



# HP ProBook 6465b Notebook PC

Maintenance and Service Guide

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## Safety warning notice

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 **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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# Table of contents

<b>1 Product description .....</b>	<b>1</b>
<b>2 External component identification .....</b>	<b>7</b>
Display .....	7
Top .....	8
TouchPad .....	8
Lights .....	9
Buttons and fingerprint reader .....	10
Keys .....	12
Front .....	13
Left .....	14
Rear .....	15
Right .....	16
Bottom .....	17
<b>3 Illustrated parts catalog .....</b>	<b>19</b>
Service tag .....	19
Computer major components .....	20
Display components .....	24
Cable Kit .....	25
Plastics Kit .....	26
Mass storage devices .....	27
Miscellaneous parts .....	28
Sequential part number listing .....	29
<b>4 Removal and replacement procedures .....</b>	<b>35</b>
Preliminary replacement requirements .....	35
Tools required .....	35
Service considerations .....	35
Plastic parts .....	35
Cables and connectors .....	36

Drive handling .....	36
Grounding guidelines .....	37
Electrostatic discharge damage .....	37
Packaging and transporting guidelines .....	38
Workstation guidelines .....	38
Equipment guidelines .....	39
Component replacement procedures .....	40
Service tag .....	40
Computer feet .....	41
Battery .....	42
SIM .....	43
Display assembly components (panel, bezel, webcam, microphone) .....	44
Bottom door .....	49
Optical drive .....	50
Upgrade bay .....	52
Hard drive .....	54
Memory modules .....	56
WWAN module .....	58
WLAN module .....	60
Bluetooth module .....	62
Modem module .....	63
Fan .....	64
Heat sink .....	65
Processor .....	67
Keyboard .....	68
Bottom cover from top cover .....	71
RTC battery .....	74
Fingerprint reader board .....	76
Lid switch .....	78
Speaker assembly .....	80
RJ-11 connector cable .....	82
Display assembly components (cable, antennas, hinges, enclosure) .....	84
System board .....	90
Smart card reader .....	93
ExpressCard assembly .....	94
<b>5 Computer Setup (BIOS) and System Diagnostics .....</b>	<b>96</b>
Using Computer Setup .....	96
Starting Computer Setup .....	96
Navigating and selecting in Computer Setup .....	96
Restoring factory settings in Computer Setup .....	97

Updating the BIOS .....	98
Determining the BIOS version .....	98
Downloading a BIOS update .....	98
Using System Diagnostics .....	99
<b>6 Specifications .....</b>	<b>100</b>
Computer specifications .....	100
35.6-cm (14.0-in), HD display specifications .....	101
35.6-cm (14.0-in), HD+ display specifications .....	102
Hard drive specifications .....	103
DVD±RW and CD-RW SuperMulti DL Combo Drive specifications .....	104
Blu-ray Disc ROM with SuperMulti DVD±R/RW DL Drive .....	105
Blu-ray BD-R/RE + DVDSM DL Drive .....	106
DVD-ROM Drive specifications .....	107
Specification information in Device Manager .....	108
<b>7 Backup and recovery .....</b>	<b>109</b>
Windows 7 .....	109
Backing up your information .....	109
Performing a system recovery .....	110
Using the Windows recovery tools .....	111
Using f11 recovery tools .....	111
Using a Windows 7 operating system DVD (purchased separately) .....	112
Windows Vista .....	113
Backing up your information .....	113
Performing a recovery .....	114
Using the Windows recovery tools .....	114
Using f11 recovery tools .....	115
Using a Windows Vista operating system DVD (purchased separately) .....	115
<b>8 Power cord set requirements .....</b>	<b>117</b>
Requirements for all countries and regions .....	117
Requirements for specific countries and regions .....	118
<b>9 Recycling .....</b>	<b>119</b>
Battery .....	119
Display .....	119
<b>Index .....</b>	<b>125</b>



# 1 Product description

Category	Description
<b>Product Name</b>	<b>HP ProBook 6465p Notebook PC</b>
<b>Processors</b>	AMD A8-3510MX, 2.50-GHz Max/1.8-GHz Base, 4-MB L2 cache, quad-core, 45W Graphics: HD 6620G
	AMD A6-3410MX, 2.30-GHz Max/1.6-GHz Base, 4-MB L2 cache, quad-core, 45W Graphics: HD 6520G
	AMD A4-3310MX, 2.50-GHz Max/2.1-GHz Base, 2-MB L2 cache, dual-core, 45W Graphics: HD 6480G
<b>Fusion Controller Hub (Chipset)</b>	AMD A60M FCH
<b>Graphics</b>	AMD UMA Processor-specific, see <b>Processors</b> .
<b>Panel</b>	All display assemblies include 2 wireless local area network (WLAN) antennas
	35.6-cm (14.0-in) HD, anti-glare, LED SVA (1366x768)
	35.6-cm (14.0-in) HD+, anti-glare, LED SVA (1600x900)
	35.6-cm (14.0-in) HD, anti-glare, LED SVA (1366x768) with WWAN
	35.6-cm (14.0-in) HD+, anti-glare, LED SVA (1600x900) with WWAN
	35.6-cm (14.0-in) HD, anti-glare, LED SVA (1366x768) with camera
	35.6-cm (14.0-in) HD+, anti-glare, LED SVA (1600x900) with camera
	35.6-cm (14.0-in) HD, anti-glare, LED SVA (1366x768) with camera and WWAN
	35.6-cm (14.0-in) HD+, anti-glare, LED SVA (1600x900) with camera and WWAN
	Support privacy filter
<b>Memory</b>	Two customer-accessible/upgradeable memory module slots supporting up to 16 GB of RAM
	Supports dual-channel memory

Category	Description
	PC3-10600, 1333-MHz, DDR3
	Supports the following configurations: <ul style="list-style-type: none"> <li>• 16384 (8192 × 2) (not orderable; customer upgrade only)</li> <li>• 8192 (8192 × 1)</li> <li>• 8192 (4096 × 2)</li> <li>• 6144 (4096 + 2048)</li> <li>• 4096 (2048 × 2)</li> <li>• 4096 (4096 × 1)</li> <li>• 3072 (2048 + 1024)</li> <li>• 2048 (2048 × 1)</li> </ul>
	Brazil memory options: <ul style="list-style-type: none"> <li>• 8192 (4096 × 2)</li> <li>• 4096 (2048 × 2)</li> <li>• 4096 (4096 × 1)</li> <li>• 2048 (2048 × 1)</li> </ul>
<b>Storage</b>	Supports 9.5-mm or 7-mm, 6.35-cm (2.50-in) SATA hard drives
	Customer-accessible
	Supports the following 7-mm or 9.5-mm, 6.35-cm (2.5-in) hard drives: <ul style="list-style-type: none"> <li>• 320-GB, 7200-rpm, self-encrypting</li> <li>• 320-GB, 7200-rpm</li> <li>• 250-GB, 7200</li> </ul>
	Supports the following 9.5-mm, 6.35-cm (2.5-in) hard drives: <ul style="list-style-type: none"> <li>• 750-GB, 7200</li> <li>• 500-GB, 7200</li> </ul>
	Supports the following solid-state drive: <ul style="list-style-type: none"> <li>• 128-GB</li> </ul>
<b>Upgrade bay</b>	Fixed
	Customer-accessible
	Serial ATA
	12.7-mm tray load
	Supports “No Drive” option

Category	Description
	<p>Supports the following 12.7-mm SATA optical drives:</p> <ul style="list-style-type: none"> <li>• DVD-ROM</li> <li>• DVD+/-RW SuperMulti DL</li> <li>• Blu-ray ROM DVD+/-RW SuperMulti DL</li> </ul> <p>Supports the following 9.5-mm SATA hard drive:</p> <ul style="list-style-type: none"> <li>• 500-GB, 7200-rpm</li> </ul>
<b>Microphone</b>	<p>Integrated dual-array microphone (webcam models only)</p> <p>Integrated mono (non-webcam models)</p>
<b>Audio</b>	<p>SRS Premium Sound</p> <p>Stereo speakers (2)</p>
<b>Webcam</b>	Integrated webcam (720p HD)
<b>Modem</b>	<p>56K V.92 MDC data/fax modem</p> <p>Modem cable not included</p> <p>Supports "No Modem" option</p>
<b>Ethernet</b>	<p>Realtek RTL8151EH-CG 10/100/1000 network interface card (NIC) with NIC Power Down Technology</p> <p>S3/S4/S5 wake on LAN</p> <p>Ethernet cable not included</p>
<b>Wireless</b>	<p><b>Integrated WLAN options by way of wireless module:</b></p> <p>Two WLAN antennas built into display assembly</p> <p>Supports "no WLAN" option</p> <p>Supports the following WLAN formats:</p> <ul style="list-style-type: none"> <li>• Broadcom 802.11 b/g/n, 1×1</li> <li>• Broadcom 802.11 a/b/g/n, 2×2</li> </ul> <p><b>Integrated WWAN options by way of wireless module:</b></p> <p>Two WWAN antennas built into display assembly (world-wide 5 band, in WWAN panels only)</p> <p>Subscriber identity module (SIM) security (customer-accessible in battery bay)</p> <p>Supports "no WWAN" option</p> <p>Supports the following WWAN modules:</p> <ul style="list-style-type: none"> <li>• Gobi 3000: HP un2430 EV-DO/HSPA Mobile Broadband</li> <li>• Ericsson: HP hs2340 HSPA+ Mobile Broadband</li> </ul> <p><b>Integrated personal area network (PAN) options by way of Bluetooth® module:</b></p> <p>Supports "no PAN" option</p>

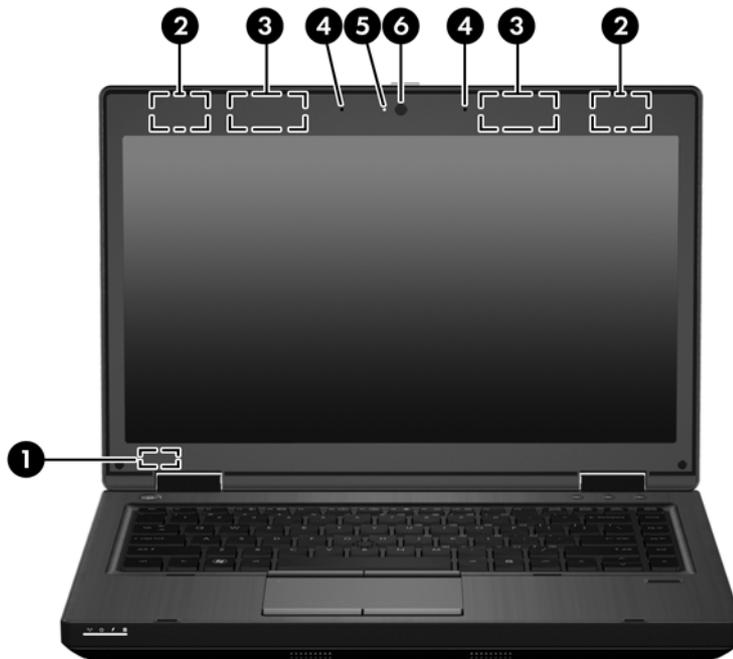
Category	Description
	Integrated Bluetooth 2.1
<b>External media card</b>	One ExpressCard/54 slot
	Integrated Media Card Reader with SD, MMC support
<b>Ports</b>	Audio-in (stereo microphone)
	Audio-out (stereo headphone)
	DisplayPort 1.1a
	RJ-11 (modem)
	RJ-45 (Ethernet, includes link and activity lights)
	USB 2.0 (3)
	eSATA/USB 2.0 combo port
	VGA (Dsub 15-pin) supporting 1920 × 1200 external resolution at 75-GHz (hot plug with auto-detect)
	1394a
	3-pin AC power
	Secondary battery connector
	Docking connector
<b>Docking</b>	HP Docking Station
	HP Advanced Docking Station
<b>Keyboard/pointing devices</b>	Keyboard with Touchpad
	Dual point
	Spill-resistant design
	Touchpad includes: on/off button, supports 2-way scroll with legend, taps enabled by default, 2-finger scrolling and zoom enabled by default
<b>Power requirements</b>	Smart AC adapter with localized cable plug support (3-wire plug with ground pin, supports 3-pin DC connector):
	<ul style="list-style-type: none"> <li>90-W</li> </ul>
	9-cell, 3.0-Ah (100-Wh) Li-ion battery
	6-cell, 2.8-Ah (62-Wh) Li-ion battery (available as drop in box option; not configurable)
	6-cell, 2.55-Ah (55-Wh) Li-ion battery
	3-cell, 2.8-Ah (31-Wh) Li-ion battery
	6-cell, 55-Wh HP Long Life Li-ion battery (only available with 3 year platinum warranty)
	6-cell, 51-Wh HP Long Life Li-ion battery (only available with 1 year platinum warranty)
	HP Fast Charge Technology (not applicable to 9-cell batteries)
<b>Security</b>	Integrated fingerprint reader

Category	Description
	Integrated smart card reader (replaces ExpressCard slot)
	Security cable slot
	Trusted platform module (TPM) V.1.2
	Full volume encryption
	Preboot authentication (password, smart card)
<b>Operating system</b>	<b>Preinstalled (U.S., French Canadian, and Japanese localizations only):</b>
	Windows 7 Professional 64 with Microsoft® Basics (localizations available only for U.S., French Canada, and Japan)
	Windows 7 Professional 32 with Microsoft Basics (localizations available only for U.S., French Canada, and Japan)
	Windows 7 Home Premium 64 with Microsoft Basics (localizations available only for U.S., French Canada, and Japan)
	Windows 7 Home Premium 32 with Microsoft Basics (localizations available only for U.S., French Canada, and Japan)
	Novell™: SuSE Linux™ – SLED 11 (available worldwide)
	FreeDOS (available worldwide)
	<b>Preinstalled with Microsoft Office:</b>
	Windows 7 Professional 32 with Microsoft Office 2010 Starter
	Windows 7 Professional 64 with Microsoft Office 2010 Starter
	Windows 7 Home Premium 32 with Microsoft Office 2010 Starter
	Windows 7 Home Premium 64 with Microsoft Office 2010 Starter
	Windows 7 Home Basic 32 with Microsoft Office 2010 Starter
	<b>Preinstalled with Microsoft Office in Japan only:</b>
	Windows 7 Professional 32 with Microsoft Office 2010 Personal
	Windows 7 Professional 32 with Microsoft Office 2010 Home & Business
	Windows 7 Professional 32 with Microsoft Office 2010 Professional
	Windows 7 Professional 64 with Microsoft Office 2010 Personal
	Windows 7 Professional 64 with Microsoft Office 2010 Home & Business
	Windows 7 Professional 64 with Microsoft Office 2010 Professional
	Windows 7 Home Premium 32 with Microsoft Office 2010 Personal
	Windows 7 Home Premium 32 with Microsoft Office 2010 Home & Business
	Windows 7 Home Premium 32 with Microsoft Office 2010 Professional
	Windows 7 Home Premium 64 with Microsoft Office 2010 Personal
	Windows 7 Home Premium 64 with Microsoft Office 2010 Home & Business

<b>Category</b>	<b>Description</b>
	Windows 7 Home Premium 64 with Microsoft Office 2010 Professional
	<b>Restore Media:</b>
	Windows 7 Professional 64
	Windows 7 Professional 32
	Windows 7 Home Premium 64
	Windows 7 Home Premium 32
	DRDVD Windows 7 (available with any Windows 7 Premium or Professional localization)
	DRDVD Windows 7 with WinDVD (available with any Windows 7 Home Basic localization)
	<b>Web-only support:</b>
	Windows XP Professional 32
	Windows Vista Enterprise 32/64
	Windows Vista Business 32/64
	Windows 7 Enterprise 32/64
	Windows 7 Ultimate 32/64
	<b>Certified:</b>
	Microsoft WHQL
	Novell: SuSE Linux
<b>Serviceability</b>	<b>End-user replaceable parts:</b>
	AC adapter
	Battery (system)
	Hard drive
	Memory module
	Optical drive
	Mini-PCI components (WLAN, WWAN, SIM)
	Modem
	Keyboard

## 2 External component identification

### Display



Component	Description
(1) Internal display switch	Turns off the display or initiates Sleep if the display is closed while the power is on. <b>NOTE:</b> The display switch is not visible from the outside of the computer.
(2) WLAN antennas (2)*	Send and receive wireless signals to communicate with wireless local area networks (WLAN).
(3) WWAN antennas (2)* (select models only)	Send and receive wireless signals to communicate with wireless wide area networks (WWAN).
(4) Internal microphone(s) (1 or 2 depending on model)	Record sound.
(5) Webcam light (select models only)	On: The webcam is in use.

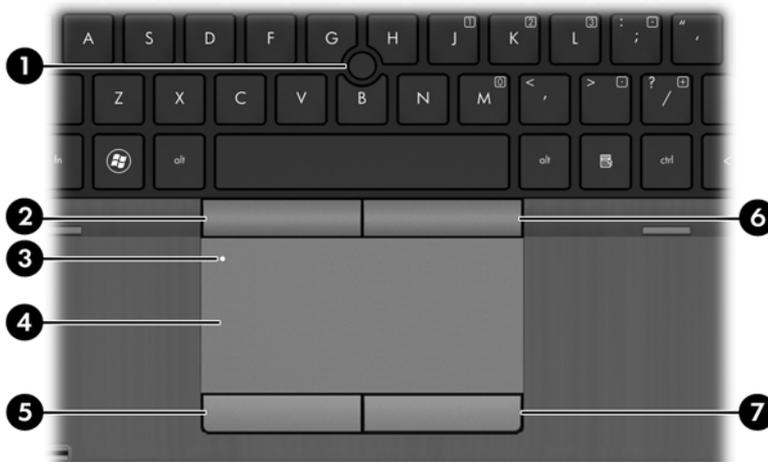
Component	Description
(6) Webcam (select models only)	Records video and captures still photographs.  To use the webcam, select <b>Start &gt; All Programs &gt; HP &gt; HP Webcam</b> .

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

## Top

### TouchPad

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



Component	Description
(1) Pointing stick (select models only)	Moves the pointer and selects or activates items on the screen.
(2) Left pointing stick button (select models only)	Can be used with the pointing stick and functions like the left button on an external mouse.
(3) TouchPad on/off button	Turns the TouchPad on and off.
(4) TouchPad zone	Moves the pointer and selects or activates items on the screen.  <b>NOTE:</b> Vertical scrolling is supported on the right edge of the TouchPad.
(5) Left TouchPad button	Functions like the left button on an external mouse.
(6) Right pointing stick button (select models only)	Can be used with the pointing stick and functions like the right button on an external mouse.
(7) Right TouchPad button	Functions like the right button on an external mouse.

## Lights



Component	Description
(1) TouchPad light	<ul style="list-style-type: none"> <li>Amber: The TouchPad is off.</li> <li>Off: The TouchPad is on.</li> </ul>
(2) Caps lock light	On: Caps lock is on.
(3)  Power light	<ul style="list-style-type: none"> <li>On: The computer is on.</li> <li>Blinking: The computer is in the Sleep state.</li> <li>Off: The computer is off or in Hibernation.</li> </ul>
(4)  Wireless light	<ul style="list-style-type: none"> <li>White: An integrated wireless device, such as a wireless local area network (WLAN) device and/or a Bluetooth® device, is on.</li> <li>Amber: All wireless devices are off.</li> </ul>
(5)  QuickWeb light	<ul style="list-style-type: none"> <li>On: The computer is on.</li> <li>Off: The computer is off or in Hibernation.</li> </ul> <p><b>NOTE:</b> For more information, refer to the HP QuickWeb software Help.</p>
(6)  Mute light	<ul style="list-style-type: none"> <li>Amber: Computer sound is off.</li> <li>Off: Computer sound is on.</li> </ul>
(7) Num lock light	On: Num lock is on.

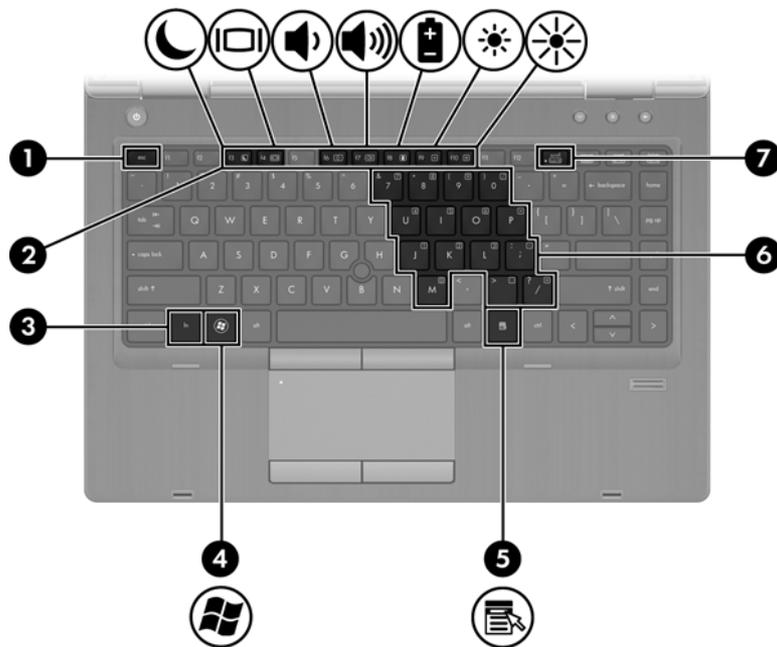
## Buttons and fingerprint reader



Component	Description
(1)	TouchPad on/off button
(2) 	<p>Power button</p> <ul style="list-style-type: none"> <li>• When the computer is off, press the button to turn on the computer.</li> <li>• When the computer is on, press the button briefly to initiate Sleep.</li> <li>• When the computer is in the Sleep state, press the button briefly to exit Sleep.</li> <li>• When the computer is in Hibernation, press the button briefly to exit Hibernation.</li> </ul> <p>If the computer has stopped responding and Windows® shutdown procedures are ineffective, press and hold the power button for at least 5 seconds to turn off the computer.</p> <p>To learn more about your power settings:</p> <ul style="list-style-type: none"> <li>• <b>Windows 7</b>—Select <b>Start &gt; Control Panel &gt; System and Security &gt; Power Options</b>.</li> <li>– or –</li> <li>• <b>Windows Vista</b>—Select <b>Start &gt; Control Panel &gt; System and Maintenance &gt; Power Options</b>.</li> <li>• Or refer to the <i>HP Notebook Reference Guide</i>.</li> </ul>
(3) 	<p>Wireless button</p> <p>Turns the wireless feature on or off but does not establish a wireless connection.</p>

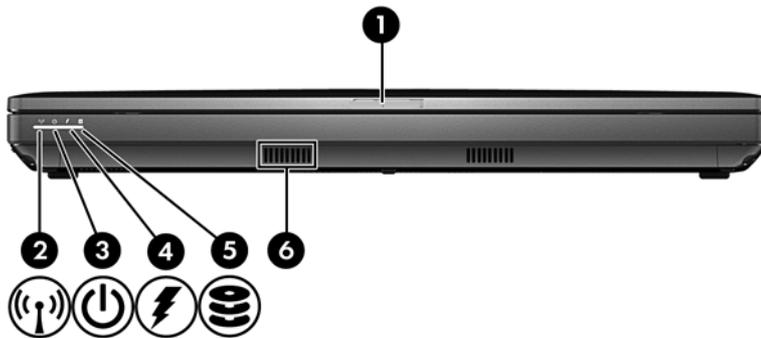
Component	Description
(4)  QuickWeb button	<ul style="list-style-type: none"><li>• When the computer is off or in Hibernation, press the button to open HP QuickWeb.</li><li>• When the computer is in Microsoft Windows, press the button to open the default Web browser.</li><li>• When the computer is in HP QuickWeb, press the button to open the default Web browser.</li></ul> <p><b>NOTE:</b> For more information, refer to the HP QuickWeb software Help. If your computer does not have HP QuickWeb software, the button does not perform any action or function.</p>
(5)  Volume mute button	Mutes and restores speaker sound.
(6) Fingerprint reader (select models only)	Allows a fingerprint logon to Windows, instead of a password logon.

## Keys



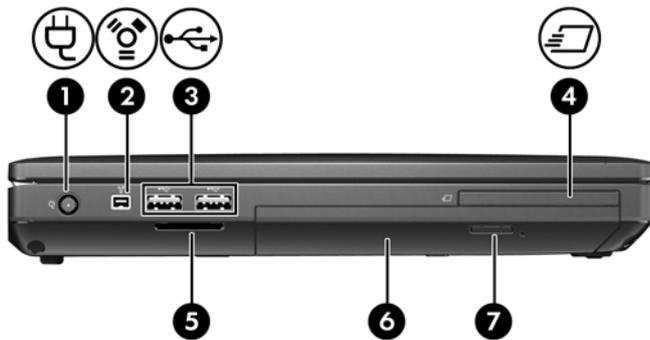
Component	Description
(1) <code>esc</code> key	Displays system information when pressed in combination with the <code>fn</code> key.
(2) Function keys	Execute frequently used system functions when pressed in combination with the <code>fn</code> key.
(3) <code>fn</code> key	Executes frequently used system functions when pressed in combination with a function key, the <code>num lk</code> key, or the <code>esc</code> key.
(4)  Windows logo key	Displays the Windows Start menu.
(5)  Windows applications key	Displays a shortcut menu for items beneath the cursor.
(6) Embedded numeric keypad	When the keypad is turned on, it can be used like an external numeric keypad.  Each key on the keypad performs the function indicated by the icon in the upper-right corner of the key.
(7) <code>num lk</code> key	Turns the embedded numeric keypad on and off when pressed in combination with the <code>fn</code> key.

# Front



Component	Description
(1) Display release latch	Opens the computer.
(2) Wireless light	<ul style="list-style-type: none"> <li>White: An integrated wireless device, such as a wireless local area network (WLAN) device and/or a Bluetooth® device, is on.</li> <li>Amber: All wireless devices are off.</li> </ul>
(3) Power light	<ul style="list-style-type: none"> <li>On: The computer is on.</li> <li>Blinking: The computer is in the Sleep state.</li> <li>Off: The computer is off or in Hibernation.</li> </ul>
(4) Battery light	<ul style="list-style-type: none"> <li>Amber: The computer is connected to external power and the battery is charged from 0 to 90%.</li> <li>White: The computer is connected to external power and the battery is charged from 90 to 99%.</li> <li>Blinking amber: A battery that is the only available power source has reached a low battery level. When the battery reaches a critical battery level, the battery light begins blinking rapidly.</li> <li>Off: The battery is fully charged.</li> </ul>
(5) Hard drive light	<ul style="list-style-type: none"> <li>Blinking turquoise: The hard drive or optical drive is being accessed.</li> <li>Amber: HP 3D DriveGuard has temporarily parked the hard drive.</li> </ul> <p><b>NOTE:</b> For information on HP 3D DriveGuard, refer to the <i>HP Notebook Reference Guide</i>.</p>
(6) Speaker	<p>Produces sound.</p> <p><b>NOTE:</b> To use the SRS Premium sound software (select models only), select <b>Start &gt; All Programs &gt; SRS Premium Sound</b>.</p>

## Left



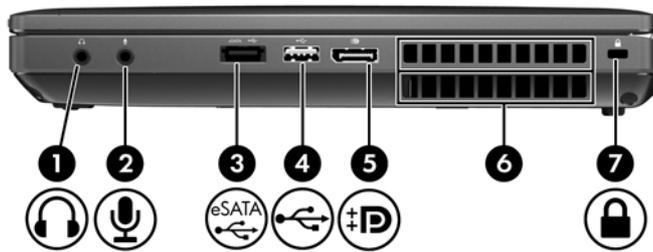
Component	Description
(1)  Power connector	Connects an AC adapter.
(2)  1394 port	Connects an optional IEEE 1394 or 1394a device, such as a camcorder.
(3)  USB 2.0 ports (2)	Connect optional USB devices.
(4)  ExpressCard slot or smart card reader (depending on configuration)	Supports optional ExpressCards or smart cards.
(5) Media Card Reader	Supports the following digital card formats: <ul style="list-style-type: none"><li>• Secure Digital (SD) Memory Card</li><li>• MultiMediaCard (MMC)</li></ul>
(6) Upgrade bay (optical drive shown)	An optical drive installed in the bay (select models only) reads and writes to an optical disc. <b>NOTE:</b> The upgrade bay can hold either a hard drive, an optical drive, or a weight saver option.
(7) Optical drive eject button (select models only)	Ejects the optical drive disc tray.

