



HP 650 Notebook PC

Maintenance and Service Guide

© Copyright 2012 Hewlett-Packard
Development Company, L.P.

Bluetooth is a trademark owned by its proprietor and used by Hewlett-Packard Company under license. Intel and Core are U.S. registered trademarks of Intel Corporation. Microsoft, Windows, and Windows Vista are U.S. registered trademarks of Microsoft Corporation. SD Logo is a trademark of its proprietor.

The information contained herein is subject to change without notice. The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.

First Edition: April 2012

Document Part Number: 694073-001

Safety warning notice

⚠ WARNING! To reduce the possibility of heat-related injuries or of overheating the device, do not place the device directly on your lap or obstruct the device air vents. Use the device 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 device and the AC adapter comply with the user-accessible surface temperature limits defined by the International Standard for Safety of Information Technology Equipment (IEC 60950).

Table of contents

1 Product description	1
2 External component identification	6
Finding your hardware and software information	6
Display	6
Button	8
Keys	9
Lights	10
TouchPad	11
Front	11
Left side	12
Right side	14
Bottom	15
3 Illustrated parts catalog	16
Service tag	17
Computer major components	18
Display assembly subcomponents	22
Mass storage devices	23
Miscellaneous parts	24
Sequential part number listing	25
4 Removal and replacement procedures	29
Preliminary replacement requirements	29
Tools required	29
Service considerations	29
Plastic parts	29
Cables and connectors	29
Drive handling	30
Grounding guidelines	30
Electrostatic discharge damage	30

Packaging and transporting guidelines	32
Component replacement procedures	34
Service tag	34
Computer feet	35
Battery	36
Memory module	37
WLAN module	38
Keyboard	40
Optical drive	44
Hard drive	46
RTC battery	49
Top cover	50
Power button board	53
TouchPad button board	54
Optical drive connector cable	57
Speakers	59
USB board	61
System board	63
Fan/heat sink assembly	65
Processor	67
Display assembly	69
Power connector cable	78
5 Setup Utility (BIOS) and Advanced System Diagnostics	80
Starting Setup Utility	80
Using Setup Utility	80
Changing the language of Setup Utility	80
Navigating and selecting in Setup Utility	81
Display system information	81
Restoring factory default settings in Setup Utility	81
Exiting Setup Utility	82
Updating the BIOS	82
Determining the BIOS version	82
Downloading a BIOS update	83
Using Advanced System Diagnostics	84
6 Specifications	85
Computer specifications	85
15.6-in, SVA, display panel display specifications	86
Hard drive specifications	87

7 Backup and recovery	88
Restore	88
Creating recovering media	89
Performing a system restore	90
Restoring using the dedicated recovery partition (select models only)	90
Restoring using the recovery media	91
Changing the computer boot order	91
Backing up and recovering your information	92
Using Windows Backup and Restore	93
Using Windows system restore points	93
When to create restore points	93
Create a system restore point	93
Restore to a previous date and time	94
8 Power cord set requirements	95
Requirements for all countries	95
Requirements for specific countries and regions	96
9 Recycling	97
Index	98

1 Product description

Category	Description
Product Name	HP 650 Notebook PC
Processors	<ul style="list-style-type: none">• Intel® Core® i5-3210M 2.50-GHz processor (3.0-MB L3 cache, 35 W; not supported on computer models equipped with Windows® 7 Starter, 32-bit operating system)• Intel Core i3-3110M 2.30-GHz processor (3.0-MB L3 cache, 35 W; not supported on computer models equipped with Windows 7 Starter, 32-bit operating system)• Intel Core i3-2370M 2.40-GHz processor (3.0-MB L3 cache, 35 W; not supported on computer models equipped with Windows 7 Starter, 32-bit operating system)• Intel Core i3-2350M 2.20-GHz processor (3.0-MB L3 cache, 35 W; not supported on computer models equipped with Windows 7 Starter, 32-bit operating system)• Intel Core i3-2308M 2.10-GHz processor (3.0-MB L3 cache, 35 W; not supported on computer models equipped with Windows 7 Starter, 32-bit operating system)• Intel Pentium B970 TJ85 2.30-GHz processor (2.0-MB L3 cache, dual core, 35 W; not supported on computer models equipped with Windows 7 Starter, 32-bit operating system)• Intel Pentium B960 TJ85 2.20-GHz processor (2.0-MB L3 cache, dual core, 35 W; not supported on computer models equipped with Windows 7 Starter, 32-bit operating system)• Intel Celeron DC B820 1.70-GHz processor (2.0-MB L3 cache, dual core, 35 W)• Intel Celeron DC B815 1.60-GHz processor (2.0-MB L3 cache, dual core, 35 W)• Intel Celeron DC B730 1.80-GHz processor (2.0-MB L3 cache, dual core, 35 W)
Chipset	<ul style="list-style-type: none">• Intel HM75 Express chipset (only on computer models equipped an Intel Core i5 or Intel Core i3 processor)• Intel HM70 Express chipset (only on computer models equipped an Intel Pentium or Intel Celeron processor)

Category	Description
Graphics	<p>Internal graphics:</p> <ul style="list-style-type: none"> • Universal memory architecture (UMA) with shared video memory • Intel HD Graphics 4000 (GT2) on computer models equipped with an Intel Core i5-3210M or Intel Core i3-3110M processor • Intel HD Graphics 3000 (GT2) on computer models equipped with an Intel Core i3-2370M, Intel Core i3-2350M, or i3-2330M processor • Intel HD Graphics (GT1) on computer models equipped with an Intel Pentium or Intel Celeron processor <p>Supports HD decode, HDMI, and DX11 (DX11 not supported on computer models equipped with an Intel Core i3-2370M, i3-2350M, or i3-2330M processor)</p>
Panel	<p>15.6-in, light-emitting diode (LED), SVA, HD, BrightView (1366×768) display; typical brightness: 200 nits</p> <p>All display assemblies include one or two wireless local area network (WLAN) antenna cables</p> <p>Supports low voltage differential signalling (LVDS)</p>
Memory	<p>Two customer-accessible/upgradable memory module slots</p> <p>DDR3/1333-MHz dual-channel support (DDR3/1600-MHz downgrade to DDR3-1333)</p> <p>Supports 8192-MB of system RAM in the following configurations:</p> <ul style="list-style-type: none"> • 8192-MB (4096-MB×2; not supported on computer models equipped with a 32-bit operating system) • 6144-MB (4096-MB+2048×1; not supported on computer models equipped with a 32-bit operating system) • 4086-MB (4096-MB×1 or 2048×2; not supported on computer models equipped with Windows 7, 32-bit operating system) • 2048-MB (2048×1; not supported on computer models equipped with Windows 7, 32-bit operating system)

Category	Description
Hard drive	<p>Supports 6.35-cm (2.5-in) hard drives in 9.5-mm (.37-in) and 7.0-mm (.28-in) thicknesses (all hard drives use the same bracket)</p> <p>Customer-accessible</p> <p>Serial ATA</p> <p>Supports the following hard drives:</p> <ul style="list-style-type: none"> • 750-GB, 5400-rpm, 9.5-mm (not supported on computer models equipped with Windows 7, 32-bit operating system) • 640-GB, 5400-rpm, 9.5-mm (not supported on computer models equipped with Windows 7, 32-bit operating system) • 500-GB, 5400-rpm, 9.5-mm • 320-GB, 5400-rpm, 9.5-mm
Optical drive	<p>Fixed</p> <p>Serial ATA</p> <p>12.7-mm tray load</p> <p>Supports DVD±RW Double-Layer with SuperMulti Drive</p> <p>Supports zero power optical drive</p>
Audio and video	<p>Two Altec-Lansing speakers</p> <p>HD audio</p> <p>Supports Microsoft premium requirements</p> <p>VGA webcam (fixed, no tilt with activity LED; 640×480 by 24 frames per second)</p> <p>One digital microphone</p>
Ethernet	<p>Integrated 10/100 network interface card (NIC)</p>
Wireless	<p>Integrated wireless local area network (WLAN) options by way of wireless module</p> <p>One or two WLAN antennas built into display assembly, varying by computer model</p>

Category	Description
	<p>Support for the following WLAN formats:</p> <ul style="list-style-type: none"> • Atheros AR9565 802.11b/g/n 1×1 WiFi + BT4.0 Combo Adapter • Atheros HB125 802.11b/g/n 1×1 WLAN module • Atheros 9485GN 802.11b/g/n 1×1 WiFi and 3012 Bluetooth 4.0 Combo Adapter • Broadcom 4313GN 802.11b/g/n 1×1 WiFi and 20702 Bluetooth 4.0 Combo Adapter • Ralink RT5390F 802.11b/g/n 1×1 WLAN module • Ralink RT5390R 802.11bg/n 1×1 WiFi Adapter • Ralink RT3290LE 802.11b/g/n 1×1 WiFi and Bluetooth 4.0 Combo Adapter
External media cards	<p>HP Multi-Format Digital Media reader with push-push technology, supporting:</p> <ul style="list-style-type: none"> • Secure Digital (SD) Memory Card • Secure Digital Extended Capacity (SDxC) Memory Card • Secure Digital High Capacity (SDHC) Memory Card • MultiMediaCard (MMC)
Ports	<ul style="list-style-type: none"> • Audio-in (mono microphone) • Audio-out (stereo headphone) • HDMI v1.4 supporting: up to 1920×1200 @ 60Hz • HP Smart AC adapter • RJ-45 (Ethernet Gigabit support with LED indicators) • USB 2.0 ports on computer: 3 (2 on one side, 1 on other; USB port allocation: 3 for the computer, 1 for camera 1 for MiniCard) • VGA (Dsub 15 pin) supporting: 2048×1536 external resolution @ 75 Hz, hot plug and unplug and autodetection for correct output to wide-aspect vs. standard aspect video
Keyboard/pointing devices	<p>Full-size (15.6-in.), textured, pocket keyboard, no numeric keypad</p> <p>Gesture support: MultiTouch gestures enabled, two-finger scrolling, and pinch-zoom as default</p> <p>Taps enabled by default</p>
Power requirements	<p>65W RC, V, EM, 3-wire HP Smart AC adapter with localized cable plug support (3-wire plug with ground pin, supports 3-pin DC connector)</p> <p>Supports the following batteries:</p> <ul style="list-style-type: none"> • 6-cell, 55-Wh, 2.55-Ah, Li-ion battery • 6-cell, 47-Wh, 2.20-Ah, Li-ion battery

Category	Description
Security	Supports security cable lock
Operating system	Preinstalled: <ul style="list-style-type: none">• Windows® 7 Home Basic 64-bit• Windows 7 Home Premium 64-bit• Windows 7 Starter 32-bit (not supported on computer models equipped with a 640- or 500-GB hard drive or with 2-GB of system memory)• FreeDOS
	Preinstalled: Suselinux (does not support EnergyStar)
Serviceability	End user replaceable parts: <ul style="list-style-type: none">• AC adapter• Battery• Hard drive• Memory module• Optical drive• WLAN module

2 External component identification

Finding your hardware and software information

- ▲ Select **Start > Computer**.

A list displays all the devices installed in your computer, including hard drive, optical drives, solid-state drives (SSD), or a secondary hard drive.

To find out what software is included on your computer, select **Start > All Programs**.

Display



Item	Component	Description
(1)	WLAN antennas (2)*	Send and receive wireless signals to communicate with WLANs.
(2)	Internal microphone	Records sound.

Item	Component	Description
(3)	Webcam	<p>Records video, captures still photographs, and allows video conferences and online chat by means of streaming video.</p> <p>To use the webcam, select Start > All Programs > Communication and Chat > CyberLink YouCam.</p>
(4)	Webcam light	On: The webcam is in use.

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

Button



Component

Power button

Description

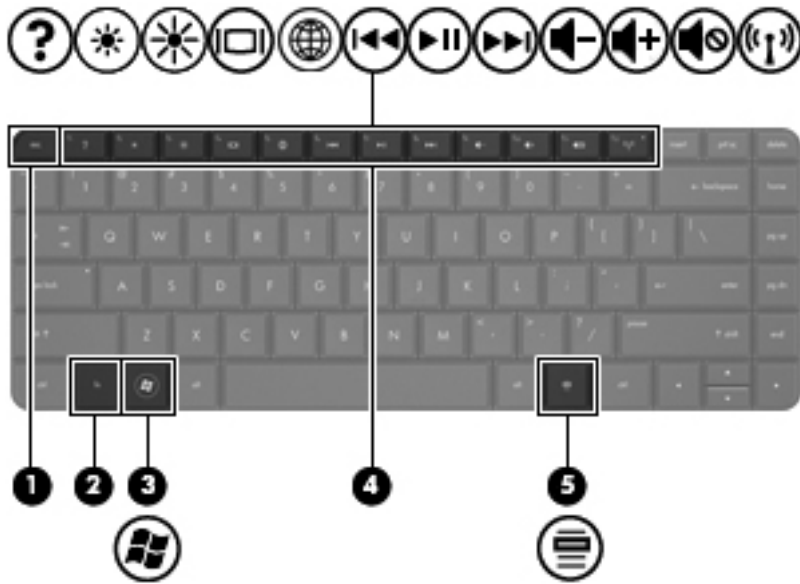
- When the computer is off, press the button to turn on the computer.
- When the computer is on, press the button briefly to initiate Sleep.
- When the computer is in the Sleep state, press the button briefly to exit Sleep.
- When the computer is in Hibernation, press the button briefly to exit Hibernation.

CAUTION: Pressing and holding down the power button will result in the loss of unsaved information.

If the computer has stopped responding and Microsoft Windows shutdown procedures are ineffective, press and hold the power button down for at least 5 seconds to turn off the computer.

To learn more about your power settings, select **Start > Control Panel > System and Security > Power Options**.

Keys



Item	Component	Description
(1)	esc key	Displays system information when pressed in combination with the fn key.
(2)	fn key	Used in conjunction with hotkeys.
(3)	Windows logo key	Displays the Windows Start menu.
(4)	Action keys	Execute frequently used system functions.
(5)	Windows applications key	Displays a shortcut menu for items beneath the pointer.

Lights



Item	Component	Description
(1)	Caps lock light	On: Caps lock is on, which switches the keys to all capital letters.
(2)	Power light	<ul style="list-style-type: none">• White: The computer is on.• Blinking white: The computer is in the Sleep state, which is an energy-saving mode. The computer shuts off power to the display and other unneeded components.• Off: The computer is off or in Hibernation. Hibernation is an energy-saving mode that uses the least amount of power.
(3)	Wireless light	<ul style="list-style-type: none">• White: An integrated wireless device, such as a WLAN device and/or a Bluetooth device, is on.• Amber: All wireless devices are off.

TouchPad



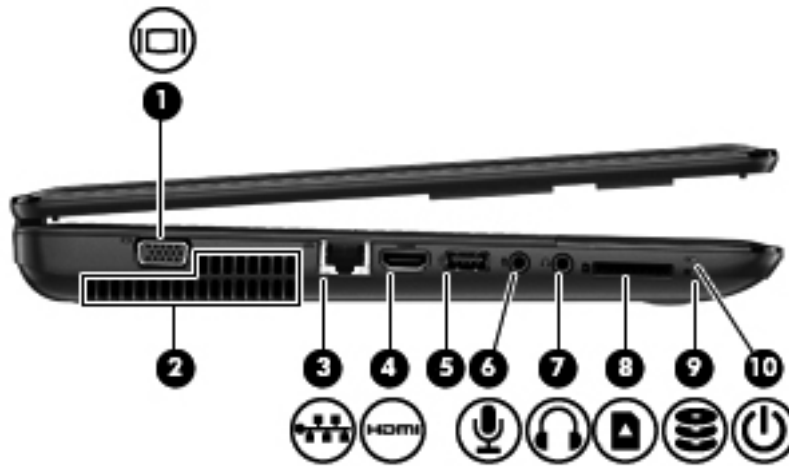
Item	Component	Description
(1)	TouchPad on/off button	Turns the TouchPad on or off.
(2)	TouchPad light	<ul style="list-style-type: none">• On: The TouchPad is off.• Off: The TouchPad is on.
(3)	TouchPad zone	Moves the on-screen pointer and selects or activates items on the screen.
(4)	Left TouchPad button	Functions like the left button on an external mouse.
(5)	Right TouchPad button	Functions like the right button on an external mouse.

Front



Component	Description
Speakers	Produce sound.

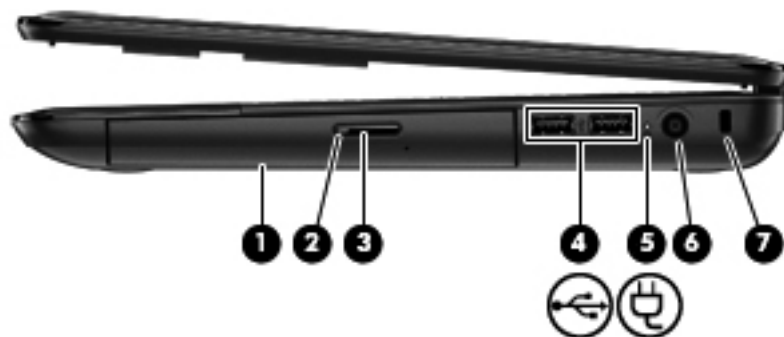
Left side



Item	Component	Description
(1)	External monitor port	Connects an external VGA monitor or projector.
(2)	Vents (2)	Enable airflow to cool internal components. NOTE: The computer fan starts up automatically to cool internal components and prevent overheating. It is normal for the internal fan to cycle on and off during routine operation.
(3)	RJ-45 (network) jack	Connects a network cable.
(4)	HDMI port	Connects an optional video or audio device, such as a high-definition television, any compatible digital or audio device.
(5)	USB port	Connects an optional USB device.
(6)	Audio-in (microphone) jack	Connects an optional computer headset microphone, stereo array microphone, or monaural microphone.
(7)	Audio-out (headphone) jack	Connects optional powered stereo speakers, headphones, earbuds, a headset, or a television audio cable. WARNING! To reduce the risk of personal injury, adjust the volume before putting on headphones, earbuds, or a headset. For additional safety information, refer to the <i>Regulatory, Safety, and Environmental Notices</i> . NOTE: When a device is connected to the jack, the computer speakers are disabled.

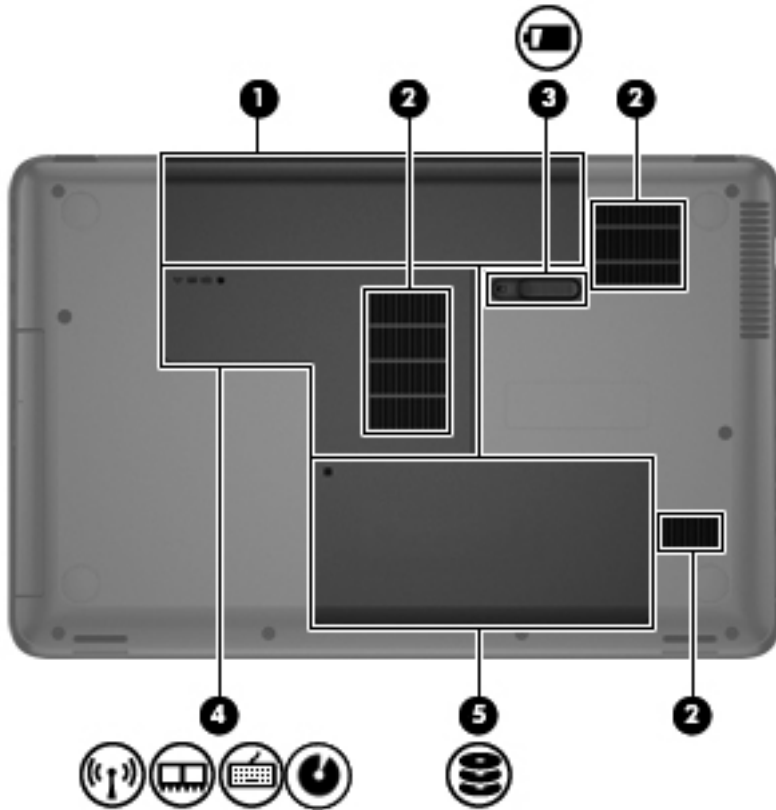
Item	Component	Description
(8)	Digital Media slot	<p>Supports the following digital card formats:</p> <ul style="list-style-type: none"> • Secure Digital (SD) Memory Card • Secure Digital Extended Capacity (SDxC) Memory Card • Secure Digital High Capacity (SDHC) Memory Card • MultiMediaCard (MMC)
(9)	Hard drive light	Blinking white: The hard drive is being accessed.
(10)	Power light	<ul style="list-style-type: none"> • White: The computer is on. • Blinking white: The computer is in the Sleep state, which is an energy-saving mode. The computer shuts off power to the display and other unneeded components.

