HP 4320t Mobile Thin Client

Maintenance and Service Guide

SUMMARY

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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1 Product description

Category	Description
Product Name	HP 4320t Mobile Thin Client, UMA
Processors	Intel® Arrandale™ P4500, 1.8-GHz, 3-MB L3 cache (35 W)
Chipsets	Intel® HM57 Express
Graphics	Intel® HD Graphics Universal Memory Architecture (UMA) graphics subsystem integrated with shared video memory (dynamically allocated)
Panels	All display panel assemblies support privacy filter LED backlight, **33.8-cm** (13.3-in) HD (1366×768 resolution)
Memory	2 customer-accessible/upgradable SODIMM memory module slots Supports dual-channel memory Supports up to 8 GB of system memory in all countries and regions PC3-10600, 1333-MHz, DDR3 Supports the following configurations in all countries and regions: • 4096-MB total system memory (2048-MB × 2, dual channel) • 3072-MB total system memory (2048-MB + 1024-MB, dual channel) • 2048-MB total system memory (2048-MB × 1) • 2048-MB total system memory (1024-MB × 2, dual channel) • 1024-MB total system memory (1024-MB × 1)
Primary storage	Serial ATA, solid-state module Supports the following storage: • 2-GB • 4-GB • 8-GB
Optical drives	Fixed DVD-ROM drive **12.7-mm** (0.50-in) tray load Supports option of no optical drive

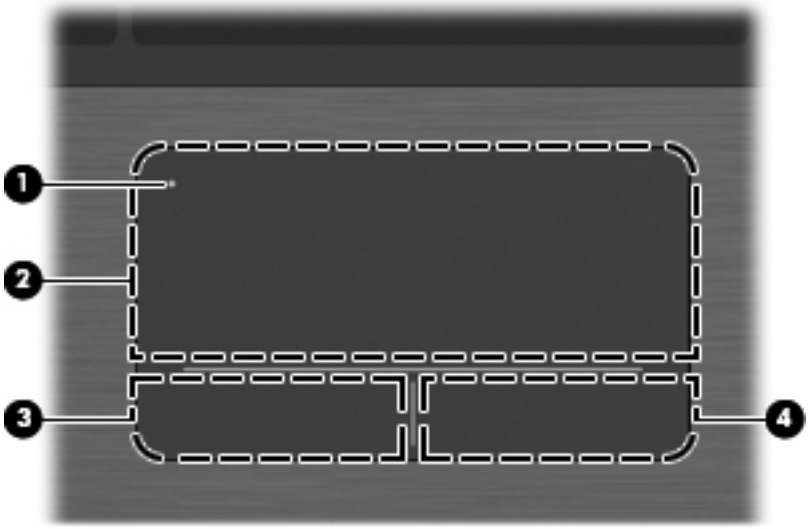
Category	Description
Diskette drive	Supports external USB diskette drive only
Audio/ Visual	HD audio - IDT 92HD80 Integrated microphone Two stereo speakers Headphone/microphone jacks
Modem	High-speed 56k modem for all regions and countries Modem cable not included Supports no-modem option
Ethernet	10/100/1000 Ethernet network interface card (NIC) S3/S4/S5 wake on LAN (AC only mode) Ethernet cable not included
Wireless	**Integrated WLAN options by way of wireless module:** Support for the following WLAN formats: • Broadcom 802.11a/b/g/n 2×2 • Broadcom 802.11b/g 2 WLAN antennas built into display assembly Support for no-WLAN option
External media cards	One ExpressCard slot (34 mm) Media Card Reader supporting Memory Stick (MS), Memory Stick Pro (MSP), Secure Digital (SD) Memory Card, Secure Digital High Capacity (SDHC) Memory Card, MultiMediaCard (MMC), and xD-Picture Card formats
Ports	Audio-in (stereo microphone) Audio-out (stereo headphone) RJ-11 (modem) RJ-45 (Ethernet, includes link light and activity lights) USB 2.0 (3) eSATA/USB 2.0 combo HDMI VGA (Dsub 15-pin) supporting 1600×1200 external resolution at 75-GHz (hot plug/unplug with auto-detect) Multi-pin AC power
Keyboard and pointing devices	**33.8-cm** (13.3-in) keyboard with TouchPad TouchPad supports 2-way scroll with legend; taps enabled as default

Category	Description
Power requirements	65-W Smart AC Adapter with localized cable plug support (3-wire plug with ground pin)
	9-cell, 93-Wh Li-ion battery
	6-cell, 47-Wh Li-ion battery
Security	Supports security cable
	Intel anti-theft support
Operating system	**Preinstalled:**
	Windows® Embedded Standard 7
	Windows® Embedded Standard 2009
	Web Support:
	Windows® Embedded Standard 7
	Windows® Embedded Standard 2009
Serviceability	**End-user replaceable parts:**
	AC adapter
	Battery (system)
	Keyboard
	Solid-state module
	Memory module
	DVD-ROM drive
	WLAN module

2 External component identification

Top components

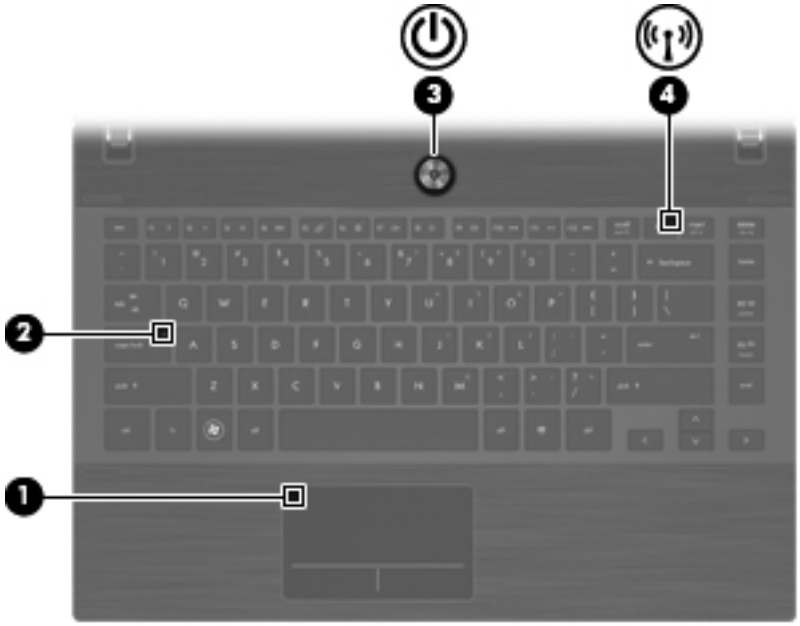
TouchPad



Component		Description
(1)	TouchPad off indicator	To turn the TouchPad zone on and off, quickly double-tap the TouchPad off indicator. **NOTE:** When the TouchPad zone is active, the light is off.
(2)	TouchPad zone	Moves the pointer and selects or activates items on the screen.
(3)	Left TouchPad button*	Functions like the left button on an external mouse.
(4)	Right TouchPad button*	Functions like the right button on an external mouse.

*This table describes factory settings. To view or change pointing device preferences, select **Start > Control Panel > Mouse**.

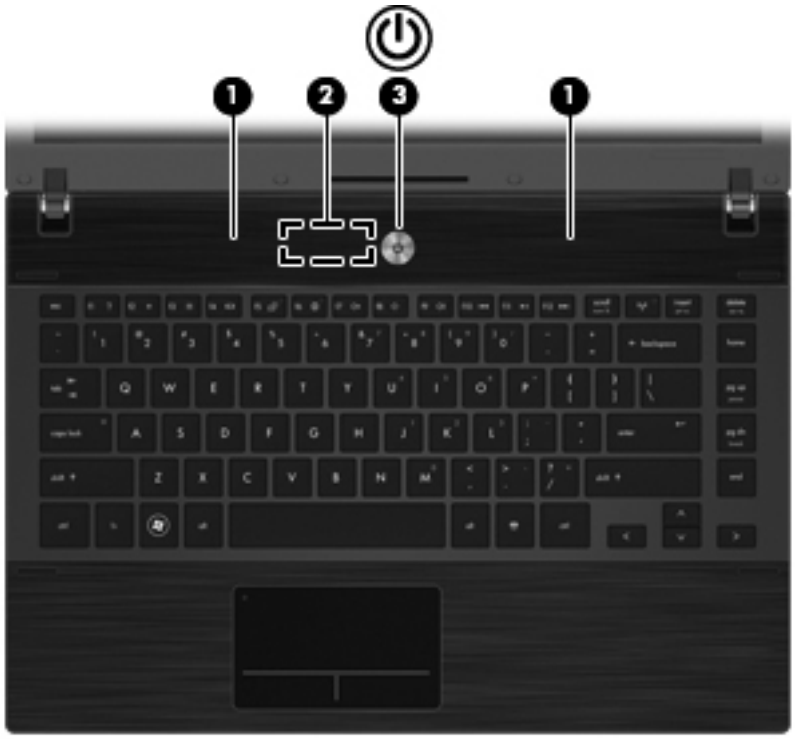
Lights



Component		Description
(1)	TouchPad off indicator	• Amber: The TouchPad is off. • Off: The TouchPad is on.
(2)	Caps lock light	On: Caps lock is on.
(3)	Power light	• On: The computer is on. • Blinking: The computer is in the Sleep state. • Off: The computer is off.
(4)	Wireless light	• White: An integrated wireless device is on, such as a wireless local area network (WLAN) device. • Amber: All wireless devices are off.

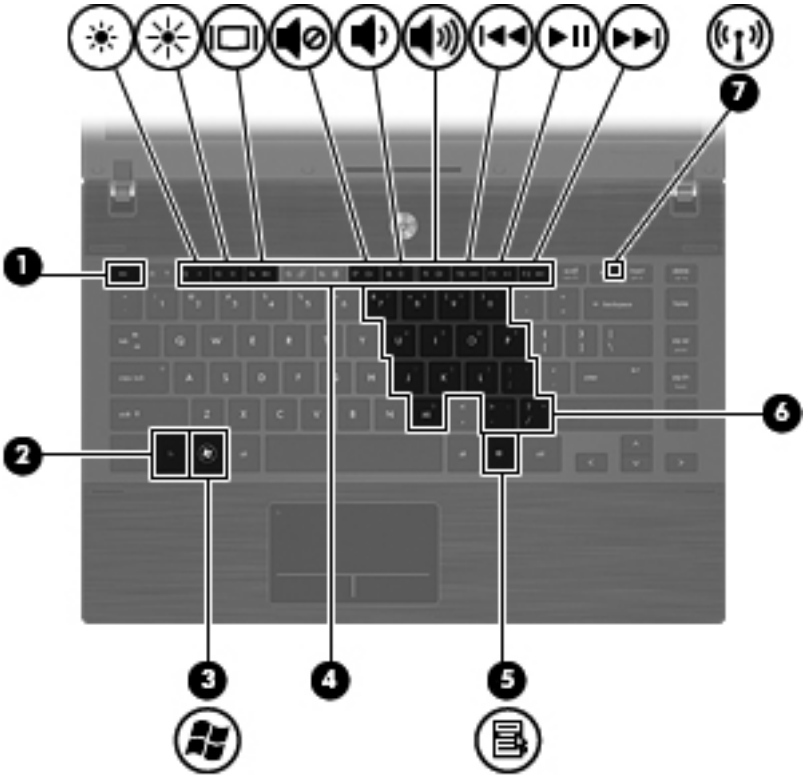
Buttons, speakers, and switches

NOTE: Your computer may look slightly different from the illustration in this section.



Component		Description
(1)	Speakers (2)	Produce sound.
(2)	Internal display switch	Turns off the display if the display is closed while the power is on.
(3)	Power button	• When the computer is off, press the button to turn on the computer. • When the computer is on, press the button to shut down the computer. • When the computer is in the Sleep state, press the button briefly to exit Sleep. If the computer has stopped responding and Windows® shutdown procedures are ineffective, press and hold the power button for at least 5 seconds to turn off the computer. To learn more about your power settings and how to change them, select **Start > Control Panel > Power Options**.

Keys

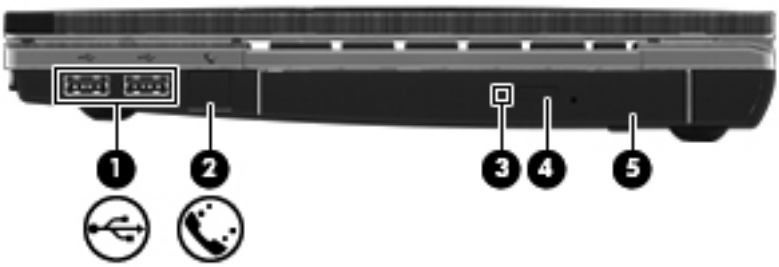


Component		Description
(1)	esc key	Displays system information when pressed in combination with the fn key.
(2)	fn key	Executes frequently used system functions when pressed in combination with a function key or the esc key.
(3)	Windows logo key	Displays the Windows Start menu.
(4)	Function keys	Execute frequently used system functions when pressed in combination with the fn key.
(5)	Windows applications key	Displays a shortcut menu for items beneath the pointer.
(6)	Embedded numeric keypad keys	Can be used like the keys on an external numeric keypad, when pressed in combination with the fn and num lk keys.
(7)	Wireless key	Turns the wireless feature on or off. **NOTE:** This key does not establish a wireless connection. To establish a wireless connection, a wireless network must be set up.

Front components

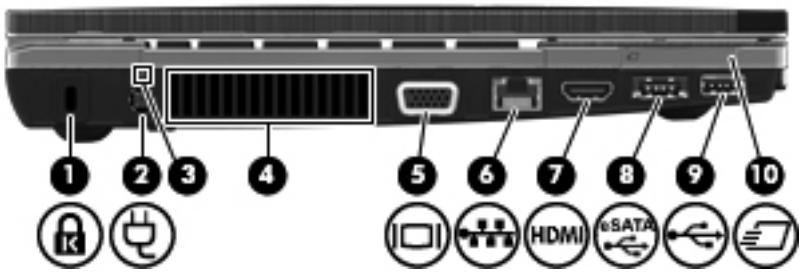
Component		Description
(1)	Drive light	• Blinking white: The solid-state module or optical drive is being accessed. • Amber: HP 3D DriveGuard has temporarily parked the solid-state module.
(2)	Media Card Reader	Supports the following optional digital card formats: • Memory Stick • Memory Stick Duo (adapter required) • Memory Stick Pro (adapter required) • MultiMediaCard (MMC) • Secure Digital (SD) Memory Card • xD-Picture Card (XD) • xD-Picture Card (XD) Type H • xD-Picture Card (XD) Type M
(3)	Audio-out (headphone) jack	Produces sound when connected to optional powered stereo speakers, headphones, ear buds, a headset, or television audio. **WARNING!** To reduce the risk of personal injury, adjust the volume before putting on headphones, earbuds, or a headset. For additional safety information, refer to the Regulatory, Safety, and Environmental Notices. **NOTE:** When a device is connected to the headphone jack, the computer speakers are disabled.
(4)	Audio-in (microphone) jack	Connects an optional computer headset microphone, stereo array microphone, or monaural microphone.

Right-side components



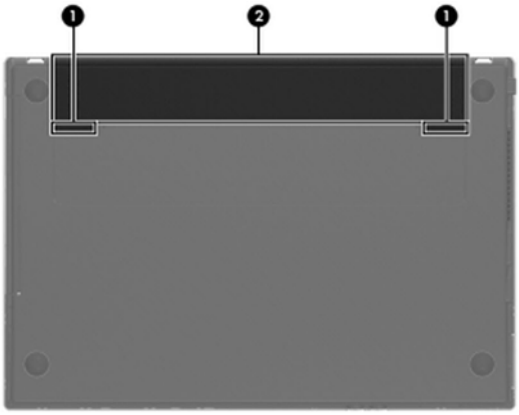
Component		Description
(1)	USB 2.0 ports (2)	Connect optional USB devices.
(2)	RJ-11 (modem) jack	Connects a modem cable.
(3)	Optical drive light (select models only)	Blinking: The optical drive is being accessed.
(4)	Optical drive eject button (select models only)	Press to eject the optical disc.
(5)	Optical drive (select models only)	Reads optical discs.

Left-side components



Component		Description
(1)	Security cable slot	Attaches an optional security cable to the computer. **NOTE:** The security cable is designed to act as a deterrent, but it may not prevent the computer from being mishandled or stolen.
(2)	Power connector	Connects an AC adapter.
(3)	Battery light	• Amber: A battery is charging. • White: A battery is close to full charge capacity. • Off: If the computer is plugged into an external power source, the light turns off when all batteries in the computer are fully charged. If the computer is not plugged into an external power source, the light stays off until the battery reaches a low battery level.
(4)	Vent	Enables airflow to cool internal components. **NOTE:** The computer fan starts up automatically to cool internal components and prevent overheating. It is normal for the internal fan to cycle on and off during routine operation.
(5)	External monitor port	Connects an external VGA monitor or projector.
(6)	RJ-45 (network) jack	Connects a network cable.
(7)	HDMI port	Connects an optional HDMI device.
(8)	Combo eSATA/USB port	Connects an optional USB device or high-performance eSATA components, such as an eSATA external solid-state module.
(9)	USB port	Connects optional USB device.
(10)	ExpressCard slot	Supports optional ExpressCards.

Bottom components



Component		Description
(1)	Battery release latches (2)	Release the battery from the battery bay.
(2)	Battery bay	Holds the battery.

Display

NOTE: Your computer may look slightly different from the illustration in this section.

Component		Description
(1)	Internal display switch	Turns off the display if the display is closed while the power is on.
(2)	Internal microphone	Records sound.

Wireless antennas (select models only)

The antennas send and receive signals from one or more wireless devices. These antennas are not visible from the outside of the computer.

Component	Description
WLAN antennas (2)*	Send and receive wireless signals to communicate with wireless local area networks (WLANs).
*For optimal transmission, keep the areas immediately around the antennas 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.

Additional hardware components

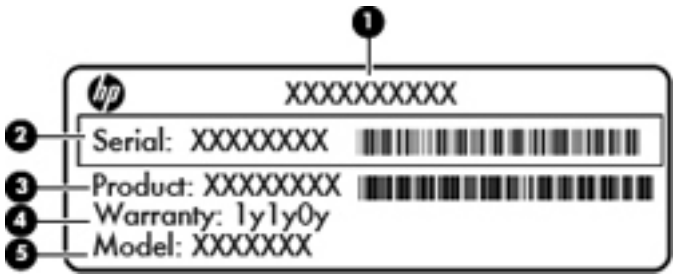
Component		Description
(1)	Power cord*	Connects an AC adapter to an AC outlet.
(2)	Battery*	Powers the computer when the computer is not plugged into an external power source.
(3)	AC adapter	Converts AC power to DC power.

*Batteries and power cords vary in appearance by country or region.

