



HP Compaq 2230s Notebook PC

Maintenance and Service Guide

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This guide is a troubleshooting reference used for maintaining and servicing the computer. It provides comprehensive information on identifying computer features, components, and spare parts; troubleshooting computer problems; and performing computer disassembly procedures.

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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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Product description

Category	Description	Models with GL40 system board	Models with GM45 system board
Product name	HP Compaq 2230s Notebook PC	X	X
Processors	Intel® Core™2 Duo processors:		
	■ T9600 2.8-GHz processor, 6-MB L2 cache, 1066-MHz front side bus (FSB)		X
	■ T9400 2.53-GHz processor, 6-MB L2 cache, 1066-MHz FSB		X
	■ P9500 2.53-GHz processor, 6-MB L2 cache, 1066-MHz FSB		X
	■ P8700 2.53-GHz processor, 3-MB L2 cache, 1066-MHz FSB		X
	■ P8600 2.4-GHz, 3-MB L2 cache, 1066-MHz FSB		X
	■ P8400 2.26-GHz processor, 3-MB L2 cache, 1066-MHz FSB		X
	■ P7370 2.0-GHz processor, 3-MB L2 cache, 1066-MHz FSB (for use with Intel WLAN only)		X
	Intel Core Duo processors:		
	■ P5870 2.0-GHz processor, 2-MB L2 cache, 800-MHz FSB (for use with no-WLAN option or Intel WLAN only)		X
	■ P5670 1.8-GHz processor, 2-MB L2 cache, 800-MHz FSB (for use with no-WLAN option or Intel WLAN only)		X
	■ T3400 2.16-GHz processor, 1-MB L2 cache, 667-MHz FSB	X	X
	■ T3200 2.0-GHz processor, 1-MB L2 cache, 667-MHz FSB	X	X
	Intel Celeron®-M processors:		
	■ 585 2.16-GHz processor, 1-MB L2 cache, 667-MHz FSB	X	
	■ 575 2.0-GHz processor, 1-MB L2 cache, 667-MHz FSB	X	
	Intel Celeron-T processors:		
	■ T1700 1.83-GHz processor, 1-MB L2 cache, 667-MHz FSB	X	
	■ T1600 1.66-GHz processor, 1-MB cache, 667-MHz FSB	X	
Chipset	Northbridge: Intel GL40	X	
	Northbridge: Intel GM45		X
	Southbridge: Intel ICH9M	X	X

(Continued)

Category	Description	Models with GL40 system board	Models with GM45 system board
Graphics	Intel Unified Memory Architecture (UMA) graphics subsystem integrated with shared system memory (dynamically allocated)	X	X
Panel	12.1-inch WXGA panel (1280 × 800)	X	X
	12.1-inch WXGA panel (1280 × 800) with integrated webcam	X	X
	12.1-inch WXGA panel (1280 × 800) with BrightView	X	X
	12.1-inch WXGA panel (1280 × 800) with BrightView and integrated webcam	X	X
	All display assemblies include 2 wireless local area network (WLAN) antennae		
Memory	2 customer-accessible/upgradable memory module slots	X	X
	Supports dual-channel memory	X	X
	Supports up to 4 GB of system RAM	X	X
	PC2-6400, 800-MHz, DDR2		
	Supports the following configurations:		
	■ 4096-MB total system memory (2048 × 2, dual-channel)	X	X
	■ 3072-MB total system memory (2048 + 1024)	X	X
	■ 2048-MB total system memory (1024 × 2, dual-channel)	X	X
■ 2048-MB total system memory (2048 × 1)	X	X	
■ 1024-MB total system memory (1024 × 1)	X	X	
Hard drives	Supports 9.5-mm, 2.5-inch hard drives	X	X
	Customer-accessible	X	X
	Serial ATA	X	X
	Supports the following drives:		
	■ 320-GB, 5400-rpm	X	X
	■ 250-GB, 5400-rpm	X	X
	■ 160-GB, 7200-rpm	X	X
	■ 160-GB, 5400-rpm	X	X
■ 120-GB, 5400-rpm	X	X	
Optical drives	Fixed (removal of 1 screw required)	X	X
	Customer-accessible	X	X
	Serial ATA	X	X
	Supports no-optical-drive option	X	X
	Supports the following drives:		
	■ DVD/CD-RW Combo Drive	X	X
	■ DVD-ROM Drive	X	X
	■ DVD±RW SuperMulti Double-Layer Drive with LightScribe	X	X
■ Blu-ray ROM DVD±RW SuperMulti DL Drive		X	
Diskette drive	Supports external USB diskette drive only	X	X

(Continued)

Category	Description	Models with GL40 system board	Models with GM45 system board
Microphone	Integrated mono microphone	X	X
Audio	Azalia audio	X	X
	2 speakers	X	X
Modem	56K V.92 1.5-inch data/fax modem with digital line guard	X	X
	Modem cable is not included		
Ethernet	Intel Broadcom 88E8072 10/100/1000 network interface card (NIC)	X	X
	Ethernet cable included	X	X
Wireless	Integrated WLAN options by way of wireless module:		
	2 wireless antennae built into display assembly	X	X
	Supports no-WLAN option	X	X
	Support for the following WLAN formats:		
	■ Broadcom 802.11a/b/g/n	X	X
	■ Intel 802.11a/b/g/n	X	X
	■ Broadcom 802.11b/g	X	X
	■ Intel 802.11a/b/g	X	X
	Integrated personal area network (PAN) options by way of Bluetooth® module:		
	Support for no-WPAN option	X	X
Broadcom Bluetooth	X	X	
External media card	One ExpressCard slot, supporting optional ExpressCard/34 cards	X	X
	Media Card Reader supporting MMC, SD, and SD High Capacity digital cards	X	X
Ports	Audio-in (mono microphone)	X	X
	Audio-out (stereo headphone)	X	X
	HDMI	X	X
	RJ-11 (modem)	X	X
	RJ-45 (Ethernet, includes link and activity lights)	X	X
	USB (3)	X	X
	VGA (Dsub 15-pin) supporting 1600 × 1200 external resolution at 75 GHz (hot plug/unplug with auto-detect)	X	X
	Multi-pin AC power	X	X
Docking	None	X	X
Keyboard/pointing devices	Spill-resistant full-size keyboard	X	X
	TouchPad with 2 TouchPad buttons	X	X
	Supports 2-way scroll	X	X
	Taps enabled as default	X	X
	Windows Vista® Hardware Start Button	X	X

(Continued)

Category	Description	Models with GL40 system board	Models with GM45 system board
Power requirements	65-W AC adapter with localized and pointing stick cable plug support (3-wire plug with ground pin, supports 3-pin DC connector)	X	X
	4-cell, 37-Wh Li-ion battery	X	X
	8-cell, 73-Wh Li-ion battery	X	X
Security	Security cable slot	X	X
Operating system	Preinstalled:		
	Windows Vista® Home Basic 32	X	X
	Windows Vista Home Premium 32	X	X
	Windows Vista Business 32	X	X
	Windows Vista Business (with downgrade to Windows® XP Professional)	X	X
	FreeDOS	X	X
	Red Flag Linux	X	X
Serviceability	End-user replaceable parts:		
	AC adapter	X	X
	Battery (system)	X	X
	Hard drive	X	X
	Memory module	X	X
	Optical drive	X	X
	WLAN module	X	X

External component identification

Display components

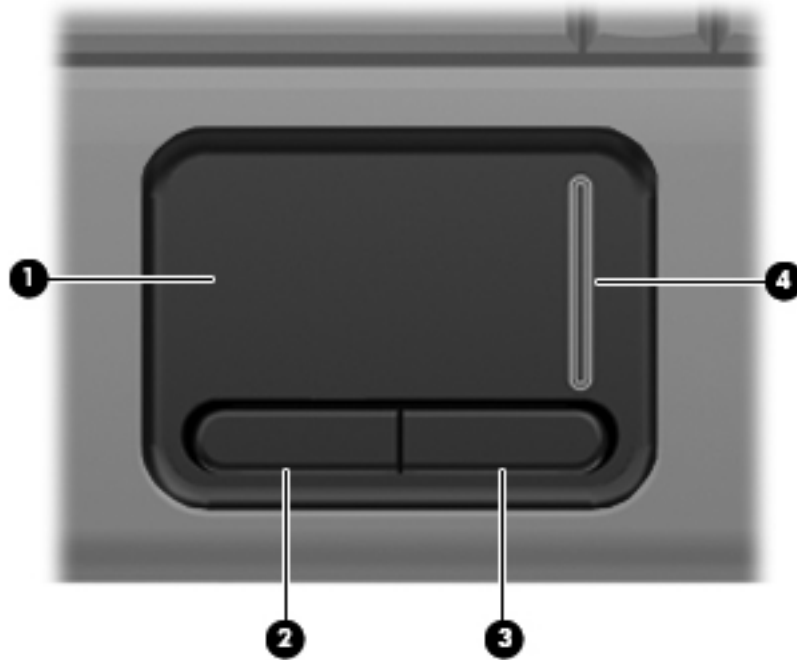


Item	Component	Function
❶	Wireless antennae (2)*	Send and receive wireless signals to communicate with WLANs.
❷	Internal microphones (2)	Record sound.
❸	Webcam light (select models only)	On: The webcam is in use.
❹	Webcam (select models only)	Records audio and video and captures still photographs.

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

Top components

Pointing devices

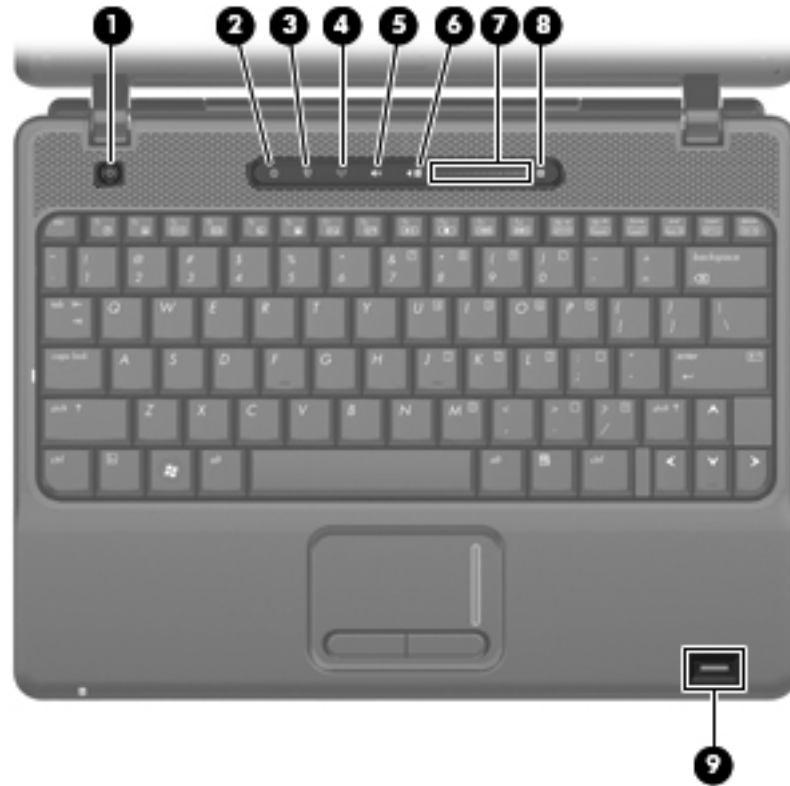


Item	Component	Function
❶	TouchPad*	Moves the pointer and selects or activates items on the screen.
❷	Left TouchPad button*	Functions like the left button on an external mouse.
❸	Right TouchPad button*	Functions like the right button on an external mouse.
❹	Vertical scroll zone	Scrolls up or down.

*This table describes factory settings. View or change device preferences as follows:


- In Windows Vista, select **Start > Control Panel > Hardware and Sound > Mouse**.
- In Windows XP, select **Start > Control Panel > Printers and Other Hardware > Mouse**.

Buttons and fingerprint reader

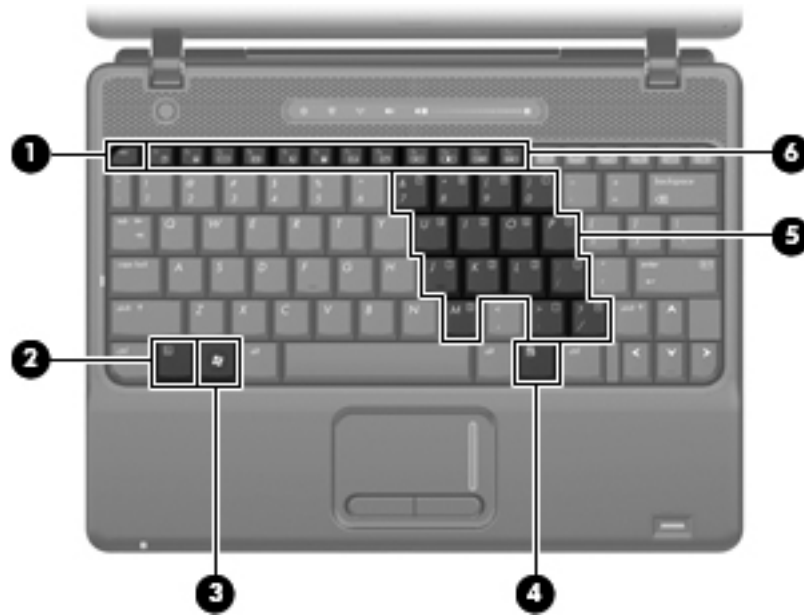


Item	Component	Function
❶	Power button	<ul style="list-style-type: none"> ■ When the computer is off, press the button to turn on the computer. ■ When the computer is on, press the button to shut down the computer. ■ When the computer is in Standby or the Sleep state, press the button briefly to exit Standby or the Sleep state. ■ When the computer is in Hibernation, press the button briefly to exit Hibernation. <p>If the computer has stopped responding and Windows® shutdown procedures are ineffective, press and hold the power button for at least 5 seconds to turn off the computer.</p> <p>To learn more about power settings, follow these steps:</p> <ul style="list-style-type: none"> ■ In Windows Vista, select Start > Control Panel > Mobile PC > Power Options. ■ In Windows XP, select Start > Control Panel > System and Maintenance > Power Options.
❷	Info button	<p>Launches Info Center, which provides shortcuts, such as the following:</p> <ul style="list-style-type: none"> ■ HP 3D DriveGuard—Controls settings for software that protects the hard drive by parking the drive when the computer is dropped or moved. ■ HP Software Setup—Installs preloaded applications to make them accessible to the user.

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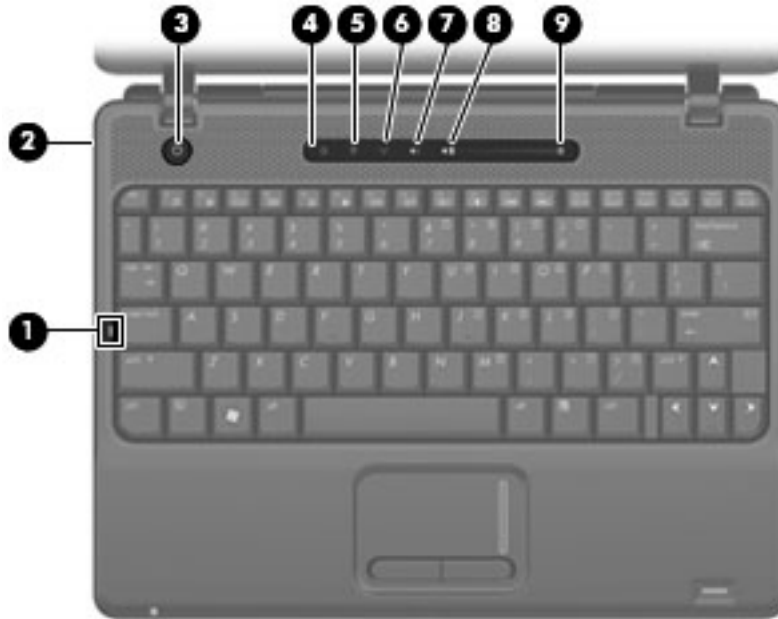
Item	Component	Function
③	Presentation button	Opens the Presentation Options window, where you can start a frequently used presentation, file, program, or Web site. You can also adjust display setting for optimum viewing.
④	Wireless button	Turns the wireless feature on or off, but does not establish a wireless connection.  You must set up or access a wireless network to establish a wireless connection.
⑤	Volume mute button	Mutes and restores speaker sound.
⑥	Volume down button	Decreases speaker volume.
⑦	Volume scroll zone	Adjusts speaker volume. Slide your finger to the left to decrease volume and to the right to increase volume.
⑧	Volume up button	Increases speaker volume.
⑨	Fingerprint reader	Allows a fingerprint logon to Windows, instead of a password logon.

Keys



Item	Component	Function
❶	esc key	Displays system information when pressed in combination with the fn key.
❷	fn key	Executes frequently used system functions when pressed in combination with a function key or the esc key.
❸	Windows logo key	Displays the Windows Start menu.
❹	Windows applications key	Displays a shortcut menu for items beneath the pointer.
❺	Embedded numeric keypad keys	Can be used like the keys on an external numeric keypad.
❻	Function keys	Execute frequently used system functions when pressed in combination with the fn key.

Lights



Item	Component	Function
❶	Caps lock light	On: Caps lock is on.
❷	Battery light (beside power connector)	<ul style="list-style-type: none"> ■ Amber: A battery is charging. ■ Green: 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.
❸	Power light	<ul style="list-style-type: none"> ■ On: The computer is on. ■ Blinking: The computer is in the Sleep state. ■ Blinking rapidly: An AC adapter with a higher power rating should be connected. ■ Off: The computer is off or in Hibernation.
❹	Info button light	<ul style="list-style-type: none"> ■ On: The Info Center is launched.
❺	Presentation button light	<ul style="list-style-type: none"> ■ On: Presentation Options is on.
❻	Wireless light	<ul style="list-style-type: none"> ■ Blue: An integrated wireless device, such as a wireless local area network (WLAN) device, an HP Mobile Broadband Module, and/or a Bluetooth® device, is on. ■ Amber: All wireless devices are off.
❼	Volume mute light	<ul style="list-style-type: none"> ■ Off: Computer sound is on. ■ On: Computer sound is off.
❽	Volume down light	Blinking: The volume scroll zone is being used to decrease speaker volume.
❾	Volume up	Blinking: The volume scroll zone is being used to increase speaker volume.

Front components



Item	Component	Function
❶	Drive light	<ul style="list-style-type: none"> ■ Blinking green: The hard drive or optical drive is being accessed. ■ Amber (select models only): HP 3D DriveGuard has temporarily parked the hard drive.
❷	Audio-in (microphone) jack	Connects an optional computer headset microphone, stereo array microphone, or monaural microphone.
❸	Audio-out (headphone) jack	Produces sound when connected to optional powered stereo speakers, headphones, ear buds, a headset, or television audio.



Left-side components



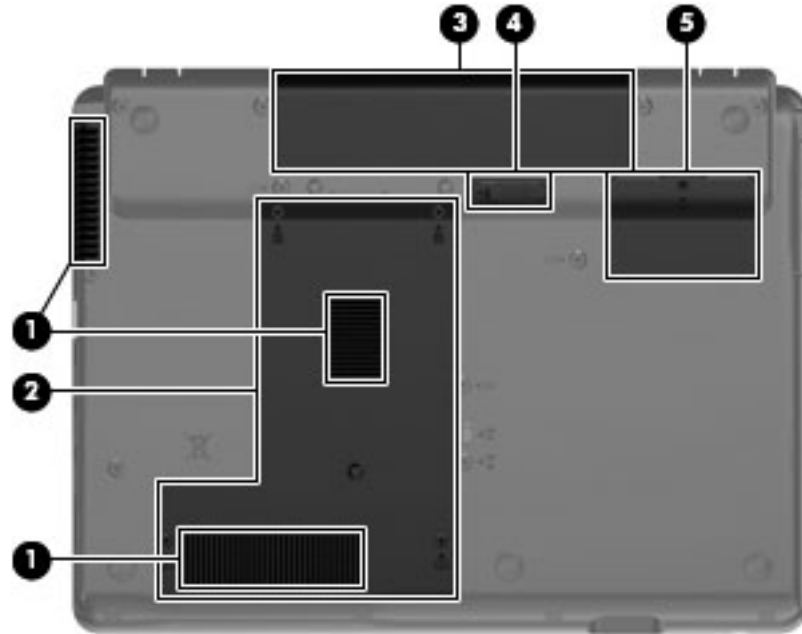
Item	Component	Function
❶	Battery light	<ul style="list-style-type: none"> ■ Amber: A battery is charging. ■ Turquoise: A battery is close to full charge capacity. ■ Blinking amber: A battery that is the only available power source has reached a low battery level. When the battery reaches a critical 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.
❷	Power connector	Connects an AC adapter.
❸	RJ-45 (network) jack	Connects a network cable.
❹	RJ-11 (modem) jack	Connects a modem cable.
❺	USB port	Connects an optional USB device.
❻	Optical drive	Reads optical discs and, on select models, also writes to optical discs.



Right-side components



Item	Component	Function
①	ExpressCard slot	Supports optional ExpressCard/34 cards.
②	Memory Card Reader (select models only)	Supports the following optional digital card formats: <ul style="list-style-type: none"> ■ MultiMediaCard ■ MultiMediaCard Plus ■ Secure Digital Memory Card ■ Secure Digital High Capacity Memory Card
③	HDMI port (select models only)	Connects an optional video or audio device, such as a high-definition television or any compatible digital or audio component.
④	USB ports (2)	Connects an optional USB device.
⑤	External monitor port	Connects an external VGA monitor or projector.
⑥	Vent	Enables airflow to cool internal components. <p> 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.</p>
⑦	Security cable slot	Attaches an optional security cable to the computer. <p> The security cable is designed to act as a deterrent, but it may not prevent the computer from being mishandled or stolen.</p>

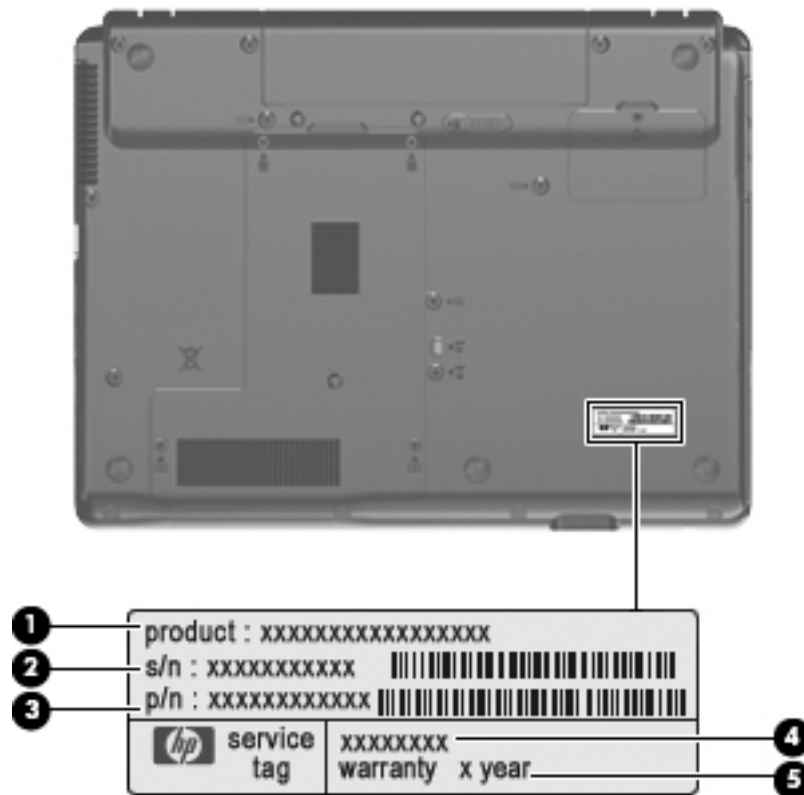
Bottom components



Item	Component	Function
❶	Vents (3)	Enables airflow to cool internal components.  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.
❷	Hard drive bay	Holds the hard drive and two memory module slots.
❸	Battery bay	Holds the battery.
❹	Battery release latch	Releases the battery from the battery bay.
❺	Wireless module compartment	Contains a WLAN module slot.  To prevent an unresponsive system, use only a wireless module authorized for use in the computer by the governmental agency that regulates wireless devices in your country or region. If you install the module and then receive a warning message, remove the module to restore computer functionality, and then contact technical support through Help and Support.