## Rear



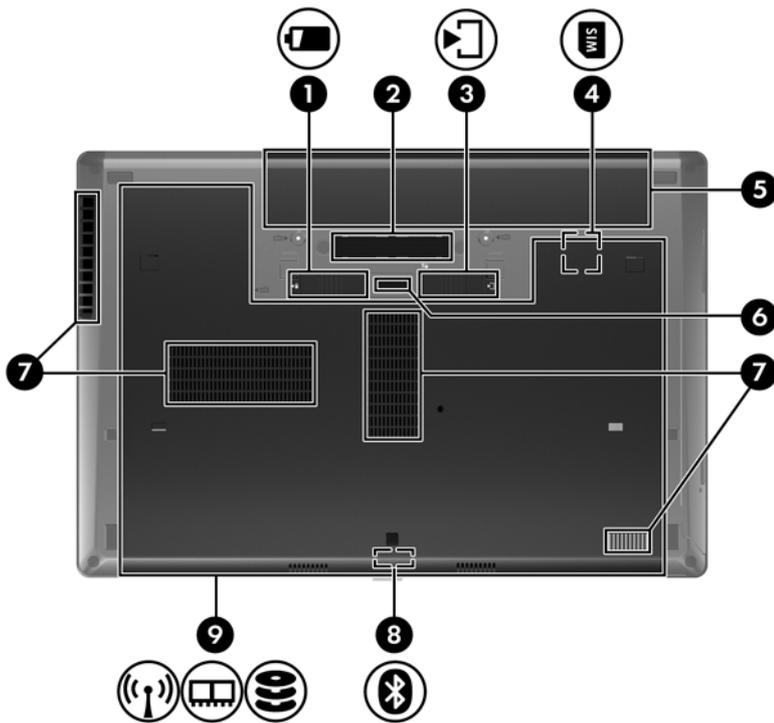
Component	Description
(1) 	RJ-11 (modem) jack Connects a modem cable.
(2) 	External monitor port Connects an external VGA monitor or projector.
(3) 	RJ-45 (network) jack Connects a network cable.

# Right



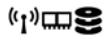
Component	Description
(1)  Audio-out (headphone) jack	Connects optional powered stereo speakers, headphones, earbuds, a headset, or television audio.  <b>WARNING!</b> To reduce the risk of personal injury, adjust the volume before putting on headphones, earbuds, or a headset. For additional safety information, refer to the <i>Regulatory, Safety, and Environmental Notices</i> .  <b>NOTE:</b> When a device is connected to the headphone jack, the computer speakers are disabled.
(2)  Audio-in (microphone) jack	Connects an optional computer headset microphone, stereo array microphone, or monaural microphone.
(3)  eSATA/USB 2.0 combo port	Connects a high-performance eSATA component, such as an eSATA external hard drive, or connects an optional USB device.
(4)  USB 2.0 port	Connects an optional USB device.
(5)  DisplayPort	Connects an optional digital display device, such as a high-performance monitor or projector.
(6) Vents (2)	Enable airflow to cool internal components.  <b>NOTE:</b> 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.
(7)  Security cable slot	Attaches an optional security cable to the computer.  <b>NOTE:</b> The security cable is designed to act as a deterrent, but it may not prevent the computer from being mishandled or stolen.

# Bottom



Component	Description
(1) 	Battery release latch Releases the battery from the battery bay.
(2)	Docking connector Connects an optional docking device.
(3) 	Bottom cover release latch Releases or locks the bottom cover.
(4) 	SIM slot Supports a wireless subscriber identity module (SIM). The SIM slot is located inside the battery bay.
(5)	Battery bay Holds the battery.
(6)	Accessory battery connector Connects an optional accessory battery.
(7)	Vents (4) Enable airflow to cool internal components.

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

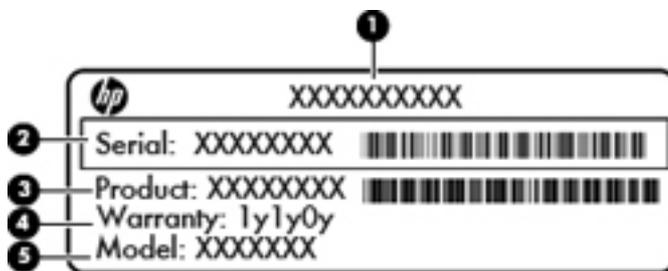
Component	Description
(8)  Bluetooth compartment	Contains a Bluetooth device.
(9)  Wireless and memory module compartments and hard drive bay	<p>Holds the wireless LAN module slot, the WWAN module slot, the memory module slots, and the hard drive.</p> <p><b>CAUTION:</b> To prevent an unresponsive system, 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.</p>

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## 3 Illustrated parts catalog

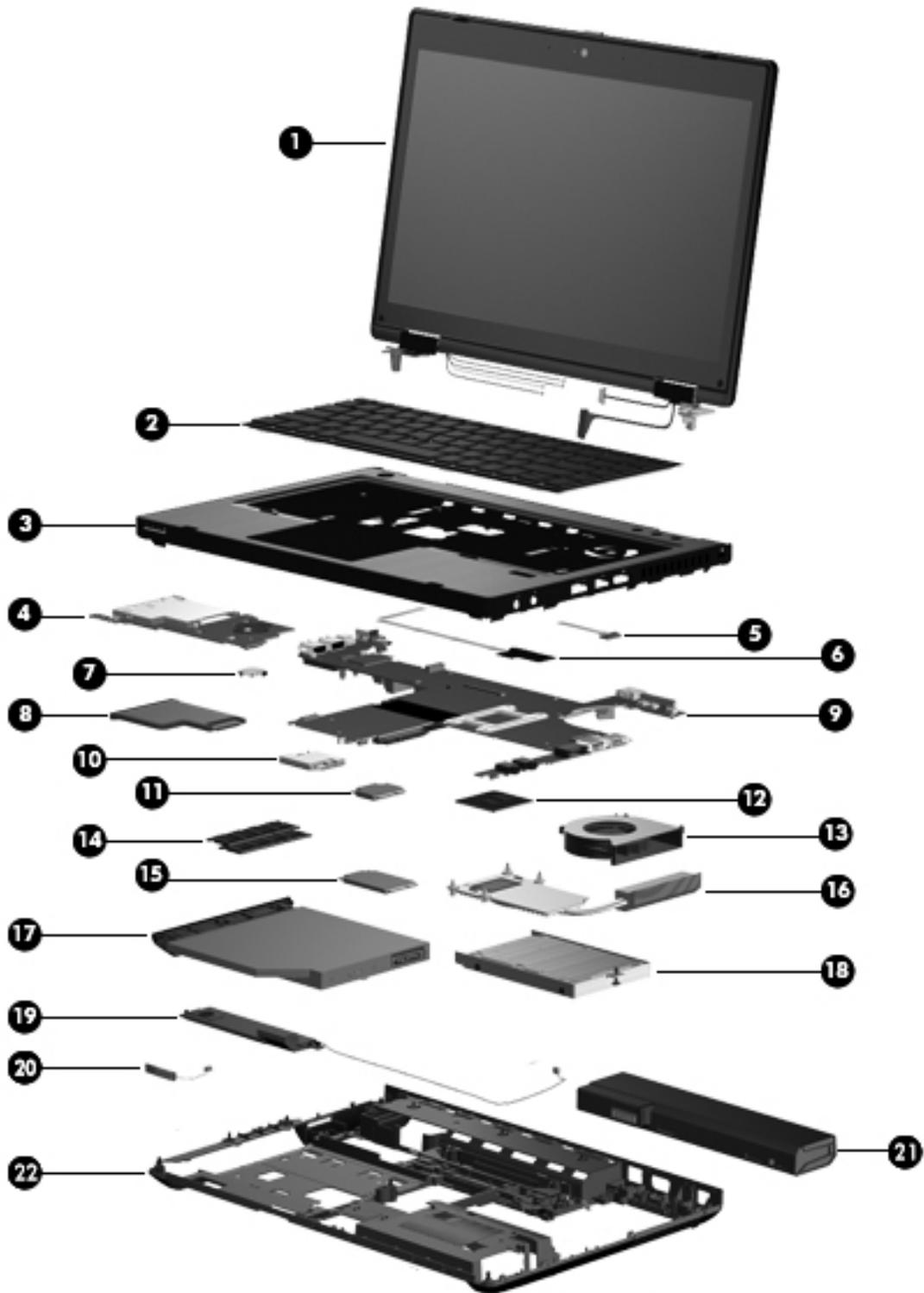
### Service tag

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



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

# Computer major components

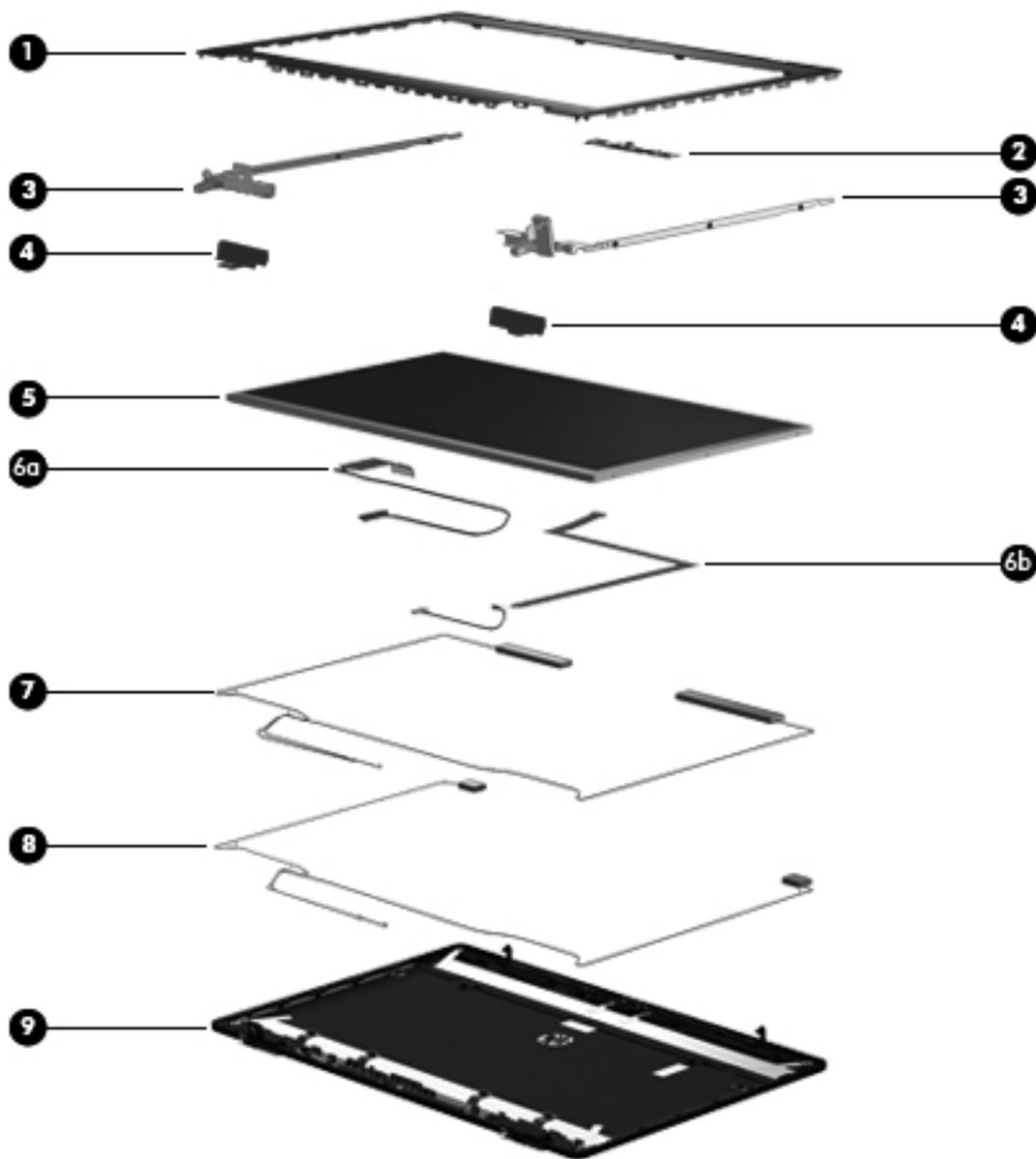


Item	Description	Spare part number
(1)	<b>Display panel</b>	not spared
	<b>NOTE:</b> For a list of display panel spare parts, see <a href="#">Display components on page 24</a> .	
(2)	<b>Keyboard</b> (includes cable)	
	<b>NOTE:</b> For a detailed list of available keyboards, see <a href="#">Sequential part number listing on page 29</a> .	
	For use in models without a pointing stick	641834-xxx
	For use in models with a pointing stick	641835-xxx
(3)	<b>Top cover</b> (includes TouchPad button and bracket)	
	Includes a 2-button touchpad and fingerprint reader	642741-001
	Includes a 2-button touchpad without fingerprint reader	642742-001
	Includes a 4-button touchpad and fingerprint reader	642743-001
	Includes a 4-button touchpad without fingerprint reader	642746-001
(4)	<b>Smart card reader</b>	654823-001
(5)	<b>Lid switch board</b> (includes cable)	642765-001
(6)	<b>Fingerprint reader board</b> (includes cable)	642764-001
(7)	<b>RTC battery</b>	651948-001
(8)	<b>ExpressCard assembly</b>	642763-001
(9)	<b>System board</b> (includes replacement thermal material)	
	For use in models without WWAN	658544-001
	For use in models with WWAN	658545-001
(10)	<b>Modem module</b>	628824-001
	<b>NOTE:</b> The modem module spare part kit does not include a modem module cable. The modem module cable is included in the Cable Kit, spare part number 641830-001. See <a href="#">Cable Kit on page 25</a> for more Cable Kit spare part number information.	
(11)	<b>WLAN module</b>	

Item	Description	Spare part number
	Broadcom 4313AGN 802.11a/b/g/draft-n WiFi Adapter for use in Afghanistan, Albania, Algeria, Andorra, Angola, Antigua and Barbuda, Argentina, Armenia, Aruba, Australia, Austria, Azerbaijan, Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Belize, Benin, Bermuda, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, the British Virgin Islands, Brunei, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Canada, Cape Verde, the Cayman Islands, Central African Republic, Chad, People's Republic of China, Colombia, Comoros, 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, Guam, Guatemala, Guinea, Guinea-Bissa, Guyana, Haiti, Honduras, Hong Kong, Hungary, Iceland, India, Iraq, Ireland, Israel, Italy, Ivory Coast, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kiribati, Kuwait, Kyrgyzstan, Laos, Latvia, Lebanon, Lesotho, Liberia, Martinique, Liechtenstein, Lithuania, Luxembourg, Macedonia, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta, Marshall Islands, Mauritania, Mauritius, Mexico, Micronesia, Monaco, Mongolia, Montenegro, Morocco, Mozambique, Namibia, Nauru, Nepal, the Nether Antilles, the Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Palau, Panama, Papua New Guinea, Paraguay, Puerto Rico, Peru, Philippines, Poland, Portugal, Qatar, Republic of Moldova, Romania, Russia, Rwanda, Samoa, San Marino, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia and Montenegro, Seychelles, Sierra Leone, Singapore, Slovakia, Slovenia, 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, Syria, Taiwan, Tajikistan, Tanzania, Thailand, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Tuvalu, Uganda, Ukraine, the United Arab Emirates, the United Kingdom, Uruguay, the United States, the US Virgin Islands, Uzbekistan, Vanuatu, Venezuela, Vietnam, Yemen, Zaire, Zambia, and Zimbabwe	593836-001
<b>(12)</b>	<b>Processor</b> (includes thermal material)	
	AMD A8-3510M (2.5-GHz/1.5-GHz, 4-MB L2 cache, 45W)	653358-001
	AMD A6-3410M (2.3-GHz/1.6-GHz, 4-MB L2 cache, 45W)	653357-001
	AMD A4-3310M (2.5-GHz/2.1-GHz, 2-MB L2 cache, 45W)	653356-001
	AMD E2-3000M (2.4-GHz/1.8-GHz, 1-MB L2 cache, 35W)	653351-001
<b>(13)</b>	<b>Fan</b>	641839-001
<b>(14)</b>	<b>Memory modules</b> (PC3-10600, 1333-MHz, DDR3)	
	8-GB	634091-001
	4-GB	621569-001
	2-GB	621565-001
<b>(15)</b>	<b>WWAN modules</b>	
	HP hs2340 HSPA+ Mobile Broadband Module	632155-001
	HP un2430 EV-DO/HSPA Mobile Broadband Module	634400-001
<b>(16)</b>	<b>Heat sink</b> (includes replacement thermal material)	658543-001
<b>(17)</b>	<b>Optical drive</b>	
	Blu-ray ROM DVD±RW SuperMulti DL Drive	643913-001
	DVD±RW and CD-RW SuperMulti DL Combo Drive	643911-001
	DVD-ROM Drive	643910-001
<b>(18)</b>	<b>Hard drive</b>	

Item	Description	Spare part number
	750-GB, 7200-rpm	633252-001
	500-GB, 7200-rpm	634926-001
	500-GB, 7200-rpm (for use in the upgrade bay)	656424-001
	320-GB, 7200-rpm (Self-Encrypting Drive (SED))	626978-001
	320-GB, 7200-rpm	641672-001
	250-GB, 7200-rpm	635225-001
	128-GB solid-state drive	643917-001
<b>(19)</b>	<b>Speaker assembly</b>	641840-001
<b>(20)</b>	<b>Bluetooth module</b> (does not include Bluetooth module cable)	537921-001
	<p><b>NOTE:</b> The Bluetooth module spare part kit does not include a Bluetooth module cable. The Bluetooth module cable is included in the Cable Kit, spare part number 641830-001. See <a href="#">Cable Kit on page 25</a> for more Cable Kit spare part number information.</p>	
<b>(21)</b>	<b>Battery, Li-ion</b>	
	9-cell (100 WHr, 3.0 Ah)	631243-001
	9-cell (73 WHr, 2.2 Ah)	634089-001
	6-cell (62 WHr, 2.8 Ah)	628668-001
	6-cell (55 WHr, 2.8 Ah, long life)	628670-001
	6-cell (2.55 Ah) (1-year warranty)	659083-001
	3-cell (31 WHr, 2.8 Ah)	628664-001
<b>(22)</b>	<b>Bottom cover</b> (includes rubber feet; not illustrated)	641838-001

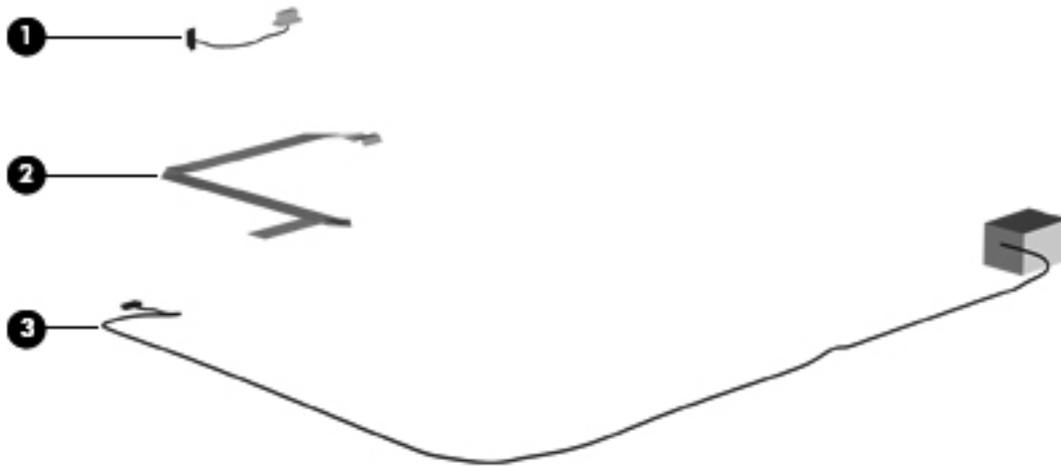
## Display components



Item	Description	Spare part number
(1)	Display bezel	658542-001
(2)	Webcam module with microphone	642795-001
	Microphone module (not illustrated)	642797-001
(3)	Display hinges (includes left and right hinges)	641836-001
(4)	Display hinge covers	642783-001
(5)	Display panel	
	35.6-cm (14.0-in), HD+, anti-glare, LED, LVDS (does not include cable)	643915-001

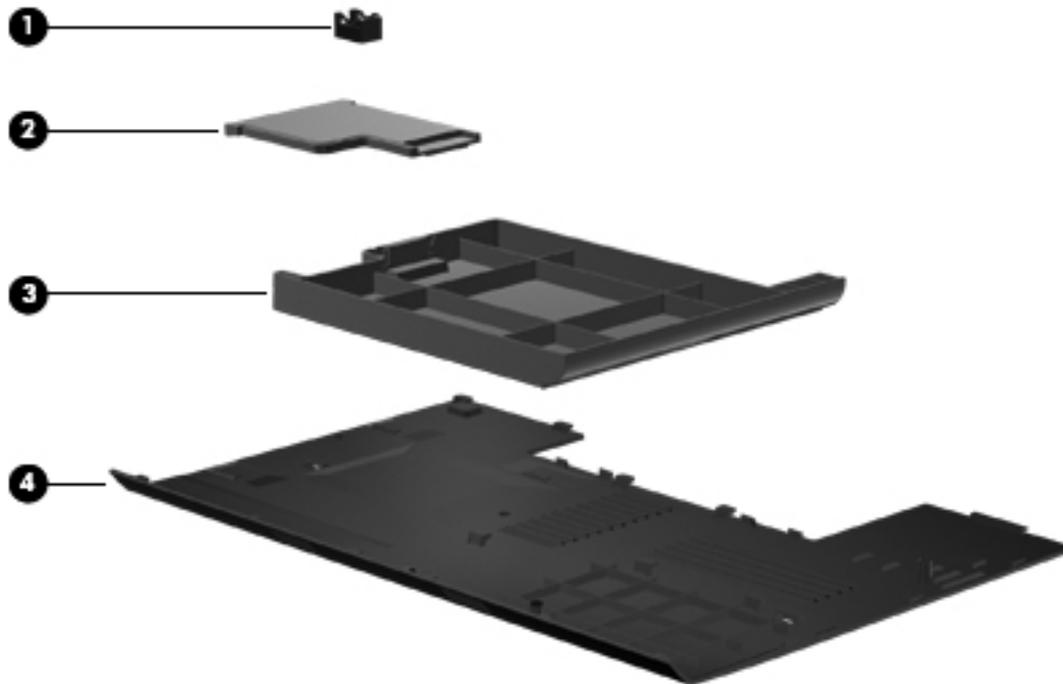
Item	Description	Spare part number
	35.6-cm (14.0-in), HD anti-glare, LED, SVA, LVDS (does not include cable)	643914-001
<b>Display Cable Kit</b>		
(6a)	Display cable	
(6b)	Webcam cable	
	For use in models with HD displays	664710-001
	For use in models with HD+ displays	664711-001
(7)	<b>WLAN antennas</b>	642799-001
(8)	<b>WWAN antennas</b>	642801-001
(9)	<b>Display enclosure</b>	642778-001
	<b>Display Latch Kit</b> (not illustrated)	641841-001
	<b>Display Screw Kit</b> (not illustrated)	642787-001
	<b>Display Rubber Kit</b> (not illustrated)	642785-001

## Cable Kit



Item	Description	Spare part number
<b>Cable Kit:</b>		641830-001
(1)	Bluetooth module cable	
(2)	Pointing stick cable	
(3)	RJ-11 connector cable	

## Plastics Kit



Item	Description	Spare part number
	<b>Plastics Kit</b>	641832-001
(1)	RJ-11 jack	
(2)	ExpressCard slot protective insert	
(3)	Optical drive protective insert	
(4)	Bottom door	

## Mass storage devices

Description	Spare part number
<b>Optical drive</b>	
Blu-ray Disc ROM with SuperMulti DVD±R/RW DL Drive	643913-001
DVD±RW and CD-RW SuperMulti DL Combo Drive	643911-00
DVD-ROM Drive	643910-001
<b>Hard drive</b>	
750-GB, 7200-rpm	633252-001
500-GB, 7200-rpm	634926-001
500-GB, 7200-rpm (for use in the upgrade bay)	656424-001
320-GB, 7200-rpm (Self-Encrypting Drive (SED))	626978-001
320-GB, 7200-rpm	641672-001
250-GB, 7200-rpm	635225-001
128-GB solid-state drive	643917-001
<b>Hard Drive Hardware Kit</b> (includes hard drive bracket and screws)	642774-001
<b>Upgrade Bay – Hard Drive Adapter Kit</b>	643921-001

## Miscellaneous parts

Description	Spare part number
<b>AC adapters</b>	
90-W AC adapter	609940-001
90-W AC adapter for use in India	609947-001
<b>Power cords:</b>	
For use in Argentina	490371-D01
For use in Australia	490371-011
For use in Thailand	490371-201
For use in Brazil	490371-202
For use in Denmark	490371-081
For use in Europe, the Middle East, and Africa	490371-021
For use in India	490371-D61
For use in Israel	490371-BB1
For use in Italy	490371-061
For use in Japan	490371-291
For use in the People's Republic of China	490371-AA1
For use in South Africa	490371-AR1
For use in South Korea	490371-AD1
For use in Switzerland	490371-111
For use in Taiwan	490371-AB1
For use in the United Kingdom	490371-031
For use in the United States	490371-001
<b>Rubber Kit</b> (includes rubber feet and rubber screw covers)	641831-001
<b>Screw Kit</b>	641833-001
<b>Mouse</b> , optical, 2-button	390632-001
<b>HP optical travel mouse</b>	434594-001
<b>HP basic carrying case</b>	455084-001
<b>Professional slim, top load case</b>	592923-001
<b>Notebook combination lock</b>	591699-001
<b>Nylon case</b>	612757-001

## Sequential part number listing

<b>Spare part number</b>	<b>Description</b>
390632-001	Mouse, optical, 2-button
434594-001	HP USB optical travel mouse
455084-001	HP basic carrying case
490371-001	Power cord for use in North America
490371-011	Power cord for use in Australia
490371-021	Power cord for use in Europe, the Middle East, and Africa
490371-031	Power cord for use in the United Kingdom
490371-061	Power cord for use in Italy
490371-081	Power cord for use in Denmark
490371-111	Power cord for use in Switzerland
490371-201	Power cord for use in Thailand
490371-202	Power cord for use in Brazil
490371-291	Power cord for use in Japan
490371-AA1	Power cord for use in the People's Republic of China
490371-AB1	Power cord for use in Taiwan
490371-AD1	Power cord for use in South Korea
490371-AR1	Power cord for use in South Africa
490371-BB1	Power cord for use in Israel
490371-D01	Power cord for use in Argentina
490371-D61	Power cord for use in India
537921-001	Bluetooth module
591699-001	Combination lock
592923-001	Professional, slim top load case