3 Illustrated parts catalog

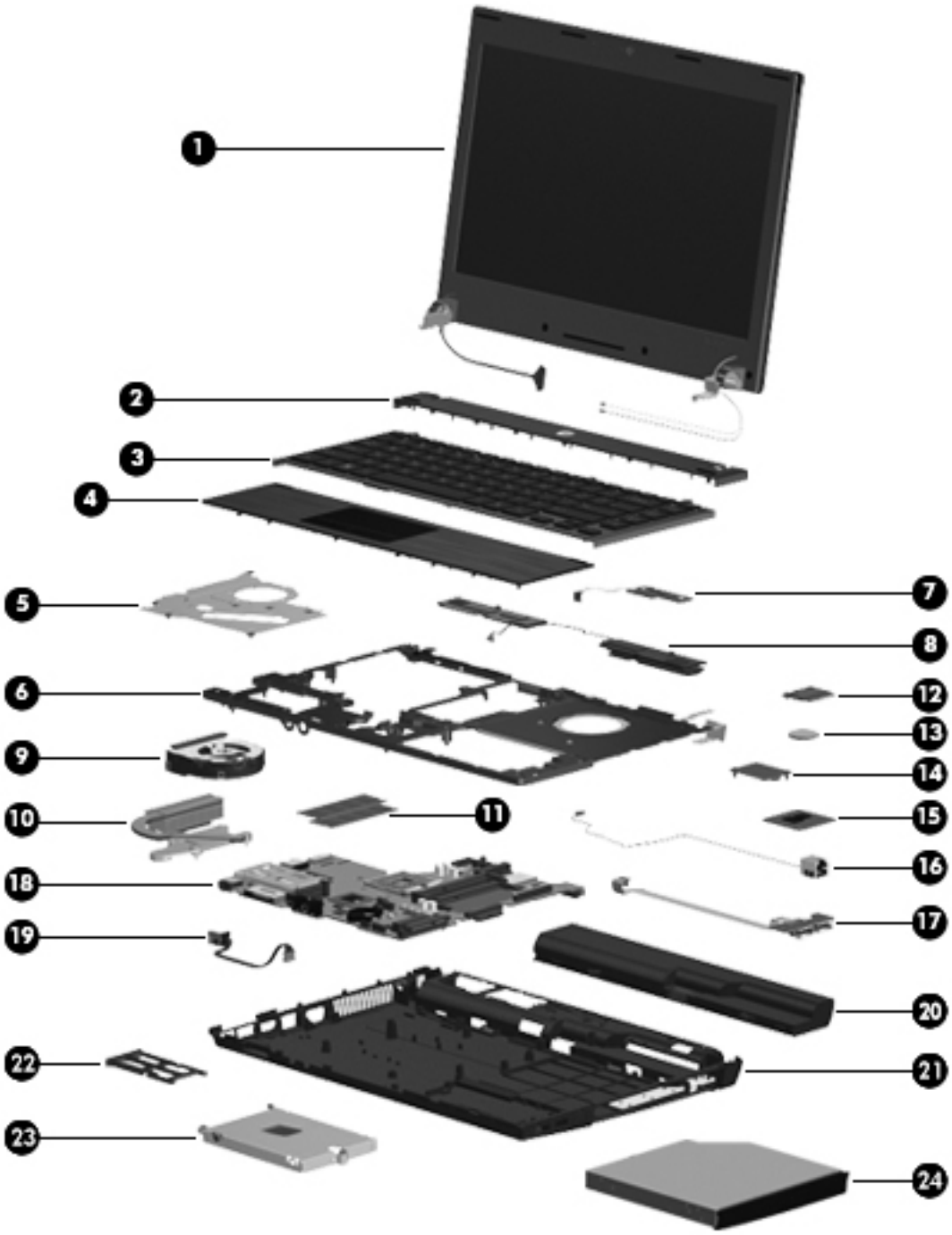
Service tag

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



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

Computer major components



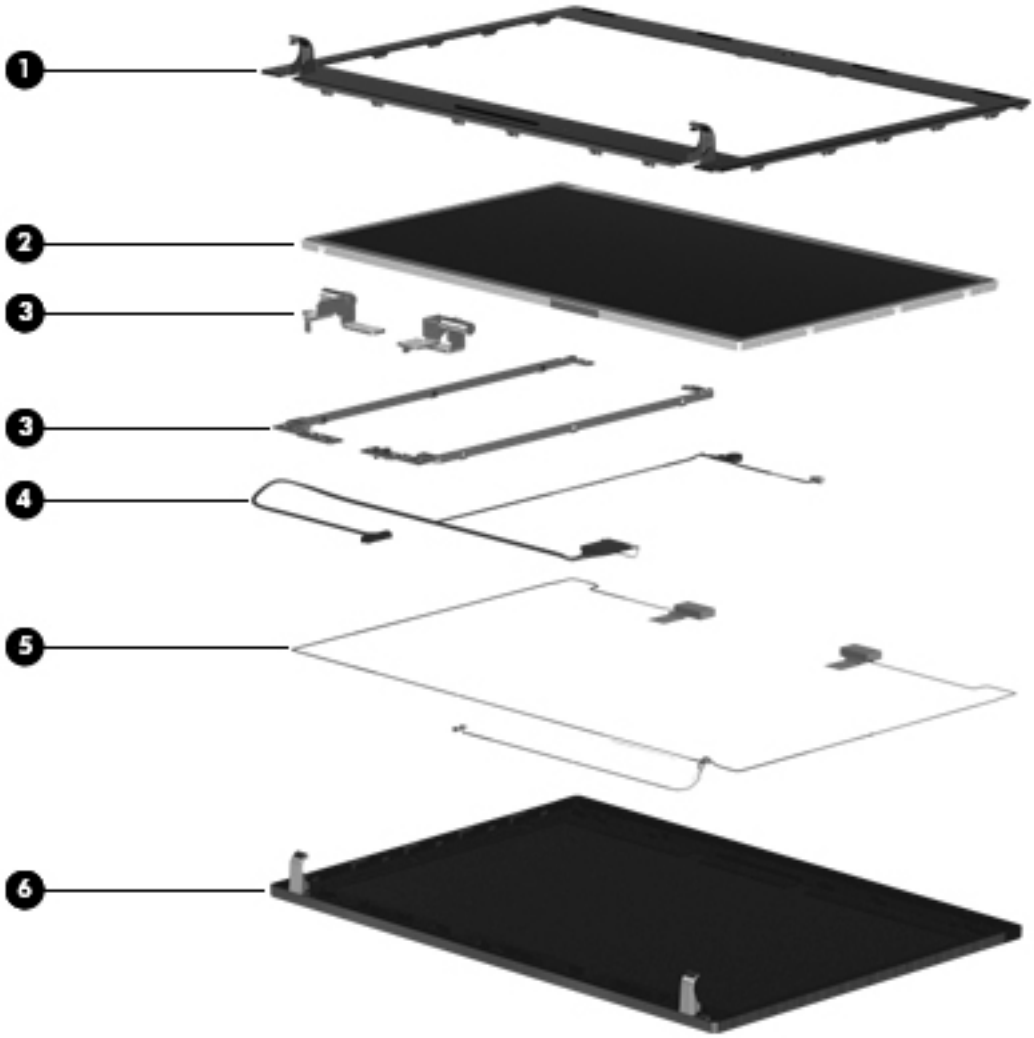
Item	Description	Spare part number
(1)	**33.8-cm (13.3-in) high-definition (1366x768 resolution) display assembly** (see Display assembly components on page 20 for more information on display assembly spare parts).	599553-001
(2)	**Switch cover**	599567-001
(3)	**Keyboard** (includes keyboard cable)	

Item	Description	Spare part number
	• For use in Belgium	599572-A41
	• For use in Brazil	599572-201
	• For use in Bulgaria	599572-261
	• For use in Canada (French)	599572-121
	• For use in Denmark	599572-081
	• For use in Europe	599572-B31
	• For use in France	599572-051
	• For use in Germany	599572-041
	• For use in Greece	599572-DJ1
	• For use in Hungary	599572-211
	• For use in Iceland	599572-DD1
	• For use in Israel	599572-BB1
	• For use in Italy	599572-061
	• For use in Japan	599572-291
	• For use in South Korea	599572-AD1
	• For use in Latin America	599572-161
	• For use in Norway	599572-091
	• For use in Portugal	599572-131
	• For use in Russia	599572-251
	• For use in Saudi Arabia	599572-171
	• For use in Spain	599572-071
	• For use in Sweden and Finland	599572-B71
	• For use in Switzerland	599572-BG1
	• For use in Taiwan	599572-AB1
	• For use in Thailand	599572-281
	• For use in the Adriatic region	599572-BA1
	• For use in the United Kingdom	599572-031
	• For use in the United States	599572-001
	• For use in Turkey	599572-141
(4)	**Palm rest** (includes TouchPad)	599551-001
(5)	**Top heat shield/bracket** (included with top cover)	
(6)	**Top cover**	599569-001
(7)	**Power button board with cable**	599517-001
(8)	**Speakers**	599566-001

Item	Description	Spare part number
(9)	**Fan**	599544-001
(10)	**Processor heat sink**	599546-001
(11)	**Memory module** (PC3-10600, 1333-MHz, DDR3, shared)	
	2048-MB	598856-002
	1024-MB	598859-002
(12)	**Modem module** **NOTE:** The modem module spare part kit does not include a modem module cable. The modem module cable is included in the Cable Kit. See Cable Kit on page 22 for more Cable Kit spare part information.	
	High-speed 56K modem for use in all countries and regions except Australia and New Zealand	510100-001
	High-speed 56K modem for use in Australia and New Zealand	510100-011
(13)	**RTC battery**	599516-001
(14)	**WLAN module**	
	Broadcom 4312G 802.11b/g WiFi Adapter	
	For use in Barbados, Belize, Canada, the Cayman Islands, Guam, Puerto Rico, the United States, and the U.S. Virgin Islands	504593-003
	For use in Afghanistan, Albania, Algeria, Andorra, Angola, Antigua and Barbuda, Argentina, Armenia, Australia, Austria, Azerbaijan, the Bahamas, Bahrain, Belarus, Belgium, Benin, Bermuda, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Brunei, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, the Central African Republic, Chad, Chile, 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, Gabon, Gambia, Georgia, Germany, Ghana, Gibraltar, Greece, Grenada, Guadeloupe, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hong Kong, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, the Ivory Coast, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kiribati, Kuwait, Laos, Latvia, Lebanon, Lesotho, Liberia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Madagascar, Malawi, Malaysia, the Maldives, Mali, Malta, the Marshall Islands, Mauritania, Mauritius, Mexico, Micronesia, Monaco, Mongolia, Montenegro, Morocco, Mozambique, Namibia, Nauru, Nepal, the Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Palau, Panama, Papua New Guinea, Paraguay, the People's Republic of China, Peru, the Philippines, Poland, Portugal, Qatar, the Republic of Moldova, Romania, Russia, Rwanda, Samoa, San Marino, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, the Seychelles, Sierra Leone, Singapore, Slovakia, Slovenia, the Solomon Islands, Somalia, South Africa, South Korea, Spain, Sri Lanka, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Swaziland, Sweden, Switzerland, Taiwan, Tajikistan, Tanzania, Thailand, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Tuvalu, Uganda, Ukraine, the United Arab Emirates, the United Kingdom, Uruguay, Uzbekistan, Vanuatu, Venezuela, Vietnam, Yemen, Zambia, and Zimbabwe	504593-004
	Broadcom 43224 802.11a/b/g/n 2x2 WiFi Adapter	
	For use in Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Canada, Guam, Guinea, Haiti, Jamaica, Nether Antilles, Puerto Rico, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, the United States, and the U.S. Virgin Islands	582564-001

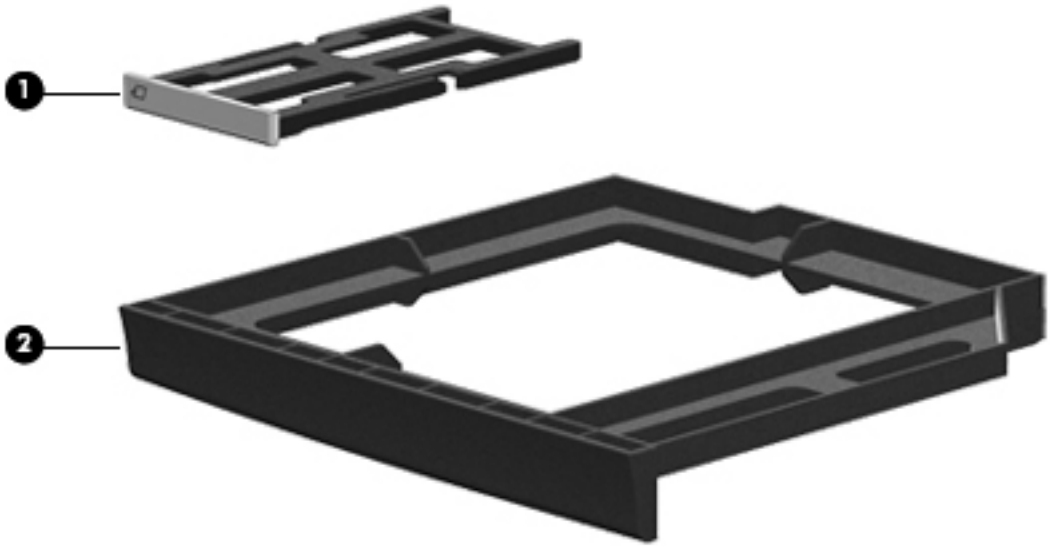
Item	Description	Spare part number
	For use in Afghanistan, Albania, Algeria, Andorra, Angola, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahrain, Belarus, Belgium, Benin, Bermuda, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, the British Virgin Islands, Brunei, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, the Cayman Islands, the Central African Republic, Chad, Chile, 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-Bissau, Honduras, Hong Kong, Hungary, Iceland, India, Ireland, Italy, the Ivory Coast, Japan, Jordan, Kazakhstan, Kenya, Kiribati, Kuwait, 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 Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Palau, Panama, Papua New Guinea, Paraguay, the People's Republic of China, Peru, the Philippines, Poland, Portugal, Qatar, the Republic of Moldova, Romania, Russia, Rwanda, Samoa, San Marino, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, the Seychelles, Sierra Leone, Singapore, Slovakia, Slovenia, the Solomon Islands, Somalia, South Africa, South Korea, Spain, Sri Lanka, Swaziland, Sweden, Switzerland, Syria, Taiwan, Tajikistan, Tanzania, Thailand, 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	582564-002
(15)	**Processor** (Intel® Arrandale™ P4500 1.8-GHz, includes replacement thermal material)	611699-001
(16)	**RJ-11 (modem) jack and cable** See Cable Kit on page 22 for more Cable Kit spare part information.	
(17)	**USB connector board and cable**	599524-001
(18)	**System board** (includes replacement thermal material)	614524-001
(19)	**Power connector and cable** (DC power) See Cable Kit on page 22 for more Cable Kit spare part information.	
(20)	**Battery**	
	9-cell, 93-Wh (2.8-Ah) Li-ion	593573-001
	6-cell, 47-Wh (2.2-Ah) Li-ion	593572-001
(21)	**Base enclosure**	599514-001
(22)	**ExpressCard slot bezel** (included in Plastics Kit, see Plastics Kit on page 21)	
(23)	**Solid-state module** (includes bracket)	
	2-GB	614527-001
	4-GB	614528-001
	8-GB	634653-001
(24)	**DVD-ROM drive** (includes bezel)	599539-001

Display assembly components



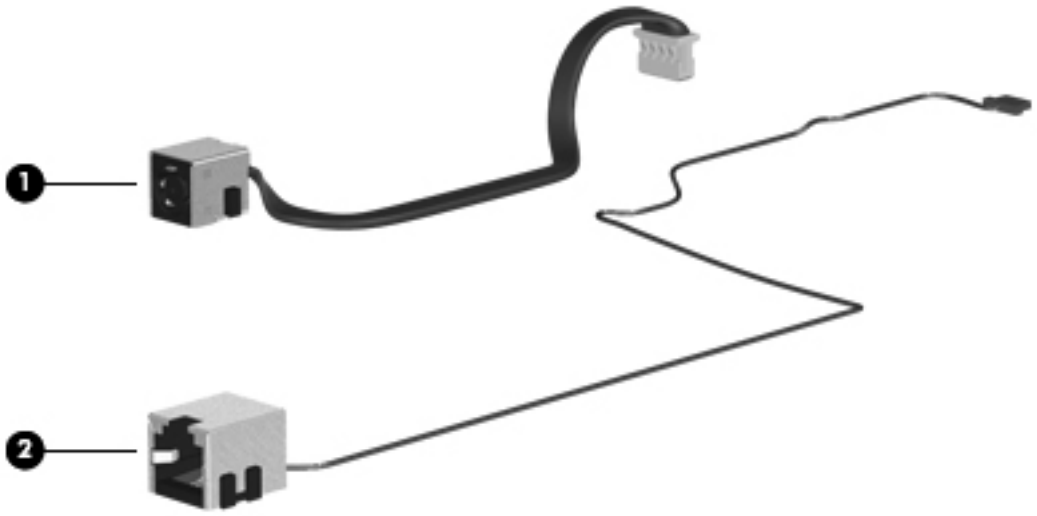
Item	Description	Spare part number
	Display assembly:	599553-001
(1)	**Display bezel**	599532-001
(2)	**Display panel** (available separately in APJ, using part number 623175-001)	
(3)	**Display Hinge Kit** (includes display hinges and left and right panel brackets)	599536-001
(4)	**Display cable and microphone**	605557-001
(5)	**2 WLAN antennas and cables** (included with back cover)	
(6)	**Display back cover** (includes 2 WLAN antennas and cables and 1 microphone)	599526-001