Right side



Item	Component	Description
(1)	Optical drive	Reads and writes (select models only) to an optical disk.
(2)	Optical drive light	<ul style="list-style-type: none">• Green: The optical drive is being accessed.• Off: The optical drive is idle.
(3)	Optical drive eject button	Releases the disc tray.
(4)	USB port	Connects an optional USB device. CAUTION: While there are multiple USB ports on the same side, only one USB port will be able to support a high power device at a time.
(5)	AC adapter light	<ul style="list-style-type: none">• White: The AC adapter is connected and the battery is charged.• Amber: The AC adapter is connected and the battery is charging.• Off: The computer is using DC power.
(6)	Power connector	Connects an AC adapter.
(7)	Security cable slot	Attaches an optional security cable to the computer. NOTE: The security cable is designed to act as a deterrent, but it may not prevent the computer from being mishandled or stolen.

Bottom

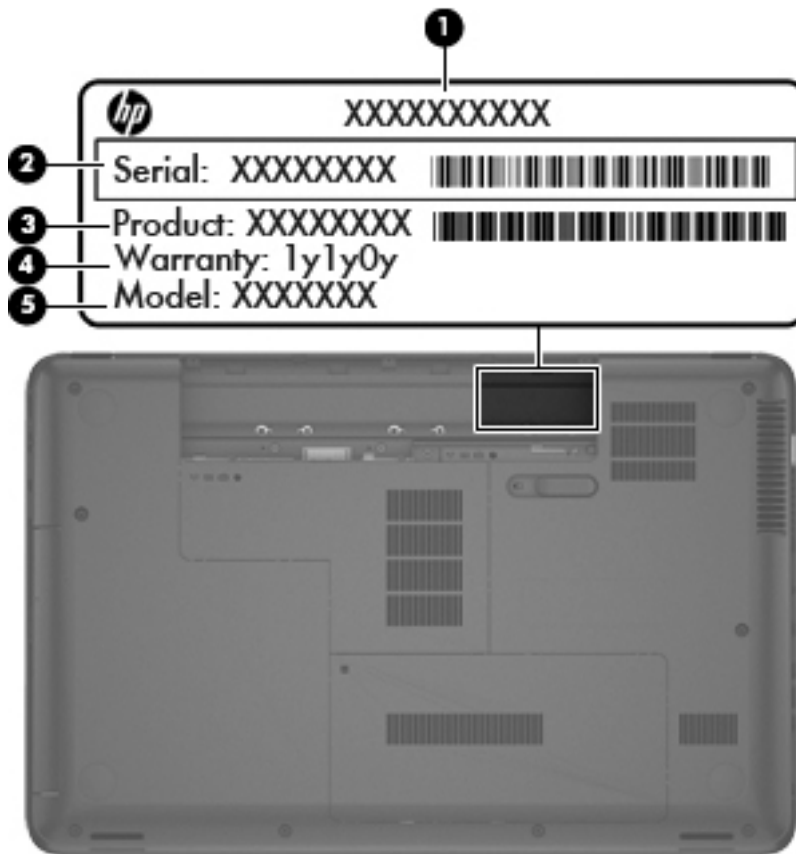


Item	Component	Description
(1)	Battery bay	Holds the battery.
(2)	Vents (3)	Enable airflow to cool internal components. NOTE: The computer fan starts up automatically to cool internal components and prevent overheating. It is normal for the internal fan to cycle on and off during routine operation.
(3)	Battery release latch	Releases the battery from the battery bay.
(4)	Memory module/wireless module compartment cover	The memory module/wireless module compartment cover provides access to the memory module compartment, wireless module compartment, keyboard retention screw, and optical drive bay. CAUTION: To prevent an unresponsive system, replace the wireless module only with a wireless module authorized for use in the computer by the governmental agency that regulates wireless devices in your country or region. If you replace the module and then receive a warning message, remove the module to restore computer functionality, and then contact customer support through Help and Support.
(5)	Hard drive compartment cover	The hard drive compartment cover provides access to the hard drive bay and the RTC battery.

3 Illustrated parts catalog

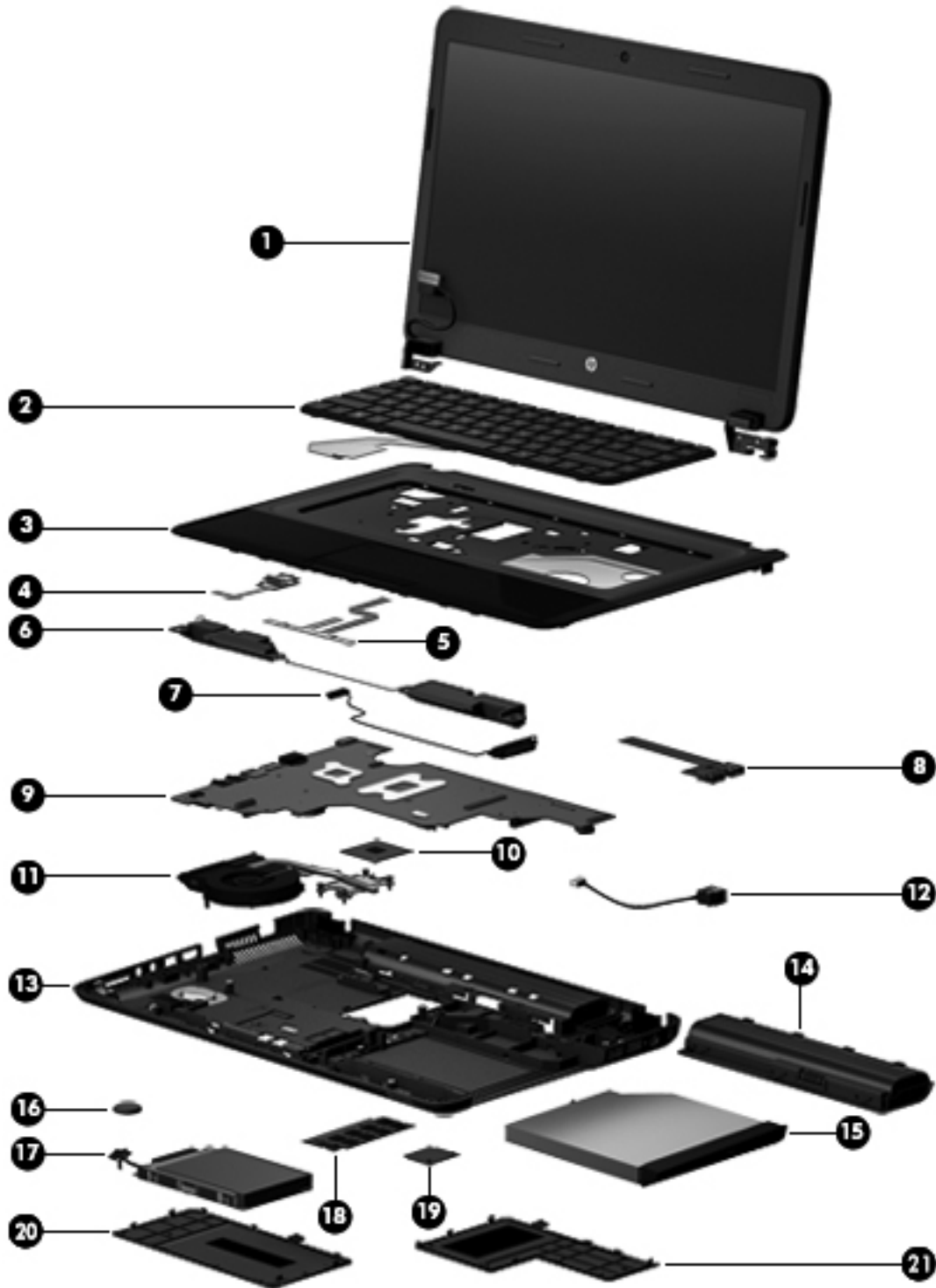
Service tag

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



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

Computer major components



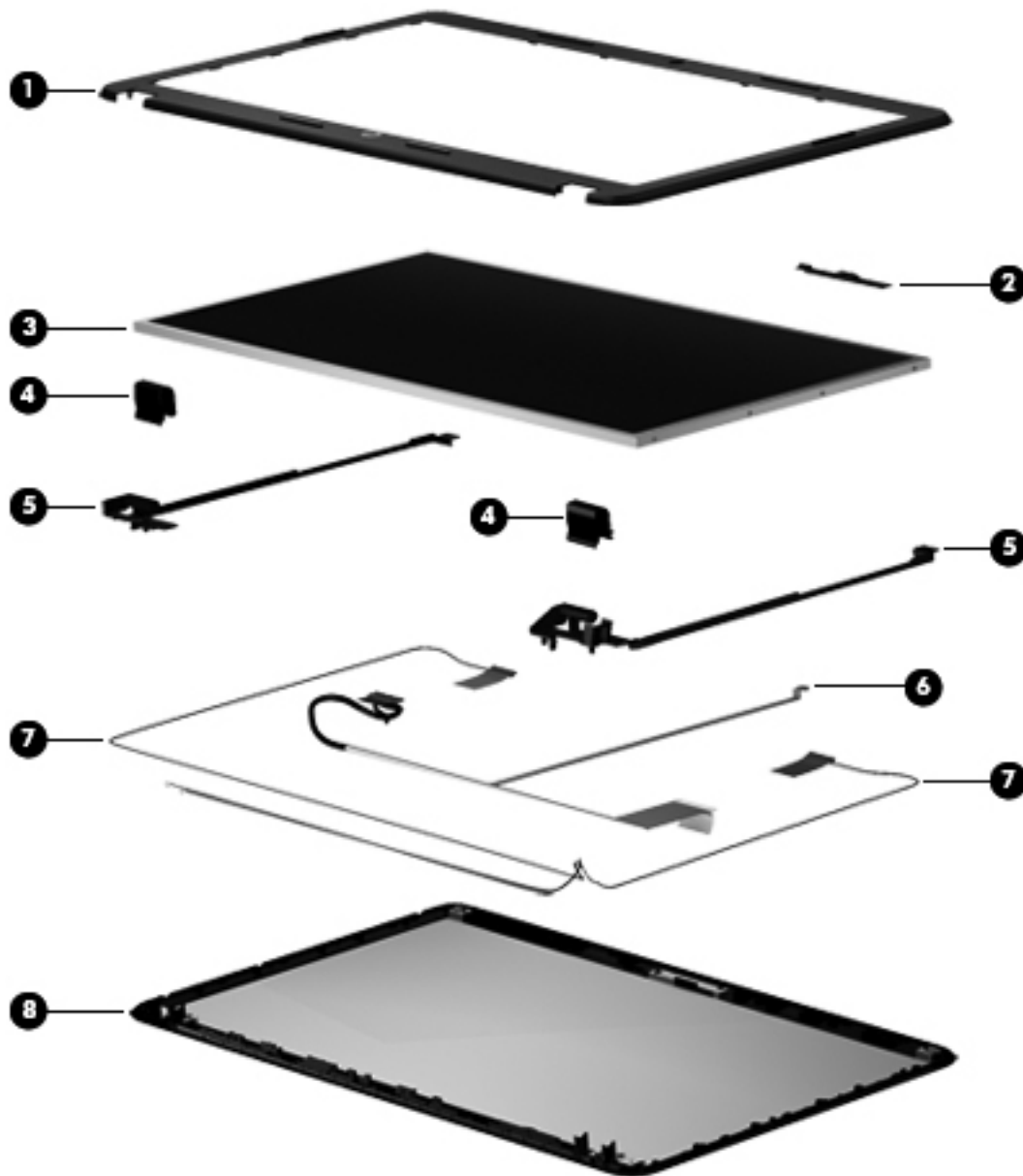
Item	Component	Spare part number
(1)	Display assembly: The display assembly is spared at the subcomponent level only. For more display assembly spare part information, see Display assembly subcomponents on page 22 .	

Item	Component	Spare part number
(2)	Keyboard (includes keyboard cable):	
	For use in Belgium	646125-A41
	For use in Bulgaria	646125-261
	For use in Canada	646125-DB1
	For use in the Czech Republic	646125-221
	For use in Denmark, Finland, and Norway	646125-DH1
	For use in France	646125-051
	For use in Germany	646125-041
	For use in Greece	646125-DJ1
	For use in Hungary	646125-211
	For use in Israel	646125-BB1
	For use in Italy	646125-061
	For use in Latin America	646125-161
	For use in the Netherlands	646125-B31
	For use in Portugal	646125-131
	For use in Russia	646125-251
	For use in Saudi Arabia	646125-171
	For use in Slovenia	646125-BA1
	For use in Spain	646125-071
	For use in Switzerland	646125-BG1
	For use in Turkey	646125-141
	For use in the United Kingdom	646125-031
	For use in the United States	646125-001
(3)	Top cover (includes the TouchPad board)	687703-001
(4)	Power button board (includes cable)	686270-001
(5)	TouchPad button board (includes bracket, TouchPad button board cable, and TouchPad cable)	686271-001
(6)	Speakers (include speaker cables)	686279-001
(7)	Optical drive connector cable (includes bracket)	686257-001
(8)	USB board (includes cable)	686269-001
(9)	System board (includes replacement thermal material):	
	Equipped with Intel HM75 Express chipset and for use with computer models equipped with an Intel Core i5 or i3 processor	687701-001

Item	Component	Spare part number
	Equipped with Intel HM70 Express chipset and for use with computer models equipped with an Intel Pentium or Celeron processor	687702-001
(10)	Processor (includes replacement thermal material):	
	Intel Core i5-3210M 2.50-GHz processor (3.0-MB L3 cache, 35 W)	680645-001
	Intel Core i3-3110M 2.30-GHz processor (3.0-MB L3 cache, 35 W)	682417-001
	Intel Core i3-2370M 2.40-GHz processor (3.0-MB L3 cache, 35 W)	677152-001
	Intel Core i3-2350M 2.20-GHz processor (3.0-MB L3 cache, 35 W)	653340-001
	Intel Core i3-2308M (2.10-GHz processor 3.0-MB L3 cache, 35 W)	693542-001
	Intel Pentium B970 TJ85 2.30-GHz processor (2.0-MB L3 cache, dual core, 35 W)	676785-001
	Intel Pentium B960 TJ85 2.20-GHz processor (2.0-MB L3 cache, dual core, 35 W)	664662-001
	Intel Celeron DC B820 1.70-GHz processor (2.0-MB L3 cache, dual core, 35 W)	690537-001
	Intel Celeron DC B815 1.60-GHz processor (2.0-MB L3 cache, dual core, 35 W)	677153-001
	Intel Celeron DC B730 1.80-GHz processor (2.0-MB L3 cache, dual core, 35 W)	690536-001
(11)	Fan/heat sink assembly (includes replacement thermal material)	686259-001
(12)	Power connector cable (includes bracket)	686258-001
(13)	Base enclosure (includes battery cover lock latch, battery cover release latch, power connector barrel, and RJ45 cover)	686253-001
	Rubber Feet Kit (not illustrated, includes front and rear rubber feet)	686276-001
(14)	Battery:	
	6-cell, 55-Wh, 2.55-Ah, Li-ion battery	593554-001
	6-cell, 47-Wh, 2.20-Ah, Li-ion battery	593553-001
(15)	DVD±RW Double-Layer with SuperMulti Drive (includes optical drive bezel and optical drive bracket)	686268-001
(16)	RTC battery	686274-001
(17)	Hard drive (does not include hard drive bracket, hard drive connector cable, or screws):	
	750-GB, 5400-rpm, 9.5-mm	634250-001
	640-GB, 5400-rpm, 9.5-mm	669300-001
	500-GB, 5400-rpm, 9.5-mm	669299-001
	320-GB, 5400-rpm, 9.5-mm	622643-001
	Hard Drive Hardware Kit (not illustrated, includes hard drive bracket, hard drive connector cable, and screws)	686261-001
(18)	Memory module (PC3, 12800, 1600-MHz):	
	4-GB memory module	652972-001
	2-GB memory module	641369-001

Item	Component	Spare part number
(19)	WLAN module:	
	Atheros AR9565 802.11b/g/n 1×1 WiFi + BT4.0 Combo Adapter	690019-001
	Atheros HB125 802.11b/g/n 1×1 WLAN module	675794-001
	Atheros 9485GN 802.11b/g/n 1×1 WiFi and 3012 Bluetooth 4.0 Combo Adapter	655795-001
	Broadcom 4313GN 802.11b/g/n 1×1 WiFi and 20702 Bluetooth 4.0 Combo Adapter	657325-001
	Ralink RT5390F 802.11b/g/n 1×1 WLAN module	670691-001
	Ralink RT5390R 802.11bg/n 1×1 WiFi Adapter	691415-001
	Ralink RT3290LE 802.11b/g/n 1×1 WiFi and Bluetooth 4.0 Combo Adapter	690020-001
	Cover Kit , includes:	686272-001
(20)	Hard drive compartment cover (includes one captive screw, secured by a C-clip)	
(21)	Memory module/wireless module compartment cover (includes one captive screw, secured by a C-clip)	

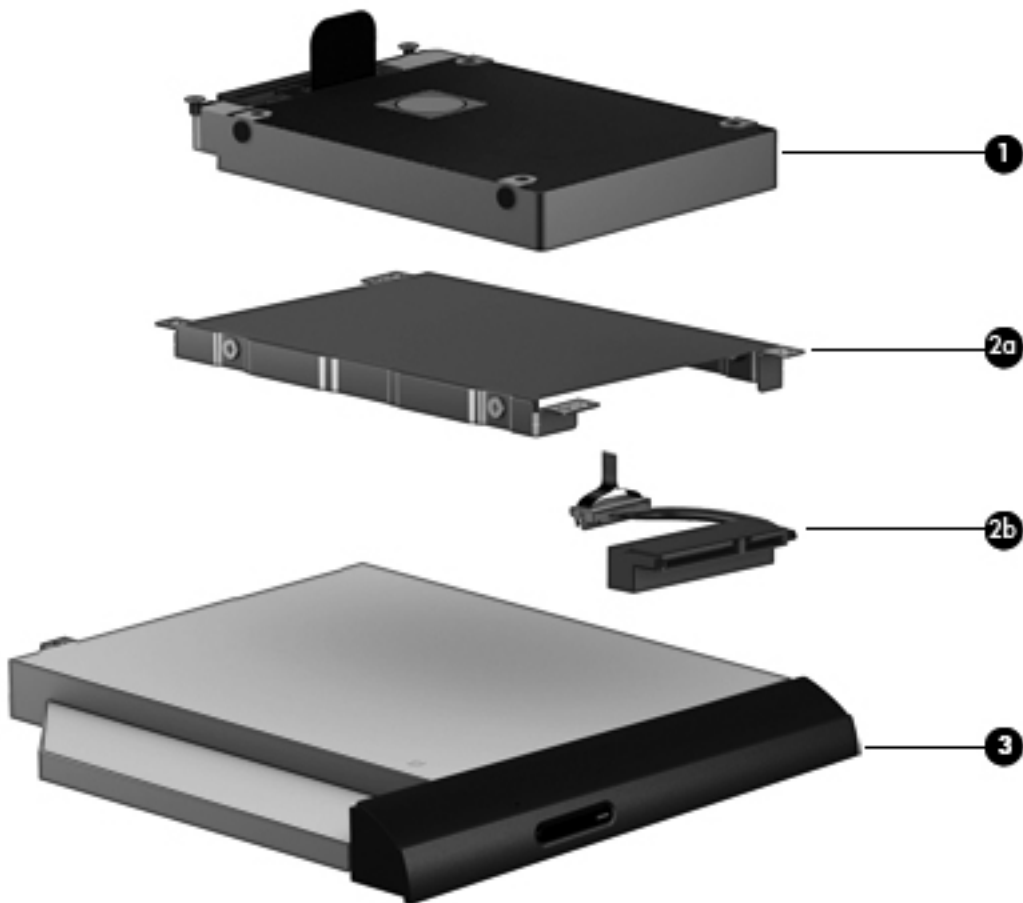
Display assembly subcomponents



Item	Component	Spare part number
(1)	Display bezel	686254-001
(2)	Webcam/microphone module (includes double-sided adhesive)	686285-001
(3)	15.6-in, LED, SVA, HD, BrightView display panel	687700-001
(4)	Display Hinge Cover Kit (includes left and right display hinge covers)	686260-001
(5)	Display hinges (includes vertical support brackets)	686262-001
(6)	Display panel cable (includes webcam/microphone module cable)	686256-001

