Maintenance & Service Guide

Sprout Pro by HP

Product notice

This user guide describes features that are common to most models. Some features may not be available on your computer.

Not all features are available in all editions of Windows. This computer may require upgraded and/or separately purchased hardware, drivers and/or software to take full advantage of Windows functionality. Go to http://www.microsoft.com for details.

Your product does not support Windows 8 or Windows 7

In accordance with Microsoft's support policy, HP does not support the Windows 8 or Windows 7 operating system on this product or provide any Windows 8 or Windows 7 drivers on http://support.hp.com.

Software terms

By installing, copying, downloading, or otherwise using any software product preinstalled on this computer, you agree to be bound by the terms of the HP End User License Agreement (EULA). If you do not accept these license terms, your sole remedy is to return the entire unused product (hardware and software) within 14 days for a full refund subject to the refund policy of your seller.

For any further information or to request a full refund of the price of the computer, please contact your seller.

About This Book

⚠ WARNING!   Text set off in this manner indicates that failure to follow directions could result in bodily harm or loss of life.

⚠ CAUTION: Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of information.

🗒 NOTE: Text set off in this manner provides important supplemental information.

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1 Getting to know your Sprout

Your Sprout immersive computer is a powerful tool designed to enhance your work and entertainment. Read this chapter to learn about best practices after you set up your immersive computer and where to find additional HP resources.

Front
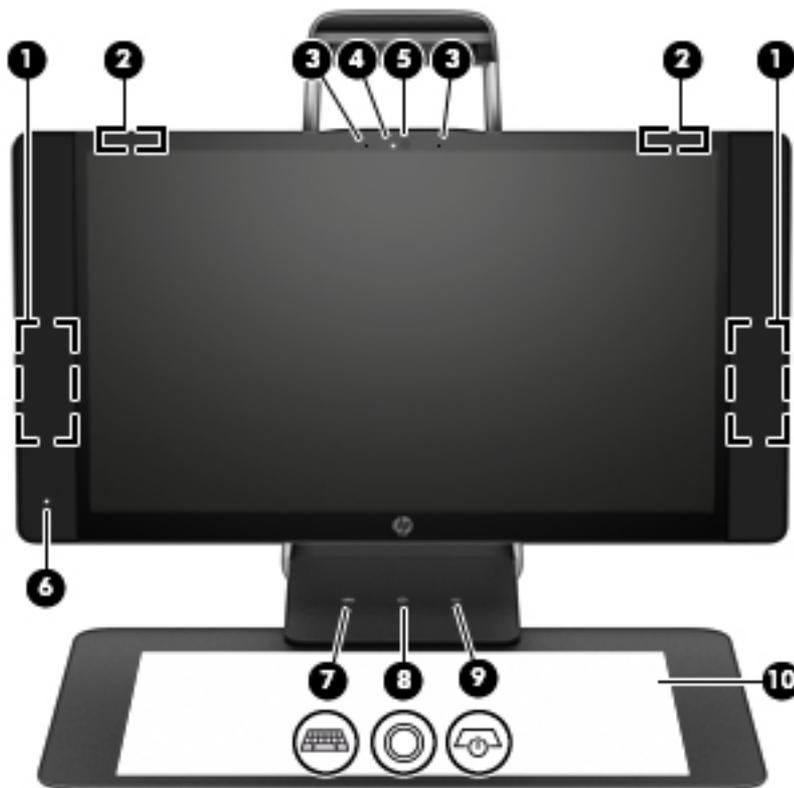
Component		Description
(1)	Speakers (2)	Produce sound.
(2)	WLAN antennas (2)*	Send and receive wireless signals.
(3)	Internal microphones (2)	Record audio, automatically filtering out the noise around you.
(4)	Webcam light	On: The webcam is on.

Component		Description
(5)	Webcam	Records video and takes still photographs.
		To use the webcam:
		▲ Type camera in the taskbar search box, and then select **Camera**.
(6)	Power light	● On: The computer is on.
		● Blinking: The computer is in the Sleep state, a power-saving state. The computer shuts off power to the display and other unneeded components.
		● Off: The computer is off or in Hibernation. Hibernation is a power-saving state that uses the least amount of power.
(7)	Keyboard button/light	Projects the keyboard on the touch mat.
(8)	Home button/light	Displays Sprout Workspace.
(9)	Projector/touch mat button/ light	● Tap the button to turn off touch capability on the mat.
		● Touch-and-hold to turn off the projector.
		● When the projector is off, tap the button to turn both the projector and the touch mat on.
(10)	HP Touch Mat	A touch-sensitive mat on which you can project Sprout Workspace to create a horizontal touch screen.

*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.

To access this document:

▲ Type support in the taskbar search box, and then select the **HP Support Assistant** app.

Sprout Illuminator
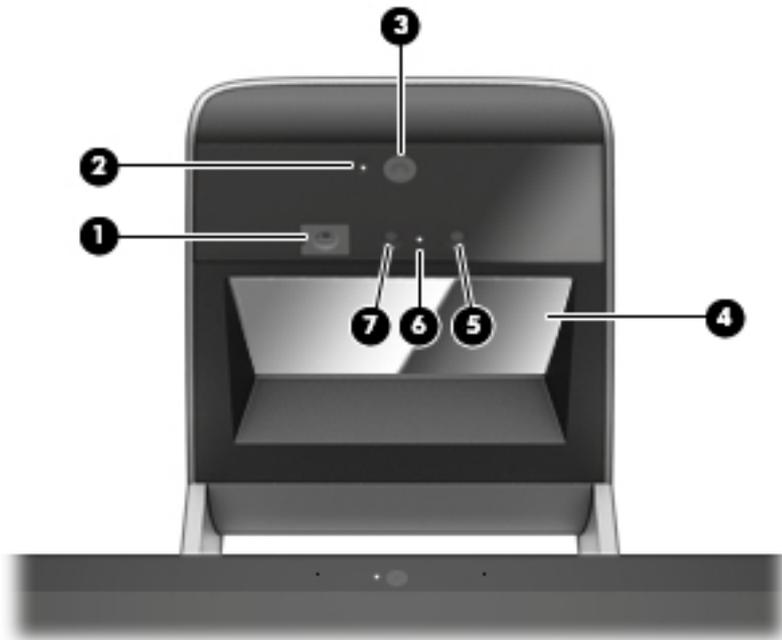
⚠ **CAUTION:** To prevent damage to your vision, avoid staring directly at the lights on Sprout Illuminator.

Component		Description
(1)	Desk lamp touch sensor (for depth camera)	Touch to turn the desk lamp on, to dim it, or to turn it off.
(2)	High-resolution camera light	On: The high-resolution camera is on.
(3)	High resolution camera	Illuminates the touch mat.
(4)	Projector mirror	Projects Sprout Workspace onto the touch mat.
(5)	Depth camera	Captures three-dimensional images.
(6)	Depth camera light	On: The depth camera is on.
(7)	High-resolution camera	Captures high-resolution images from the touch mat.

Rear
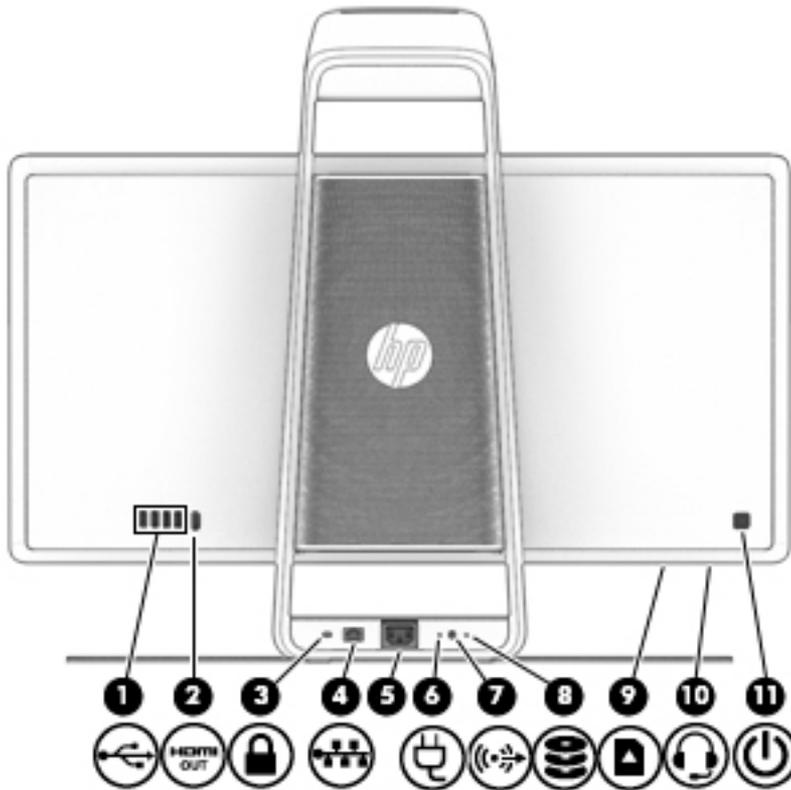
Component			Description
(1)		USB 3.0 ports (4)	Connect optional USB 3.0 devices.
(2)		HDMI output port	Projects the computer screen display to an external monitor.
			NOTE: The HDMI output port cannot be used as an input from a TV, a game console, or a set top box.
(3)		Security cable slot	Attaches an optional security cable to the computer.
			NOTE: The security cable may not prevent the computer from being mishandled or stolen.
(4)		RJ-45 (network) jack	Connects a network cable.
(5)		Power connector	Connects a power cord.
(6)		Power supply light	On: The power cord is connected.