Plastics Kit



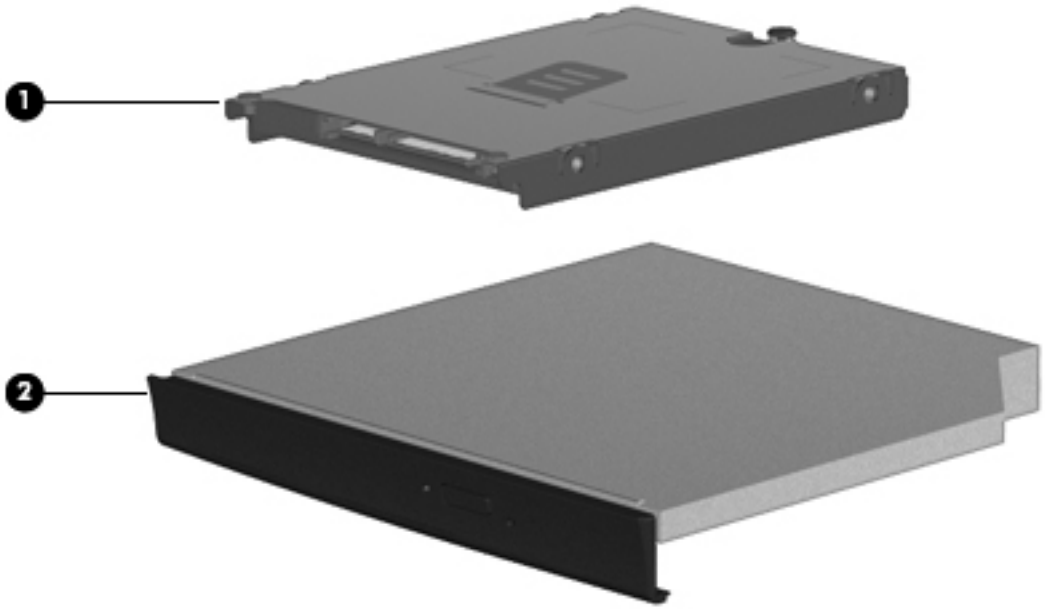
Item	Description	Spare part number
	Plastics Kit:	599563-001
(1)	ExpressCard slot bezel	
(2)	DVD-ROM drive blank (used with no-ODD option)	
	RJ-11 (modem) connector blank (not illustrated, used with no-modem option)	

Cable Kit



Item	Description	Spare part number
	Cable Kit:	599525-001
(1)	Power connector and cable	
(2)	RJ-11 (modem) jack and cable	

Mass storage devices



Item	Description	Spare part number
(1)	**Solid-state module** (includes bracket)	
	2-GB	614527-001
	4-GB	614528-001
	8-GB	634653-001
(2)	**DVD-ROM drive** (includes bezel)	599539-001

Miscellaneous parts

Description	Spare part number
AC adapters	
65-W, 3-pin Smart AC adapter	
• For use in all countries and regions except India	609939-001
• For use in India	609948-001
Power cords (AC power, 3-pin, black, 1.83 m)	
• For use in Argentina	490371-D01
• For use in Austria	490371-011
• For use in Brazil	490371-202
• For use in Denmark	490371-081
• For use in Europe	490371-021
• For use in India	490371-D61
• For use in Israel	490371-BB1
• For use in Italy	490371-061
• For use in Japan	490371-291
• For use in North America	490371-001
• For use in the People's Republic of China	490371-AA1
• For use in South Africa	490371-AR1
• For use in South Korea	490371-AD1
• For use in Switzerland	490371-111
• For use in Taiwan	490371-AB1
• For use in the United Kingdom and Singapore	490371-031
Rubber Kit (includes display bumpers, display screw covers, base enclosure feet, and display hinge bumpers)	599564-001
Screw Kit, includes: • Slotted T8 M2.5x6.5 • Slotted T8 M2.5x5.0 • Slotted T8 M2.5x3.0 • P1 M2.5x5.0 • P1 M2.5x3.0 • P1 M2.0x3.0 • P0 M2.0x2.5 • PM3.0x3.5	599565-001

Sequential part number listing

Spare part number	Description
490371-001	Power cord (AC power, 3-pin, black, 1.83 m), for use in North America
490371-011	Power cord (AC power, 3-pin, black, 1.83 m), for use in Austria
490371-021	Power cord (AC power, 3-pin, black, 1.83 m), for use in Europe
490371-031	Power cord (AC power, 3-pin, black, 1.83 m), for use in the United Kingdom and Singapore
490371-061	Power cord (AC power, 3-pin, black, 1.83 m), for use in Italy
490371-081	Power cord (AC power, 3-pin, black, 1.83 m), for use in Denmark
490371-111	Power cord (AC power, 3-pin, black, 1.83 m), for use in Switzerland
490371-202	Power cord (AC power, 3-pin, black, 1.83 m), for use in Brazil
490371-291	Power cord (AC power, 3-pin, black, 1.83 m), for use in Japan
490371-AA1	Power cord (AC power, 3-pin, black, 1.83 m), for use in the People's Republic of China
490371-AB1	Power cord (AC power, 3-pin, black, 1.83 m), for use in Taiwan
490371-AD1	Power cord (AC power, 3-pin, black, 1.83 m), for use in South Korea
490371-AR1	Power cord (AC power, 3-pin, black, 1.83 m), for use in South Africa
490371-BB1	Power cord (AC power, 3-pin, black, 1.83 m), for use in Israel
490371-D01	Power cord (AC power, 3-pin, black, 1.83 m), for use in Argentina
490371-D61	Power cord (AC power, 3-pin, black, 1.83 m), for use in India
504593-003	Broadcom 4312G 802.11b/g WiFi Adapter for use in Barbados, Belize, Canada, the Cayman Islands, Guam, Puerto Rico, the United States, and the U.S. Virgin Islands
504593-004	Broadcom 4312G 802.11b/g WiFi Adapter for use in Afghanistan, Albania, Algeria, Andorra, Angola, Antigua and Barbuda, Argentina, Armenia, Australia, Austria, Azerbaijan, the Bahamas, Bahrain, Belarus, Belgium, Benin, Bermuda, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Brunei, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, the Central African Republic, Chad, Chile, 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, Gabon, Gambia, Georgia, Germany, Ghana, Gibraltar, Greece, Grenada, Guadeloupe, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hong Kong, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, the Ivory Coast, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kiribati, Kuwait, Laos, Latvia, Lebanon, Lesotho, Liberia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Madagascar, Malawi, Malaysia, the Maldives, Mali, Malta, the Marshall Islands, Mauritania, Mauritius, Mexico, Micronesia, Monaco, Mongolia, Montenegro, Morocco, Mozambique, Namibia, Nauru, Nepal, the Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Palau, Panama, Papua New Guinea, Paraguay, the People's Republic of China, Peru, the Philippines, Poland, Portugal, Qatar, the Republic of Moldova, Romania, Russia, Rwanda, Samoa, San Marino, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, the Seychelles, Sierra Leone, Singapore, Slovakia, Slovenia, the Solomon Islands, Somalia, South Africa, South Korea, Spain, Sri Lanka, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Swaziland, Sweden, Switzerland, Taiwan, Tajikistan, Tanzania, Thailand, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Tuvalu, Uganda, Ukraine, the United Arab Emirates, the United Kingdom, Uruguay, Uzbekistan, Vanuatu, Venezuela, Vietnam, Yemen, Zambia, and Zimbabwe
510100-001	High-speed 56K modem for use in all countries and regions except Australia and New Zealand
510100-011	High-speed 56K modem for use in Australia and New Zealand

Spare part number	Description
582564-001	Broadcom 43224 802.11a/b/g/n 2x2 WiFi Adapter, for use in Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Canada, Guam, Guinea, Haiti, Jamaica, Nether Antilles, Puerto Rico, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, the United States, and the U.S. Virgin Islands
582564-002	Broadcom 43224 802.11a/b/g/n 2x2 WiFi Adapter, for use in Afghanistan, Albania, Algeria, Andorra, Angola, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahrain, Belarus, Belgium, Benin, Bermuda, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, the British Virgin Islands, Brunei, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, the Cayman Islands, the Central African Republic, Chad, Chile, 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-Bissau, Honduras, Hong Kong, Hungary, Iceland, India, Ireland, Italy, the Ivory Coast, Japan, Jordan, Kazakhstan, Kenya, Kiribati, Kuwait, 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 Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Palau, Panama, Papua New Guinea, Paraguay, the People's Republic of China, Peru, the Philippines, Poland, Portugal, Qatar, the Republic of Moldova, Romania, Russia, Rwanda, Samoa, San Marino, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, the Seychelles, Sierra Leone, Singapore, Slovakia, Slovenia, the Solomon Islands, Somalia, South Africa, South Korea, Spain, Sri Lanka, Swaziland, Sweden, Switzerland, Syria, Taiwan, Tajikistan, Tanzania, Thailand, 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
593572-001	Battery, 6-cell, 47-Wh (2.2-Ah) Li-ion
593573-001	Battery, 9-cell, 93-Wh (2.8-Ah) Li-ion
598856-002	Memory module (PC3-10600 shared), 2048-MB
598859-002	Memory module (PC3-10600 shared), 1024-MB
599514-001	Base enclosure
599516-001	RTC battery
599517-001	Power button board with cable
599524-001	USB board and cable
599525-001	Cable Kit
599526-001	Display back cover (includes 2 WLAN antennas and cables and 1 microphone)
599532-001	Display bezel
599536-001	Display Hinge Kit (includes display hinges and left and right panel brackets)
599539-001	DVD-ROM drive
599544-001	Fan
599546-001	Processor heat sink
599551-001	Palm rest with TouchPad
599553-001	**33.8-cm** (13.3-in) HD (1366x768 resolution) display assembly
599563-001	Plastics Kit
599564-001	Rubber Kit

Spare part number	Description
599565-001	Screw Kit
599566-001	Speaker assembly
599567-001	Switch cover
599569-001	Top cover
599572-001	Keyboard, for use in the United States
599572-031	Keyboard, for use in the United Kingdom
599572-041	Keyboard, for use in Germany
599572-051	Keyboard, for use in France
599572-061	Keyboard, for use in Italy
599572-071	Keyboard, for use in Spain
599572-081	Keyboard, for use in Denmark
599572-091	Keyboard, for use in Norway
599572-121	Keyboard, for use in Canada (French)
599572-131	Keyboard, for use in Portugal
599572-141	Keyboard, for use in Turkey
599572-161	Keyboard, for use in Latin America
599572-171	Keyboard, for use in Saudi Arabia
599572-201	Keyboard, for use in Brazil
599572-211	Keyboard, for use in Hungary
599572-251	Keyboard, for use in Russia
599572-261	Keyboard, for use in Bulgaria
599572-281	Keyboard, for use in Thailand
599572-291	Keyboard, for use in Japan
599572-A41	Keyboard, for use in Belgium
599572-AB1	Keyboard, for use in Taiwan
599572-AD1	Keyboard, for use in South Korea
599572-B31	Keyboard, for use in Europe
599572-B71	Keyboard, for use in Sweden and Finland
599572-BA1	Keyboard, for use in the Adriatic region
599572-BB1	Keyboard, for use in Israel
599572-BG1	Keyboard, for use in Switzerland
599572-DD1	Keyboard, for use in Iceland
599572-DJ1	Keyboard, for use in Greece
605557-001	Display cable

Spare part number	Description
609939-001	65-W, 3-pin Smart AC adapter for use in all countries and regions except India
609948-001	65-W, 3-pin Smart AC adapter for use in India
611699-001	Processor (Intel® Arrandale™ P4500 1.8-GHz, includes replacement thermal material)
614524-001	System board
614527-001	2-GB solid-state module (includes bracket)
614528-001	4-GB solid-state module (includes bracket)
623175-001	Display panel (APJ only)
623987-001	Display bezel logo
634653-001	8-GB solid-state module (includes bracket)

4 Removal and replacement procedures

Preliminary replacement requirements

Tools required

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

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

Service considerations

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

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

Plastic parts

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

Cables and connectors

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

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

Drive handling

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

Before removing or inserting a solid-state module, shut down the computer.

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 solid-state module, an optical drive, or a diskette drive, place it in a static-proof bag.

Avoid exposing a solid-state module to products that have magnetic fields, such as monitors or speakers.

Avoid exposing a drive to temperature extremes or liquids.

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

Grounding guidelines

Electrostatic discharge damage

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

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

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

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

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

Use nonmagnetic tools.

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

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

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

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

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

Typical electrostatic voltage levels

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

Packaging and transporting guidelines

Follow these grounding guidelines when packaging and transporting equipment:

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

Workstation guidelines

Follow these grounding workstation guidelines:

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

Equipment guidelines

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

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

The following grounding equipment is recommended to prevent electrostatic damage:

- Antistatic 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

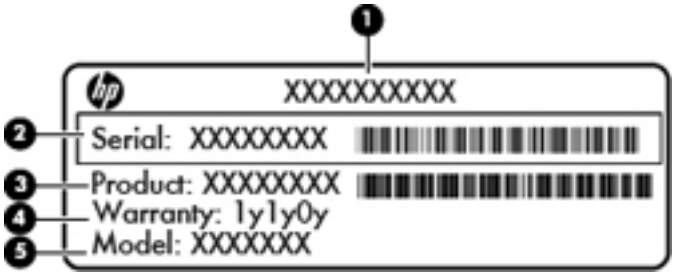
Component replacement procedures

This section provides removal and replacement procedures.

There are as many as 83 screws, in 8 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.

Service tag

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

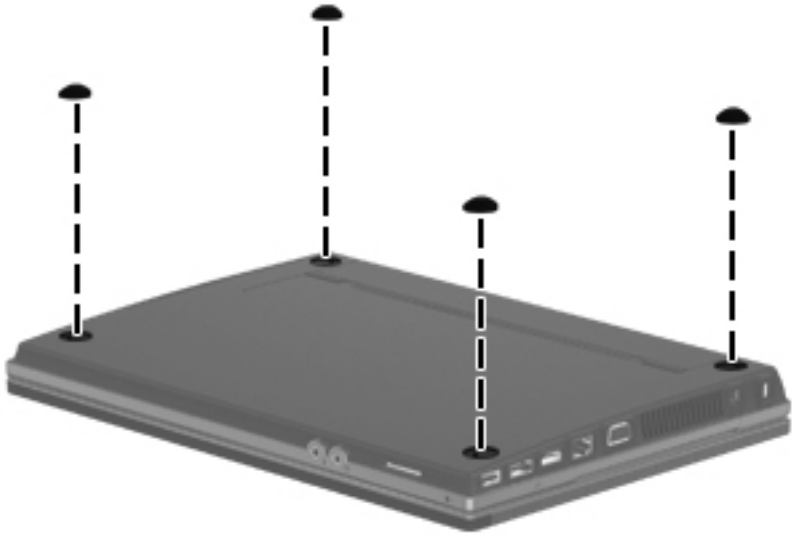


Component		Description
(1)	Product name	The product name affixed to the front of your computer.
(2)	Serial number (s/n)	An alphanumeric number that is unique to each product.
(3)	Part number/Product number (p/n)	The number that provides specific information about the product's hardware components. The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

Computer feet

Description	Spare part number
Rubber Kit (includes computer feet)	599564-001

The computer feet are adhesive-backed rubber pads. The feet are included in the Rubber Kit, spare part number 599564-001. There are 4 rubber feet that attach to the base enclosure in the locations illustrated below.



Battery

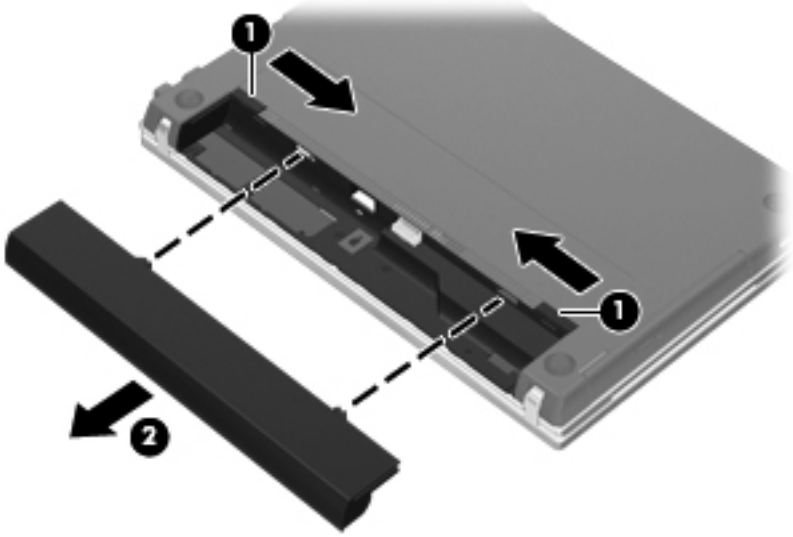
Description	Spare part number
Battery	
9-cell, 93-Wh (2.8-Ah) Li-ion	593573-001
6-cell, 47-Wh (2.2-Ah) Li-ion	593572-001

Before disassembling the computer, follow these steps:

1. Shut down the computer.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.

Remove the battery:

1. Position the computer upside-down on a flat surface with the battery bay toward you.
2. Slide the two battery release latches **(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.

Switch cover

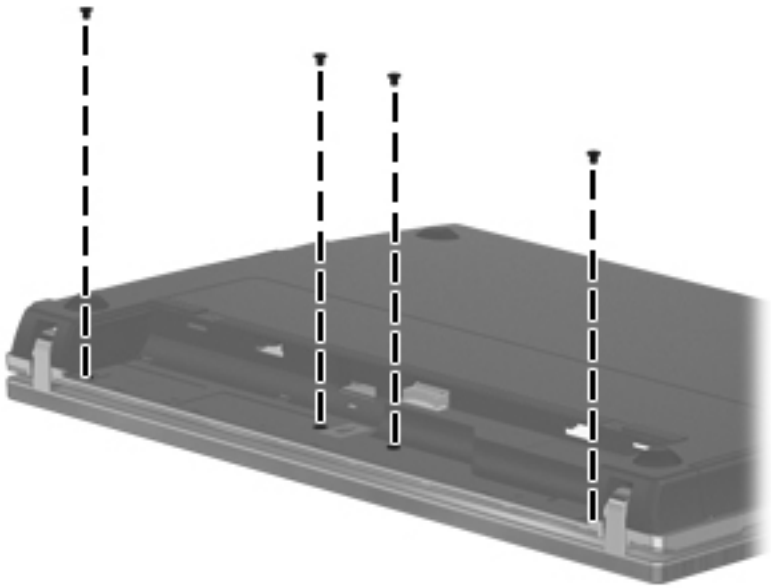
Description	Spare part number
Switch cover	599567-001

Before removing the switch cover, follow these steps:

1. Shut down the computer.
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 36).

Remove the switch cover:

1. Position the computer upside down with the rear toward you.
2. Remove the four PM2.5×3.0 screws in the battery bay.



3. Turn the computer right-side up, and open the computer as far as possible.

4. Slide the switch cover back **(1)**, and then remove it from the computer **(2)**.

Reverse this procedure to install the switch cover and keyboard.

