worldwide Telephone Numbers booklet included with the computer.

△ **CAUTION:** Using a Windows Vista 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 Vista operating system DVD, follow these steps:

NOTE: This process takes several minutes.

1. If possible, back up all personal files.
2. Restart the computer, and then insert the Windows Vista 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.

Windows XP

To protect your information, use the Windows Backup utility to back up files and folders or create recovery points. In case of system failure, you can use the backup files to restore your computer.

Windows provides the following options:

- Backing up individual files and folders
- Backing up all files and folders
- Scheduling automatic backups
- Creating recovery points
- Recovering information

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

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

Backing up your information

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

You can back up individual files or folders to an optional external hard drive or to a network drive.

Note the following when backing up:

- Store personal files in the My Documents folder, and back it up periodically.
- Back up templates stored in their associated programs.
- Save customized settings that appear in a window, toolbar, or menu bar by taking a screen shot of your settings. The screen shot can be a time saver if you have to reset your preferences.

To copy the screen and paste it into a word-processing document:

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

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

   To copy the entire screen, press fn+prt sc.
3. Open a word-processing document, and then select **Edit > Paste**.

   The screen image is added to the document.
4. Save the document.

To create a backup using the Windows Backup utility (select models only), follow these steps:

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 > Accessories > System Tools > Backup**.
2. Follow the on-screen instructions.

Performing a recovery

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

- Windows recovery tools (select models only): You can use the Windows Backup utility to recover information you have previously backed up.
- *Operating System* and *Driver Recovery* discs (included with your computer): You can use the discs to recover your operating system and programs installed at the factory.

Recovering your information

To recover information you previously backed up, follow these steps:

1. If possible, back up all personal files.
2. Select **Start > All Programs > Accessories > System Tools > Backup**.

   The Backup or Restore Wizard opens.
3. Click **Restore files and settings**, and then click **Next**.
4. Follow the on-screen instructions.

NOTE: For additional information on initiating a recovery in Windows, perform a search for this topic in Help and Support.

Recovering the operating system and programs

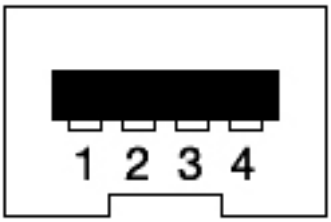
CAUTION: The recovery process reformats and completely erases the hard drive. All files you have created and any software installed on the computer are permanently removed. The recovery process reinstalls the original operating system as well as software and drivers. Software, drivers, and updates not installed by HP must be manually reinstalled. Personal files must be restored from a backup.

To recover your operating system and programs, follow these steps:

1. If possible, back up all personal files.
2. Shut down the computer.
3. Insert the *Operating System* disc into the optical drive.
4. Turn on the computer.
5. Follow the on-screen instructions to install the operating system.
6. After the operating system is installed, remove the *Operating System* disc and insert the *Driver Recovery* disc.
7. Follow the on-screen instructions to install the drivers and programs.

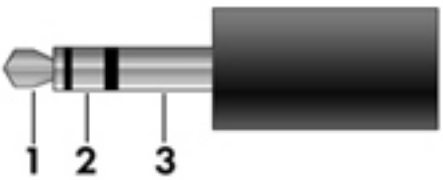
8 Connector pin assignments

1394



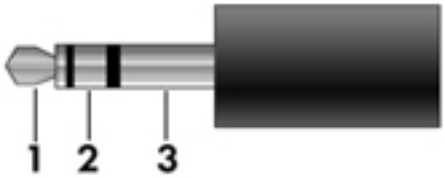
Pin	Signal
1	TPB-
2	TPB+
3	TPA-
4	TPA+

Audio-in (microphone)