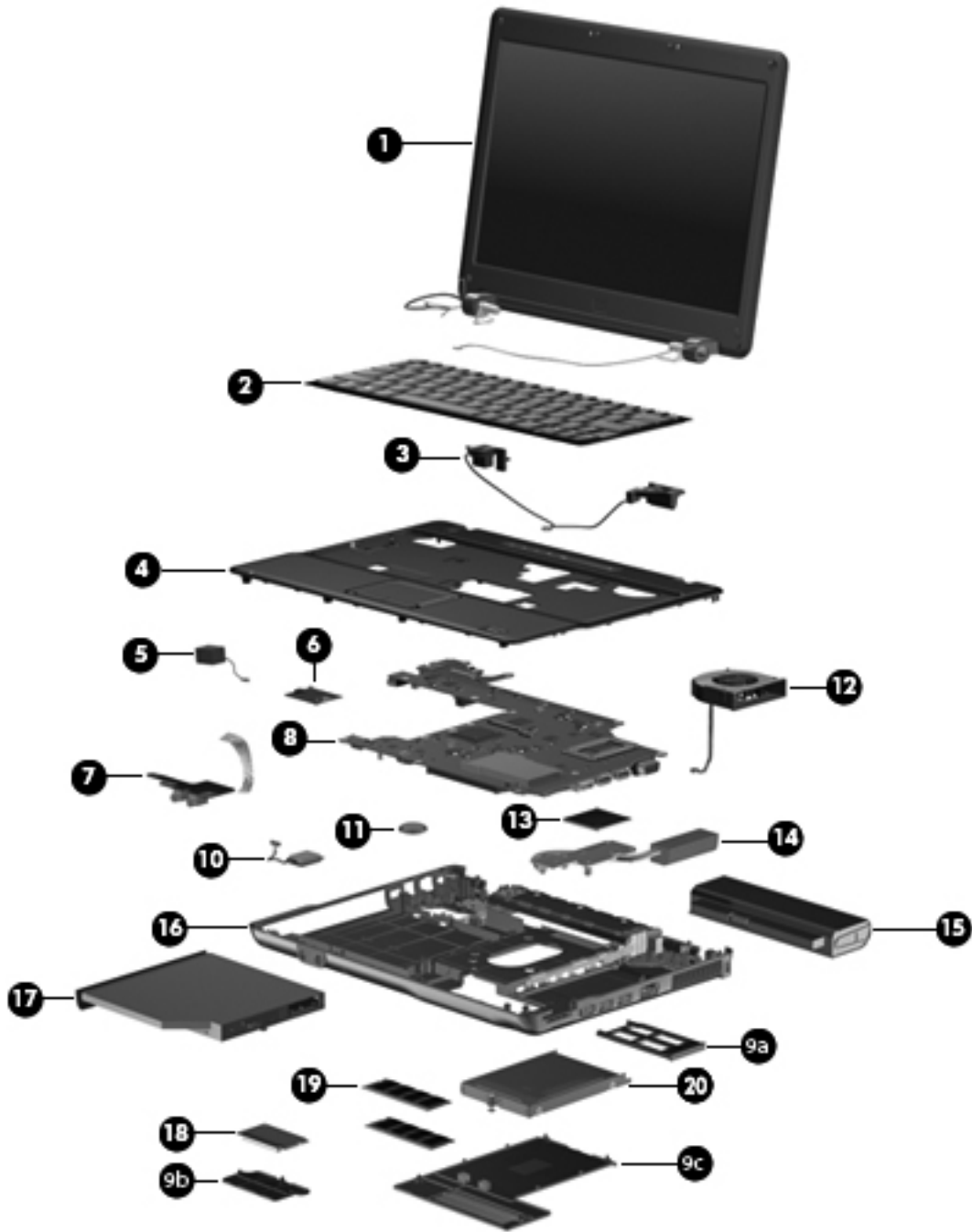
Serial number location

When ordering parts or requesting information, provide the computer serial number and model number located on the bottom of the computer. The service tag provides the following information.






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

Computer major components



Item	Description	Spare Part Number
(1)	Display assembly (include 2 WLAN antenna transceivers and cables, nameplate, and logo)	
	12.1-inch, WXGA display assembly	493186-001
	12.1-inch, WXGA display assembly with integrated webcam	501932-001
	12.1-inch, WXGA BrightView display assembly	493187-001
	12.1-inch, WXGA BrightView display assembly with integrated webcam	501933-001
	Display internal components:	
	Webcam with cable	492159-001
	Display bezel	495015-001
	Display bezel with webcam	501934-001
	Display inverter	493193-001
	Display hinges	493192-001
	Display hinge covers	495016-001
	Display cables (includes display, microphone, and antenna cables)	493189-001
	Display nameplate	493191-001
	Display enclosure	493188-001
	Display Miscellaneous Kit (includes rubber feet, screw covers, and hinge cover)	493190-001
(2)	Keyboard (includes keyboard cable)	
	For use in Belgium	493960-A41
	For use in Canada	493960-121
	For use in the Czech Republic	493690-221
	For use in Denmark	493960-081
	For use in France	493960-051
	For use in Greece	493960-DJ1
	For use in Germany	493960-041
	For use in Hungary	493960-211
	For use in Iceland	493960-DD1
	For international use	493960-B31
	For use in Italy	493960-061
	For use in Israel	493960-BB1
	For use in Japan	493960-291
	For use in Latin America	493960-161
	For use in Norway	493960-091
	For use in Portugal	493960-131
	For use in Russia	493960-251
	For use in Saudi Arabia	493960-171
	For use in Slovakia	493960-231
	For use in Slovenia	493960-BA1
	For use in Spain	493960-071
	For use in Sweden and Finland	493960-B71

(Continued)

Item	Description	Spare Part Number
	For use in Switzerland	493960-BG1
	For use in South Korea	493960-AD1
	For use in Taiwan	493960-AB1
	For use in Thailand	493960-281
	For use in Turkey	493960-141
	For use in the United Kingdom	493960-031
	For use in the United States	493960-001
(3)	Speaker assembly	493273-001
(4)	Top cover (includes TouchPad and cable, LED board and cable, and switch cover)	493278-001
(5)	Modem module cable (includes RJ-11 jack)  The modem module cable is included in the Cable Kit, spare part number 493275-001. See “Cable Kit” on page 3-8 for more Cable Kit information.	
(6)	Modem module  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 493275-001. See “Cable Kit” on page 3-8 for more Cable Kit information.	
	For use in Australia and New Zealand	461749-011
	For use in all countries or regions except Australia and New Zealand	461749-001
(7)	Audio board	493272-001
(8)	System board	
	GM45 (includes RTC battery and replacement thermal material)	493185-001
	GL40 (includes RTC battery and replacement thermal material)	504446-001
	Plastics Kit (see “Plastics Kit” on page 3-9 for more Plastics Kit spare part information)	493274-001
(9a)	ExpressCard slot bezel	
(9b)	WLAN module compartment cover	
(9c)	Hard drive compartment cover	
(10)	Bluetooth module  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 493275-001. See “Cable Kit” on page 3-8 for more Cable Kit information.	398393-002
(11)	RTC battery	449137-001
(12)	Fan	493269-001

(Continued)

Item	Description	Spare Part Number
(13)	Processor (includes replacement thermal material)	
	Intel Core2 Duo processors (6-MB L2 cache, 1066-MHz FSB):	
	■ T9600 2.8-GHz processor	486257-001
	■ T9400 2.53-GHz processor	486256-001
	■ P9500 2.53-GHz processor	496458-001
	Intel Core2 Duo processors (3-MB L2 cache, 1066-MHz FSB):	
	■ P8700 2.53-GHz processor	512585-001
	■ P8600 2.4-GHz processor	486255-001
	■ P8400 2.26-GHz processor	486254-001
	■ P7370 2.0-GHz processor (for use with Intel WLAN only)	507966-001
	Intel Core Duo processors (2-MB L2 cache, 800-MHz FSB):	
	■ P5870 2.0-GHz processor	500771-001
	■ P5670 1.8-GHz processor	500770-001
	Intel Core Duo processors (1-MB L2 cache, 667-MHz FSB):	
	■ T3400 2.16-GHz processor	509061-001
	■ T3200 2.0-GHz processor	509060-001
	Intel Celeron-M processors (1-MB L2 cache, 667-MHz FSB):	
	■ 585 2.16-GHz processor (for use with no WLAN support or Intel WLAN only)	490337-001
	■ 575 2.0-GHz processor (for use with no WLAN support or Intel WLAN only)	490336-001
	Intel Celeron-T processor (1-MB L2 cache, 667-MHz FSB):	
	■ T1700 1.83-GHz processor	509059-001
	■ T1600 1.66-GHz processor	509058-001
(14)	Thermal module (includes heat sink and thermal material)	493270-001
(15)	Battery	
	4-cell, 37-Wh	493202-001
	8-cell, 73-Wh	501935-001
(16)	Base enclosure (includes rubber feet)	493271-001
	Rubber Kit (not illustrated, contains 5 computer feet)	493276-001
(17)	Optical drive (includes optical drive bezel and bracket)	
	DVD/CD-RW Combo Drive	493200-001
	DVD-ROM Drive	493201-001
	DVD±RW SuperMulti Double-Layer Drive with LightScribe	493961-001
	Blu-ray ROM DVD±RW SuperMulti DL Drive	497536-001

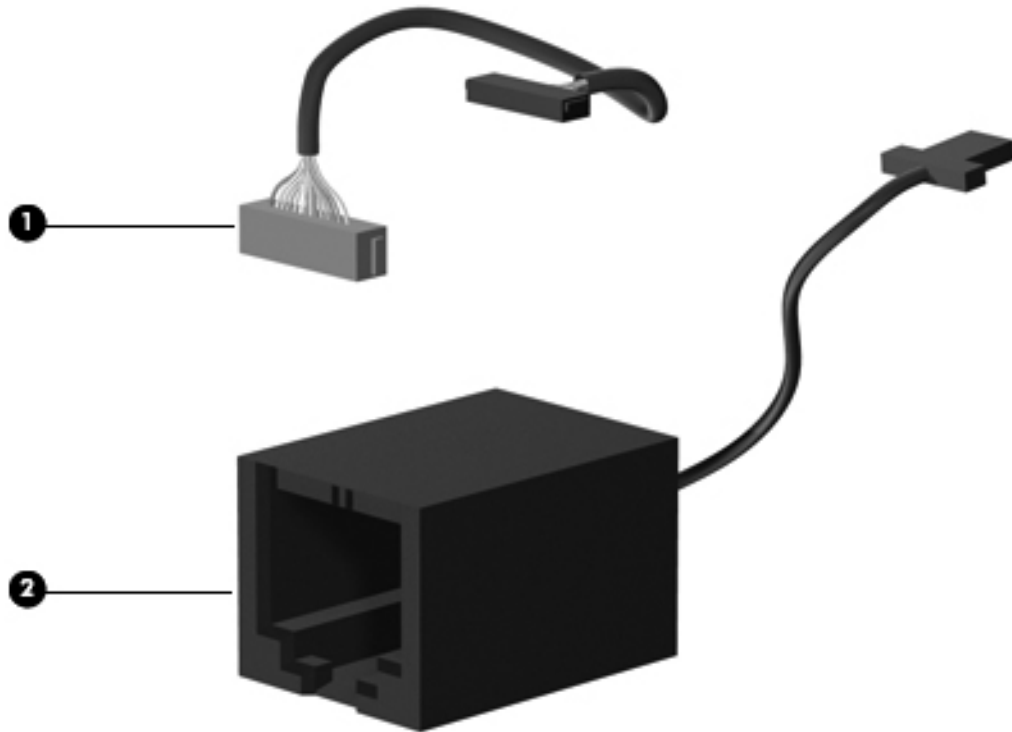
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Item	Description	Spare Part Number
(18)	WLAN module	
	Broadcom 802.11a/b/g/n WLAN modules:	
	■ For use in Canada, the Cayman Islands, Guam, Puerto Rico, the U.S. Virgin Islands, and the United States	487330-001
	■ For use in Afghanistan, Albania, Algeria, Andorra, Angola, Antigua and Barbuda, Argentina, Armenia, Aruba, Australia, Austria, Azerbaijan, the Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Belize, Benin, Bermuda, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, the British Virgin Islands, Brunei, Bulgaria, Burkina Faso, Burundi, Cameroon, Cape Verde, the Central African Republic, Chad, Chile, People's Republic of China, Colombia, Comoros, the Congo, Costa Rica, Croatia, Cyprus, the Czech Republic, Denmark, Djibouti, Dominica, the Dominican Republic, East Timor, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Fiji, Finland, France, French Guiana, Gabon, Gambia, Georgia, Germany, Ghana, Gibraltar, Greece, Grenada, Guadeloupe, Guatemala, Guinea, Guinea-Bissa, Guyana, Haiti, Honduras, Hong Kong, Hungary, Iceland, India, Ireland, Israel, Italy, the Ivory Coast, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kiribati, Kyrgyzstan, Laos, Latvia, Lebanon, Lesotho, Liberia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Madagascar, Malawi, Malaysia, the Maldives, Mali, Malta, the Marshall Islands, Martinique, Mauritania, Mauritius, Mexico, Micronesia, Monaco, Mongolia, Montenegro, Morocco, Mozambique, Namibia, Nauru, Nepal, the Nether Antilles, the Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Palau, Panama, Papua New Guinea, Paraguay, Peru, the Philippines, Poland, Portugal, the Republic of Moldova, Romania, Russia, Rwanda, Samoa, San Marino, Sao Tome & Principe, Saudi Arabia, Senegal, Serbia and Montenegro, the Seychelles, Sierra Leone, Singapore, Slovakia, Slovenia, the Solomon Islands, Somalia, South Africa, South Korea, Spain, Sri Lanka, St. Kitts & Nevis, St. Lucia, St. Vincent & Grenada, Suriname, Swaziland, Sweden, Switzerland, Taiwan, Tajikistan, Tanzania, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Tuvalu, Uganda, Ukraine, the United Arab Emirates, the United Kingdom, Uruguay, Uzbekistan, Vanuatu, Venezuela, Vietnam, Yemen, Zaire, Zambia, and Zimbabwe	487330-002
	Broadcom 802.11b/g WLAN modules:	
	■ For use in Canada, the Cayman Islands, Guam, Puerto Rico, the U.S. Virgin Islands, and the United States	459263-001
	■ For use in Afghanistan, Albania, Algeria, Andorra, Angola, Antigua and Barbuda, Argentina, Armenia, Aruba, Australia, Austria, Azerbaijan, the Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Belize, Benin, Bermuda, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, the British Virgin Islands, Brunei, Bulgaria, Burkina Faso, Burundi, Cameroon, Cape Verde, the Central African Republic, Chad, Chile, People's Republic of China, Colombia, Comoros, the Congo, Costa Rica, Croatia, Cyprus, the Czech Republic, Denmark, Djibouti, Dominica, the Dominican Republic, East Timor, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Fiji, Finland, France, French Guiana, Gabon, Gambia, Georgia, Germany, Ghana, Gibraltar, Greece, Grenada, Guadeloupe, Guatemala, Guinea, Guinea-Bissa, Guyana, Haiti, Honduras, Hong Kong, Hungary, Iceland, India, Ireland, Israel, Italy, the Ivory Coast, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kiribati, Kyrgyzstan, Laos, Latvia, Lebanon, Lesotho, Liberia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Madagascar, Malawi, Malaysia, the Maldives, Mali, Malta, the Marshall Islands, Martinique, Mauritania, Mauritius, Mexico, Micronesia, Monaco, Mongolia, Montenegro, Morocco, Mozambique, Namibia, Nauru, Nepal, the Nether Antilles, the Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Palau, Panama, Papua New Guinea, Paraguay, Peru, the Philippines, Poland, Portugal, the Republic of Moldova, Romania, Russia, Rwanda, Samoa, San Marino, Sao Tome & Principe, Saudi Arabia, Senegal, Serbia and Montenegro, the Seychelles, Sierra Leone, Singapore, Slovakia, Slovenia, the Solomon Islands, Somalia, South Africa, South Korea, Spain, Sri Lanka, St. Kitts & Nevis, St. Lucia, St. Vincent & Grenada, Suriname, Swaziland, Sweden, Switzerland, Taiwan, Tajikistan, Tanzania, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Tuvalu, Uganda, Ukraine, the United Arab Emirates, the United Kingdom, Uruguay, Uzbekistan, Vanuatu, Venezuela, Vietnam, Yemen, Zaire, Zambia, and Zimbabwe	459263-002

(Continued)

Item	Description	Spare Part Number
	Intel 802.11a/b/g/n WLAN module:	
	■ For use in Canada, the Cayman Islands, Guam, Puerto Rico, the U.S. Virgin Islands, and the United States	480985-001
	Intel 802.11a/b/g WLAN module:	
	■ For use in Pakistan, Russia, and Ukraine	482957-001
(19)	Memory modules	
	2048-MB	493195-001
	1024-MB	493194-001
(20)	Hard drive (includes hard drive bracket)	
	320-GB, 5400-rpm	493199-001
	250-GB, 5400-rpm	493198-001
	160-GB, 7200-rpm	513695-001
	160-GB, 5400-rpm	493197-001
	120-GB, 5400-rpm	493196-001
	Cable Kit (not illustrated)	493275-001

Cable Kit



Item	Description	Spare part number
	Cable Kit:	493275-001
❶	Bluetooth module cable	
❷	Modem module cable (includes RJ-11 jack)	

Plastics Kit



Item	Description	Spare part number
Plastics Kit:		493274-001
①	Hard drive compartment cover (includes one captive screw, secured by a C-clip)	
②	Wireless module compartment cover (includes one captive screw, secured by a C-clip)	
③	ExpressCard slot bezel	
④	SD card bezel	
⑤	Base enclosure screw covers (4 covers, 2 sizes)	

Mass storage devices




Item	Description	Spare part number
①	Optical drive (includes bezel)	
	320-GB, 5400-rpm	493199-001
	250-GB, 5400-rpm	493198-001
	160-GB, 7200-rpm	513695-001
	160-GB, 5400-rpm	493197-001
	120-GB, 5400-rpm	493196-001
②	Hard drive (includes bracket)	
	DVD/CD-RW Combo Drive	493200-001
	DVD-ROM Drive	493201-001
	DVD±RW SuperMulti Double-Layer Drive with LightScribe	493961-001
	Blu-ray ROM DVD±RW SuperMulti DL Drive	497536-001

Miscellaneous parts

Description	Spare part number
65-W AC adapter	463958-001
Power cords:	
For use in Argentina	490371-D01
For use in Denmark	490371-081
For use in Europe	490371-021
For use in Israel	490371-BB1
For use in North America	490371-001
For use in the United Kingdom and Singapore	490371-031
For use in the People's Republic of China	490371-AA1
For use in Australia	490371-011
For use in India	490371-D61
For use in Italy	490371-061
For use in Japan	490371-291
For use in South Africa	490371-AR1
For use in South Korea	490371-AD1
For use in Switzerland	490371-111
For use in Taiwan	490371-AB1
Screw Kit	493277-001
■ Torx T8M2.5x6.0 screw (14)	
■ Phillips M2.0x4.0 screw (5)	
■ Phillips M2.5x5.0 screw (7)	
■ Phillips M2.0x3.0 screw (3)	
■ Phillips M2.5x2.5 screw (4)	
■ Phillips M2.0x2.0 screw (3)	

Sequential part number listing

Spare part number	Description
398393-002	Bluetooth module  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 493275-001.
449137-001	RTC battery
459263-001	Broadcom 802.11a/b/g WLAN module for use in Canada, the Cayman Islands, Guam, Puerto Rico, the U.S. Virgin Islands, and the United States
459263-002	Broadcom 802.11a/b/g WLAN module for use in Afghanistan, Albania, Algeria, Andorra, Angola, Antigua and Barbuda, Argentina, Armenia, Aruba, Australia, Austria, Azerbaijan, the Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Belize, Benin, Bermuda, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, the British Virgin Islands, Brunei, Bulgaria, Burkina Faso, Burundi, Cameroon, Cape Verde, the Central African Republic, Chad, Chile, People's Republic of China, Colombia, Comoros, the Congo, Costa Rica, Croatia, Cyprus, the Czech Republic, Denmark, Djibouti, Dominica, the Dominican Republic, East Timor, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Fiji, Finland, France, French Guiana, Gabon, Gambia, Georgia, Germany, Ghana, Gibraltar, Greece, Grenada, Guadeloupe, Guatemala, Guinea, Guinea-Bissa, Guyana, Haiti, Honduras, Hong Kong, Hungary, Iceland, India, Ireland, Israel, Italy, the Ivory Coast, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kiribati, Kyrgyzstan, Laos, Latvia, Lebanon, Lesotho, Liberia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Madagascar, Malawi, Malaysia, the Maldives, Mali, Malta, the Marshall Islands, Martinique, Mauritania, Mauritius, Mexico, Micronesia, Monaco, Mongolia, Montenegro, Morocco, Mozambique, Namibia, Nauru, Nepal, the Nether Antilles, the Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Palau, Panama, Papua New Guinea, Paraguay, Peru, the Philippines, Poland, Portugal, the Republic of Moldova, Romania, Russia, Rwanda, Samoa, San Marino, Sao Tome & Principe, Saudi Arabia, Senegal, Serbia and Montenegro, the Seychelles, Sierra Leone, Singapore, Slovakia, Slovenia, the Solomon Islands, Somalia, South Africa, South Korea, Spain, Sri Lanka, St. Kitts & Nevis, St. Lucia, St. Vincent & Grenada, Suriname, Swaziland, Sweden, Switzerland, Taiwan, Tajikistan, Tanzania, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Tuvalu, Uganda, Ukraine, the United Arab Emirates, the United Kingdom, Uruguay, Uzbekistan, Vanuatu, Venezuela, Vietnam, Yemen, Zaire, Zambia, and Zimbabwe
461749-001	Modem module for use in all countries or regions except Australia and New Zealand
461749-011	Modem module for use in Australia and New Zealand
463958-001	65-W AC adapter
480985-001	Intel 802.11a/b/g WLAN modules for use in Canada, the Cayman Islands, Guam, Puerto Rico, the U.S. Virgin Islands, and the United States
482957-001	Intel 802.11a/b/g WLAN module for use in Pakistan, Russia, and Ukraine
486254-001	Intel Core2 Duo processor (3-MB L2 cache, 1066-MHz FSB), P8400 2.26-GHz (includes replacement thermal material)
486255-001	Intel Core2 Duo processor (3-MB L2 cache, 1066-MHz FSB), P8600 2.4-GHz (includes replacement thermal material)
486256-001	Intel Core2 Duo processor (6-MB L2 cache, 1066-MHz FSB), T9400 2.53-GHz (includes replacement thermal material)
486257-001	Intel Core2 Duo processor (6-MB L2 cache, 1066-MHz FSB), T9600 2.8-GHz (includes replacement thermal material)
487330-001	Intel 802.11a/b/g/n WLAN module for use in Canada, the Cayman Islands, Guam, Puerto Rico, the U.S. Virgin Islands, and the United States

(Continued)

Spare part number	Description
487330-002	Intel 802.11a/b/g/n WLAN module for use in Afghanistan, Albania, Algeria, Andorra, Angola, Antigua and Barbuda, Argentina, Armenia, Aruba, Australia, Austria, Azerbaijan, the Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Belize, Benin, Bermuda, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, the British Virgin Islands, Brunei, Bulgaria, Burkina Faso, Burundi, Cameroon, Cape Verde, the Central African Republic, Chad, Chile, People's Republic of China, Colombia, Comoros, the Congo, Costa Rica, Croatia, Cyprus, the Czech Republic, Denmark, Djibouti, Dominica, the Dominican Republic, East Timor, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Fiji, Finland, France, French Guiana, Gabon, Gambia, Georgia, Germany, Ghana, Gibraltar, Greece, Grenada, Guadeloupe, Guatemala, Guinea, Guinea-Bissa, Guyana, Haiti, Honduras, Hong Kong, Hungary, Iceland, India, Ireland, Israel, Italy, the Ivory Coast, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kiribati, Kyrgyzstan, Laos, Latvia, Lebanon, Lesotho, Liberia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Madagascar, Malawi, Malaysia, the Maldives, Mali, Malta, the Marshall Islands, Martinique, Mauritania, Mauritius, Mexico, Micronesia, Monaco, Mongolia, Montenegro, Morocco, Mozambique, Namibia, Nauru, Nepal, the Nether Antilles, the Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Palau, Panama, Papua New Guinea, Paraguay, Peru, the Philippines, Poland, Portugal, the Republic of Moldova, Romania, Russia, Rwanda, Samoa, San Marino, Sao Tome & Principe, Saudi Arabia, Senegal, Serbia and Montenegro, the Seychelles, Sierra Leone, Singapore, Slovakia, Slovenia, the Solomon Islands, Somalia, South Africa, South Korea, Spain, Sri Lanka, St. Kitts & Nevis, St. Lucia, St. Vincent & Grenada, Suriname, Swaziland, Sweden, Switzerland, Taiwan, Tajikistan, Tanzania, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Tuvalu, Uganda, Ukraine, the United Arab Emirates, the United Kingdom, Uruguay, Uzbekistan, Vanuatu, Venezuela, Vietnam, Yemen, Zaire, Zambia, and Zimbabwe
490336-001	Intel Celeron-M processor (1-MB L2 cache, 667-MHz FSB), 575 2.0-GHz (includes replacement thermal material)
490337-001	Intel Celeron-M processor (1-MB L2 cache, 667-MHz FSB), 585 2.16-GHz (includes replacement thermal material)
490371-001	Power cord for use in North America
490371-011	Power cord for use in Australia
490371-021	Power cord for use in Europe
490371-031	Power cord for use in the United Kingdom and Singapore
490371-061	Power cord for use in Italy
490371-081	Power cord for use in Denmark
490371-111	Power cord for use in Switzerland
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
492159-001	Webcam with cable
493185-001	System board, GM45 (includes RTC battery and replacement thermal material)
493186-001	12.1-inch, WXGA display assembly
493187-001	12.1-inch, WXGA BrightView display assembly
493188-001	Display enclosure