Keyboard

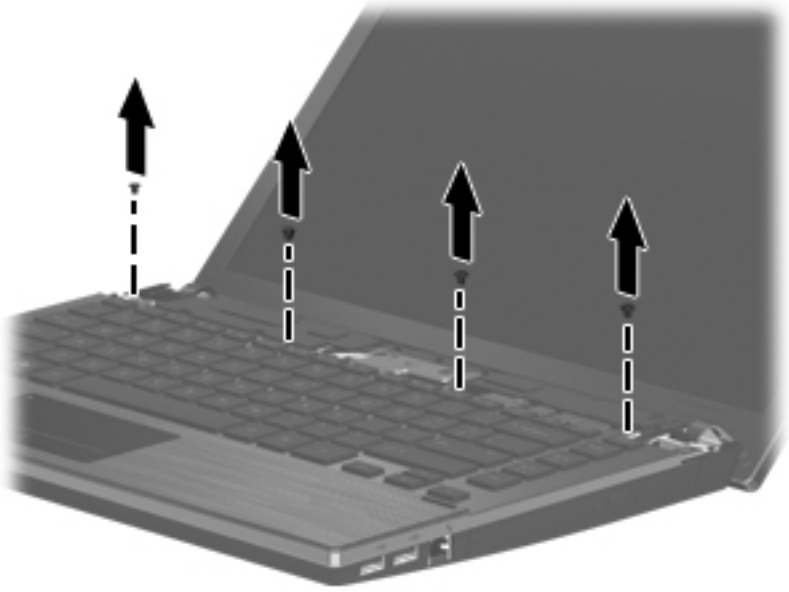
Description	Spare part number
Keyboard (includes keyboard cable)	599572-*xxx*
NOTE: For a detailed list of keyboards see the parts list in Computer major components on page 16	

Before removing the keyboard, follow these steps:

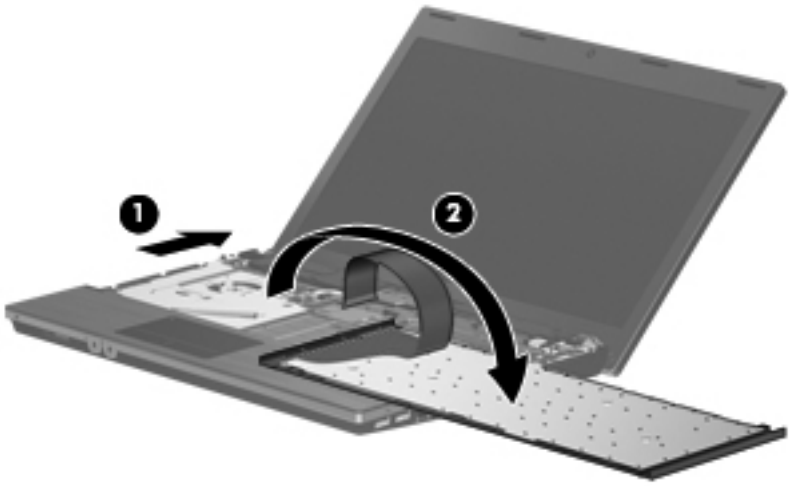
1. Shut down the computer.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 36).
5. Remove the switch cover (see Switch cover on page 37).

Remove the keyboard:

1. Remove the four PM2.5×3.0 screws that secure the keyboard to the computer.

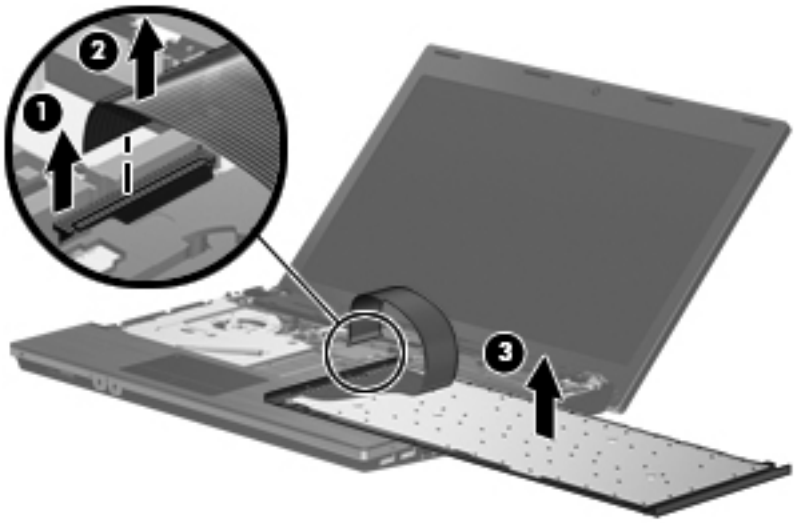


2. Slide the keyboard back toward the display **(1)**, and then rotate it right **(2)** until it rests upside down on the right side of the computer.



3. Release the zero insertion force (ZIF) connector **(1)** to which the keyboard cable is attached, and disconnect the keyboard cable **(2)** from the system board.

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



Reverse this procedure to install the keyboard.

Memory module

Description	Spare part number
Memory module (PC3-10600, 1333-MHz, DDR3, shared)	
2048-MB	598856-002
1024-MB	598859-002

Before removing the memory module, follow these steps:

1. Shut down the computer.
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 36).
5. Remove the switch cover (see Switch cover on page 37).
6. Remove the keyboard (see Keyboard on page 39).

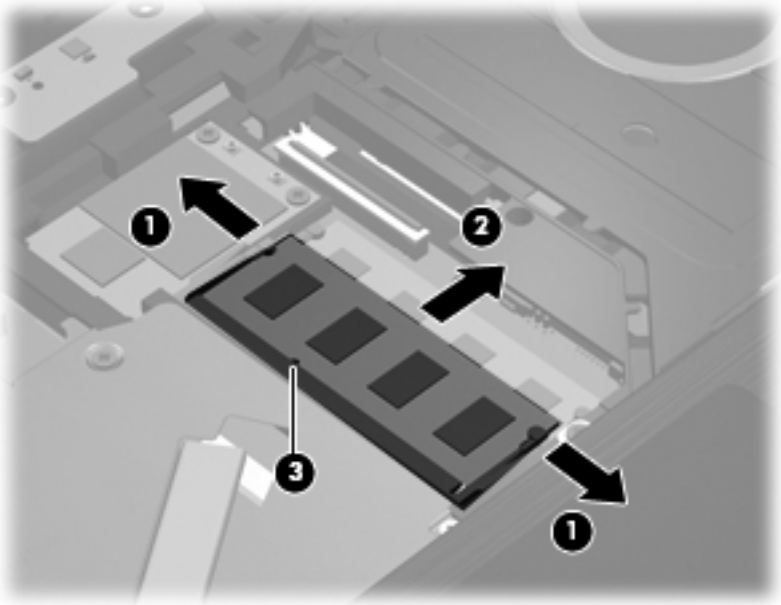
NOTE: You can release the keyboard without removing the keyboard cable from the system board, and then rotate it right until it rests upside down on the right side of the computer to remove the memory modules.

Remove the memory module:

1. Position the computer right-side up with the front toward you.
2. Spread the retaining tabs **(1)** on each side of the memory module slot to release the memory module. (The edge of the module opposite the slot rises away from the computer.)

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

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



Reverse this procedure to install a memory module.

DVD-ROM drive

Description	Spare part number
DVD-ROM drive	599539-001

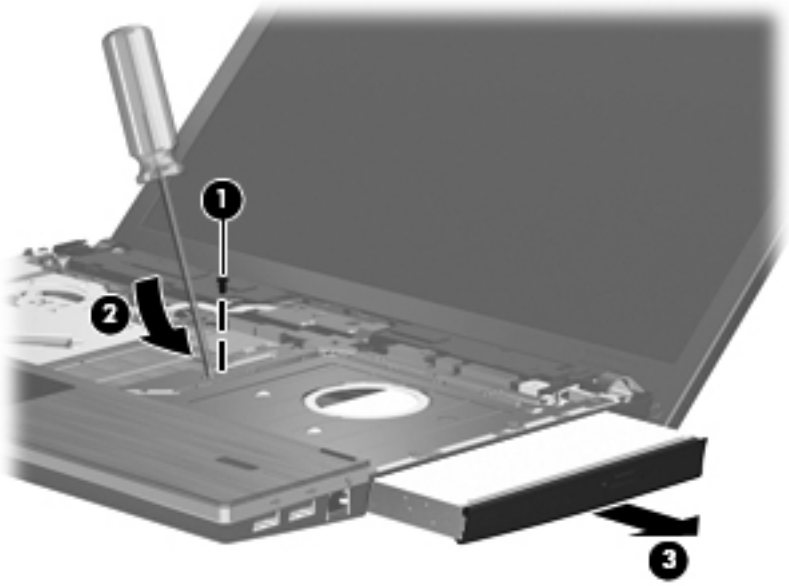
Before removing the DVD-ROM drive, follow these steps:

1. Shut down the computer.
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 36).
5. Remove the switch cover (see Switch cover on page 37).
6. Remove the keyboard (see Keyboard on page 39)

NOTE: You can release the keyboard without removing the keyboard cable from the system board, and then rotate it left until it rests upside down on the left side of the computer to remove the DVD-ROM drive.

Remove the DVD-ROM drive:

1. Position the computer with the right side toward you.
2. Remove the PM2.5×5.0 screw **(1)** that secures the DVD-ROM drive to the computer.
3. Insert a flat-bladed screwdriver or similar tool into the access point on the top cover, and press the DVD-ROM bracket **(2)** to the right to release the drive from the computer.
4. Remove the DVD-ROM drive **(3)** from the computer.



5. If it is necessary to replace the DVD-ROM drive bracket, position the DVD-ROM drive with the rear toward you.
6. Remove the two PM2.0×3.0 screws **(1)** that secure the DVD-ROM drive bracket to the DVD-ROM drive.
7. Remove the DVD-ROM drive bracket **(2)**.

Reverse this procedure to reassemble and install a DVD-ROM drive.

Power button board

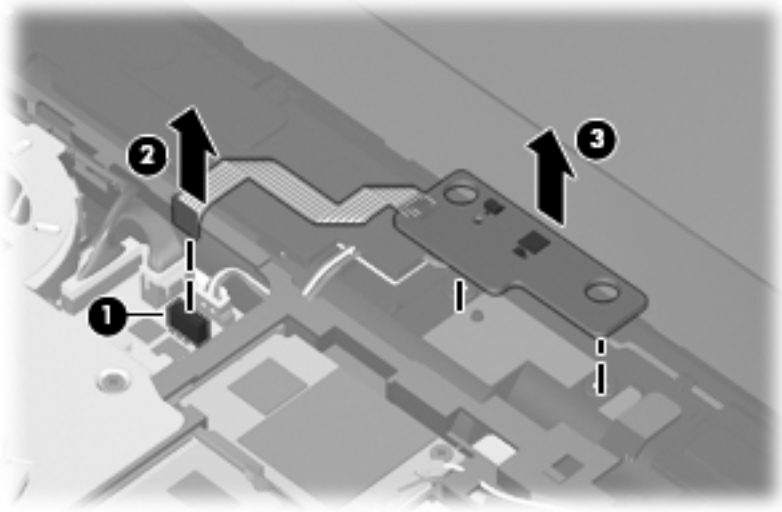
Description	Spare part number
Power button board with cable	599517-001

Before removing the power button board, follow these steps:

1. Shut down the computer.
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 36).
5. Remove the switch cover (see Switch cover on page 37).

Remove the power button board:

1. Release the LIF (low insertion force) connector that connects the power button board cable to the system board **(1)**, and then disconnect the power button board cable **(2)**.
2. Gently pull the power button board away from the double-sided tape that secures the board to the base enclosure.
3. Remove the power button board **(3)**.



Reverse this procedure to install the power button board.

Speakers

Description	Spare part number
Speaker assembly	599566-001

Before removing the speakers, follow these steps:

1. Shut down the computer.
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 36).
5. Remove the switch cover (see Switch cover on page 37).
6. Remove the keyboard.

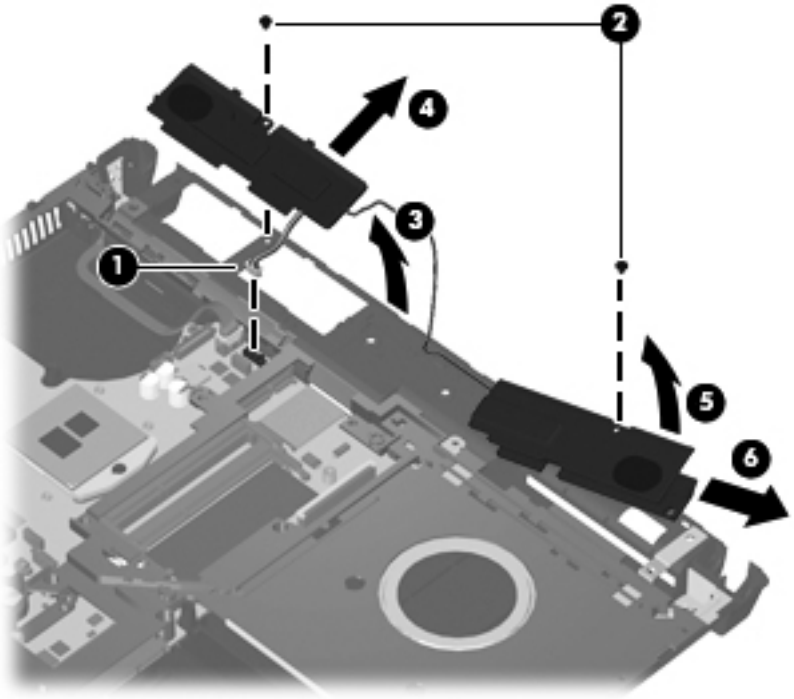
Remove the speakers:

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

NOTE: The two speakers are connected with a single cable.

3. Remove the two PM2.5×3.0 screws **(2)** that secure the speakers to the base enclosure.
4. Remove the speaker cable from the clips and routing channel.
5. Remove the tape holding the left speaker to the base enclosure.
6. Using a flat-bladed screwdriver, gently pry the left speaker from the base enclosure **(3)**, lifting the left speaker **(4)** up and away at an angle.

7. Slide the right speaker back and out from the tab **(5)** that holds it at the right, then lift the right speaker **(6)** up and out at an angle.



Reverse this procedure to install the speakers.

Palm rest

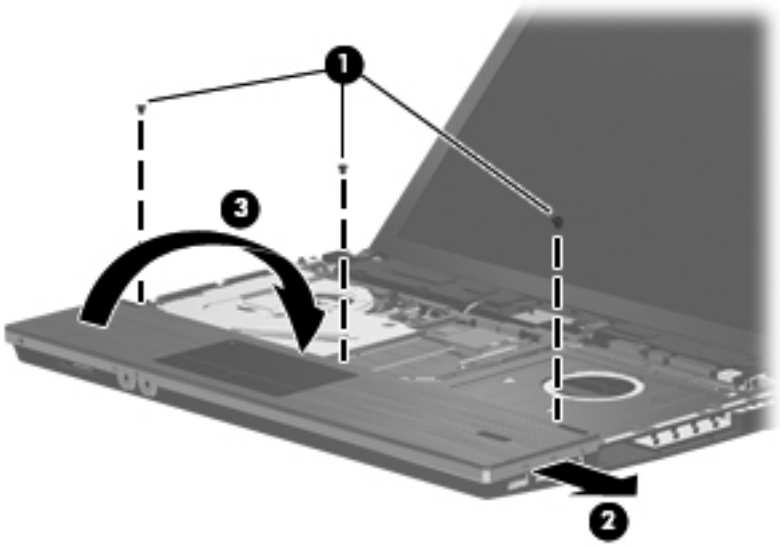
Description	Spare part number
Palm rest (includes TouchPad)	599551-001

Before removing the palm rest, follow these steps:

1. Shut down the computer.
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 36).
5. Remove the switch cover (see Switch cover on page 37).
6. Remove the keyboard (see Keyboard on page 39).

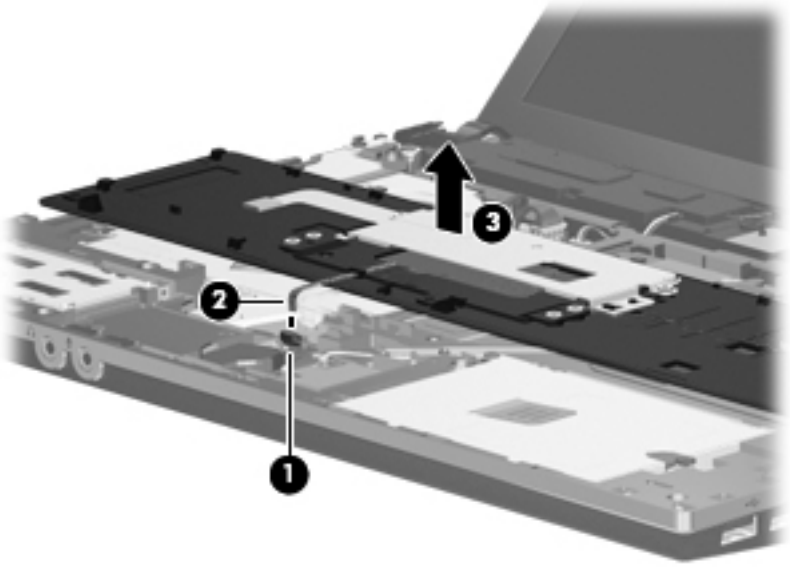
Remove the palm rest:

1. Position the computer right-side up with the front toward you.
2. Remove the three PM2.5×3.0 screws **(1)** that secure the palm rest to the computer.
3. Slide the palm rest to the right **(2)**, and then turn it over from the front edge **(3)** until it rests upside down on the top cover.



4. Release the TouchPad cable connector **(1)**, and then remove the TouchPad cable **(2)** from the system board.

5. Remove the palm rest **(3)**.



Reverse this procedure to install the palm rest.

Solid-state module

NOTE: The solid-state module spare part kit includes a solid-state module bracket.