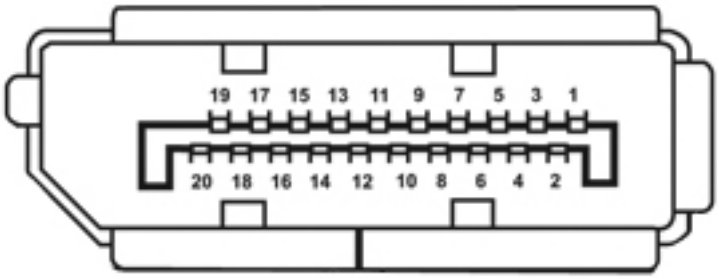
Pin	Signal
1	Audio signal in
2	Audio signal in
3	Ground

Audio-out (headphone)



Pin	Signal
1	Audio out, left channel
2	Audio out, right channel
3	Ground

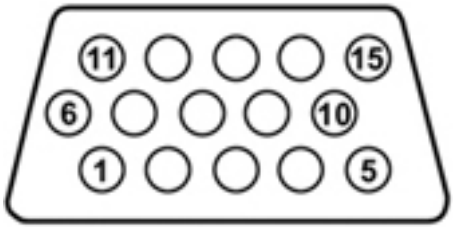
DisplayPort



Pin	Signal
1	ML_lane 0 (positive)
2	Ground
3	Lane 0 (negative)
4	Lane 1 (positive)
5	Ground
6	Lane 1 (negative)
7	Lane 2 (positive)
8	Ground
9	Lane 2 (negative)
10	Lane 3 (positive)
11	Ground
12	Lane 3 (negative)
13	Connectecd to ground
14	Connected to ground
15	Auxiliary channel (positive)

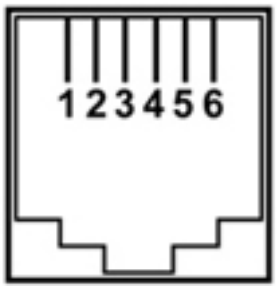
Pin	Signal
16	Ground
17	Auxiliary channel
18	Hot plug detect
19	Return for power
20	Power for connector

External monitor



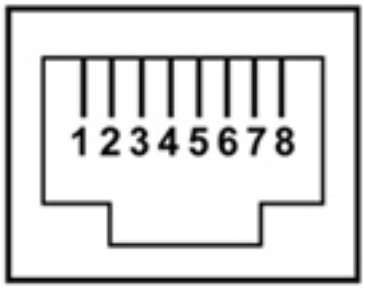
Pin	Signal
1	Red analog
2	Green analog
3	Blue analog
4	Not connected
5	Ground
6	Ground analog
7	Ground analog
8	Ground analog
9	+5 VDC
10	Ground
11	Monitor detect
12	DDC 2B data
13	Horizontal sync
14	Vertical sync
15	DDC 2B clock

RJ-11 (modem)



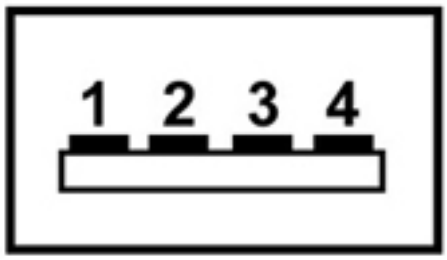
Pin	Signal
1	Unused
2	Tip
3	Ring
4	Unused
5	Unused
6	Unused

RJ-45 (network)



Pin	Signal
1	Transmit +
2	Transmit -
3	Receive +
4	Unused
5	Unused
6	Receive -
7	Unused
8	Unused

Universal Serial Bus



Pin	Signal
1	+5 VDC
2	Data
3	Data +
4	Ground

9 Power cord set requirements

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

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

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

Requirements for all countries

The following requirements are applicable to all countries and regions:

- The length of the power cord set must be at least **1.5 m** (5.0 ft) and no more than **2.0 m** (6.5 ft).
- All power cord sets must be approved by an acceptable accredited agency responsible for evaluation in the country or region where the power cord set will be used.
- The power cord sets must have a minimum current capacity of 10 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
Sweden	SEMKO	1
Switzlerland	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.