Spare part number	Description
593836-001	Broadcom 4313AGN 802.11a/b/g/draft-n WiFi Adapter for use in Afghanistan, Albania, Algeria, Andorra, Angola, Antigua and Barbuda, Argentina, Armenia, Aruba, Australia, Austria, Azerbaijan, Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Belize, Benin, Bermuda, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, the British Virgin Islands, Brunei, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Canada, Cape Verde, the Cayman Islands, Central African Republic, Chad, People's Republic of China, Colombia, Comoros, 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, Guam, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hong Kong, Hungary, Iceland, India, Iraq, Ireland, Israel, Italy, Ivory Coast, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kiribati, Kuwait, Kyrgyzstan, Laos, Latvia, Lebanon, Lesotho, Liberia, Martinique, Liechtenstein, Lithuania, Luxembourg, Macedonia, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta, Marshall Islands, Mauritania, Mauritius, Mexico, Micronesia, Monaco, Mongolia, Montenegro, Morocco, Mozambique, Namibia, Nauru, Nepal, the Nether Antilles, the Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Palau, Panama, Papua New Guinea, Paraguay, Puerto Rico, Peru, Philippines, Poland, Portugal, Qatar, Republic of Moldova, Romania, Russia, Rwanda, Samoa, San Marino, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia and Montenegro, Seychelles, Sierra Leone, Singapore, Slovakia, Slovenia, 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, Syria, Taiwan, Tajikistan, Tanzania, Thailand, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Tuvalu, Uganda, Ukraine, the United Arab Emirates, the United Kingdom, Uruguay, the United States, the US Virgin Islands, Uzbekistan, Vanuatu, Venezuela, Vietnam, Yemen, Zaire, Zambia, and Zimbabwe
609940-001	90-W AC adapter
609947-001	90-W AC adapter for use in India
612757-001	Nylon case
621565-001	2-GB memory module (PC3-10600, 1333-MHz, DDR3)
621569-001	4-GB memory module (PC3-10600, 1333-MHz, DDR3)
626978-001	320-GB, 7200-rpm hard drive (Self-Encrypting Drive (SED))
628664-001	3-cell, 31 WHr, 2.8 Ah Li-ion battery
628668-001	6-cell, 62 WHr, 2.8 Ah Li-ion battery
628670-001	6-cell, 55 WHr, 2.8 Ah, long life Li-ion battery
628824-001	Modem module  <b>NOTE:</b> The modem module spare part kit does not include a modem module cable. The modem module cable is included in the Cable Kit, spare part number 641830-001. See <a href="#">Cable Kit on page 25</a> for more Cable Kit spare part number information.
631243-001	9-cell, 100 WHr, 3.0 Ah Li-ion battery
632155-001	HP hs2340 HSPA+ Mobile Broadband Module
633252-001	750-GB, 7200-rpm hard drive
634089-001	9-cell, 73 WHr, 2.2 Ah Li-ion battery
634091-001	8-GB memory module (PC3-10600, 1333-MHz, DDR3)
634400-001	HP un2430 EV-DO/HSPA Mobile Broadband Module
634926-001	500-GB, 7200-rpm hard drive
635225-001	250-GB, 7200-rpm hard drive
641672-001	320-GB, 7200-rpm hard drive

<b>Spare part number</b>	<b>Description</b>
641830-001	Cable Kit (see <a href="#">Cable Kit on page 25</a> for more Cable Kit spare part information)
641831-001	Rubber Kit (includes rubber feet and rubber screw covers)
641832-001	Plastics Kit (see <a href="#">Plastics Kit on page 26</a> for more Plastics Kit spare part information)
641833-001	Screw Kit
641834-001	Keyboard without pointing stick for use in models in the United States (includes keyboard cable)
641834-031	Keyboard without pointing stick for use in models in the United Kingdom (includes keyboard cable)
641834-041	Keyboard without pointing stick for use in models in Germany (includes keyboard cable)
641834-051	Keyboard without pointing stick for use in models in France (includes keyboard cable)
641834-061	Keyboard without pointing stick for use in models in Italy (includes keyboard cable)
641834-071	Keyboard without pointing stick for use in models in Spain (includes keyboard cable)
641834-081	Keyboard without pointing stick for use in models in Denmark (includes keyboard cable)
641834-091	Keyboard without pointing stick for use in models in Norway (includes keyboard cable)
641834-121	Keyboard without pointing stick for use in models in French Canada (includes keyboard cable)
641834-131	Keyboard without pointing stick for use in models in Portugal (includes keyboard cable)
641834-141	Keyboard without pointing stick for use in models in Turkey (includes keyboard cable)
641834-161	Keyboard without pointing stick for use in models in Latin America (includes keyboard cable)
641834-171	Keyboard without pointing stick for use in models in Saudi Arabia (includes keyboard cable)
641834-201	Keyboard without pointing stick for use in models in Brazil (includes keyboard cable)
641834-211	Keyboard without pointing stick for use in models in Hungary (includes keyboard cable)
641834-251	Keyboard without pointing stick for use in models in Russia (includes keyboard cable)
641834-261	Keyboard without pointing stick for use in models in Bulgaria (includes keyboard cable)
641834-281	Keyboard without pointing stick for use in models in Thailand (includes keyboard cable)
641834-291	Keyboard without pointing stick for use in models in Japan (includes keyboard cable)
641834-A41	Keyboard without pointing stick for use in models in Belgium (includes keyboard cable)
641834-A81	Keyboard without pointing stick for use in models in the Czech Republic (includes keyboard cable)
641834-AB1	Keyboard without pointing stick for use in models in Taiwan (includes keyboard cable)
641834-AD1	Keyboard without pointing stick for use in models in South Korea (includes keyboard cable)
641834-B31	Keyboard without pointing stick for use in models in the Netherlands and Europe (includes keyboard cable)
641834-B71	Keyboard without pointing stick for use in models in Sweden (includes keyboard cable)
641834-BA1	Keyboard without pointing stick for use in models in Slovenia (includes keyboard cable)
641834-BB1	Keyboard without pointing stick for use in models in Israel (includes keyboard cable)
641834-BG1	Keyboard without pointing stick for use in models in Switzerland (includes keyboard cable)
641834-DD1	Keyboard without pointing stick for use in models in Iceland (includes keyboard cable)
641834-DJ1	Keyboard without pointing stick for use in models in Greece (includes keyboard cable)

<b>Spare part number</b>	<b>Description</b>
641834-DW1	Keyboard without pointing stick for use in models in the French Arabic region (includes keyboard cable)
641835-001	Keyboard with pointing stick for use in models in the United States (includes keyboard and pointing stick cables)
641835-031	Keyboard with pointing stick for use in models in the United Kingdom (includes keyboard and pointing stick cables)
641835-041	Keyboard with pointing stick for use in models in Germany (includes keyboard and pointing stick cables)
641835-051	Keyboard with pointing stick for use in models in France (includes keyboard and pointing stick cables)
641835-061	Keyboard with pointing stick for use in models in Italy (includes keyboard and pointing stick cables)
641835-071	Keyboard with pointing stick for use in models in Spain (includes keyboard and pointing stick cables)
641835-081	Keyboard with pointing stick for use in models in Denmark (includes keyboard and pointing stick cables)
641835-091	Keyboard with pointing stick for use in models in Norway (includes keyboard and pointing stick cables)
641835-121	Keyboard with pointing stick for use in models in French Canada (includes keyboard and pointing stick cables)
641835-131	Keyboard with pointing stick for use in models in Portugal (includes keyboard and pointing stick cables)
641835-141	Keyboard with pointing stick for use in models in Turkey (includes keyboard and pointing stick cables)
641835-161	Keyboard with pointing stick for use in models in Latin America (includes keyboard and pointing stick cables)
641835-171	Keyboard with pointing stick for use in models in Saudi Arabia (includes keyboard and pointing stick cables)
641835-201	Keyboard with pointing stick for use in models in Brazil (includes keyboard and pointing stick cables)
641835-211	Keyboard with pointing stick for use in models in Hungary (includes keyboard and pointing stick cables)
641835-251	Keyboard with pointing stick for use in models in Russia (includes keyboard and pointing stick cables)
641835-261	Keyboard with pointing stick for use in models in Bulgaria (includes keyboard and pointing stick cables)
641835-281	Keyboard with pointing stick for use in models in Thailand (includes keyboard and pointing stick cables)
641835-291	Keyboard with pointing stick for use in models in Japan (includes keyboard and pointing stick cables)
641835-A41	Keyboard with pointing stick for use in models in Belgium (includes keyboard and pointing stick cables)
641835-A81	Keyboard with pointing stick for use in models in the Czech Republic (includes keyboard cable)
641835-AB1	Keyboard with pointing stick for use in models in Taiwan (includes keyboard and pointing stick cables)
641835-AD1	Keyboard with pointing stick for use in models in South Korea (includes keyboard and pointing stick cables)
641835-B31	Keyboard with pointing stick for use in models in the Netherlands and Europe (includes keyboard and pointing stick cables)
641835-B71	Keyboard with pointing stick for use in models in Sweden (includes keyboard and pointing stick cables)
641835-BA1	Keyboard with pointing stick for use in models in Slovenia (includes keyboard and pointing stick cables)
641835-BB1	Keyboard with pointing stick for use in models in Israel (includes keyboard and pointing stick cables)
641835-BG1	Keyboard with pointing stick for use in models in Switzerland (includes keyboard and pointing stick cables)
641835-DD1	Keyboard with pointing stick for use in models in Iceland (includes keyboard and pointing stick cables)
641835-DJ1	Keyboard with pointing stick for use in models in Greece (includes keyboard and pointing stick cables)

<b>Spare part number</b>	<b>Description</b>
641835-DW1	Keyboard with pointing stick for use in models in the French Arabic region (includes keyboard cable)
641836-001	Display hinges (includes left and right hinge)
641838-001	Bottom cover
641839-001	Fan
641840-001	Speaker assembly
641841-001	Display Latch Kit
642741-001	Top cover for use with models that include a 2-button touchpad and fingerprint reader
642742-001	Top cover for use with models that include a 2-button touchpad without a fingerprint reader
642743-001	Top cover for use with models that include a 4-button touchpad and a fingerprint reader
642746-001	Top cover for use with models that include a 4-button touchpad without a fingerprint reader
642763-001	ExpressCard assembly
642764-001	Fingerprint reader board (includes cable)
642765-001	Lid switch board with cable
642774-001	Hard Drive Hardware Kit (includes hard drive bracket and screws)
642778-001	Display enclosure
642783-001	Display hinge covers (includes left and right covers)
642785-001	Display Rubber Kit
642787-001	Display Screw Kit
642795-001	Webcam module with microphone
642797-001	Microphone module
642799-001	WLAN antennas (includes two antennas)
642801-001	WWAN antennas
643910-001	DVD-ROM drive
643911-001	DVD±RW and CD-RW SuperMulti DL Combo Drive
643913-001	Blu-ray ROM DVD±RW SuperMulti DL Drive
643914-001	Display panel, 35.6-cm (14.0-in), HD anti-glare, LED, SVA, LVDS (does not include cable)
643915-001	Display panel, 35.6-cm (14.0-in), HD+, anti-glare, LED, LVDS (does not include cable)
643917-001	128-GB solid-state drive (SSD)
643921-001	Upgrade Bay – Hard Drive Adapter Kit
651948-001	RTC battery
653351-001	AMD E2-3000M processor (2.4-GHz/1.8-GHz, 1-MB L2 cache, 35W)
653356-001	AMD A4-3310M processor (2.5-GHz/2.1-GHz, 2-MB L2 cache, 45W)
653357-001	AMD A6-3410M (2.3-GHz/1.6-GHz, 4-MB L2 cache, 45W)
653358-001	AMD A8-3510M (2.5-GHz/1.5-GHz, 4-MB L2 cache, 45W)

<b>Spare part number</b>	<b>Description</b>
654823-001	Smart card reader
656424-001	500-GB, 7200-rpm (for use in the upgrade bay)
658542-001	Display bezel for use with models with a webcam
658543-001	Heat sink
658544-001	System board for use in models without WWAN (includes replacement thermal material)
658545-001	System board for use in models with WWAN (includes replacement thermal material)
659083-001	6-cell, 2.55 Ah, Li-ion battery with 1-year warranty
664710-001	Display Cable Kit for use in models with HD displays (includes display cable and webcam cable)
664711-001	Display Cable Kit for use in models with HD+ displays (includes display cable and webcam cable)

---

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

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

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

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

Avoid dropping drives from any height onto any surface.

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

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

Avoid exposing a drive to temperature extremes or liquids.

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

---

# Grounding guidelines

## Electrostatic discharge damage

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

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

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

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

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

Use nonmagnetic tools.

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

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

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

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

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

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

## Packaging and transporting guidelines

Follow these grounding guidelines when packaging and transporting equipment:

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

## Workstation guidelines

Follow these grounding workstation guidelines:

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

## Equipment guidelines

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

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

The following grounding equipment is recommended to prevent electrostatic damage:

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

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

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

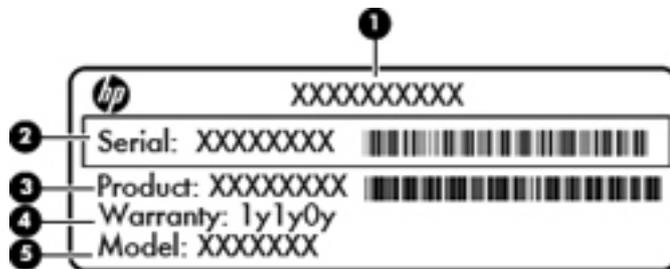
# Component replacement procedures

This chapter provides removal and replacement procedures.

There are as many as 95 screws and screw locks, in 15 different sizes, that must be removed, replaced, or loosened when servicing the computer. Make special note of each screw and screw lock size and location during removal and replacement.

## Service tag

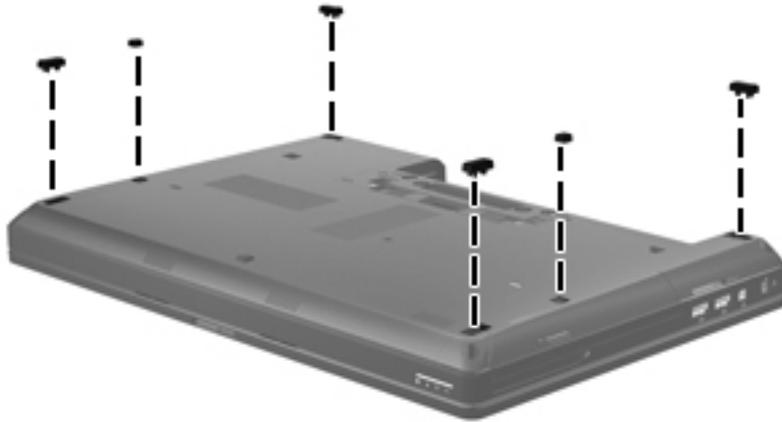
When ordering parts or requesting information, provide the computer serial number and model description provided on the service tag.



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

## Computer feet

The computer feet are adhesive-backed rubber pads. The feet are included in the Rubber Kit, spare part number 641831-001. There are 6 rubber feet that attach to the base enclosure in the locations illustrated below.



## Battery

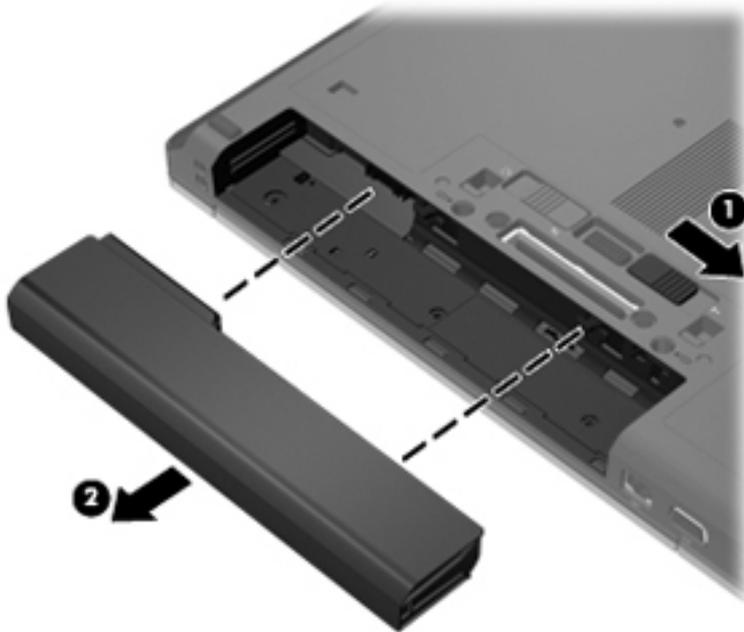
Description	Spare part number
9-cell, 100 WHr, 3.0 Ah Li-ion battery	631243-001
9-cell, 73 WHr, 2.2 Ah Li-ion battery	634089-001
6-cell, 62 WHr, 2.8 Ah, Li-ion battery	628668-001
6-cell, 55 WHr, 2.8 Ah, long life Li-ion battery	628670-001
6-cell, 2.55 Ah, Li-ion battery with 1-year warranty	659083-001
3-cell, 31 WHr, 2.8 Ah Li-ion battery	628664-001

Before disassembling the computer, follow these steps:

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

Remove the battery:

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



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

## SIM

 **NOTE:** This section applies only to computer models with WWAN capability.

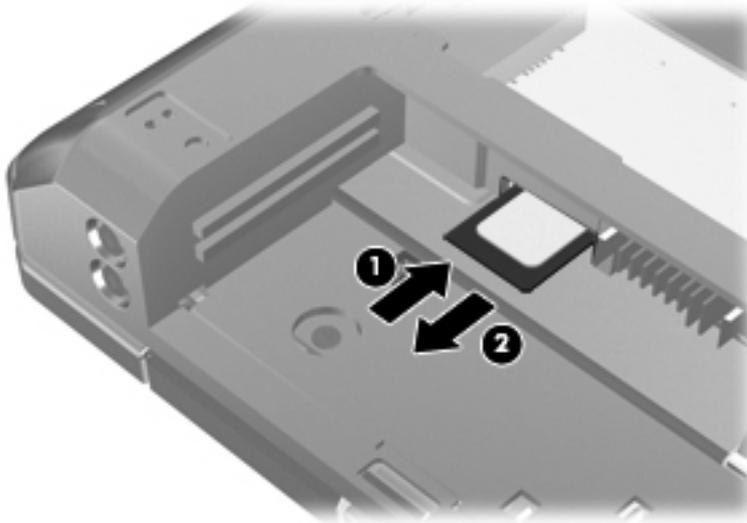
 **NOTE:** If there is a SIM inserted in the SIM slot, it must be removed before disassembling the computer. Be sure that the SIM is reinserted in the SIM slot after reassembling the computer.

Before removing the SIM, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 42](#)).

Remove the SIM:

1. Press in on the SIM **(1)**. (The module is partially ejected from the SIM slot.)
2. Remove the SIM **(2)** from the SIM slot.



Reverse this procedure to install the SIM.

## Display assembly components (panel, bezel, webcam, microphone)

All display assemblies include WLAN antenna transceivers and cables. WWAN models also include 2 WWAN antenna transceivers and cables.

 **NOTE:** Full hinge-up displays are not spared.

This section describes removing components that do not require that you entirely remove the display assembly from the computer. You can remove the display bezel, webcam/microphone module, and display panel with the display assembly still attached to the computer.

To remove the remaining display components, including the display brackets, antennas, cable, and enclosure, you must remove the entire display assembly from the computer. See [Display assembly components \(cable, antennas, hinges, enclosure\) on page 84](#) for more information about removing the remaining components.

Description	Spare part number
<b>Display panels</b>	
35.6-cm (14.0-in), HD+, anti-glare, LED, LVDS (does not include cable)	643915-001
35.6-cm (14.0-in), HD anti-glare, LED, SVA, LVDS (does not include cable)	643914-001
<b>Display bezel</b>	658542-001
<b>Webcam module with microphone</b>	642795-001
<b>Microphone modules</b>	642797-001
<b>Display Screw Kit</b>	642787-001
<b>Display Rubber Kit</b>	642785-001

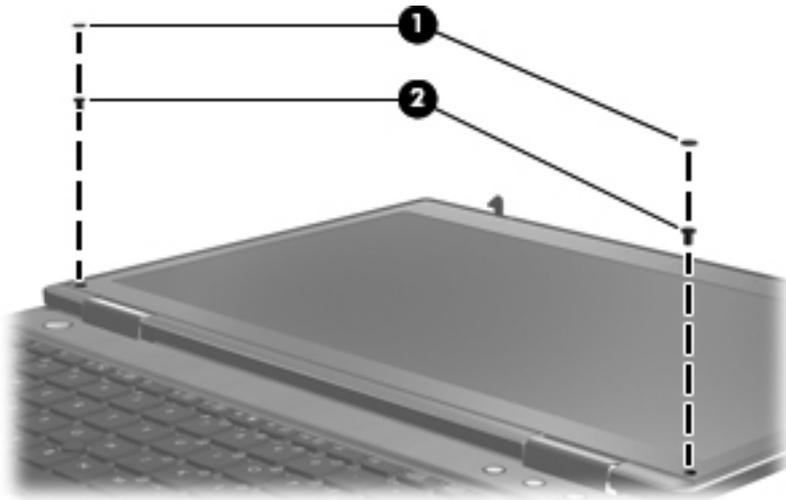
Before removing the display panel, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 42](#)).

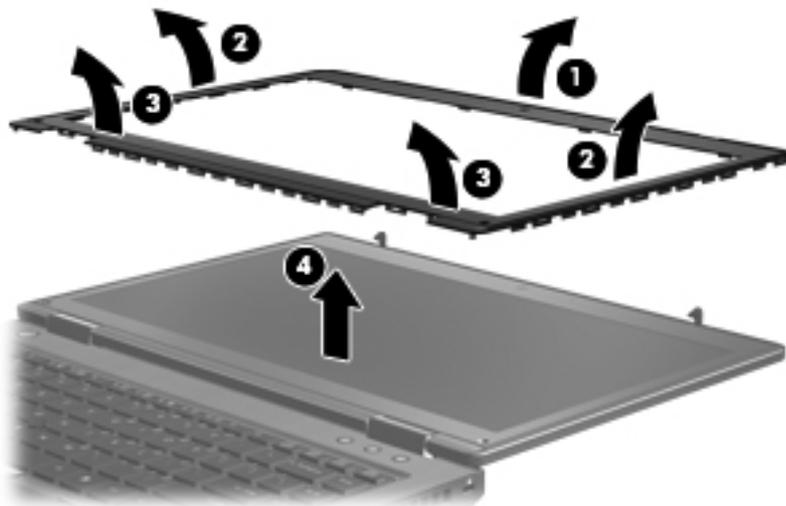
Remove the display assembly components:

1. Position the computer upright, with the front toward you.
2. Open the computer as far as possible.

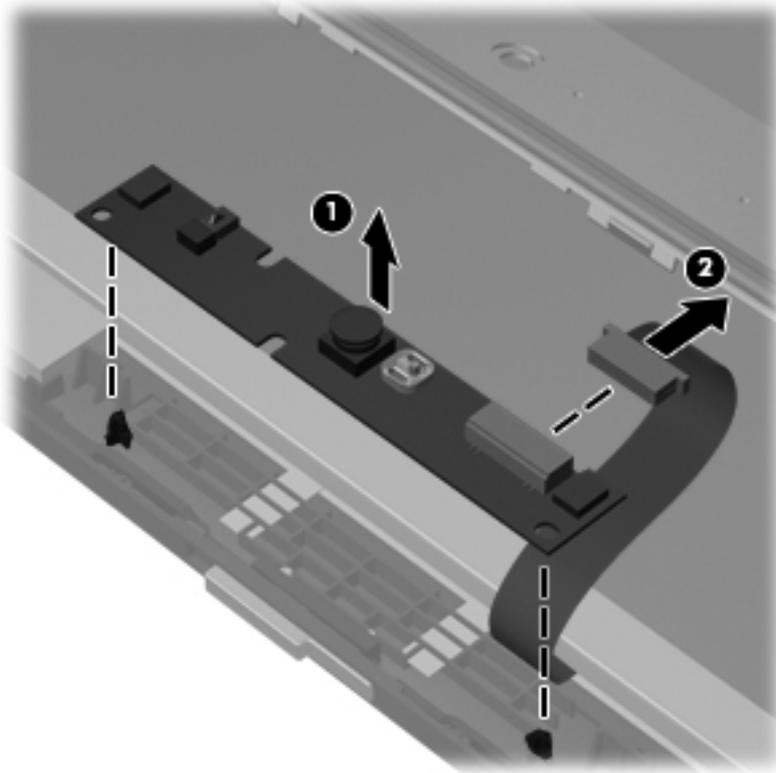
3. To remove the display bezel, remove the two rubber screw covers (1) and the two Phillips PM2.5×5.0 screws (2) in the bottom corners of the display bezel.



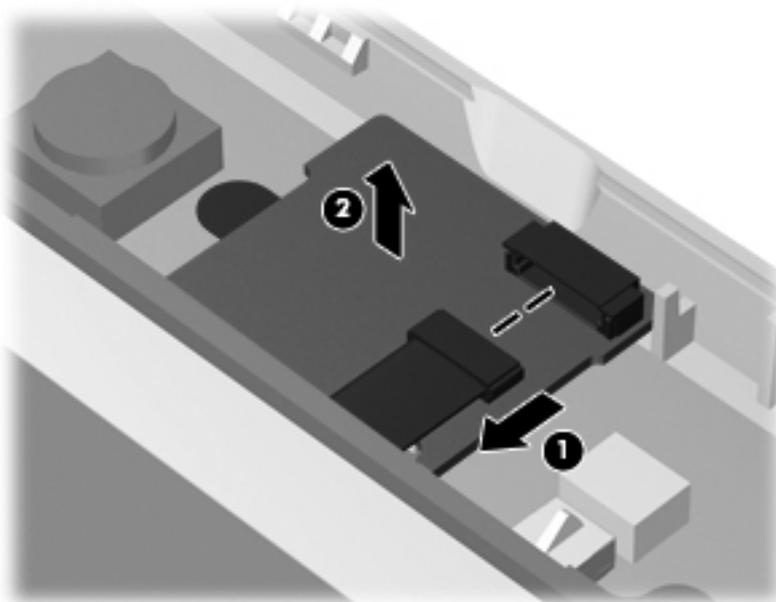
4. Flex the top (1) of the bezel, the inside edges of the left and right sides (2), and then the bottom (3) of the bezel until it disengages from the display enclosure.
5. Remove the display bezel (4).



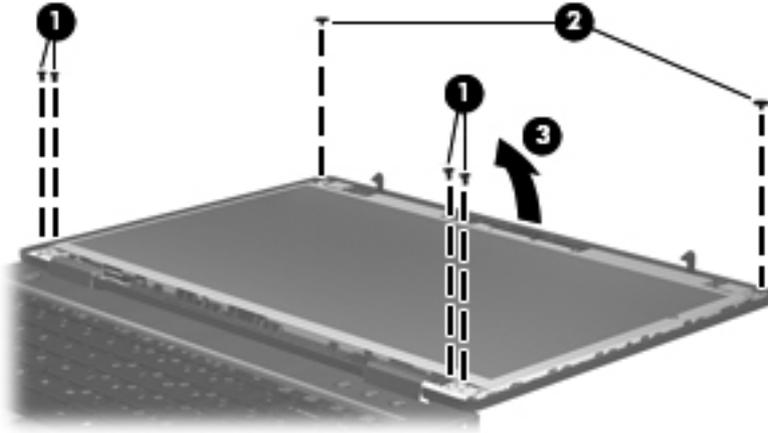
6. If it is necessary to replace the webcam module, gently pull the module away from the double-sided tape on the display enclosure (1), disconnect the webcam cable from the module (2), and then remove the webcam.