Component			Description
(7)		Audio-out (headphone) jack	Connects optional powered stereo speakers, headphones, earbuds, a headset, or a television audio cable. Also connects an optional headset microphone. This jack does not support optional microphone-only devices.
			WARNING! To reduce the risk of personal injury, adjust the volume before putting on headphones, earbuds, or a headset. For additional safety information, see the *Regulatory, Safety, and Environmental Notices*.
			To access this guide:
			1. Type support in the taskbar search box, and then select the **HP Support Assistant** app.
			– or –
			Click the question mark icon in the taskbar.
			2. Select My **PC**, select the **Specifications** tab, and then select **User Guides**.
			NOTE: When a device is connected to the jack, the computer speakers are disabled.
(8)		Drive light	Blinking white: The hard drive is being accessed.
(9)		Memory card reader	Reads optional memory cards (SD, SDHC and SDXC) that store, manage, share, or access information.
			To insert a card:
			1. Hold the card label-side facing to the front with the connectors facing the computer.
			2. Insert the card into the memory card reader, and then press in on the card until it is firmly seated.
			To remove a card, pull the card out from the memory reader.
(10)		Audio-out (headphone)/ Audio-in (microphone) 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 *Regulatory, Safety, and Environmental Notices*.
			To access this guide:
			1. Type support in the taskbar search box, and then select the **HP Support Assistant** app.
			– or –

Component		Description
		Click the question mark icon in the taskbar.
		2. Select My **PC**, select the **Specifications** tab, and then select **User Guides**.
		NOTE: When a device is connected to the headphone jack, the computer speakers are disabled.
(11) ⏻	Power button	• 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 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, see your power options.
		1. Type `power options` in the taskbar search box, and then select **Power Options**
		– or –
		2. Right-click the Power Meter icon, and then select **Power Options**.

Connecting the HP Touch Mat

Set up your Sprout on a flat, level surface.

CAUTION: To prevent damage to the touch mat:

- Do not cut or pierce the touch mat.

- Do not bend or fold the touch mat.

- Do not place any magnetic components on the touch mat.

- Do not use metal objects on or under the touch mat.

- When using a stylus on the touch mat, do not place your hand or palm on the touch mat because your hand or palm may be treated as contact points.

To connect the touch mat, place the touch mat on a flat, level surface in front of the monitor, and slide it toward the monitor. Magnets connect the touch mat to the monitor automatically.

NOTE: If you remove the touch mat, the projector will turn off.

To protect the touch mat from dirt or accidental damage when it is not being used, use the optional HP Touch Mat Cover (purchased separately).

Labels

Identifying the labels

The labels affixed to the computer provide information you may need when you troubleshoot system problems. The labels are located on the bottom of the computer.

- Service label—Provides important information to identify your computer. When contacting support, you will probably be asked for the serial number, and possibly for the product number or the model number. Locate these numbers before you contact support.

- Regulatory label(s)—Provide(s) regulatory information about the computer.

- Wireless certification label(s)—Provide(s) information about optional wireless devices and the approval markings for the countries or regions in which the devices have been approved for use.

2   Illustrated parts catalog

Computer covers and plastics

Item	Description
(1)	**Left rear cover**
(2)	**Right rear cover**
(3)	**Outer plastic frame**

Computer boards
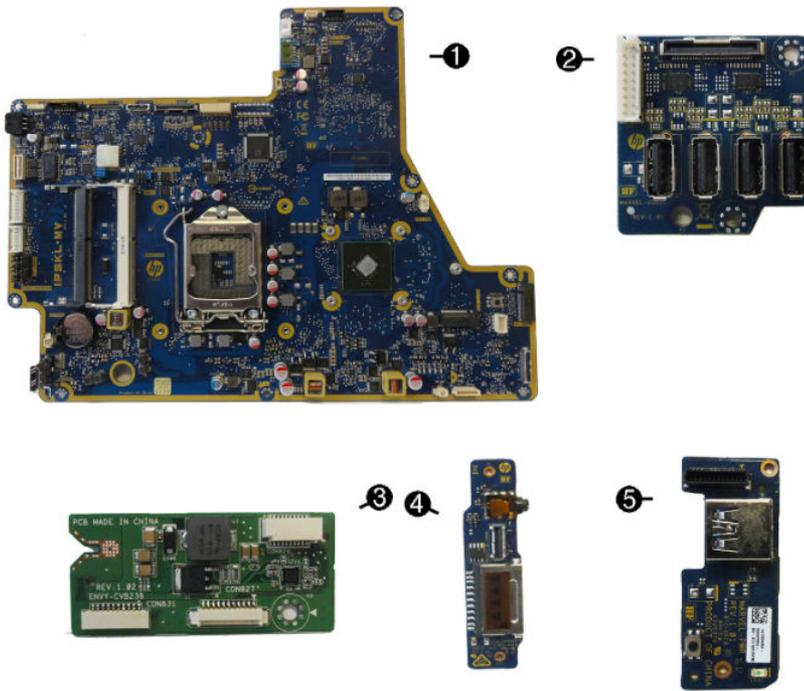
Item	Description
(1)	**System board**
(2)	**USB board**
(3)	**Converter board**
(4)	**Card reader/audio board**
(5)	**Wireless receiver/power button board**

Computer miscellaneous parts

Item	Description
(1)	**Column assembly**, full assembly
(2)	**Display assembly**, full assembly
(3)	**Speakers**, right and left
(4)	**Fan**
(5)	**Heat sink (thermal module)** (includes replacement thermal material)
(6)	**Power supply**
(7)	**Wireless USB receiver**
(8)	**Webcam module assembly**
(9)	**Hard drive connector and cables**

Item	Description
(10)	**Hard drive cage**
(11)	**Hard drive** (1 TB, 2.5-inch, hybrid SSHD)
(12)	**M.2 solid-state drives**
	SATA solid-state drive (512 GB, 2.5-inch)
	PCIe solid-state drive (512 GB M.2 2280 NVMe PCIe; EMEA region only)
	PCIe solid-state drive (256 GB M.2 2280 NVMe PCIe)
(13)	**Hard drive rubber screw grommet**
(14)	**4-GB memory module** (SODIMM; PC4-2400)
(15)	**WLAN module** (Intel Dual Band Wireless-AC 8260 NIC; 802.11abgn+ac MIMO 2x2; Bluetooth® 4.2; not illustrated)
*	**Intel Core i7-7700T processor (2.9 GHz, 8 MB cache, 35 W)** (includes replacement thermal material; not illustrated)
*	**Antenna kit**
*	**HP Comfort Grip Wireless Mouse**
*	**Pen with app launch button**
*	**Pen keyboard loop**
*	**Touch Mat**

*   not illustrated

Computer cables

Description
LVDS (display) cable
Webcam cable
Converter cable
Power/LED/wireless USB cable
LAN, rear I/O cable
Card reader/audio board cable
USB 3.0 I/O signal cable
USB 3.0 power cable
Touch USB cable
POGO USB 2.0 cable
Backlight cable

Keyboards

Description
HP Wireless Link-5 Keyboard available for the following countries:
Asia/Pacific
Belgium
Czech Republic
France
French Canada
Germany
India
Internationally
Israel
Italy
India
Japan
India
People's Republic of China
Saudi Arabia
South Korea
Switzerland
Thailand
Turkey
United Kingdom
United States

Power cords

Description
Power cord available for the following countries and regions:
North America
Australia
Europe
India
Japan
People's Republic of China
South Africa
South Korea
Switzerland
United Kingdom

3 Disassembly preparation and SATA drive guidelines

This chapter provides general service information for the computer. Adherence to the procedures and precautions described in this chapter is essential for proper service.

⚠ **CAUTION:** When the computer is plugged into an AC power source, voltage is always applied to the system board. You must disconnect the power cord from the power source before opening the computer to prevent system board or component damage.

Electrostatic discharge information

A sudden discharge of static electricity from your finger or other conductor can destroy static-sensitive devices or microcircuitry. Often the spark is neither felt nor heard, but damage occurs. An electronic device exposed to electrostatic discharge (ESD) may not appear to be affected at all and can work perfectly throughout a normal cycle. The device may function normally for a while, but it has been degraded in the internal layers, reducing its life expectancy.

Networks built into many integrated circuits provide some protection, but in many cases, the discharge contains enough power to alter device parameters or melt silicon junctions.

Generating static

The following table shows that:

- Different activities generate different amounts of static electricity.

- Static electricity increases as humidity decreases.

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

These are then multi-packaged inside plastic tubes, trays, or Styrofoam.

NOTE: 700 volts can degrade a product.

Preventing electrostatic damage to equipment

Many electronic components are sensitive to ESD. Circuitry design and structure determine the degree of sensitivity. The following packaging and grounding precautions are necessary to prevent damage to electric components and accessories.

- To avoid hand contact, transport products in static-safe containers such as tubes, bags, or boxes.

- Protect all electrostatic parts and assemblies with conductive or approved containers or packaging.

- Keep electrostatic sensitive parts in their containers until they arrive at static-free stations.

- Place items on a grounded surface before removing them from their container.

- Always be properly grounded when touching a sensitive component or assembly.

- Avoid contact with pins, leads, or circuitry.

- Place reusable electrostatic-sensitive parts from assemblies in protective packaging or conductive foam.

Personal grounding methods and equipment

Use the following equipment to prevent static electricity damage to equipment:

- **Wrist straps** are flexible straps with a maximum of one-megohm ± 10% resistance in the ground cords. To provide proper ground, a strap must be worn snug against bare skin. The ground cord must be connected and fit snugly into the banana plug connector on the grounding mat or workstation.

- **Heel straps/Toe straps/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 them on both feet with a maximum of one-megohm ± 10% resistance between the operator and ground.

Static Shielding Protection Levels

Method	Voltage
Antistatic plastic	1,500
Carbon-loaded plastic	7,500
Metallized laminate	15,000

Grounding the work area

To prevent static damage at the work area, use the following precautions:

- Cover the work surface with approved static-dissipative material. Provide a wrist strap connected to the work surface and properly grounded tools and equipment.

- Use static-dissipative mats, foot straps, or air ionizers to give added protection.

- Handle electrostatic sensitive components, parts, and assemblies by the case or PCB laminate. Handle them only at static-free work areas.

- Turn off power and input signals before inserting and removing connectors or test equipment.

- Use fixtures made of static-safe materials when fixtures must directly contact dissipative surfaces.