Description	Spare part number
2-GB	614527-001
4-GB	614528-001
8-GB	634653-001

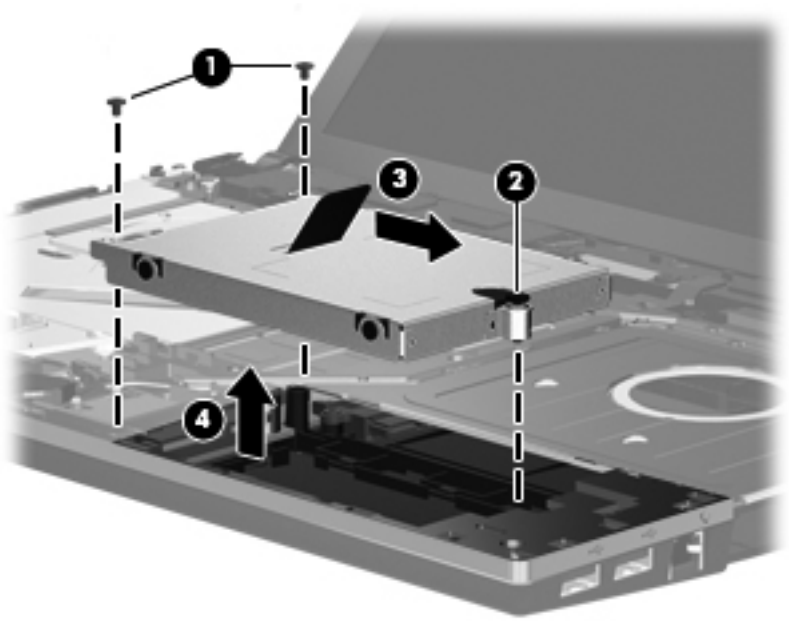
Before removing the solid-state module, follow these steps:

1. Shut down the computer.
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 36).
5. Remove the following components:
   a. Switch cover (see Switch cover on page 37)
   b. Keyboard (see Keyboard on page 39)
   c. Palm rest (see Palm rest on page 48)

Remove the solid-state module:

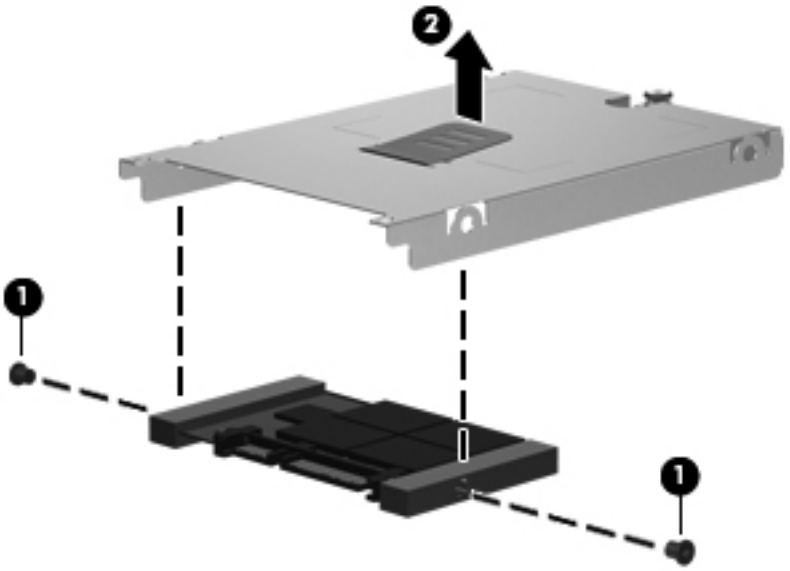
1. Position the computer right-side up with the front toward you.
2. Remove the two PM2.0×2.5 screws **(1)** and loosen the PM2.5×10.0 captive screw **(2)** that secures the solid-state module to the computer.
3. Grasp the Mylar tab on the solid-state module and slide the solid-state module **(3)** to the right to disconnect it from the system board.

4. Remove the solid-state module **(4)** from the solid-state module bay.



5. If it is necessary to replace the solid-state module bracket, remove the PM3.0×3.5 screws **(1)** from each side of the solid-state module.

6. Lift the bracket **(2)** straight up to remove it from the solid-state module.



Reverse this procedure to reassemble and install the solid-state module.

RTC battery

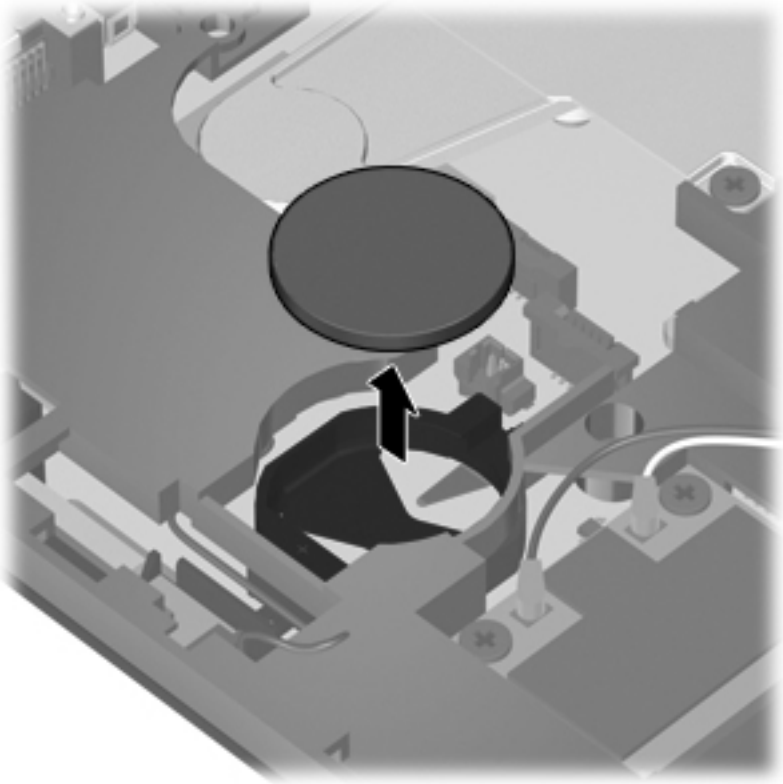
Description	Spare part number
RTC battery	599516-001

Before removing the RTC battery, follow these steps:

1. Shut down the computer.
2. Disconnect all external devices connected to the computer.
3. Disconnect 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 following components:
   a. Battery (see Battery on page 36)
   b. Switch cover (see Switch cover on page 37)
   c. Keyboard (see Keyboard on page 39)
   d. Palm rest (see Palm rest on page 48)

Remove the RTC battery:

1. Remove the tape from the top of the battery.
2. Remove the RTC battery from the system board.



Reverse this procedure to install the RTC battery.

WLAN module

Description	Spare part number
Broadcom 4312G 802.11b/g WiFi Adapter	
For use in Barbados, Belize, Canada, the Cayman Islands, Guam, Puerto Rico, the United States, and the U.S. Virgin Islands	504593-003
For use in Afghanistan, Albania, Algeria, Andorra, Angola, Antigua and Barbuda, Argentina, Armenia, Australia, Austria, Azerbaijan, the Bahamas, Bahrain, Belarus, Belgium, Benin, Bermuda, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Brunei, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, the Central African Republic, Chad, Chile, 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, Gabon, Gambia, Georgia, Germany, Ghana, Gibraltar, Greece, Grenada, Guadeloupe, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hong Kong, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, the Ivory Coast, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kiribati, Kuwait, Laos, Latvia, Lebanon, Lesotho, Liberia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Madagascar, Malawi, Malaysia, the Maldives, Mali, Malta, the Marshall Islands, Mauritania, Mauritius, Mexico, Micronesia, Monaco, Mongolia, Montenegro, Morocco, Mozambique, Namibia, Nauru, Nepal, the Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Palau, Panama, Papua New Guinea, Paraguay, the People's Republic of China, Peru, the Philippines, Poland, Portugal, Qatar, the Republic of Moldova, Romania, Russia, Rwanda, Samoa, San Marino, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, the Seychelles, Sierra Leone, Singapore, Slovakia, Slovenia, the Solomon Islands, Somalia, South Africa, South Korea, Spain, Sri Lanka, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Swaziland, Sweden, Switzerland, Taiwan, Tajikistan, Tanzania, Thailand, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Tuvalu, Uganda, Ukraine, the United Arab Emirates, the United Kingdom, Uruguay, Uzbekistan, Vanuatu, Venezuela, Vietnam, Yemen, Zambia, and Zimbabwe	504593-004
Broadcom 43224 802.11a/b/g/n 2x2 WiFi Adapter	
For use in Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Canada, Guam, Guinea, Haiti, Jamaica, Nether Antilles, Puerto Rico, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, the United States, and the U.S. Virgin Islands	582564-001
For use in Afghanistan, Albania, Algeria, Andorra, Angola, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahrain, Belarus, Belgium, Benin, Bermuda, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, the British Virgin Islands, Brunei, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, the Cayman Islands, the Central African Republic, Chad, Chile, 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-Bissau, Honduras, Hong Kong, Hungary, Iceland, India, Ireland, Italy, the Ivory Coast, Japan, Jordan, Kazakhstan, Kenya, Kiribati, Kuwait, 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 Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Palau, Panama, Papua New Guinea, Paraguay, the People's Republic of China, Peru, the Philippines, Poland, Portugal, Qatar, the Republic of Moldova, Romania, Russia, Rwanda, Samoa, San Marino, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, the Seychelles, Sierra Leone, Singapore, Slovakia, Slovenia, the Solomon Islands, Somalia, South Africa, South Korea, Spain, Sri Lanka, Swaziland, Sweden, Switzerland, Syria, Taiwan, Tajikistan, Tanzania, Thailand, 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	582564-002

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

Before removing the WLAN module, follow these steps:

1. Shut down the computer.
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 36).
5. Remove the following components:
   a. Switch cover (see Switch cover on page 37)
   b. Keyboard (see Keyboard on page 39)
   c. Palm rest (see Palm rest on page 48)

Remove the WLAN module:

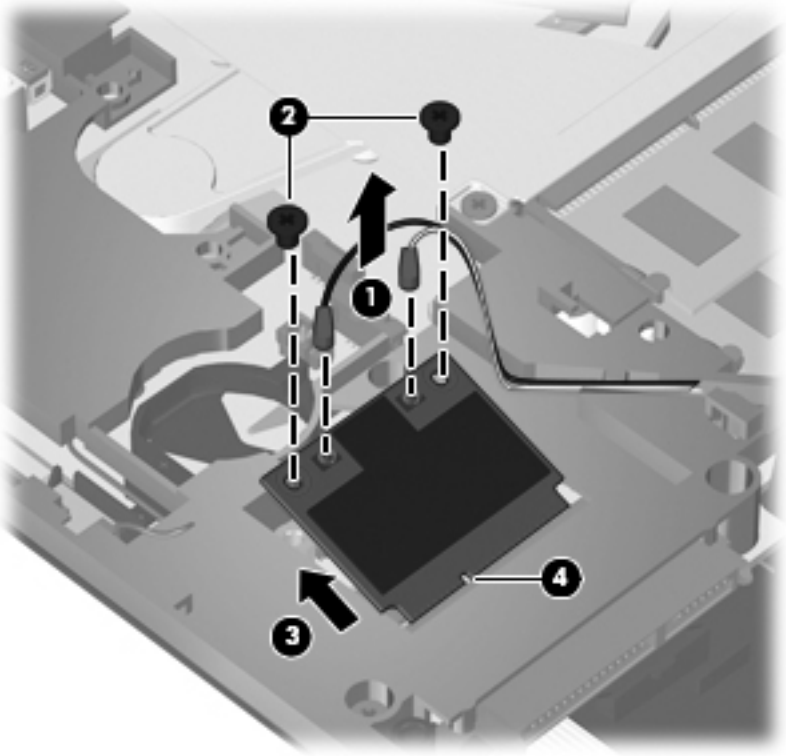
1. Position the computer right-side up with the front toward you.
2. Disconnect the WLAN antenna cables **(1)** from the terminals on the WLAN module.

NOTE: The black WLAN antenna cable is connected to the WLAN module “Main” terminal. The white WLAN antenna cable is connected to the WLAN module “Aux” terminal.

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

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

NOTE: WLAN modules are designed with a notch **(4)** to prevent incorrect insertion.



Reverse this procedure to install the WLAN module.

Heat sink and fan

NOTE: The heat sink spare part kit includes replacement thermal material.

Description	Spare part number
Fan	599544-001
Processor heat sink	599546-001

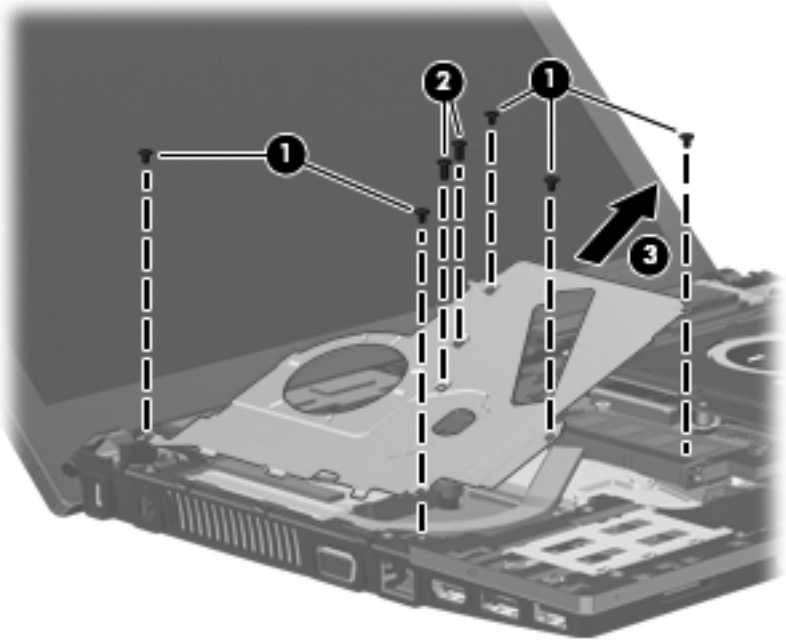
Before removing the heat sink, follow these steps:

1. Shut down the computer.
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 36).
5. Remove the following components:
   a. Switch cover (see Switch cover on page 37)
   b. Keyboard (see Keyboard on page 39)
   c. Palm rest (see Palm rest on page 48)

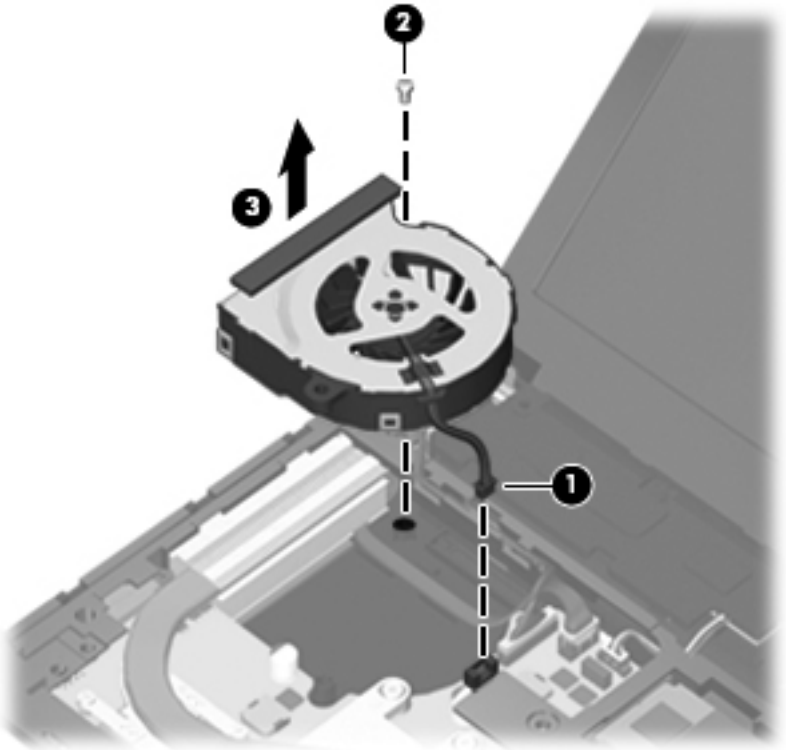
Remove the heat sink:

1. Position the computer right-side up with the front toward you.
2. Remove the five PM2.5×3.0 screws **(1)** that secure the heat shield to the top cover.
3. Remove the two PM2.5×5.0 screws **(2)** that secure the heat shield to the top cover.

4. Lift the right edge of the heat shield to disengage the tabs on the left side of the heat shield from the top cover, and then remove the heat shield **(3)**.

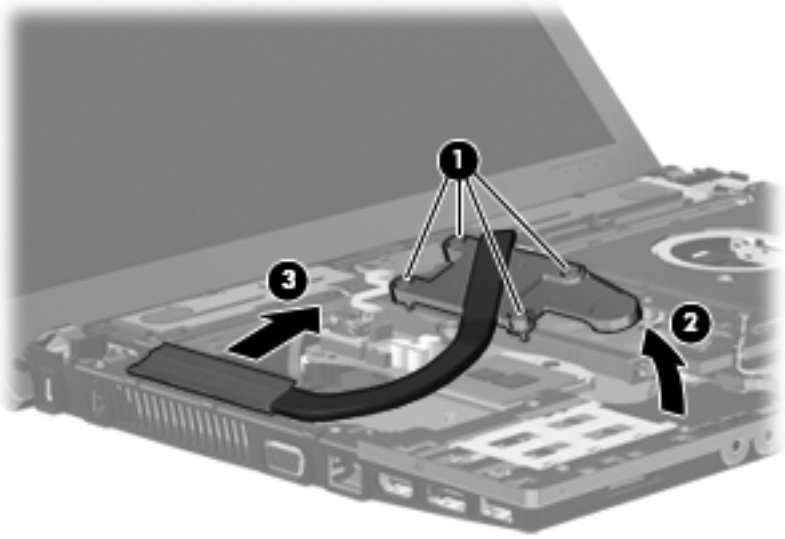


5. Disconnect the fan cable from the system board **(1)**.
6. Loosen the 2.0×5.0 captive screw **(2)** from the system board, and then remove the fan **(3)**.

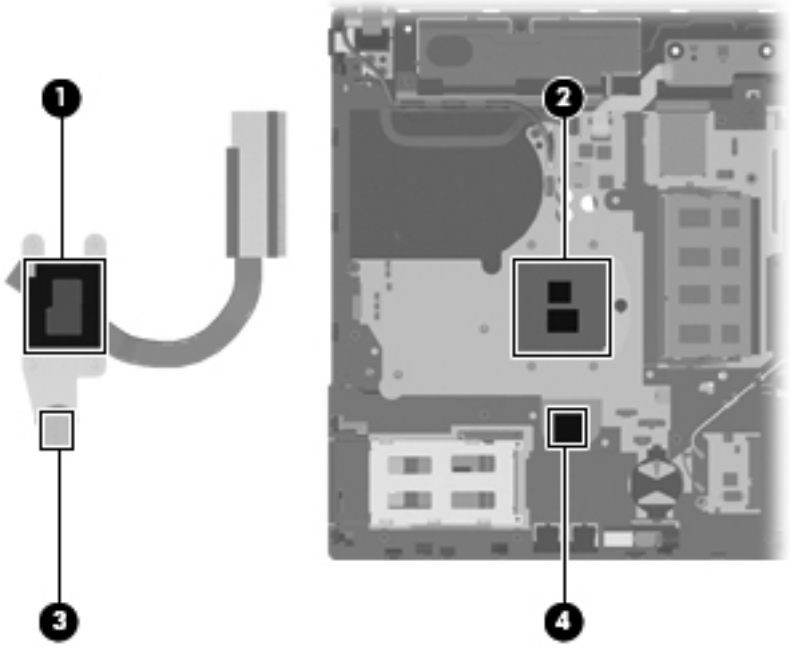


7. Following the sequence stamped into the heat sink, loosen the four PM2.5×10.0 captive screws **(1)** that secure the heat sink to the processor.

8. Lift the heat sink off the processor **(2)**, and then lift the heat sink up and to the right to remove the heat sink from the base enclosure **(3)**.