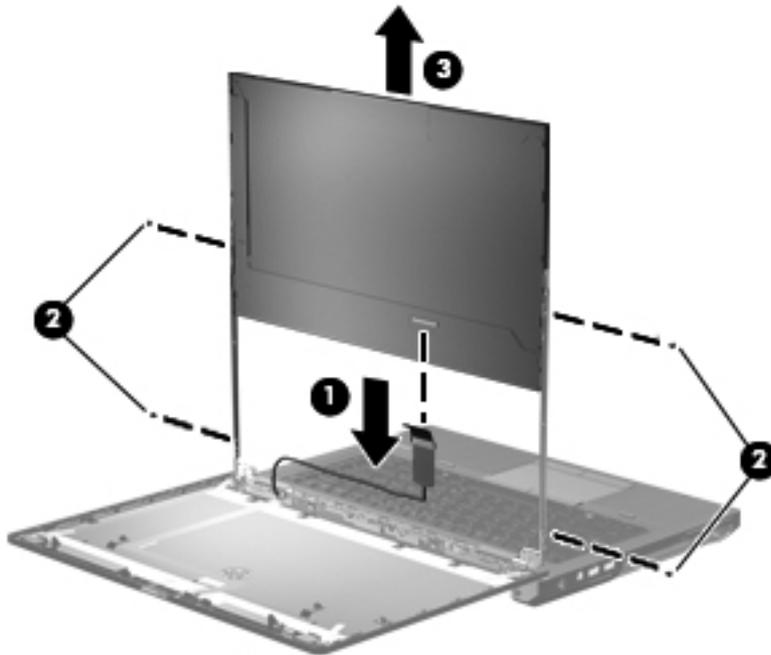
7. If it is necessary to replace the ambient light sensor board, disconnect the cable from the board (1), and then lift the board straight up and off the display (2).



8. If it is necessary to replace the display panel, remove the four Phillips PM2.5×5.0 screws (1) at the bottom of the display panel.
9. Remove the two broadhead Phillips PM2.0×4.0 screws (2) at the top of the display panel.
10. Pivot the display panel upward until it sits at a 90 degree angle (3).

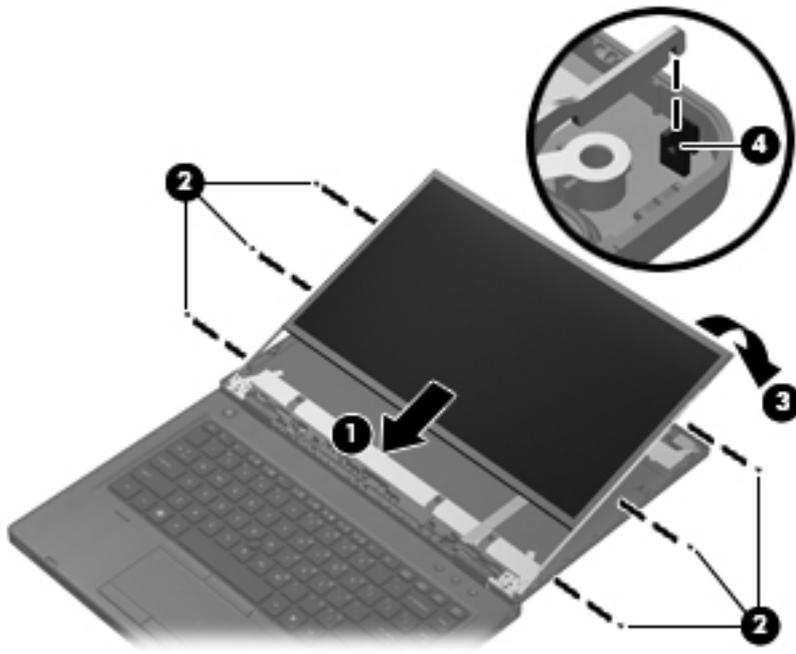


11. Disconnect the display panel cable from the back of the display panel (1).
12. Remove the four Phillips PM2.5×5.0 screws (2) that secure the display panel to the brackets.
13. Slide the display panel up and out of the hinges (3).



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

When replacing the display panel, after connecting the display cable, slide the panel into the bracket (1), replace the screws (2), and then rotate the panel assembly downward so it lies flat in the enclosure (3). Make sure to insert the display panel brackets into the notches in the corners of the display enclosure (4).



## Bottom door

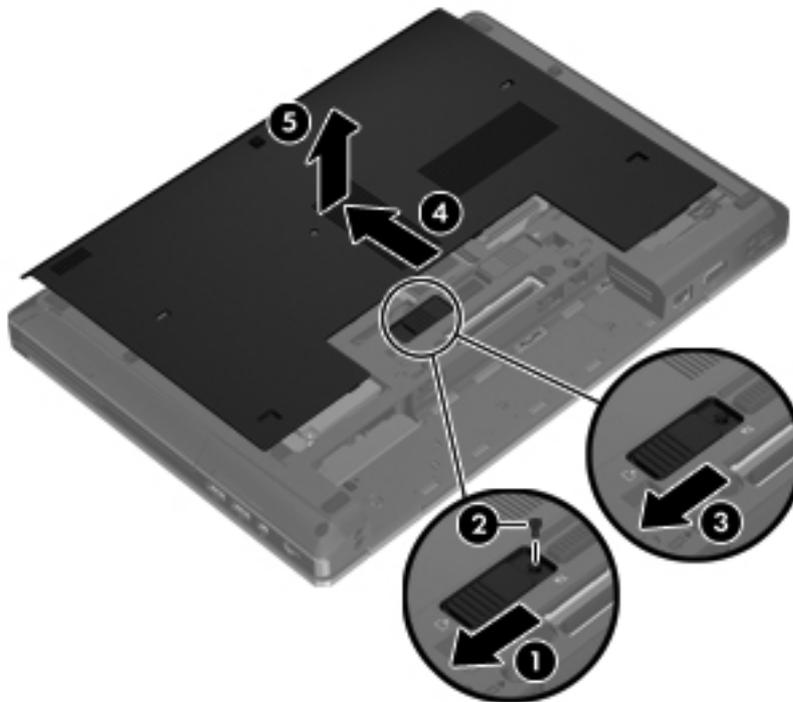
The bottom door is available in the Plastics Kit, spare part number 641832-001.

Before disassembling the computer, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 42](#)).

Remove the bottom door:

1. Position the computer upside-down on a flat surface, with the battery bay toward you.
2. Slide the release latch **(1)** and remove the locking screw (if installed) **(2)**.
3. Slide the release latch **(3)** to disengage the door from the computer.
4. Slide the door toward the front of the computer **(4)**, and then lift the door off the computer **(5)**.



Reverse the removal procedures to install the bottom door.

## Optical drive

Description	Spare part number
Blu-ray ROM DVD±RW SuperMulti DL Drive	643913-001
DVD±RW and CD-RW SuperMulti DL Combo Drive	643911-001
DVD-ROM Drive	643910-001

Before removing the optical drive, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 42](#)).
5. Remove the bottom door (see [Bottom door on page 49](#)).

Remove the optical drive:

1. Position the computer upside-down with the right side toward you.
2. Loosen the captive Phillips screw **(1)** that secures the optical drive to the computer.
3. Push the optical drive tab **(2)** to release the optical drive from the computer.
4. Remove the optical drive **(3)** from the computer.



5. If it is necessary to replace the optical drive bracket, position the optical drive with the rear toward you.

6. Remove the three Phillips PM2.0×3.0 screws (1) that secure the optical drive bracket to the optical drive.
7. Remove the optical drive bracket (2).



Reverse this procedure to install an optical drive.

## Upgrade bay

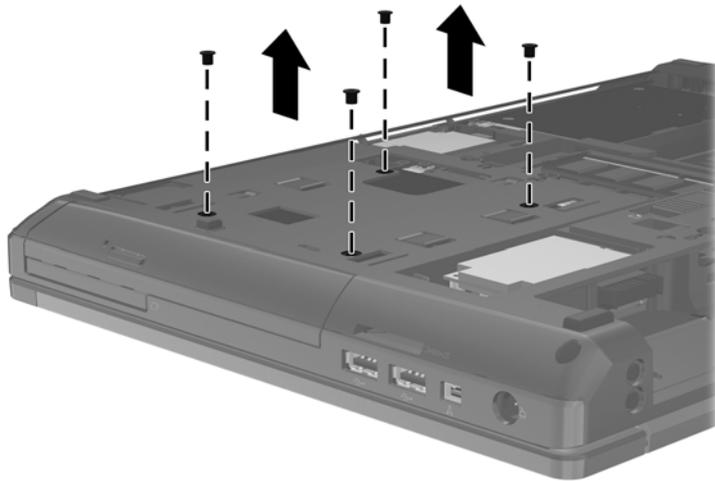
Description	Spare part number
Upgrade Bay – Hard Drive Adapter Kit	643921-001
500-GB, 7200-rpm hard drive	656424-001

Before removing a drive from the upgrade bay, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 42](#)).
5. Remove the bottom door (see [Bottom door on page 49](#)).

Remove the drive from the upgrade bay:

1. Position the computer upside-down with the right side toward you.
2. Remove the four Phillips PM2.0×4.0 screws that secure the drive assembly into the upgrade bay.



3. Loosen the captive Phillips screw that secures the drive in the bay **(1)**.
4. Push the drive tab **(2)** to release the drive from the computer.

5. Remove the drive assembly (3) from the computer.



Reverse this procedure to install the hard drive into the upgrade bay.

## Hard drive



**NOTE:** All hard drive spare part kits include a hard drive bracket and screws.

Description	Spare part number
750-GB, 7200-rpm hard drive	633252-001
500-GB, 7200-rpm hard drive	634926-001
500-GB, 7200-rpm (for use in the upgrade bay)	656424-001
320-GB, 7200-rpm hard drive	641672-001
320-GB, 7200-rpm hard drive (Self-Encrypting Drive (SED))	626978-001
250-GB, 7200-rpm hard drive	635225-001
128-GB solid-state drive	643917-001
Upgrade Bay – Hard Drive Adapter Kit	643921-001

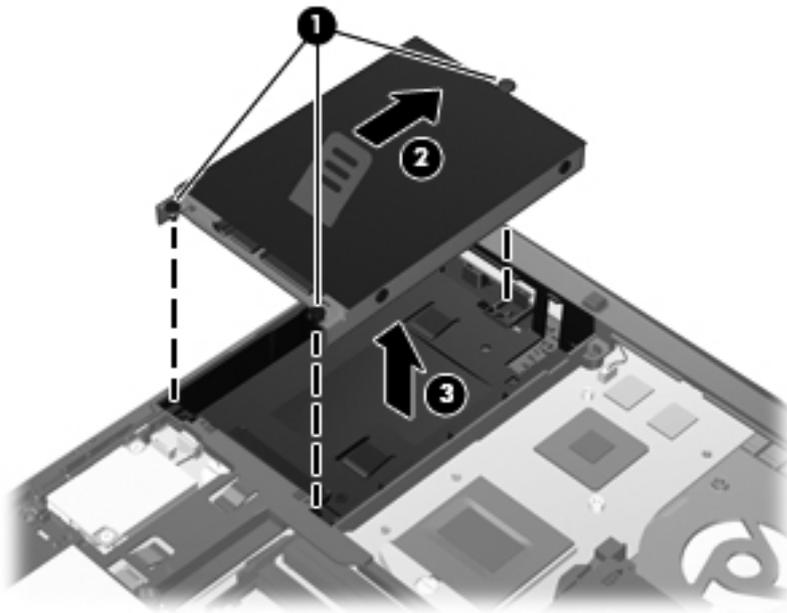
Before disassembling the computer, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 42](#)).
5. Remove the bottom door (see [Bottom door on page 49](#)).

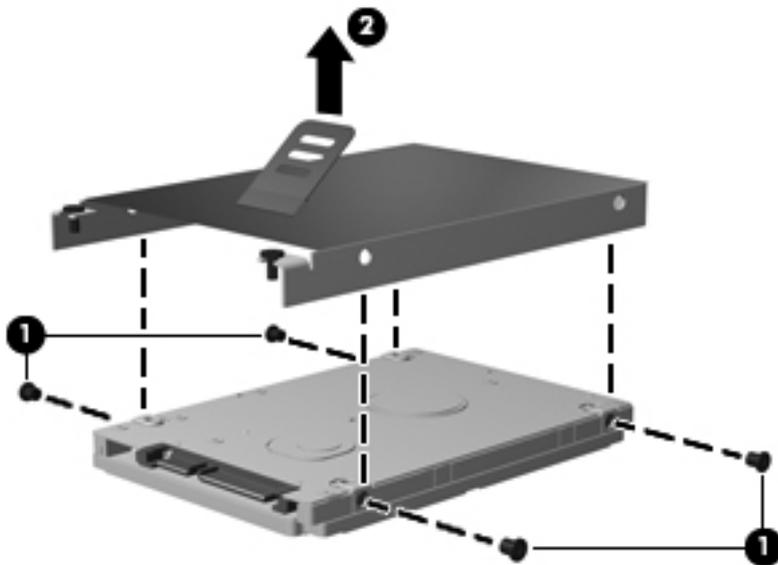
Remove the hard drive:

1. Position the computer upside-down, with the battery bay toward you.
2. If necessary, lift the smart card reader out of the way.
3. Loosen the three captive Phillips screws **(1)** that secure the hard drive to the computer.
4. Grasp the Mylar tab on the hard drive and slide the hard drive to the right **(2)** to disconnect it from the system board connector.

5. Remove the hard drive (3) from the hard drive bay.



6. If it is necessary to replace the hard drive bracket, remove the two Phillips PM3.0×5.0 hard drive bracket screws (1) from each side of the hard drive (4 total screws).
7. Lift the bracket (2) straight up to remove it from the hard drive.



Reverse this procedure to reassemble and install the hard drive.

## Memory modules



**NOTE:** Primary and expansion memory is installed in a stacked configuration in the bottom of the computer.

Description	Spare part number
2-GB (PC3-10600, 1333-MHz, DDR3)	621565-001
4-GB (PC3-10600, 1333-MHz, DDR3)	621569-001
8-GB (PC3-10600, 1333-MHz, DDR3)	634091-001

### Update BIOS before adding memory modules

Before adding new memory, make sure you update the computer to the latest BIOS.



**CAUTION:** Failure to update the computer to the latest BIOS prior to installing new memory may result in various system problems.

To update BIOS:

1. Navigate to [www.hp.com](http://www.hp.com).
2. Click **Support & Drivers** > click **Drivers & Software**.
3. In the **Enter a product name/number** box, type the computer model information, and then click **Search**.
4. Click the link for the computer model.
5. Select the operating system, and then click **Next**.
6. Under **Step 2: Select a Download**, click the **BIOS** link.
7. Click the link for the most recent BIOS.
8. Click the **Download** button, and then follow the on-screen instructions.

Before removing the memory module, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 42](#)).
5. Remove the bottom door (see [Bottom door on page 49](#)).

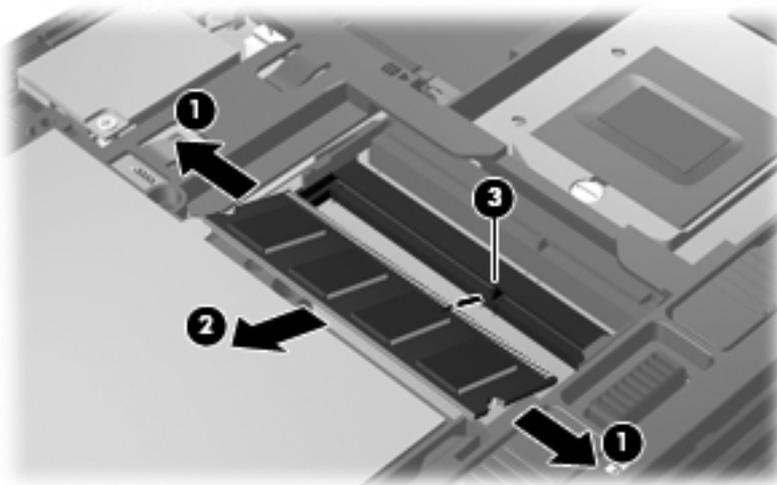
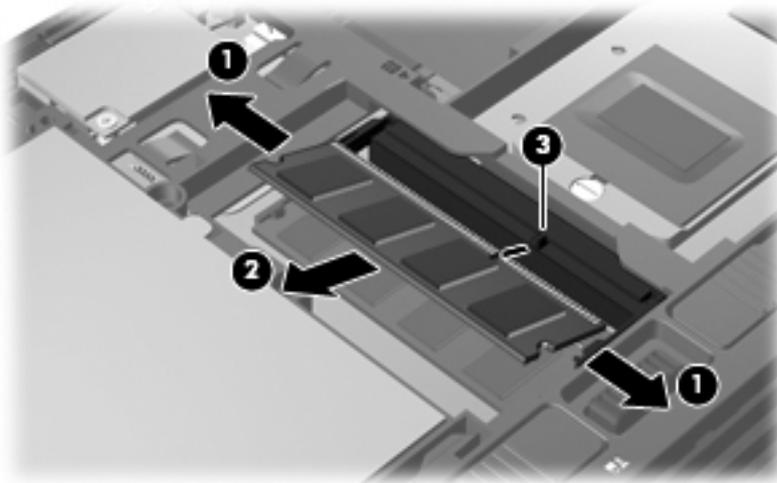
Remove the memory module:

1. Position the computer upside-down with the battery bay 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.

 **NOTE:** The computer uses two memory slots. The top slot houses the expansion memory module and is shown in the first image below. The bottom slot houses the primary memory module and is shown in the second image below.



Reverse this procedure to install a memory module.

## WWAN module

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

Description	Spare part number
HP hs2340 HSPA+ Mobile Broadband Module	632155-001
HP un2430 EV-DO/HSPA Mobile Broadband Module	634400-001

Before removing the WWAN module, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 42](#)).
5. Remove the SIM (see [SIM on page 43](#)).
6. Remove the bottom door (see [Bottom door on page 49](#)).

Remove the WWAN module:

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



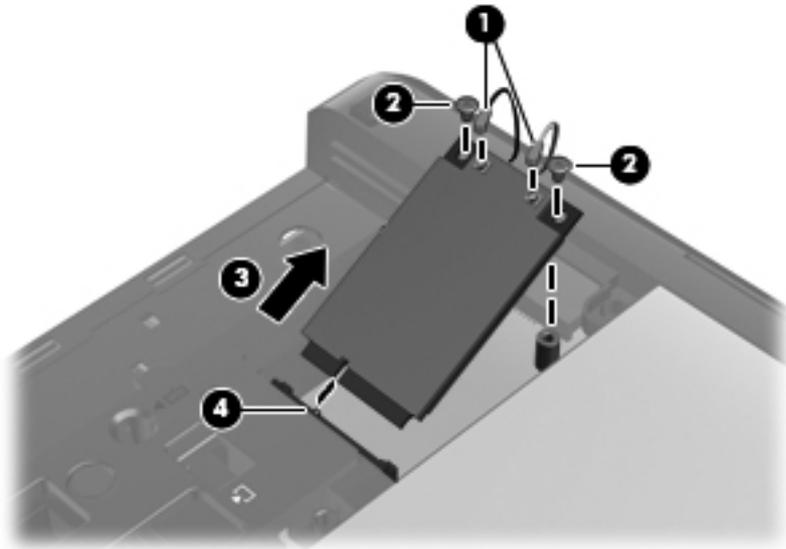
**NOTE:** The red WWAN antenna cable is connected to the WWAN module “Main” terminal. The blue WWAN antenna cable is connected to the WWAN module “Aux” terminal.

2. Remove the two Phillips PM2.0×3.0 screws **(2)** that secure the WWAN module to the computer. (The edge of the module opposite the slot rises away from the computer.)

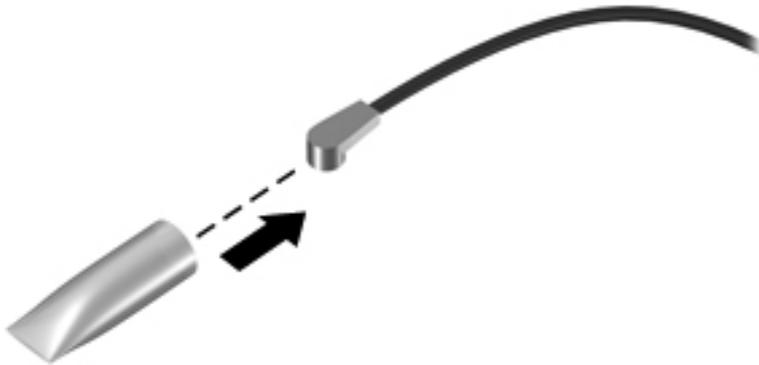
3. Remove the WWAN module (3) by pulling the module away from the slot at an angle.

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

**Figure 4-1** Removing the WWAN module



 **NOTE:** If the WWAN antennas are not connected to the terminals on the WWAN module, the protective sleeves must be installed on the antenna connectors, as shown in the following illustration.



Reverse this procedure to install the WWAN module.

## WLAN module

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

Description	Spare part number
Broadcom 4313AGN 802.11a/b/g/draft-n WiFi Adapter for use in Afghanistan, Albania, Algeria, Andorra, Angola, Antigua and Barbuda, Argentina, Armenia, Aruba, Australia, Austria, Azerbaijan, Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Belize, Benin, Bermuda, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, the British Virgin Islands, Brunei, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Canada, Cape Verde, the Cayman Islands, Central African Republic, Chad, People's Republic of China, Colombia, Comoros, 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, Guam, Guatemala, Guinea, Guinea-Bissa, Guyana, Haiti, Honduras, Hong Kong, Hungary, Iceland, India, Iraq, Ireland, Israel, Italy, Ivory Coast, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kiribati, Kuwait, Kyrgyzstan, Laos, Latvia, Lebanon, Lesotho, Liberia, Martinique, Liechtenstein, Lithuania, Luxembourg, Macedonia, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta, Marshall Islands, Mauritania, Mauritius, Mexico, Micronesia, Monaco, Mongolia, Montenegro, Morocco, Mozambique, Namibia, Nauru, Nepal, the Nether Antilles, the Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Palau, Panama, Papua New Guinea, Paraguay, Puerto Rico, Peru, Philippines, Poland, Portugal, Qatar, Republic of Moldova, Romania, Russia, Rwanda, Samoa, San Marino, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia and Montenegro, Seychelles, Sierra Leone, Singapore, Slovakia, Slovenia, 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, Syria, Taiwan, Tajikistan, Tanzania, Thailand, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Tuvalu, Uganda, Ukraine, the United Arab Emirates, the United Kingdom, Uruguay, the United States, the US Virgin Islands, Uzbekistan, Vanuatu, Venezuela, Vietnam, Yemen, Zaire, Zambia, and Zimbabwe	593836-001

Before removing the WLAN module, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 42](#)).
5. Remove the bottom door (see [Bottom door on page 49](#)).

Remove the WLAN module:

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

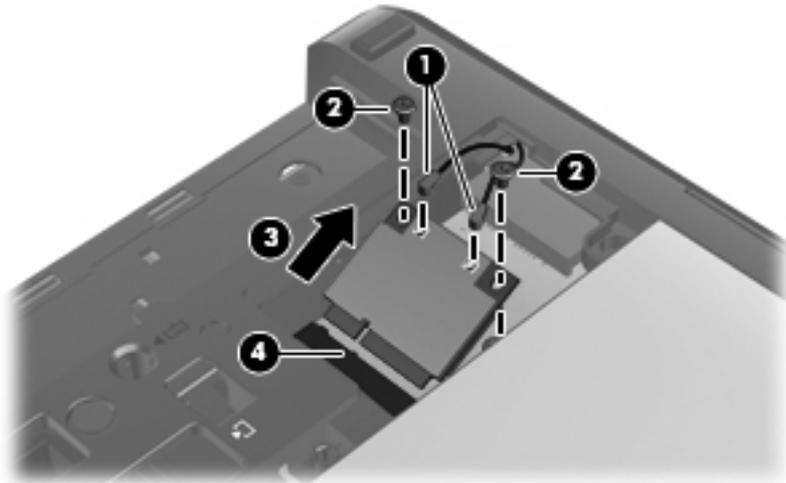


**NOTE:** The WLAN antenna cable labeled “1” connects to the WLAN module “Main” terminal labeled “1”. The WLAN antenna cable labeled “2” connects to the WLAN module “Aux” terminal labeled “2”. If the computer is equipped with an 802.11a/b/g/n WLAN module, the yellow WLAN antenna cable connects to the middle terminal on the WLAN module.

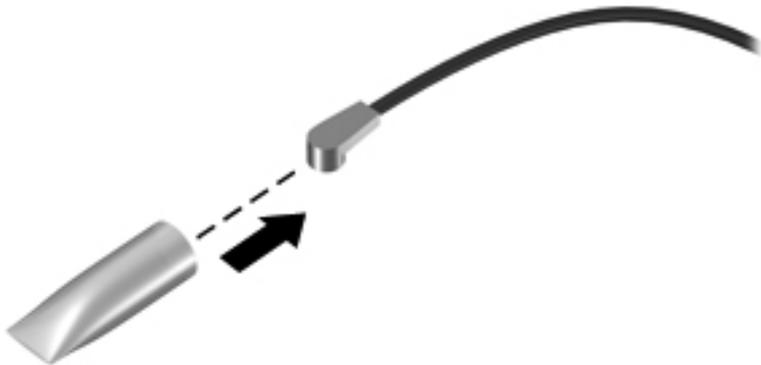
3. Remove the two Phillips PM2.0×3.0 screws **(2)** that secure the WLAN module to the computer. (The edge of the module opposite the slot rises away from the computer.)

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.



 **NOTE:** If the WLAN antennas are not connected to the terminals on the WLAN module, the protective sleeves must be installed on the antenna connectors, as shown in the following illustration.



Reverse this procedure to install the WLAN module.

## Bluetooth module

 **NOTE:** The Bluetooth module spare part kit does not include a Bluetooth module cable. The Bluetooth module cable is included in the Cable Kit, spare part number 641830-001. See [Cable Kit on page 25](#) for more Cable Kit spare part number information.

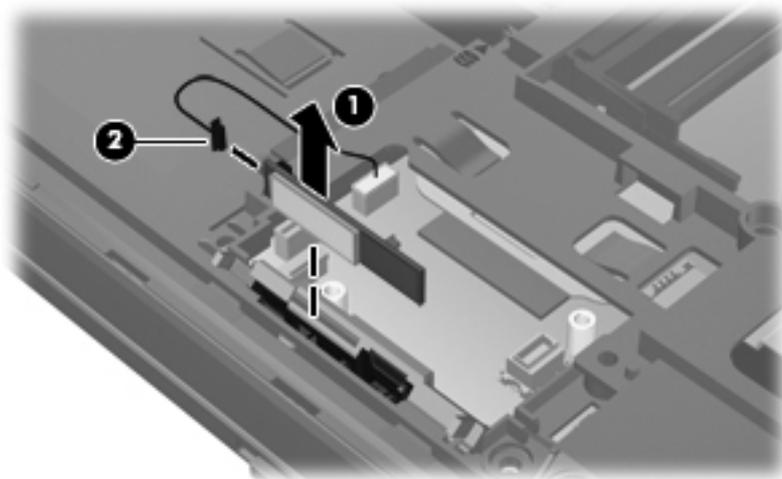
Description	Spare part number
Bluetooth module	537921-001

Before removing the Bluetooth module, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 42](#)).
5. Remove the bottom door (see [Bottom door on page 49](#)).

Remove the Bluetooth module:

1. Position the computer upside-down with the front toward you.
2. Lift the module straight up out of the computer (1), and then disconnect the cable (2) from the module.



3. Remove the module from the computer.

Reverse this procedure to install the Bluetooth module.