- Keep work area free of nonconductive materials such as ordinary plastic assembly aids and Styrofoam.

- Use field service tools, such as cutters, screwdrivers, and vacuums, that are conductive.

Recommended materials and equipment

Materials and equipment that are recommended for use in preventing static electricity include:

- Antistatic tape

- Antistatic smocks, aprons, or sleeve protectors

- Conductive bins and other assembly or soldering aids

- Conductive foam

- Conductive tabletop workstations with ground cord of one-megohm +/- 10% resistance

- Static-dissipative table or floor mats with hard tie to ground

- Field service kits

- Static awareness labels

- Wrist straps and footwear straps providing one-megohm +/- 10% resistance

- Material handling packages

- Conductive plastic bags

- Conductive plastic tubes

- Conductive tote boxes

- Opaque shielding bags

- Transparent metallized shielding bags

- Transparent shielding tubes

Operating guidelines

To prevent overheating and to help prolong the life of the computer:

- Keep the computer away from excessive moisture, direct sunlight, and extremes of heat and cold.

- Operate the computer on a sturdy, level surface. Leave a 10.2-cm (4-inch) clearance on all vented sides of the computer and above the monitor to permit the required airflow.

- Never restrict the airflow into the computer by blocking any vents or air intakes. Do not place the keyboard, with the keyboard feet down, directly against the front of the desktop unit as this also restricts airflow.

- Occasionally clean the air vents on all vented sides of the computer. Lint, dust, and other foreign matter can block the vents and limit the airflow. Be sure to unplug the computer before cleaning the air vents.

- Never operate the computer with the covers or panels removed.

- If the computer is to be operated within a separate enclosure, intake and exhaust ventilation must be provided on the enclosure, and the same operating guidelines listed above will still apply.

- Keep liquids away from the computer and keyboard.

- Never cover the ventilation slots on the monitor with any type of material.

- Install or enable power management functions of the operating system or other software, including sleep states.

Service considerations

Listed below are some of the considerations that you should keep in mind during the disassembly and assembly of the computer.

Fan

The fan is variable-speed based on the temperature in the computer.

⚠ **CAUTION:**   The cooling fan is always on when the computer is in the "On" mode. The cooling fan is off when the computer is in "Standby," "Suspend," or "Off" modes.

You must disconnect the power cord from the power source before opening the computer to prevent system board or component damage.

Tools and software requirements

To service the computer, you need the following:

- Torx T-15 screwdriver

- Flat-bladed screwdriver (may sometimes be used in place of the Torx screwdriver)

- Phillips #1 screwdriver

- Diagnostics software

Screws

The screws used in the computer are not interchangeable. They may have standard or metric threads and may be of different lengths. If an incorrect screw is used during the reassembly process, it can damage the unit. HP strongly recommends that all screws removed during disassembly be kept with the part that was removed, then returned to their proper locations.

⚠ **CAUTION:**   Metric screws have a black finish. U.S. screws have a silver finish and are used on hard drives only.

CAUTION: As each subassembly is removed from the computer, it should be placed away from the work area to prevent damage.

Cables and connectors

Most cables used throughout the unit are flat, flexible cables. These cables must be handled with care to avoid damage. Apply only the tension required to seat or unseat the cables during insertion or removal from the connector. Handle cables by the connector whenever possible. In all cases, avoid bending or twisting the cables, and ensure that the cables are routed in such a way that they cannot be caught or snagged by parts being removed or replaced.

⚠ **CAUTION:**   When servicing this computer, ensure that cables are placed in their proper location during the reassembly process. Improper cable placement can damage the computer.

Hard Drives

Handle hard drives as delicate, precision components, avoiding all physical shock and vibration. This applies to failed drives as well as replacement spares.

- If a drive must be mailed, place the drive in a bubble-pack mailer or other suitable protective packaging and label the package "Fragile: Handle With Care."

- Do not remove hard drives from the shipping package for storage. Keep hard drives in their protective packaging until they are actually mounted in the CPU.

- Avoid dropping drives from any height onto any surface.

- If you are inserting or removing a hard drive, turn off the computer. Do not remove a hard drive while the computer is on or in standby mode.

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

- Do not use excessive force when inserting a drive.

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

Lithium coin cell battery

The battery that comes with the computer provides power to the real-time clock and has a minimum lifetime of about three years.

See the appropriate removal and replacement chapter for the chassis you are working on in this guide for instructions on the replacement procedures.

⚠ **WARNING!**   This computer contains a lithium battery. There is a risk of fire and chemical burn if the battery is handled improperly. Do not disassemble, crush, puncture, short external contacts, dispose in water or fire, or expose it to temperatures higher than 140ºF (60ºC). Do not attempt to recharge the battery.

📝 **NOTE:**   Batteries, battery packs, and accumulators should not be disposed of together with the general household waste. In order to forward them to recycling or proper disposal, please use the public collection system or return them to HP, their authorized partners, or their agents.

SATA hard drives

Serial ATA Hard Drive Characteristics	
Number of pins/conductors in data cable	7/7
Number of pins in power cable	15
Maximum data cable length	39.37 in (100 cm)
Data interface voltage differential	400–700 mV
Drive voltages	3.3 V, 5 V, 12 V
Jumpers for configuring drive	N/A
Data transfer rate	6.0 Gb/s

SATA hard drive cables

SATA data cable

Always use an HP approved SATA 6.0 Gb/s cable as it is fully backwards compatible with the SATA 1.5 Gb/s drives.

Current HP desktop products ship with SATA 6.0 Gb/s hard drives.

SATA data cables are susceptible to damage if overflexed. Never crease a SATA data cable and never bend it tighter than a 30 mm (1.18 in) radius.

The SATA data cable is a thin, 7-pin cable designed to transmit data for only a single drive.

SMART ATA drives

The Self Monitoring Analysis and Recording Technology (SMART) ATA drives for the HP Personal Computers have built-in drive failure prediction that warns the user or network administrator of an impending failure or crash of the hard drive. The SMART drive tracks fault prediction and failure indication parameters such as reallocated sector count, spin retry count, and calibration retry count. If the drive determines that a failure is imminent, it generates a fault alert.

Cable management

Always follow good cable management practices when working inside the computer.

- Keep cables away from major heat sources like the heat sink.

- Do not jam cables on top of memory modules. Printed circuit cards like these are not designed to take excessive pressure on them.

- Keep cables clear of sliding or moveable parts to prevent them from being cut or crimped when the parts are moved.

- When folding a flat ribbon cable, never fold to a sharp crease. Sharp creases may damage the wires.

- Do not bend any cable sharply. A sharp bend can break the internal wires.

- Never bend a SATA data cable tighter than a 30 mm (1.18 in) radius.

- Never crease a SATA data cable.

- Do not rely on components to push cables down into the chassis. Always position the cables to lay properly by themselves.

4 Removal and Replacement Procedures

The following sections provide information about disassembling various components of the computer.

Preparing to disassemble the computer

To avoid injury and equipment damage, always complete the following steps in order.

1. Remove all media from the computer.

2. Shut down the computer.

3. After the system has completely shut down, remove the Touch Mat and disconnect the power cord and all attached cables from the back of the computer.

4. Using caution, lay the computer down on a flat surface covered with a soft cloth. Make sure the head hangs off the front of the table (as shown).

⚠ WARNING! Beware of sharp edges inside the chassis.

Removing the rear covers from the computer

You must remove the rear covers from the computer before you can service the computer or the column. Each cover may be secured with one screw.

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 23).

2. **Right cover:** If a security screw is installed in the bottom of the rear cover, remove the screw **(1)**.

3. Locate the recess in the bottom of the cover **(2)**, and then lift and rotate the outside of the cover up to disengage it from the chassis **(3)**.

4. Pull the cover away from the computer **(4)**.
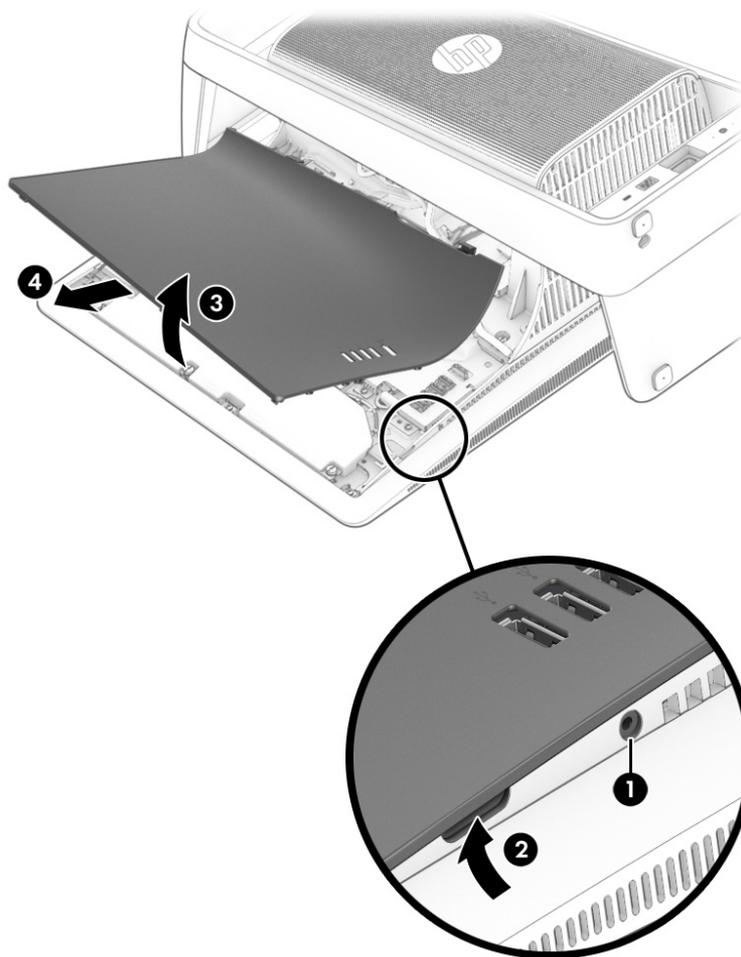
5. **Left cover:** If a security screw is installed in the bottom of the rear cover, remove the screw **(1)**.