NOTE: The thermal material must be thoroughly cleaned from the surfaces of the heat sink, the discrete system board **(1)** and **(2)**, and the system board **(3)** and **(4)**, each time the heat sink is removed. Replacement thermal material is included with all heat sink, system board, and processor spare part kits.



Reverse this procedure to install the heat sink and fan.

Processor

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

Description	Spare part number
Processor, Intel Arrandale P4500 1.8-GHz, (includes replacement thermal material)	611699-001

Before removing the processor, follow these steps:

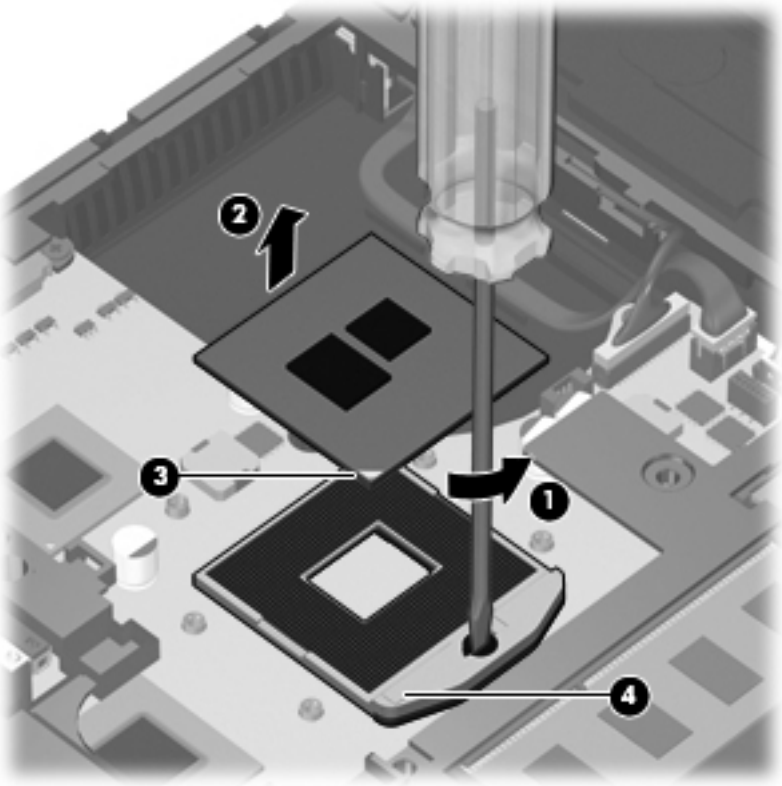
1. Shut down the computer.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 36).
5. Remove the following components:
   a. Switch cover (see Switch cover on page 37)
   b. Keyboard (see Keyboard on page 39)
   c. DVD-ROM drive (see DVD-ROM drive on page 43)
   d. Speakers (see Speakers on page 46)
   e. Palm rest (see Palm rest on page 48)
   f. Top cover (see Top cover on page 67)
   g. Heat shield, heat sink, and fan (see Heat sink and fan on page 57)

Remove the processor:

1. Position the computer right-side up with the front toward you.
2. Use a flat-bladed screwdriver to turn the processor locking screw **(1)** one-half turn counterclockwise until you hear a click.

3. Lift the processor **(2)** straight up and remove it.

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



Reverse this procedure to install the processor.

Display assembly

NOTE: The display assembly spare part kit includes 2 WLAN antennas and cables.

Description	Spare part number
Display assembly, 33.8-cm (13.3-in) HD (1366x768 resolution)	599553-001
• **Display bezel**	599532–001
• **Display panel** (available separately in APJ, using part number 623175-001)	
• **Display Hinge Kit** (includes display hinges and left and right panel brackets)	599536-001
• **Display cable and microphone**	605557-001
• **WLAN antennas and cables** (included with display assembly)	
• **Display back cover** (includes 2 WLAN antennas and cables and 1 microphone)	599526-001

Before removing the display assembly, follow these steps:

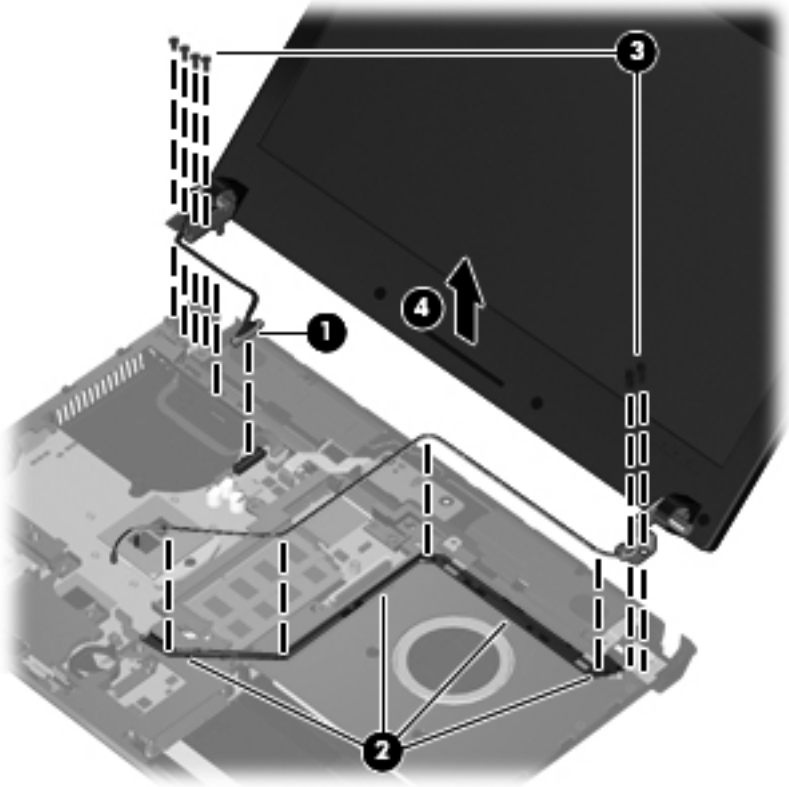
1. Shut down the computer.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 36).
5. Remove the following components:
   a. Switch cover (see Switch cover on page 37)
   b. Keyboard (see Keyboard on page 39)
   c. Speakers (see Speakers on page 46)
   d. Palm rest (see Palm rest on page 48)
   e. WLAN cables (see WLAN module on page 54)

Remove the display assembly:

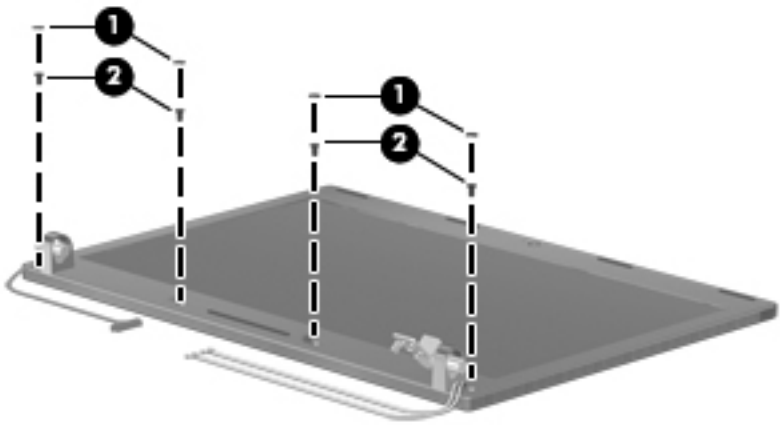
CAUTION: Support the display assembly when removing the following screws. Failure to support the display assembly can result in damage to the display assembly and other computer components.

1. Disconnect the display cable from the system board **(1)**, and remove all cables from the routing channels along the top cover **(2)**.
2. Remove the five T8 M2.5x6.0 screws and one PM 2.5x5.0 screw **(3)** that secure the display assembly to the base enclosure.

3. Lift the display assembly **(4)** straight up and remove it from the base enclosure.



4. If it is necessary to replace the display bezel, display enclosure, or display hinges, remove the four Mylar screw covers **(1)** and the four slotted T8 M2.5×5.0 screws **(2)** that secure the display bezel to the display assembly. The screw covers are available in the Rubber Kit, spare part number 599564-001.



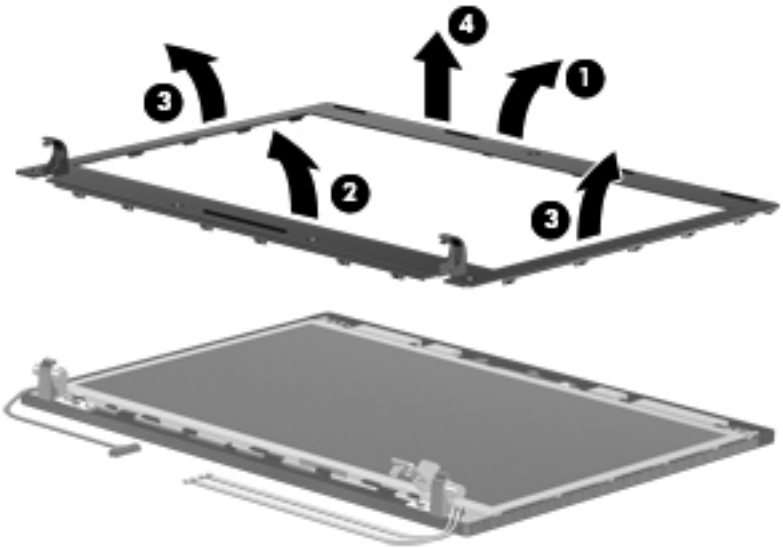
5. If it is necessary to replace the bezel, remove it as follows:

   a. Flex the top of the bezel from the inside edge until it disengages from the display back cover **(1)**.

   b. Flex the bottom of the bezel from the inside edge until it disengages from the display back cover **(2)**.

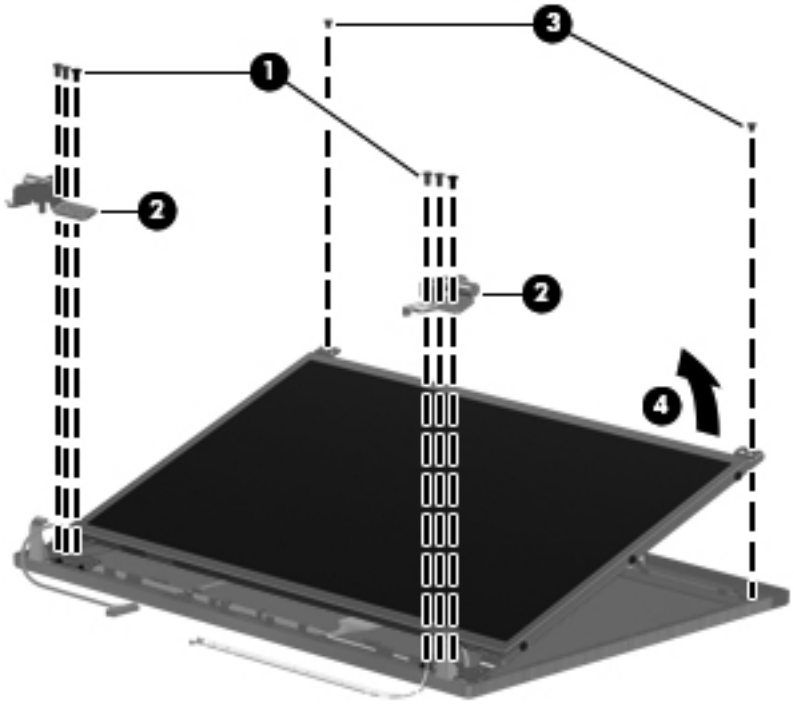
c. Flex the inside edge of the left side and the right side of the bezel until it disengages from the display back cover **(3)**.

d. Remove the display bezel from the display back cover **(4)**.



6. If it is necessary to replace the display hinges, remove the six T8 2.5x5.0 screws **(1)** that secure the display hinges to the display panel. Lift the hinges **(2)** to remove them.

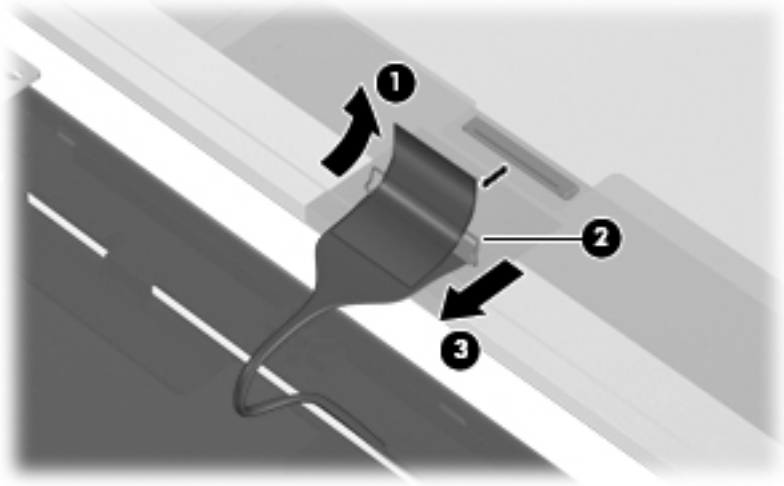
7. If it is necessary to replace the display panel, remove the two T8 2.5x3.0 screws **(3)** that secure the top corners of the display panel to the top of the display back cover. Lift the top of the display panel **(4)** away from the back cover at an angle.



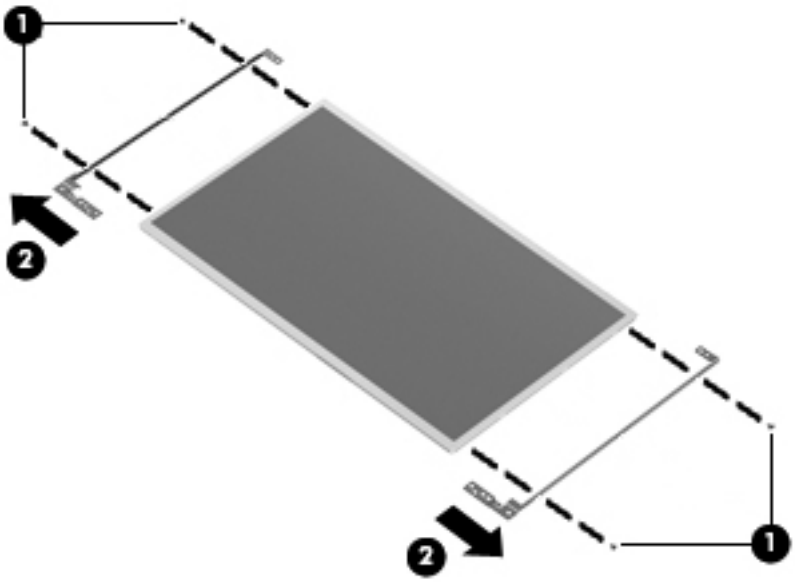
8. Peel back the tape **(1)** that secures the display cable to the display panel, and then release the ZIF connector **(2)**. Remove the cable from the display panel connector **(3)**.

NOTE: The display cable includes the microphone.

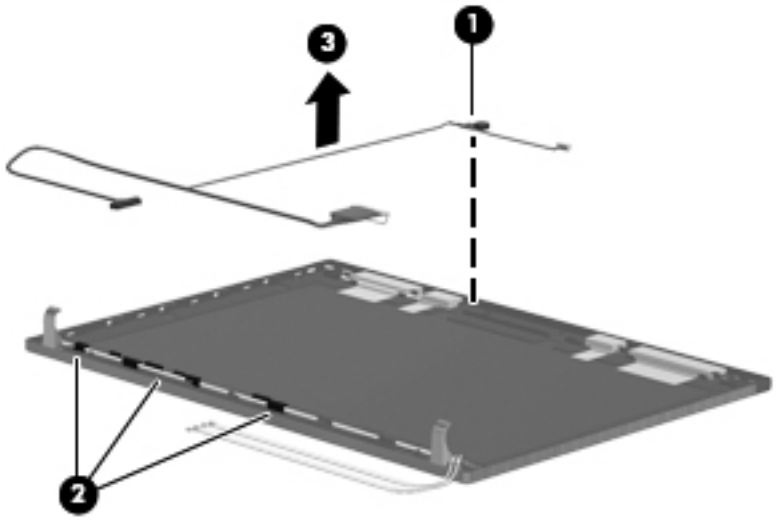
9. Remove the display panel.



10. If it is necessary to replace the display brackets, remove the four PM2.0×3.0 screws **(1)** that secure the display brackets to the display panel, and then remove the display brackets **(2)**.

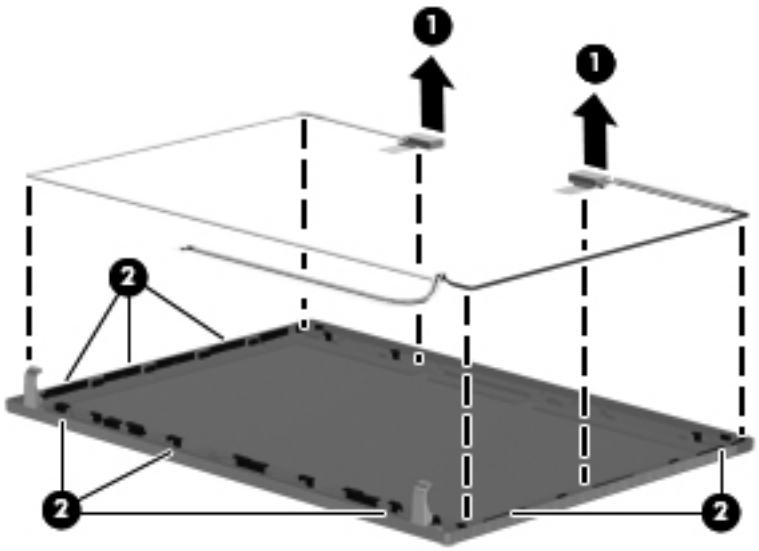


11. Gently release the integrated microphone **(1)** from the clips at the top of the display back cover, remove the display cable from the clips and routing channels **(2)** along the bottom of the display back cover, and then remove the display cable **(3)**.



12. If it is necessary to remove the wireless antennas and cables:

    a. Detach the WLAN antennas **(1)** from the adhesive on the back cover, and then route the cables through the clips **(2)** that secure the antenna cables to the display back cover.



    b. Remove the wireless antennas and cables.

Reverse this procedure to reassemble and install the display assembly.