(Continued)

Spare part number	Description
493189-001	Display cables (includes display, microphone, and antenna cables)
493190-001	Display Miscellaneous Kit (includes rubber feet, screw covers, and hinge cover)
493191-001	Display nameplate
493192-001	Display hinges
493193-001	Display inverter
493194-001	Memory module, 1024-MB
493195-001	Memory module, 2048-MB
493196-001	Hard drive, 120-GB, 5400-rpm
493197-001	Hard drive, 160-GB, 5400-rpm
493198-001	Hard drive, 250-GB, 5400-rpm
493199-001	Hard drive, 320-GB, 5400-rpm
493200-001	DVD/CD-RW Combo Drive (includes drive bezel and bracket)
493201-001	DVD-ROM Drive (includes drive bezel and bracket)
493202-001	Battery, 4-cell, 37-Wh
493269-001	Fan
493270-001	Thermal module (includes heat sink and thermal material)
493271-001	Base enclosure (includes rubber feet)
493272-001	Audio board
493273-001	Speaker assembly
493274-001	Plastics Kit (see “Plastics Kit” on page 3-9 for more Plastics Kit spare part information)
493275-001	Cable Kit (see “Cable Kit” on page 3-8 for more Cable Kit information)
493276-001	Rubber Kit (contains 5 computer feet)
493277-001	Screw Kit
493278-001	Top cover (includes TouchPad and cable, LED board and cable, and switch cover)
493960-001	Keyboard for use in the United States
493960-031	Keyboard for use in the United Kingdom
493960-041	Keyboard for use in Germany
493960-051	Keyboard for use in France
493960-061	Keyboard for use in Italy
493960-071	Keyboard for use in Spain
493960-081	Keyboard for use in Denmark
493960-091	Keyboard for use in Norway
493960-121	Keyboard for use in Canada
493960-131	Keyboard for use in Portugal
493960-141	Keyboard for use in Turkey
493960-161	Keyboard for use in Latin America
493960-171	Keyboard for use in Saudi Arabia
493960-211	Keyboard for use in Hungary

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Spare part number	Description
493960-221	Keyboard for use in the Czech Republic
493960-231	Keyboard for use in Slovakia
493960-251	Keyboard for use in Russia
493960-281	Keyboard for use in Thailand
493960-291	Keyboard for use in Japan
493960-A41	Keyboard for use in Belgium
493960-AB1	Keyboard for use in Taiwan
493960-AD1	Keyboard for use in South Korea
493960-B31	Keyboard for international use
493960-B71	Keyboard for use in Sweden and Finland
493960-BA1	Keyboard for use in Slovenia
493960-BB1	Keyboard for use in Israel
493960-BG1	Keyboard for use in Switzerland
493960-DD1	Keyboard for use in Iceland
493960-DJ1	Keyboard for use in Greece
493961-001	DVD±RW SuperMulti Double-Layer Drive with LightScribe (includes drive bezel and bracket)
495015-001	Display bezel
495016-001	Display hinge covers
496458-001	Intel Core2 Duo processor (6-MB L2 cache, 1066-MHz FSB), P9500 2.53-GHz (includes replacement thermal material)
497536-001	Blu-ray ROM DVD±RW SuperMulti DL Drive (includes drive bezel and bracket)
500770-001	Intel Core Duo processor (2-MB L2 cache, 800-MHz FSB), P5670 1.8-GHz (includes replacement thermal material)
500771-001	Intel Core Duo processor (2-MB L2 cache, 800-MHz FSB), P5870 2.0-GHz (includes replacement thermal material)
501932-001	12.1-inch, WXGA display assembly with integrated webcam
501933-001	12.1-inch, WXGA BrightView display assembly with integrated webcam
501934-001	Display bezel with webcam
501935-001	Battery, 8-cell, 73-Wh
504446-001	System board, GL40 (includes RTC battery and replacement thermal material)
507966-001	Intel Core2 Duo processor (3-MB L2 cache, 1066-MHz FSB), P7370 2.0-GHz (includes replacement thermal material)
509058-001	Intel Celeron-T processor (1-MB L2 cache, 667-MHz FSB), T1600 1.66-GHz (includes replacement thermal material)
509059-001	Intel Celeron-T processor (1-MB L2 cache, 667-MHz FSB), T1700 1.83-GHz (includes replacement thermal material)
509060-001	Intel Core Duo processor (1-MB L2 cache, 667-MHz FSB), T3200 2.0-GHz (includes replacement thermal material)
509061-001	Intel Core Duo processor (1-MB L2 cache, 667-MHz FSB), T3400 2.16-GHz (includes replacement thermal material)
512585-001	Intel Core2 Duo processor (3-MB L2 cache, 1066-MHz FSB), P8700 2.53-GHz (includes replacement thermal material)
513695-001	Hard drive, 160-GB, 7200-rpm

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

Service considerations

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



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

Plastic parts



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

Cables and connectors



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

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

Drive handling



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

- Before removing or inserting a hard drive, shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
- Before handling a drive, be sure that you are discharged of static electricity. While handling a drive, avoid touching the connector.
- Before removing a diskette drive or optical drive, be sure that a diskette or disc is not in the drive and be sure that the optical drive tray is closed.
- Handle drives on surfaces covered with at least one inch of shock-proof foam.
- Avoid dropping drives from any height onto any surface.
- After removing a hard drive, an optical drive, or a diskette drive, place it in a static-proof bag.
- Avoid exposing a hard drive to products that have magnetic fields, such as monitors or speakers.
- Avoid exposing a drive to temperature extremes or liquids.
- If a drive must be mailed, place the drive in a bubble pack mailer or other suitable form of protective packaging and label the package "FRAGILE."

Grounding guidelines

Electrostatic discharge damage

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

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

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



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

- Keep components in their electrostatic-safe containers until you are ready to install them.
- Use nonmagnetic tools.
- Before touching an electronic component, discharge static electricity by using the guidelines described in this section.
- Avoid touching pins, leads, and circuitry. Handle electronic components as little as possible.
- If you remove a component, place it in an electrostatic-safe container.

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



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

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

Packaging and transporting guidelines

Follow these grounding guidelines when packaging and transporting equipment:

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

Workstation guidelines

Follow these grounding workstation guidelines:

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

Equipment guidelines

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

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

The following grounding equipment is recommended to prevent electrostatic damage:

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

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

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

Unknown user password

If the computer you are servicing has an unknown user password, follow these steps to clear the password:



These steps also clear CMOS.

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 4-7](#)).
5. Remove the real-time clock (RTC) battery (see [“RTC battery” on page 4-36](#)).
6. Wait approximately 5 minutes.
7. Replace the RTC battery and reassemble the computer.

8. Connect AC power to the computer. Do not reinsert any batteries at this time.
9. Turn on the computer.

All passwords and all CMOS settings have been cleared.

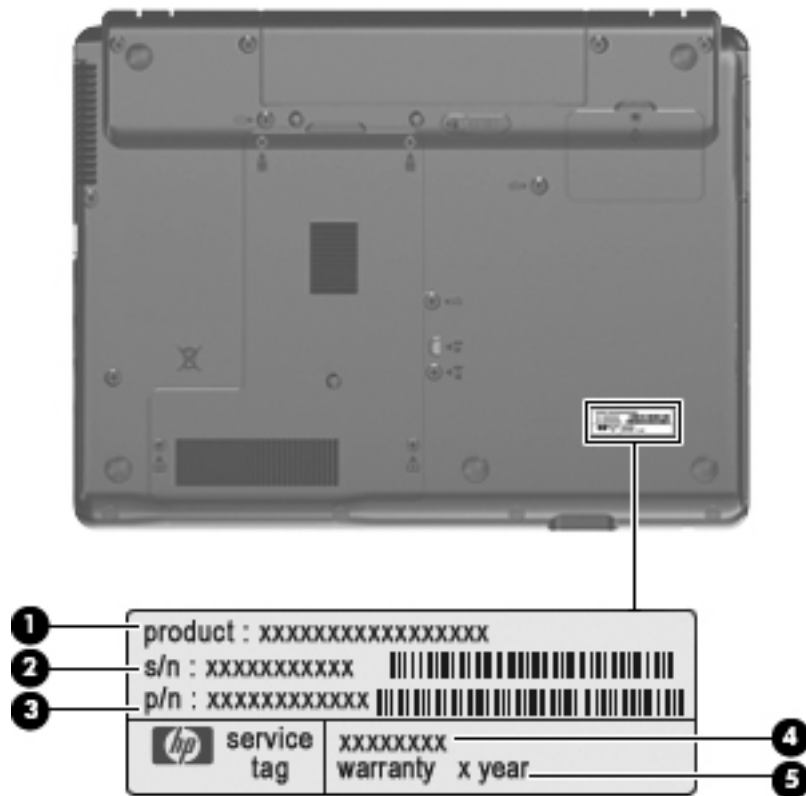
Component replacement procedures

This chapter provides removal and replacement procedures.

There are as many as 71 screws, in 14 different sizes, that must be removed, replaced, or loosened when servicing the computer. Make special note of each screw size and location during removal and replacement.

Serial number

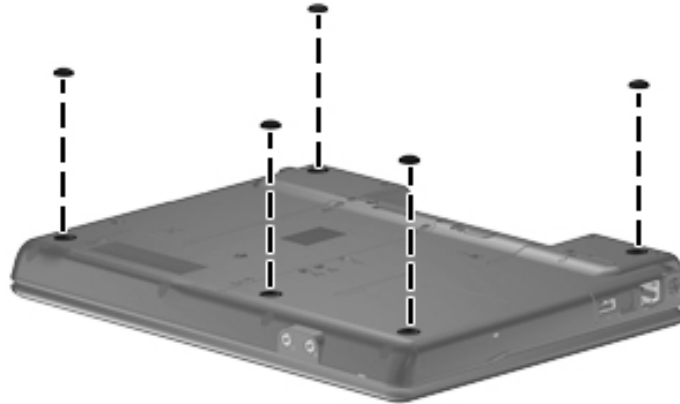
When ordering parts or requesting information, provide the computer serial number and model description provided on the service tag.



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 to determine what components and parts are needed.
④	Model description	This is the number used to locate documents, drivers, and support for the computer.
⑤	Warranty period	This number describes the duration of the warranty period for the computer.

Computer feet

The computer feet are adhesive-backed rubber pads. The feet are included in the Plastics Kit, spare part number 493274-001. There are 5 rubber feet that attach to the base enclosure in the locations illustrated below.



Battery

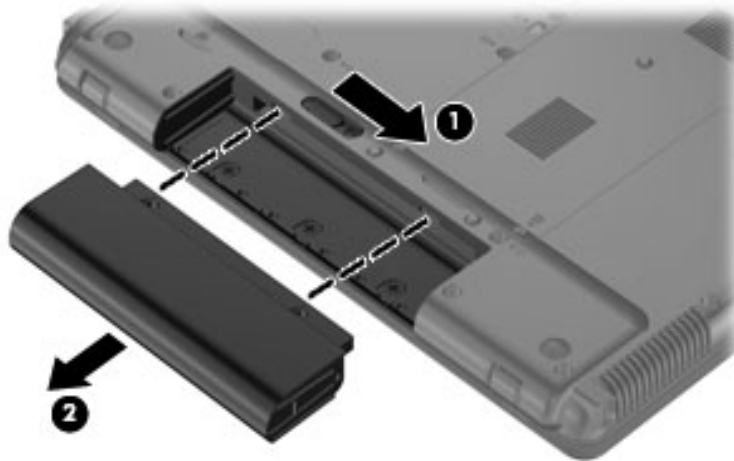
Description	Spare part number
4-cell, 37-Wh Li-ion	493202-001
8-cell, 73-Wh Li-ion	501935-001

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.

Hard drive



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

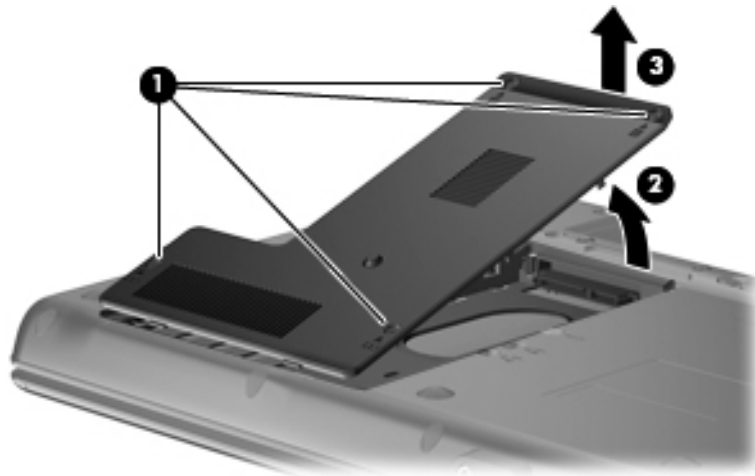
Description	Spare part number
320-GB, 5400-rpm	493199-001
250-GB, 5400-rpm	493198-001
160-GB, 7200-rpm	513695-001
160-GB, 5400-rpm	493197-001
120-GB, 5400-rpm	493196-001

Before removing the hard drive, follow these steps:

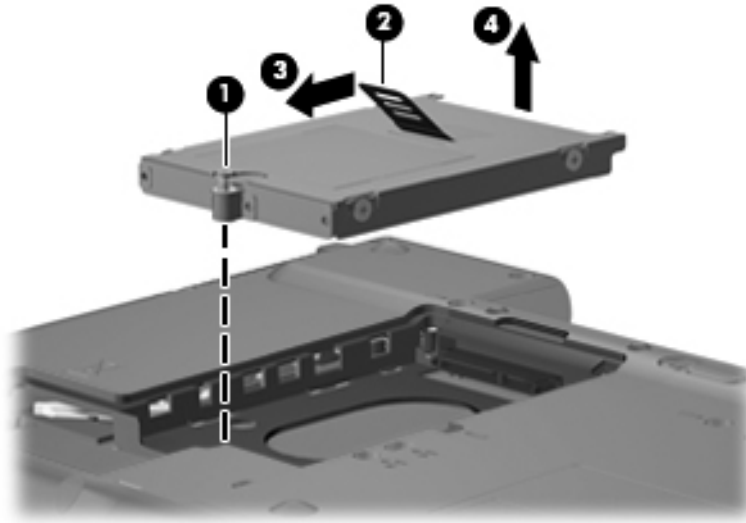
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see [“Battery” on page 4-7](#)).

Remove the hard drive:

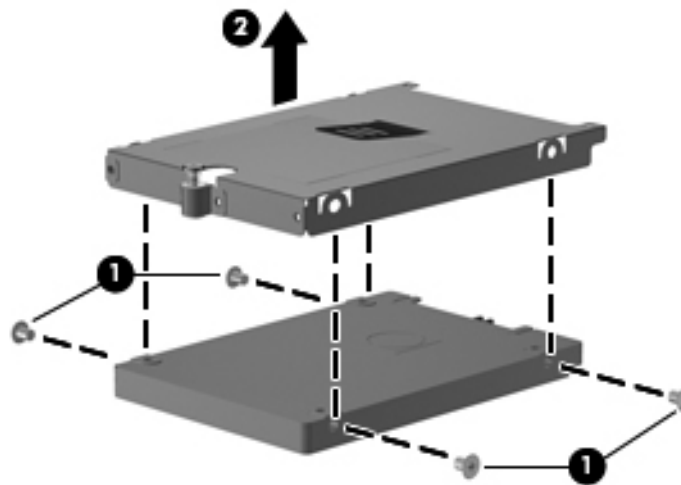
1. Position the computer with the front toward you.
2. Loosen the four Phillips PM2.0×5.0 captive screws ❶ that secure the hard drive cover to the computer.
3. Place your finger in the tab area ❷ on the rear edge of the hard drive cover and lift it up and forward ❸ to remove the cover. The hard drive cover is included in the Plastics Kit, spare part number 493274-001.



4. Loosen the Phillips PM2.5×10.0 captive screw ❶ that secures the hard drive to the computer.
5. Grasp the Mylar tab ❷ on the hard drive and slide the hard drive ❸ away from the hard drive connector.
6. Remove the hard drive ❹ from the hard drive bay.



7. If it is necessary to replace the hard drive bracket
 - a. Remove the two Phillips PM3.0×3.0 hard drive bracket screws ❶ from each side of the hard drive.
 - b. Lift the bracket ❷ straight up to remove it from the hard drive.



Reverse this procedure to reassemble and install the hard drive.

Memory module

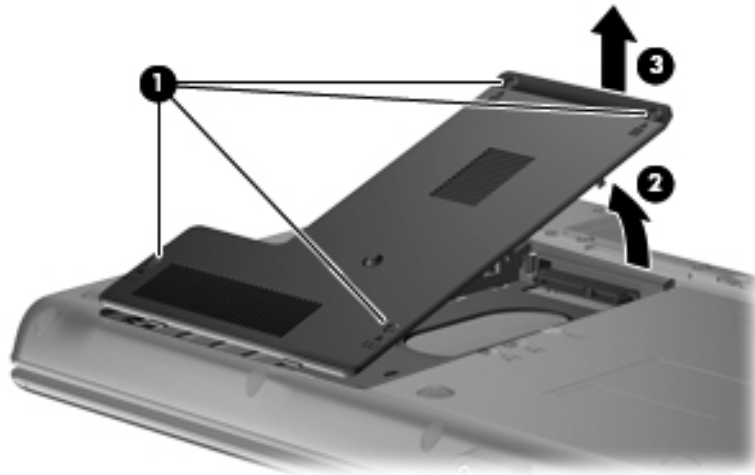
Description	Spare part number
2048-MB (PC2-5300, 667-MHz, DDR2)	493195-001
1024-MB (PC2-5300, 667-MHz, DDR2)	493194-001

Before removing the memory module, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see “[Battery](#)” on page 4-7).

Remove the memory module:


1. Position the computer with the front toward you.
2. Loosen the four Phillips PM2.0×5.0 captive screws ❶ that secure the cover to the computer.
3. Place your finger in the tab area ❷ on the rear edge of the hard drive cover and lift it up and forward ❸ to remove the cover. The memory module cover is included in the Plastics Kit, spare part number 493274-001.

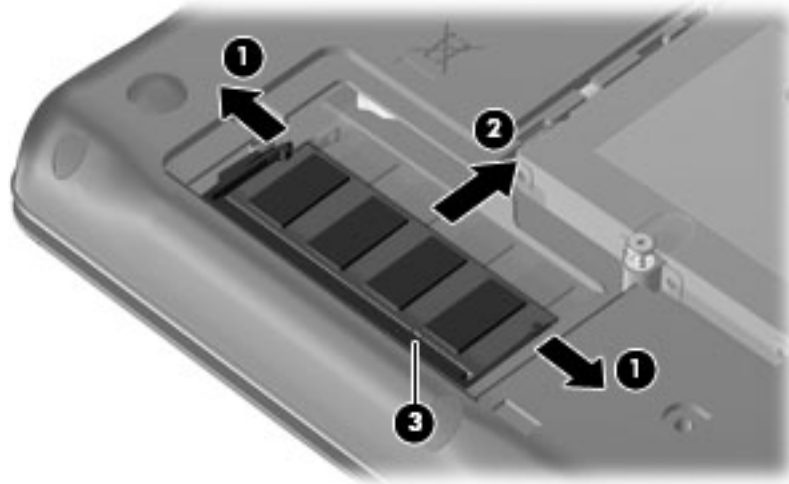




The top memory module slot is for extension memory and the bottom slot is for primary memory.

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

 Memory modules are designed with a notch **3** to prevent incorrect insertion into the memory module slot.



Reverse this procedure to install a memory module.

WLAN module



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

Description	Spare part number
Broadcom 802.11a/b/g/n WLAN modules:	
■ For use in Canada, the Cayman Islands, Guam, Puerto Rico, the U.S. Virgin Islands, and the United States	487330-001
■ For use in Afghanistan, Albania, Algeria, Andorra, Angola, Antigua and Barbuda, Argentina, Armenia, Aruba, Australia, Austria, Azerbaijan, the Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Belize, Benin, Bermuda, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, the British Virgin Islands, Brunei, Bulgaria, Burkina Faso, Burundi, Cameroon, Cape Verde, the Central African Republic, Chad, Chile, People's Republic of China, Colombia, Comoros, the Congo, Costa Rica, Croatia, Cyprus, the Czech Republic, Denmark, Djibouti, Dominica, the Dominican Republic, East Timor, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Fiji, Finland, France, French Guiana, Gabon, Gambia, Georgia, Germany, Ghana, Gibraltar, Greece, Grenada, Guadeloupe, Guatemala, Guinea, Guinea-Bissa, Guyana, Haiti, Honduras, Hong Kong, Hungary, Iceland, India, Ireland, Israel, Italy, the Ivory Coast, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kiribati, Kyrgyzstan, Laos, Latvia, Lebanon, Lesotho, Liberia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Madagascar, Malawi, Malaysia, the Maldives, Mali, Malta, the Marshall Islands, Martinique, Mauritania, Mauritius, Mexico, Micronesia, Monaco, Mongolia, Montenegro, Morocco, Mozambique, Namibia, Nauru, Nepal, the Nether Antilles, the Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Palau, Panama, Papua New Guinea, Paraguay, Peru, the Philippines, Poland, Portugal, the Republic of Moldova, Romania, Russia, Rwanda, Samoa, San Marino, Sao Tome & Principe, Saudi Arabia, Senegal, Serbia and Montenegro, the Seychelles, Sierra Leone, Singapore, Slovakia, Slovenia, the Solomon Islands, Somalia, South Africa, South Korea, Spain, Sri Lanka, St. Kitts & Nevis, St. Lucia, St. Vincent & Grenada, Suriname, Swaziland, Sweden, Switzerland, Taiwan, Tajikistan, Tanzania, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Tuvalu, Uganda, Ukraine, the United Arab Emirates, the United Kingdom, Uruguay, Uzbekistan, Vanuatu, Venezuela, Vietnam, Yemen, Zaire, Zambia, and Zimbabwe	487330-002

(Continued)

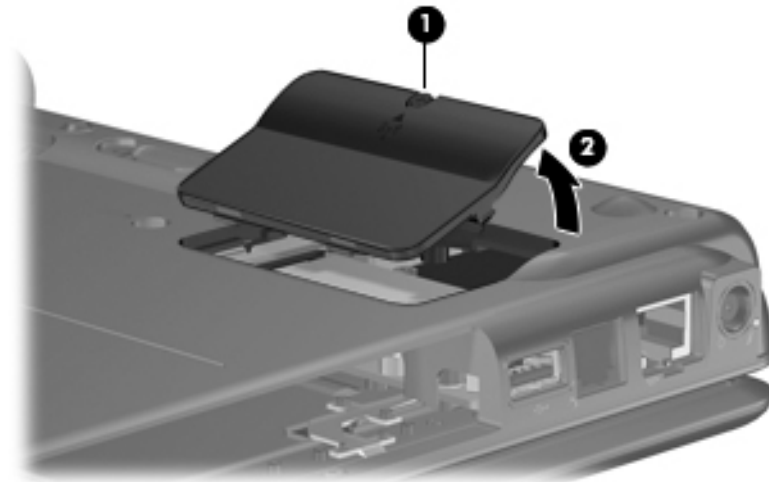
Description	Spare part number
Broadcom 802.11b/g WLAN modules:	
■ For use in Canada, the Cayman Islands, Guam, Puerto Rico, the U.S. Virgin Islands, and the United States	459263-001
■ For use in Afghanistan, Albania, Algeria, Andorra, Angola, Antigua and Barbuda, Argentina, Armenia, Aruba, Australia, Austria, Azerbaijan, the Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Belize, Benin, Bermuda, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, the British Virgin Islands, Brunei, Bulgaria, Burkina Faso, Burundi, Cameroon, Cape Verde, the Central African Republic, Chad, Chile, People's Republic of China, Colombia, Comoros, the Congo, Costa Rica, Croatia, Cyprus, the Czech Republic, Denmark, Djibouti, Dominica, the Dominican Republic, East Timor, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Fiji, Finland, France, French Guiana, Gabon, Gambia, Georgia, Germany, Ghana, Gibraltar, Greece, Grenada, Guadeloupe, Guatemala, Guinea, Guinea-Bissa, Guyana, Haiti, Honduras, Hong Kong, Hungary, Iceland, India, Ireland, Israel, Italy, the Ivory Coast, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kiribati, Kyrgyzstan, Laos, Latvia, Lebanon, Lesotho, Liberia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Madagascar, Malawi, Malaysia, the Maldives, Mali, Malta, the Marshall Islands, Martinique, Mauritania, Mauritius, Mexico, Micronesia, Monaco, Mongolia, Montenegro, Morocco, Mozambique, Namibia, Nauru, Nepal, the Nether Antilles, the Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Palau, Panama, Papua New Guinea, Paraguay, Peru, the Philippines, Poland, Portugal, the Republic of Moldova, Romania, Russia, Rwanda, Samoa, San Marino, Sao Tome & Principe, Saudi Arabia, Senegal, Serbia and Montenegro, the Seychelles, Sierra Leone, Singapore, Slovakia, Slovenia, the Solomon Islands, Somalia, South Africa, South Korea, Spain, Sri Lanka, St. Kitts & Nevis, St. Lucia, St. Vincent & Grenada, Suriname, Swaziland, Sweden, Switzerland, Taiwan, Tajikistan, Tanzania, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Tuvalu, Uganda, Ukraine, the United Arab Emirates, the United Kingdom, Uruguay, Uzbekistan, Vanuatu, Venezuela, Vietnam, Yemen, Zaire, Zambia, and Zimbabwe	459263-002
Intel 802.11a/b/g/n WLAN module:	
■ For use in Canada, the Cayman Islands, Guam, Puerto Rico, the U.S. Virgin Islands, and the United States	480985-001
Intel 802.11a/b/g WLAN module:	
■ For use in Pakistan, Russia, and Ukraine	482957-001

Before removing the WLAN module, follow these steps:


1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see [“Battery” on page 4-7](#)).