10 Recycling

Battery

When a 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 computer battery disposal.

Display

⚠ **WARNING!** The backlight contains mercury. Caution must be exercised when removing and handling the backlight to avoid damaging this component and causing exposure to the mercury.

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

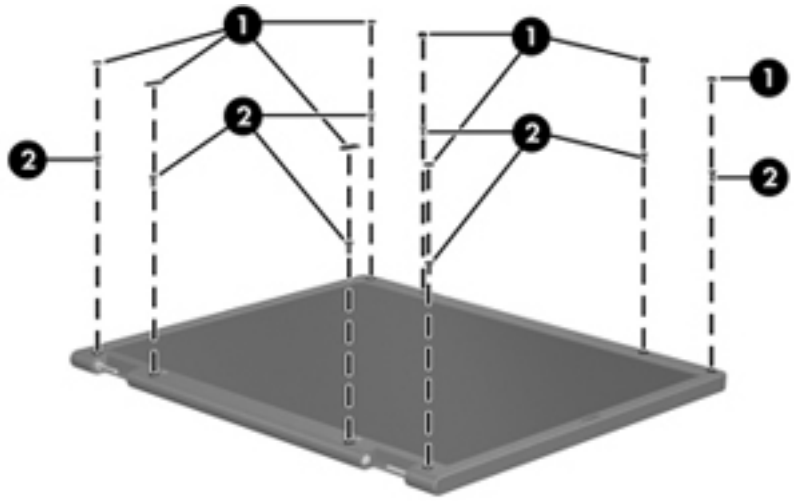
NOTE: Materials Disposal. This HP product contains mercury in the backlight in the display assembly that might require special handling at end-of-life. Disposal of mercury may be regulated because of environmental considerations. For disposal or recycling information, contact your local authorities,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

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

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

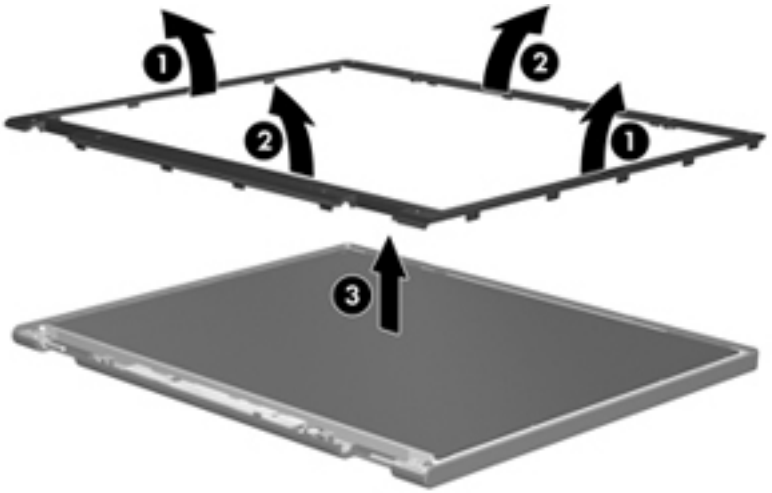
Perform the following steps:

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

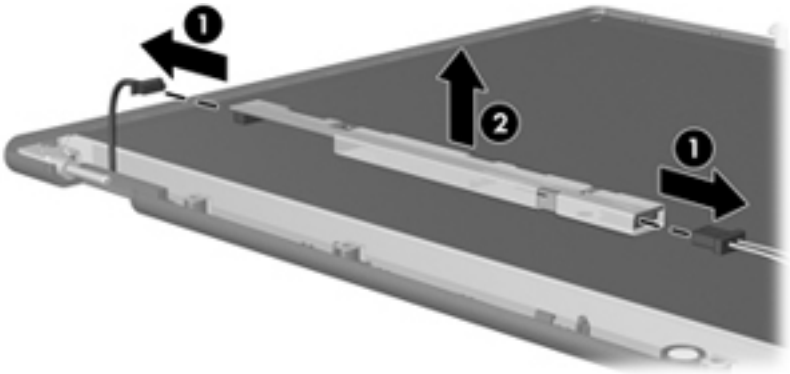


2. Lift up and out on the left and right inside edges **(1)** and the top and bottom inside edges **(2)** of the display bezel until the bezel disengages from the display assembly.