## Modem module

 **NOTE:** The modem module spare part kit does not include a modem module cable. The modem module cable is included in the Cable Kit, spare part number 641830-001. See [Cable Kit on page 25](#) for more Cable Kit spare part number information.

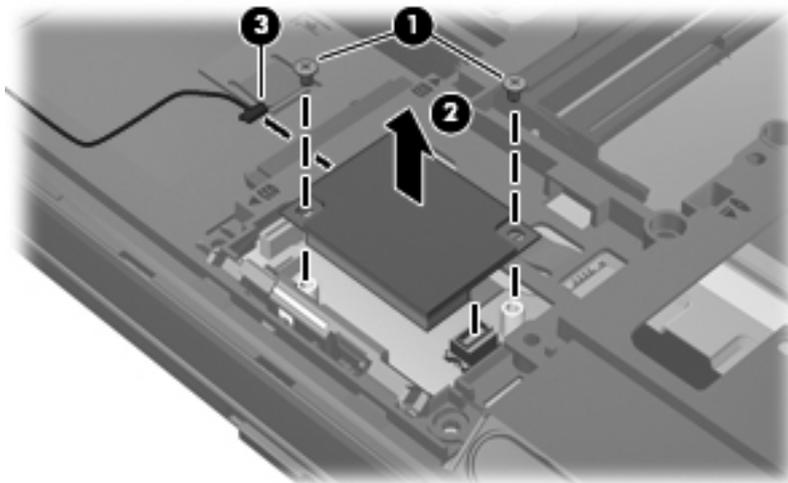
Description	Spare part number
Modem module	628824-001

Before removing the modem module, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 42](#)).
5. Remove the bottom door (see [Bottom door on page 49](#)).

Remove the modem module:

1. Position the computer upside-down with the front toward you.
2. Remove the two Phillips PM2.0×3.0 screws (1) that secure the modem module to the system board.
3. Disconnect the modem module (2) from the system board by lifting it straight up.
4. Disconnect the modem module cable (3) from the modem module.



Reverse this procedure to install the modem module.

## Fan

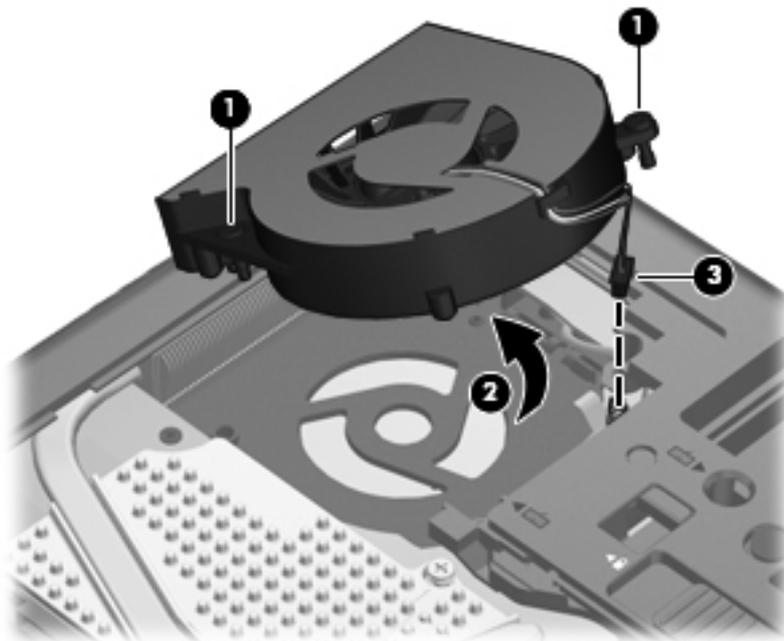
Description	Spare part number
Fan	641839-001

Before removing the fan, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 42](#)).
5. Remove the bottom door (see [Bottom door on page 49](#)).

Remove the fan:

1. Position the computer upside-down with the front toward you.
2. Loosen the two captive Phillips screws (1) that secure the fan to the base enclosure.
3. Rotate the right side of the fan upward at an angle (2), and then lift the fan up to gain access to the system board connector.
4. Disconnect the fan cable (3) from the system board.



5. Remove the fan from the computer.

Reverse this procedure to install the fan.

 **NOTE:** To properly ventilate the computer, allow at least a 7.6-cm (3-in) clearance on the left side of the computer.

The computer uses an electric fan for ventilation. The fan is controlled by a temperature sensor and is designed to turn on automatically when high temperature conditions exist. These conditions are affected by high external temperatures, system power consumption, power management/battery conservation configurations, battery fast charging, and software requirements. Exhaust air is displaced through the ventilation grill located on the left side of the computer.

## Heat sink

 **NOTE:** All heat sink spare part kits include replacement thermal material.

Description	Spare part number
Heat sink	658543-001

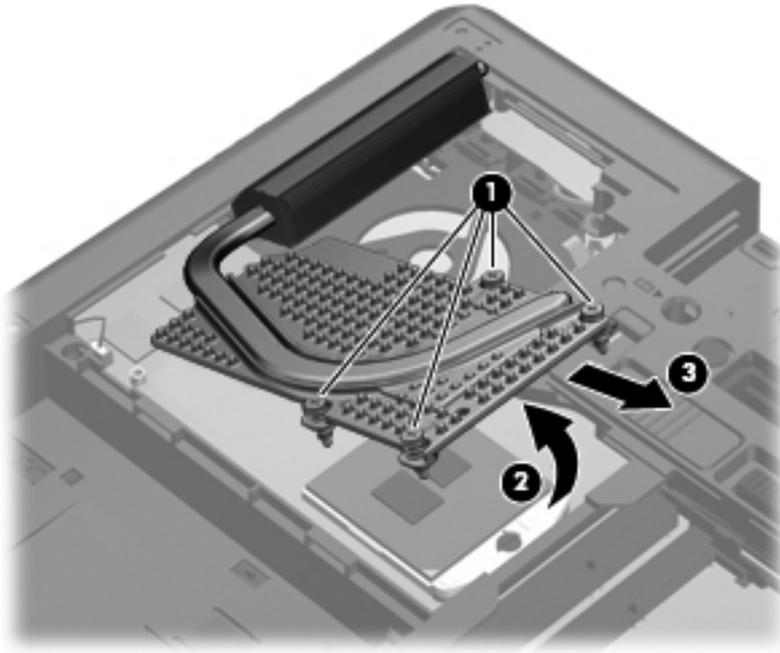
Before removing the heat sink, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 42](#)).
5. Remove the bottom door (see [Bottom door on page 49](#)).
6. Remove the fan (see [Fan on page 64](#)).

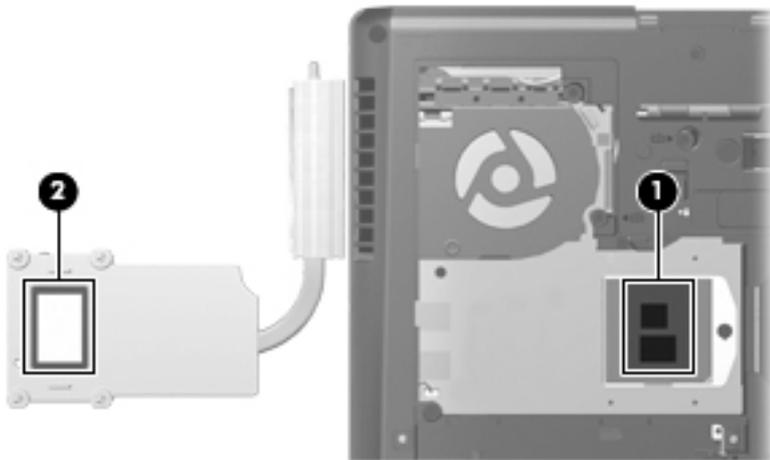
Remove the heat sink:

1. Position the computer upside-down with the front toward you.
2. In the order indicated on the heat sink, loosen the captive Phillips screws **(1)** that secure the heat sink to the system board. The discrete heat sink has six screws, while the UMA heat sink has four screws. Both heat sinks are illustrated below.
3. Lift the right side of the heat sink up at an angle **(2)**.

4. Pull the heat sink away from the side of the computer to remove it (3).



 **NOTE:** Thoroughly clean thermal material from the surfaces of the processor (1) and the heat sink (2) each time you remove the heat sink. All heat sink and processor spare part kits include thermal material.



Reverse this procedure to install the heat sink.

## Processor



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

Description	Spare part number
AMD A8-3510M (2.5-GHz/1.5-GHz, 4-MB L2 cache, 45W)	653358-001
AMD A6-3410M (2.3-GHz/1.6-GHz, 4-MB L2 cache, 45W)	653357-001
AMD A4-3310M (2.5-GHz/2.1-GHz, 2-MB L2 cache, 45W)	653356-001
AMD E2-3000M (2.4-GHz/1.8-GHz, 1-MB L2 cache, 35W)	653351-001

Before removing the processor, follow these steps:

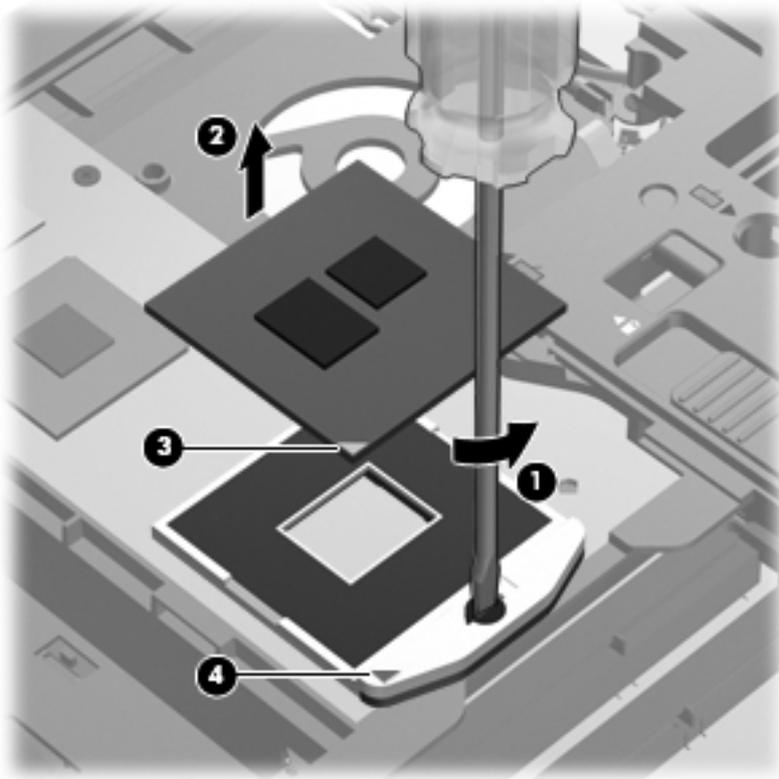
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 42](#)).
5. Remove the bottom door (see [Bottom door on page 49](#)).
6. Remove the fan (see [Fan on page 64](#)).
7. Remove the heat sink (see [Heat sink on page 65](#)).

Remove the processor:

1. Position the computer upside-down 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:** The gold triangle (3) on the processor must be aligned with the triangle (4) embossed on the processor slot when you install the processor.



Reverse this procedure to install the processor.

## Keyboard

 **NOTE:** For a detailed list of available keyboards, see [Sequential part number listing on page 29](#).

Description	Spare part number
Keyboard for use in models without a pointing stick	641834-xxx
Keyboard for use in models with a pointing stick	641835-xxx

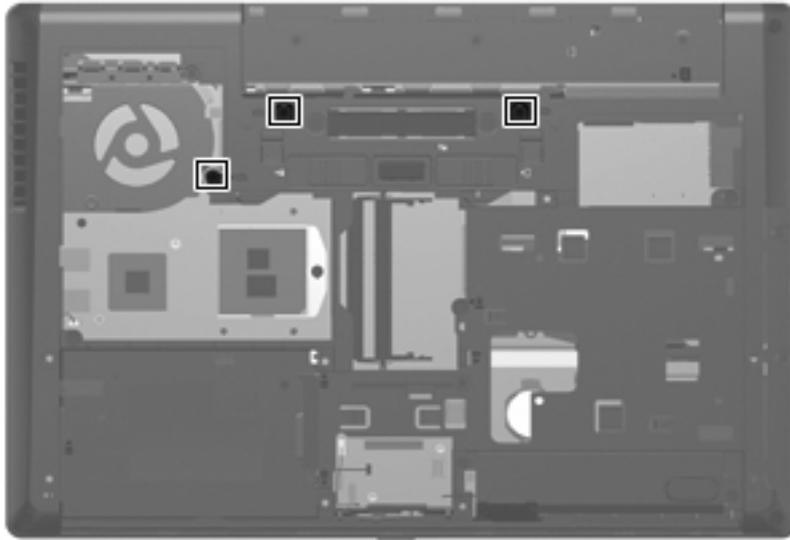
Before removing the keyboard, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 42](#)).

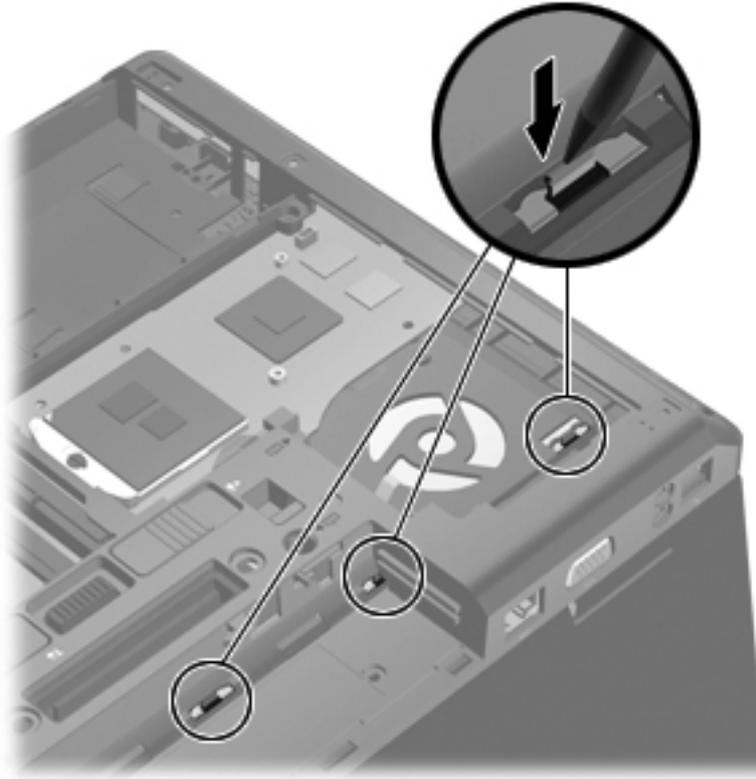
5. Remove the bottom door (see [Bottom door on page 49](#)).
6. Remove the fan (see [Fan on page 64](#)).
7. Remove the heat sink (see [Heat sink on page 65](#)).

Remove the keyboard:

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



- Using a flat-blade screwdriver, press on the tabs along the bottom of the computer to disengage the keyboard.

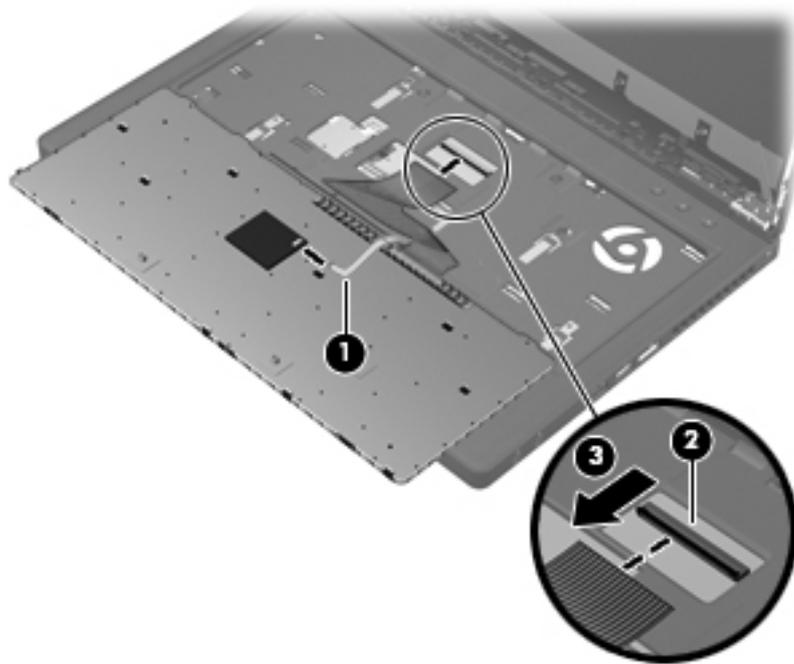


- Position the computer right-side up with the front toward you.
- Open the computer as far as possible.
- Lift and rotate the keyboard (1) until it rests upside-down on top of the Touchpad (2).



- Disconnect the pointing stick cable from the rear of the keyboard (1).

- Lift the keyboard connector latch (2), and then disconnect the keyboard cable from the system board (3).



- Remove the keyboard.

Reverse this procedure to install the keyboard.

## Bottom cover from top cover

Description	Spare part number
Bottom cover	641838-001
Top cover (includes a 2-button touchpad and fingerprint reader)	642741-001
Top cover (includes a 2-button touchpad without a fingerprint reader)	642742-001
Top cover (includes a 4-button touchpad with a fingerprint reader)	642743-001
Top cover (includes a 4-button touchpad without a fingerprint reader)	642746-001

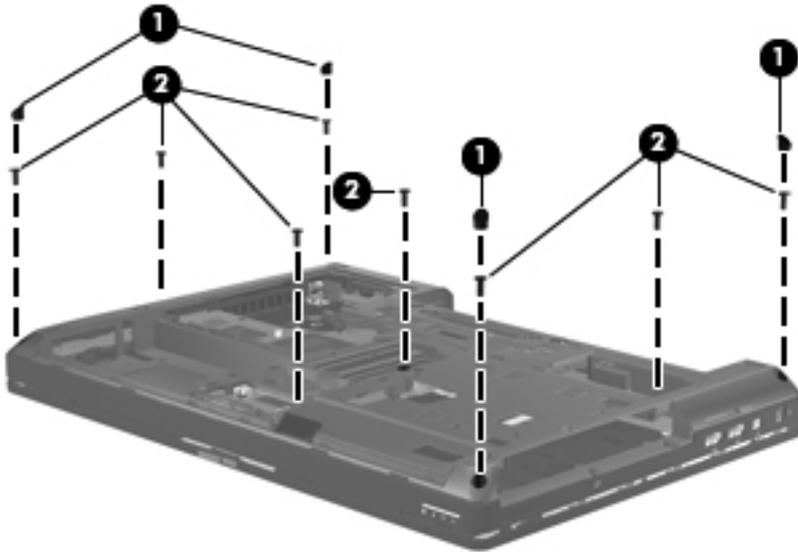
Before removing the bottom cover, follow these steps:

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

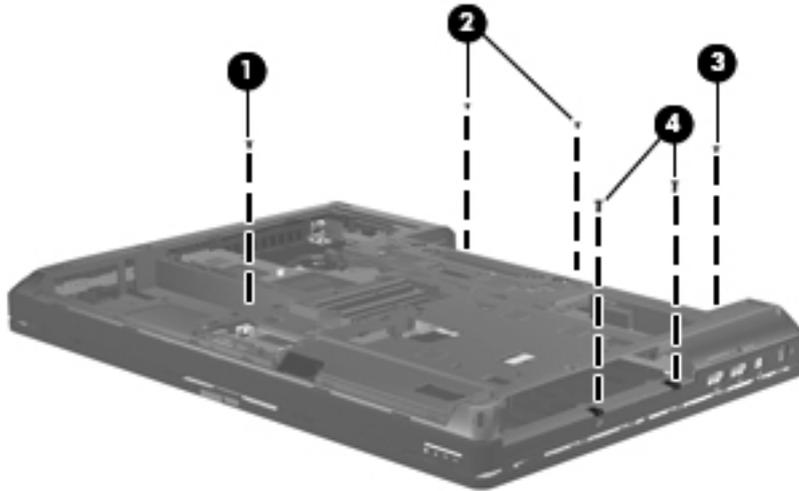
4. Remove the battery (see [Battery on page 42](#)).
5. Remove the following components:
  - a. Bottom door (see [Bottom door on page 49](#)).
  - b. Hard drive (see [Hard drive on page 54](#))
  - c. Optical drive (see [Optical drive on page 50](#))
  - d. WLAN module (see [WLAN module on page 60](#))
  - e. WWAN module (see [WWAN module on page 58](#))
  - f. Fan (see [Fan on page 64](#))
  - g. Heat sink (see [Heat sink on page 65](#))
  - h. Keyboard (see [Keyboard on page 68](#))

Remove the bottom cover:

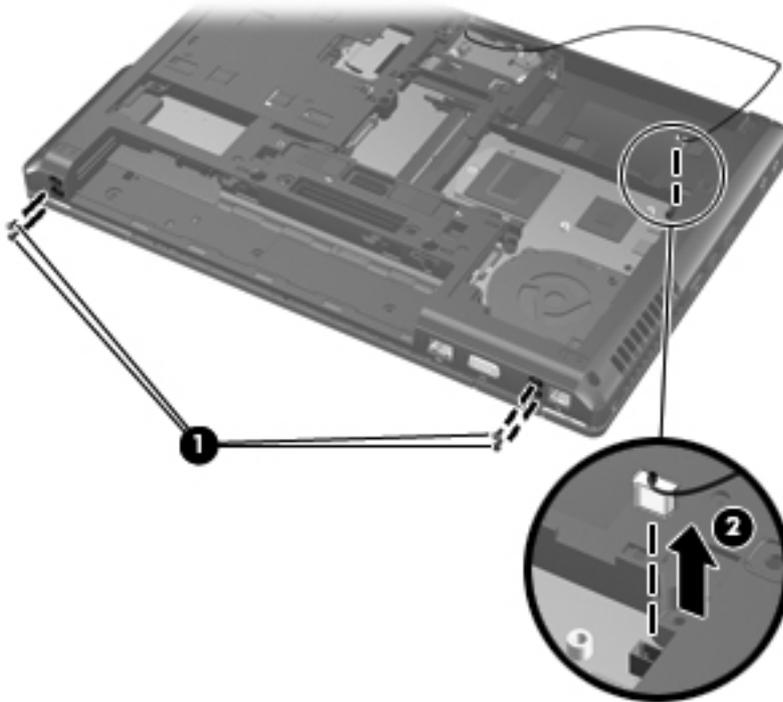
1. Position the computer upside-down with the front toward you.
2. Remove the following covers and screws that secure the bottom cover to the computer:
  - (1): 4 rubber screw covers
  - (2): 8 Torx PM2.5×8.0 screws



3. Remove the following screws that secure the bottom cover to the computer:
  - (1): 1 Phillips PM2.0×3.0 screw from the hard drive bay
  - (2): 2 Phillips PM2.0×3.0 screws from the battery bay
  - (3): 1 Phillips broadhead PM2.0×4.0 screw from the battery bay
  - (4): 2 Phillips PM2.5×4.5 screws from the optical drive bay

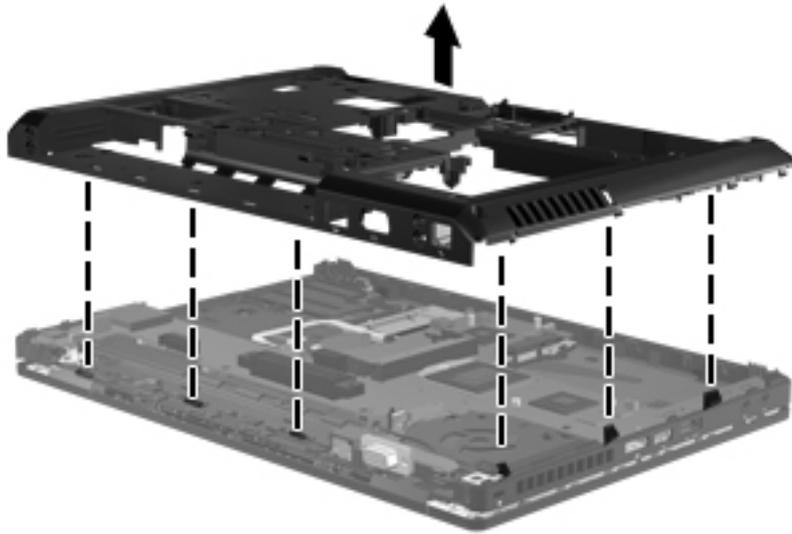


4. Remove the 4 Torx PM2.5×8.0 screws **(1)** from the rear of the computer.
5. Disconnect the speaker cable from the system board connector **(2)**.



6. Release the bottom cover by lifting the edges until it disengages from the computer.

7. Remove the bottom cover from the computer.



Reverse this procedure to install the bottom cover.

## RTC battery

Description	Spare part number
RTC battery	651948-001

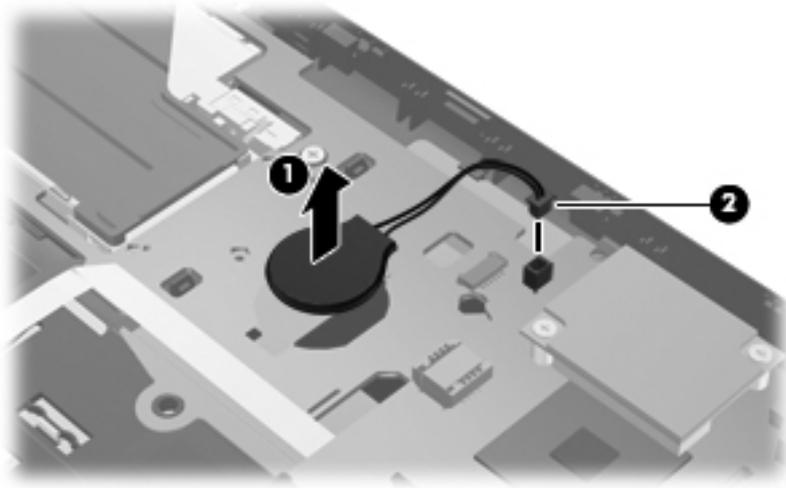
Before removing the RTC battery, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 42](#)).
5. Remove the following components:
  - a. Bottom door (see [Bottom door on page 49](#)).
  - b. Hard drive (see [Hard drive on page 54](#))
  - c. Optical drive (see [Optical drive on page 50](#))
  - d. WLAN module (see [WLAN module on page 60](#))
  - e. WWAN module (see [WWAN module on page 58](#))
  - f. Fan (see [Fan on page 64](#))
  - g. Heat sink (see [Heat sink on page 65](#))

- h. Keyboard (see [Keyboard on page 68](#))
- i. Bottom cover (see [Bottom cover from top cover on page 71](#))

Remove the RTC battery:

1. Position the computer upside-down, with the front toward you.
2. Pull upward to disengage the battery from the computer (1).
3. Disconnect the battery cable from the system board (2).



Reverse this procedure to install the RTC battery.