Remove the WLAN module:

1. Position the computer with the front toward you.
2. Loosen the Phillips PM2.0×5.0 captive screw ❶ that secures the WLAN module compartment cover to the computer. The screw is identified by the wireless icon.
3. Lift the right side of the cover ❷ and remove the cover.




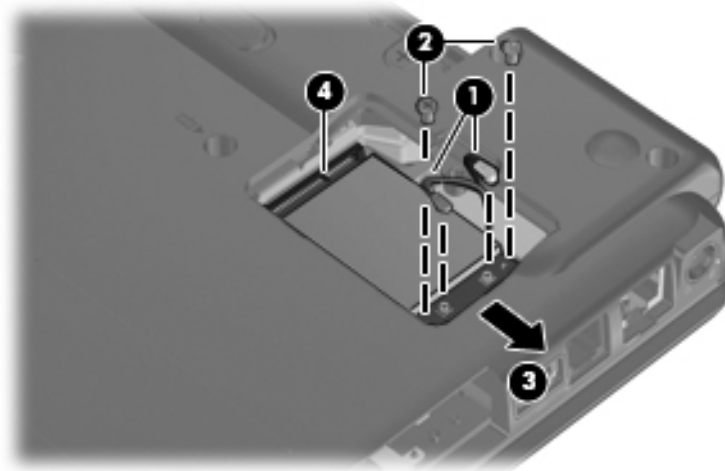
4. Disconnect the WLAN antenna cables ❶ from the terminals on the WLAN module.

 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.

5. Remove the two Phillips PM2.5×4.0 screws ❷ that secure the WLAN module to the computer. (The edge of the module opposite the slot rises away from the computer.)

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

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



Reverse this procedure to install the WLAN module.

Optical drive



The optical drive spare part kit includes an optical drive bezel.

Description	Spare part number
DVD/CD-RW Combo Drive	493200-001
DVD-ROM Drive	493201-001
DVD±RW SuperMulti Double-Layer Drive with LightScribe	493961-001
Blu-ray ROM DVD±RW SuperMulti DL Drive	497536-001

Before removing the optical drive, follow these steps:

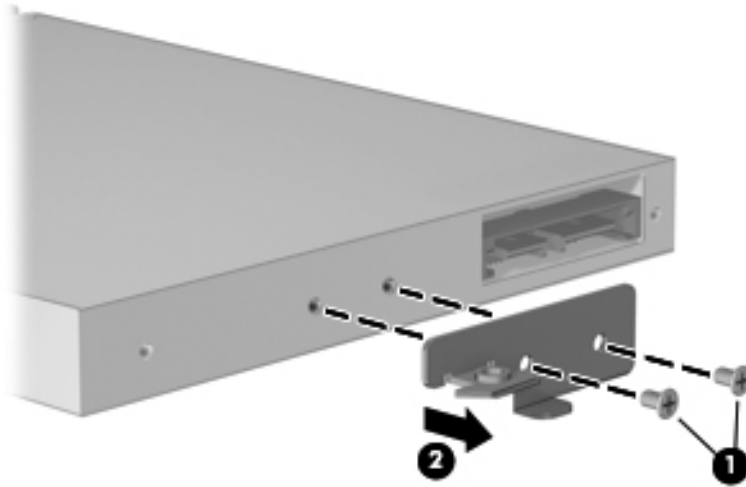
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see [“Battery” on page 4-7](#)).

Remove the optical drive:

1. Position the computer with the right side toward you.
2. Remove the Torx T8M2.5×6.0 slotted 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 push the tab forward to release the optical drive from the computer.
4. Remove the optical drive **3** from the computer.



5. If it is necessary to replace the optical drive bracket:
 - a. Position the optical drive with the rear toward you.
 - b. Remove the two Phillips PM1.5×3.0 screws ❶ that secure the optical drive bracket to the optical drive.
 - c. Remove the optical drive bracket ❷.



Reverse this procedure to reassemble and install an optical drive.

Keyboard

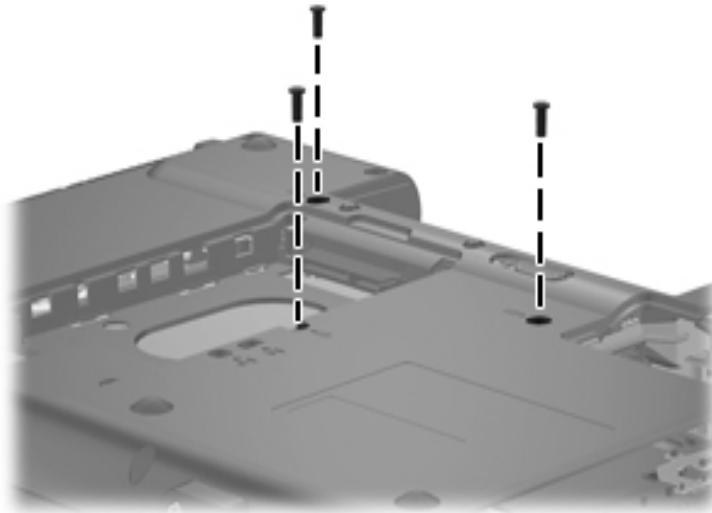
Description	Spare part number
For use in Belgium	493960-A41
For use in Canada	493960-121
For use in the Czech Republic	493690-221
For use in Denmark	493960-081
For use in France	493960-051
For use in Greece	493960-DJ1
For use in Germany	493960-041
For use in Hungary	493960-211
For use in Iceland	493960-DD1
For international use	493960-B31
For use in Italy	493960-061
For use in Israel	493960-BB1
For use in Japan	493960-291
For use in Latin America	493960-161
For use in Norway	493960-091
For use in Portugal	493960-131
For use in Russia	493960-251
For use in Saudi Arabia	493960-171
For use in Slovakia	493960-231
For use in Slovenia	493960-BA1
For use in Spain	493960-071
For use in Sweden and Finland	493960-B71
For use in Switzerland	493960-BG1
For use in South Korea	493960-AD1
For use in Taiwan	493960-AB1
For use in Thailand	493960-281
For use in Turkey	493960-141
For use in the United Kingdom	493960-031
For use in the United States	493960-001

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 4-7](#)).
5. Remove the following components:
 - a. Hard drive (see [“Hard drive” on page 4-8](#))
 - b. Memory module (see [“Memory module” on page 4-10](#))
 - c. WLAN module (see [“WLAN module” on page 4-12](#))
 - d. Optical drive (see [“Optical drive” on page 4-16](#))

Remove the keyboard:

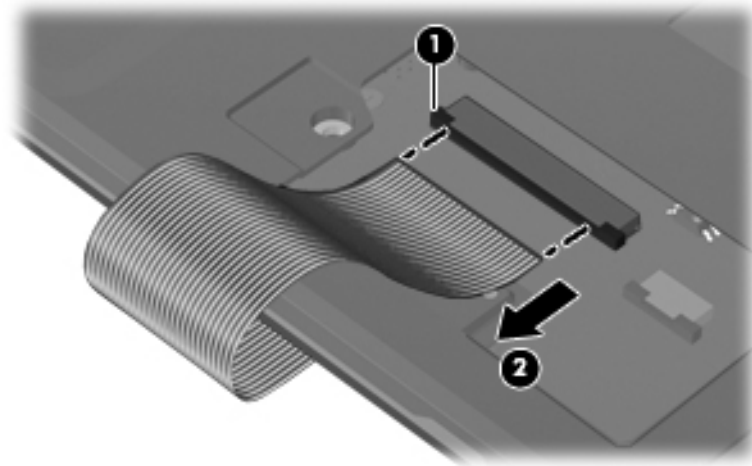
1. Turn the computer upside down, with the front toward you.
2. Remove the three Torx T8M2.5×6.0 slotted screws that secure the keyboard to the computer.



3. Turn the computer display-side up, and open the computer.
4. Lift the rear edge of the keyboard ❶ and rotate the keyboard toward you ❷ until it rests upside down on the top cover.



5. Release the zero insertion force (ZIF) connector ❶ to which the keyboard cable is attached, and disconnect the keyboard cable ❷ from the system board.



6. Remove the keyboard.
- Reverse this procedure to install the keyboard.

Top cover

Description	Spare part number
Top cover (includes caps lock light, capacitive board, fingerprint reader board and cable, TouchPad, and TouchPad cable)	493278-001

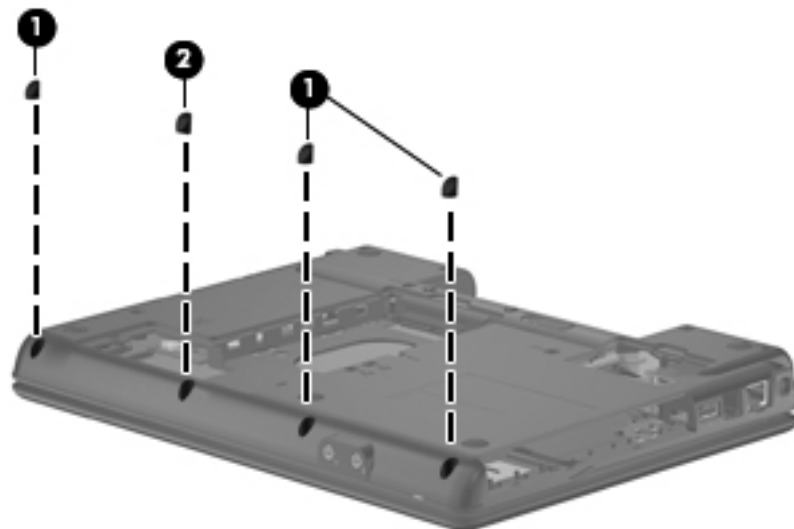
Before removing the top cover, follow these steps:

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 4-7](#)).
5. Remove the following components:
 - a. Hard drive (see [“Hard drive” on page 4-8](#))
 - b. Memory module (see [“Memory module” on page 4-10](#))
 - c. WLAN module (see [“WLAN module” on page 4-12](#))
 - d. Optical drive (see [“Optical drive” on page 4-16](#))
 - e. Keyboard (see [“Keyboard” on page 4-18](#))

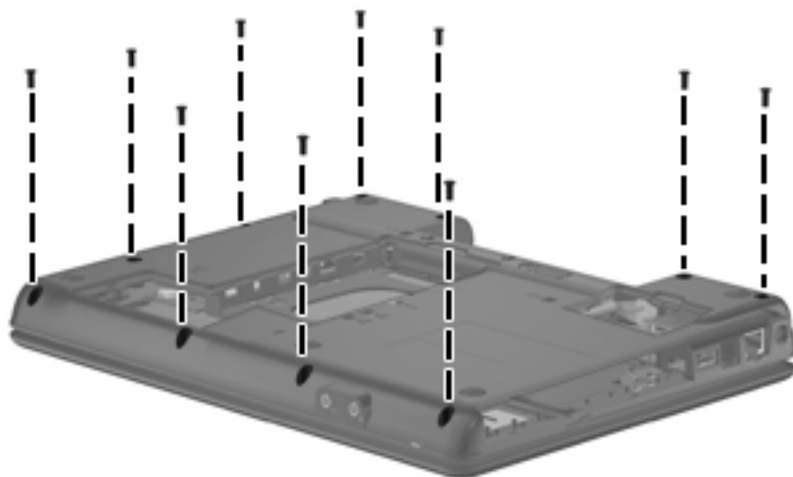
Remove the top cover:

1. Close the computer and turn it upside down, with the front toward you.
2. Remove the following:

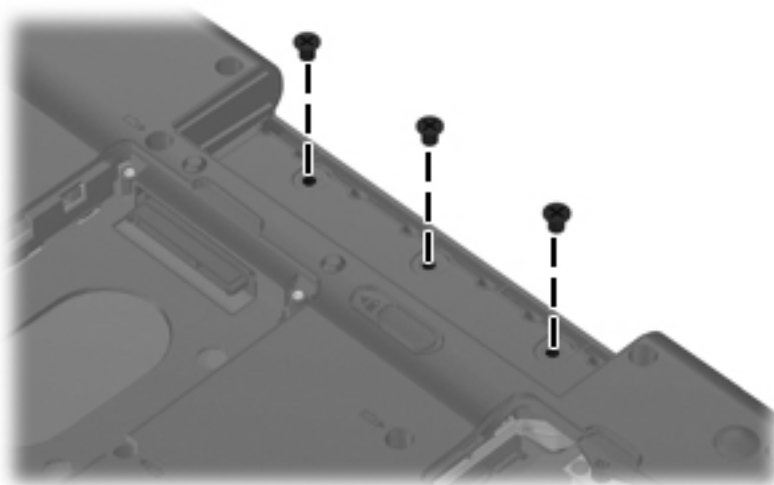
Remove the four rubber screw covers on the front of the computer. Note that three of the screw covers are the same ❶ and one screw cover ❷ is different. The rubber screw covers are included in the Plastics Kit, spare part number 493274-001.



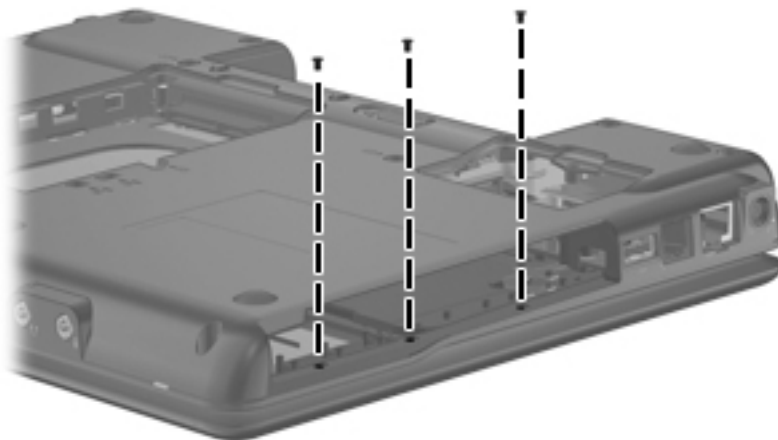
3. Remove the ten Torx T8M2.5×6.0 slotted screws.



4. Remove the three Phillips PM2.0×2.0BH screws in the battery bay.



5. Remove the three Phillips PM2.0×3.0 screws in the optical drive bay.

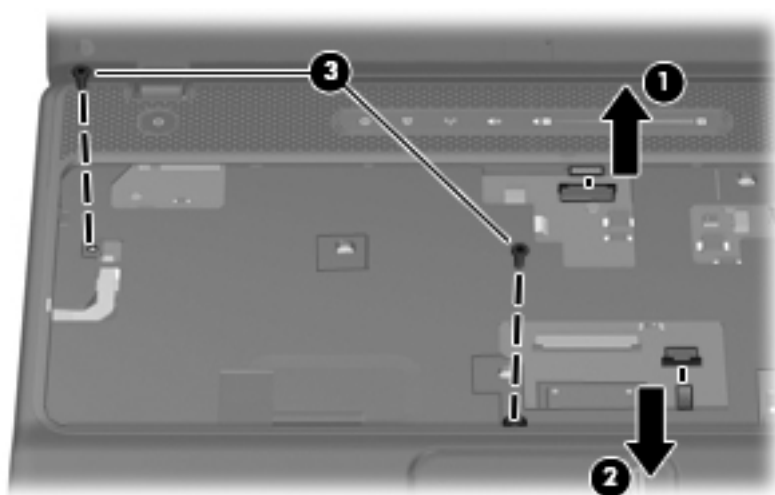


6. Turn the computer right-side up, with the front toward you.

7. Open the LED board cable ZIF connector ❶, and then disconnect the cable.

8. Open the TouchPad cable ZIF connector ❷, and then disconnect the cable.

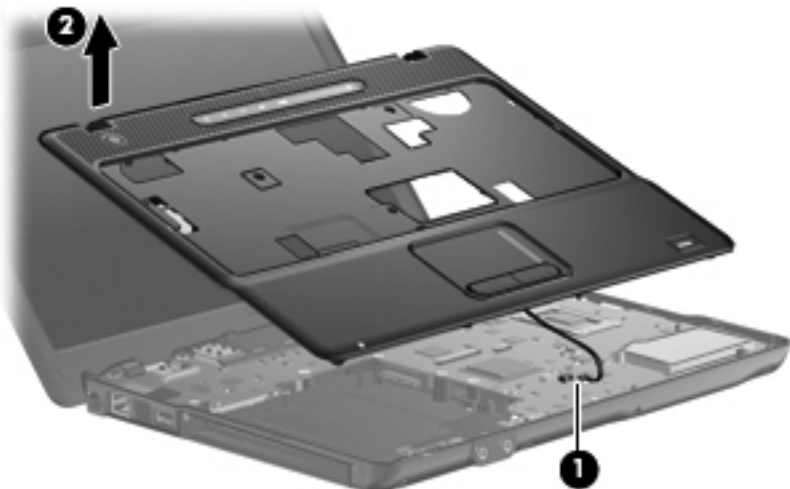
9. Remove the two Torx T8M2.5×6.0 slotted screws ❸ that attach the top cover to the base enclosure.



10. Lift the rear edge and sides of the top cover ❶ to release it. Move the top cover backward ❷ and hold it.



11. Disconnect the fingerprint reader cable ❶ and remove the top cover ❷.



Reverse this procedure to install the top cover.

Speaker assembly

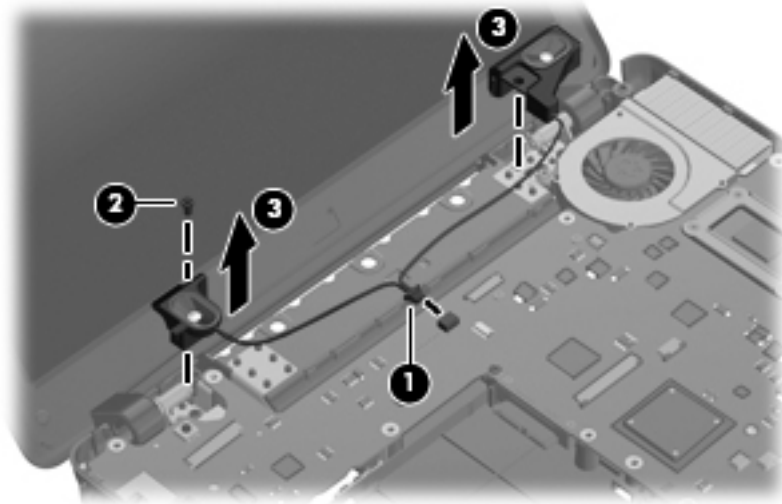
Description	Spare part number
Speaker assembly	493273-001

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 4-7](#)).
5. Remove the following components:
 - a. Hard drive (see [“Hard drive” on page 4-8](#))
 - b. Memory module (see [“Memory module” on page 4-10](#))
 - c. WLAN module (see [“WLAN module” on page 4-12](#))
 - d. Optical drive (see [“Optical drive” on page 4-16](#))
 - e. Keyboard (see [“Keyboard” on page 4-18](#))
 - f. Top cover (see [“Top cover” on page 4-21](#))

Remove the speaker assembly:

1. Disconnect the speaker assembly cable ❶ from the system board.
2. Remove the Phillips PM3.0×4.0 screw ❷ that attaches the left speaker to the base enclosure.
3. Remove the speaker cables from the clips on the system board, and then remove the speaker assembly ❸ from the base enclosure.



Reverse this procedure to install the speaker assembly.

Display assembly

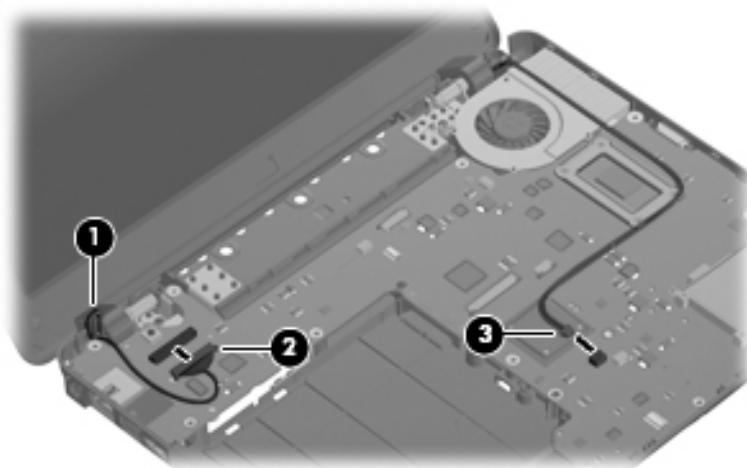
Description	Spare part number
12.1-inch, WXGA	493186-001
12.1-inch WXGA (with integrated webcam)	501932-001
12.1-inch, WXGA BrightView	493187-001
12.1-inch, WXGA BrightView (with integrated webcam)	501933-001

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 4-7](#)).
5. Remove the following components:
 - a. Hard drive (see [“Hard drive” on page 4-8](#))
 - b. Memory module (see [“Memory module” on page 4-10](#))
 - c. WLAN module (see [“WLAN module” on page 4-12](#))
 - d. Optical drive (see [“Optical drive” on page 4-16](#))
 - e. Keyboard (see [“Keyboard” on page 4-18](#))
 - f. Top cover (see [“Top cover” on page 4-21](#))
 - g. Speaker assembly (see [“Speaker assembly” on page 4-25](#))

Remove the display assembly:

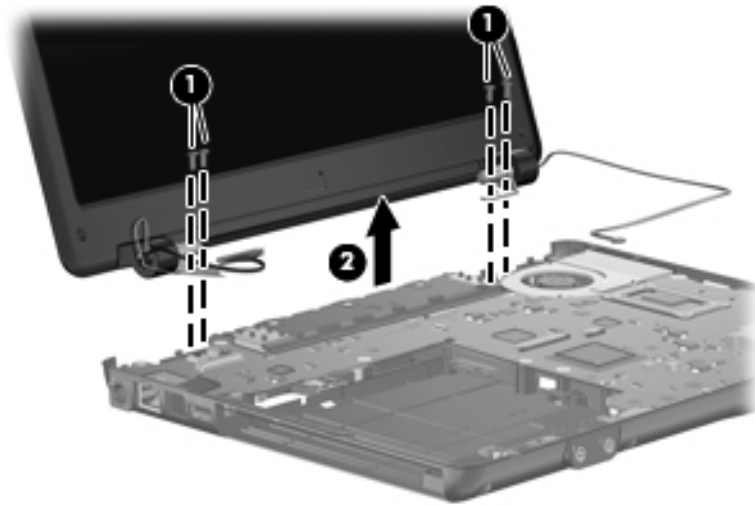
1. Open the computer as far as possible.
2. Disconnect the display panel cable ❶ from the system board.
3. Remove the WLAN antenna cable ❷ from the opening in the base enclosure.
4. Disconnect the microphone cable ❸ from the system board. Remove any tape that may be used to secure the cable to the system board.





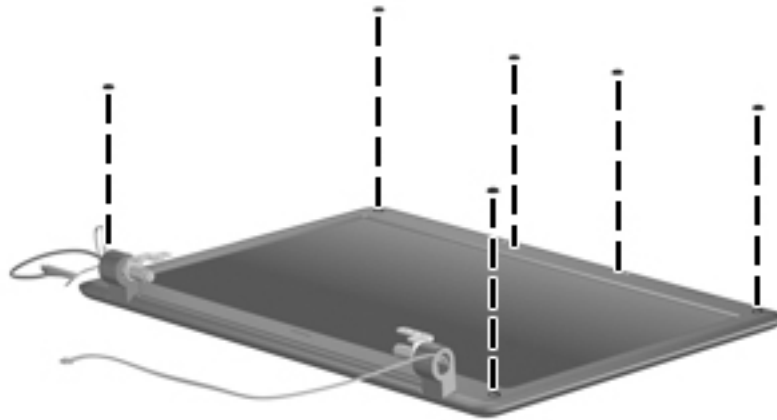
CAUTION: Support the display assembly when removing the following screws. Failure to support the display assembly can result in damage to the display assembly and other computer components.

5. Remove the four Torx T8M2.5×6.0 slotted screws ❶ that secure the display assembly to the computer.
6. Lift the display assembly ❷ straight up and remove it.