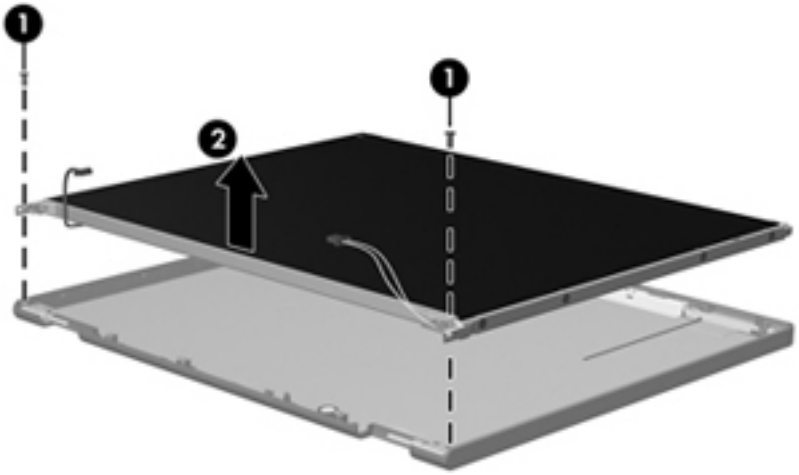
3. Remove the display bezel 3.



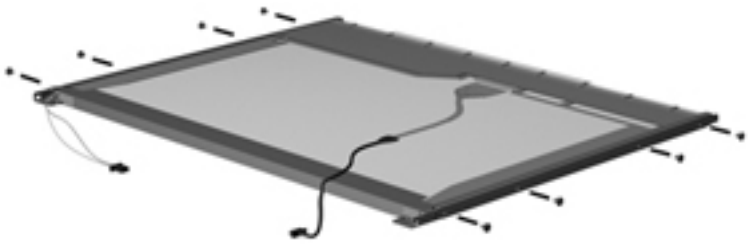
4. Disconnect all display panel cables **(1)** from the display inverter and remove the inverter 2.



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

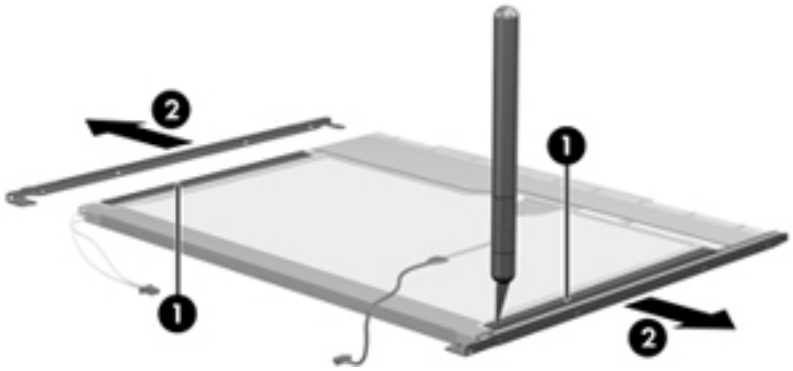


7. Turn the display panel assembly upside down.
8. Remove all screws that secure the display panel frame to the display panel.