## Fingerprint reader board

Description	Spare part number
Fingerprint reader board (includes cable)	642764-001

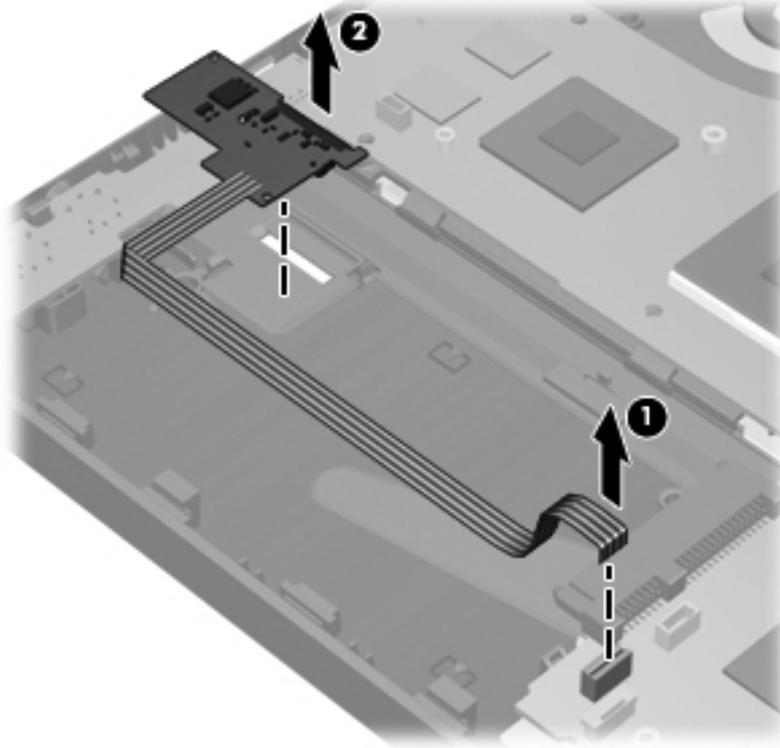
Before removing the fingerprint reader board, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 42](#)).
5. Remove the following components:
  - a. Bottom door (see [Bottom door on page 49](#)).
  - b. Hard drive (see [Hard drive on page 54](#))
  - c. Optical drive (see [Optical drive on page 50](#))
  - d. WLAN module (see [WLAN module on page 60](#))
  - e. WWAN module (see [WWAN module on page 58](#))
  - f. Fan (see [Fan on page 64](#))
  - g. Heat sink (see [Heat sink on page 65](#))
  - h. Keyboard (see [Keyboard on page 68](#))
  - i. Bottom cover (see [Bottom cover from top cover on page 71](#))

Remove the fingerprint reader board:

1. Position the computer upside-down, with the front toward you.

2. Disconnect the cable from the system board (1), and then lift the board straight up and off the computer (2).



Reverse this procedure to install the fingerprint reader board.

## Lid switch

Description	Spare part number
Lid switch board (includes cable)	642765-001

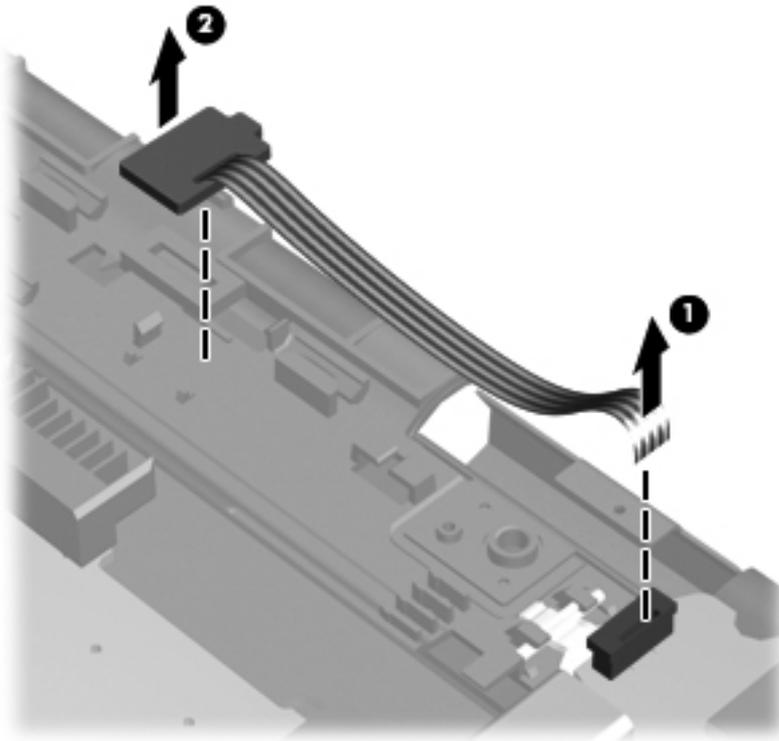
Before removing the lid switch, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 42](#)).
5. Remove the following components:
  - a. Remove the bottom door (see [Bottom door on page 49](#)).
  - b. Hard drive (see [Hard drive on page 54](#))
  - c. Optical drive (see [Optical drive on page 50](#))
  - d. WLAN module (see [WLAN module on page 60](#))
  - e. WWAN module (see [WWAN module on page 58](#))
  - f. Fan (see [Fan on page 64](#))
  - g. Heat sink (see [Heat sink on page 65](#))
  - h. Modem module (see [Modem module on page 63](#))
  - i. Keyboard (see [Keyboard on page 68](#))
  - j. Bottom cover (see [Bottom cover from top cover on page 71](#))

Remove the lid switch:

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

2. Disconnect the cable from the system board (1), and then lift the lid switch and cable straight up and off the computer (2).



Reverse this procedure to install the lid switch.

## Speaker assembly

Description	Spare part number
Speaker assembly	641840-001

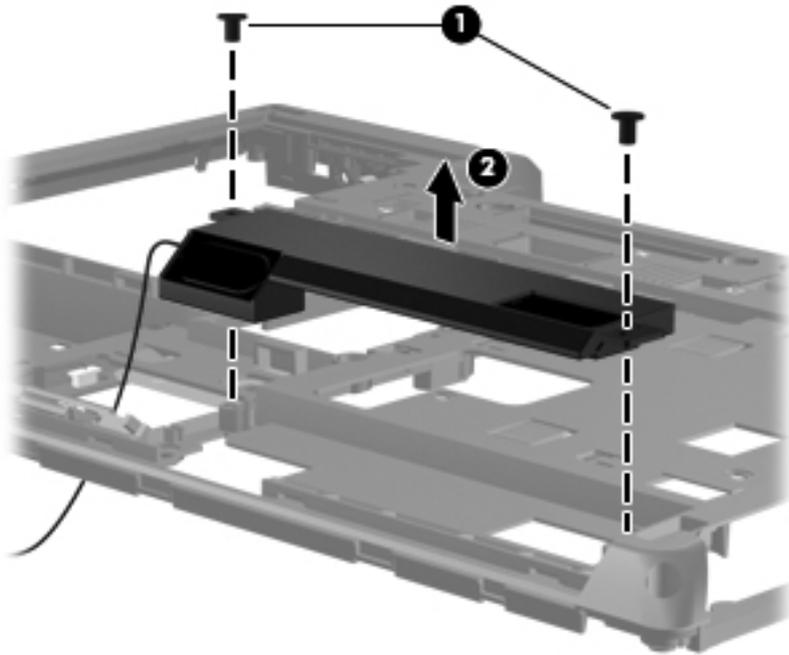
Before removing the speaker assembly, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 42](#)).
5. Remove the following components:
  - a. Remove the bottom door (see [Bottom door on page 49](#)).
  - b. Hard drive (see [Hard drive on page 54](#))
  - c. Optical drive (see [Optical drive on page 50](#))
  - d. WLAN module (see [WLAN module on page 60](#))
  - e. WWAN module (see [WWAN module on page 58](#))
  - f. Fan (see [Fan on page 64](#))
  - g. Heat sink (see [Heat sink on page 65](#))
  - h. Modem module (see [Modem module on page 63](#))
  - i. Keyboard (see [Keyboard on page 68](#))
  - j. Bottom cover (see [Bottom cover from top cover on page 71](#))

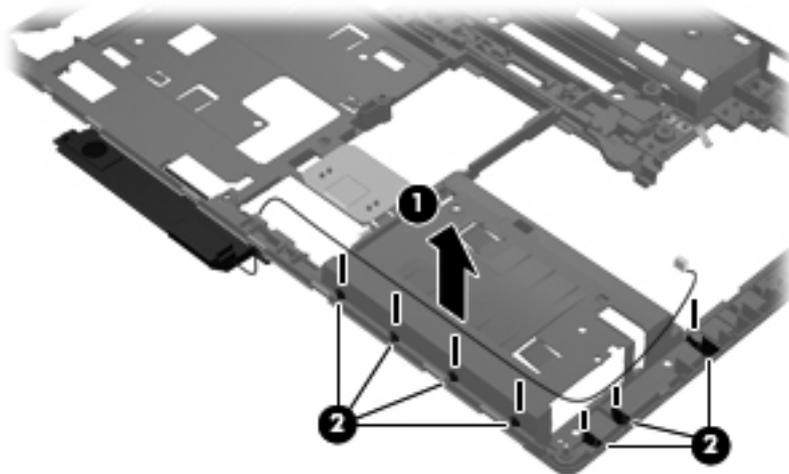
Remove the speaker assembly:

1. Position the bottom cover with the front toward you.
2. Remove the two Phillips PM2.0×5.0 screws **(1)** that secure the speaker assembly to the bottom cover.

3. Remove the speaker assembly (2) from the bottom cover.



4. Turn the bottom cover over, and then remove the speaker cable (1) from the routing path (2) in the bottom cover. Note that the cable routes from the bottom to the top of the bottom cover.



Reverse this procedure to install the speaker assembly.

## RJ-11 connector cable



**NOTE:** The RJ-11 connector cable is included in the Cable Kit, spare part number 641830-001.

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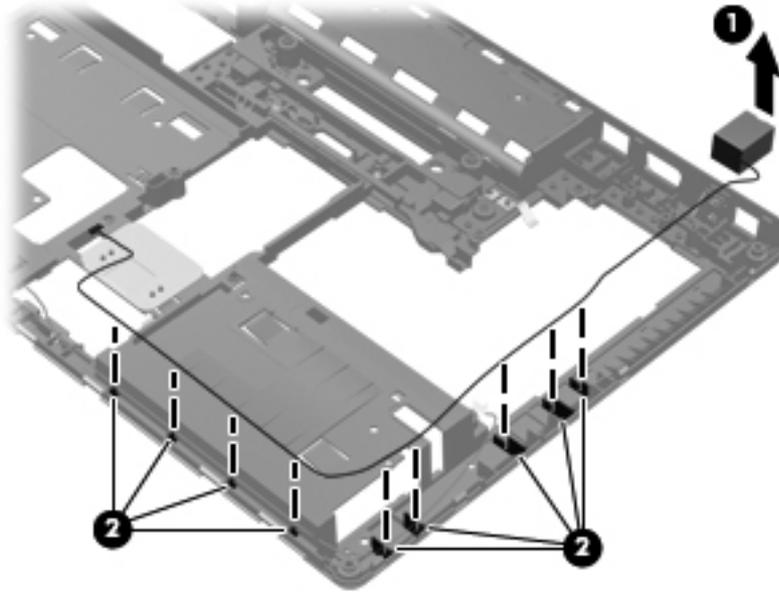
Before removing the RJ-11 connector cable, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 42](#)).
5. Remove the following components:
  - a. Remove the bottom door (see [Bottom door on page 49](#)).
  - b. Hard drive (see [Hard drive on page 54](#))
  - c. Optical drive (see [Optical drive on page 50](#))
  - d. WLAN module (see [WLAN module on page 60](#))
  - e. WWAN module (see [WWAN module on page 58](#))
  - f. Modem module (see [Modem module on page 63](#))
  - g. Fan (see [Fan on page 64](#))
  - h. Heat sink (see [Heat sink on page 65](#))
  - i. Keyboard (see [Keyboard on page 68](#))
  - j. Bottom cover (see [Bottom cover from top cover on page 71](#))

Remove the RJ-11 connector cable:

1. Position the bottom cover with the front toward you.
2. Remove the RJ-11 connector (**1**) from the clip built into the base enclosure.

3. Remove the RJ-11 connector cable from the clips and routing channel (2) built into the base enclosure.



4. Remove the RJ-11 connector cable from the bottom cover.  
Reverse this procedure to install the RJ-11 connector cable.

## Display assembly components (cable, antennas, hinges, enclosure)



**NOTE:** This section describes removing components that require you to completely remove the display panel. For more information about removing display components that do not require that you remove the assembly from the computer, see [Display assembly components \(panel, bezel, webcam, microphone\) on page 44](#).

All display assemblies include WLAN antenna transceivers and cables. WWAN models include 2 WWAN antenna transceivers and cables.

For a list of display spare parts, see [Display components on page 24](#).

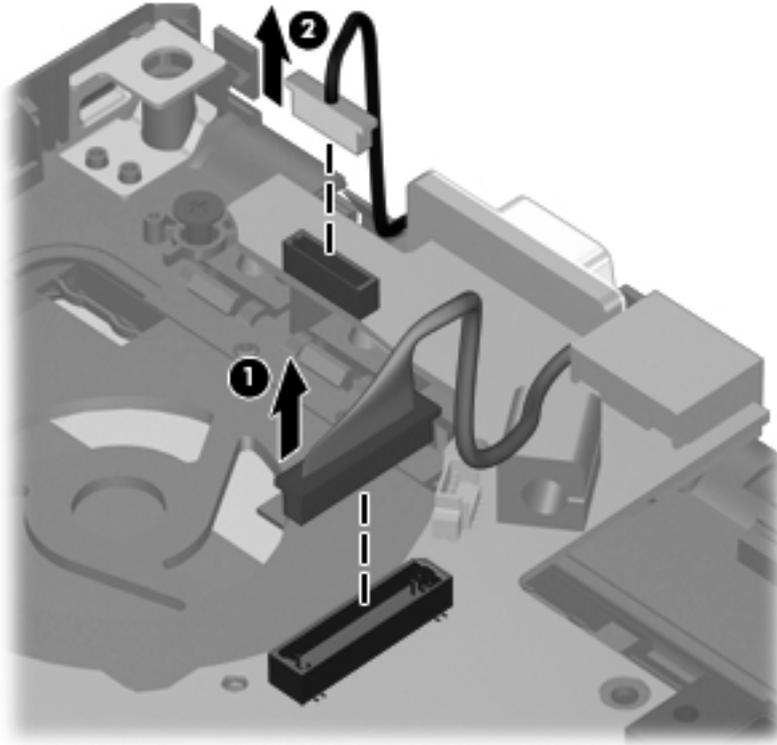
Before removing the display assembly, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 42](#)).
5. Remove the following components:
  - a. Remove the bottom door (see [Bottom door on page 49](#)).
  - b. Hard drive (see [Hard drive on page 54](#))
  - c. Optical drive (see [Optical drive on page 50](#))
  - d. WLAN module (see [WLAN module on page 60](#))
  - e. WWAN module (see [WWAN module on page 58](#))
  - f. Fan (see [Fan on page 64](#))
  - g. Heat sink (see [Heat sink on page 65](#))
  - h. Modem module (see [Modem module on page 63](#))
  - i. Keyboard (see [Keyboard on page 68](#))
  - j. Bottom cover (see [Bottom cover from top cover on page 71](#))

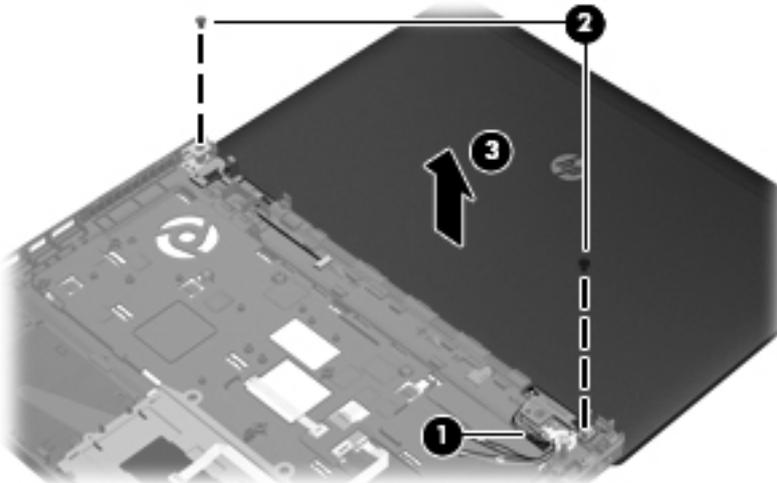
Remove the display assembly:

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

2. Disconnect the display cable (1) and webcam cable (2) from the system board.



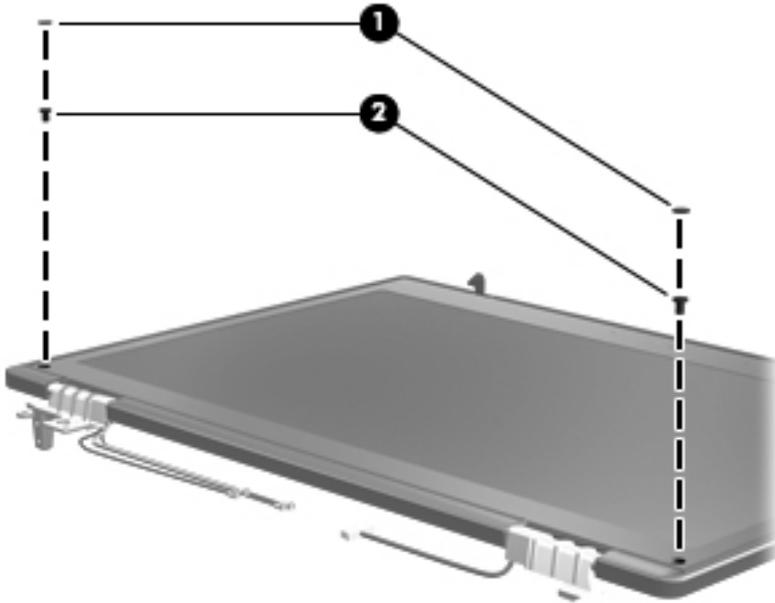
3. Remove the antennas from the holes they route through in the computer (1) that secure the display assembly to the computer.
4. Remove the two Phillips PM2.5×4.5 screws (2).
5. Lift the display assembly (3) straight up and remove it.



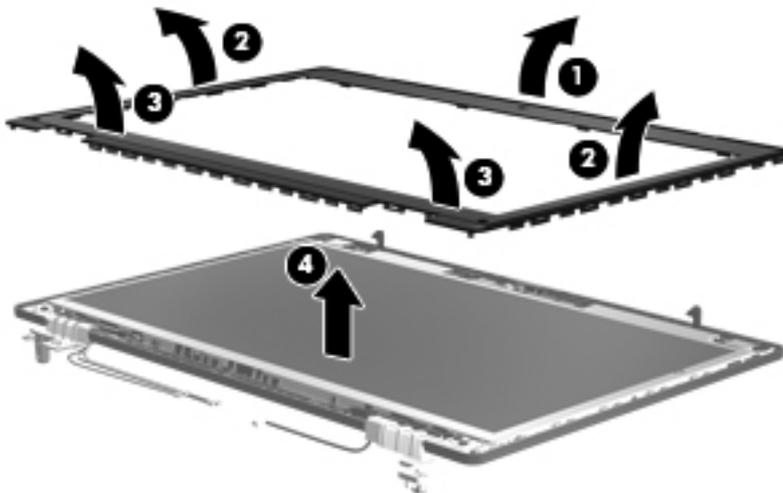
**⚠ CAUTION:** When installing the display assembly, be sure that the wireless antenna cables are routed and arranged properly.

Failure to properly route the antennas can result in degradation of the computer's WLAN and WWAN performance.

6. To remove the display bezel, remove the two rubber screw covers (1) and the two Phillips PM2.5×5.0 screws (2) in the bottom corners of the display bezel.

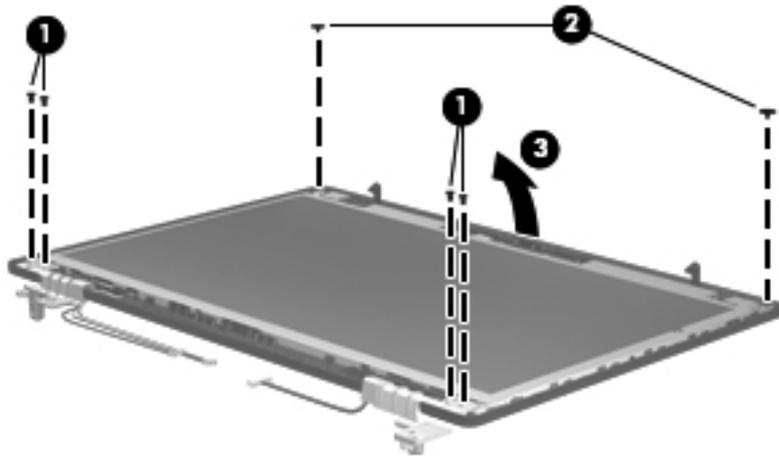


7. Flex the top (1) of the bezel, the inside edges of the left and right sides (2), and then the bottom (3) of the bezel until it disengages from the display enclosure.
8. Remove the display bezel (4).

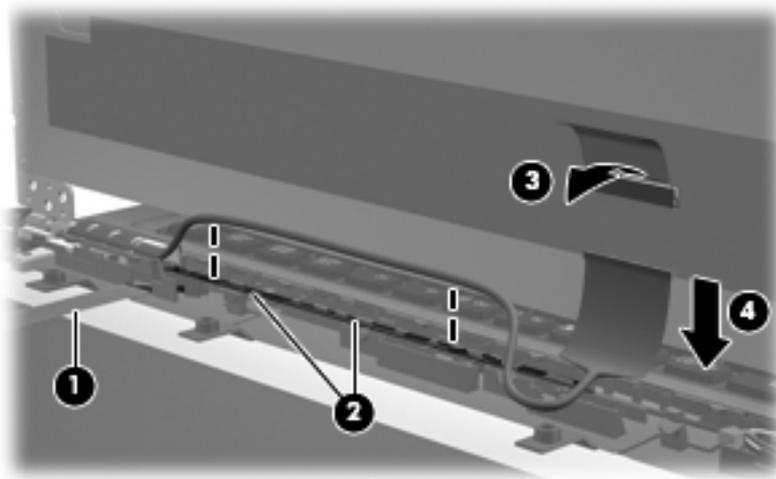


9. If it is necessary to replace the display panel, remove the four Phillips PM2.5×5.0 screws (1) at the bottom of the display panel.
10. Remove the two broadhead Phillips PM2.0×4.0 screws (2) at the top of the display panel.

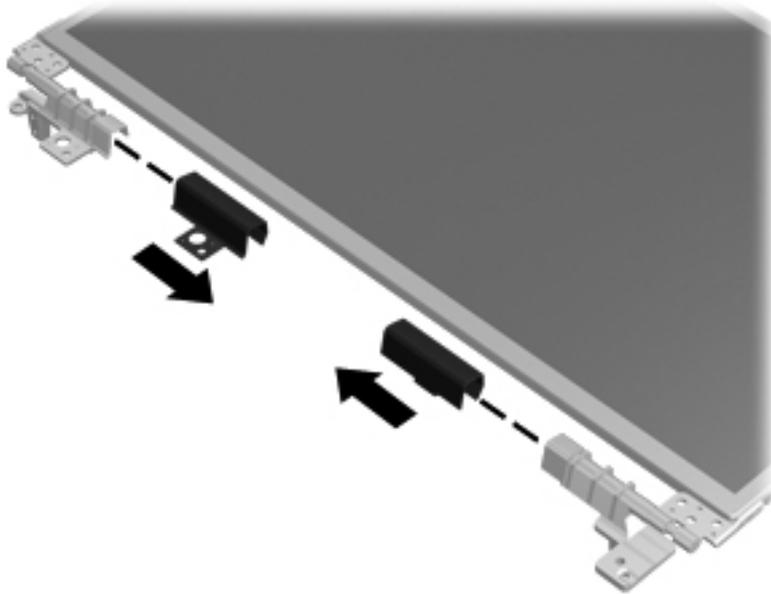
11. Lift the display panel from the display enclosure (3).



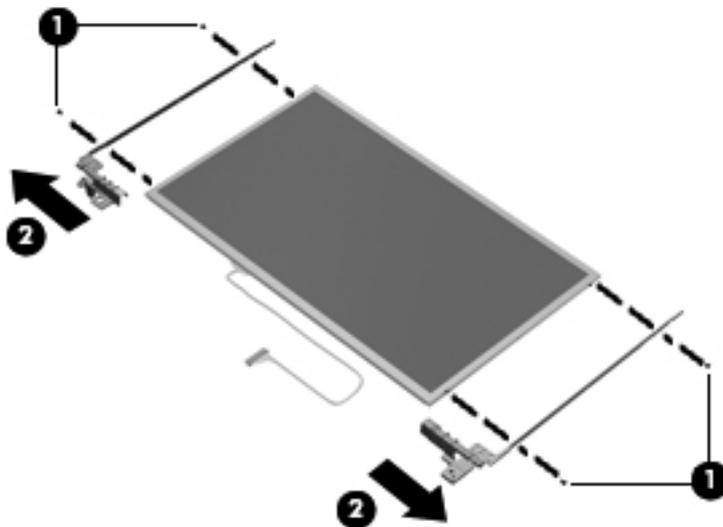
12. If it is necessary to remove the display panel/webcam cable, remove the display cable from its routing path (1) and the webcam cable from its routing path (2).
13. Disconnect the display panel cable from the back of the display panel (3), and then remove the display panel cable from the panel (4).



14. If you need to remove the hinge covers from the display hinges, pull the hinges toward one another to remove them.

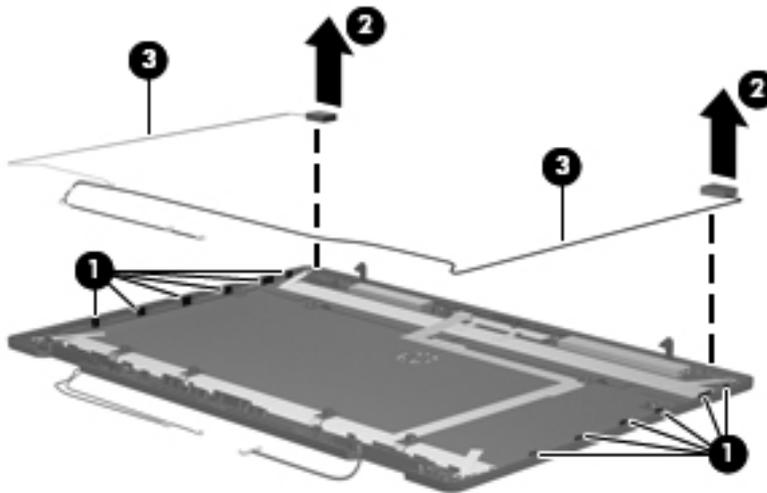


15. If it is necessary to replace the display hinges, remove the four Phillips PM2.5×3.0 screws (1) that secure each display hinge to the display panel.
16. Remove the display hinges (2).



17. If you need to remove the WLAN antennas, remove the antenna cables from the clips (1) and routing paths built into the display enclosure.

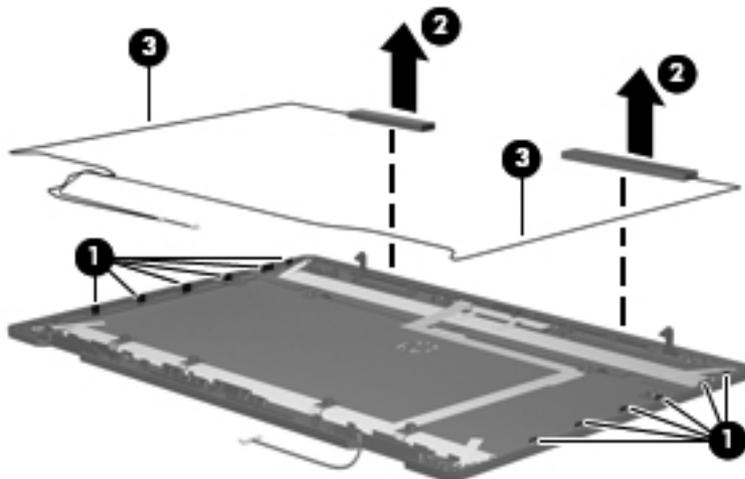
18. Lift the antennas (2) and cables (3) straight up out of the display enclosure.