Item	Component	Spare part number
(7)	Antenna Kit (includes wireless antenna left and right (main and auxiliary) cables and transceivers)	686249-001
(8)	Display enclosure	687698-001
	Display Rubber Kit (not illustrated, includes display assembly rubber bumpers and screw covers)	686275-001

Mass storage devices



Item	Component	Spare part number
(1)	Hard drive (does not include hard drive bracket, hard drive connector cable, or screws):	
	750-GB, 5400-rpm, 9.5-mm	634250-001
	640-GB, 5400-rpm, 9.5-mm	669300-001
	500-GB, 5400-rpm, 9.5-mm	669299-001
	320-GB, 5400-rpm, 9.5-mm	622643-001
	Hard Drive Hardware Kit , includes:	686261-001

Item	Component	Spare part number
(2a)	Hard drive bracket	
(2b)	Hard drive connector cable	
	Hard drive bracket screws (not illustrated)	
(3)	DVD±RW Double-Layer with SuperMulti Drive (includes optical drive bezel and optical drive bracket)	686268-001

Miscellaneous parts

Component	Spare part number
65-W HP Smart AC adapter (RC, V, EM, 3-wire)	609939-001
Power cord (3-pin, black, 1.83-m):	
For use in Denmark	490371-081
For use in Europe	490371-021
For use in Israel	490371-BB1
For use in Italy	490371-061
For use in North America	490371-001
For use in South Africa	490371-AR1
For use in Switzerland	490371-111
For use in the United Kingdom and Singapore	490371-031
Screw Kit	686278-001

Sequential part number listing

Spare part number	Description
490371-001	Power cord for use in North America (3-pin, black, 1.83-m)
490371-021	Power cord for use in Europe (3-pin, black, 1.83-m)
490371-031	Power cord for use in the United Kingdom and Singapore (3-pin, black, 1.83-m)
490371-061	Power cord for use in Italy (3-pin, black, 1.83-m)
490371-081	Power cord for use in Denmark (3-pin, black, 1.83-m)
490371-111	Power cord for use in Switzerland (3-pin, black, 1.83-m)
490371-AR1	Power cord for use in South Africa (3-pin, black, 1.83-m)
490371-BB1	Power cord for use in Israel (3-pin, black, 1.83-m)
593553-001	6-cell, 47-Wh, 2.20-Ah, Li-ion battery
593554-001	6-cell, 55-Wh, 2.55-Ah, Li-ion battery
609939-001	65-W HP Smart adapter (RC, V, non-PFC, 3-wire)
622643-001	320-GB, 5400-rpm, 9.5-mm hard drive (does not include hard drive bracket, hard drive connector cable, or screws)
	NOTE: The hard drive bracket, hard drive connector cable, and screws are included in the Hard Drive Hardware Kit, spare part number 686261-001.
634250-001	750-GB, 5400-rpm, 9.5-mm hard drive (does not include hard drive bracket, hard drive connector cable, or screws)
	NOTE: The hard drive bracket, hard drive connector cable, and screws are included in the Hard Drive Hardware Kit, spare part number 686261-001.
641369-001	4-GB memory module (PC3, 12800, 1600-MHz)
646125-001	Keyboard for use in the United States (includes keyboard cable)
646125-031	Keyboard for use in the United Kingdom and Singapore (includes keyboard cable)
646125-041	Keyboard for use in Germany (includes keyboard cable)
646125-051	Keyboard for use in France (includes keyboard cable)
646125-061	Keyboard for use in Italy (includes keyboard cable)
646125-071	Keyboard for use in Spain (includes keyboard cable)
646125-131	Keyboard for use in Portugal (includes keyboard cable)
646125-141	Keyboard for use in Turkey (includes keyboard cable)
646125-161	Keyboard for use in Latin America (includes keyboard cable)
646125-171	Keyboard for use in Saudi Arabia (includes keyboard cable)
646125-211	Keyboard for use in Hungary (includes keyboard cable)
646125-221	Keyboard for use in the Czech Republic (includes keyboard cable)

Spare part number	Description
646125-251	Keyboard for use in Russia (includes keyboard cable)
646125-261	Keyboard for use in Bulgaria (includes keyboard cable)
646125-A41	Keyboard for use in Belgium (includes keyboard cable)
646125-B31	Keyboard for use in the Netherlands (includes keyboard cable)
646125-BA1	Keyboard for use in Slovenia (includes keyboard cable)
646125-BB1	Keyboard for use in Israel (includes keyboard cable)
646125-BG1	Keyboard for use in Switzerland (includes keyboard cable)
646125-DB1	Keyboard for use in Canada (includes keyboard cable)
646125-DH1	Keyboard for use in Denmark, Finland, and Norway (includes keyboard cable)
646125-DJ1	Keyboard for use in Greece (includes keyboard cable)
652972-001	2-GB memory module (PC3, 12800, 1600-MHz)
653340-001	Intel Core i3-2350M 2.30-GHz processor (3.0-MB L3 cache, dual core, 35 W; includes replacement thermal material)
655795-001	Atheros 9485GN 802.11b/g/n 1×1 WiFi and 3012 Bluetooth 4.0 Combo Adapter
657325-001	Broadcom 4313GN 802.11b/g/n 1×1 WiFi and 20702 Bluetooth 4.0 Combo Adapter
664662-001	Intel Pentium B960 TJ85 2.20-GHz processor (2.0-MB L3 cache, dual core, 35 W; includes replacement thermal material)
669299-001	500-GB, 5400-rpm, 9.5-mm hard drive (does not include hard drive bracket, hard drive connector cable, or screws) NOTE: The hard drive bracket, hard drive connector cable, and screws are included in the Hard Drive Hardware Kit, spare part number 686261-001.
669300-001	640-GB, 5400-rpm, 9.5-mm hard drive (does not include hard drive bracket, hard drive connector cable, or screws) NOTE: The hard drive bracket, hard drive connector cable, and screws are included in the Hard Drive Hardware Kit, spare part number 686261-001.
670691-001	Ralink RT5390F 802.11b/g/n 1×1 WLAN module
675794-001	Atheros HB125 802.11b/g/n 1×1 WLAN module
676785-001	Intel Pentium B970 TJ85 2.30-GHz processor (2.0-MB L3 cache, dual core, 35 W; includes replacement thermal material)
677152-001	Intel Core i3-2370M 2.40-GHz processor (3.0-MB L3 cache, 35 W; includes replacement thermal material)
677153-001	Intel Celeron DC B815 1.60-GHz processor (2.0-MB L3 cache, dual core, 35 W; includes replacement thermal material)
680645-001	Intel Core i5-3210M 2.50-GHz processor (3.0-MB L3 cache, 35 W; includes replacement thermal material)
682417-001	Intel Core i3-3110M 2.30-GHz processor (3.0-MB L3 cache, 35 W; includes replacement thermal material)

Spare part number	Description
686249-001	Antenna Kit (includes wireless antenna left and right (main and auxiliary) cables and transceivers)
686253-001	Base enclosure
686254-001	Display bezel
686256-001	Display panel cable (includes webcam/microphone module cable)
686257-001	Optical drive connector cable (includes bracket)
686258-001	Power connector cable
686259-001	Fan/heat sink assembly (includes replacement thermal material)
686260-001	Display Hinge Cover Kit (includes left and right display hinge covers)
686261-001	Hard Drive Hardware Kit (includes hard drive bracket, hard drive connector cable, and screws)
686262-001	Display hinges (includes vertical support brackets)
686268-001	DVD±RW Double-Layer with SuperMulti Drive (includes optical drive bezel and optical drive bracket)
686269-001	USB board (includes cable)
686270-001	Power button board (includes cable)
686271-001	TouchPad button board (includes bracket, TouchPad button board cable, and TouchPad cable)
686272-001	Cover Kit (includes hard drive compartment cover and memory module/wireless module compartment cover)
686274-001	RTC battery
686275-001	Display Rubber Kit (includes display assembly rubber bumpers)
686276-001	Rubber Feet Kit (includes front and rear rubber feet)
686278-001	Screw Kit
686279-001	Speakers (include speaker cables)
686285-001	Webcam/microphone module (includes double-sided adhesive)
687698-001	Display enclosure
687700-001	15.6-in, LED, SVA, HD, BrightView display panel
687701-001	System board for use on computer models equipped with the HM75 Express chipset and an Intel Core i5 or i3 processor (includes replacement thermal material)
687702-001	System board for use on computer models equipped with the HM70 Express chipset and an Intel Pentium or Celeron processor (includes replacement thermal material)
687703-001	Top cover (includes the TouchPad board)
690019-001	Atheros AR9565 802.11b/g/n 1×1 WiFi + Bluetooth 4.0 Combo Adapter
690020-001	Ralink RT3290LE 802.11b/g/n 1×1 WiFi and Bluetooth 4.0 Combo Adapter
690536-001	Intel Celeron DC B730 1.80-GHz processor (2.0-MB L3 cache, dual core, 35 W; includes replacement thermal material)

Spare part number	Description
690537-001	Intel Celeron DC B820 1.70-GHz processor (2.0-MB L3 cache, dual core, 35 W; includes replacement thermal material)
691415-001	Ralink RT5390R 802.11bg/n 1×1 WiFi Adapter
693542-001	Intel Core i3-2308M 2.10-GHz processor (3.0-MB L3 cache, 35 W; includes replacement thermal material)

4 Removal and replacement procedures

Preliminary replacement requirements


Tools required

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


- Flat-bladed screwdriver
- Magnetic screwdriver
- Phillips P0 and P1 screwdrivers

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 an internal 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, 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.

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 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 plastics	Bags	1,500 V
Carbon-loaded plastic	Floor mats	7,500 V
Metallized laminate	Floor mats	5,000 V

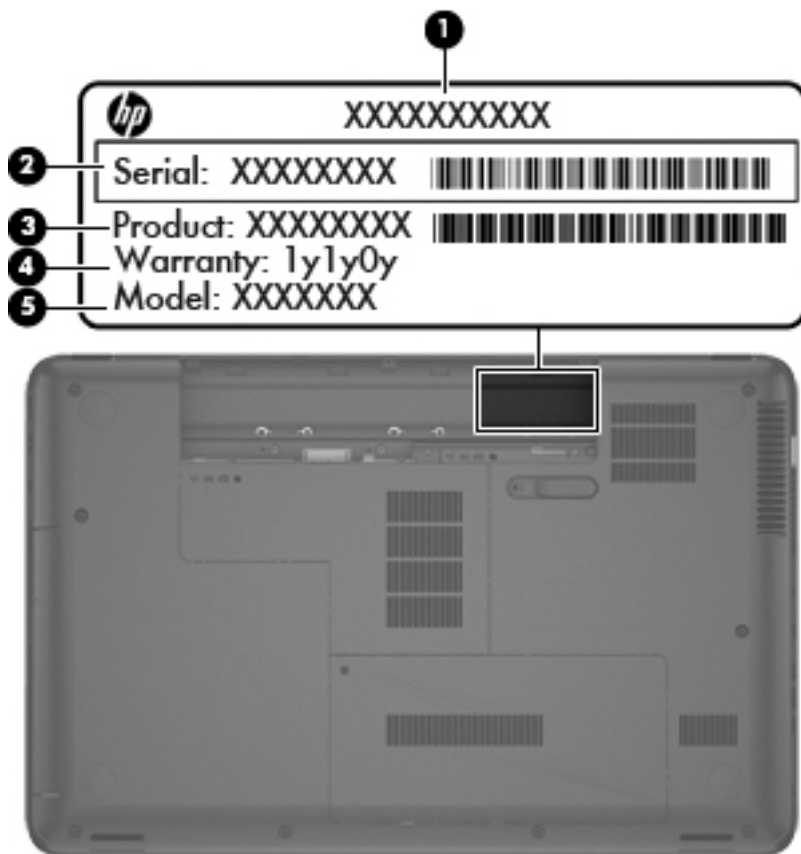
Component replacement procedures

This chapter provides removal and replacement procedures.

There are as many as 72 screws that must be removed, replaced, and/or loosened when servicing the computer. Make special note of each screw size and location during removal and replacement.

Service tag

When ordering parts or requesting information, provide the computer serial number and model number provided on the service tag. It is necessary to remove the battery to obtain these numbers. See [Battery on page 36](#) for battery removal instructions.

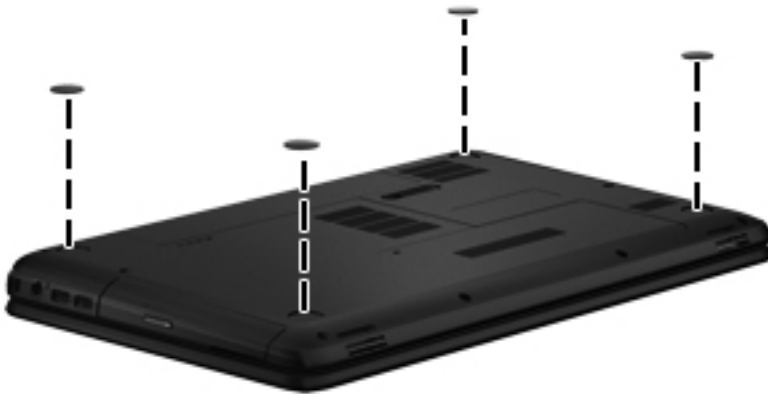


Item	Component	Description
(1)	Product name	This is the product name affixed to the front of the computer.
(2)	Serial number (s/n)	This is an alphanumeric identifier that is unique to each product.
(3)	Part number/Product number (p/n)	This number provides specific information about the product's hardware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

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


Computer feet

The computer feet are adhesive-backed rubber pads. There are 4 rubber feet that attach to the base enclosure, as indicated in the illustration below. These rubber feet are available in the Rubber Feet Kit, spare part number 686276-001.



Battery

Description	Spare part number
6-cell, 55-Wh, 2.55-Ah, Li-ion battery	593554-001
6-cell, 47-Wh, 2.20-Ah, Li-ion battery	593553-001

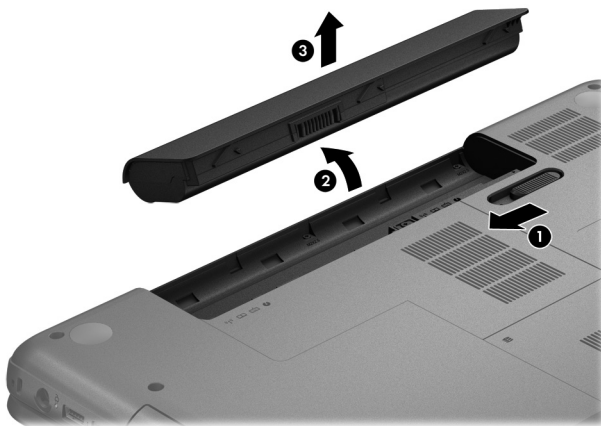
 **IMPORTANT:** The customer should not attempt to replace the computer battery, which is installed and sealed at the factory. A broken battery seal voids the computer and battery warranties. The computer has an internal rechargeable battery that can be replaced only by an authorized service provider.

Before disassembling the computer, follow these steps:

1. Turn off 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 the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.

Remove the battery:

1. Turn the computer upside down on a flat surface.
2. Slide the battery release latch **(1)** to release the battery.
3. Pivot the front edge of the battery **(2)** up and back.
4. Remove the battery **(3)** from the computer.



To insert the battery:

1. Align the tabs on the rear edge of the battery with the notches on the rear edge of the battery bay.
2. Pivot the front edge of the battery down into the battery bay until it is seated. (The battery release latch will automatically lock into place.)

Memory module

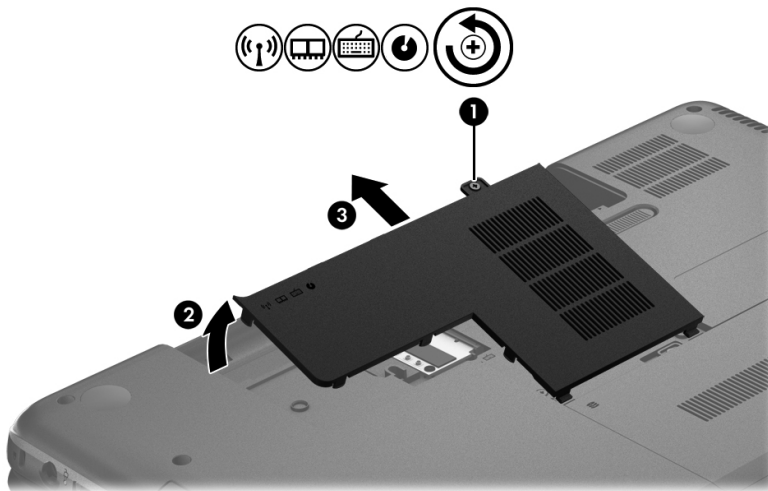
Description	Spare part number
4-GB memory module (PC3, 12800, 1600-MHz)	652972-001
2-GB memory module (PC3, 12800, 1600-MHz)	641369-001

Before removing the memory module, follow these steps:

1. Turn off 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 the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the battery (see [Battery on page 36](#)).

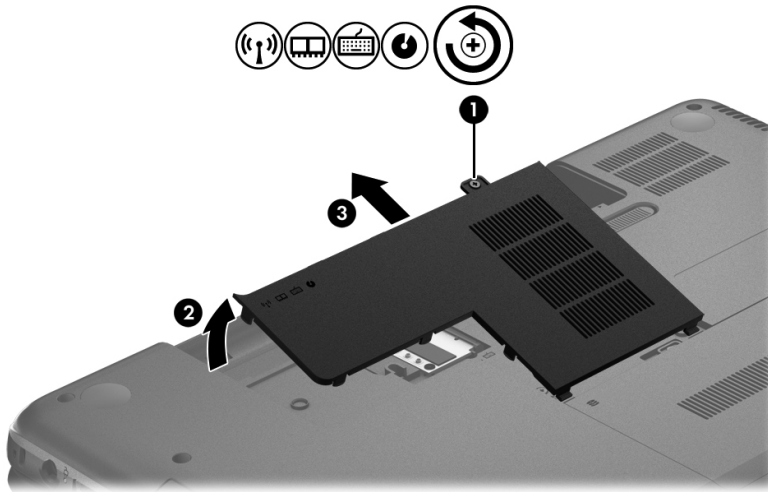
Remove the memory module:

1. Loosen the captive screw **(1)** that secures the memory module/wireless module compartment cover to the computer.
2. Lift the rear edge of the memory module/wireless module compartment cover **(2)** up and forward until it rests at an angle.
3. Remove the memory module/wireless module compartment cover **(3)** by sliding it away from the computer at an angle. The memory module/wireless module compartment cover is available in the Cover Kit, spare part number 686272-001.



4. Spread the retaining tabs **(1)** on each side of the memory module slot to release the memory module. (The memory module tilts up.)

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



Reverse this procedure to install a memory module.