6. Locate the recess in the bottom of the cover **(2)**, and then lift and rotate the outside of the cover up to disengage it from the chassis **(3)**.

7. Pull the cover away from the computer **(4)**.
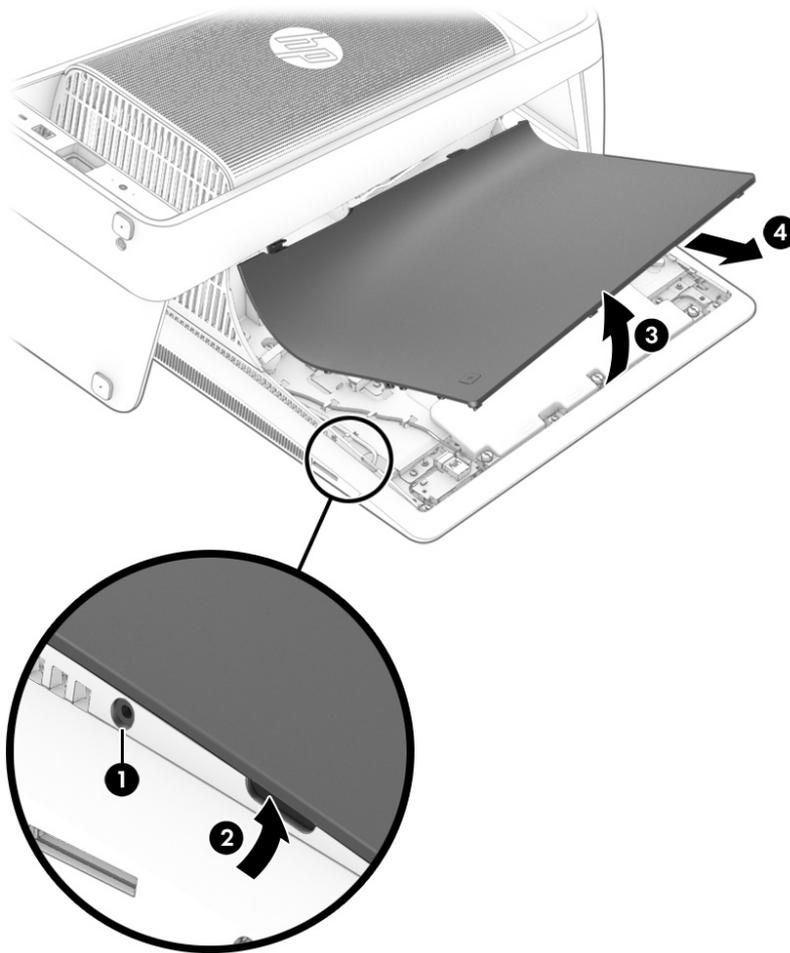
Reverse the removal procedures to install the covers.

Hard drive

The hard drive **(1)** is located under the right rear cover. You do not have to remove the computer from the column to service the hard drive.
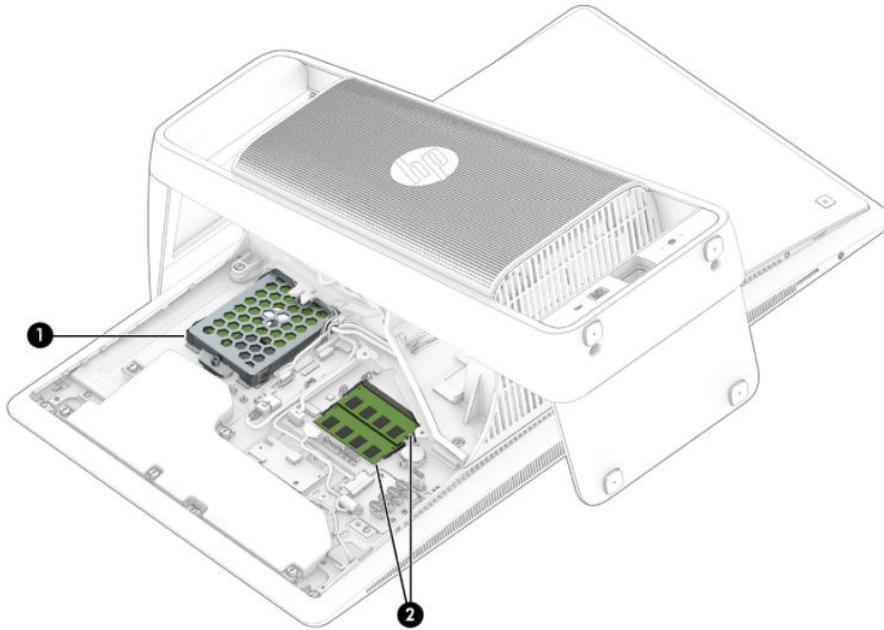
To remove the hard drive:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 23).

2. Remove the right rear cover (see Removing the rear covers from the computer on page 24).

3. Loosen the captive Phillips screw that secures the drive **(1)**, slide the drive away from the column **(2)**, and then remove the drive from the computer **(3)**.
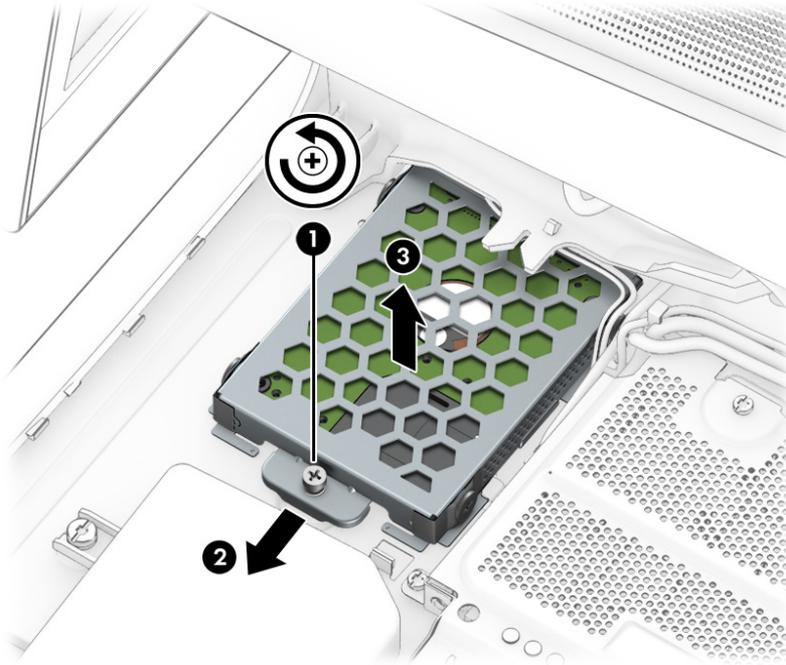
4. To remove the drive from the drive cage, remove the four Phillips screws from the sides of the cage **(1)**, and then lift the cage off the drive **(2)**.

NOTE: Be sure to note the orientation of the hard drive (which side is up and connector location) before removing from the hard drive cage.
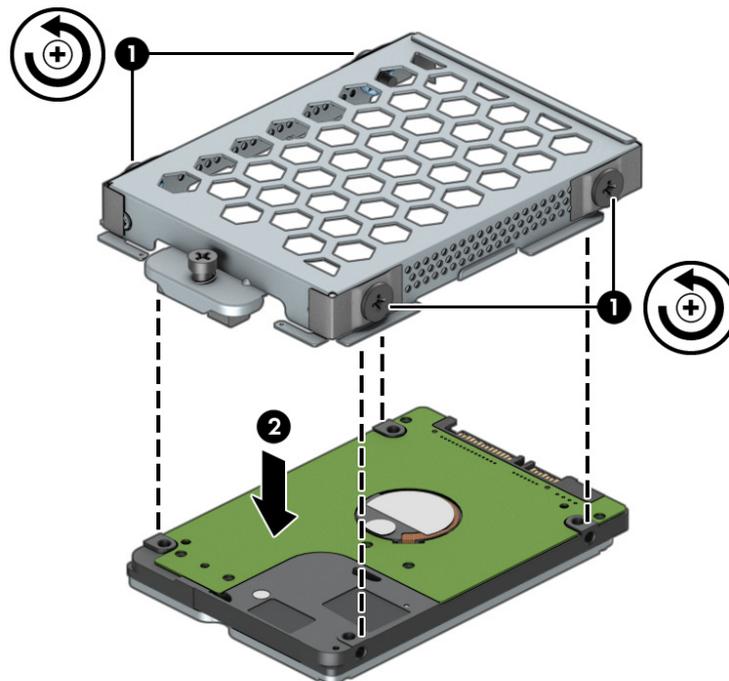
To replace the hard drive, reverse the removal procedures.