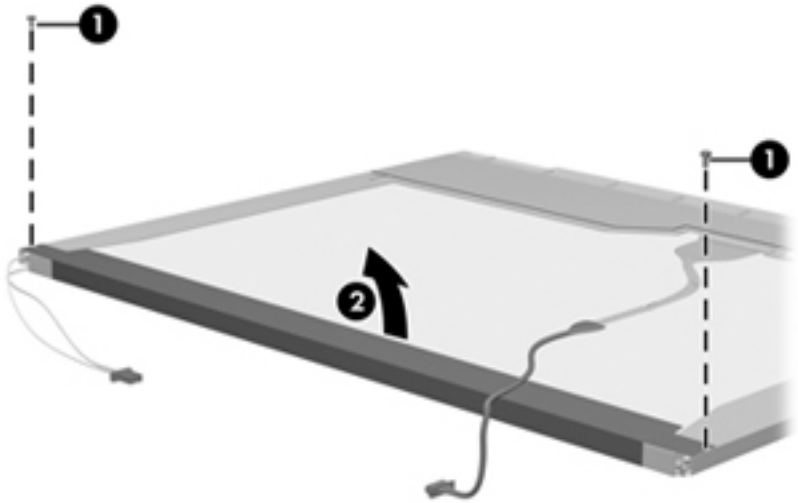


9. Use a sharp-edged tool to cut the tape **(1)** that secures the sides of the display panel to the display panel frame.

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

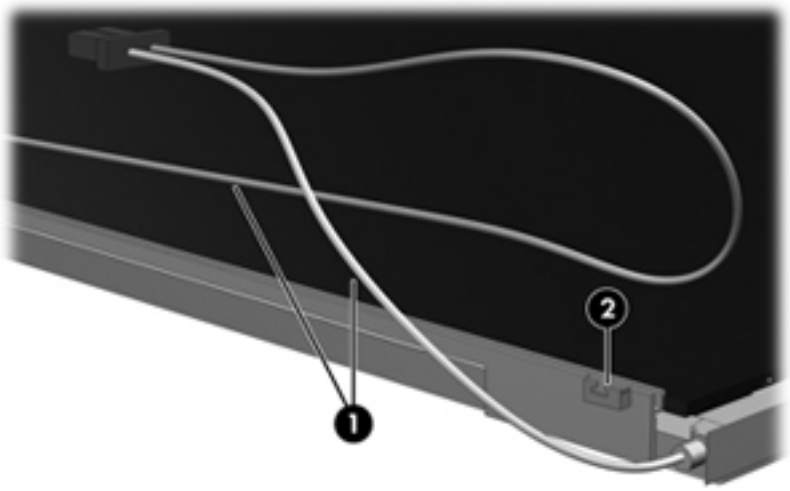


11. Remove the screws **(1)** that secure the backlight cover to the display panel.
12. Lift the top edge of the backlight cover **(2)** and swing it outward.



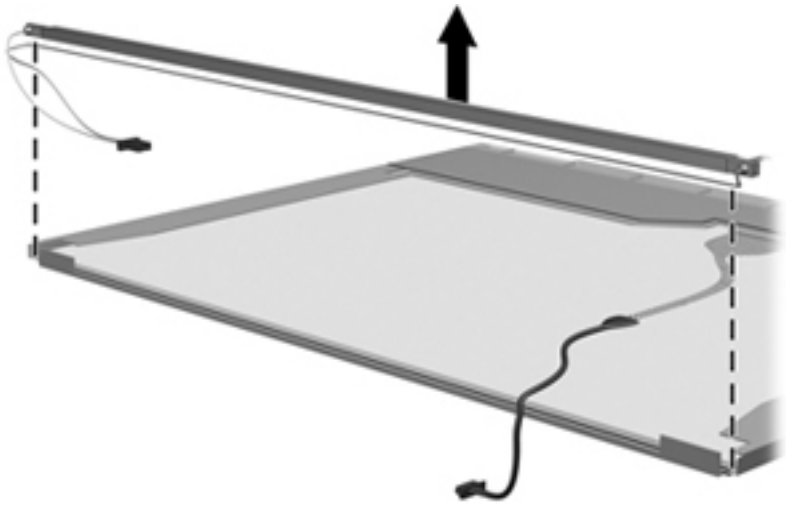
13. Remove the backlight cover.
14. Turn the display panel right-side up.