WLAN module

Description	Spare part number
Atheros AR9565 802.11b/g/n 1×1 WiFi + BT4.0 Combo Adapter	690019-001
Atheros HB125 802.11b/g/n 1×1 WLAN module	675794-001
Atheros 9485GN 802.11b/g/n 1×1 WiFi and 3012 Bluetooth 4.0 Combo Adapter	655795-001
Broadcom 4313GN 802.11b/g/n 1×1 WiFi and 20702 Bluetooth 4.0 Combo Adapter	657325-001
Ralink RT5390F 802.11b/g/n 1×1 WLAN module	670691-001
Ralink RT5390R 802.11bg/n 1×1 WiFi Adapter	691415-001
Ralink RT3290LE 802.11b/g/n 1×1 WiFi and Bluetooth 4.0 Combo Adapter	690020-001

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

Before removing the WLAN module, follow these steps:

1. Turn off 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 the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.

4. Remove the battery (see [Battery on page 36](#)).
5. Remove the memory module/wireless module compartment cover (see [Memory module on page 37](#)).


Remove the WLAN module:

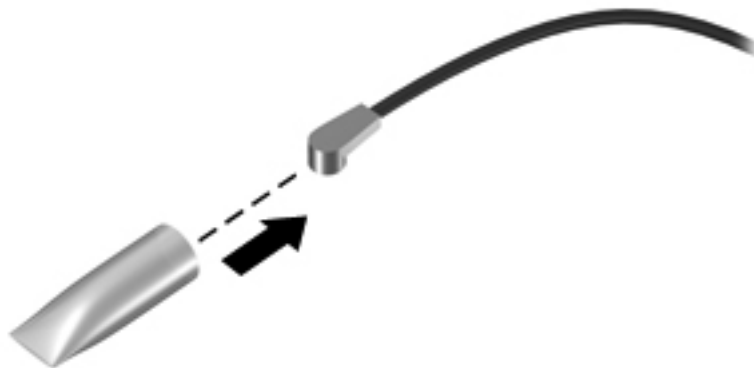
1. Disconnect the WLAN antenna cables **(1)** from the terminals on the WLAN module.

 **NOTE:** The #1 WLAN antenna cable is connected to the WLAN module #1 terminal. The #2 WLAN antenna cable is connected to the WLAN module #2 terminal.

2. Remove the Phillips PM2.0×3.0 screw **(2)** that secures the WLAN module to the system board. (The WLAN module tilts up.)
3. Remove the WLAN module by pulling the module away from the slot at an angle **(3)**.



 **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.

Keyboard



NOTE: The keyboard spare part kit includes the keyboard cable.

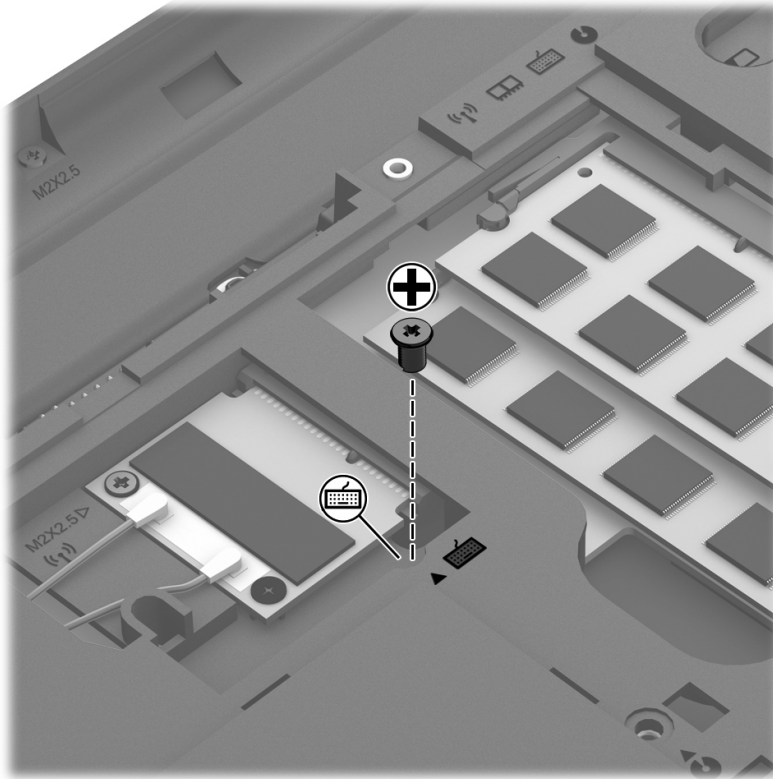
For use in country/region	Spare part number	For use in country/region	Spare part number
For use in Belgium	646125-A41	For use in Latin America	646125-161
For use in Bulgaria	646125-261	For use in the Netherlands	646125-B31
For use in Canada	646125-DB1	For use in Portugal	646125-131
For use in the Czech Republic	646125-221	For use in Russia	646125-251
For use in Denmark, Finland, and Norway	646125-DH1	For use in Saudi Arabia	646125-171
For use in France	646125-051	For use in Slovenia	646125-BA1
For use in Germany	646125-041	For use in Spain	646125-071
For use in Greece	646125-DJ1	For use in Switzerland	646125-BG1
For use in Hungary	646125-211	For use in Turkey	646125-141
For use in Israel	646125-BB1	For use in the United Kingdom	646125-031
For use in Italy	646125-061	For use in the United States	646125-001

Before removing the keyboard, follow these steps:

1. Turn off 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 the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the battery (see [Battery on page 36](#)).
5. Remove the memory module/wireless module compartment cover (see [Memory module on page 37](#)).

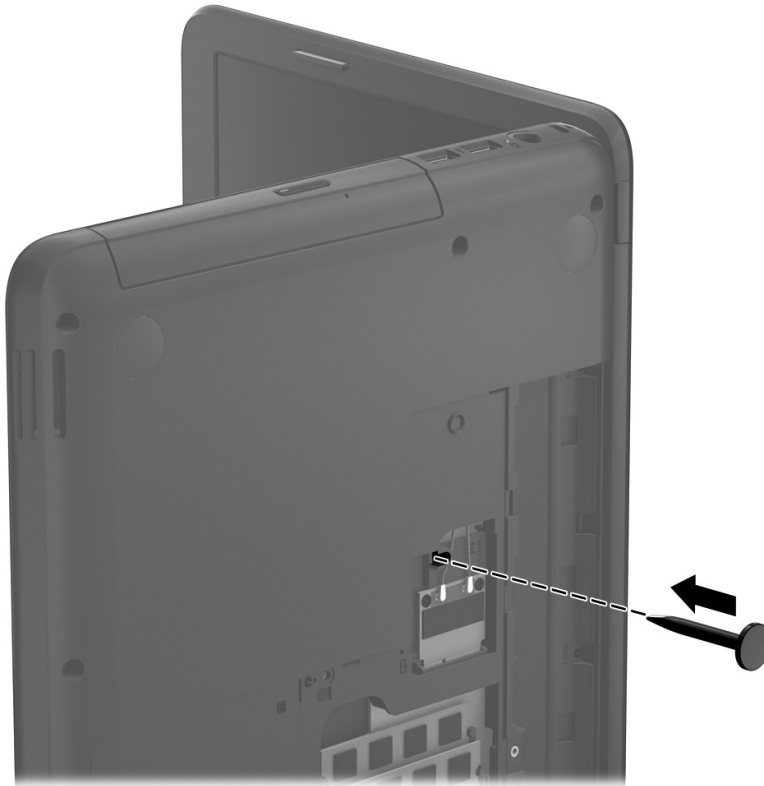
Remove the keyboard:

1. Remove the Phillips PM2.5×4.0 screw that secures the keyboard to the computer.



2. Rest and secure the computer on its left side.
3. Partially open the computer.

4. Insert a screw driver or similar thin tool into the keyboard release hole, and then press on the back of the keyboard until the keyboard disengages from the computer.



5. Turn the computer right-side up with the front toward you.
6. Lift the rear edge of the keyboard **(1)**, and then swing the keyboard up and forward **(2)** until it rests upside down on the palm rest.



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



Reverse this procedure to install the keyboard.

Optical drive

Description	Spare part number
DVD±RW Double-Layer with SuperMulti Drive (includes optical drive bezel and optical drive bracket)	686268-001

Before removing the optical drive, follow these steps:

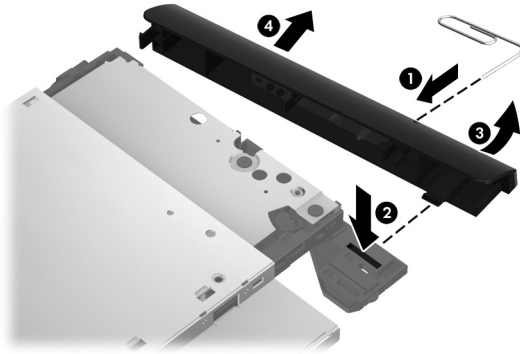
1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the battery (see [Battery on page 36](#)).
5. Remove the memory module/wireless module compartment cover (see [Memory module on page 37](#)).

Remove the optical drive:

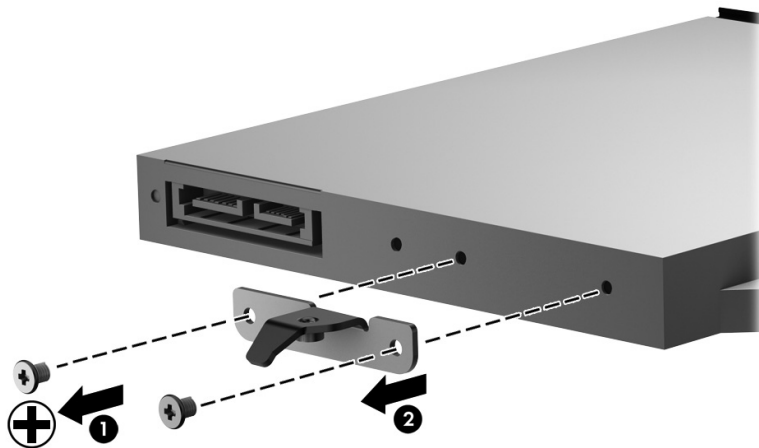
1. Remove the Phillips PM2.5×4.0 screw **(1)** that secures the optical drive to the computer.
2. Use a flat-blade screw driver or similar tool to press on the optical drive bracket tab **(2)** to release the optical drive.
3. Remove the optical drive **(3)** from the computer.



4. If it is necessary to replace the optical drive bezel, use a thin tool or an unbent paper clip **(1)** to release the optical drive tray.
5. Use a flat-blade screw driver or similar tool to press on the optical drive bezel tab **(2)** to release the optical drive bezel.
6. Release the left side of the optical drive bezel **(3)**.
7. Remove the optical drive bezel **(4)**.



8. If it is necessary to replace the optical drive bracket, position the optical drive with the rear panel toward you.
9. Remove the two Phillips PM2.0×3.0 screws **(1)** that secure the optical drive bracket to the optical drive.
10. Remove the optical drive bracket **(2)**.



Reverse this procedure to install the optical drive.

Hard drive



NOTE: The hard drive spare part kit does not include the hard drive bracket, hard drive connector cable, or screws.

Description	Spare part number
750-GB, 5400-rpm, 9.5-mm	634250-001
640-GB, 5400-rpm, 9.5-mm	669300-001
500-GB, 5400-rpm, 9.5-mm	669299-001
320-GB, 5400-rpm, 9.5-mm	622643-001
Hard Drive Hardware Kit (includes hard drive bracket, hard drive connector cable, and screws)	686261-001

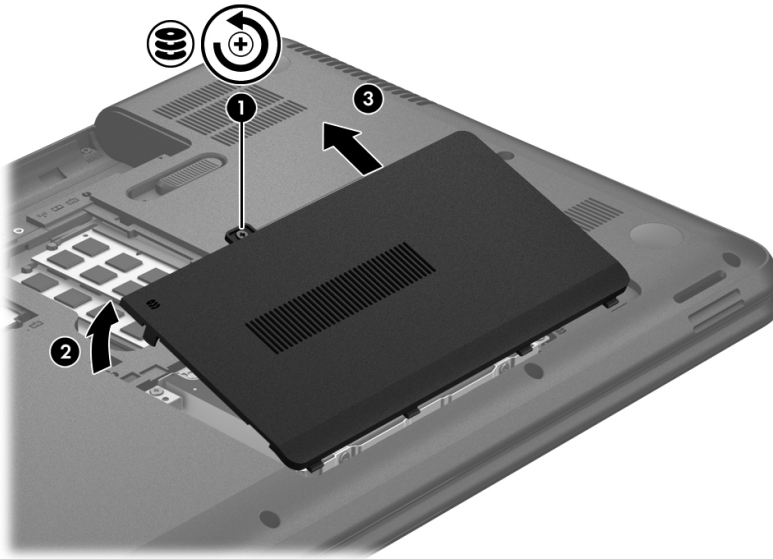
Before removing the hard drive, follow these steps:

1. Turn off 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 the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the battery (see [Battery on page 36](#)).
5. Remove the memory module/wireless module compartment cover (see [Memory module on page 37](#)).

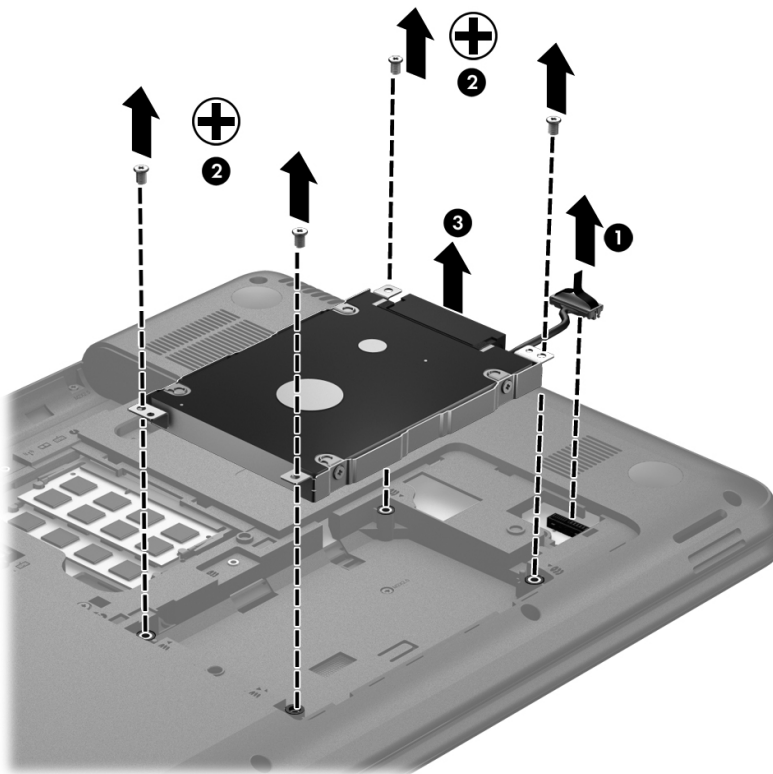
Remove the hard drive:

1. Loosen the captive screw **(1)** that secures the hard drive compartment cover to the computer.
2. Lift the rear edge of the hard drive compartment cover **(2)** up and forward until it rests at an angle.

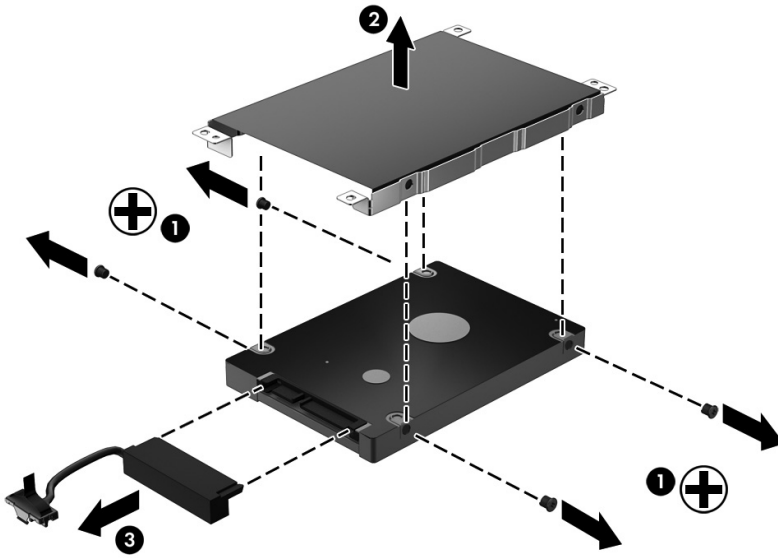
3. Remove the hard drive compartment cover **(3)** by sliding it away from the computer at an angle. The hard drive compartment cover is available in the Cover Kit, spare part number 686272-001.



4. Disconnect the hard drive connector cable **(1)** from the system board, and then release the cable from the clip **(2)** built into the base enclosure.
5. Remove the four Phillips PM2.5x4.0 screws **(3)** that secure the hard drive to the computer.
6. Remove the hard drive **(4)** from the hard drive bay.



7. If it is necessary to disassemble the hard drive, perform the following steps:
- a. Remove the four Phillips PM3.0×3.0 screws **(1)** that secure the hard drive bracket to the hard drive.
 - b. Remove the hard drive bracket **(2)** from the hard drive.
 - c. Disconnect the hard drive connector cable **(3)** from the hard drive. The hard drive bracket, hard drive connector cable, and screws are available in the Hard Drive Hardware Kit, spare part number 686261-001.



Reverse this procedure to reassemble and install the hard drive.

RTC battery

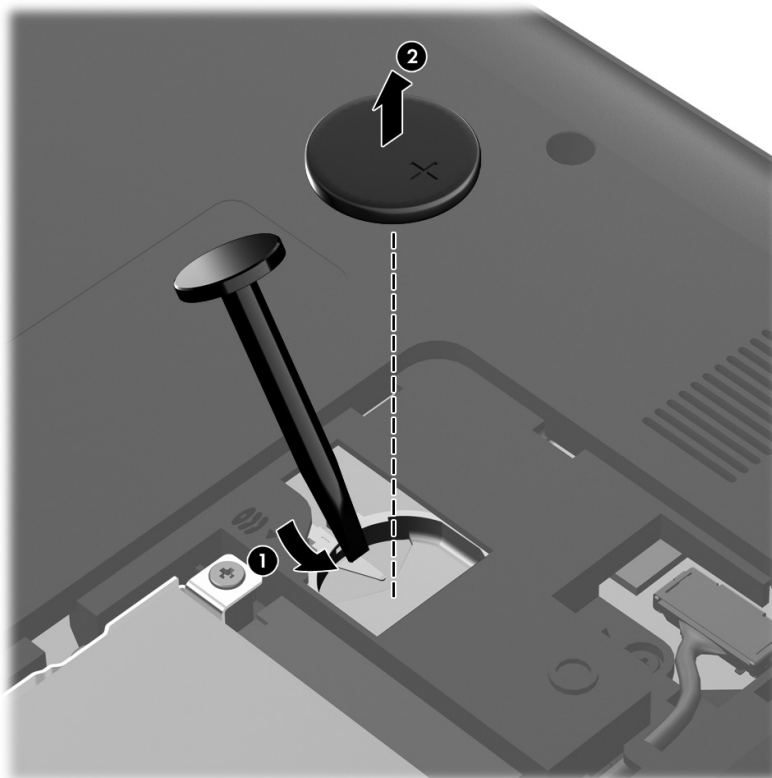
Description	Spare part number
RTC battery	686274-001

Before removing the RTC battery, follow these steps:

1. Turn off 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 the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the battery (see [Battery on page 36](#)).
5. Remove the memory module/wireless module compartment cover (see [Memory module on page 37](#)).
6. Remove the hard drive compartment cover (see [Hard drive on page 46](#)).

Remove the RTC battery:

1. Use a flat-bladed, non-metallic tool **(1)** to release the RTC battery from the socket on the system board.
2. Remove the RTC battery **(2)**.