Before installing a hard drive into the hard drive cage, make sure the four rubber grommets are correctly installed in the cage.
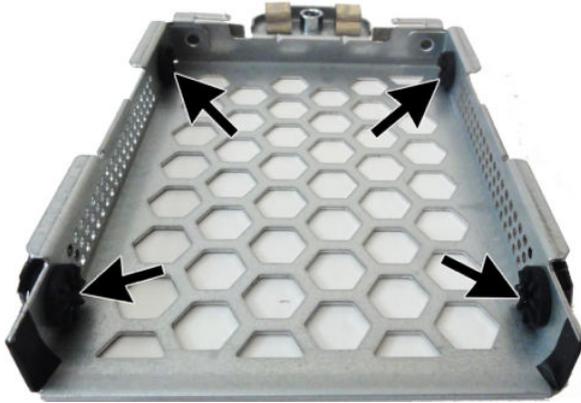
Memory

Two memory module sockets **(2)** are located under the memory cover under right rear cover. You do not have to remove the computer from the column to replace the memory modules.
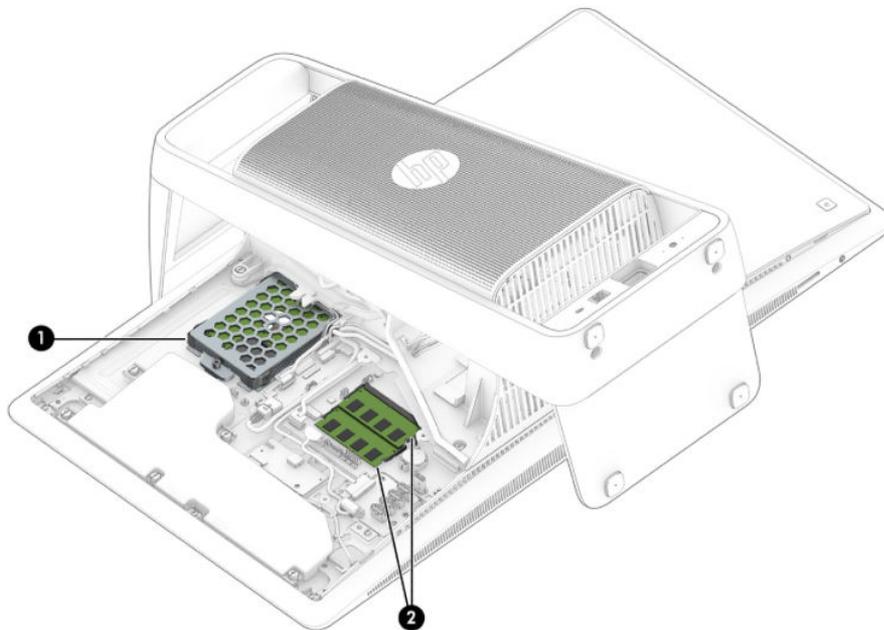
SODIMMs are small outline dual-inline memory modules. SODIMM modules must meet the following requirements:

- DDR4-2400 non-ECC unbuffered SODIMMs (204 pin)

- 1.2 V memory only

- 16 GB maximum installable memory

NOTE: Because the memory uses dual channels, you must use the same SODIMM type for both sockets.

The actual memory transfer speed might vary based on the processor used in your computer.

Memory performance might vary due to different system configurations.

To remove a memory module:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 23).

2. Remove the right rear cover (see Removing the rear covers from the computer on page 24).

3. Remove the four Phillips screws **(1)** that secure the memory cover to the computer, rotate the column side of the cover upward, and then remove the cover **(2)**.
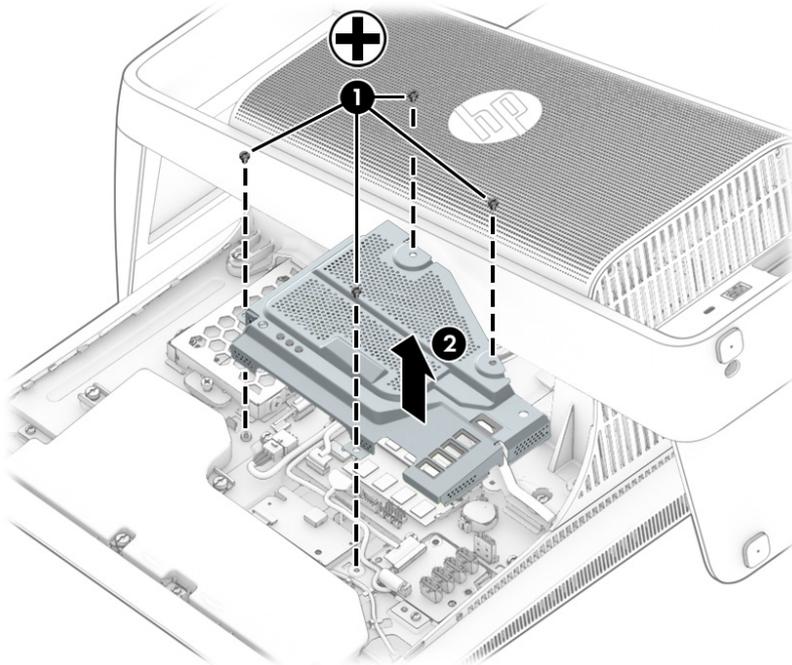
4. Spread the two retention clips outward **(1)** until the memory module tilts up at a 45-degree angle. Remove the module **(2)**. Use the same procedure to remove both memory modules.
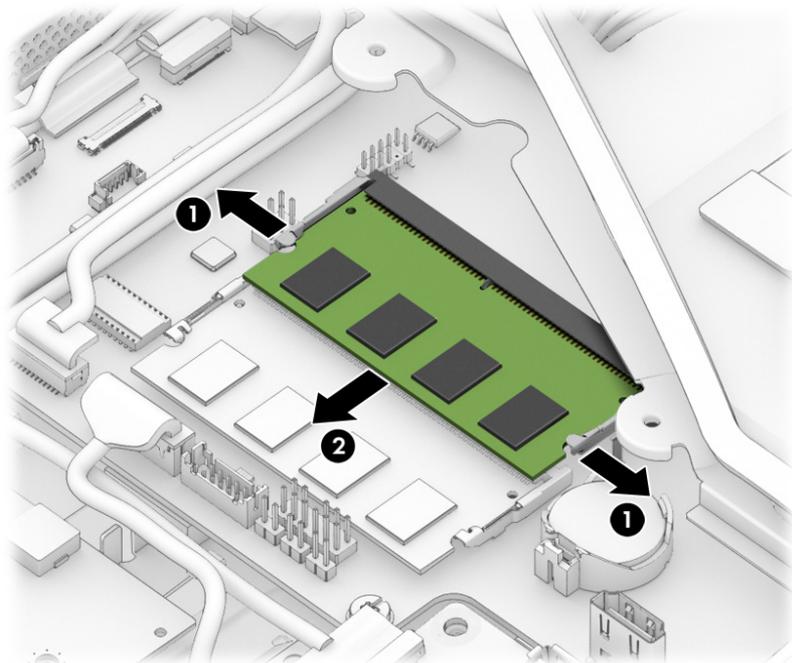
NOTE: A memory module can be installed in only one way. Match the notch on the module with the tab on the memory socket.

The computer automatically recognizes the additional memory when you turn on the computer.

Wireless USB receiver

Two wireless replacement kits are available:

- Wireless keyboard

- Wireless mouse with wireless receiver

The wireless USB receiver controls both kits.

The receiver **(3)** is located under the left rear cover. You do not have to remove the computer from the column to replace the wireless USB receiver.
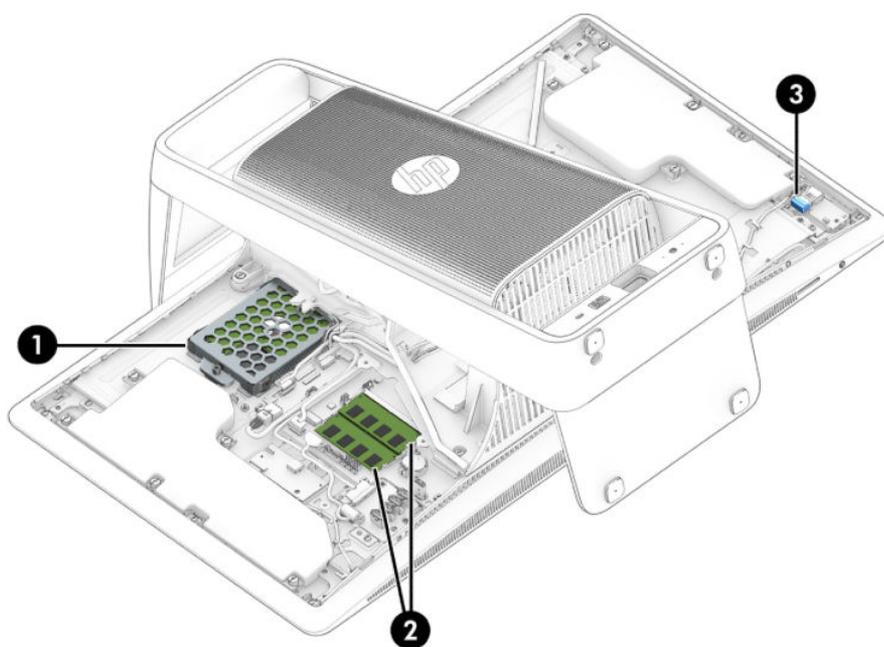
To remove a wireless USB receiver:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 23).

2. Remove the left rear cover (see Removing the rear covers from the computer on page 24).

3. Remove the old wireless receiver from the internal USB port, and then insert the new receiver into the port.
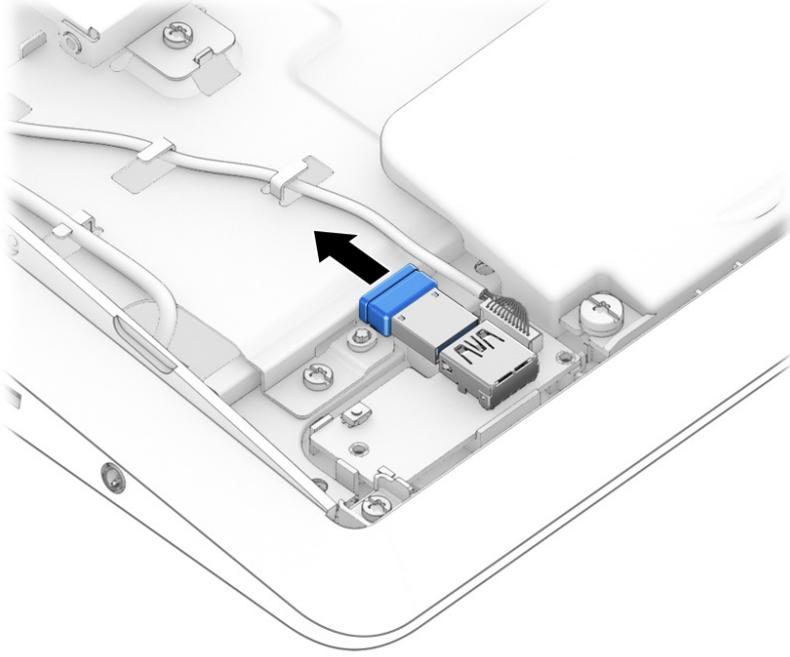
M.2 cover and solid-state drive

The location of the M.2 cover is shown in the following image. You do not have to remove the computer from the column to replace the M.2 solid-state drive.