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



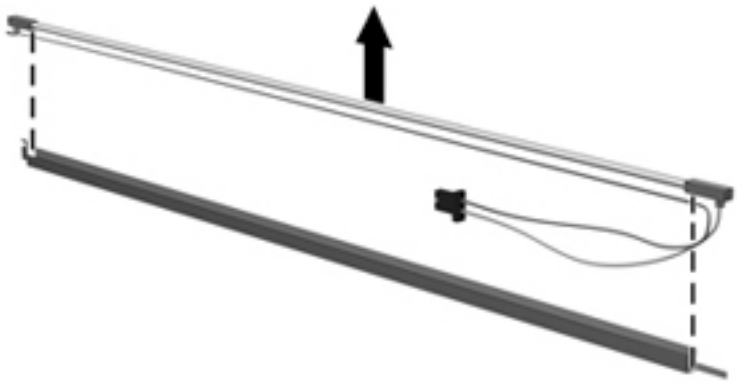
16. Turn the display panel upside down.

17. Remove the backlight frame from the display panel.

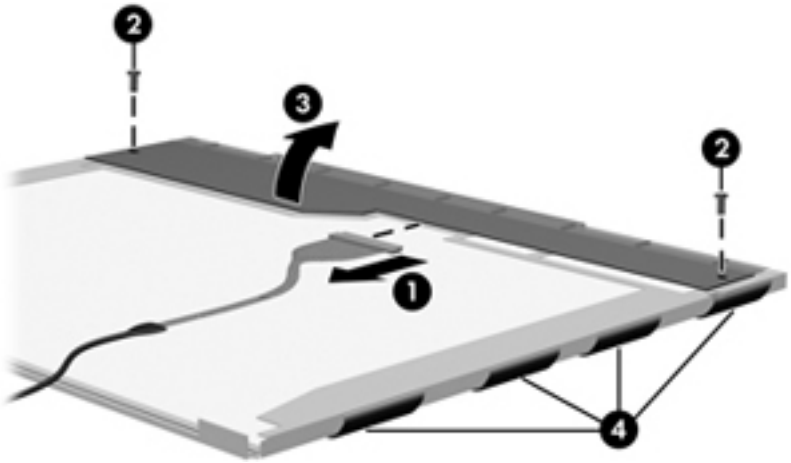


⚠ **WARNING!** The backlight contains mercury. Exercise caution when removing and handling the backlight to avoid damaging this component and causing exposure to the mercury.

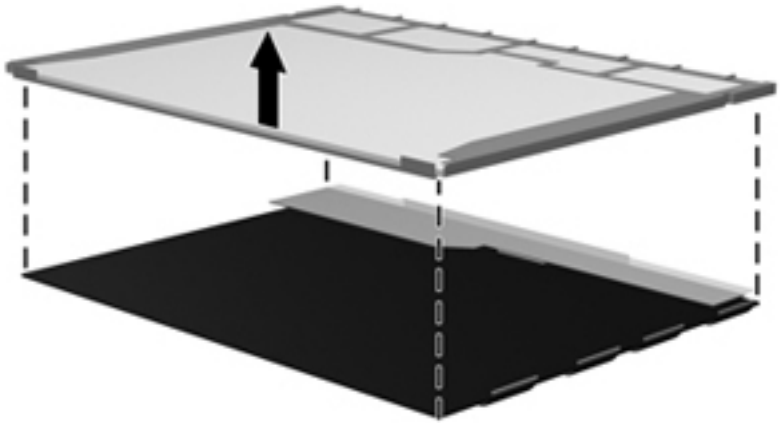
18. Remove the backlight from the backlight frame.



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



23. Remove the LCD panel.



24. Recycle the LCD panel and backlight.

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