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

Top cover

Description	Spare part number
Top cover (includes the TouchPad board)	687703-001

Before removing the top cover, follow these steps:

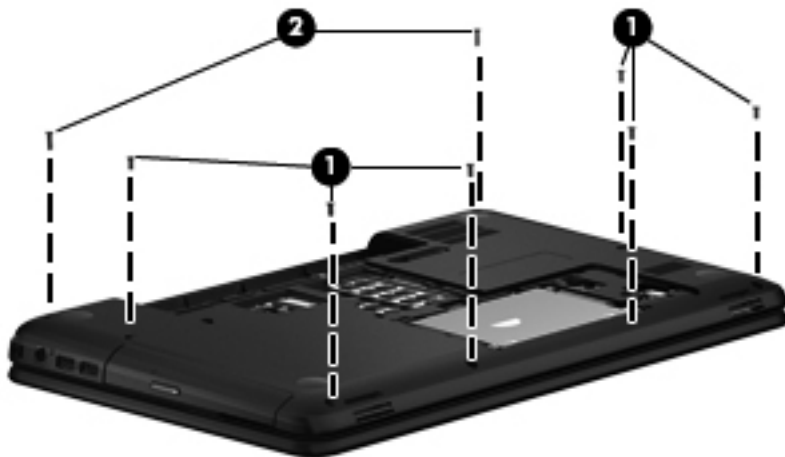
1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the battery (see [Battery on page 36](#)), and then remove the following components:
 - a. Memory module/wireless module compartment cover (see [Memory module on page 37](#))
 - b. Keyboard (see [Keyboard on page 40](#))
 - c. Hard drive (see [Hard drive on page 46](#))

 **NOTE:** When replacing the top cover, be sure to remove the following components from the defective top cover and install them on the replacement top cover:

- Power button board (see [Power button board on page 53](#))
- TouchPad button board (see [TouchPad button board on page 54](#))

Remove the top cover:

1. Remove the six Phillips PM2.5×6.5 screws **(1)** and the two Phillips PM2.5×10.0 screws **(2)** that secure the top cover to the computer.



2. Remove the four Phillips PM2.0×2.5 screws on the rear edge of the battery bay and in the hard drive bay that secure the top cover to the computer.

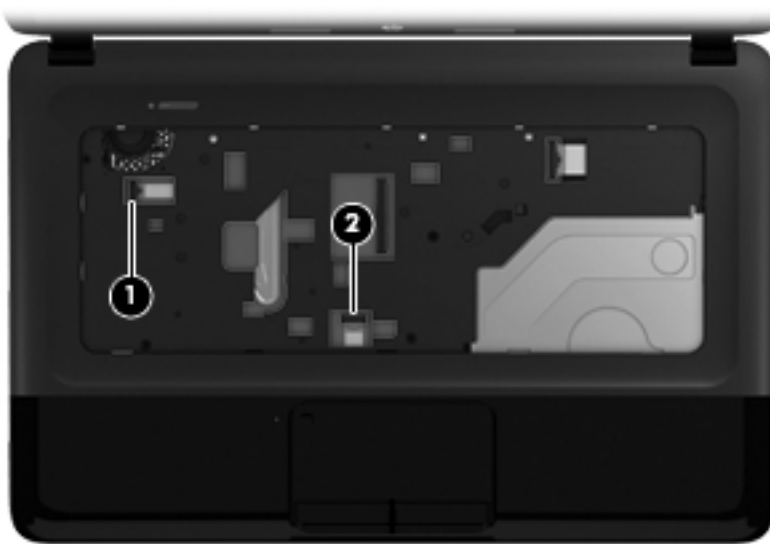


3. Remove the four Phillips PM2.5×4.0 screws on the front edge of the battery bay and near the hard drive connector that secure the top cover to the computer.

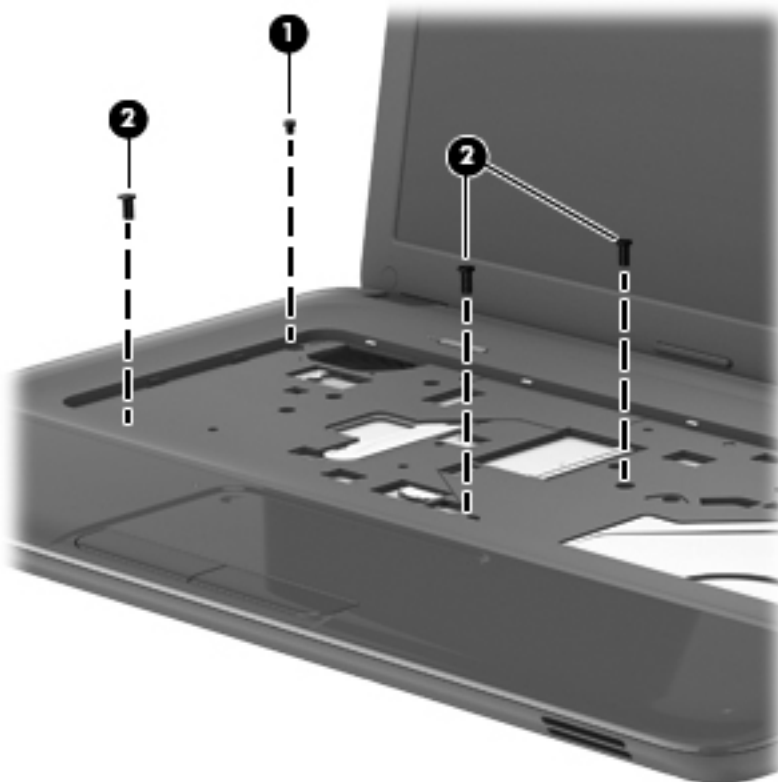


4. Turn the computer right side up, with the front toward you.
5. Open the computer.
6. Release the ZIF connector to which the power button board cable is connected, and then disconnect the power button board cable (**1**) from the system board.

7. Release the ZIF connector to which the TouchPad button board cable is connected, and then disconnect the TouchPad button board cable **(2)** from the system board.



8. Remove the Phillips PM2.0×2.5 screw **(1)** and the three Phillips PM2.5×6.5 screws **(2)** that secure the top cover to the computer.



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

10. Remove the top cover **(2)**.



Reverse this procedure to install the top cover.

Power button board

Description	Spare part number
Power button board (includes cable)	686270-001

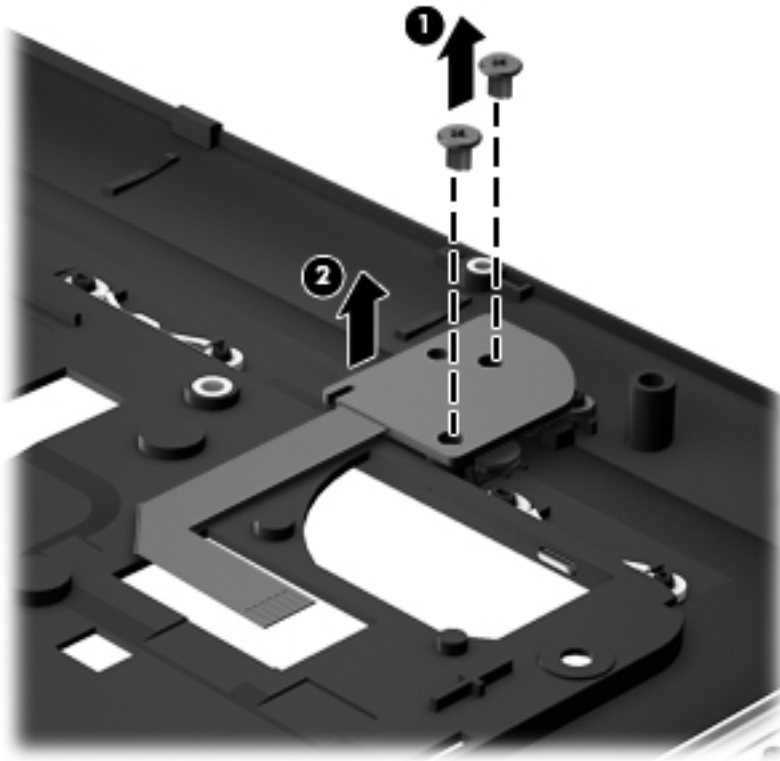
Before removing the power button board, follow these steps:

1. Turn off 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 the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the battery (see [Battery on page 36](#)), and then remove the following components:
 - a. Memory module/wireless module compartment cover (see [Memory module on page 37](#))
 - b. Keyboard (see [Keyboard on page 40](#))
 - c. Hard drive (see [Hard drive on page 46](#))
 - d. Top cover (see [Top cover on page 50](#))

Remove the power button board:

1. Turn the top cover upside down, with the front toward you.
2. Remove the two Phillips PM2.0×3.0 screws **(1)** that secure the power button board to the top cover.

3. Remove the power button board (2).



Reverse this procedure to install the power button board.

TouchPad button board

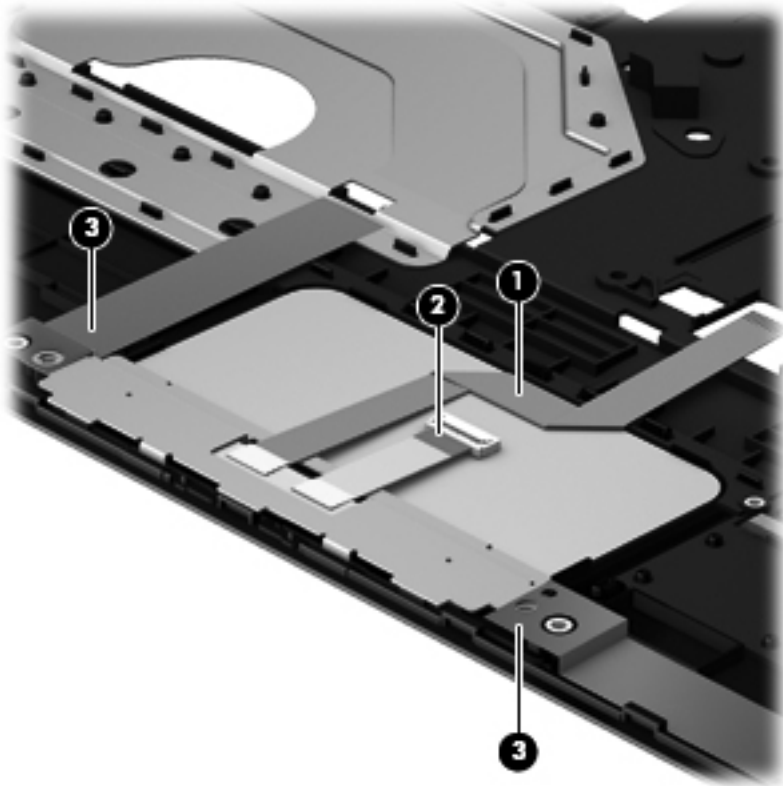
Description	Spare part number
TouchPad button board (includes bracket, TouchPad button board cable, and TouchPad cable)	686271-001

Before removing the TouchPad button board, follow these steps:

1. Turn off 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 the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the battery (see [Battery on page 36](#)), and then remove the following components:
 - a. Memory module/wireless module compartment cover (see [Memory module on page 37](#))
 - b. Keyboard (see [Keyboard on page 40](#))
 - c. Hard drive (see [Hard drive on page 46](#))
 - d. Top cover (see [Top cover on page 50](#))

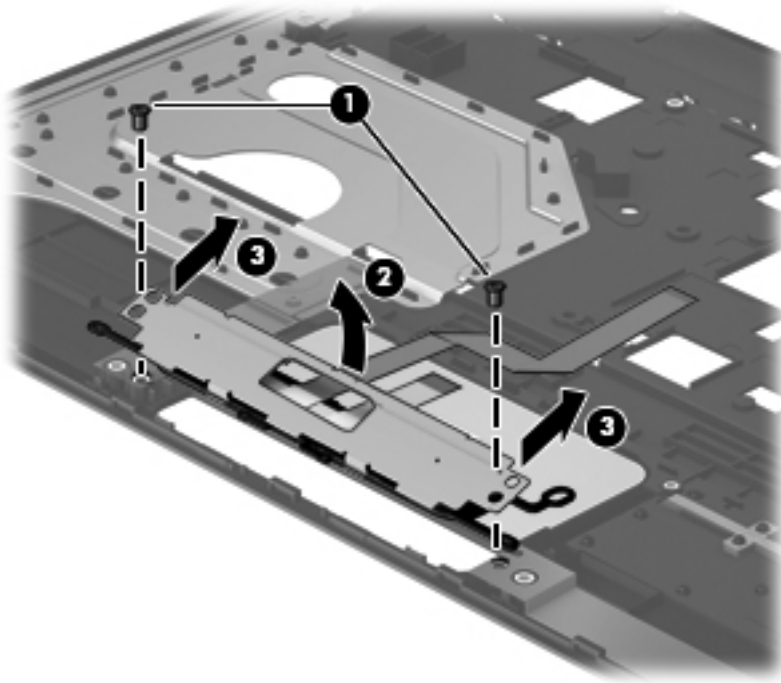
Remove the TouchPad button board:

1. Turn the top cover upside down, with the front toward you.
2. Detach the TouchPad button board cable **(1)** from the TouchPad. (The TouchPad button board cable is attached to the TouchPad with double-sided tape).
3. Release the ZIF connector to which the TouchPad board cable is connected, and then disconnect the TouchPad board cable **(2)** from the TouchPad board.
4. Release the two pieces of shielding tape that cover the left and right sides of the TouchPad button board **(3)**.



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

6. Remove the TouchPad button board **(3)** by sliding it away from the top cover at an angle.



Reverse this procedure to install the TouchPad button board.

Optical drive connector cable

Description	Spare part number
Optical drive connector cable	686257-001

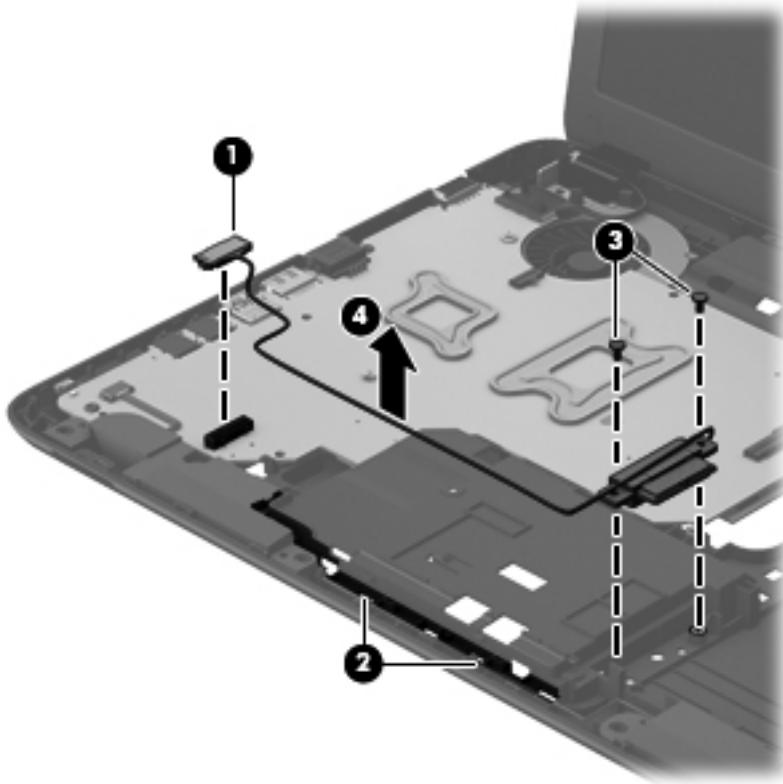
Before removing the optical drive connector cable, follow these steps:

1. Turn off 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 the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the battery (see [Battery on page 36](#)), and then remove the following components:
 - a. Memory module/wireless module compartment cover (see [Memory module on page 37](#))
 - b. Keyboard (see [Keyboard on page 40](#))
 - c. Hard drive (see [Hard drive on page 46](#))
 - d. Top cover (see [Top cover on page 50](#))

Remove the optical drive connector cable:

1. Disconnect the optical drive connector cable **(1)** from the system board.
2. Release the optical drive connector cable from the clips **(2)** and routing channel built into the base enclosure.
3. Remove the two Phillips PM2.0×4.5 screws **(3)** that secure the optical drive connector to the base enclosure.

4. Remove the optical drive connector cable (4).



Reverse this procedure to install the optical drive connector cable.

Speakers

Description	Spare part number
Speakers (include speaker cables)	686279-001

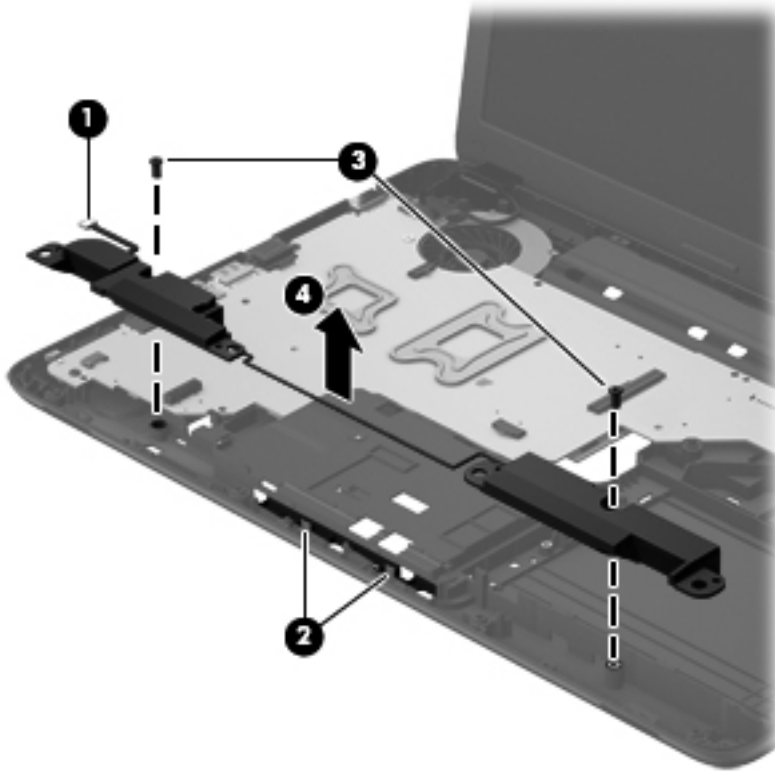
Before removing the speakers, follow these steps:

1. Turn off 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 the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the battery (see [Battery on page 36](#)), and then remove the following components:
 - a. Memory module/wireless module compartment cover (see [Memory module on page 37](#))
 - b. Keyboard (see [Keyboard on page 40](#))
 - c. Hard drive (see [Hard drive on page 46](#))
 - d. Top cover (see [Top cover on page 50](#))

Remove the speakers:

1. Disconnect the speaker cable **(1)** from the system board.
2. Release the speaker cable from the clips **(2)** and routing channel built into the base enclosure.
3. Remove the two Phillips PM2.5×4.0 screws **(3)** that secure the speakers to the base enclosure.

4. Remove the speakers **(4)**.



Reverse this procedure to install the speakers.