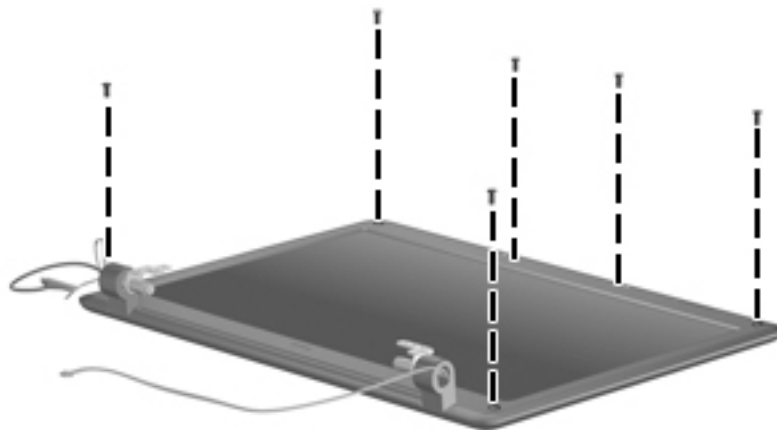


Perform the following steps in sequence to remove or replace the display bezel or the display assembly internal components.

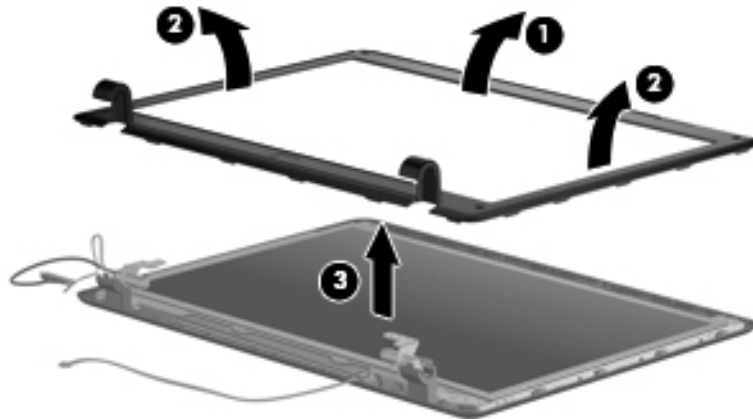
1. If it is necessary to remove the display bezel:
 - a. Remove the six rubber screw covers in the display bezel.



- b. Remove the six PM2.0×5.0 screws that secure the display bezel to the display enclosure.

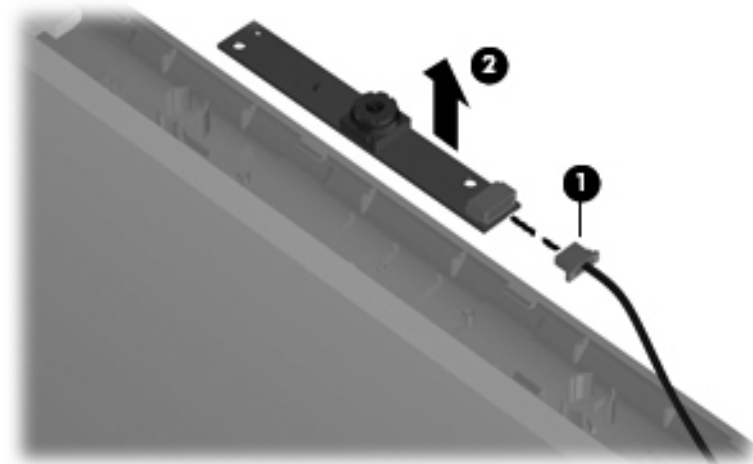


- c. Lift the inside edge of the top side of the bezel ❶ to disengage it from the clips, and then lift the left and right sides ❷ until the bezel disengages from the display enclosure.
- d. Remove the display bezel ❸. The display bezel is available using spare part number 495015-001.



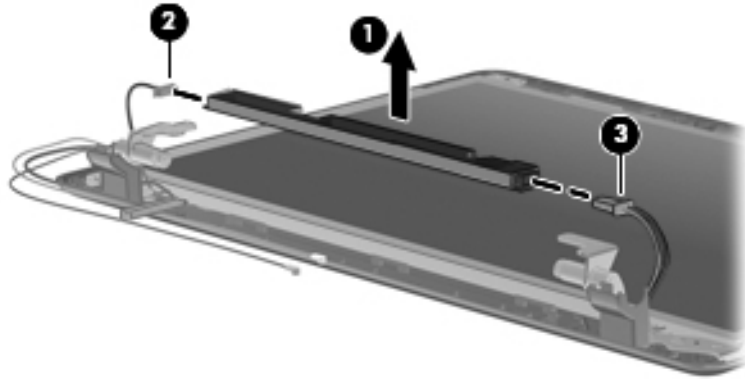
Reverse this procedure to install the display bezel. Be careful to route the cables through the side openings in the hinge covers and avoid pinching the cables between the bezel and display enclosure.

2. If it is necessary to remove the webcam module:
 - a. Disconnect the webcam cable ❶ from the computer.
 - b. Remove the webcam module ❷ from the display enclosure. (The webcam is secured with double-sided tape.) The webcam can also be ordered separately and is available using spare part number 492159-001.



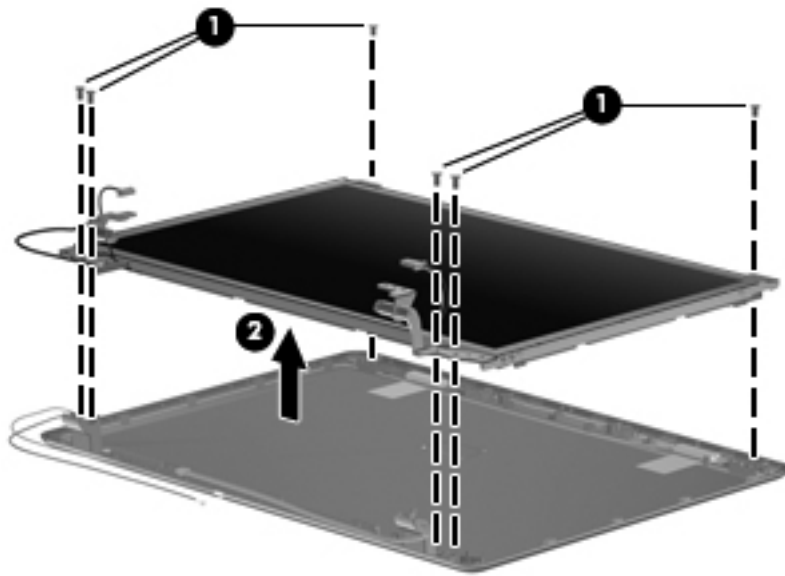
3. If it is necessary to remove the display inverter:

- a. Use a flat bladed screwdriver to release the inverter ❶, which is secured with double-sided tape.
- b. Disconnect the backlight cable ❷ and the display panel cable ❸ from the display inverter. The display inverter is available using spare part number 493193-001.

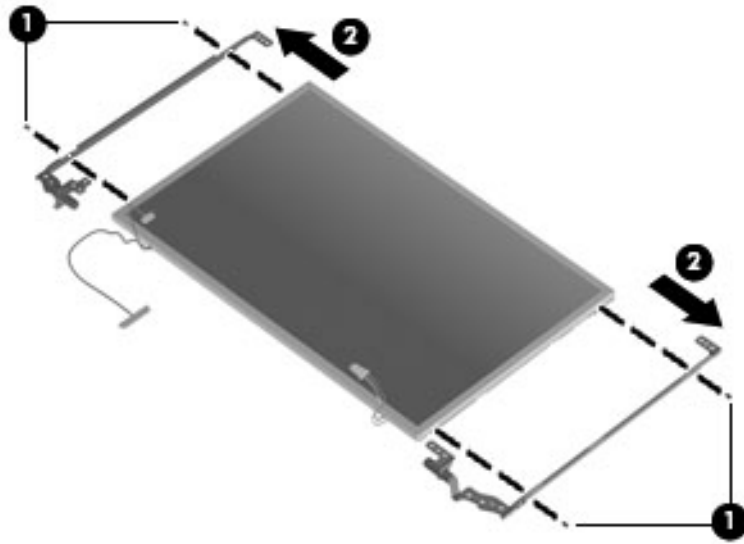


4. If it is necessary to remove the display panel:


- a. Remove the six Phillips PM2.0×5.0 screws ❶ that secure the display panel to the display enclosure.
- b. Remove the display panel ❷ from the display enclosure.



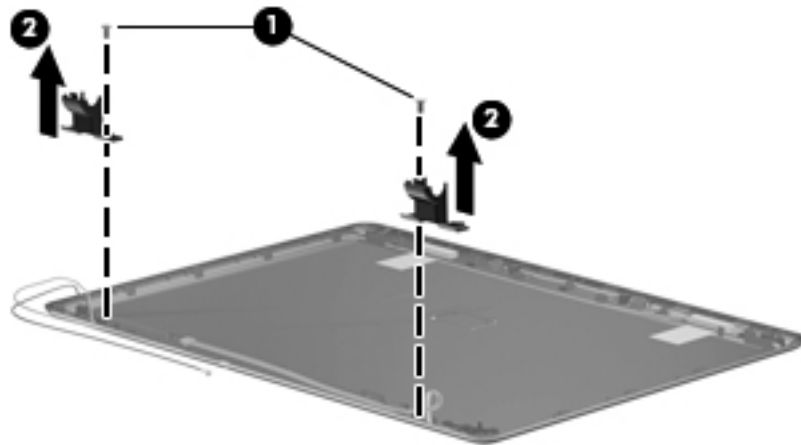
- c. Remove the four Phillips PM1.5×3.0 screws ❶ that secure the hinges to the display panel.
- d. Remove the display hinges ❷ from the display panel. The display hinges are available using spare part number 493192-001.



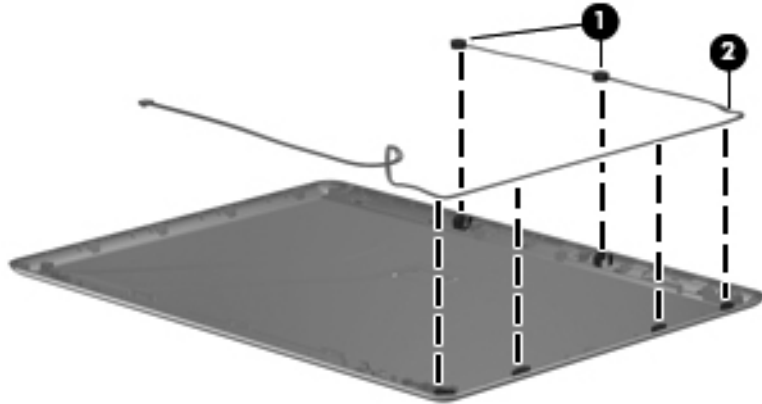
5. If it is necessary to remove the microphone cable or WLAN transceivers and cable:

 The microphone, WLAN antenna cable, and the LCD module cable are included in the Cable Kit, spare part number 493275-001.

- a. Remove the two Phillips PM2.0×6.0 screws ❶ and display hinge covers ❷.

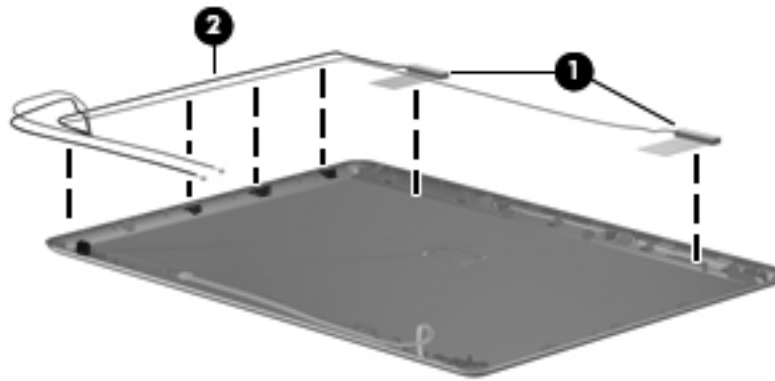


- b. Remove the two microphone receivers **1** from the display enclosure, and then release the microphone cable **2** from the clips in the display enclosure.



Reverse this procedure to install the microphone.

- c. Remove the adhesive tape from the WLAN transceivers **1**, and then release the WLAN cables **2** from the clips in the display enclosure.



Reverse this procedure to install the WLAN transceivers and cable.

Audio board

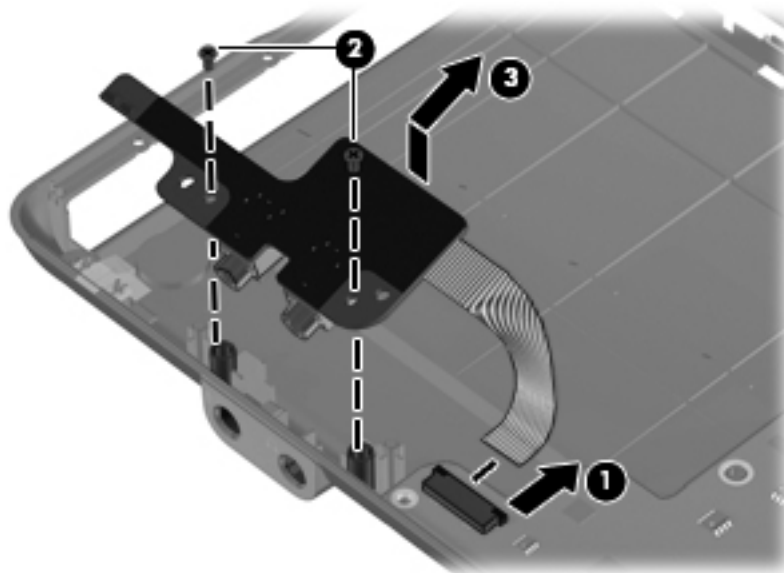
Description	Spare part number
Audio board	493272-001

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 4-7](#)).
5. Remove the following components:
 - a. Hard drive (see [“Hard drive” on page 4-8](#))
 - b. Memory module (see [“Memory module” on page 4-10](#))
 - c. WLAN module (see [“WLAN module” on page 4-12](#))
 - d. Optical drive (see [“Optical drive” on page 4-16](#))
 - e. Keyboard (see [“Keyboard” on page 4-18](#))
 - f. Top cover (see [“Top cover” on page 4-21](#))

Remove the audio board and cable:

1. Open the audio board cable ZIF connector ❶, and then remove the cable from the system board.
2. Remove the two Phillips PM2.0×3.0 screws ❷ that secure the audio board to the system board.
3. Lift and move the audio board backward ❸ so that the external audio connectors slide out of the openings in the base enclosure.



Reverse this procedure to install the audio board.

Fan

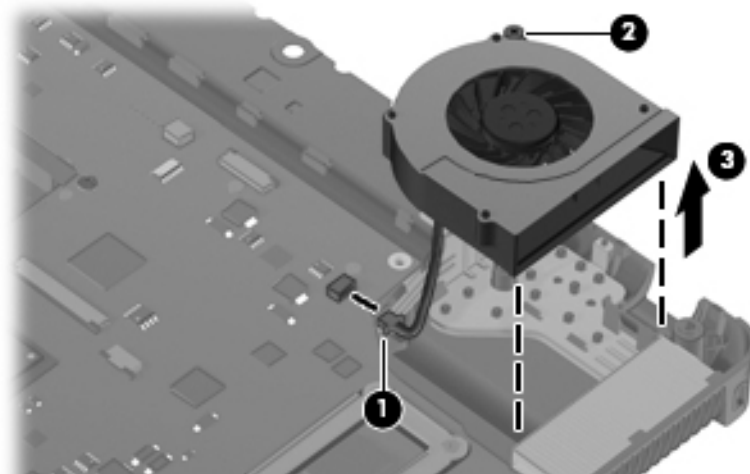
Description	Spare part number
Fan	493269-001

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 4-7).
5. Remove the following components:
 - a. Hard drive (see “[Hard drive](#)” on page 4-8)
 - b. Memory module (see “[Memory module](#)” on page 4-10)
 - c. WLAN module (see “[WLAN module](#)” on page 4-12)
 - d. Optical drive (see “[Optical drive](#)” on page 4-16)
 - e. Keyboard (see “[Keyboard](#)” on page 4-18)
 - f. Top cover (see “[Top cover](#)” on page 4-21)

Remove the fan:

1. Disconnect the fan cable ❶ from the system board.
2. Loosen the captive Phillips PM2.0×7.0 screw ❷ that secures the fan to the base enclosure, and then remove the fan ❸ from the heat sink.



Reverse this procedure to install the fan.



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.

System board

Description	Spare part number
GM45 (includes RTC battery and replacement thermal material)	493185-001
GL40 (includes RTC battery and replacement thermal material)	504446-001

Before removing the system board, follow these steps:

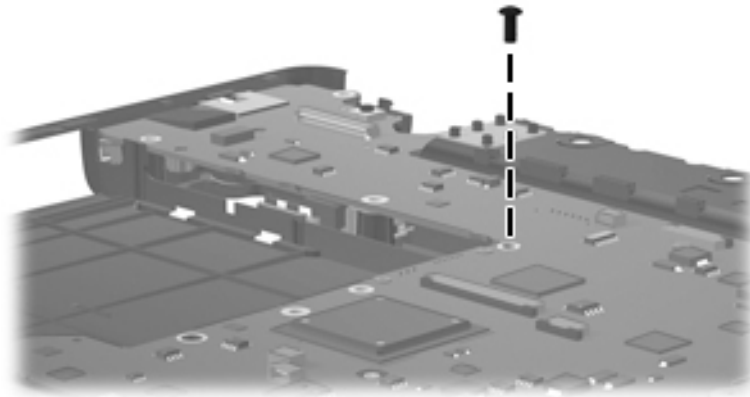
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see [“Battery” on page 4-7](#)).
5. Remove the following components:
 - a. Hard drive (see [“Hard drive” on page 4-8](#))
 - b. Memory module (see [“Memory module” on page 4-10](#))
 - c. WLAN module (see [“WLAN module” on page 4-12](#))
 - d. Optical drive (see [“Optical drive” on page 4-16](#))
 - e. Keyboard (see [“Keyboard” on page 4-18](#))
 - f. Top cover (see [“Top cover” on page 4-21](#))
 - g. Audio board (see [“Audio board” on page 4-32](#))
 - h. Fan (see [“Fan” on page 4-33](#))

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:

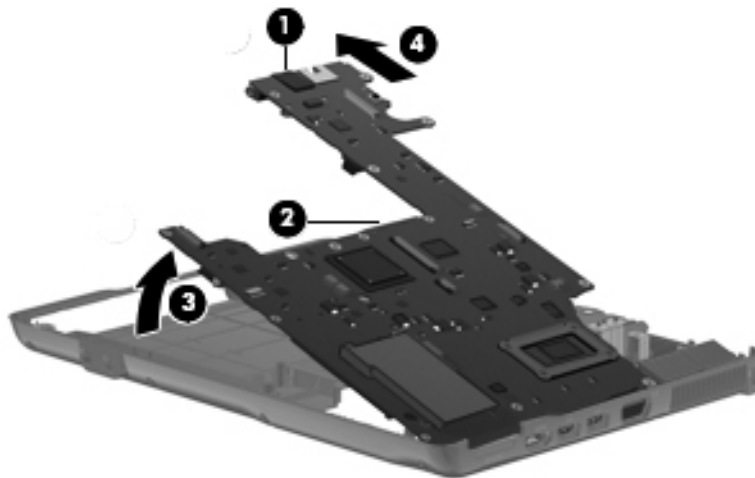
- RTC battery (see [“RTC battery” on page 4-36](#))
- Modem module (see [“Modem module” on page 4-37](#))
- Bluetooth module (see [“Bluetooth module” on page 4-39](#))
- Heat sink (see [“Heat sink” on page 4-41](#))
- Processor (see [“Processor” on page 4-43](#))

Remove the system board:

1. Remove the Torx T8M2.5×6.0 slotted screw that secures the system board to the base enclosure. The screw is located by the optical drive connector,



2. Flex the left side of the base enclosure until the USB, RJ-45, and RJ-11 jacks ❶ clear the openings in the base enclosure.
3. Use the optical drive connector ❷ to lift the left side of the system board ❸ until it rests at an angle.
4. Remove the system board from the base enclosure by pulling it away at an angle ❹.



Reverse this procedure to install the system board.

RTC battery



Removing the RTC battery and leaving it uninstalled for 5 or more minutes causes all passwords and CMOS settings to be cleared.

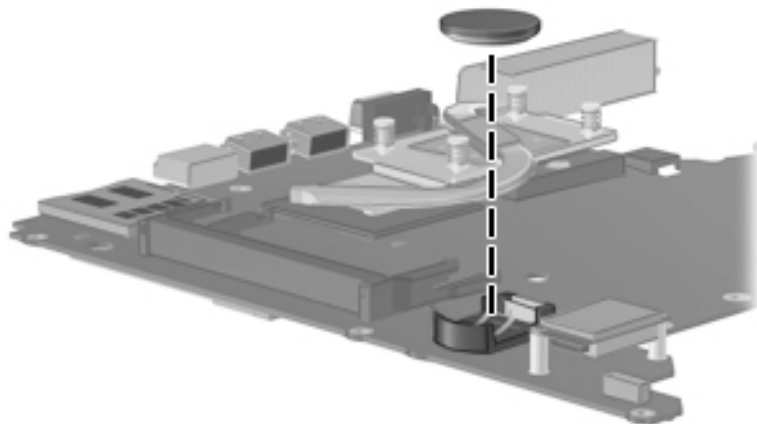
Description	Spare part number
RTC battery	449137-001

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 4-7](#)).
5. Remove the following components:
 - a. Hard drive (see [“Hard drive” on page 4-8](#))
 - b. Memory module (see [“Memory module” on page 4-10](#))
 - c. WLAN module (see [“WLAN module” on page 4-12](#))
 - d. Optical drive (see [“Optical drive” on page 4-16](#))
 - e. Keyboard (see [“Keyboard” on page 4-18](#))
 - f. Top cover (see [“Top cover” on page 4-21](#))
 - g. Audio board (see [“Audio board” on page 4-32](#))
 - h. Fan (see [“Fan” on page 4-33](#))
 - i. System board (see [“System board” on page 4-34](#))

Remove the RTC battery:

1. Turn the system board upside down with the front toward you.
2. Lift the RTC battery from the socket.



Reverse this procedure to install the RTC battery.

Modem module



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 493275-001. See [“Cable Kit” on page 3-8](#) for more Cable Kit information.

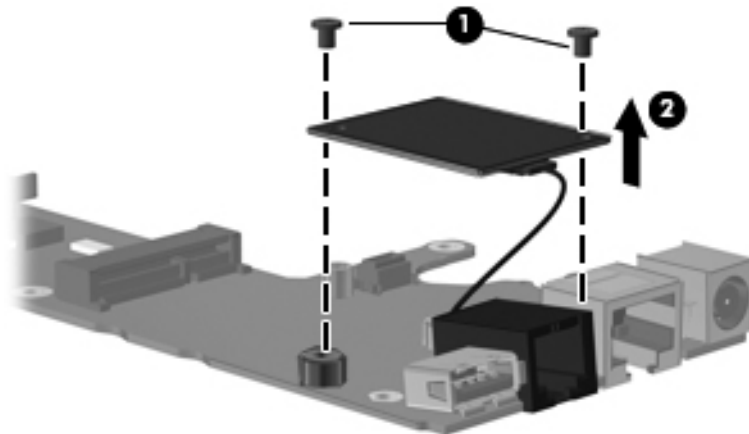
Description	Spare part number
For use in Australia and New Zealand	461749-011
For use in all countries or regions except Australia and New Zealand	461749-001

Before removing the modem module, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see [“Battery” on page 4-7](#)).
5. Remove the following components:
 - a. Hard drive (see [“Hard drive” on page 4-8](#))
 - b. Memory module (see [“Memory module” on page 4-10](#))
 - c. WLAN module (see [“WLAN module” on page 4-12](#))
 - d. Optical drive (see [“Optical drive” on page 4-16](#))
 - e. Keyboard (see [“Keyboard” on page 4-18](#))
 - f. Top cover (see [“Top cover” on page 4-21](#))
 - g. Audio board (see [“Audio board” on page 4-32](#))
 - h. Fan (see [“Fan” on page 4-33](#))
 - i. System board (see [“System board” on page 4-34](#))
 - j. Heat sink (see [“Heat sink” on page 4-41](#))

Remove the modem module:

1. Turn the system board upside down with the rear edge toward you.
2. Remove the two Phillips PM2.0×3.0 screws ❶ that secure the modem module to the system board.
3. Disconnect the modem module ❷ from the system board by lifting it straight up.



4. Remove the modem module, cable, adhesive tape, and RJ-II port.

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

Bluetooth module



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 493275-001. See [“Cable Kit” on page 3-8](#) for more Cable Kit information.