**CAUTION:** When installing the display assembly, be sure that the wireless antenna cables are routed and arranged properly.

Failure to properly route the antennas can result in degradation of the computer's WLAN performance.

19. If you need to remove the WWAN antennas, remove the antenna cables from the clips (1) and routing paths built into the display enclosure.
20. Lift the antennas (2) and cables (3) straight up out of the display enclosure.

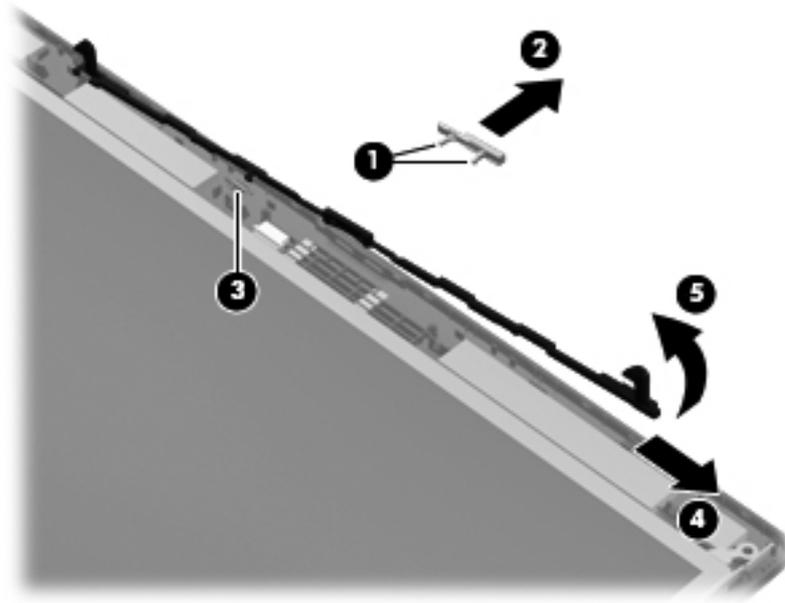


**CAUTION:** When installing the display assembly, be sure that the wireless antenna cables are routed and arranged properly.

Failure to properly route the antennas can result in degradation of the computer's WWAN performance.

21. If you need to remove the display latch, from the inside of the top of the display, squeeze together the tabs that secure the latch to the display (1), and then remove the latch from the display (2).

22. Remove the latching mechanism from the tabs that hold it in place (3), slide the mechanism until it clears the tabs (4), and then lift the mechanism from the display (5).



Reverse this procedure to reassemble and install the display assembly.

## System board



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

Description	Spare part number
<ul style="list-style-type: none"> <li>• System board for use in models without WWAN</li> </ul>	658544-001
<ul style="list-style-type: none"> <li>• System board for use in models with WWAN</li> </ul>	658545-001

Before removing the system board, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 42](#)).
5. Remove the following components:
  - a. Bottom door (see [Bottom door on page 49](#)).
  - b. Hard drive (see [Hard drive on page 54](#))
  - c. Optical drive (see [Optical drive on page 50](#))

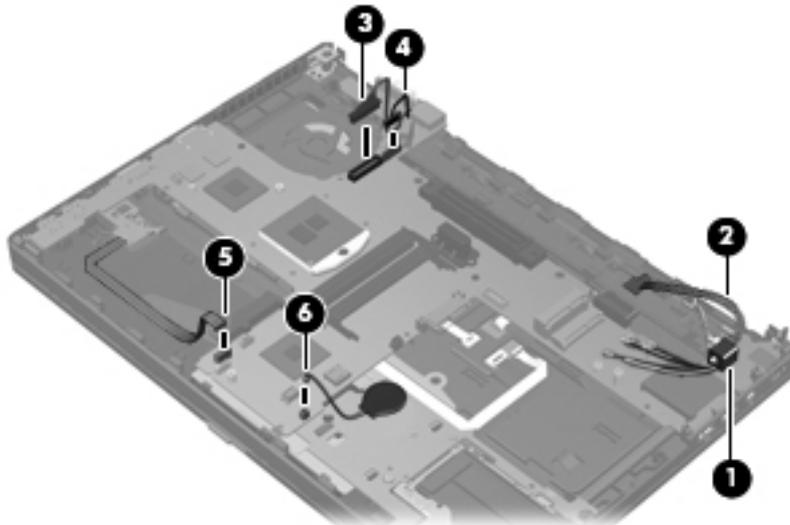
- d. Fan (see [Fan on page 64](#))
- e. Heat sink (see [Heat sink on page 65](#))
- f. Keyboard (see [Keyboard on page 68](#))
- g. Bottom cover (see [Bottom cover from top cover on page 71](#))

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:

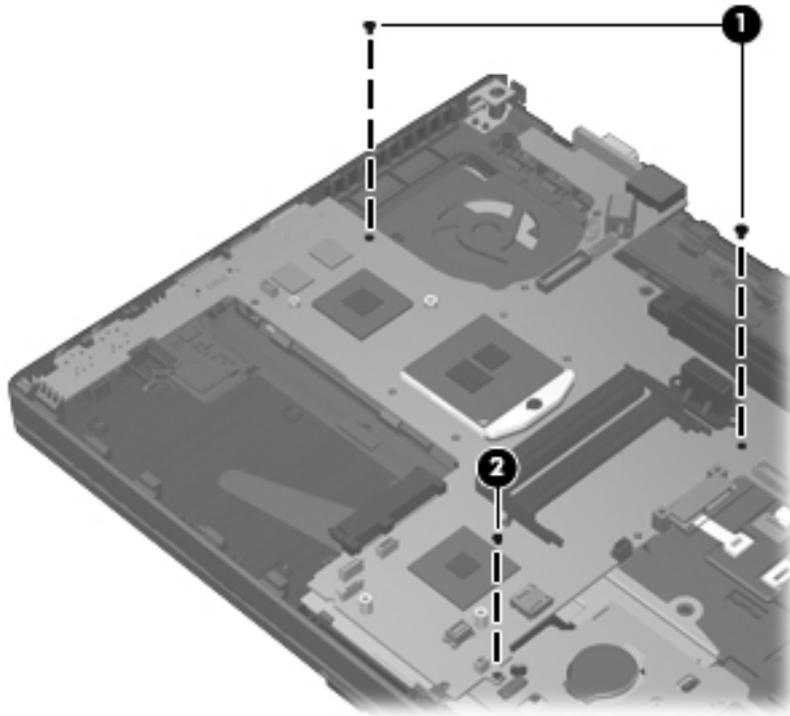
- SIM (see [SIM on page 43](#))
- Memory module (see [Memory modules on page 56](#))
- WLAN module (see [WLAN module on page 60](#))
- WWAN module (see [WWAN module on page 58](#))
- Modem module (see [Modem module on page 63](#))
- Processor (see [Processor on page 67](#))

Remove the system board:

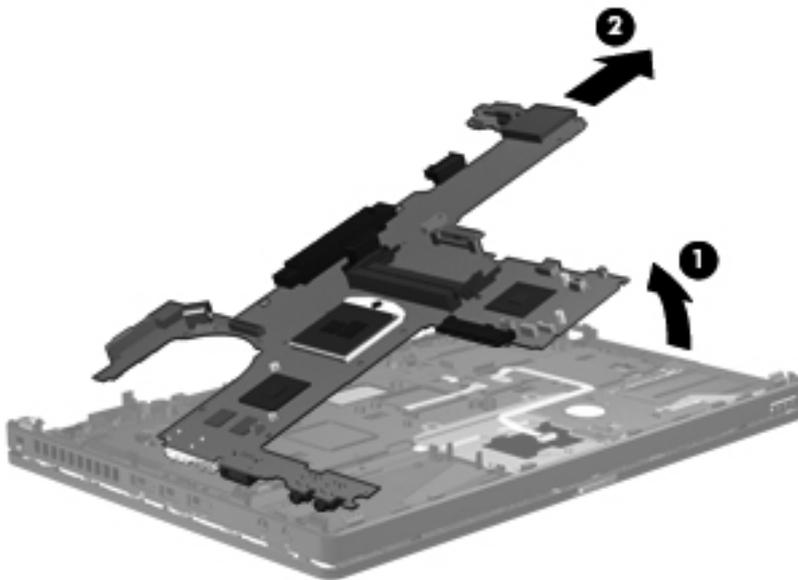
1. Position the computer right-side up, with the front toward you.
2. Disconnect the following cables from the system board (as necessary):
  - (1): Antenna cables from the rubber clamp
  - (2): Lid sensor board cable
  - (3): Display cable
  - (4): Webcam cable
  - (5): Fingerprint reader cable
  - (6): RTC battery cable



3. Remove the two Phillips PM2.5×4.5 screws (1) and the Phillips PM2.0×3.0 screw (1) that secures the system board to the base enclosure.



4. Lift the system board up at an angle (1), and then lift the system board up and out of the computer (2).



5. Remove the system board from the chassis.  
Reverse the preceding procedure to install the system board.

## Smart card reader

Description	Spare part number
Smart card reader assembly	654823-001

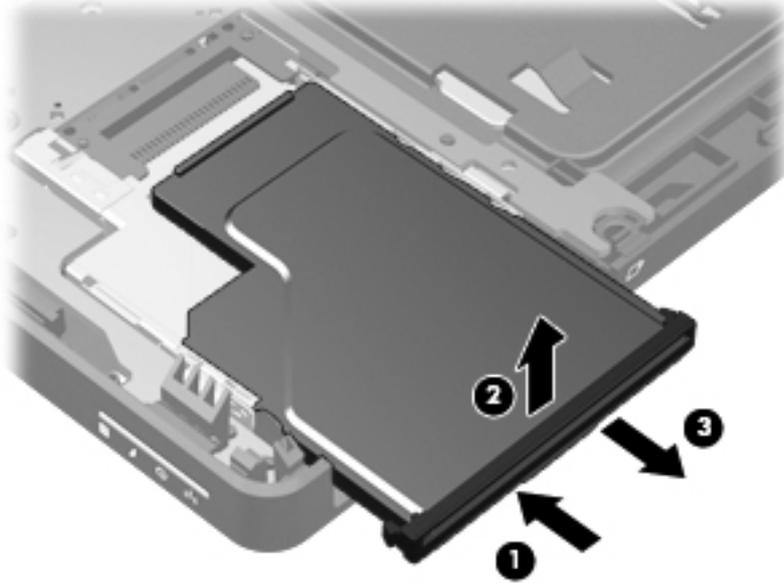
Before removing the smart card reader assembly, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 42](#)).
5. Remove the following components:
  - a. Bottom door (see [Bottom door on page 49](#)).
  - b. Hard drive (see [Hard drive on page 54](#))
  - c. Optical drive (see [Optical drive on page 50](#))
  - d. Fan (see [Fan on page 64](#))
  - e. Heat sink (see [Heat sink on page 65](#))
  - f. Keyboard (see [Keyboard on page 68](#))
  - g. Bottom cover (see [Bottom cover from top cover on page 71](#))

Remove the smart card reader assembly:

1. Position the computer upside-down with the front toward you.

2. Press in on the smart card reader (1), and then lift the reader slightly upward (2) while pulling it out of the slot (3).



Reverse this procedure to install the smart card reader assembly.

## ExpressCard assembly

Description	Spare part number
ExpressCard assembly	642763-001

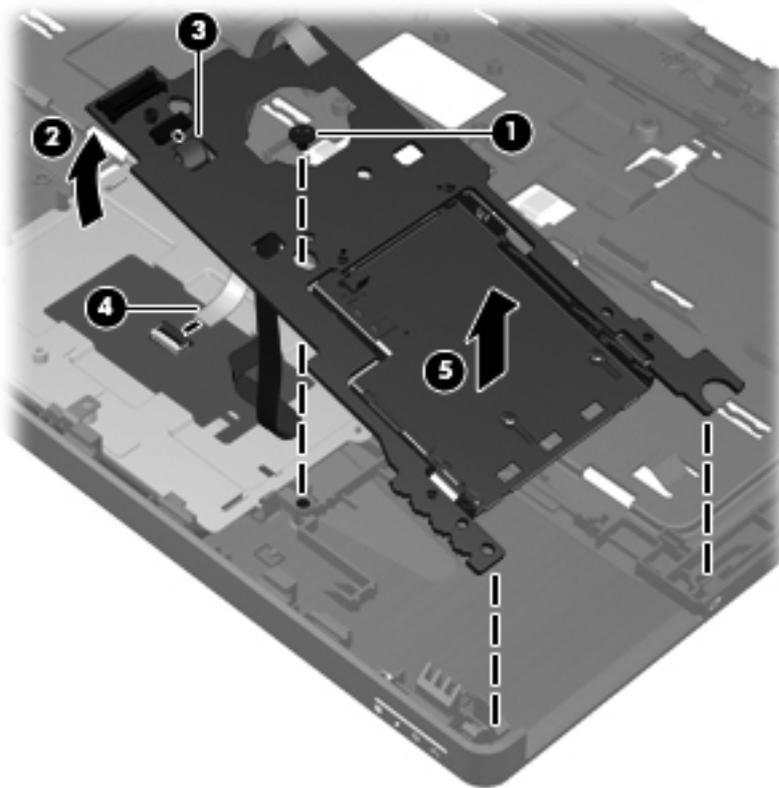
Before removing the ExpressCard assembly, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the battery (see [Battery on page 42](#)).
5. Remove the following components:
  - a. Remove the bottom door (see [Bottom door on page 49](#)).
  - b. Hard drive (see [Hard drive on page 54](#))
  - c. Optical drive (see [Optical drive on page 50](#))
  - d. Fan (see [Fan on page 64](#))
  - e. Heat sink (see [Heat sink on page 65](#))
  - f. Modem module (see [Modem module on page 63](#))

- g. Keyboard (see [Keyboard on page 68](#))
- h. Bottom cover (see [Bottom cover from top cover on page 71](#))
- i. System board (see [System board on page 90](#))

Remove the ExpressCard assembly:

1. Position the computer upside-down with the front toward you.
2. Remove the broadhead Phillips PM2.0×4.0 screw (1) that secures the assembly to the computer.
3. Lift the board up at an angle to gain access to the cables underneath (2).
4. Disconnect the cable from the ExpressCard board (3).
5. Disconnect the cable (4) from the Touchpad board.
6. Lift the assembly straight up and off the computer (5).



Reverse this procedure to install the ExpressCard assembly.

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# 5 Computer Setup (BIOS) and System Diagnostics

## Using Computer Setup

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

---

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

---

## Starting Computer Setup

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

---

To start Computer Setup, follow these steps:

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

## Navigating and selecting in Computer Setup

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

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

---

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

---

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

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

- To exit Computer Setup menus without saving your changes:

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

– or –

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

- To save your changes and exit Computer Setup menus:

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

– or –

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

Your changes go into effect when the computer restarts.

## Restoring factory settings in Computer Setup



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

---

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

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

– or –

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

Your changes go into effect when the computer restarts.



---

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

---

## Updating the BIOS

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

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

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

### Determining the BIOS version

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

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

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

– or –

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

### Downloading a BIOS update

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

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

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

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

1. Select **Start > Help and Support > Maintain**.
2. Follow the on-screen instructions to identify your computer and access the BIOS update you want to download.
3. At the download area, follow these steps:
  - a. Identify the BIOS update that is later than the BIOS version currently installed on your computer. Make a note of the date, name, or other identifier. You may need this information to locate the update later, after it has been downloaded to your hard drive.
  - b. Follow the on-screen instructions to download your selection to the hard drive.

Make a note of the path to the location on your hard drive where the BIOS update is downloaded. You will need to access this path when you are ready to install the update.

---

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

---

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

1. Open Windows Explorer by selecting **Start > Computer**.
2. Double-click your hard drive designation. The hard drive designation is typically Local Disk (C:).
3. Using the hard drive path you recorded earlier, open the folder on your hard drive that contains the update.
4. Double-click the file that has an .exe extension (for example, *filename.exe*).

The BIOS installation begins.

5. Complete the installation by following the on-screen instructions.

---

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

---

## Using System Diagnostics

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

- **Start-up test**—This test analyzes the main computer components that are required to start the computer.
- **Run-in test**—This test repeats the start-up test and checks for intermittent problems that the start-up test does not detect.
- **Hard disk test**—This test analyzes the physical condition of the hard drive, and then checks all data in every sector of the hard drive. If the test detects a damaged sector, it attempts to move the data to a good sector.
- **Memory test**—This test analyzes the physical condition of the memory modules. If it reports an error, replace the memory modules immediately.
- **Battery test**—This test analyzes the condition of the battery. If the battery fails the test, contact HP Customer Support to report the issue and purchase a replacement battery.

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

To start System Diagnostics:

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

---

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

---

# 6 Specifications

## Computer specifications

	Metric	U.S.
<b>Dimensions</b>		
Length	23.1 cm	9.11 in
Width	33.8 cm	13.3 in
Height (front to rear)	3.4 to 3.6 cm	1.34 to 1.42 in
<b>Weight</b> (equipped with UMA graphics, optical drive, 1 SODIMM, hard drive, WLAN module, 3 cell battery)	2.20 kg	4.85 lbs
<b>Input power</b>		
Operating voltage	19.0 V dc @ 4.74 A – 90 W	
Operating current	4.74 A	
<b>Temperature</b>		
Operating	5°C to 35°C	41°F to 95°F
Nonoperating	-20°C to 60°C	-4°F to 140°F
<b>Relative humidity</b> (noncondensing)		
Operating	10% to 90%	
Nonoperating	5% to 95%	
<b>Maximum altitude</b> (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
<b>Shock</b>		
Operating	125 g, 2 ms, half-sine	
Nonoperating	200 g, 2 ms, half-sine	
<b>Random vibration</b>		
Operating	0.75 g zero-to-peak, 10 Hz to 500 Hz, 0.25 oct/min sweep rate	

	Metric	U.S.
Nonoperating	1.50 g zero-to-peak, 10 Hz to 500 Hz, 0.5 oct/min sweep rate	

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

## 35.6-cm (14.0-in), HD display specifications

	Metric	U.S.
<b>Dimensions</b>		
Height	19.2 cm	7.56 in
Width	32.4 cm	12.76 in
Weight	350g max	12.35 oz
<b>Surface treatment</b>	Anti-glare	
<b>Contrast ratio</b>	300:1 (typical)	
<b>Response time</b>	8 ms	
<b>Brightness</b>	200 nits (typical)	
<b>Luminance uniformity</b>	1.4 (typ) 1.5 (max)	
Color depth	6 bit	
Format	1366 × 768	
Color gamut	45% typ	
<b>Backlight</b>	LED	
DCLK	69.3 MHz	
<b>Viewing angle</b>	SVA	

## 35.6-cm (14.0-in), HD+ display specifications

	Metric	U.S.
<b>Dimensions</b>		
Height	20.6 cm	8.11 in
Width	32.1 cm	12.64 in
Weight	325 g max	11.46 oz
<b>Surface treatment</b>	Anti-glare	
<b>Contrast ratio</b>	300:1 (typical)	
<b>Response time</b>	8 ms	
<b>Brightness</b>	200 nits (typical)	
<b>Pixel resolution</b>		
Pixel pitch	0.1935 mm × 0.1935 mm	
Resolution	1600 × 900	
Active area	309.6 × 174.15	
<b>Backlight</b>	LED	
<b>Color gamut</b>	45% NTSC @CIE1931	
DLCK	107.8 MHz	
<b>Viewing angle @ CR&gt;10</b>	15/35/45/45 (Up/Down/Left/Right)	

## Hard drive specifications

	750-GB*	500-GB*	320-GB*	250-GB*
<b>Dimensions</b>				
Height	9.5 mm	9.5 mm	9.5 mm	9.5 mm
Width	70 mm	70 mm	70 mm	70 mm
Weight	115 g	101 g	101 g	101 g
<b>Interface type</b>	SATA	SATA	SATA	SATA
<b>Transfer rate</b>	100 MB/sec	100 MB/sec	100 MB/sec	100 MB/sec
<b>Security</b>	ATA security	ATA security	ATA security	ATA security
<b>Seek times</b> (typical read, including setting)				
Single track	1.5 ms	3 ms	3 ms	3 ms
Average	11 ms	13 ms	13 ms	13 ms
Maximum	14 ms	24 ms	24 ms	24 ms
<b>Logical blocks</b>	1,465,149,168	1,048,576,000	625,141,400	488,397,168
<b>Disc rotational speed</b>	7200 rpm			
<b>Operating temperature</b>	5°C to 55°C (41°F to 131°F)			
*1 GB = 1 billion bytes when referring to hard drive storage capacity. Actual accessible capacity is less. Actual drive specifications may differ slightly.				
<b>NOTE:</b> Certain restrictions and exclusions apply. Contact technical support for details.				

# DVD±RW and CD-RW SuperMulti DL Combo Drive specifications

Applicable disc	Read:	Write:
	CD-DA, CD+(E)G, CD-MIDI, CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio, CD-R, CD-RW), CD-R, CD-RW, DVD-ROM (DVD-5, DVD-9, DVD-10, DVD-18), DVD-R, DVD-RW, DVD+R, DVD+RW, DVD-RAM	CD-R and CD-RW DVD+R, DVD+RW, DVD-R, DVD-RW, DVD-RAM
<b>Center hole diameter</b>	1.5 cm (0.59 in)	
<b>Disc diameter</b>		
Standard disc	12 cm (4.72 in)	
Mini disc	8 cm (3.15 in)	
<b>Disc thickness</b>	1.2 mm (0.047 in)	
<b>Track pitch</b>	0.74 µm	
<b>Access time</b>	<b>CD</b>	<b>DVD</b>
Random	< 175 ms	< 230 ms
Full stroke	< 285 ms	< 335 ms
<b>Audio output level</b>	Line-out, 0.7 Vrms	
<b>Cache buffer</b>	2 MB	
<b>Data transfer rate</b>		
24X CD-ROM	3,600 KB/sec	
8X DVD-ROM	10,800 KB/sec	
24X CD-R	3,600 KB/sec	
16X CD-RW	2,400 KB/sec	
8X DVD+R	10,800 KB/sec	
4X DVD+RW	5,400 KB/sec	
8X DVD-R	10,800 KB/sec	
4X DVD-RW	5,400 KB/sec	
2.4X DVD+R(9)	2,700 KB/sec	
5X DVD-RAM	6,750 KB/sec	
<b>Transfer mode</b>	Multiword DMA Mode	
<b>Startup time</b>	< 15 seconds	
<b>Stop time</b>	< 6 seconds	

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

Applicable disc	Read:	Write:	
	CD-DA, CD+(E)G, CD-MIDI, CDTEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio, CD-R, CD-RW), CD-R, CD-RW, DVDROM (DVD-5, DVD-9, DVD-10, DVD-18), DVD-R, DVD-RW, DVD+R, DVD+RW, DVD-RAM, HD-ROM (Single Layer), HD-ROM (Dual Layer), HD DVD-R, HD DVD-R for Dual Layer, HD DVD-RW	CD-R and CD-RW DVD+R, DVD+R(9), DVD+RW, DVD-R, DVD-R(9), DVD-RW, DVD-RAM	
Access time	CD	DVD	HD
Random	170 ms	170 ms	230 ms
Cache buffer	8 MB		
Data transfer rate			
24X CD-ROM	3,600 KB/sec		
8X DVD	10,800 KB/sec		
24X CD-R	3,600 KB/sec		
16X CD-RW	2,400 KB/sec		
8X DVD+R	10,800 KB/sec		
4X DVD+RW	5,400 KB/sec		
8X DVD-R	10,800 KB/sec		
4X DVD-RW	5,400 KB/sec		
2.4X DVD+R(9)	2,700 KB/sec		
5X DVD-RAM	6,750 KB/sec		
1X BD-ROM	4,500 KB/sec		
1X BD-R read	4,500 KB/sec		
1X BD-RE read	4,500 KB/sec		
Transfer mode	Multiword DMA Mode		

## Blu-ray BD-R/RE + DVDSM DL Drive

Applicable disc	Read:	Write:	
	CD-DA, CD+(E)G, CD-MIDI, CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio, CD-R, CD-RW), CD-R, CD-RW, DVD-ROM (DVD-5, DVD-9, DVD-10, DVD-18), DVD-R, DVD-RW, DVD+R, DVD+RW, DVD-RAM, BD-ROM, BD-R, BD-RE	CD-R, CD-RW, DVD+R, DVD+R(9), DVD+RW, DVD-R, DVD-R(9), DVD-RW, DVD-RAM, BD-R, BD-RE	
Access time	CD	DVD	BD-ROM
Random	<180 ms	<180 ms	<230 ms
Maximum Media Capacity (read)	50 GB		
Maximum Media Capacity (write)	8.5 GB		
Data transfer rate			
24X CD-ROM	3,600 KB/sec		
8X DVD	10,800 KB/sec		
2X BD-ROM	9,000 KB/sec		
16X CD-R	3,600 KB/sec		
16X CD-RW	2,400 KB/sec		
8X DVD+R	10,800 KB/sec		
6X DVD+RW	8,100 KB/sec		
8X DVD-R	10,800 KB/sec		
6X DVD-RW	8,100 KB/sec		
4X DVD+R Dual Layer	5,400 KB/sec		
4X DVD-R Dual Layer	5,400 KB/sec		
5X DVD-RAM	6,750 KB/sec		
2X BD-R	9,000 KB/sec		
2X BD-RE	9,000 KB/sec		

## DVD-ROM Drive specifications

<b>Applicable disc</b>	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	
<b>Center hole diameter</b>	1.5 cm (0.59 in)	
<b>Disc diameter</b>		
Standard disc	12 cm (4.72 in)	
Mini disc	8 cm (3.15 in)	
<b>Disc thickness</b>	1.2 mm (0.047 in)	
<b>Track pitch</b>	0.74 $\mu$ m	
<b>Access time</b>	<b>CD</b>	<b>DVD</b>
Random	< 100 ms	< 125 ms
Full stroke	< 175 ms	< 225 ms
<b>Audio output level</b>	Line-out, 0.7 Vrms	
<b>Cache buffer</b>	512 KB	
<b>Data transfer rate</b>		
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	
<b>Startup time</b>	< 10 seconds	
<b>Stop time</b>	< 3 seconds	

## Specification information in Device Manager

Device Manager allows you to view and control the hardware attached to the computer, as well as provides hardware specification information.

You can also add hardware or modify device configurations using Device Manager.



---

**NOTE:** Windows 7 and Windows Vista include the User Account Control feature to improve the security of your computer. You may be prompted for your permission or password for tasks such as installing software, running utilities, or changing Windows settings. Refer to Windows Help and Support for more information.

---

After you open Device Manager, drill-down to a device and double-click it to access its properties.

### To access Device Manager in Windows 7:

1. Select **Start > Computer > System properties**.
2. In the left pane, click **Device Manager**.

### To access Device Manager in Windows Vista:

1. Select **Start > Computer > System properties**.
2. In the left pane, click **Device Manager**.

### To access Device Manager in Windows XP:

1. Select **Start > My Computer**.
2. In the left pane of the System Tasks window, select **View system information**.
3. Select **Hardware tab > Device Manager**.

---

# 7 Backup and recovery

## Windows 7

- [Backing up your information](#)
- [Performing a system recovery](#)

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

Windows Backup and Restore provides the following options:

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

---

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

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

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

---

## Backing up your information

Recovery after a system failure is as good as your most recent backup. You should create system repair discs (select models only) by using the installed optical drive (select models only) or an optional external optical drive, and your initial backup immediately after software setup. As you add

new software and data files, you should continue to back up your system on a regular basis to maintain a reasonably current backup. The system repair discs (select models only) are used to start up (boot) the computer and repair the operating system in case of system instability or failure. Your initial and subsequent backups allow you to restore your data and settings if a failure occurs.