USB board

Description	Spare part number
USB board (includes cable)	686269-001

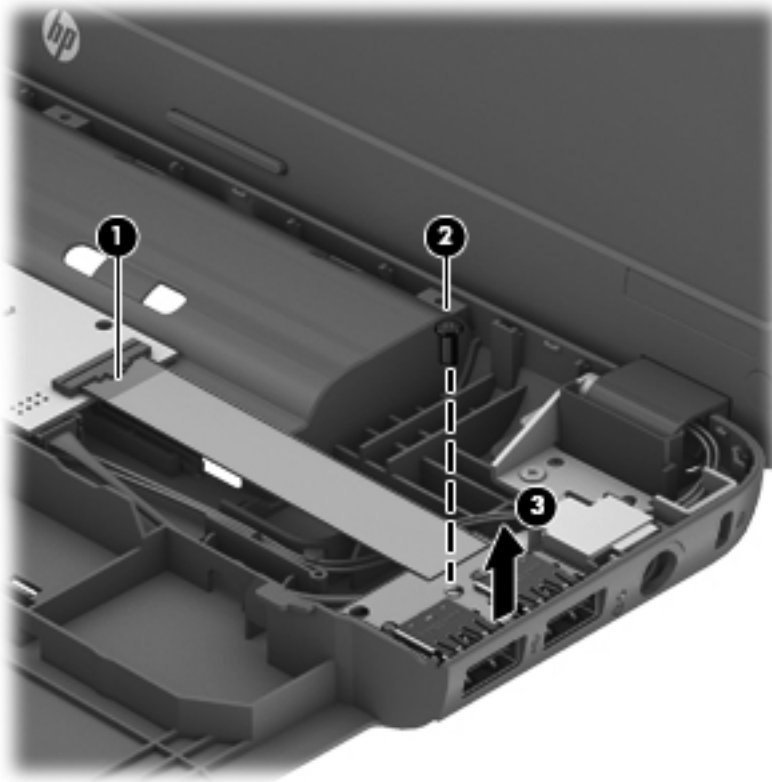
Before removing the USB board, follow these steps:

1. Turn off 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 the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the battery (see [Battery on page 36](#)), and then remove the following components:
 - a. Memory module/wireless module compartment cover (see [Memory module on page 37](#))
 - b. Keyboard (see [Keyboard on page 40](#))
 - c. Hard drive (see [Hard drive on page 46](#))
 - d. Top cover (see [Top cover on page 50](#))

Remove the USB board:

1. Release the ZIF connector to which the USB board cable is connected, and then disconnect the USB board cable **(1)** from the system board.
2. Remove the Phillips PM2.5×6.0 screw **(2)** that secures the USB board to the base enclosure.

3. Remove the USB board (3).



Reverse this procedure to install the USB board.

System board



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

Description	Spare part number
Equipped with Intel HM75 Express chipset and for use with computer models equipped with an Intel Core i5 or i3 processor	687701-001
Equipped with Intel HM70 Express chipset and for use with computer models equipped with an Intel Pentium or Celeron processor	687702-001

Before removing the system board, follow these steps:

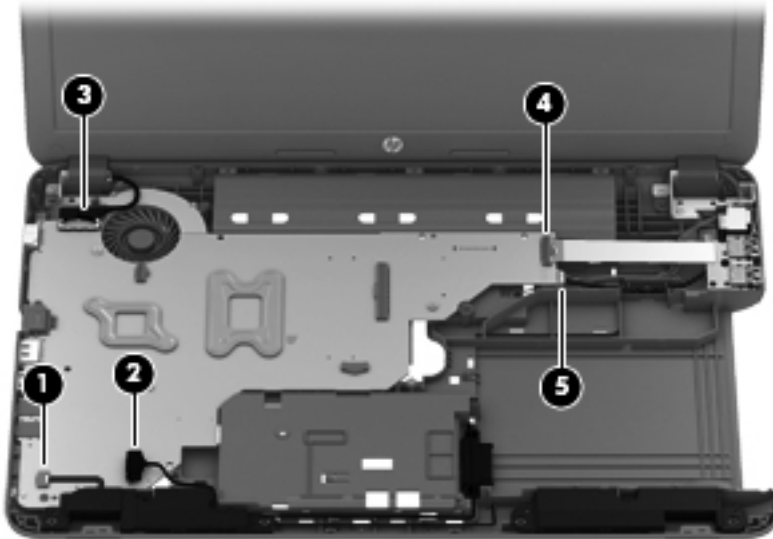
1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the battery (see [Battery on page 36](#)), and then remove the following components:
 - a. Memory module/wireless module compartment cover (see [Memory module on page 37](#))
 - b. WLAN module (see [WLAN module on page 38](#))
 - c. Keyboard (see [Keyboard on page 40](#))
 - d. Optical drive (see [Optical drive on page 44](#))
 - e. Hard drive (see [Hard drive on page 46](#))
 - f. Top cover (see [Top cover on page 50](#))

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

- Memory module (see [Memory module on page 37](#))
- RTC battery (see [RTC battery on page 49](#))
- Fan/heat sink assembly (see [Fan/heat sink assembly on page 65](#))
- Processor (see [Processor on page 67](#))

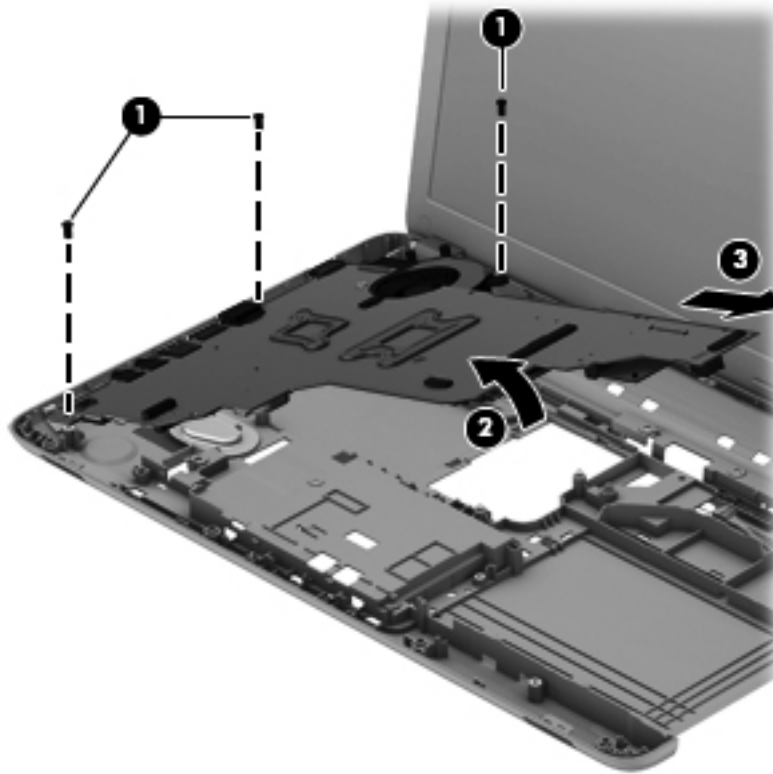
Remove the system board:

1. Disconnect the following cables from the system board.
 - (1) Speaker cable
 - (2) Optical drive connector cable
 - (3) Display panel cable
 - (4) USB board cable
 - (5) Power connector cable



2. Remove the three Phillips PM2.5×6.0 screws **(1)** that secure the system board to the base enclosure.
3. Lift the right side of the system board **(2)** until it rests at an angle.

4. Remove the system board **(3)** by sliding it up and to the right at an angle.



Reverse this procedure to install the system board.

Fan/heat sink assembly

Description	Spare part number
Fan/heat assembly (includes replacement thermal material)	686259-001


Before removing the fan/heat sink assembly, follow these steps:

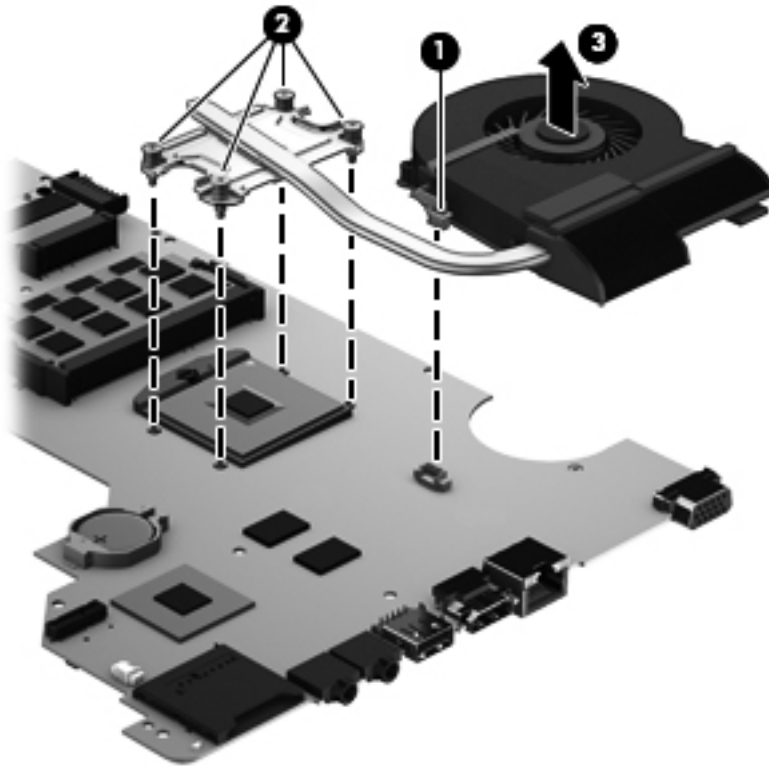
1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the battery (see [Battery on page 36](#)), and then remove the following components:
 - a. Memory module/wireless module compartment cover (see [Memory module on page 37](#))
 - b. Keyboard (see [Keyboard on page 40](#))
 - c. Hard drive (see [Hard drive on page 46](#))

- d. Top cover (see [Top cover on page 50](#))
- e. System board (see [System board on page 63](#))


Remove the fan/heat sink assembly:

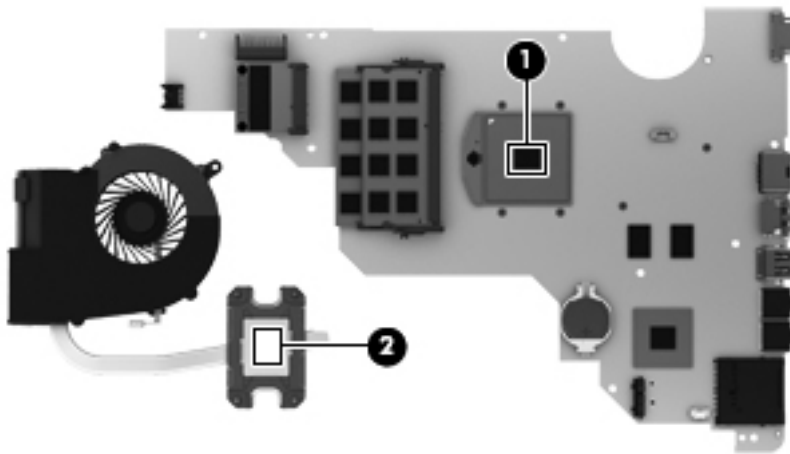
1. Turn the system board upside down, with the front toward you.
2. Disconnect the fan cable **(1)** from the system board.
3. Following the 1, 2, 3, 4 sequence stamped into the heat sink, loosen the four captive Phillips screws **(2)** that secure the fan/heat sink assembly to the system board.
4. Remove the fan/heat sink assembly **(3)**.

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



The thermal material must be thoroughly cleaned from the surfaces of the processor heat sink and the processor each time the processor heat sink is removed. Replacement thermal material is included with the processor heat sink and system board spare part kits.

 **NOTE:** The following illustration shows the replacement thermal material locations. Thermal paste is used on the processor **(1)** and the heat sink section **(2)** that services it.



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

Processor

Description	Spare part number
Intel Core i5-3210M 2.50-GHz processor (3.0-MB L3 cache, 35 W)	680645-001
Intel Core i3-3110M 2.30-GHz processor (3.0-MB L3 cache, 35 W)	682417-001
Intel Core i3-2370M 2.40-GHz processor (3.0-MB L3 cache, 35 W)	677152-001
Intel Core i3-2350M 2.20-GHz processor (3.0-MB L3 cache, 35 W)	653340-001
Intel Core i3-2308M 2.10-GHz processor (3.0-MB L3 cache, 35 W)	693542-001
Intel Pentium B970 TJ85 2.30-GHz processor (2.0-MB L3 cache, dual core, 35 W)	676785-001
Intel Pentium B960 TJ85 2.20-GHz processor (2.0-MB L3 cache, dual core, 35 W)	664662-001
Intel Celeron DC B820 1.70-GHz processor (2.0-MB L3 cache, dual core, 35 W)	690537-001
Intel Celeron DC B815 1.60-GHz processor (2.0-MB L3 cache, dual core, 35 W)	677153-001
Intel Celeron DC B730 1.80-GHz processor (2.0-MB L3 cache, dual core, 35 W)	690536-001


Before removing the processor, follow these steps:

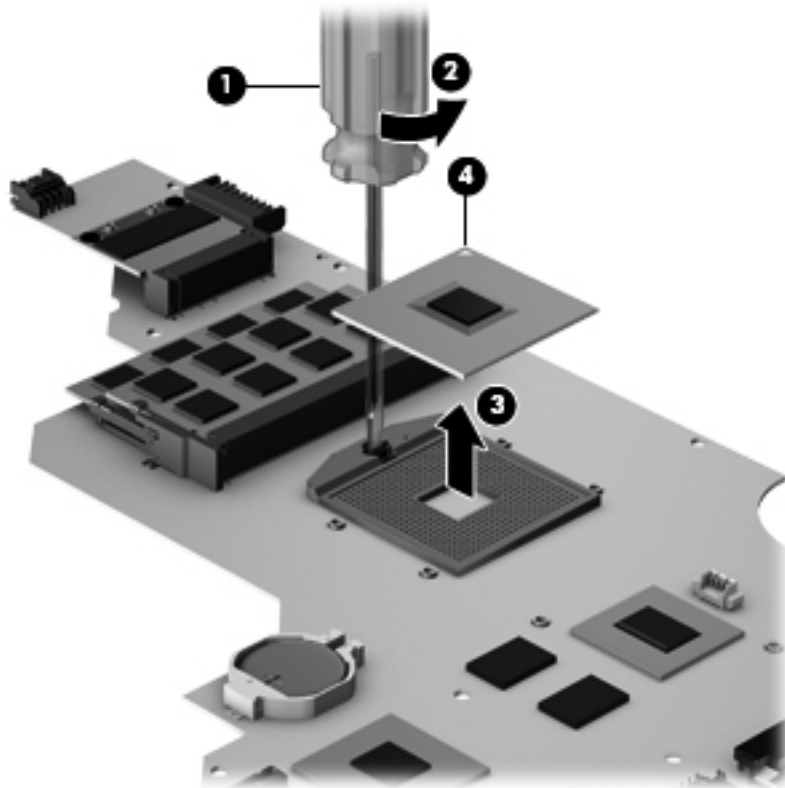
1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the battery (see [Battery on page 36](#)), and then remove the following components:
 - a. Memory module/wireless module compartment cover (see [Memory module on page 37](#))
 - b. Keyboard (see [Keyboard on page 40](#))

- c. Hard drive (see [Hard drive on page 46](#))
- d. Top cover (see [Top cover on page 50](#))
- e. System board (see [System board on page 63](#))

Remove the the processor:


1. Turn the system board upside down, with the front toward you.
2. Use a flat-bladed screw driver **(1)** to turn the processor locking screw one-half turn counterclockwise **(2)**, until you hear a click.
3. Remove the processor **(3)**.

 **NOTE:** The gold triangle **(4)** on the processor must be aligned with the triangle icon embossed on the processor socket when you install the processor.



Reverse this procedure to install the processor.

Display assembly

 **NOTE:** The display assembly is spared at the subcomponent level only. For more display assembly spare part information, see the individual removal subsections.

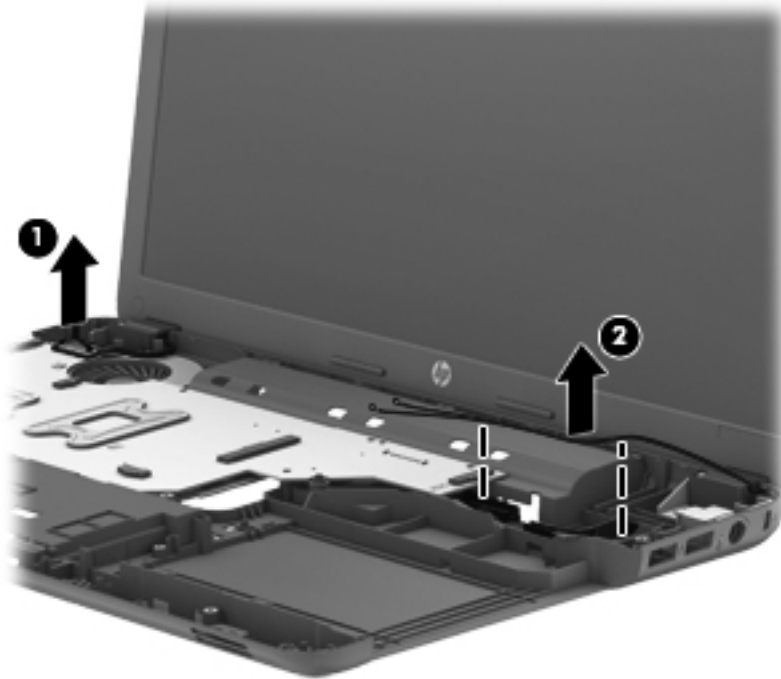
Before removing the display assembly, follow these steps:

1. Turn off 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 the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the battery (see [Battery on page 36](#)).
5. Disconnect the wireless antenna cables from the WLAN module (see [Memory module on page 37](#)).
6. Remove the following components:
 - a. Keyboard (see [Keyboard on page 40](#))
 - b. Hard drive (see [Hard drive on page 46](#))
 - c. Top cover (see [Top cover on page 50](#))

Remove the display assembly:

1. Disconnect the display panel cable **(1)** from the system board.

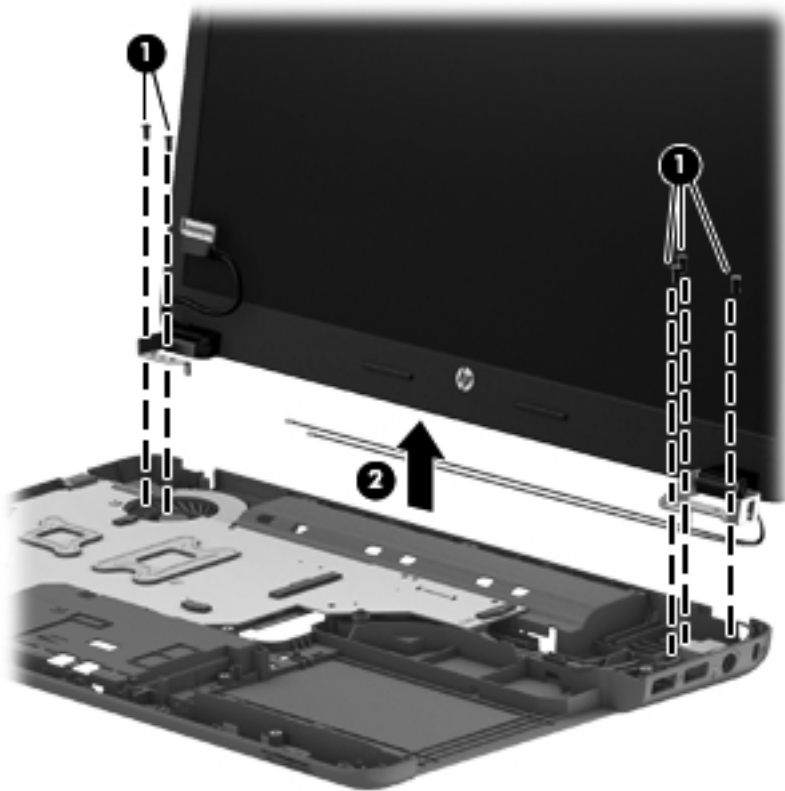
2. Release the wireless antenna cables **(2)** from the clips and routing channel built into the base enclosure.