To remove the M.2 cover and solid-state drive:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 23).

2. Remove the left rear cover (see Removing the rear covers from the computer on page 24).

3. Remove the Torx screw from the M.2 cover **(1)**, and then lift the cover off the computer **(2)**.

4. Remove the Phillips M2.0×3.0 screw **(1)** that secures the solid-state drive to the system board.

5. Remove the drive **(2)** by pulling it away from the connector.

> 📝 **NOTE:** M.2 solid-state drives are designed with notches to prevent incorrect insertion.
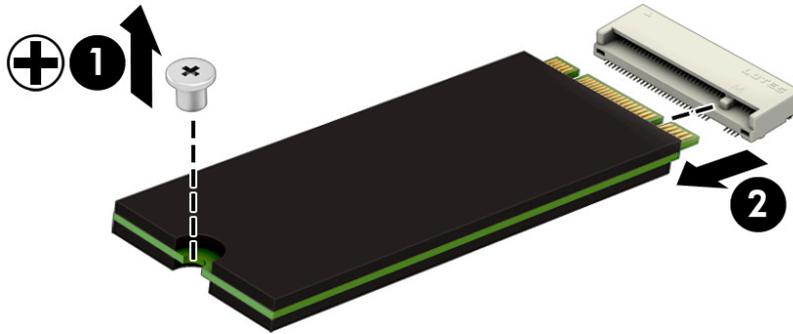
To replace the M.2 solid-state drive, reverse the removal procedures.

Battery

The battery is located under the memory cover near the memory modules. You do not have to remove the computer from the column to replace the battery.
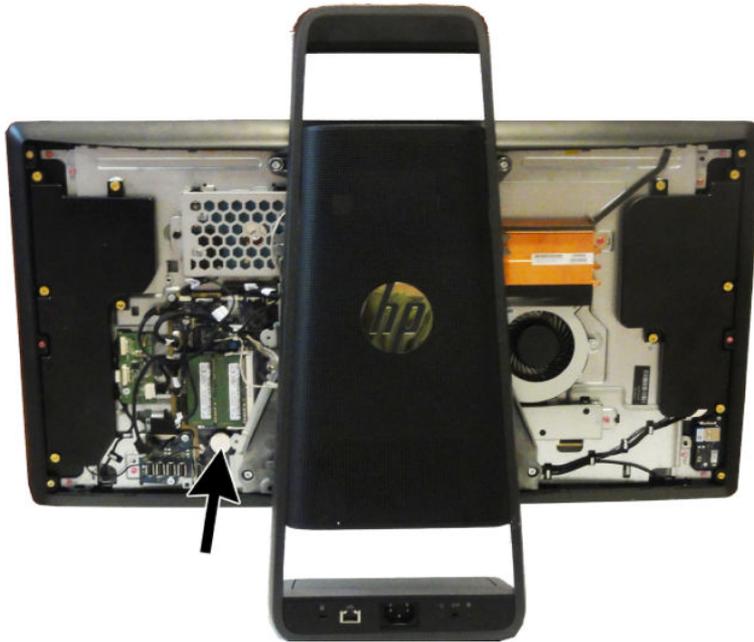
The battery that comes with the computer provides power to the real-time clock. When replacing the battery, use a battery equivalent to the battery originally installed in the computer. The computer comes with a 3-volt lithium coin cell battery.

⚠ **WARNING!**   The computer contains an internal lithium manganese dioxide battery. There is a risk of fire and burns if the battery is not handled properly. To reduce the risk of personal injury:

Do not attempt to recharge the battery.

Do not expose to temperatures higher than 60° C (140º F).

Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.

Replace the battery only with the HP spare designated for this product.

⚠ **CAUTION:**   Before replacing the battery, it is important to back up the computer CMOS settings. When the battery is removed or replaced, the CMOS settings will be cleared.

Static electricity can damage the electronic components of the computer or optional equipment. Before beginning these procedures, ensure that you are discharged of static electricity by briefly touching a grounded metal object.

📝 **NOTE:**   The lifetime of the lithium battery can be extended by plugging the computer into a live AC wall socket. The lithium battery is only used when the computer is NOT connected to AC power.

HP encourages customers to recycle used electronic hardware, HP original print cartridges, and rechargeable batteries. For more information about recycling programs, go to http://www.hp.com/recycle.

1.   Prepare the computer for disassembly (see Preparing to disassemble the computer on page 23).

2.   Remove the right rear cover (see Removing the rear covers from the computer on page 24).

3. Remove the memory cover (see).

4. To release the battery from its holder, squeeze the metal clamp that extends above one edge of the battery. When the battery pops up, lift it out **(1)**.

5. To insert the new battery, slide one edge of the replacement battery under the holder's lip with the positive side up. Push the other edge down until the clamp snaps over the other edge of the battery **(2)**.
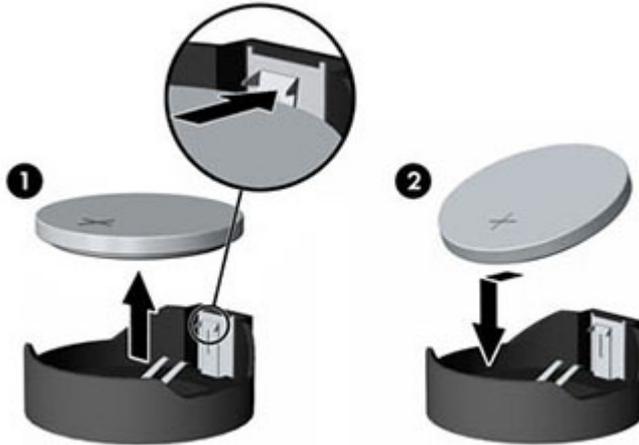
Wireless USB/power button board

When viewing the back of the computer, the wireless USB/power button board is located at the bottom right of the computer. The wireless USB receiver plugs into this board.

To remove the wireless USB/power button board:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 23).

2. Remove the left rear cover (see Removing the rear covers from the computer on page 24).

3. Disconnect the cable from the connector on the wireless board **(1)**.

4. Remove the two Phillips screws **(2)** that secure the board to the computer.

5. Remove the wireless board from the computer.
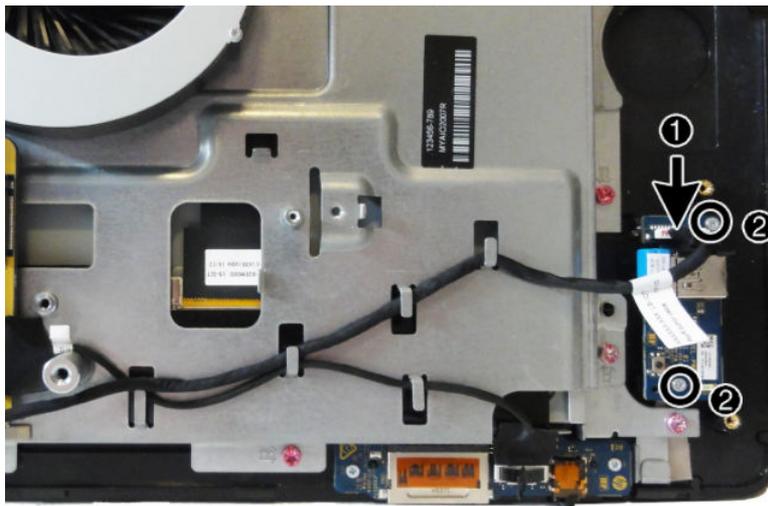
To install the wireless USB/power button board, reverse the removal procedures.

Converter board

When viewing the back of the computer, the converter board is located to the left of the system board.

To remove the converter board:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 23).

2. Remove the right rear cover (see Removing the rear covers from the computer on page 24).

3. Remove the memory cover (see Memory on page 29).

4. Disconnect the two cables from the board **(1)**.

    📝 **NOTE:** Use the backlight cable specific to the display manufacturer.

5. Remove the Torx screw **(2)** that secures the board to the computer.

6. Lift the converter board from the computer.

To install the converter board, reverse the removal procedures.

USB board

When viewing the back of the computer, the USB board is located to the left of the system board.
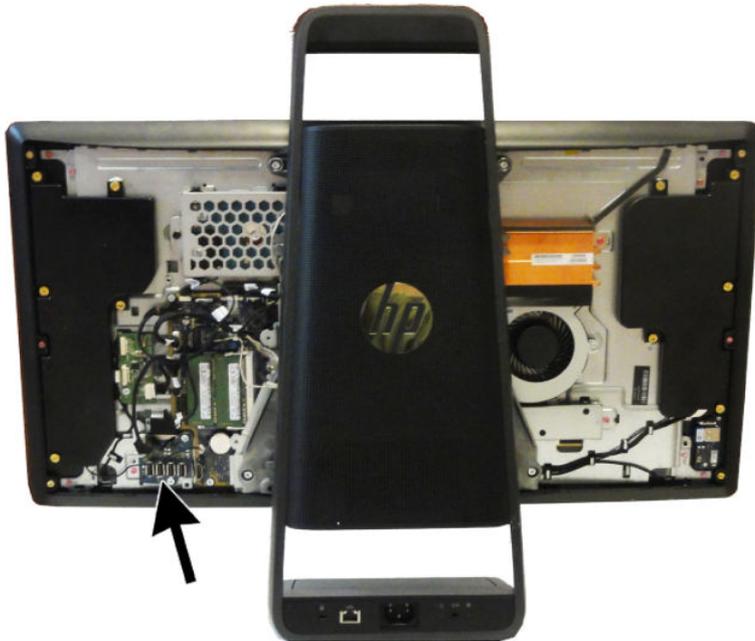
To remove the USB board:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 23).