Top cover

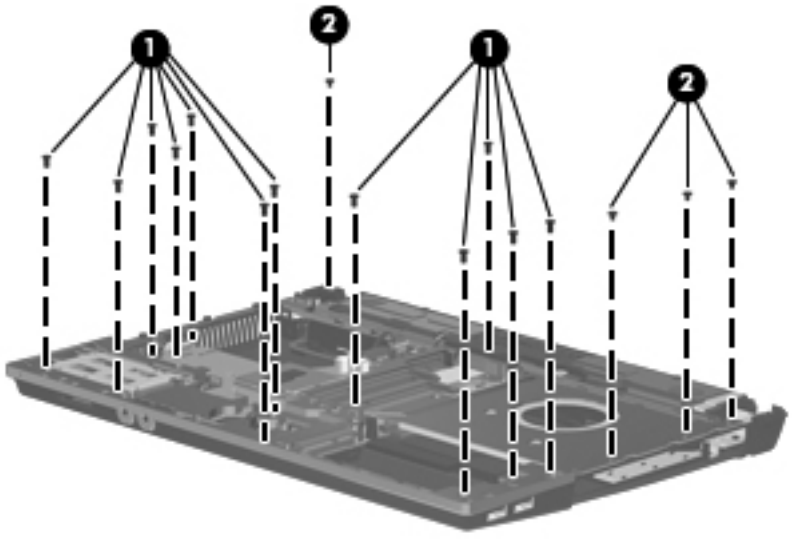
Description	Spare part number
Top cover	599569-001

Before removing the top cover, follow these steps:

1. Shut down the computer.
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 36).
5. Remove the following components:
   a. Switch cover (see Switch cover on page 37)
   b. Keyboard (see Keyboard on page 39)
   c. Speakers (see Speakers on page 46)
   d. DVD-ROM drive (see DVD-ROM drive on page 43)
   e. Palm rest (see Palm rest on page 48)

Remove the top cover:

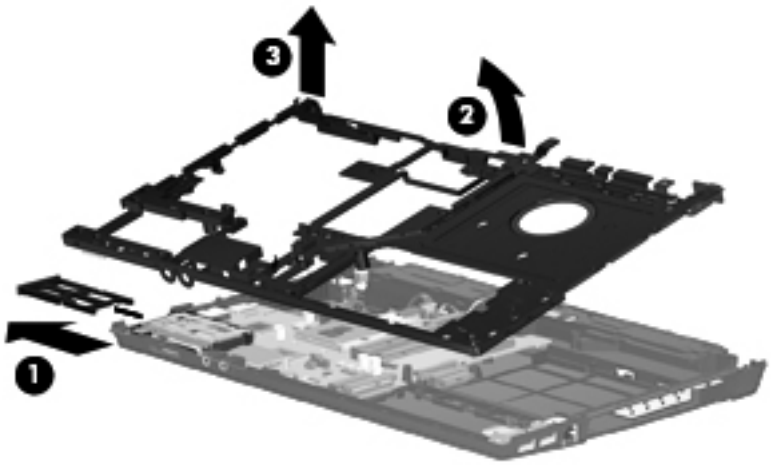
1. Position the computer right-side up with the front toward you.
2. Remove the 12 slotted T8 2.5×5.0 screws **(1)** and the 4 PM2.0×3.0 screws **(2)** that secure the top cover to the base enclosure.



3. If installed, remove the ExpressCard slot bezel **(1)**, and remove the tape that attaches the top cover to the audio jacks.

4. Release the top cover from the sides of the base enclosure , and gently use a flat-bladed screwdriver to pry loose the top cover along the front edge **(2)**.

5. Remove the top cover **(3)**.



Reverse this procedure to install the top cover.

Modem module

Description	Spare part number
Modem module **NOTE:** The modem module spare part kit does not include a modem module cable. The modem module cable is included in the Cable Kit. See Cable Kit on page 22 for more Cable Kit spare part information.	
High-speed 56K modem for use in all countries and regions except Australia and New Zealand	510100-001
High-speed 56K modem for use in Australia and New Zealand	510100-011

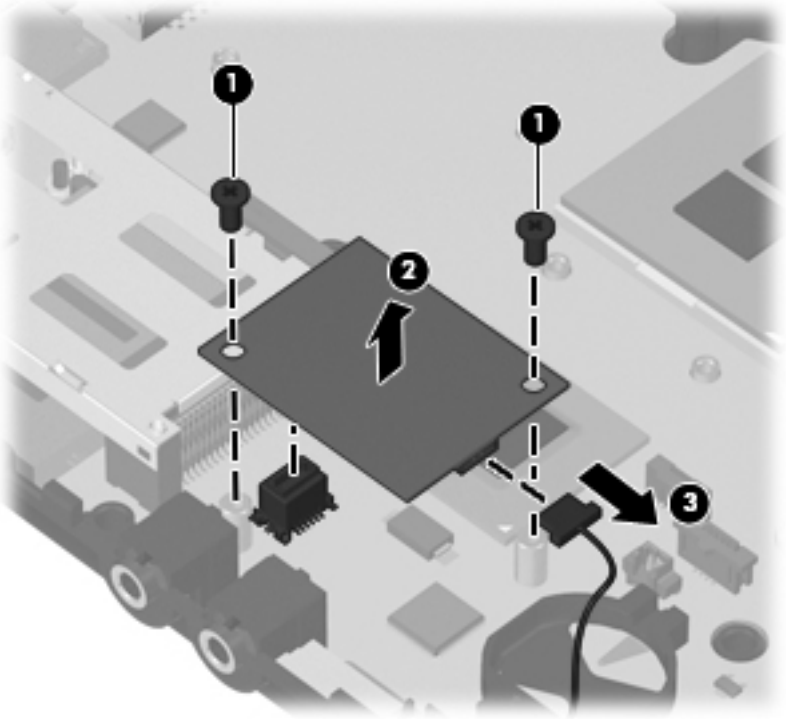
Before removing the modem module, follow these steps:

1. Shut down the computer.
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 36).
5. Remove the following components:
   a. Switch cover (see Switch cover on page 37)
   b. Keyboard (see Keyboard on page 39)
   c. DVD-ROM drive (see DVD-ROM drive on page 43)
   d. Speakers (see Speakers on page 46)
   e. Palm rest (see Palm rest on page 48)
   f. Top cover (see Top cover on page 67)

Remove the modem module:

1. Position the computer right-side up with the front toward you.
2. Remove the two PM2.5×5.0 screws **(1)** that secure the modem module to the system board.
3. Lift the modem module **(2)** straight up to disconnect it from the system board.
4. Disconnect the modem cable **(3)** from the modem module.

5. Remove the modem module.



Reverse this procedure to install the modem module.

System board

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

Description	Spare part number
System board (includes replacement thermal material)	614524-001

Before removing the system board, follow these steps:

1. Shut down the computer.
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 36).
5. Remove the following components:
   a. Switch cover (see Switch cover on page 37)
   b. Keyboard (see Keyboard on page 39)
   c. Speakers (see Speakers on page 46)
   d. Palm rest (see Palm rest on page 48)
   e. WLAN module (see WLAN module on page 54)
   f. Solid-state module (see Solid-state module on page 50)
   g. DVD-ROM drive (see DVD-ROM drive on page 43)
   h. Display assembly (see Display assembly on page 62)
   i. Top cover (see Top cover on page 67)

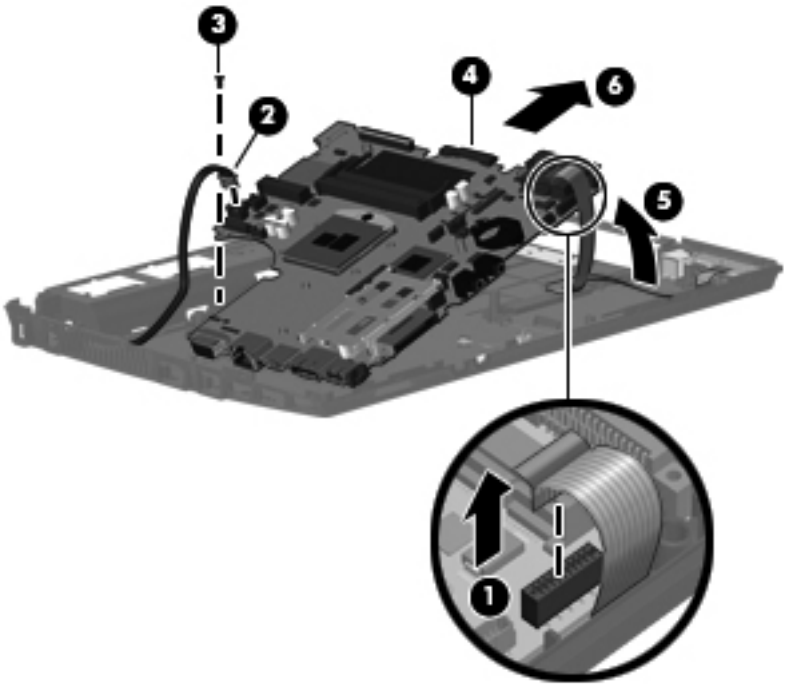
When replacing the system board, be sure that the following components are removed from the defective system board and installed on the replacement system board:

- Memory module (see Memory module on page 41)
- WLAN module (see WLAN module on page 54)
- Modem module (see Modem module on page 69)
- Processor (see Processor on page 60)

Remove the system board:

1. Position the computer right-side up with the front toward you.
2. Disconnect the USB board cable **(1)** from the system board.
3. Disconnect the power connector cable **(2)**.
4. Remove the slotted T8 2.5×5.0 screw **(3)** that secures the system board to the base enclosure.

5. Use the optical drive connector **(4)** to lift the right side **(5)** of the system board.
6. Remove the system board **(6)** at an angle.



Reverse this procedure to install the system board.

USB connector board

Description	Spare part number
USB board with cable	599524-001

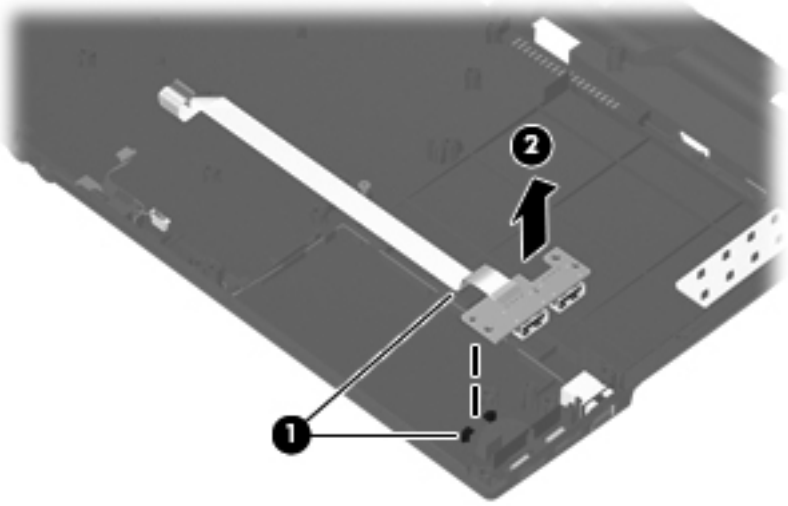
Before removing the USB connector assembly, follow these steps:

1. Shut down the computer.
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 36).
5. Remove the following components:
   a. Switch cover (see Switch cover on page 37)
   b. Keyboard (see Keyboard on page 39)
   c. DVD-ROM drive (see DVD-ROM drive on page 43)
   d. Speakers (see Speakers on page 46)
   e. Palm rest (see Palm rest on page 48)
   f. Solid-state module (see Solid-state module on page 50)
   g. Display assembly (see Display assembly on page 62)
   h. Top cover (see Top cover on page 67)
   i. System board (see System board on page 71)

Remove the USB connector assembly:

1. Position the computer right-side up with the right side toward you.
2. Release the USB connector board cable from the base enclosure clips and routing channel **(1)**.

3. Remove the USB connector assembly **(2)** from the base enclosure.



Reverse this procedure to install the USB connector assembly.

Modem module cable

NOTE: The modem module cable with RJ-11 connector is included in the Cable Kit on page 22, part number 599525-001.

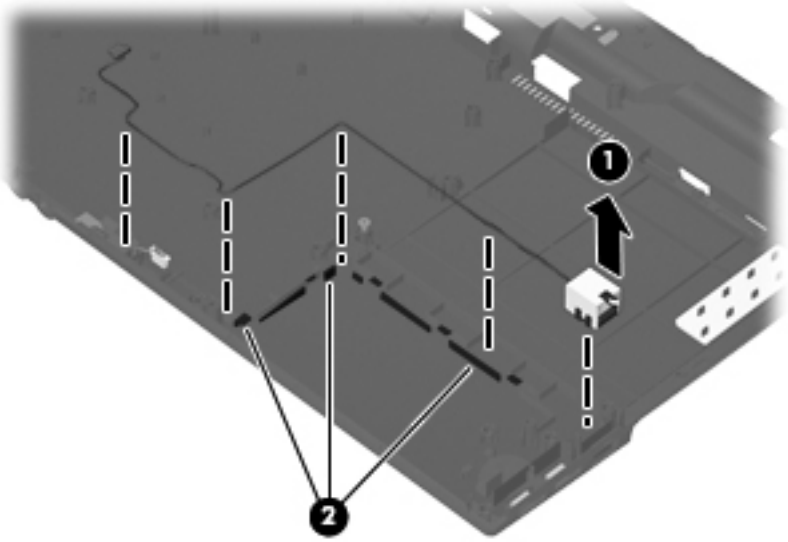
Before removing the modem module cable, follow these steps:

1. Shut down the computer.
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 36).
5. Remove the following components:
   a. Switch cover (see Switch cover on page 37)
   b. Keyboard (see Keyboard on page 39)
   c. DVD-ROM drive (see DVD-ROM drive on page 43)
   d. Heat sink and fan (see Heat sink and fan on page 57)
   e. Speakers (see Speakers on page 46)
   f. Palm rest (see Palm rest on page 48)
   g. Solid-state module (see Solid-state module on page 50)
   h. Display assembly (see Display assembly on page 62)
   i. Top cover (see Top cover on page 67)
   j. System board (see System board on page 71)
   k. USB connector board and cable (see USB connector board on page 73)

Remove the modem cable.

1. Position the computer right-side up with the front toward you.
2. Release the RJ-11 connector from the base enclosure clips **(1)**.

3. Remove the modem cable **(2)** from the routing channel in the base enclosure.



4. Remove the modem cable.

Reverse this procedure to install the modem cable.

Power connector cable

NOTE: The power connector cable (DC power) is included in the Cable Kit on page 22, part number 599525-001.

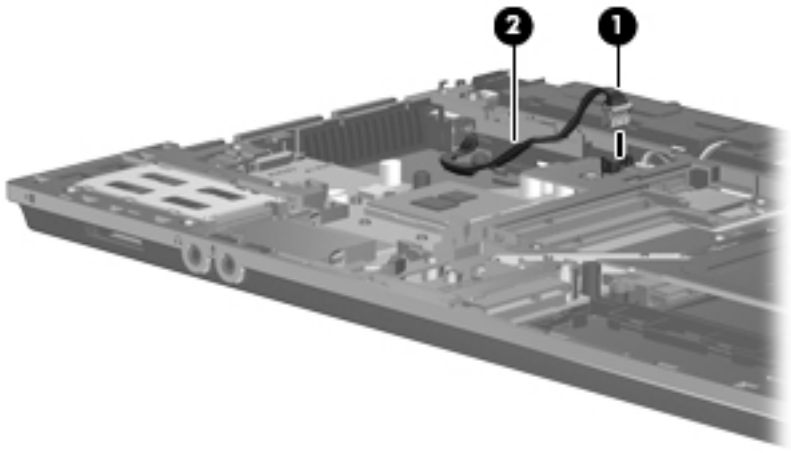
Before removing the power connector cable, follow these steps:

1. Shut down the computer.
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 36).
5. Remove the following components:
   a. Switch cover (see Switch cover on page 37)
   b. Keyboard (see Keyboard on page 39)
   c. DVD-ROM drive (see DVD-ROM drive on page 43)
   d. Heat sink and fan (see Heat sink and fan on page 57)
   e. Speakers (see Speakers on page 46)
   f. Palm rest (see Palm rest on page 48)
   g. Solid-state module (see Solid-state module on page 50)
   h. Display assembly (see Display assembly on page 62)
   i. Top cover (see Top cover on page 67)
   j. System board (see System board on page 71)
   k. USB connector board and cable (see USB connector board on page 73)

Remove the power connector cable.

1. Position the computer right-side up with the front toward you.

2. Disconnect the power connector cable from the base enclosure **(1)**, and then remove the cable from the routing channel **(2)** in the base enclosure.



3. Remove the power connector cable.

Reverse this procedure to install the power connector cable.

5 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.

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

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

To start Computer Setup, follow these steps:

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

Using Computer Setup

Navigating and selecting in Computer Setup

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

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

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

   To select a menu or a menu item, use the fn key and the keyboard arrow keys and then press enter.

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

2. Press f10 to enter BIOS Setup.

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

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

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

  – or –

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

  – or –

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

  – or –

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

Your changes go into effect when the computer restarts.

Restoring factory settings in Computer Setup

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

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

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

2. Press f10 to enter BIOS Setup.

3. Use a pointing device or the arrow keys to select **File > Restore defaults**.

4. Follow the on-screen instructions.

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

Your changes go into effect when the computer restarts.

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

Computer Setup menus

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

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

File menu

Select	To do this
System Information	• View identification information for the computer and the batteries in the system. • View specification information for the processor, cache and memory size, system ROM, video revision, and keyboard controller version.
Set System Date and Time	Set or change the date and time on the computer.
Restore defaults	Replace the configuration settings in Computer Setup with the original factory settings. (Hard drive mode, password settings, and security settings are not changed when you restore the factory settings.)
Reset BIOS security to factory default	
Ignore changes and exit	Cancel any changes entered during the current session. Then exit and restart the computer.
Save changes and exit	Save any changes entered during the current session. Then exit and restart the computer. Your changes go into effect when the computer restarts.

Security menu

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

Select	To do this
Setup BIOS Administrator Password	Set up a BIOS administrator password.
System IDs	Enter a user-defined computer asset tracking number and ownership tag.

System Configuration menu

NOTE: Some of the listed System Configuration options may not be supported by your computer.

Select	To do this
Language	Change the Computer Setup language.

Select	To do this
Boot Options	• Set a Startup Menu delay (in seconds). • Set the Express Boot Popup delay in seconds. • Enable/disable CD-ROM boot (enabled by default). • Enable/disable PXE Internal NIC boot (disabled by default). • Set the boot order.
Device Configurations	• Enable/disable USB legacy support (enabled by default). When enabled, USB legacy support allows the following: ◦ Use of a USB keyboard in Computer Setup even when a Windows® operating system is not running. ◦ Startup from bootable USB devices, including a hard drive, diskette drive, or optical drive connected by a USB port to the computer. • Enable/disable fan always on while connected to an AC outlet (enabled by default). • Enable/disable Data Execution Prevention (select models only; enabled by default). When enabled, the processor can disable some virus code execution, which helps to improve computer security. **NOTE:** Availability of the options above varies by computer model. • Enable/disable LAN Power Save (disabled by default). • Enable/disable Virtualization Technology (select models only; disabled by default). • Enable/disable Wake on USB (disabled by default). • Enable/disable Num lk on at boot (disabled by default).