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

Note the following when backing up:

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

---

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

---

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

To create a backup using Backup and Restore:

---

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

---

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

---

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

## Performing a system recovery

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

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

---

 **NOTE:** If you are unable to boot (start up) your computer and you cannot use the system repair discs you previously created (select models only), you must purchase a Windows 7 operating system DVD to reboot the computer and repair the operating system. For additional information, refer to [Using a Windows 7 operating system DVD \(purchased separately\) on page 112](#).

---

## Using the Windows recovery tools

To recover information you previously backed up:

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

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

---

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

---

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

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

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

---

 **NOTE:** If the Windows partition and the HP Recovery partition are not listed, you must recover your operating system and programs using the Windows 7 operating system DVD and the *Driver Recovery* disc (both purchased separately). For additional information, refer to [Using a Windows 7 operating system DVD \(purchased separately\) on page 112](#).

---

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

---

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

---

## Using f11 recovery tools

---

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

---

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

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

---

 **NOTE:** If the HP Recovery partition is not listed, you must recover your operating system and programs using the Windows 7 operating system DVD and the *Driver Recovery* disc (both purchased separately). For additional information, refer to [Using a Windows 7 operating system DVD \(purchased separately\) on page 112](#).

---

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

## Using a Windows 7 operating system DVD (purchased separately)

To order a Windows 7 operating system DVD, go to <http://www.hp.com/support>, select your country or region, and follow the on-screen instructions. You can also order the DVD by calling technical support. For contact information, refer to the *Worldwide Telephone Numbers* booklet included with the computer.

---

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

---

To initiate recovery using a Windows 7 operating system DVD:

---

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

---

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

After the repair is completed:

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

# Windows Vista

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

The Backup and Restore Center provides the following options:

- Backing up individual files and folders
- Backing up the entire hard drive (select models only)
- Scheduling automatic backups (select models only)
- Creating system restore points
- Recovering individual files
- Restoring the computer to a previous state
- Recovering information using recovery tools

---

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

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

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

---

## Backing up your information

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

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

Note the following when backing up:

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

---

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

---

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

To create a backup using Backup and Restore Center:

---

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

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

---

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

## Performing a recovery

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

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

---

 **NOTE:** If you are unable to boot (start up) your computer, you must purchase a Windows Vista® operating system DVD to reboot the computer and repair the operating system. For additional information, refer to [Using a Windows Vista operating system DVD \(purchased separately\) on page 115](#).

---

## Using the Windows recovery tools

To recover information you previously backed up:

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

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

---

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

---

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

---

 **NOTE:** If the Windows partition and the HP Recovery partition have been deleted, you must recover your operating system and programs using the Windows Vista operating system DVD and the *Driver Recovery* disc (both purchased separately). For additional information, refer to [Using a Windows Vista operating system DVD \(purchased separately\) on page 115](#).

---

3. Restart the computer, and then press **f8** before the Windows operating system loads.

4. Select **Repair your computer**.
5. Follow the on-screen instructions.

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

---

## Using f11 recovery tools

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

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

---

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

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

 **NOTE:** If the HP Recovery partition has been deleted, you must recover your operating system and programs using the Windows Vista operating system DVD and the *Driver Recovery* disc (both purchased separately). For additional information, refer to [Using a Windows Vista operating system DVD \(purchased separately\) on page 115](#).

---

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

## Using a Windows Vista operating system DVD (purchased separately)

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

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

---

To initiate recovery using a Windows Vista operating system DVD:



---

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

---

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

---

## 8 Power cord set requirements

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

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

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

### Requirements for all countries 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-mm<sup>2</sup> 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-mm<sup>2</sup> 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-mm<sup>2</sup> 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-mm<sup>2</sup> conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country or region where it will be used.

---

# 9 Recycling

## 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 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).



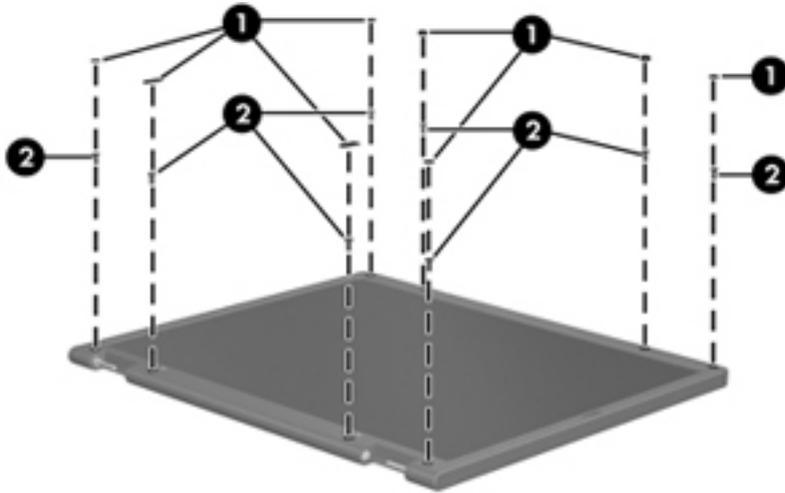
---

**📝 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.

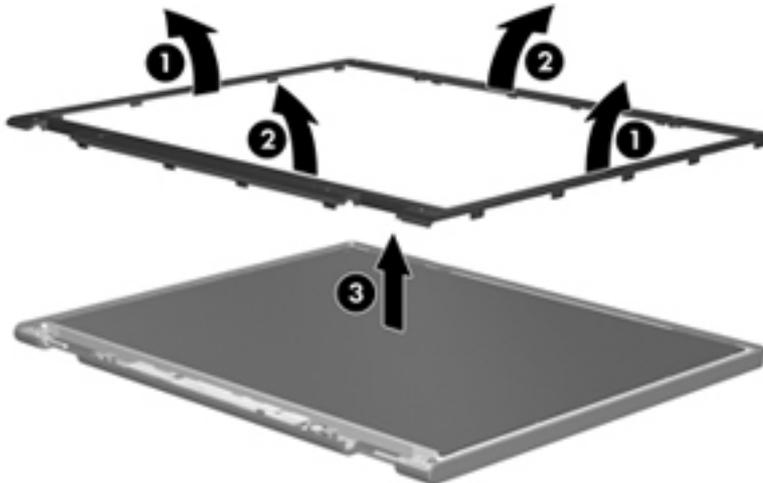
---

Perform the following steps to disassemble the display assembly:

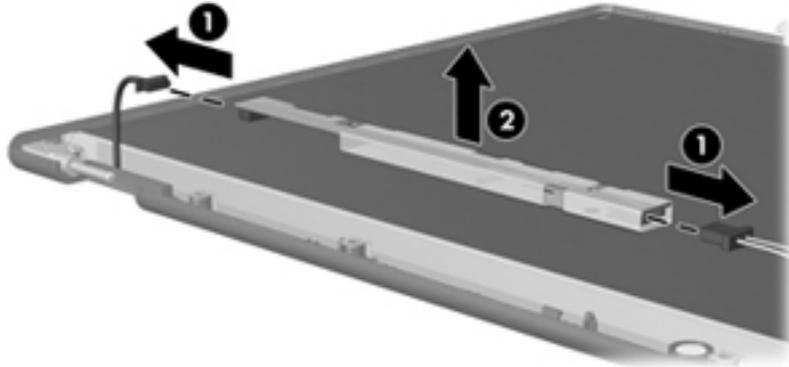
1. Remove all screw covers (1) and screws (2) that secure the display bezel to the display assembly.



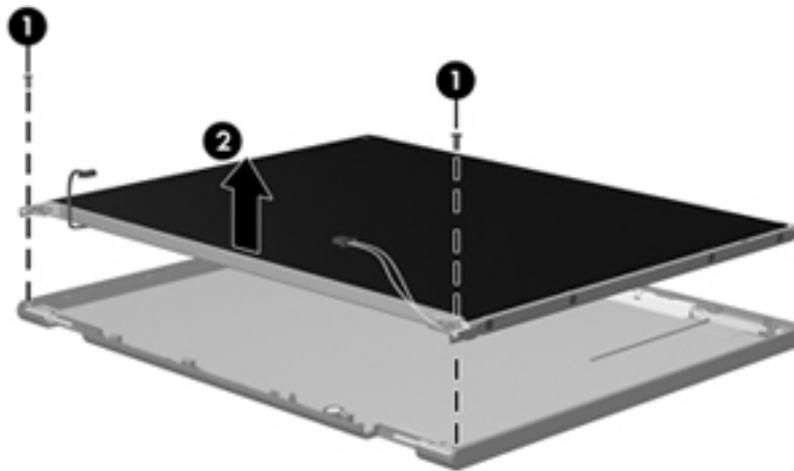
2. Lift up and out on the left and right inside edges (1) and the top and bottom inside edges (2) of the display bezel until the bezel disengages from the display assembly.
3. Remove the display bezel (3).



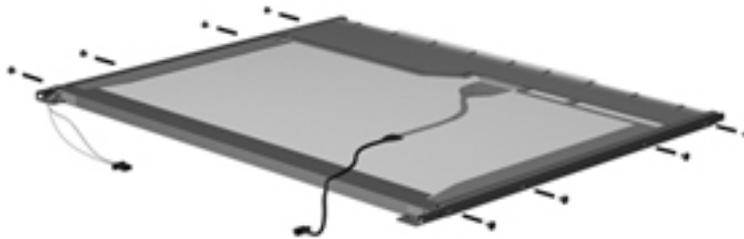
4. Disconnect all display panel cables (1) from the display inverter and remove the inverter (2).



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.

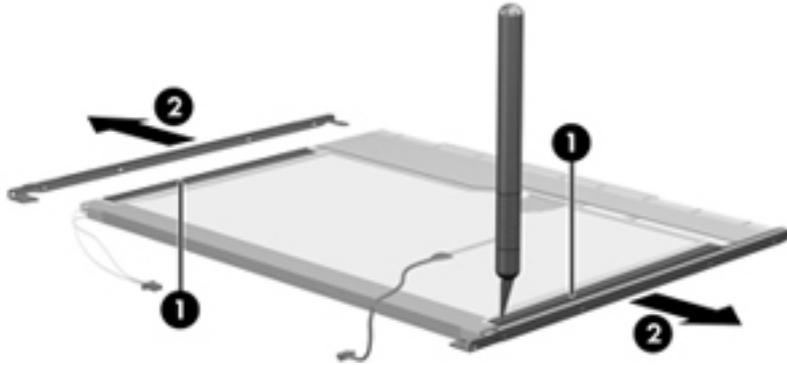


7. Position the display panel assembly upside-down.
8. Remove all screws that secure the display panel frame to the display panel.

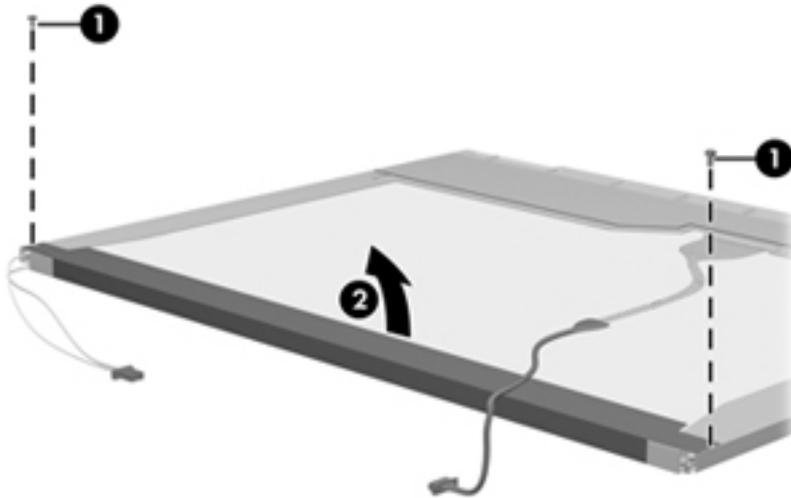


9. Use a sharp-edged tool to cut the tape (1) that secures the sides of the display panel to the display panel frame.

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

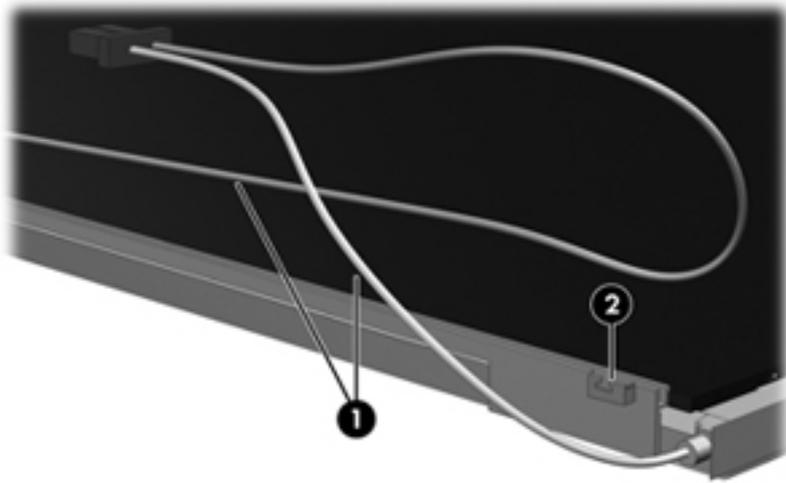


11. Remove the screws (1) that secure the backlight cover to the display panel.
12. Lift the top edge of the backlight cover (2) and swing it outward.



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

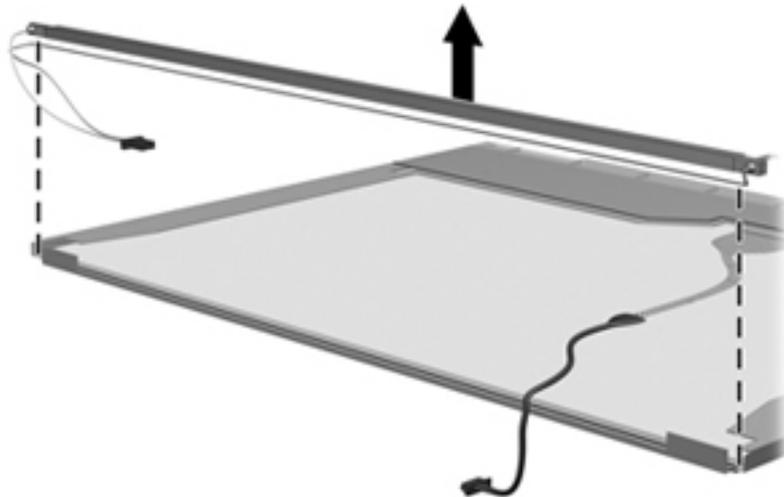
15. Remove the backlight cables (1) from the clip (2) in the display panel.



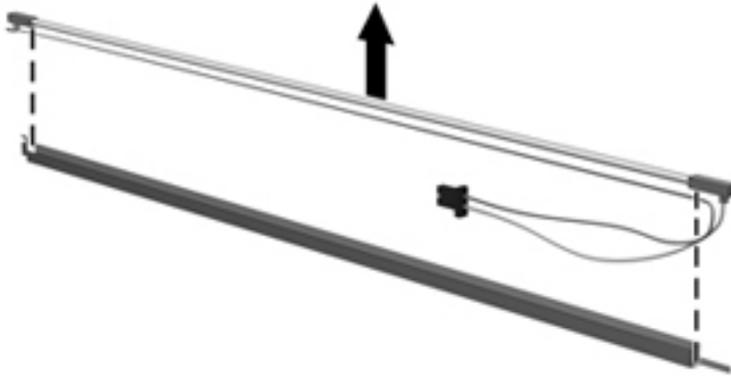
16. Position the display panel upside-down.

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

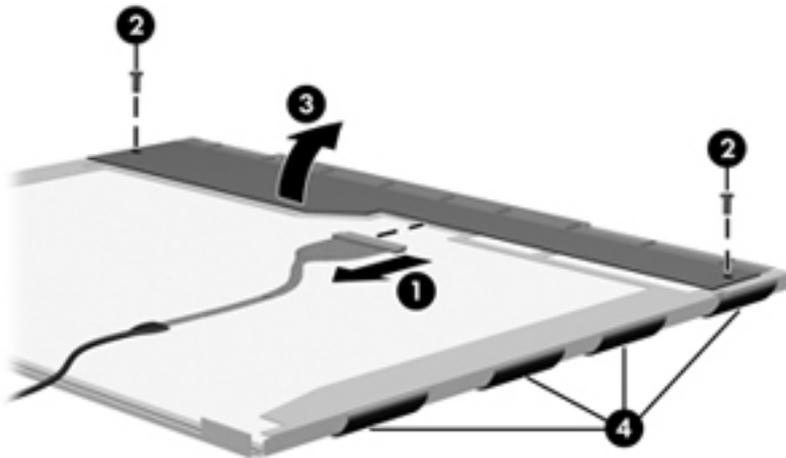
17. Remove the backlight frame from the display panel.



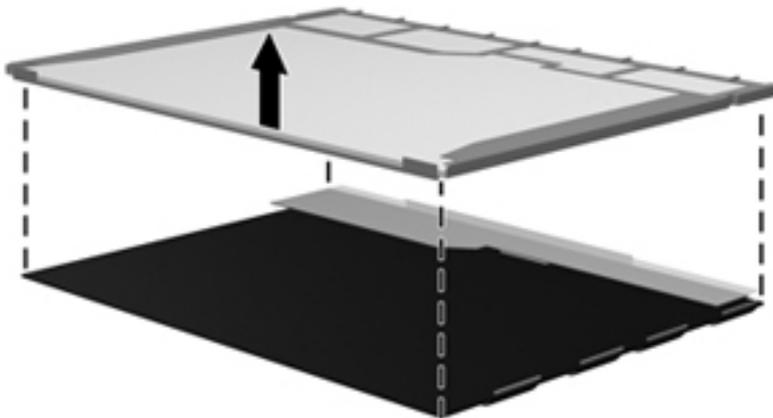
18. Remove the backlight from the backlight frame.



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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# Index

## Symbols/Numerics

1394 port, identifying 14

## A

AC adapter, spare part numbers 28, 30

accessory battery connector, identifying 17

antennas

    disconnecting 58, 60

audio, product description 3

audio-in (microphone) jack 16

audio-out (headphone) jack 16

## B

Backup and Restore 110

Backup and Restore Center 113, 114

battery

    removal 42

    spare part number 23, 42

battery bay 17

battery light 13

battery release latch 17

BIOS

    determining version 98

    downloading an update 98

    updating 98

Blu-ray BD-R/RE + DVDSM DL

    Drive, specifications 106

Blu-ray ROM DVD±RW SuperMulti DL Drive

    spare part number 22, 27, 33, 50

    specifications 105

Bluetooth cable, illustrated 25

Bluetooth compartment, identifying 18

Bluetooth module

    removal 62

    spare part number 23, 29, 62

bottom cover

    removal 71

    spare part number 23, 33, 71

bottom cover release latch,

    identifying 17

bottom door

    illustrated 26

    removal 49

    spare part number 49

buttons

    left pointing stick button 8

    left TouchPad 8

    optical drive eject 14

    power 10

    QuickWeb 11

    right pointing stick button 8

    right TouchPad 8

    TouchPad 10

    TouchPad on/off 8

    volume mute 11

    wireless 10

## C

Cable Kit

    contents 25

    spare part number 25, 31

cables, service considerations 36

caps lock light, identifying 9

chipset, product description 1

components

    bottom 17

    display 7

    front 13

    left side 14

    rear 15

    right side 16

    top 8

computer feet

    locations 41

    spare part number 41

Computer Setup

    navigating and selecting 96

    restoring factory settings 97

computer specifications 100

connector, docking 17

connector, power 14

connectors, service

    considerations 36

## D

diskette drive

    precautions 36

display assembly

    removal 84

    spare part numbers 84

display assembly components

    removal 44

    spare part numbers 44

display bezel

    removal 45, 86

    spare part numbers 24, 44

display component recycling 119

display components, spare part

    numbers 24

display enclosure, spare part

    number 25, 33

display hinge

    removal 88

    spare part number 33

display hinge covers

    spare part number 24

Display Hinge Kit

    spare part number 24

- Display Latch Kit
  - spare part number 25, 33
- display panel
  - product description 1
  - removal 47
  - spare part number 24, 33, 44
- display release latch 13
- Display Rubber Kit, spare part number 25
- Display Screw Kit, spare part number 25, 44
- display specifications 101, 102
- DisplayPort, identifying 16
- docking connector, identifying 17
- docking support, product description 4
- drives
  - preventing damage 36
- DVD-ROM Drive
  - precautions 36
  - removal 50
  - spare part number 22, 27, 33, 50
  - specifications 107
- DVD±RW and CD-RW SuperMulti DL Combo Drive
  - precautions 36

**E**

- electrostatic discharge 37
- embedded numeric keypad, identifying 12
- eSATA port, identifying 16
- esc key, identifying 12
- Ethernet, product description 3
- ExpressCard assembly
  - removal 94
  - spare part number 21, 33, 94
- ExpressCard slot 14
- ExpressCard slot insert, illustrated
  - illustrated 26
- external media cards, product description 4
- external monitor port 15

**F**

- f11 recovery 111, 115
- fan
  - removal 64
  - spare part number 22, 33, 64

- feet
  - locations 41
  - spare part number 41
- fingerprint reader board
  - removal 76
  - spare part number 21, 76
- fingerprint reader board, spare part number 33
- fingerprint reader, identifying 11
- fn key, identifying 12
- function keys
  - identifying 12

**G**

- graphics, product description 1
- grounding equipment and methods 39

**H**

- hard drive
  - precautions 36
  - product description 2
  - removal 54
  - spare part numbers 22, 27, 30, 54
  - specifications 103
- hard drive bracket, removal 55
- Hard Drive Hardware Kit, spare part number 27, 33
- hard drive light 13
- hard drive recovery 111, 115
- heat sink
  - removal 65
  - spare part number 22, 34, 65
- hinge
  - removal 88
  - spare part number 33
- HP QuickWeb light 9

**I**

- integrated webcam light, identifying 7
- internal display switch 7
- internal microphones, identifying 7

**J**

- jacks
  - audio-in (microphone) 16
  - audio-out (headphone) 16
  - network 15

- RJ-11 (modem) 15
- RJ-45 (network) 15

**K**

- keyboard
  - product description 4
  - removal 68
  - spare part numbers 21, 31, 32, 68
- keypad, embedded numeric 12
- keys
  - esc 12
  - fn 12
  - function 12
  - num lk 12
  - Windows applications 12
  - Windows logo 12

**L**

- latch, battery release 17
- latch, bottom cover release 17
- legacy support, USB 96
- lid switch
  - removal 78
  - spare part number 21, 33, 78
- lights
  - battery 13
  - caps lock 9
  - hard drive 13
  - HP QuickWeb 9
  - mute 9
  - num lock 9
  - power 9, 13
  - TouchPad 9
  - webcam 7
  - wireless 9, 13

**M**

- mass storage devices, spare part numbers 27
- Media Card Reader, identifying 14
- memory module
  - product description 1
  - removal 56
  - spare part numbers 22, 56
- memory module compartment, identifying 18
- microphone (audio-in) jack
  - product description 3

- microphone module
  - spare part number 24, 44
- Mobile Broadband Module,
  - identifying 18
- model name 1
- modem module
  - product description 3
  - removal 63
  - spare part number 21, 30, 63
- mute light, identifying 9
  
- N**
- network jack, identifying 15
- num lk key, identifying 12
- num lock light 9
  
- O**
- operating system, product
  - description 5
- optical drive
  - precautions 36
  - product description 2
  - removal 50
  - spare part numbers 22, 27, 50
  - specifications 104, 105, 106, 107
- optical drive eject button,
  - identifying 14
- optical drive protective insert
  - illustrated 26
- optical drive, identifying 14
  
- P**
- packing guidelines 38
- plastic parts 35
- Plastics Kit, spare part number
  - 26, 31
- pointing device, product
  - description 4
- pointing stick 8
- pointing stick cable, illustrated 25
- ports
  - 1394 14
  - DisplayPort 16
  - eSATA 16
  - external monitor 15
  - product description 4
  - USB 14, 16
- power button, identifying 10
- power connector, identifying 14
  
- power cord
  - set requirements 117
  - spare part numbers 28, 29
- power light 9, 13
- power requirements, product
  - description 4
- processor
  - product description 1
  - removal 67
  - spare part numbers 22, 67
- product description
  - audio 3
  - chipset 1
  - display panel 1
  - docking support 4
  - Ethernet 3
  - external media cards 4
  - graphics 1
  - hard drives 2
  - keyboard 4
  - memory module 1
  - microphone 3
  - modem module 3
  - operating system 5
  - optical drives 2
  - pointing devices 4
  - ports 4
  - power requirements 4
  - processors 1
  - product name 1
  - security 4
  - serviceability 6
  - webcam 3
  - wireless 3
- product name 1
  
- Q**
- QuickWeb button, identifying 11
  
- R**
- recovery partition 111, 115
- removal/replacement
  - preliminaries 35
  - procedures 40
- restoring the hard drive 111, 115
- RJ-11 (modem) jack, identifying
  - 15
- RJ-11 connector cable
  - illustrated 25
  - removal 82
  
- RJ-11 jack, illustrated 26
- RJ-45 (network) jack, identifying
  - 15
- RTC battery
  - removal 74
  - spare part number 21, 33, 74
- Rubber Kit, spare part number 31
  
- S**
- Screw Kit, spare part number
  - 28, 31
- security cable slot, identifying 16
- security, product description 4
- service considerations 35
- service tag 19, 40
- serviceability, product
  - description 6
- setup utility
  - navigating and selecting 96
  - restoring factory settings 97
- SIM slot, identifying 17
- SIM, removal 43
- slots
  - ExpressCard 14
  - security cable 16
- smart card reader 14
- smart card reader assembly
  - removal 93
  - spare part number 21, 34, 93
- speaker assembly
  - removal 80
  - spare part number 23, 33, 80
- speakers, identifying 13
- specifications
  - Blu-ray BD-R/RE + DVDSM DL Drive 106
  - Blu-ray ROM DVD±RW SuperMulti DL Drive 105
  - computer 100
  - display 101, 102
  - DVD-ROM Drive 107
  - DVD±RW and CD-RW SuperMulti DL Combo Drive 104
  - hard drive 103
  - optical drive 104, 105, 106, 107
  - static-shielding materials 39

- system board
  - removal 90
  - spare part numbers 21, 34, 90
- system repair disc 109
- system restore points 109

## T

- thermal material, replacement 66
- tools required 35
- top cover
  - spare part numbers 21, 33
- TouchPad
  - buttons 8
- TouchPad light, identifying 9
- TouchPad on/off button 8
  - identifying 10
- TouchPad zone, identifying 8
- transporting guidelines 38

## U

- upgrade bay 14
  - removal 52
  - spare part number 52
- upgrade bay adapter
  - spare part number 27, 33, 52, 54
- USB legacy support 96
- USB ports, identifying 14, 16

## V

- vents, identifying 16, 17
- volume mute button, identifying 11

## W

- webcam 8
  - product description 3
  - spare part number 24, 33, 44
- webcam light, identifying 7
- webcam, identifying 8
- Windows 7 operating system
  - DVD 112
- Windows applications key,
  - identifying 12
- Windows Backup and Restore 109
- Windows logo key, identifying 12
- Windows Vista operating system
  - DVD 115

- wireless antennas
  - disconnecting 58, 60
  - identifying 7
- wireless button, identifying 10
- wireless lights 9, 13
- wireless, identifying 18
- wireless, product description 3
- WLAN antennas
  - spare part number 25, 33
- WLAN antennas, identifying 7
- WLAN module
  - removal 60
  - spare part numbers 21, 30, 60
- workstation guidelines 38
- WWAN antennas
  - identifying 7
  - spare part number 25, 33
- WWAN module
  - removal 58
  - spare part number 22, 30, 58