2. Remove the right rear cover (see Removing the rear covers from the computer on page 24).

3. Remove the memory cover (see Memory on page 29).

4. Disconnect the two cables from the board **(1)**.

5. Remove the two Torx screws **(2)** that secure the board to the computer.

6. Lift the USB board from the computer.
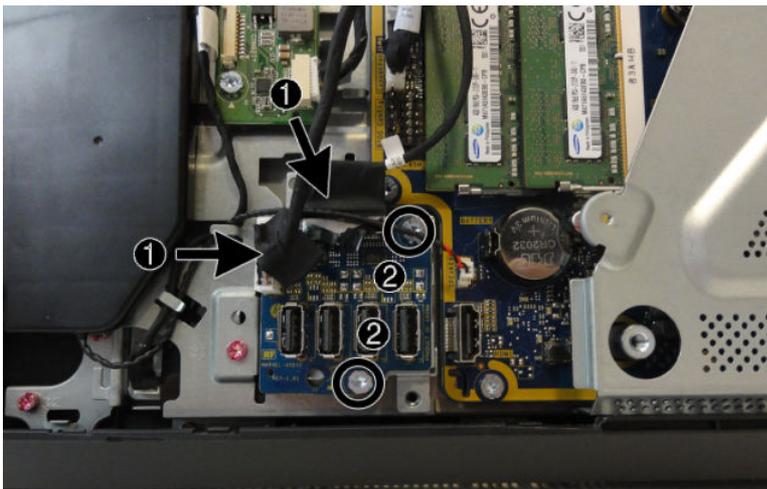
To install the USB board, reverse the removal procedures.

Separating the computer from the column

You must remove the computer from the column before you can service the remaining components. The computer is secured to the column using four Torx screws.

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 23).

2. Remove the rear covers from the computer (see Removing the rear covers from the computer on page 24).

3. Remove the memory cover (see Memory on page 29).

4. Disconnect the following cables from the system board:

    (1) LAN cable

    (2) DC In cable

    (3) POGO cable

    (4) SYS CTRL cable

    (5) H/L CAM cable

    (6) Projector cable

5. Remove the two screws from the left side of the column **(7)**.

6. Remove the two screws from right side of the column.

7. Lift the column off the computer.

Reverse the separation procedures to reattach the computer to the column.

System board cover

The system board cover is secured by three screws.

To remove the system board cover:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 23).

2. Remove the rear covers (see Removing the rear covers from the computer on page 24).

3. Remove the memory cover (see Memory on page 29).

4. Separate the computer from the column (see Separating the computer from the column on page 41).

5. Remove the M.2 cover (see M.2 cover and solid-state drive on page 33).

6. Remove the three Torx screws that secure the system board cover to the computer.
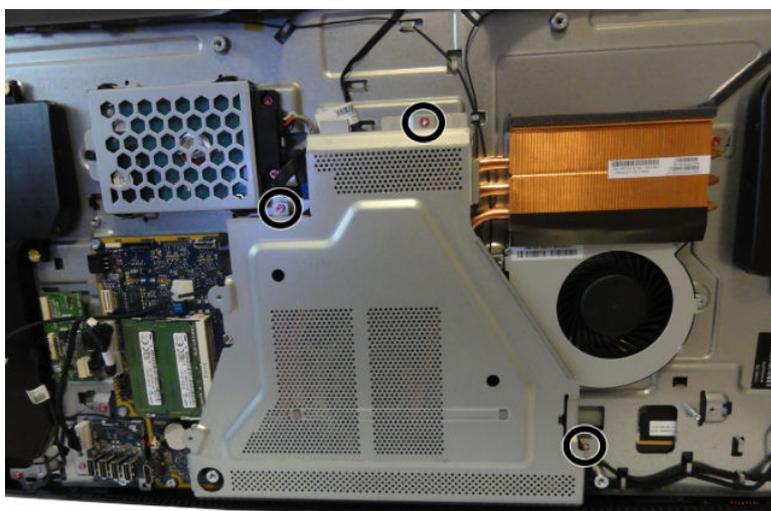
7. Lift the system board cover off the computer.
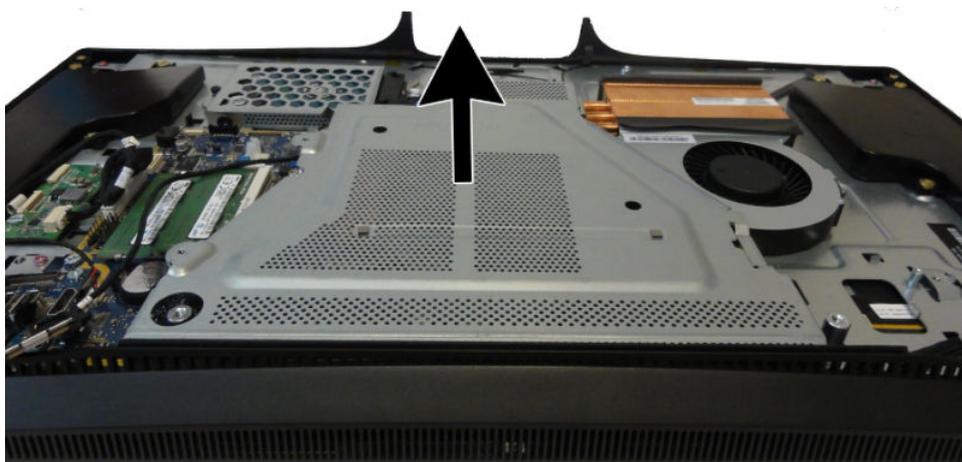
To replace the system board cover, reverse the removal procedures.

WLAN module

The WLAN module is located on the left side of the system board near the fan.
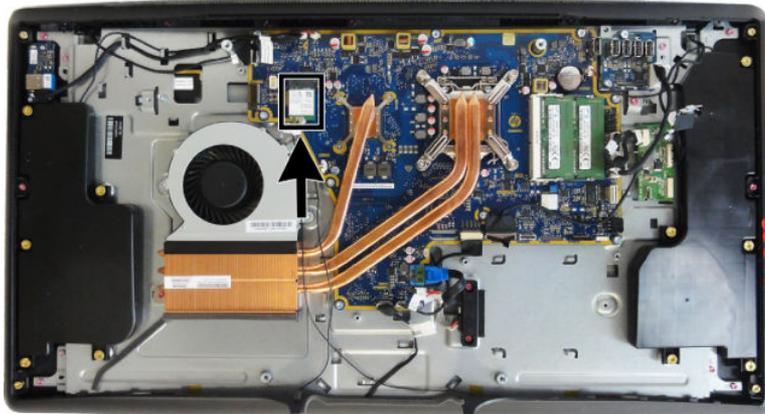
NOTE: WLAN module appearance may vary.

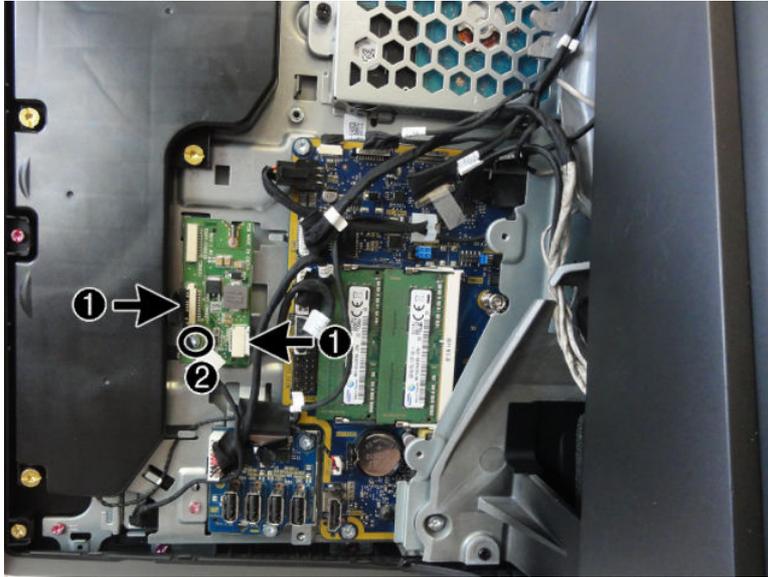To remove the WLAN module:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 23).

2. Remove the rear covers (see Removing the rear covers from the computer on page 24).

3. Remove the memory cover (see Memory on page 29).

4. Separate the computer from the column (see Separating the computer from the column on page 41).

5. Remove the system board cover (see System board cover on page 43).

6. Disconnect the antenna cables from the module **(1)**.

7. Remove the Phillips screw **(2)** that secures the module to the computer.

8. Lift the top of the module, and then pull it away to remove it from the socket **(3)**.
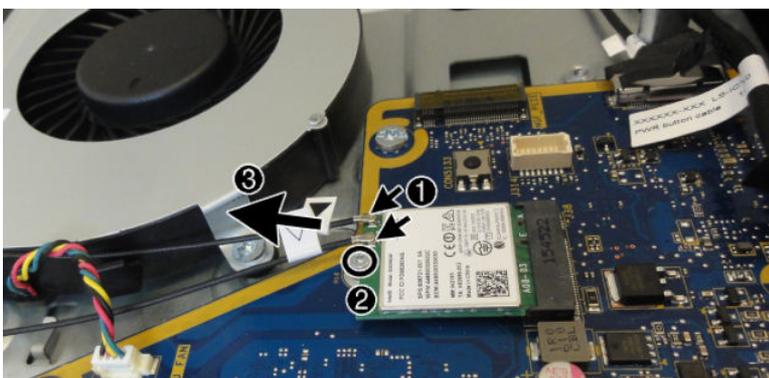
To install the WLAN module, reverse the removal procedures.

When connecting the antennas cables, connect the cable labeled "1" to the MAIN connector on the module and the cable labeled "2" to the AUX connector on the module.