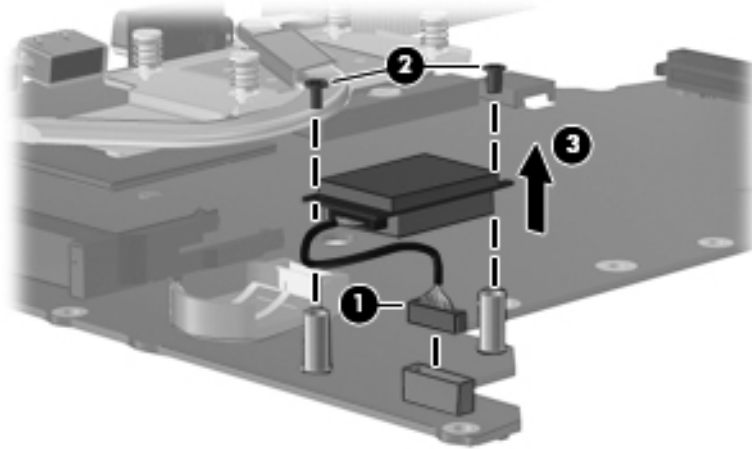
Description	Spare part number
Bluetooth module	398393-002

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 4-7](#)).
5. Remove the following components:
 - a. Hard drive (see [“Hard drive” on page 4-8](#))
 - b. Memory module (see [“Memory module” on page 4-10](#))
 - c. WLAN module (see [“WLAN module” on page 4-12](#))
 - d. Optical drive (see [“Optical drive” on page 4-16](#))
 - e. Keyboard (see [“Keyboard” on page 4-18](#))
 - f. Top cover (see [“Top cover” on page 4-21](#))
 - g. Audio board (see [“Audio board” on page 4-32](#))
 - h. Fan (see [“Fan” on page 4-33](#))
 - i. System board (see [“System board” on page 4-34](#))

Remove the Bluetooth module:

1. Turn the system board upside down with the front toward you.
2. Disconnect the Bluetooth module cable ❶ from the system board.
3. Remove the two Phillips PM1.5×3.0 screws ❷ that secure the Bluetooth module to the system board.
4. Remove the module ❸.



Reverse this procedure to install the Bluetooth module.

Heat sink

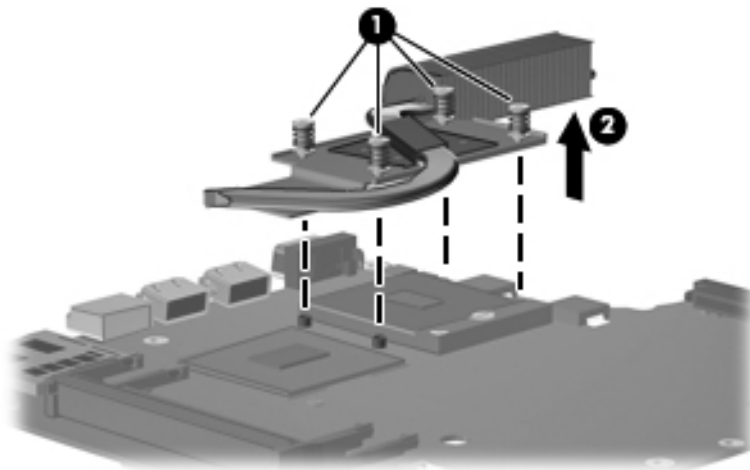
Description	Spare part number
Thermal module (includes heat sink and thermal material)	493270-001

Before removing the heat sink, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see [“Battery” on page 4-7](#)).
5. Remove the following components:
 - a. Hard drive (see [“Hard drive” on page 4-8](#))
 - b. Memory module (see [“Memory module” on page 4-10](#))
 - c. WLAN module (see [“WLAN module” on page 4-12](#))
 - d. Optical drive (see [“Optical drive” on page 4-16](#))
 - e. Keyboard (see [“Keyboard” on page 4-18](#))
 - f. Top cover (see [“Top cover” on page 4-21](#))
 - g. Audio board (see [“Audio board” on page 4-32](#))
 - h. Fan (see [“Fan” on page 4-33](#))
 - i. System board (see [“System board” on page 4-34](#))

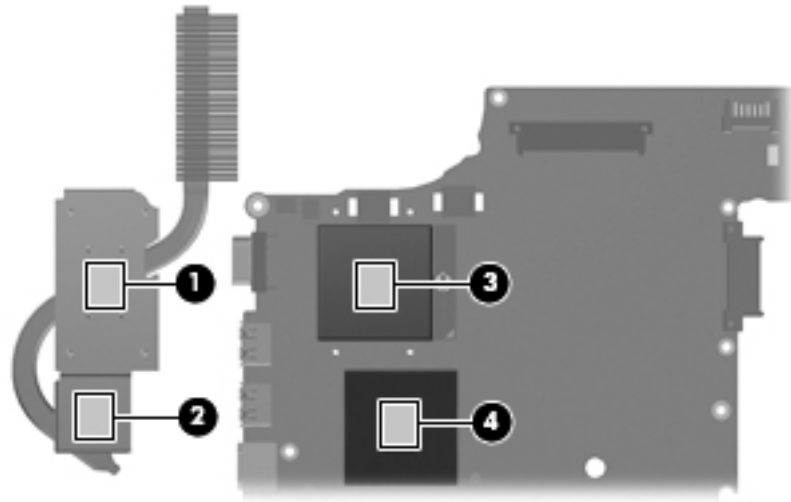
Remove the heat sink:

1. Loosen the four Phillips PM2.0×10.0 captive screws ❶ that secure the heat sink to the system board.
2. Remove the heat sink ❷ by lifting it straight up.





The thermal material must be thoroughly cleaned from the surfaces of the heat sink ❶ and ❸, the processor ❷, and graphics subsystem component ❹ on the system board each time the heat sink is removed. Thermal material is included with all System Board, Heat Sink, and Processor Spare Part Kits.



Reverse this procedure to install the heat sink.

Processor



The processor spare part kit includes replacement thermal material.

Description	Spare part number
Intel Core2 Duo processors (6-MB L2 cache, 1066-MHz FSB):	
■ T9600 2.8-GHz processor	486257-001
■ T9400 2.53-GHz processor	486256-001
■ P9500 2.53-GHz processor	496458-001
Intel Core2 Duo processors (3-MB L2 cache, 1066-MHz FSB):	
■ P8700 2.53-GHz processor	512585-001
■ P8600 2.4-GHz processor	486255-001
■ P8400 2.26-GHz processor	486254-001
■ P7370 2.0-GHz processor (for use with Intel WLAN only)	507966-001
Intel Core Duo processors (2-MB L2 cache, 800-MHz FSB):	
■ P5870 2.0-GHz processor (for use with no WLAN support or Intel WLAN only)	500771-001
■ P5670 1.8-GHz processor (for use with no WLAN support or Intel WLAN only)	500770-001
Intel Core Duo processors (1-MB L2 cache, 667-MHz FSB):	
■ T3400 2.16-GHz processor	509061-001
■ T3200 2.0-GHz processor	509060-001
Intel Celeron-M processors (1-MB L2 cache, 667-MHz FSB):	
■ 585 2.16-GHz processor	490337-001
■ 575 2.0-GHz processor	490336-001
Intel Celeron-T processors (1-MB L2 cache, 667-MHz FSB):	
■ T1700 1.83-GHz processor	509059-001
■ T1600 1.66-GHz processor	509058-001

Before removing the processor, follow these steps:

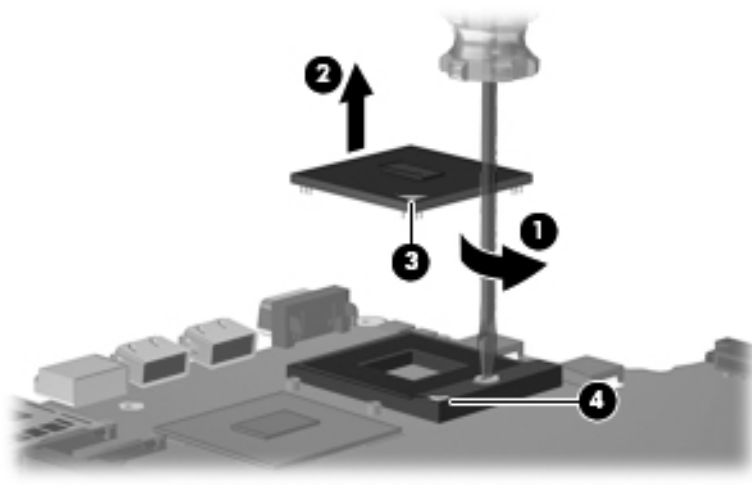
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see [“Battery” on page 4-7](#)).
5. Remove the following components:
 - a. Hard drive (see [“Hard drive” on page 4-8](#))
 - b. Memory module (see [“Memory module” on page 4-10](#))
 - c. WLAN module (see [“WLAN module” on page 4-12](#))
 - d. Optical drive (see [“Optical drive” on page 4-16](#))
 - e. Keyboard (see [“Keyboard” on page 4-18](#))
 - f. Top cover (see [“Top cover” on page 4-21](#))
 - g. Audio board (see [“Audio board” on page 4-32](#))
 - h. Fan (see [“Fan” on page 4-33](#))
 - i. System board (see [“System board” on page 4-34](#))
 - j. Heat sink (see [“Heat sink” on page 4-41](#))

Remove the processor:

1. Use a flat-bladed screwdriver to turn the processor locking screw ❶ one-half turn counterclockwise until you hear a click.
2. Lift the processor ❷ straight up and remove it.



When you install the processor, the gold triangle ❸ on the processor must be aligned with the triangle ❹ embossed on the processor slot.



Reverse this procedure to install the processor.

Computer Setup

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.



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



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.

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



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, Diagnostics, 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 arrow keys to select **File > Ignore changes and exit**, and then press **enter**.
- To save your changes and exit Computer Setup menus, click the **Save** icon in the lower-left corner of the screen, and then follow the on-screen instructions.
 - or –
 - Use the 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



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

– or –

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

Your changes go into effect when the computer restarts.



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.



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	<ul style="list-style-type: none">■ 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.
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.)
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



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

Select	To do this
Setup BIOS Administrator Password	Set up a BIOS administrator password.
User Management (requires a BIOS administrator password)	<ul style="list-style-type: none">■ Create a new BIOS user account.■ View 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)	Enable/disable the fingerprint reader (select models only; disabled by default).
Allow reset of HP ProtectTools security keys	Enable/disable reset of HP ProtectTools security keys
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.
DriveLock Passwords	<ul style="list-style-type: none">■ Enable/disable DriveLock on any computer hard drive (enabled by default).■ Change a DriveLock user password or master password. <p> DriveLock settings are accessible only when you enter Computer Setup by turning on (not restarting) the computer.</p>
Automatic DriveLock	Enable/disable Automatic DriveLock support.
Disk Sanitizer	Run Disk Sanitizer to destroy all existing data on the primary hard drive or the drive in the upgrade bay.  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.
Always Prompt for HP SpareKey Enrollment	Enable/disable a prompt for HP SpareKey enrollment.


Diagnostics menu

Select	To do this
System Diagnostics menu	<ul style="list-style-type: none">■ F1 System Information—Displays the following information:<ul style="list-style-type: none"><input type="checkbox"/> Identification information for the computer and the batteries in the system.<input type="checkbox"/> Specification information for the processor, cache and memory size, system ROM, video revision, and keyboard controller version.■ F2 Start-up Test—Verifies the system components needed for starting the computer.■ F3 Run-In Test—Runs a comprehensive check on system memory.■ F4 Hard Disk Test—Runs a comprehensive self-test on any hard drive in the system.



System Configuration menu



Some of the listed System Configuration options in this section may not be supported by your computer.


Select	To do this
Language	Change the Computer Setup language.
Boot Options	<ul style="list-style-type: none">■ Set a Startup Menu delay (in seconds).■ Enable/disable Custom Logo (disabled by default).■ Enable/disable Display Diagnostic URL (enabled by default).■ Enable/disable CD-ROM boot (enabled 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).■ Set the Express Boot Popup delay in seconds.■ Set the boot order.
Device Configurations	<ul style="list-style-type: none">■ Enable/disable USB legacy support (enabled by default). When enabled, USB legacy support allows the following:<ul style="list-style-type: none"><input type="checkbox"/> Use of a USB keyboard in Computer Setup even when a Windows® operating system is not running.<input type="checkbox"/> 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 LAN Power Save (select models only). When enabled, saves power by turning off the LAN when not in use (enabled by default).■ Enable/disable Data Execution Prevention. When enabled, the processor can disable some virus code execution, which helps to improve computer security.■ SATA (Serial Advanced Technology Attachment) device mode. The following options are available:<ul style="list-style-type: none"><input type="checkbox"/> AHCI (Advanced Host Controller Interface)<input type="checkbox"/> IDE (Integrated Drive Electronics)<input type="checkbox"/> RAID (select models only) <p> Availability of the options above varies by computer model.</p> <ul style="list-style-type: none">■ Enable/disable secondary battery fast charge (enabled by default).■ Enable/disable HP QuickLook 2 (enabled 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).■ Enable/disable Dual Core CPU (select models only; enabled by default).■ Enable/Disable Unified Extensible Firmware Interface (UEFI) mode (disabled by default).

(Continued)

Select	To do this
Built-In Device Options	<ul style="list-style-type: none"> ■ Enable/disable the wireless button state (enabled by default). ■ Enable/disable embedded WWAN device radio (select models only; enabled by default). ■ Enable/disable embedded Bluetooth® device radio (enabled by default). ■ Enable/disable the Network Interface Controller (LAN) (enabled by default). ■ Set the wake on LAN state. Options include the following: <ul style="list-style-type: none"> <input type="checkbox"/> Disabled <input type="checkbox"/> Boot to Network (set by default) <input type="checkbox"/> Follow Boot Order ■ Enable/disable the fingerprint device (enabled by default). ■ Enable/disable a modem device (enabled by default). ■ Enable/disable the embedded WLAN device (enabled by default). ■ Enable/disable LAN/WLAN switching (disabled by default). ■ Enable the ambient light sensor (enabled by default). ■ Enable/disable the Notebook Multibay device (enabled by default). ■ Enable/disable the integrated camera (select models only; enabled by default).
Port Options (all are enabled by default)	<p> All port options are enabled by default.</p> <ul style="list-style-type: none"> ■ Enable/disable the Smart Card slot. ■ Enable/disable the ExpressCard slot. ■ Enable/disable the serial port. ■ Enable/disable the parallel port. ■ Enable/disable the flash media reader. ■ Enable/disable the USB port. <p> Disabling the USB port also disables MultiBay devices and ExpressCard devices on the advanced port replicator.</p> <ul style="list-style-type: none"> ■ Enable/disable the 1394 port.
Set Security Level	Change, view, or hide security levels for all BIOS menu items.
Restore Security Defaults	Restore the default security settings.

Specifications

Computer specifications

	Metric	U.S.
Dimensions		
Length	22.6 cm	8.9 in
Width	29.4 cm	11.7 in
Height (front to rear)	2.8 to 3.6 cm	1.10 to 1.42 in
Weight		
Equipped with 4-cell battery and optical drive	1.85 kg	4.07 lbs
Input power		
Operating voltage	19.0 V dc @ 4.74 A - 65 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 95%	
Maximum altitude (unpressurized)		
Operating	-15 m to 3,048 m	-50 ft to 10,000 ft
Nonoperating	-15 m to 12,192 m	-50 ft to 40,000 ft
Shock		
Operating	125 g, 2 ms, half-sine	
Nonoperating	200 g, 2 ms, half-sine	
Random vibration		
Operating	0.75 g zero-to-peak, 10 Hz to 500 Hz, 0.25 oct/min sweep rate	
Nonoperating	1.50 g zero-to-peak, 10 Hz to 500 Hz, 0.5 oct/min sweep rate	
 Applicable product safety standards specify thermal limits for plastic surfaces. The computer operates well within this range of temperatures.		

12.1-inch, WXGA display specifications

	Metric	U.S.
Dimensions		
Height	16.9 cm	6.7 in
Width	26.2 cm	10.3 in
Diagonal	30.8 cm	12.1 in
Number of colors	Up to 16.8 million	
Contrast ratio	250:1 (typical)	
Brightness	180 nits (typical)	
Pixel resolution		
Pitch	0.279 × 0.279 mm	
Format	1280 × 800	
Configuration	RGB vertical stripe	
Backlight	Edge lit	
Character display	80 × 25	
Total power consumption	4.0 W	
Viewing angle	+/-40° horizontal, +120/-40° vertical (typical)	

Hard drive specifications

	320-GB*	250-GB*	160-GB*	120-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	625,142,448	488,397,168	312,581,808	234,441,648
Disc rotational speed	5400 rpm	5400 rpm	5400 rpm	5400 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.



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

DVD/CD-RW 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 (Photo-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
Access time	CD	DVD
Random	< 190 ms	< 180 ms
Cache buffer	2 MB	
Data transfer rate		
16X CD-ROM	2,400 KB/sec	
8X DVD	2,400 KB/sec	
16X CD-R	2,400 KB/sec	
16X CD-RW	2,400 KB/sec	
Transfer mode	Multiword DMA mode 2	

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

Applicable disc	Read:	Write:
		CD-ROM, CD-R, CD-RW, High Speed CD-RW, Ultra & Ultra+ Speed CD-RW, DVD, DVD±R/RW, DVD±R, DVD-RAM
Access time	CD	DVD
Random	< 130 ms	< 150 ms
Cache buffer	2 MB	
Data transfer rate		
5X DVD-RAM	6,750 KB/sec	
8X DVD±RW	10,800 KB/sec	
8X DVD±R	10,800 KB/sec	
16X CD-R	3,600 KB/sec	
16X CD-RW (High Speed)	1,500 KB/sec	

DVD-ROM Drive

Applicable disc	DVD-ROM (DVD-5, DVD-9, DVD-10, DVD-18, CD-ROM (Mode 1 and 2), CD Digital Audio, CD-XA ready (Mode 2, Form 1 and Form 2), CD-I (Mode 2, Form 1 and Form 2), CD-R, CD-RW, Photo CD (single and multisession), CD-Bridge	
Access time	CD	DVD
Random	< 100 ms	< 125 ms
Full stroke	< 175 ms	< 225 ms
Cache buffer	512 KB	
Data transfer rate		
CD-R (24X)	3600 KB/s (150 KB/s at 1X CD rate)	
CD-RW (10X)	1500 KB/s (150 KB/s at 1X CD rate)	
CD-ROM (24X)	3600 KB/s (150 KB/s at 1X CD rate)	
DVD (8X)	10,800 KB/s (1,352 KB/s at 1X DVD rate)	
Multiword DMA mode 2	16.6 MB/s	

System DMA specifications


Hardware	DMA System function
DMA0	Not applicable
DMA1*	Not applicable
DMA2*	Not applicable
DMA3	Not applicable
DMA4	Direct memory access controller
DMA5*	Not applicable
DMA6	Not assigned
DMA7	Not assigned


*PC Card controller can use DMA 1, 2, or 5.

System interrupt specifications

Hardware IRQ	System function
IRQ0	System timer
IRQ1	Standard 101-/102-Key or Microsoft® Natural Keyboard
IRQ8	System CMOS/real-time clock
IRQ12	Synaptics PS/2 TouchPad
IRQ13	Numeric data processor
IRQ16	Intel ICH9 Family USB universal Host Controller 2937 Mobile Intel 4 Series Express Chipset Family
IRQ17	High Definition Audio Controller Intel ICH9 Family USB universal Host Controller 2938 Marvell Yukon 88E8072 PCIE-Gigabit Ethernet Controller
IRQ18	Intel ICH9 Family USB universal Host Controller 2939 Intel ICH9 Family USB universal Host Controller 2936
IRQ19	Intel ICH9 Family USB2 Enhanced Controller 293C
IRQ20	Intel ICH9 Family USB2 Enhanced Controller 293A Intel ICH9 Family USB universal Host Controller 2934
IRQ21	Intel ICH9M-E/M SATA AHCI Controller
IRQ22	Intel ICH9 Family USB universal Host Controller 2935

*Default configuration; audio possible configurations are IRQ5, IRQ7, IRQ9, IRQ10, or none.

 PC Cards may assert IRQ3, IRQ4, IRQ5, IRQ7, IRQ9, IRQ10, IRQ11, or IRQ15. Either the infrared or the serial port may assert IRQ3 or IRQ4.

 For operating systems after Windows 2000, APIC (advanced programming interrupt controller) is used.

System I/O address specifications

I/O address (hex)	System function (shipping configuration)
000 - 01F	DMA controller
020 - 021	Program interrupt controller
024 - 025	Program interrupt controller
028 - 029	Program interrupt controller
02C - 03D	Program interrupt controller
02E - 02F	Motherboard resource
030 - 031	Program interrupt controller
034 - 035	Program interrupt controller
038 - 039	Program interrupt controller
03C- 03D	Program interrupt controller
040 - 043	System timer
04E-04F	Motherboard resource
050-053	System timer
060	Standard 101-/102-key or Microsoft Natural Keyboard
061	Motherboard resource
062	Microsoft ACPI-Compliant Embedded Controller
063	Motherboard resource
064	Standard 101-/102-key or Microsoft Natural Keyboard
065	Motherboard resources
066	Microsoft ACPI-Compliant Embedded Controller
067	Motherboard resources
070	Motherboard resources
071-077	System CMOS/real time clock
080	Motherboard resources
081-091	Direct memory access controller
092	Motherboard resources
093-09F	Direct memory access controller
0A0-0A1	Program interrupt controller
0A4-0A5	Program interrupt controller
0A8-0A9	Program interrupt controller
0AC-0AD	Program interrupt controller
0B0-0B1	Program interrupt controller
0B2-0B3	Motherboard resources
0B4- 0B5	Program interrupt controller
0B8-0B9	Program interrupt controller
0BC- 0BD	Program interrupt controller

(Continued)

I/O address (hex)	System function (shipping configuration)
0C0-0DF	Direct memory access controller
0F0-0F0	Numeric data processor
0200-027F	Motherboard resource
3B0-3BB	Mobile Intel® 4 Series Express Chipset Family
3C0-3DF	Mobile Intel® 4 Series Express Chipset Family
400-47F	Motherboard resource
4D0-4D1	Programmable interrupt controller
500-57F	Motherboard resources
1000-1003	Motherboard resources
1010-101F	Motherboard resources
2000-20FF	Marvell Yukon 88E8072 PCI-E Gigabit Ethernet Controller
2000-2FFF	ICH9 Family PCI Express Root Port6-294A
3000-4FFF	ICH9 Family PCI Express Root Port5-2948
5000-6FFF	ICH9 Family PCI Express Root Port3-2944
7000-701F	ICH9M-E/M SATA AHCI Controller
7020-703F	ICH9 Family USB Universal Host Controller-2936
7040-705F	ICH9 Family USB Universal Host Controller-2935
7060-707F	ICH9 Family USB Universal Host Controller-2934
7080-709F	ICH9 Family USB Universal Host Controller-2939
70A0-70BF	ICH9 Family USB Universal Host Controller-2938
70C0-70DF	ICH9 Family USB Universal Host Controller-2937
70E0-70E7	ICH9M-E/M SATA AHCI Controller
70E8-70EF	ICH9M-E/M SATA AHCI Controller
70F0-70F7	Mobile Intel(R) 4 Series Express Chipset Family
70F8-70FB	ICH9M-E/M SATA AHCI Controller
70FC-70FF	ICH9M-E/M SATA AHCI Controller
EF80-EF9F	Motherboard resources
FE00-FE0F	Motherboard resources
FE80-EF8F	Motherboard resources
FFFF	Motherboard resources

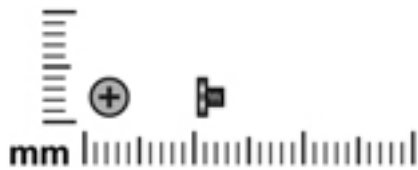
System memory map specifications

Size	Memory address	System function
640 KB	00000000-0009FFFF	Base memory
128 KB	000A0000-000BFFFF	Video memory
64 KB	000C0000-000CFFFF	Video BIOS
64 KB	000E8000-000FFFFF	System BIOS
	00100000- XFFFFFFF	Extended memory (based on memory installed)
	(X+1)00000000-FEDFFFFFFF	PCI bus
	FED00000-FED003FF	High precision event timer
	FEE01000-FFFFFFF	PCI bus

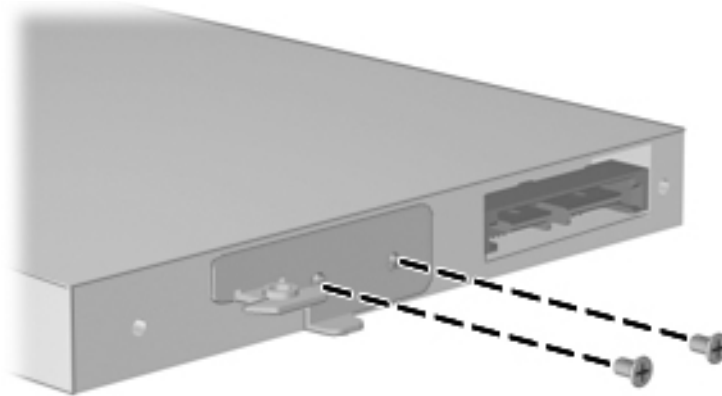
Screw listing

This section provides specification and reference information for the screws used in the computer. Some screws listed in this section are available in the Screw Kit, spare part number 493277-001.