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

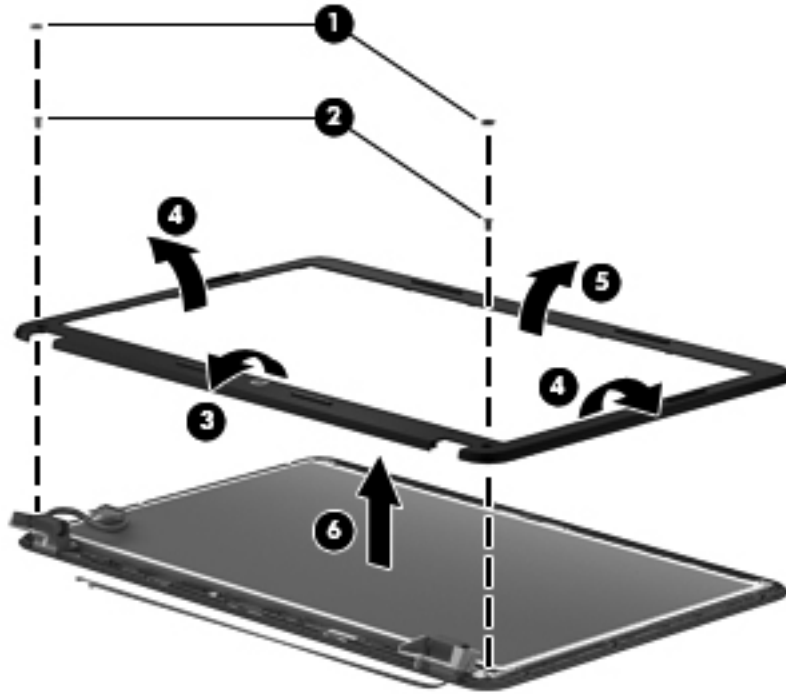
3. Remove the five Phillips PM2.5×6.5 screws **(1)** that secure the display assembly to the base enclosure.

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



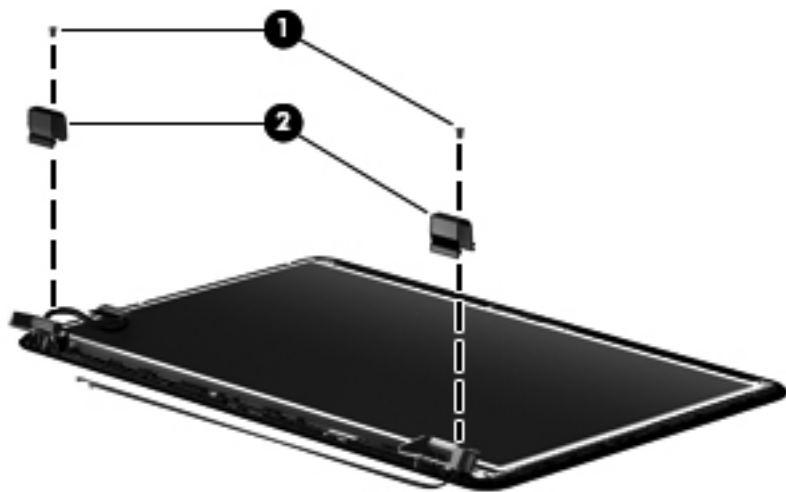
5. If it is necessary to replace the display bezel or any of the display assembly subcomponents:
 - a. Remove the two display bezel screw covers **(1)** and the two Phillips PM2.5×5.5 screws **(2)** that secure the display bezel to the display assembly. The display bezel screw covers are available in the Display Rubber Kit, spare part number 686275-001.
 - b. Flex the inside edges of the bottom edge **(3)**, the left and right sides **(4)**, and the top edge **(5)** of the display bezel until the bezel disengages from the display enclosure.

- c. Remove the display bezel **(6)**. The display bezel is available using spare part number 686254-001.

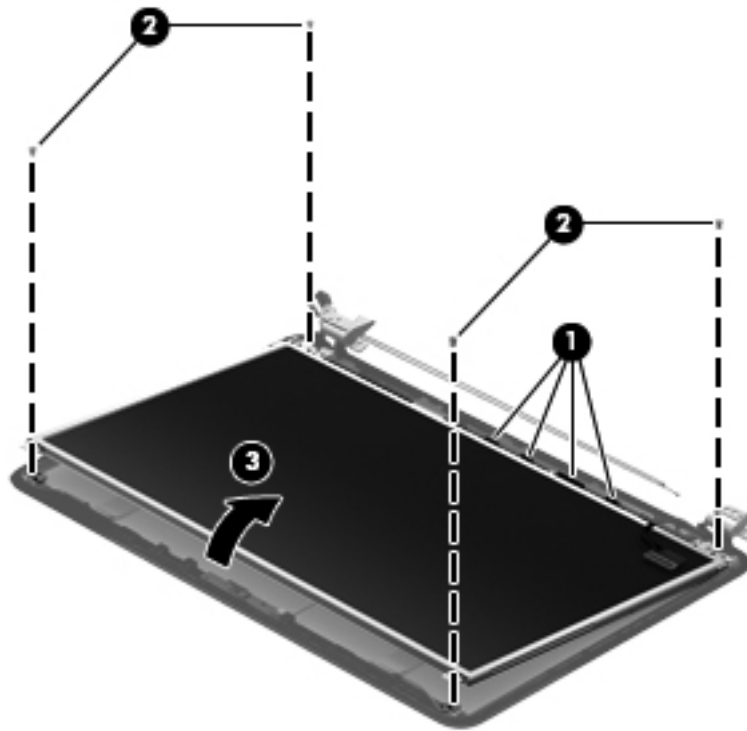


- 6. If it is necessary to replace the display hinge covers:

- a. Remove the two Phillips PM2.5×4.0 screws **(1)** that secure the display hinge covers to the display enclosure.
- b. Remove the display hinge covers **(2)**. The display hinge covers are available using spare part number 686260-001.

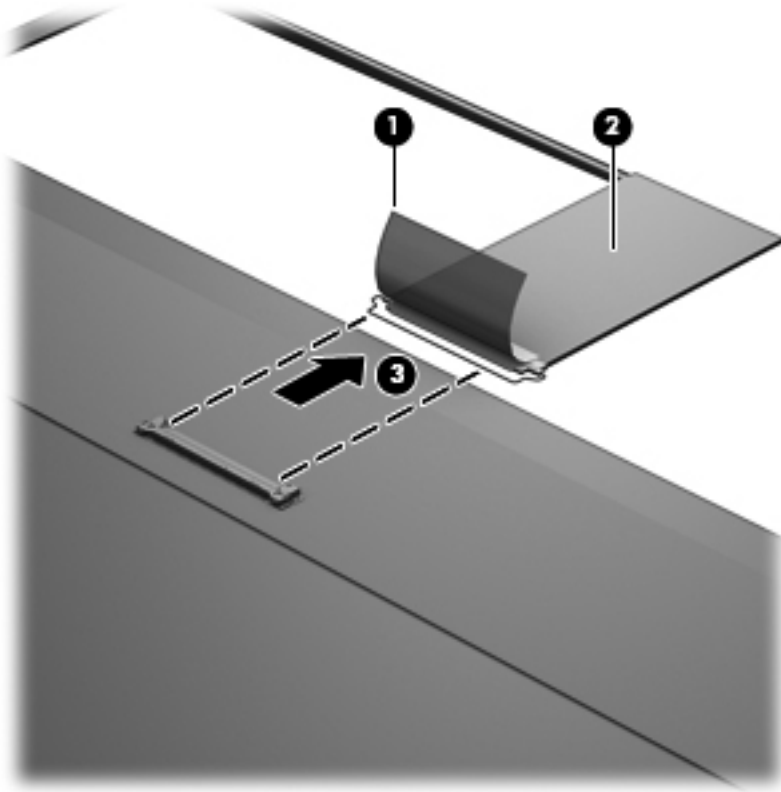


7. If it is necessary to replace the display panel:
- a. Release the display panel cable **(1)** from the clips built into the bottom edge of the display enclosure.
 - b. Remove the four Phillips PM2.5×4.0 screws **(2)** that secure the display panel to the display enclosure.
 - c. Lift the top edge of the display panel **(3)**, and then swing it up and forward until it rests upside down in front of the display enclosure.



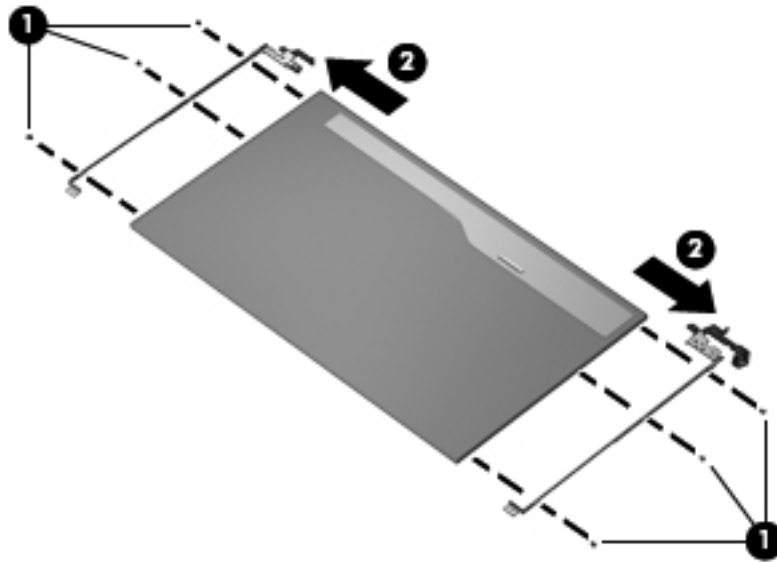
- d. Release the adhesive support strip **(1)** that secures the display panel cable to the display panel.
- e. Detach the display panel cable **(2)** from the display panel. (The display panel cable is attached to the display panel with double-sided tape.)

- f. Disconnect the display panel cable **(3)** from the display panel.



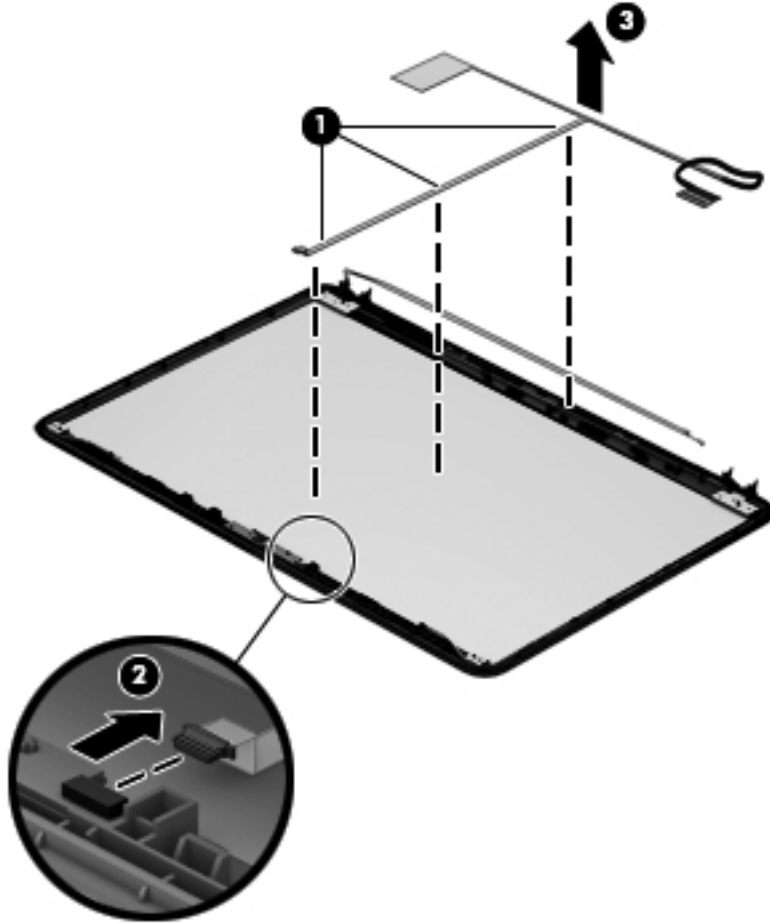
- g. Remove the display panel. The display panel is available using spare part number 686273-001.
- 8.** If it is necessary to replace the display hinges:
- a. Remove the six Phillips PM2.0×3.5 screws **(1)** that secure the display hinges to the display panel.

- b.** Remove the display hinges (**2**). The display hinges are available using spare part number 686262-001.



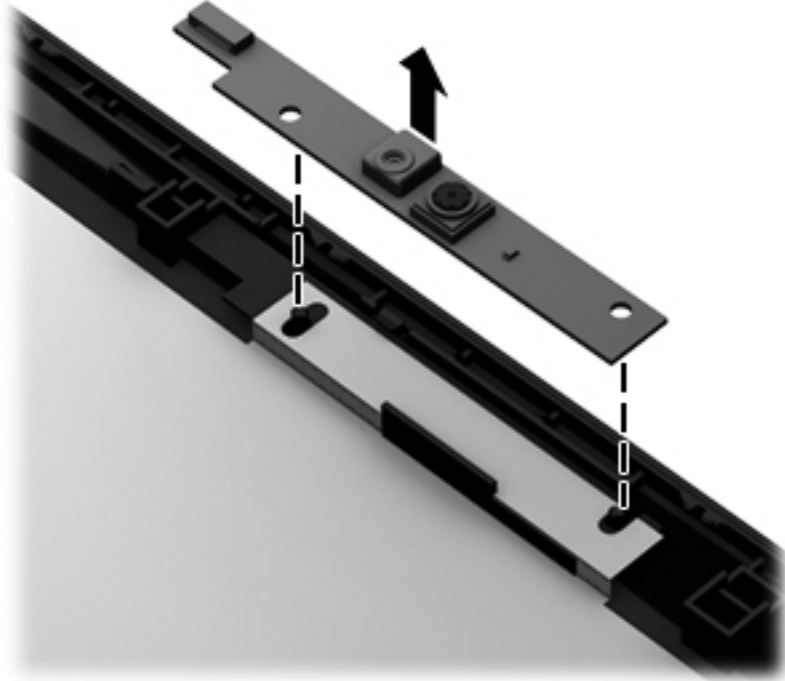
- 9.** If it is necessary to replace the display panel cable:
- a.** Detach the display panel cable (**1**) from the display enclosure. (The display panel cable is attached to the display enclosure with double-sided tape in multiple locations.)
 - b.** Disconnect the webcam/microphone cable (**2**) from the webcam/microphone module.

- c. Remove the display panel cable **(3)**. The display panel cable is available using spare part number 686256-001 and includes the webcam/microphone cable.



10. If it is necessary to replace the webcam/microphone module, gently detach the webcam/microphone module from the display enclosure. (The webcam/microphone module is attached to the display enclosure with double-sided tape.) The webcam/microphone module is available using spare part number 686285-001.

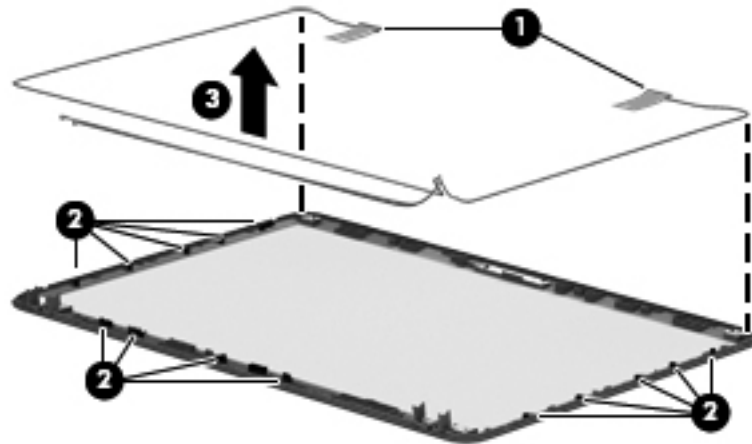
⚠ CAUTION: Due to the thin profile of the webcam/microphone module, it is easily damaged. Take extra precaution to ensure the webcam/microphone module is not damaged when removing and replacing the module.



📝 NOTE: Depending on computer model, some computer models may be equipped one or two sets of wireless antenna cables and transceivers.

11. If it is necessary to replace the wireless antenna cables and transceivers:
 - a. Detach the wireless antenna transceivers **(1)** from the display enclosure. (The wireless antenna transceivers are attached to the display enclosure with double-sided tape.)
 - b. Release the wireless antenna cables from the clips and routing channels along the left, right, and bottom edges of the display enclosure **(2)**.

- c. Remove the wireless antenna cables and transceivers **(3)**. The wireless antenna cables and transceivers are available using spare part number 686249-001.



Reverse this procedure to install the display assembly.

Power connector cable

Description	Spare part number
Power connector cable (includes bracket)	686258-001

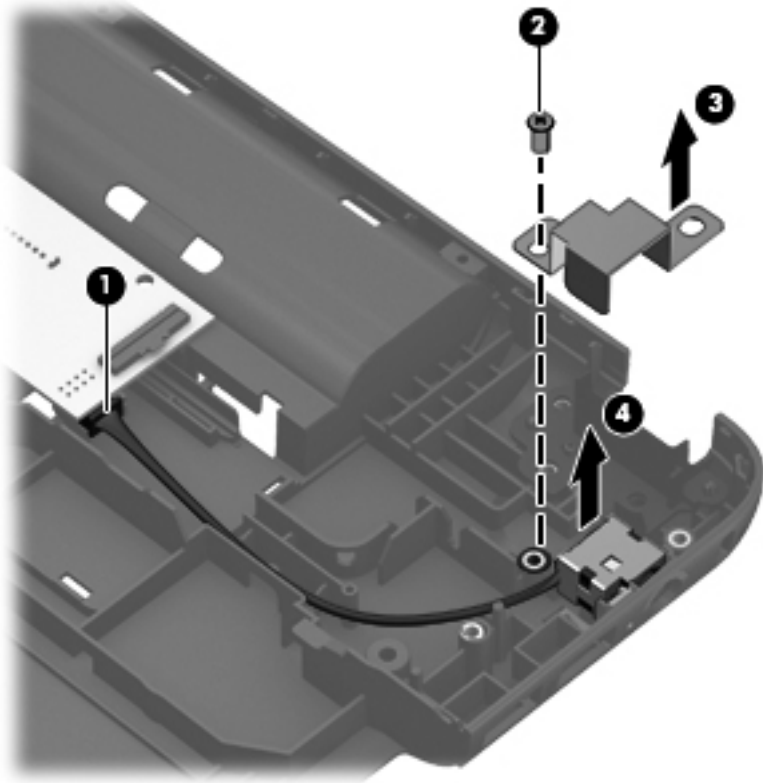
Before removing the power connector cable, follow these steps:

1. Turn off 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 the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the battery (see [Battery on page 36](#)), and then remove the following components:
 - a. Memory module/wireless module compartment cover (see [Memory module on page 37](#))
 - b. Keyboard (see [Keyboard on page 40](#))
 - c. Hard drive (see [Hard drive on page 46](#))
 - d. Top cover (see [Top cover on page 50](#))
 - e. Display assembly (see [Display assembly on page 69](#))

Remove the power connector cable:

1. Disconnect the power connector cable **(1)** from the system board.
2. Remove the Phillips PM2.5×6.5 screw **(2)** that secures the power connector and bracket to the base enclosure.


3. Remove the power connector bracket **(3)**.
4. Remove the power connector cable **(4)**.



Reverse this procedure to install the power connector cable.

5 Setup Utility (BIOS) and Advanced System Diagnostics

Setup Utility, 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). Setup Utility includes settings for the types of peripherals installed, the startup sequence of the computer, and the amount of system and extended memory.

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

Starting Setup Utility

- ▲ 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 **f10**.

Using Setup Utility

Changing the language of Setup Utility

1. Start Setup Utility.
2. Use the arrow keys to select **System Configuration > Language**, and then press **enter**.
3. Use the arrow keys to select a language, and then press **enter**.
4. When a confirmation prompt with your language selected is displayed, press **enter**.
5. To save your change and exit Setup Utility, use the arrow keys to select **Exit > Exit Saving Changes**, and then press **enter**.

Your change takes effect immediately.

Navigating and selecting in Setup Utility

Setup Utility does not support the TouchPad. Navigation and selection are by keystroke.

- To choose a menu or a menu item, use the arrow keys.
- To choose an item in a list or to toggle a field—for example an Enable/Disable field—use either the arrow keys or **f5** and **f6**.
- To select an item, press **enter**.
- To close a text box or return to the menu display, press **esc**.
- To display additional navigation and selection information while Setup Utility is open, press **f1**.