Select	To do this
Built-In Device Options	• Enable/disable the wireless button state (enabled by default). • Enable/disable the embedded WLAN device (enabled by default). • Enable/disable LAN/WLAN switching (disabled by default). • Enable/disable the Network Interface Controller (LAN) (enabled by default). • Set the wake on LAN state. Options include the following: ◦ Disabled ◦ Boot to Network (set by default) ◦ Follow Boot Order • Enable/disable the optical disc drive (enabled by default). • Enable/disable an audio device (enabled by default). • Enable/disable a modem device (enabled by default). • Enable/disable the microphone (enabled by default).
Port Options	**NOTE:** All port options are enabled by default. • Enable/disable the flash media reader. • Enable/disable the USB port. **CAUTION:** Disabling the USB port also disables MultiBay devices and ExpressCard devices on the advanced port replicator. • Enable/disable the ExpressCard slot. • Enable/disable the eSATA port.

6 Specifications

Computer specifications

Dimensions	
Depth	**22.81** cm (8.98 in)
Width	**32.2 cm** (12.68 in)
Height (front to rear)	**27.5 to 35.5 cm** (1.08 to 1.40 in)
Weight	
• With 6-cell battery, one memory module, and optical disk drive	< **2.07 kg** (4.58 lbs)
• With 6-cell battery, one memory module; without optical disk drive	< **1.93 kg** (4.27 lbs)
Input power	
Operating voltage	18.5 V dc @ 4.74 A – 90 W
Operating current	4.74 A
Temperature	
Operating (not writing to optical disc)	**0°C to 35°C** (32°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

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

33.8-cm (13.3-in) display specifications

Dimensions	
Height	**20.83 cm** (8.2 in)
Width	**27.94 cm** (11.0 in)
Diagonal	**33.6 cm** (13.3 in)
Number of colors	Up to 16.8 million
Contrast ratio	250:1 (typical)
Brightness	200 nits (typical)
Pixel resolution	
Pitch	0.279 × 0.279 mm
Format	SD: 1280 × 800; HD: 1366 × 768
Configuration	RGB vertical stripe
Backlight	LED
Character display	80 × 25
Total power consumption	4.0 W
Viewing angle	±40° horizontal, +120/-40° vertical (typical)

Solid-state module specifications

	2-GB*	4-GB*	8-GB*
Dimensions			
Height	9.5 mm	9.5 mm	9.5 mm
Width	70 mm	70 mm	70 mm
Weight	15 g	15 g	15 g
Interface type	SATA II	SATA II	SATA II
Transfer rate			
Sustained read	54 MB/sec	102 MB/sec	102 MB/sec
Sustained write	33 MB/sec	55 MB/sec	57 MB/sec
Operating temperature	**0°C to 70°C** (32°F to 158°F)	**0°C to 70°C** (32°F to 158°F)	**0°C to 70°C** (32°F to 158°F)

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

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

DVD-ROM drive specifications

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
Random access time	
DVD	< 125 ms
CD	< 100 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 resource specifications

You can use Device Manager to get a graphical view of the system resources that control how the devices work on the computer. System resources that are accessible from Device Manager are direct memory access (DMA) channels, input/output (I/O) ports, interrupt request (IRQ) lines, and memory addresses.

If two devices require the same resource and create a device conflict, you can manually change the resource settings in Device Manager to be sure each setting is unique.

△ **CAUTION:** Improperly changing resource settings can disable your hardware and cause your computer to malfunction or become inoperable. Only users who have expert knowledge of computer hardware and hardware configurations should change resource settings.

To view resource settings:

1. Select **Start** > **Control Panel**.
2. Click **Device Manager**.
3. On the **View** menu, click one of the following:
   - **Resources by type**
   - **Resources by connection**

7 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.

8 Recycling

Battery

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

Display

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

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

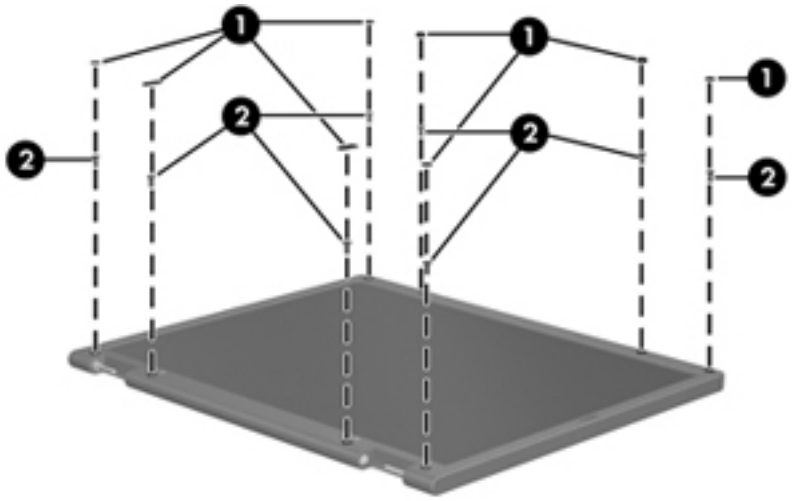
NOTE: **Materials Disposal**. This HP product contains mercury in the backlight in the display assembly that might require special handling at end-of-life. Disposal of mercury may be regulated because of environmental considerations. For disposal or recycling information, contact your local authorities,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

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

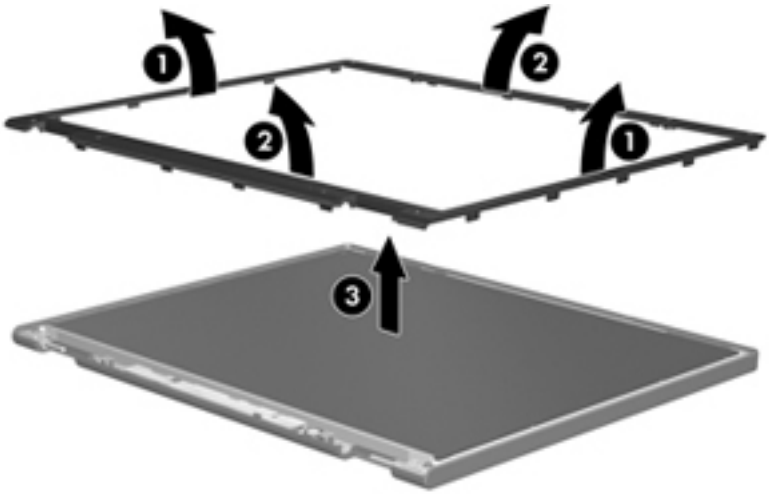
NOTE: The procedures provided in this chapter are general disassembly instructions. Specific details, such as screw sizes, quantities, and locations, and component shapes and sizes, can vary from one computer model to another.

Perform the following steps to disassemble the display assembly:

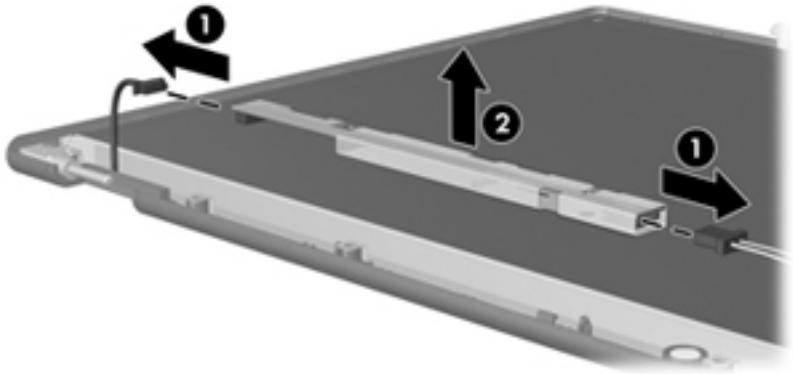
1. Remove all screw covers **(1)** and screws **(2)** that secure the display bezel to the display assembly.



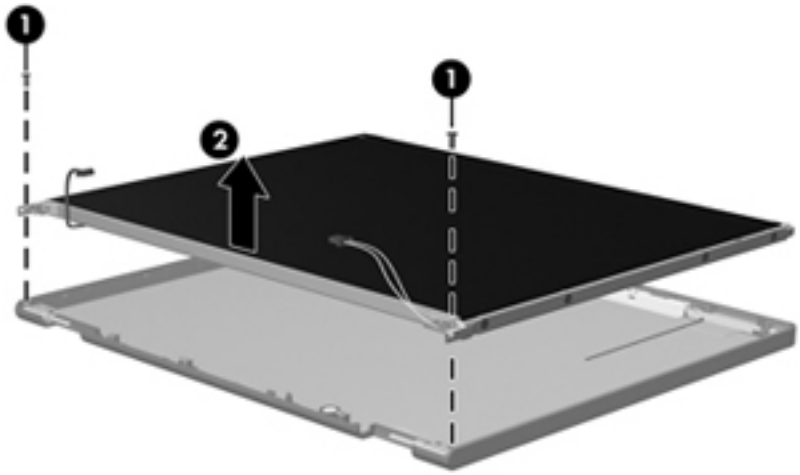
2. Lift up and out on the left and right inside edges **(1)** and the top and bottom inside edges **(2)** of the display bezel until the bezel disengages from the display assembly.
3. Remove the display bezel **(3)**.



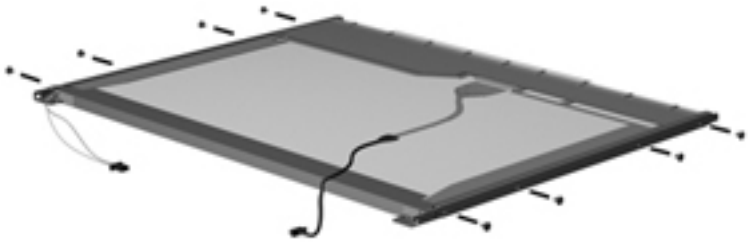
4. Disconnect all display panel cables **(1)** from the display inverter and remove the inverter **(2)**.



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

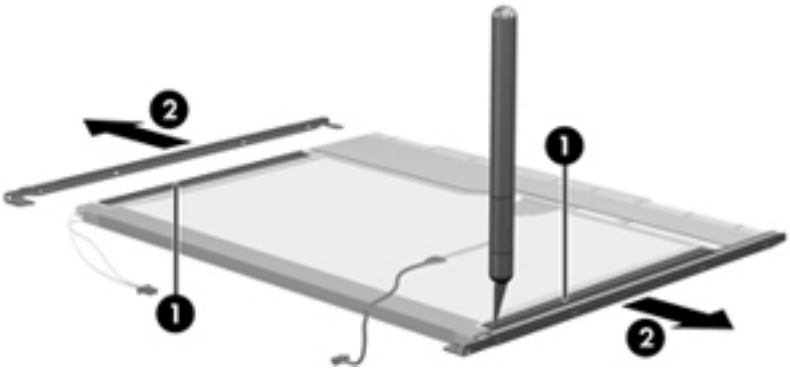


7. Turn the display panel assembly upside-down.
8. Remove all screws that secure the display panel frame to the display panel.

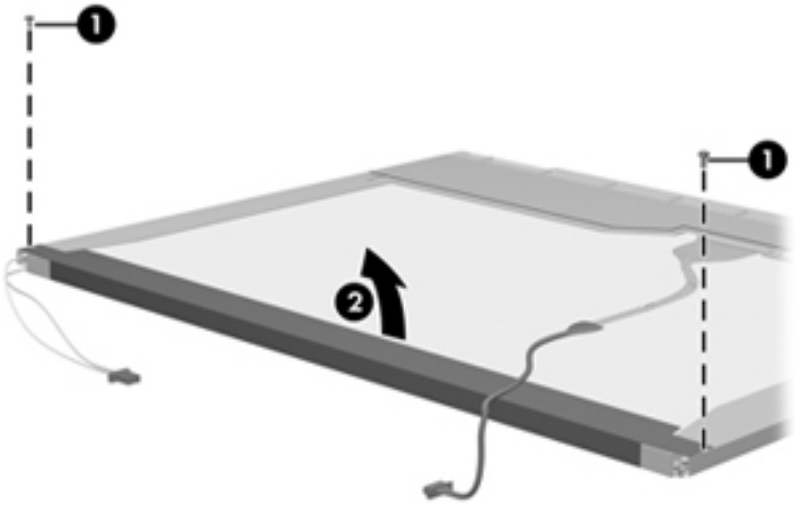


9. Use a sharp-edged tool to cut the tape **(1)** that secures the sides of the display panel to the display panel frame.

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

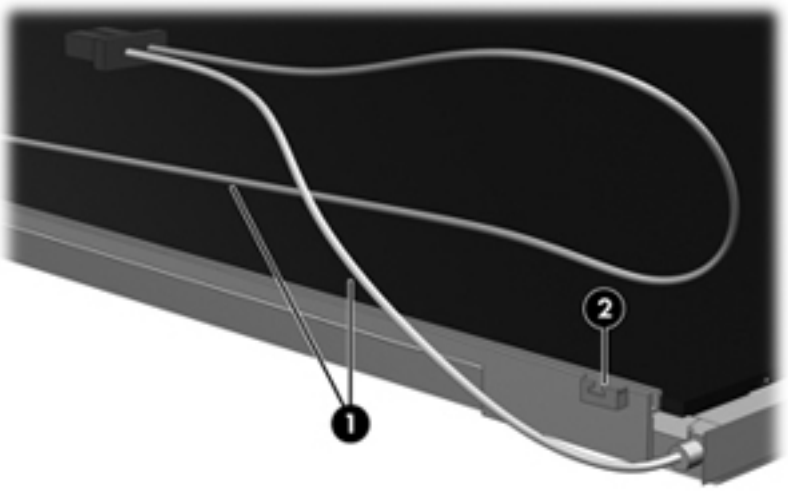


11. Remove the screws **(1)** that secure the backlight cover to the display panel.
12. Lift the top edge of the backlight cover **(2)** and swing it outward.



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

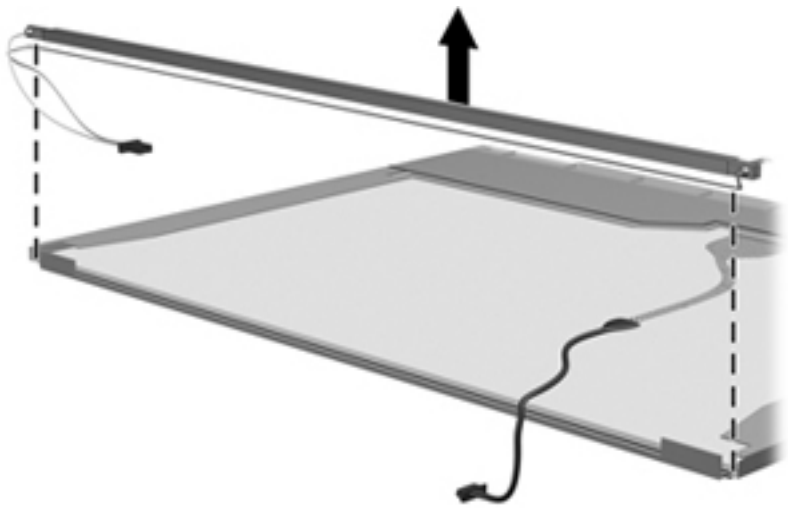
15. Remove the backlight cables **(1)** from the clip **(2)** in the display panel.



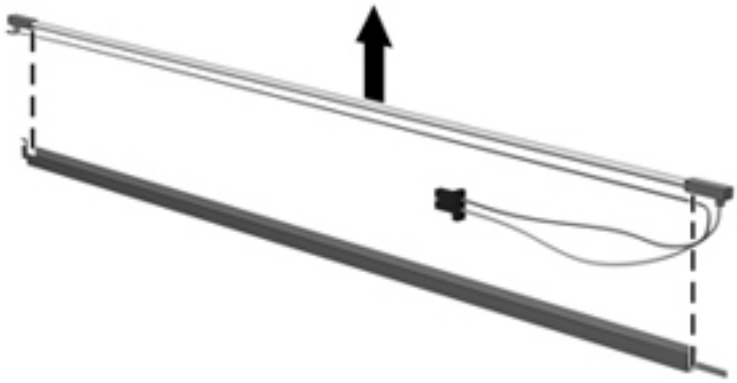
16. Turn the display panel upside-down.

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

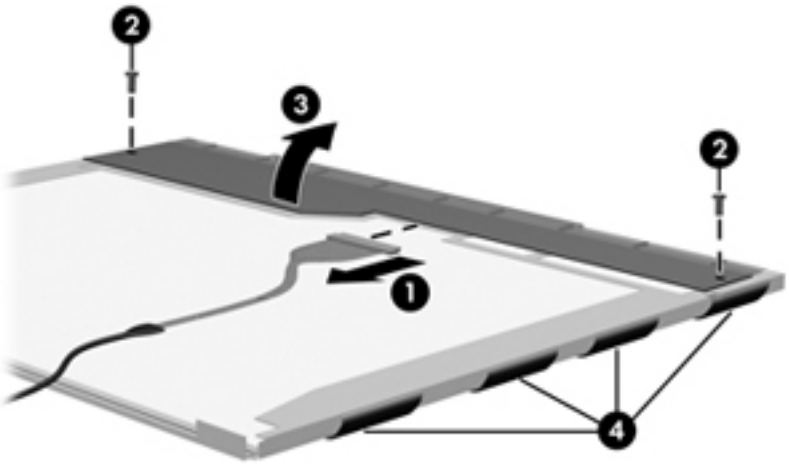
17. Remove the backlight frame from the display panel.



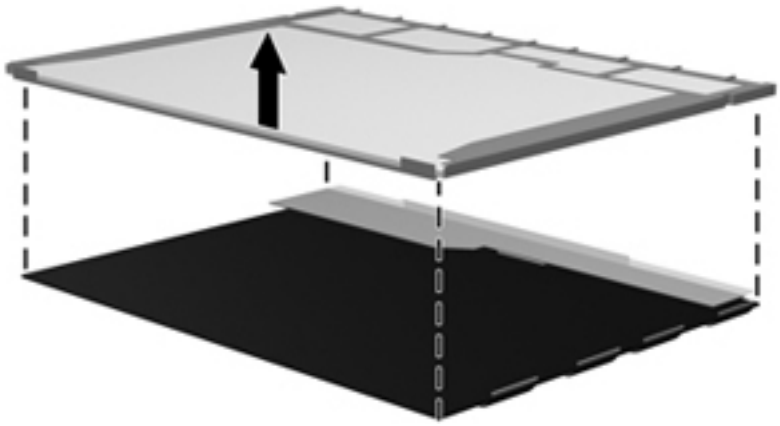
18. Remove the backlight from the backlight frame.



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



23. Remove the LCD panel.



24. Recycle the LCD panel and backlight.

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