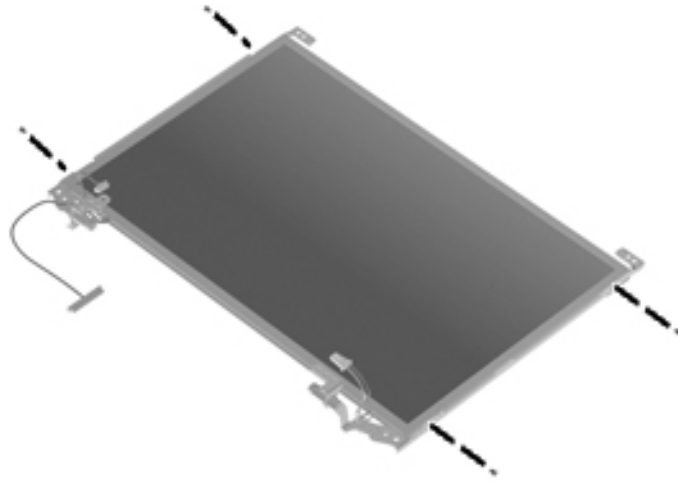
Phillips PM1.5×3.0 screw



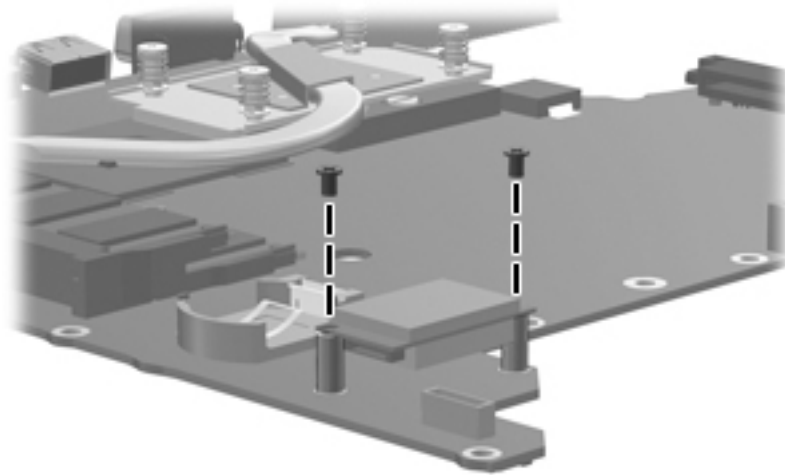
Color	Quantity	Length	Thread	Head diameter
Silver	8	3.0 mm	1.5 mm	3.0 mm



Where used: 2 screws that secure the optical drive bracket to the optical drive

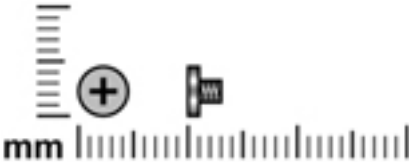


Where used: 4 screws that secure the display hinges to the display panel

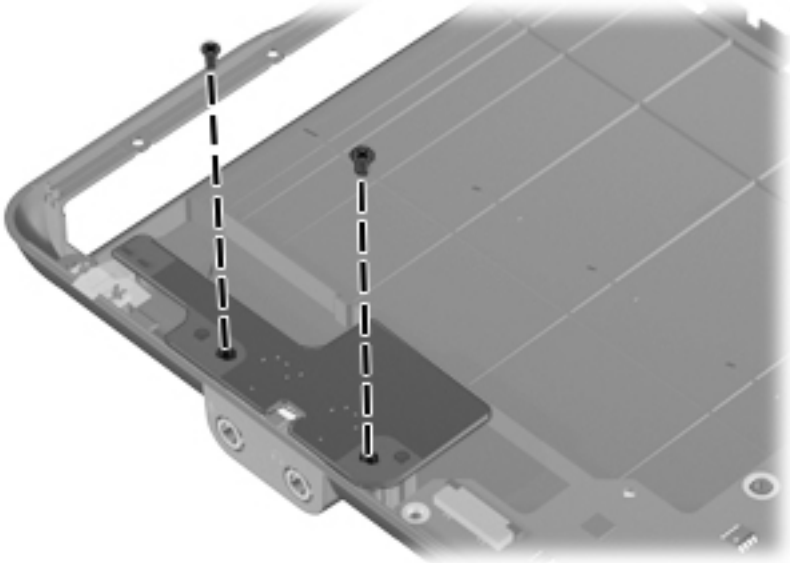


Where used: 2 screws that secure the Bluetooth module to the system board

Phillips PM2.0×3.0 screw

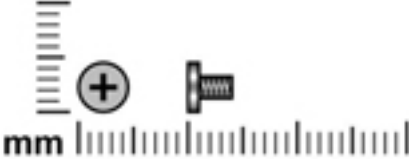


Color	Quantity	Length	Thread	Head diameter
Silver	2	3.0 mm	2.0 mm	3.0 mm

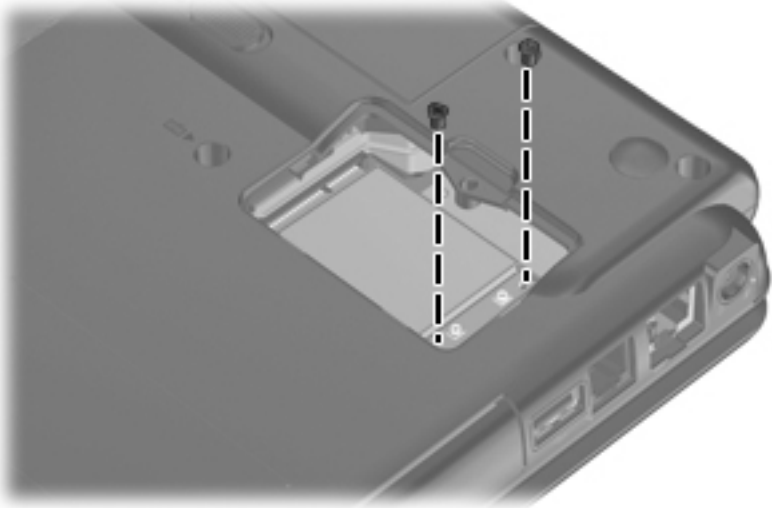


Where used: 2 screws that secure the audio board to the base enclosure

Phillips PM2.0×4.0 screw

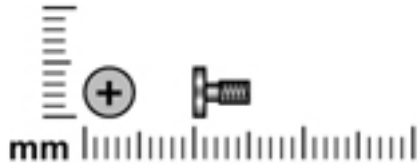


Color	Quantity	Length	Thread	Head diameter
Silver	2	4.0 mm	2.0	3.5 mm

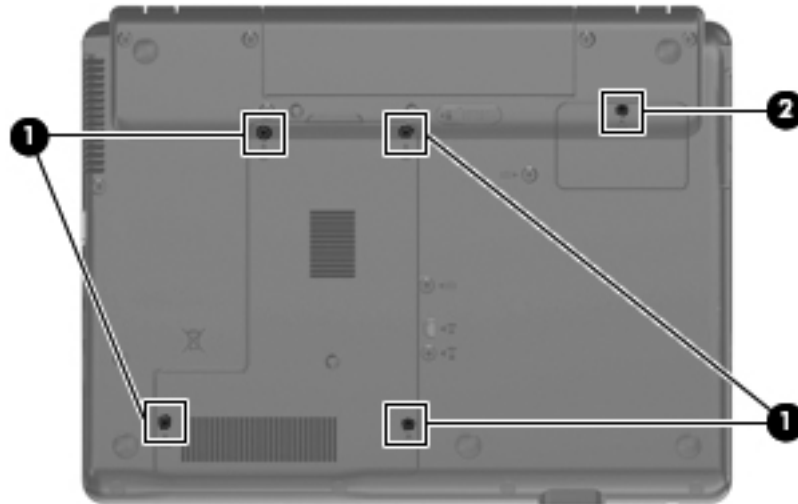


Where used: 2 screws that secure the WLAN module to the system board

Phillips PM2.0×5.0 captive screw



Color	Quantity	Length	Thread	Head diameter
Black	5	5.0 mm	2.0 mm	3.5 mm

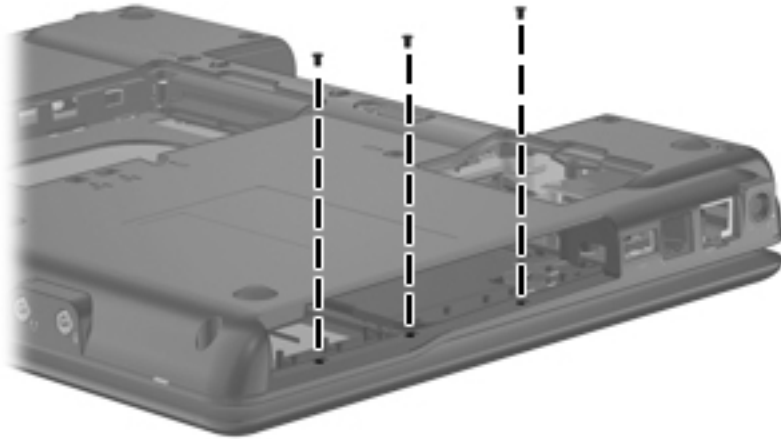


Where used: 4 captive screws ❶ that secure the hard drive cover to the computer and 1 captive screw ❷ that secures the wireless module compartment cover to the computer

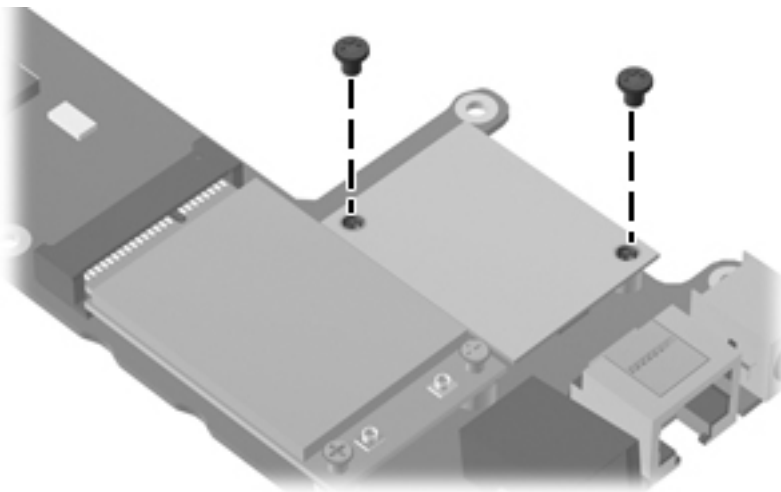
Phillips PM2.0×3.0 screw



Color	Quantity	Length	Thread	Head diameter
Black	5	3.0 mm	2.0 mm	4.0 mm

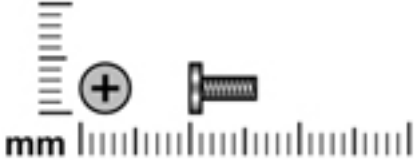


Where used: 3 screws (in optical drive bay) that secure the top cover to the computer



Where used: 2 screws that secure the modem module to the system board

Phillips PM2.0×6.0 screw

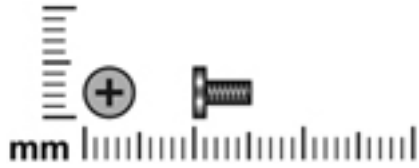


Color	Quantity	Length	Thread	Head diameter
Black	2	6.0 mm	2.0 mm	4.0 mm

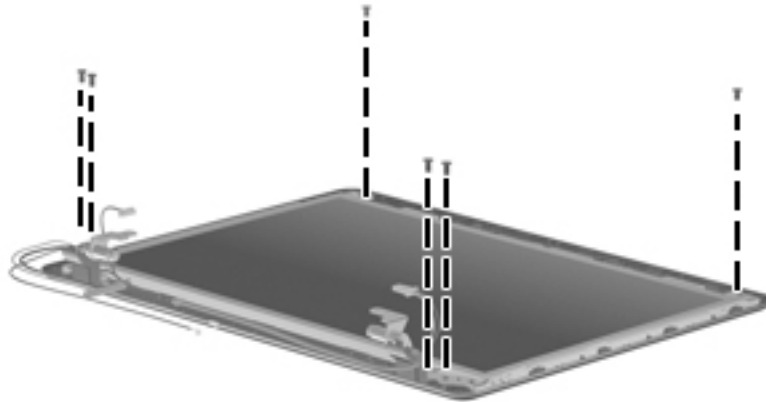


Where used: 2 screws that secure the display hinge covers to the display enclosure

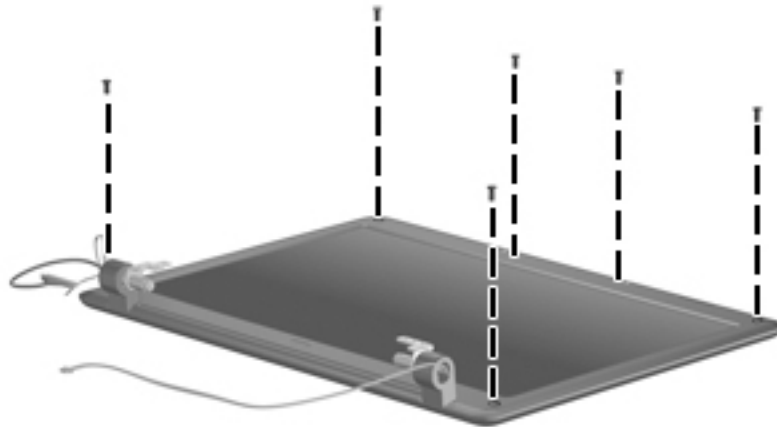
Phillips PM2.0×5.0 screw



Color	Quantity	Length	Thread	Head diameter
Silver	12	5.0 mm	2.0 mm	4.0 mm

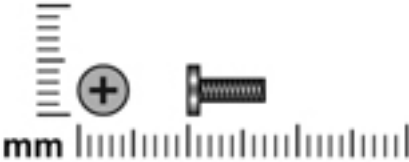


Where used: 6 screws that secure the display panel to the display enclosure

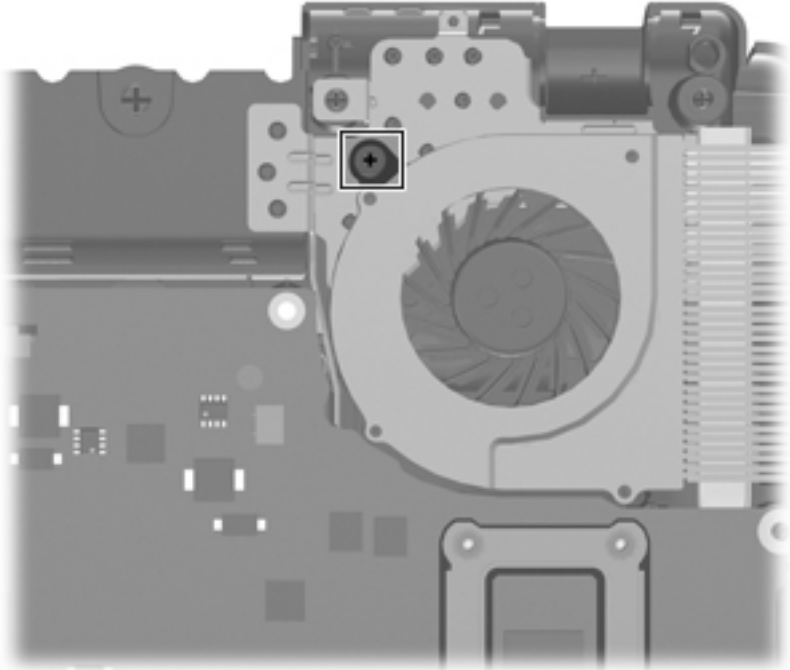


Where used: 6 screws that secure the display bezel to the display enclosure

Phillips PM2.0×7.0 captive screw

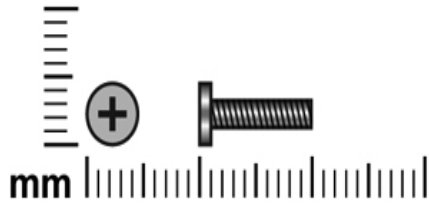


Color	Quantity	Length	Thread	Head diameter
Silver	1	7.0 mm	2.0 mm	4.0 mm

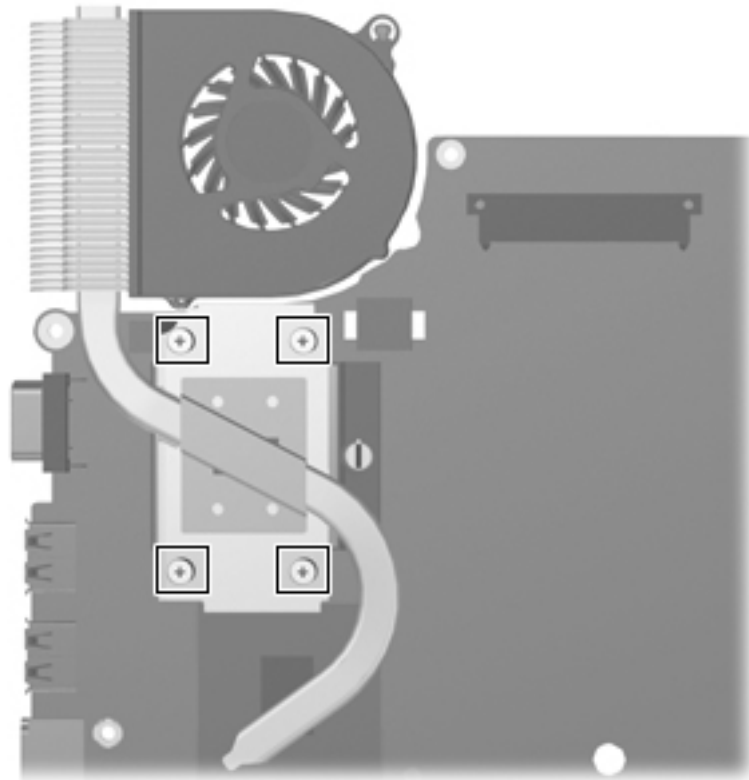


Where used: 1 captive screw that secures the fan to the base enclosure

Phillips PM2.0×10.0 captive screw

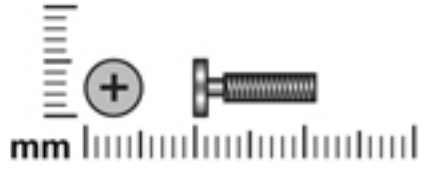


Color	Quantity	Length	Thread	Head diameter
Silver	4	10.0 mm	2.0	5.0 mm

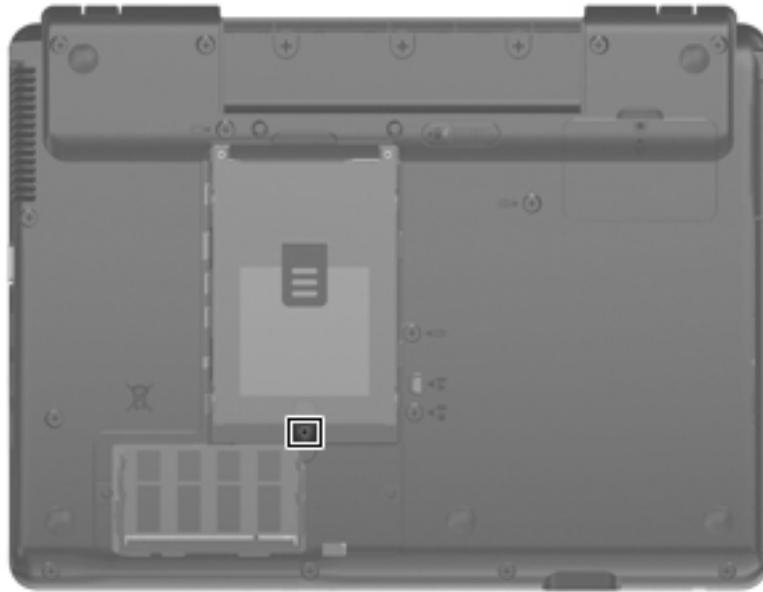


Where used: 4 captive screws that secure the heat sink to the system board

Phillips PM2.5×10.0 captive screw



Color	Quantity	Length	Thread	Head diameter
Black	1	10.0 mm	2.5	5.0 mm



Where used: 1 captive screw that secures the hard drive to the computer

Phillips PM3.0×3.0 screw

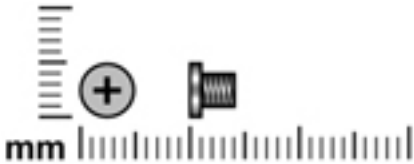


Color	Quantity	Length	Thread	Head diameter
Silver	4	3.0 mm	3.0	4.5 mm

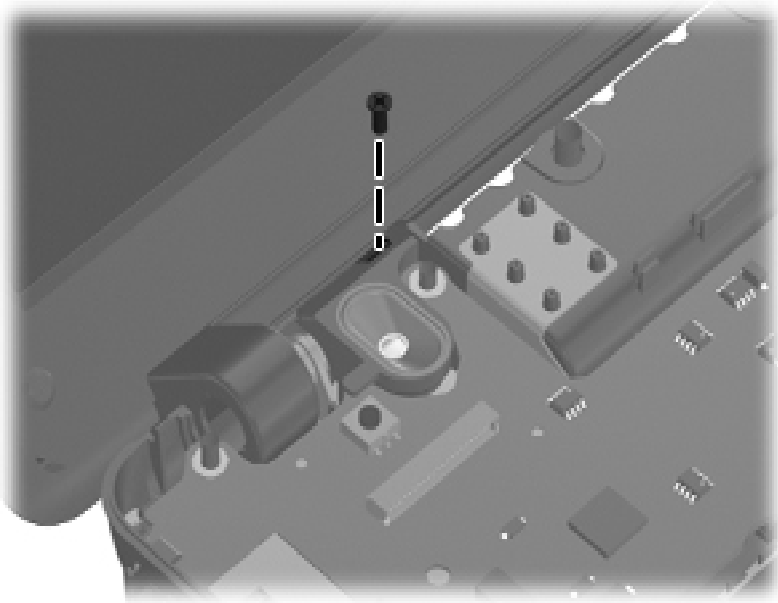


Where used: 4 screws that secure the hard drive bracket to the hard drive

Phillips PM3.0×4.0 screw



Color	Quantity	Length	Thread	Head diameter
Silver	1	4.0 mm	3.0	4.5 mm

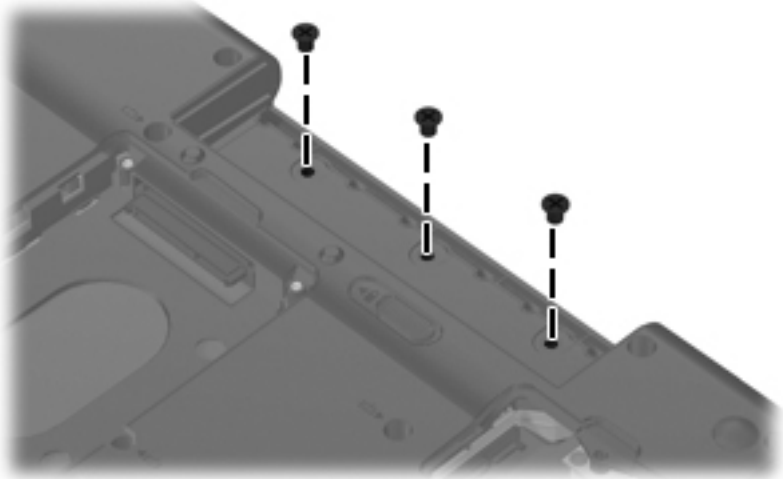


Where used: 1 screw that secures the speaker assembly to the base enclosure

Phillips T2.0×2.0BH screw

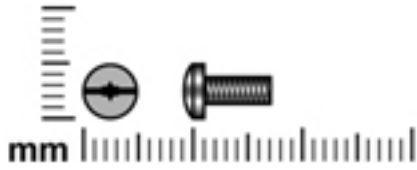


Color	Quantity	Length	Thread	Head diameter
Black	3	2.0 mm	2.0	6.0 mm



Where used: 3 screws (in the battery bay) that secure the top cover to the base enclosure