Display system information

1. Start Setup Utility.
2. Select the **Main** menu. System information such as the system time and date, and identification information about the computer is displayed.
3. To exit Setup Utility without changing any settings, use the arrow keys to select **Exit > Exit Discarding Changes**, and then press **enter**.

Restoring factory default settings in Setup Utility

1. Start Setup Utility.
2. Use the arrow keys to select **Exit > Load Setup Defaults**, and then press **enter**.
3. When the Setup Confirmation is displayed, press **enter**.
4. To save your change and exit Setup Utility, use the arrow keys to select **Exit > Exit Saving Changes**, and then press **enter**.

The Setup Utility factory settings take effect when the computer restarts.



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

Exiting Setup Utility

- To exit Setup Utility and save your changes from the current session:
If the Setup Utility menus are not visible, press **esc** to return to the menu display. Then use the arrow keys to select **Exit > Exit Saving Changes**, and then press **enter**.
- To exit Setup Utility without saving your changes from the current session:
If the Setup Utility menus are not visible, press **esc** to return to the menu display. Then use the arrow keys to select **Exit > Exit Discarding Changes**, and then press **enter**.

Updating the BIOS

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

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.

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

BIOS version information (also known as ROM date and System BIOS) can be displayed by pressing **fn +esc** or by using Setup Utility.

1. Start Setup Utility.
2. If the system information is not displayed, use the arrow keys to select the **Main** menu.
BIOS and other system information is displayed.
3. To exit Setup Utility, use the arrow keys to select **Exit > Exit Discarding Changes**, 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, or connected to an optional power source. During the download and installation, follow these instructions:


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

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


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

1. Access the page on the HP Web site that provides software for your computer.
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.

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

Using Advanced System Diagnostics

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

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

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

To start Advanced System Diagnostics:

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



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

6 Specifications

Computer specifications

	Metric	U.S.
Dimensions		
Width	37.60 cm	14.80 in
Depth	24.70 cm	9.72 in
Height (front to rear)	3.05 to 3.58 cm	1.20 to 1.41 in
Weight	2.45 kg	5.39 lb
Input power		
Operating voltage and current	18.5V/ 3.5A or 19.5V/ 3.33A – 65W 19V/ 4.74A or 19.5V/ 4.62A – 90W	
Temperature		
Operating	5°C to 35°C	41°F to 95°F
Nonoperating	-20°C to 60°C	-4°F to 140°F
Relative humidity (noncondensing)		
Operating	10% to 90%	
Nonoperating	5% to 95%	
Maximum altitude (unpressurized)		
Operating	-15 m to 3,048 m	-50 ft to 10,000 ft
Nonoperating	-15 m to 12,192 m	-50 ft to 40,000 ft

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

15.6-in, SVA, display panel display specifications

	Metric	U.S.
Dimensions		
Height	19.6 cm	7.72 in
Width	34.7 cm	13.66 in
Diagonal	39.8 cm	15.67 in
Number of colors	Up to 16.8 million	
Contrast ratio	200:1 (typical)	
Brightness	250 nits (typical)	
Pixel resolution		
Pitch	0.197 × 0.197 mm	
Format	1366 × 768	
Configuration	RGB vertical stripe	
Backlight	LED	
Character display	80 × 25	
Total power consumption	3.46 W	
Viewing angle	±65° horizontal, +50° vertical (typical)	

Hard drive specifications

	750-GB*	640-GB*	500-GB*	320-GB*
Dimensions				
Height	9.5 mm	9.5 mm	9.5 mm	9.5 mm
Length	100.4 mm	100.4 mm	100.4 mm	100.4 mm
Width	69.9 mm	69.9 mm	69.9 mm	69.9 mm
Weight	110 g	110 g	110 g	110 g
Interface type	SATA	SATA	SATA	SATA
Transfer rate				
Synchronous (maximum)	1.1 GB/sec	1.1 GB/sec	1.1 GB/sec	1.1 GB/sec
Security	ATA security	ATA security	ATA security	ATA security
Seek times (typical read, including setting)				
Single track	1.5 ms	1.5 ms	1.5 ms	1.5 ms
Average (read/write)	11/13 ms	11/13 ms	11/13 ms	11/13 ms
Maximum	22 ms	22 ms	22 ms	22 ms
Logical blocks	1,465,159,751	1,250,269,655	976,773,168	628,142,448
Disk rotational speed	5400 rpm	5400 rpm	5400 rpm	5400 rpm
Operating temperature	0°C to 60°C (32°F to 140°F)			
*1 GB = 1 billion bytes when referring to hard drive storage capacity. Actual accessible capacity is less.				
NOTE: Certain restrictions and exclusions apply. Contact technical support for details.				

7 Backup and recovery

Your computer includes tools provided by the operating system and HP to help you safeguard your information and restore it if necessary.


This chapter provides information about the following topics:


- Creating a set of recovery discs or a recovery flash drive (HP Recovery Manager software feature)
- Performing a system restore (from the recovery partition, recovery discs, or a recovery flash drive)
- Backing up your information
- Recovering a program or driver

Restore

In the event of hard drive failure, to restore your system to its factory image you must use a set of recovery discs or a recovery flash drive that you have created using HP Recovery Manager. HP recommends that you use HP Recovery Manager immediately after software setup to create either a set of recovery discs or a recovery flash drive.


If you need to restore your system for some other reason than hard drive failure, you can use the HP Recovery partition (select models only), without the need for recovery discs or a recovery flash drive. To check for the presence of a recovery partition, click **Start**, right-click **Computer**, click **Manage**, and then click **Disk Management**. If the recovery partition is present, a Recovery drive is listed in the window.


 **CAUTION:** HP Recovery Manager (partition or discs/flash drive) restores only the software that was installed at the factory. Software not provided with this computer must be reinstalled manually.

 **NOTE:** Recovery discs have been included if your computer does not have a recovery partition.

Creating recovering media


HP recommends that you create either a set of recovery discs or a recovery flash drive to be sure that you can restore your computer to its original factory state if the hard drive fails, or if for any reason you cannot restore using the recovery partition tools. Create these discs or the flash drive after setting up the computer for the first time.

 **NOTE:** HP Recovery Manager allows the creation of only one set of recovery discs or one recovery flash drive. Handle these discs or the flash drive carefully and keep them in a safe place.


 **NOTE:** If your computer does not include an integrated optical drive, you can use an optional external optical drive (purchased separately) to create recovery discs, or you can purchase recovery discs for your computer from the HP website. If you use an external optical drive, it must be connected directly to a USB port on the computer, not to a USB port on an external device, such as a USB hub.

Guidelines:

- Purchase high-quality DVD-R, DVD+R, DVD-R DL, or DVD+R DL discs.

 **NOTE:** Read-write discs, such as CD-RW, DVD±RW, double-layer DVD±RW, and BD-RE (rewritable Blu-ray) discs, are not compatible with the HP Recovery Manager software.

- The computer must be connected to AC power during this process.
- Only one set of recovery discs or one recovery flash drive can be created per computer.

 **NOTE:** If you are creating recovery discs, number each disc before inserting it into the optical drive.


- If necessary, you can exit the program before you have finished creating the recovery discs or recovery flash drive. The next time you open HP Recovery Manager, you will be prompted to continue the backup creation process.

To create a set of recovery discs or a recovery flash drive:

1. Select **Start > All Programs > HP Help and Support > HP Recovery Manager > HP Recovery Media Creation**.
2. Follow the on-screen instructions.

Performing a system restore

HP Recovery Manager software allows you to repair or restore the computer to its original factory state. HP Recovery Manager works from recovery discs or a recovery flash drive, or from a dedicated recovery partition (select models only) on the hard drive.

 **NOTE:** A system restore must be performed if the computer hard drive has failed or if all attempts to correct any functional computer issues fail. A system restore should be used only as a final attempt to correct computer issues.

Note the following when performing a system restore:

- You can restore the system only if you have previously backed it up. HP recommends that as soon as you set up the computer you use HP Recovery Manager to create either a set of recovery discs or a recovery flash drive.
- Windows has its own built-in repair features, such as System Restore. If you have not already tried these features, try them before using HP Recovery Manager.
- HP Recovery Manager restores only software that was installed at the factory. Software not provided with this computer must be downloaded from the manufacturer's website or reinstalled from the disc provided by the manufacturer.

Restoring using the dedicated recovery partition (select models only)

When using the dedicated recovery partition, you can back up pictures, music and other audio, videos and movies, recorded TV shows, documents, spreadsheets and presentations, email, and Internet favorites and settings during this process.

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

1. Access HP Recovery Manager in either of the following ways:
 - Select **Start > All Programs > HP Help and Support > HP Recovery Manager > HP Recovery Manager**.
 - or –
 - 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. Then, press **f11** while the “F11 (System Recovery)” message is displayed on the screen.
2. Click **System Recovery** in the HP Recovery Manager window.
3. Follow the on-screen instructions.

Restoring using the recovery media

1. If possible, back up all personal files.
2. Insert the first recovery disc into the optical drive on your computer or an optional external optical drive, and then restart the computer.

– or –

Insert the recovery flash drive into a USB port on your computer, and then restart the computer.

3. Press **f9** at system bootup.
4. Select the optical drive or the flash drive.
5. Follow the on-screen instructions.

Changing the computer boot order

To change the boot order for recovery discs:

1. Restart the computer.
2. Press **esc** while the computer is restarting, and then press **f9** for boot options.
3. Select **Internal CD/DVD ROM Drive** from the boot options window.


To change the boot order for a recovery flash drive:

1. Insert the flash drive into a USB port.
2. Restart the computer.
3. Press **esc** while the computer is restarting, and then press **f9** for boot options.
4. Select the flash drive from the boot options window.

Backing up and recovering your information

It is very important to back up your files and keep any new software in a safe place. As you add new software and data files, continue to create backups on a regular basis.

How completely you are able to recover your system depends on how recent your backup is.

 **NOTE:** A recovery from your most recent backup should be performed if the computer is attacked by a virus or if any major system components fail. In order to correct computer issues, attempt a recovery before you attempt a system restore.

You can back up your information to an optional external hard drive, a network drive, or discs. Back up your system at the following times:

- At regularly scheduled times

 **TIP:** TIP: Set reminders to back up your information periodically.

- Before the computer is repaired or restored
- Before you add or modify hardware or software

Guidelines:

- Create system restore points using the Windows System Restore feature, and periodically copy them to an optical disc or an external hard drive. For more information about using system restore points, see the “Using Windows system restore points” section.
- Store personal files in the Documents library and back up this folder periodically.
- Save customized settings 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 reenter your preferences.

To create a screen shot:

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

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

To copy the entire screen, press **prt sc**.

3. Open a word-processing document, and then select **Edit > Paste**. The screen image is added to the document.
4. Save and print the document.

Using Windows Backup and Restore

Guidelines

- Connect the computer to AC power before you start the backup process.
- Allow enough time to complete the backup process. Depending on file sizes, it may take over an hour.

To create a backup:

1. Select **Start > Control Panel > System and Security > Backup and Restore**.
2. Follow the on-screen instructions to schedule and create a backup.



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

Using Windows system restore points

A system restore point allows you to save and name a snapshot of your hard drive at a specific point in time. You can then recover back to that point if you want to reverse subsequent changes.



NOTE: Recovering to an earlier restore point does not affect data files saved or e-mails created since the last restore point.

You also can create additional restore points to provide increased protection for your files and settings.

When to create restore points

- Before you add or modify software or hardware
- Periodically, whenever the computer is functioning optimally

Create a system restore point

1. Select **Start > Control Panel > System and Security > System**.
2. In the left pane, click **System protection**.
3. Click the **System Protection** tab.
4. Click **Create**.
5. Follow the on-screen instructions.

Restore to a previous date and time

To revert to a restore point (created at a previous date and time), when the computer was functioning optimally, follow these steps:

1. Select **Start > Control Panel > System and Security > System**.
2. In the left pane, click **System protection**.
3. Click the **System Protection** tab.
4. Click **System Restore**.
5. Follow the on-screen instructions.



NOTE: If you revert to a restore point and then change your mind, you can reverse the restoration.

8 Power cord set requirements

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

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

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

Requirements for all countries

The following requirements are applicable to all countries and regions:

- The length of the power cord set must be at least **1.5 m** (5.0 ft) and no more than **2.0 m** (6.5 ft).
- All power cord sets must be approved by an acceptable accredited agency responsible for evaluation in the country or region where the power cord set will be used.
- The power cord sets must have a minimum current capacity of 10 amps and a nominal voltage rating of 125 or 250 V AC, as required by the power system of each country or region.
- The appliance coupler must meet the mechanical configuration of an EN 60 320/IEC 320 Standard Sheet C13 connector for mating with the appliance inlet on the back of the computer.

Requirements for specific countries and regions

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

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

9 Recycling

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

HP encourages customers to recycle used electronic hardware, HP original print cartridges, and rechargeable batteries. For more information about recycling programs, see the HP Web site at <http://www.hp.com/recycle>.

Index

- A**
 - AC adapter light 14
 - AC adapter, spare part number 24, 25
 - Action keys 9
 - antenna
 - locations 6
 - removal 77
 - spare part number 23, 27, 78
 - Antenna Kit, spare part number 23, 27, 78
 - audio, product description 3
 - audio-in jack 12
 - audio-out jack 12
- B**
 - base enclosure, spare part number 20, 27
 - battery
 - removal 36
 - spare part numbers 20, 25, 36
 - battery bay 15
 - battery release latch 15
 - bottom components 15
 - button component 8
 - buttons
 - optical drive eject 14
 - power 8
 - TouchPad 11
 - TouchPad on/off 11
- C**
 - cables, service considerations 29
 - caps lock light 10
 - chipset, product description 1
 - components
 - bottom 15
 - button 8
 - display 6
 - front 11
 - keys 9
 - left-side 12
 - lights 10
 - right-side 14
 - TouchPad 11
 - computer feet
 - locations 35
 - spare part number 20, 27
 - computer major components 18
 - computer part number 34
 - computer specifications 85
 - connectors, service considerations 29
 - Cover Kit, spare part number 21, 27, 37, 47
- D**
 - Digital Media slot 13
 - display
 - components 6
 - specifications 86
 - display assembly
 - removal 69
 - subcomponents 22
 - display bezel
 - removal 71
 - spare part number 22, 27, 72
 - display enclosure, spare part number 23, 27
 - display hinge
 - removal 74
 - spare part number 22, 27, 75
 - display hinge cover
 - removal 72
 - spare part number 22, 27, 72
 - Display Hinge Cover Kit, spare part number 22, 27
 - display panel
 - removal 73
 - spare part number 22, 27, 74
 - display panel cable
 - removal 75
 - spare part number 22, 27, 76
 - display panel, product description 2
 - Display Rubber Kit, spare part number 23, 27
 - drives, preventing damage 30
 - DVD±RW Double-Layer with SuperMulti Drive
 - precautions 30
 - removal 44
 - spare part number 20, 24, 27, 44
- E**
 - electrostatic discharge 30
 - equipment guidelines 33
 - esc key 9
 - Ethernet, product description 3
 - external monitor port 12
- F**
 - fan/heat sink assembly
 - removal 65
 - spare part number 20, 27, 65
 - feet
 - locations 35
 - spare part number 20, 27
 - fn key 9
 - front component 11
- G**
 - graphics, product description 2
 - grounding guidelines 30

- guidelines
 - equipment 33
 - grounding 30
 - packaging 32
 - transporting 32
 - workstation 32
- H**
 - hard drive
 - precautions 30
 - product description 3
 - removal 46
 - spare part numbers 20, 23, 25, 26, 46
 - specifications 87
 - hard drive bracket
 - illustrated 24
 - removal 48
 - hard drive compartment cover
 - location 15
 - removal 47
 - spare part number 27, 47
 - hard drive connector cable
 - illustrated 24
 - removal 48
 - Hard Drive Hardware Kit
 - contents 23
 - spare part number 20, 23, 27, 46
 - hard drive light 13
 - HDMI port 12
 - headphone jack 12
- J**
 - jacks
 - audio-in 12
 - audio-out 12
 - headphone 12
 - microphone 12
 - network 12
 - RJ-45 12
- K**
 - key components 9
 - keyboard
 - product description 4
 - removal 40
 - spare part numbers 19, 25, 26, 40
 - keys
 - Action 9
 - esc 9
 - fn 9
 - Windows applications 9
 - Windows logo 9
- L**
 - left-side components 12
 - light components 10
 - lights
 - AC adapter 14
 - caps lock 10
 - hard drive 13
 - optical drive 14
 - power 10, 13
 - TouchPad 11
 - webcam 7
 - wireless 10
- M**
 - mass storage device
 - illustrated 23
 - precautions 30
 - memory module
 - product description 2
 - removal 37
 - spare part numbers 20, 25, 26, 37
 - memory module/wireless module
 - compartment cover
 - location 15
 - removal 37
 - spare part number 27, 37
 - microphone
 - location 6
 - product description 3
 - microphone jack 12
 - model description 35
 - model name 1
 - monitor port 12
- N**
 - network jack 12
- O**
 - operating system, product
 - description 5
 - optical drive
 - location 14
 - precautions 30
 - product description 3
 - removal 44
 - spare part number 20, 24, 27, 44
 - optical drive connector cable
 - removal 57
 - spare part number 19, 27, 57
 - optical drive eject button 14
 - optical drive light 14
- P**
 - packaging guidelines 32
 - plastic parts, service
 - considerations 29
 - pointing device, product
 - description 4
 - ports
 - external monitor port 12
 - HDMI 12
 - monitor port 12
 - product description 4
 - USB 12, 14
 - power button 8
 - power button board
 - removal 53
 - spare part number 19, 27, 53
 - power connector 14
 - power connector cable
 - removal 78
 - spare part number 20, 27, 78
 - power cord
 - set requirements 95
 - spare part numbers 24, 25
 - power light 10, 13
 - power requirements, product
 - description 4
 - processor
 - removal 67
 - spare part numbers 20, 26, 27, 28, 67
 - processor, product description 1
 - product description
 - audio 3
 - chipset 1
 - display panel 2
 - Ethernet 3
 - external media cards 4
 - graphics 2
 - hard drive 3
 - keyboard 4
 - memory module 2

- microphone 3
- operating system 5
- optical drive 3
- pointing device 4
- ports 4
- power requirements 4
- processors 1
- product name 1
- security 5
- serviceability 5
- video 3
- wireless 3
- product name 1, 34
- product number 34

R

- removal/replacement
 - preliminaries 29
 - procedures 34
- right-side components 14
- RJ-45 jack 12
- RTC battery
 - removal 49
 - spare part number 20, 27, 49
- Rubber Feet Kit, spare part number 20, 27

S

- Screw Kit, spare part number 24, 27
- security cable slot 14
- security, product description 5
- serial number 34
- service considerations
 - cables 29
 - connectors 29
 - plastic parts 29
- service tag 17, 34
- serviceability, product description 5
- speakers
 - location 11
 - removal 59
 - spare part number 19, 27, 59
- specifications
 - computer 85
 - display 86
 - hard drive 87

- system board
 - removal 63
 - spare part numbers 19, 27, 63

T

- tools required 29
- top cover
 - removal 50
 - spare part number 19, 27, 50
- TouchPad button 11
- TouchPad button board
 - removal 54
 - spare part number 19, 27, 54
- TouchPad components 11
- TouchPad light 11
- TouchPad on/off button 11
- TouchPad zone 11
- transporting guidelines 32

U

- USB board
 - removal 61
 - spare part number 19, 27, 61
- USB port 12, 14

V

- vents 12, 15
- video, product description 3

W

- warranty period 35
- webcam 7
- webcam light 7
- webcam/microphone module
 - removal 77
 - spare part number 22, 27, 77
- Windows applications key 9
- Windows logo key 9
- wireless antenna
 - locations 6
 - removal 77
 - spare part number 23, 27, 78
- wireless light 10
- wireless, product description 3
- WLAN module
 - removal 38
 - spare part numbers 21, 26, 27, 28, 38
- workstation guidelines 32