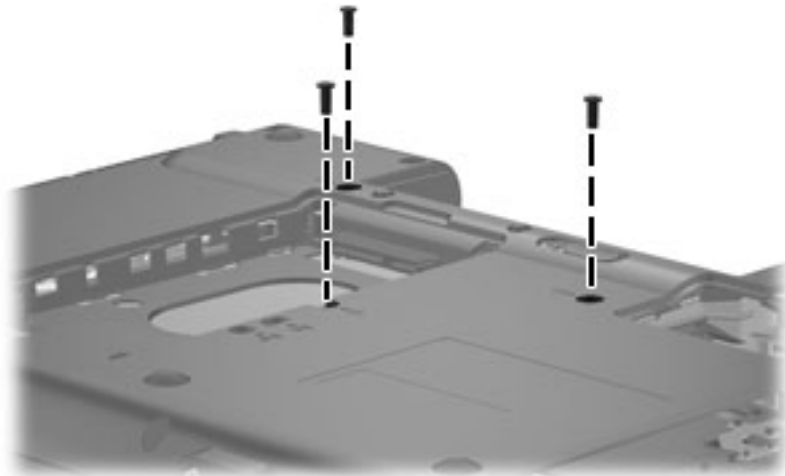
Torx T8M2.5×6.0 slotted screw



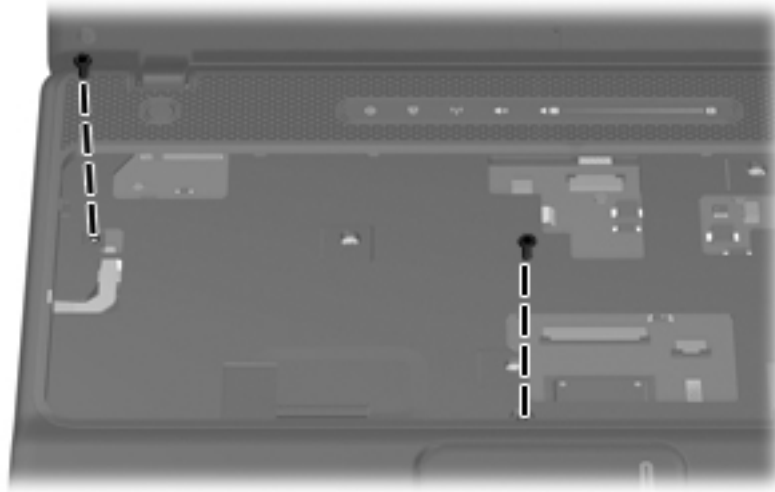
Color	Quantity	Length	Thread	Head diameter
Black	21	6.0 mm	2.5 mm	4.0 mm



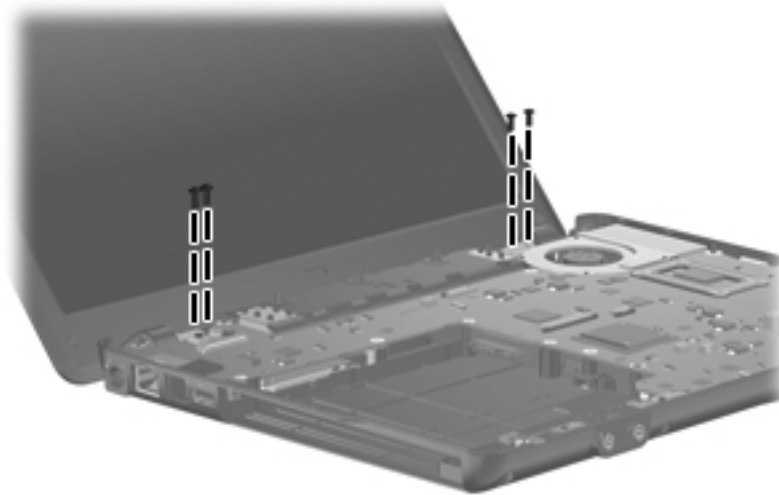
Where used: 1 screw that secures the optical drive to the computer



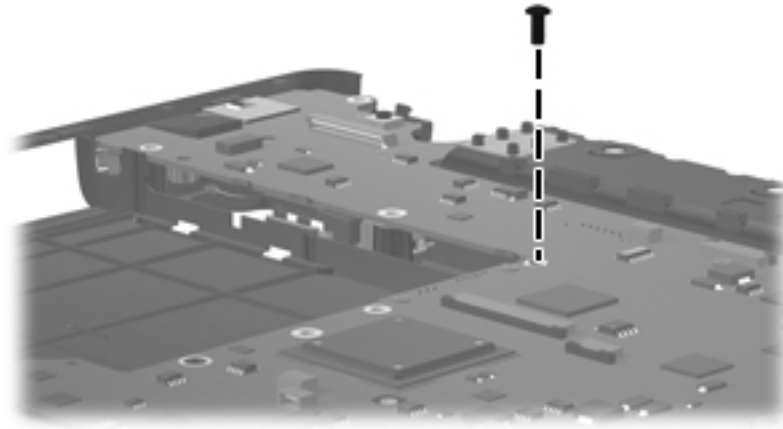
Where used: 3 screws that secure the keyboard to the computer



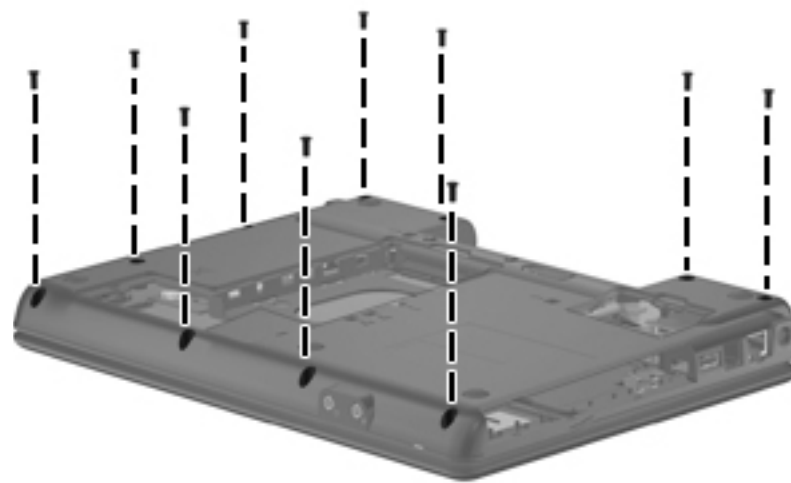
Where used: 2 screws that secure the top cover to the base enclosure (top)



Where used: 4 screws that secure the display assembly hinges to the computer



Where used: 1 screw that secures the system board to the base enclosure



Where used: 10 screws that secure the top cover to the base enclosure

Backup and recovery in 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.

Windows Vista® provides the following advanced backup and recovery 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



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

Backup tips

- Connect the computer to AC power during the backup process.
- Store personal files in the Documents folder and back them 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.

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.

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

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.



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, use the f11 recovery tool to recover your original hard drive image. The image includes the Windows operating system and software programs installed at the factory.



Windows Vista provides additional recovery tools through the operating system. For additional information, go to Help and Support.




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 “Recovering information using a Windows Vista operating system DVD (purchased separately)” section in this guide.

Recovering the hard drive using f11



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

To recover the original hard drive image, 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**.
 -  If the HP Recovery partition has been deleted, you will need to recover your operating system and programs using the Windows Vista operating system DVD and the *Driver Recovery* disc (purchased separately). For additional information, refer to the “Recovering information using a Windows Vista operating system DVD (purchased separately)” section in this guide.
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.

Recovering information 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. Make 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 will completely erase hard drive contents and reformat the hard drive. All files you have created and any software installed on the computer will be permanently removed. When reformatting is complete, the recovery process will help 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:



This process will take 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.

Backup and recovery in Windows XP

To protect your information, use the Windows® Backup utility (select models only) 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



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



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

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, click **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:



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



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

1. Click **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. Click **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.



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



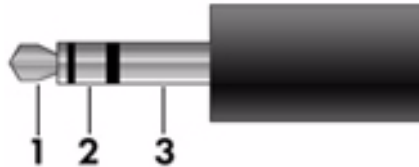
CAUTION: The recovery process reformats and completely erases the hard drive. All files you have created and any software installed on the computer are permanently removed. The recovery process reinstalls the original operating system, software, and drivers. Software, drivers, and updates not installed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

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

1. If possible, back up all personal files.
2. Insert the *Operating System* disc into the optical drive.
3. Shut down the computer.
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.

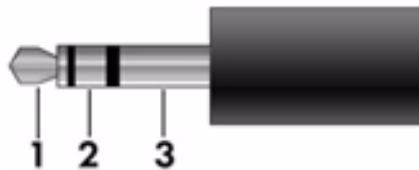
Connector pin assignments

Audio-in (microphone)



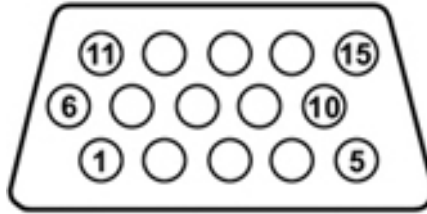
Pin	Signal
1	Audio signal in
2	Audio signal in
3	Ground

Audio-out (headphone)



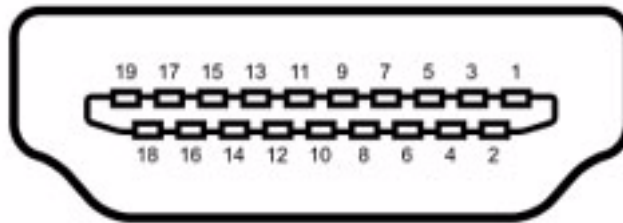
Pin	Signal
1	Audio out, left channel
2	Audio out, right channel
3	Ground

External monitor



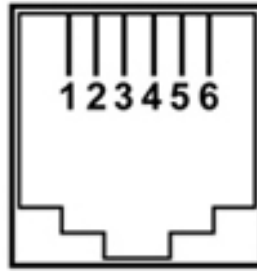
Pin	Signal
1	Red analog
2	Green analog
3	Blue analog
4	Not connected
5	Ground
6	Ground analog
7	Ground analog
8	Ground analog
9	+5 VDC
10	Ground
11	Monitor detect
12	DDC 2B data
13	Horizontal sync
14	Vertical sync
15	DDC 2B clock

HDMI



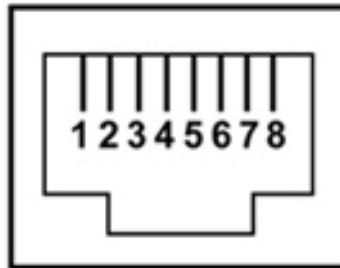
Pin	Signal
1	Transition minimized differential signal (TDMS) data 2+
2	Transition minimized differential signal (TDMS) data 2 shield
3	Transition minimized differential signal (TDMS) data 2-
4	Transition minimized differential signal (TDMS) data 1+
5	Transition minimized differential signal (TDMS) data 1 shield
6	Transition minimized differential signal (TDMS) data 1 shield
7	Transition minimized differential signal (TDMS) data 0+
8	Transition minimized differential signal (TDMS) data 0 shield
9	Transition minimized differential signal (TDMS) data 0-
10	Transition minimized differential signal (TDMS) clock +
11	Transition minimized differential signal (TDMS) data clock shield
12	Transition minimized differential signal (TDMS) data clock-
13	Consumer electronics control (CEC)
14	Not connected
15	Display data channel (DDC) clock
16	Display data channel (DDC) data
17	Ground
18	+5V Power
19	Hot plug detect

RJ-11 (modem)



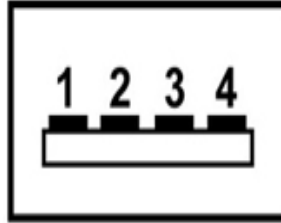
Pin	Signal
1	Unused
2	Tip
3	Ring
4	Unused
5	Unused
6	Unused

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

Power cord set requirements

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

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

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

Requirements for all countries and regions

The requirements listed below 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	CCC	5
South Korea	EK	4
Sweden	SEMKO	1
Switzerland	SEV	1
Taiwan	BSMI	4
The United Kingdom	BSI	1
The United States	UL	2


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


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.

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

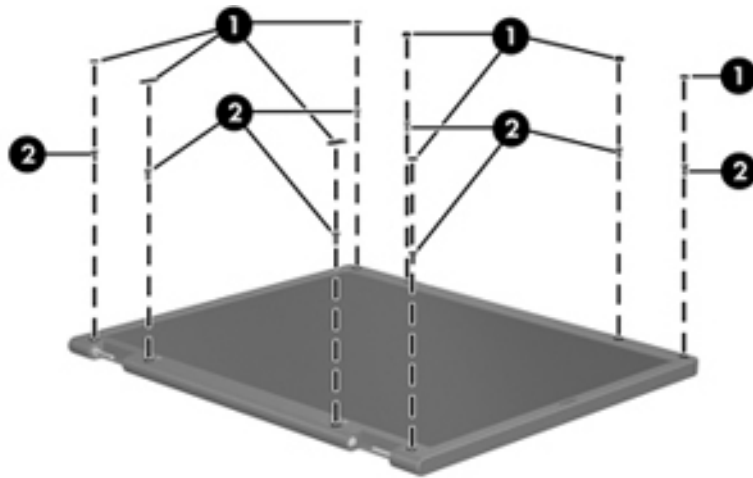
This section provides disassembly instructions for the display assembly. The display assembly must be disassembled to gain access to the backlight ❶ and the liquid crystal display (LCD) panel ❷.



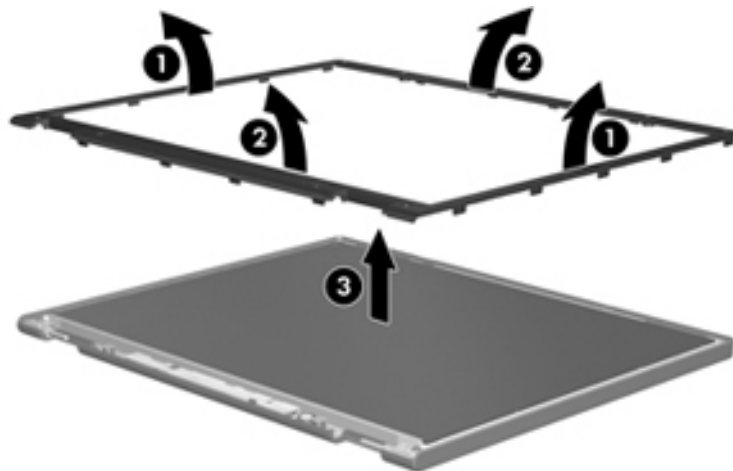
 The procedures provided in this chapter are general disassembly instructions. Specific details, such as screw sizes, quantities, and locations, and component shapes and sizes, can vary from one computer model to another.

Perform the following steps to disassemble the display assembly:

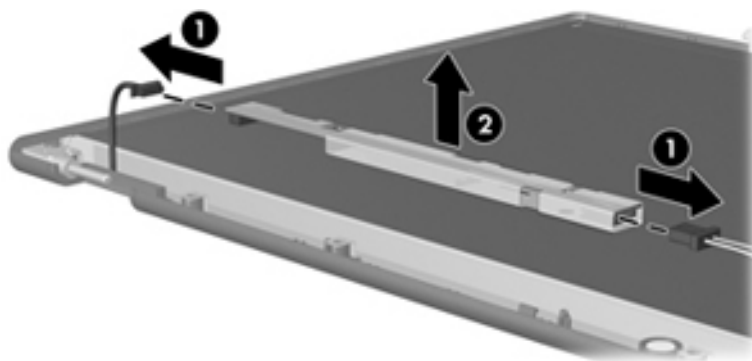
1. Remove all screw covers ① and screws ② that secure the display bezel to the display assembly.



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

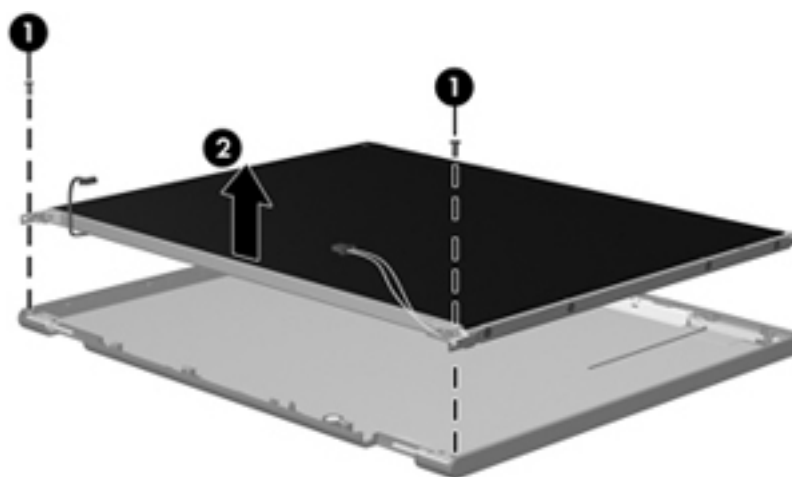


4. Disconnect all display panel cables ❶ from the display inverter and remove the inverter ❷.



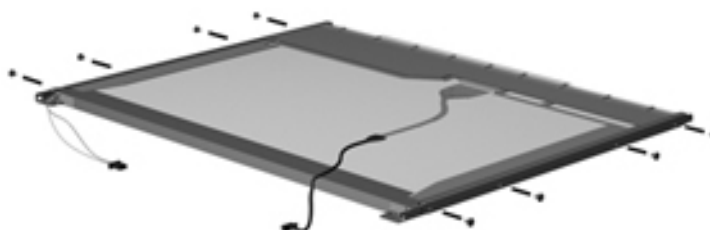
5. Remove all screws ❶ that secure the display panel assembly to the display enclosure.

6. Remove the display panel assembly ❷ from the display enclosure.

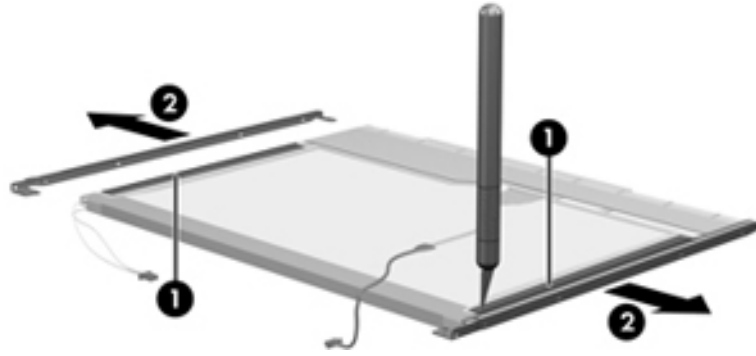


7. Turn the display panel assembly upside down.

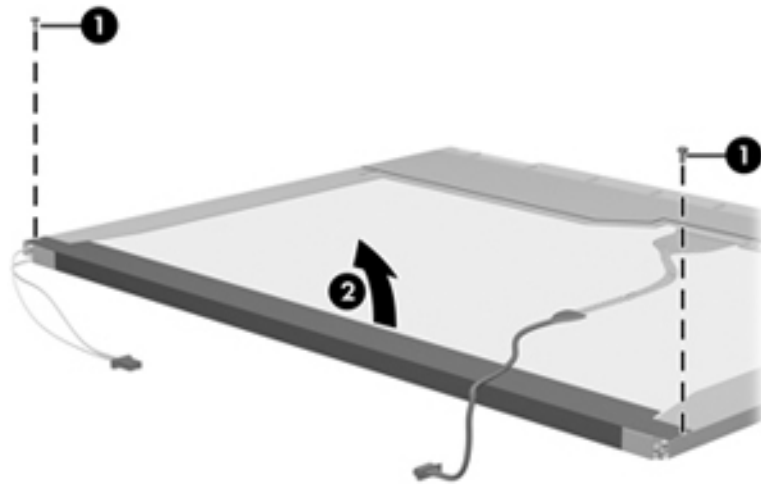
8. Remove all screws that secure the display panel frame to the display panel.



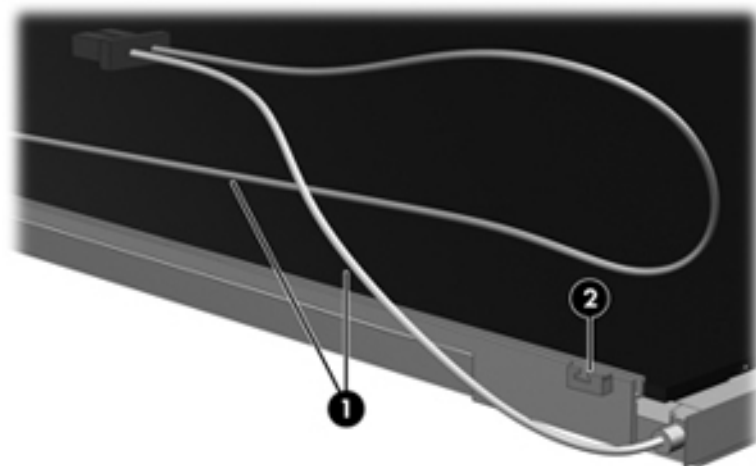
9. Use a sharp-edged tool to cut the tape ① that secures the sides of the display panel to the display panel frame.
10. Remove the display panel frame ② from the display panel.



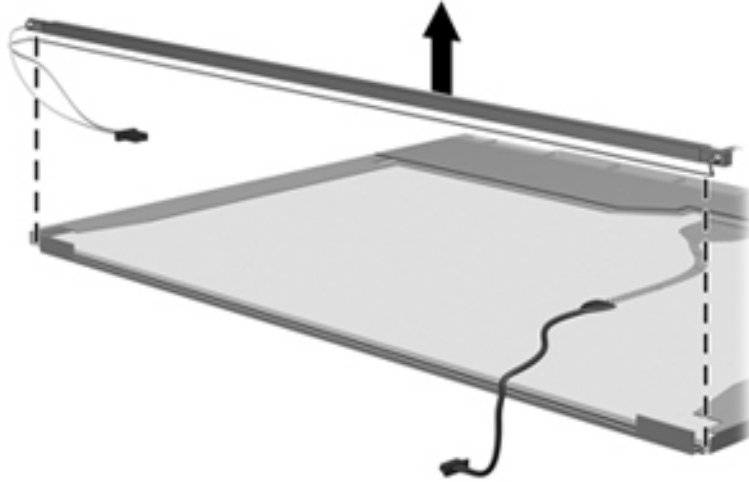
11. Remove the screws ① that secure the backlight cover to the display panel.
12. Lift the top edge of the backlight cover ② and swing it outward.




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.

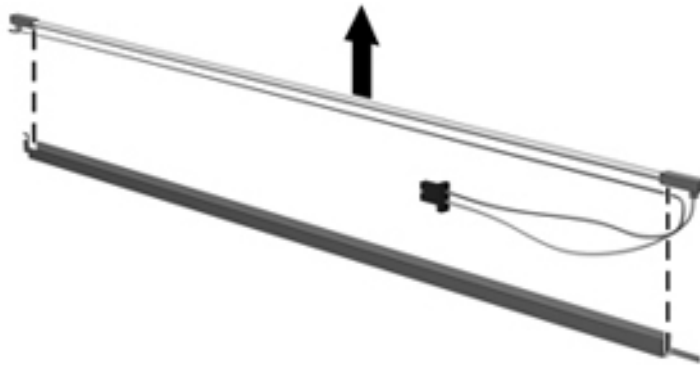


16. Turn the display panel upside down.
17. Remove the backlight frame from the display panel.

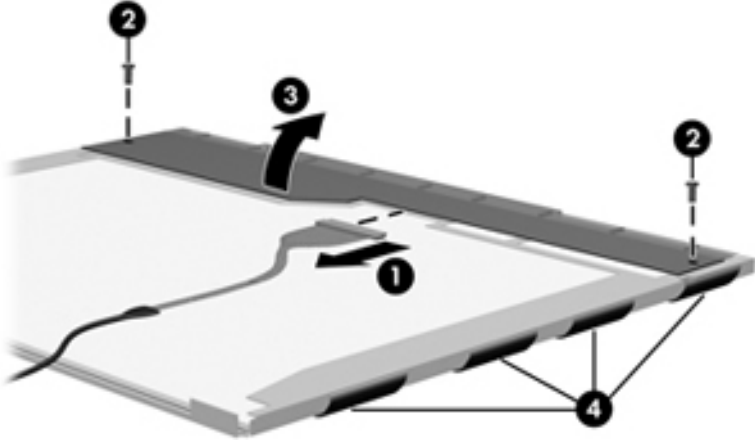


 **WARNING:** The backlight contains mercury. Exercise caution when removing and handling the backlight to avoid damaging this component and causing exposure to the mercury.

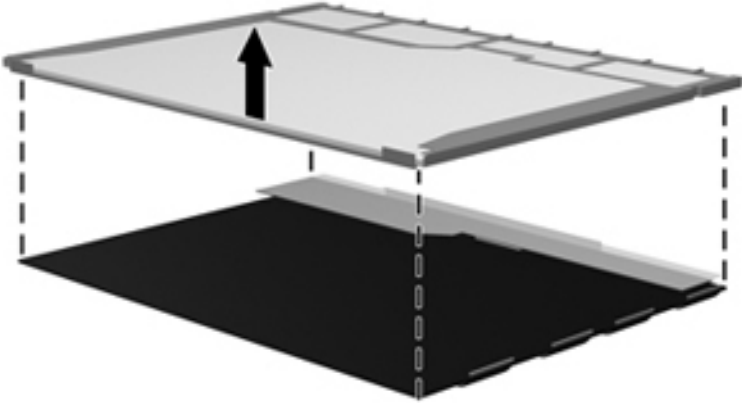
18. Remove the backlight from the backlight frame.



- 19. Disconnect the display cable ❶ from the LCD panel.
- 20. Remove the screws ❷ that secure the LCD panel to the display rear panel.
- 21. Release the LCD panel ❸ from the display rear panel.
- 22. Release the tape ❹ 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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