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

Heat sink

The heat sink is secured with four captive Torx screws, four captive Phillips #1 screws, and one non-captive Torx screw.
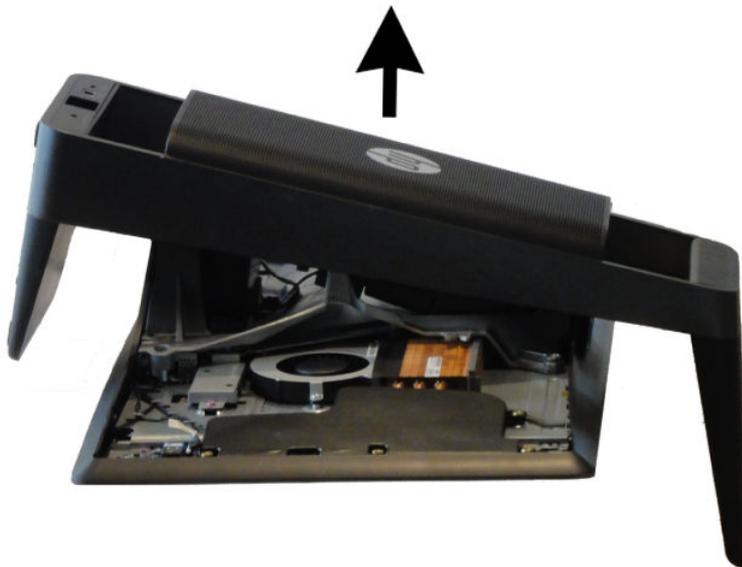
To remove the heat sink:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 23).

2. Remove the rear covers (see Removing the rear covers from the computer on page 24).

3. Remove the memory cover (see Memory on page 29).

4. Separate the computer from the column (see Separating the computer from the column on page 41).

5. Remove the system board cover (see System board cover on page 43).

6. In the order indicated on the heat sink, loosen the four captive Torx screws **(1)** – **(4)** from the larger part of the heat sink over the processor.

    ⚠ **CAUTION:**   Remove heat sink retaining screws in diagonally opposite pairs (as in an X) to even the downward forces on the processor. This is especially important as the pins on the socket are very fragile and any damage to them may require replacing the system board.

7. In the order indicated on the heat sink, loosen the four captive Phillips #1 screws **(1)** – **(4)** from the smaller part of the heat sink over the graphics chip.

8. Remove the Torx screw on the right part of the heat sink **(5)** above the fan.

9. Lift the heat sink out of the computer.

    ⚠ **CAUTION:**   To reduce a degradation in thermal performance, be sure not to touch the thermal grease on the surface of the processor or the heat sink.

To replace the heat sink, reverse the removal procedures.

Processor

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 23).

2. Remove the rear covers (see Removing the rear covers from the computer on page 24).

3. Remove the memory cover (see Memory on page 29).

4. Separate the computer from the column (see Separating the computer from the column on page 41).

5. Remove the system board cover (see System board cover on page 43).

6. Remove the heat sink (see Heat sink on page 45).

7. Rotate the locking lever to its full open position **(1)**.

⚠ **CAUTION:** Do NOT handle the pins in the processor socket. These pins are very fragile and handling them could cause irreparable damage. Once pins are damaged it may be necessary to replace the system board.

8. Raise and rotate the microprocessor retainer to its fully open position **(2)**.

9. Lift the processor **(3)** straight up and remove it.
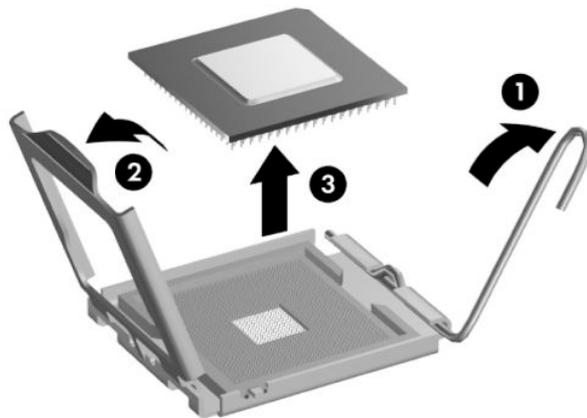
📝 **NOTE:** After installing a new processor onto the system board, update the system ROM to ensure that the latest version of the BIOS is being used on the computer. The latest system BIOS can be found on the Web at: http://www.hp.com.

Fan assembly

The fan sits adjacent to the heat sink. You do not need to remove the heat sink to remove the fan.

To remove the fan assembly:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 23).

2. Remove the rear covers (see Removing the rear covers from the computer on page 24).

3. Remove the memory cover (see Memory on page 29).

4. Separate the computer from the column (see Separating the computer from the column on page 41).

5. Remove the system board cover (see System board cover on page 43).

6. Remove the three Torx screws that secure the fan assembly to the computer **(1)**.

7. Disconnect the fan cable **(2)** from the system board.

8. Remove the fan from the computer.
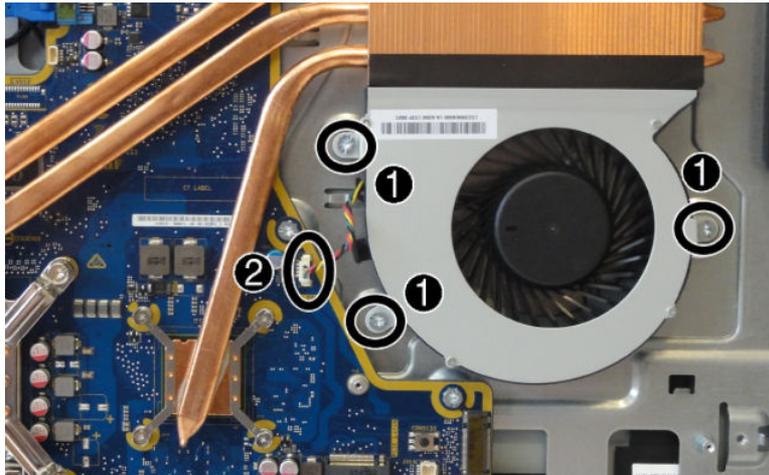
To install the fan assembly, reverse the removal procedures.
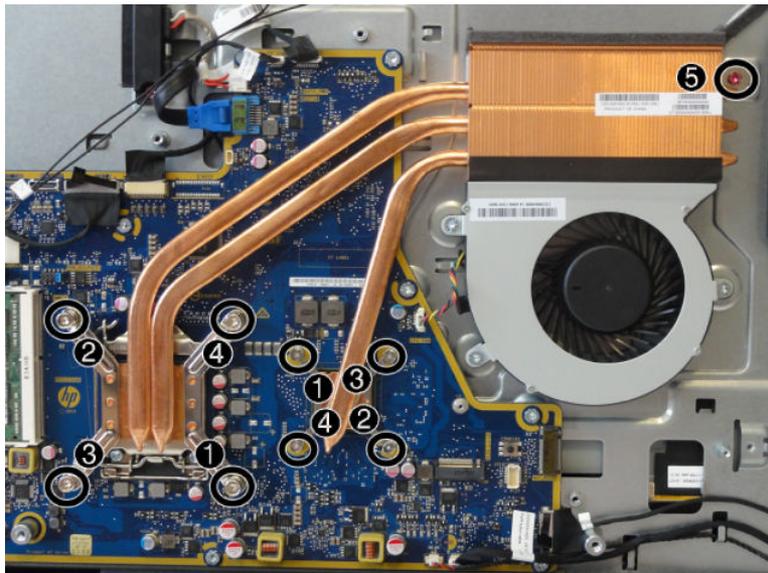
System board

Before removing the system board, following these steps:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 23).

2. Remove the rear covers (see Removing the rear covers from the computer on page 24).

3. Remove the memory cover (see Memory on page 29).

4. Separate the computer from the column (see Separating the computer from the column on page 41).

5. Remove the system board cover (see System board cover on page 43).

6. Remove the heat sink (see Heat sink on page 45).

7. Remove the fan (see Fan assembly on page 47).

When replacing the system board, be sure to remove the following components (as needed) from the defective system board and install on the replacement system board:

- Wireless USB receiver (see Wireless USB receiver on page 31)

- Solid-state drive (see M.2 cover and solid-state drive on page 33)

- Memory modules (see Memory on page 29)

- WLAN/Bluetooth module (see WLAN module on page 44)

- Processor (see Processor on page 46)

Before removing the system board, following these steps:

1. Disconnect all remaining cables from the system board, noting their location for reinstallation as shown in the following image.
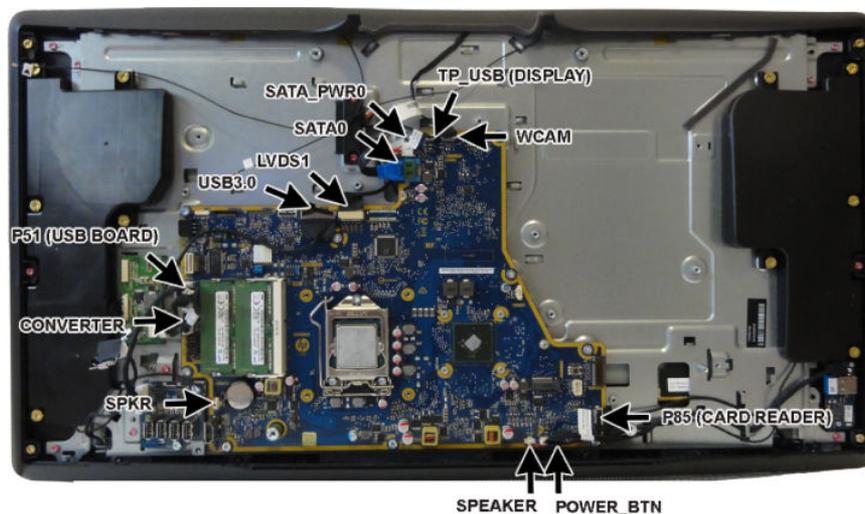
2. Remove the 10 Torx screws that secure the system board to the computer, and then remove the system board.
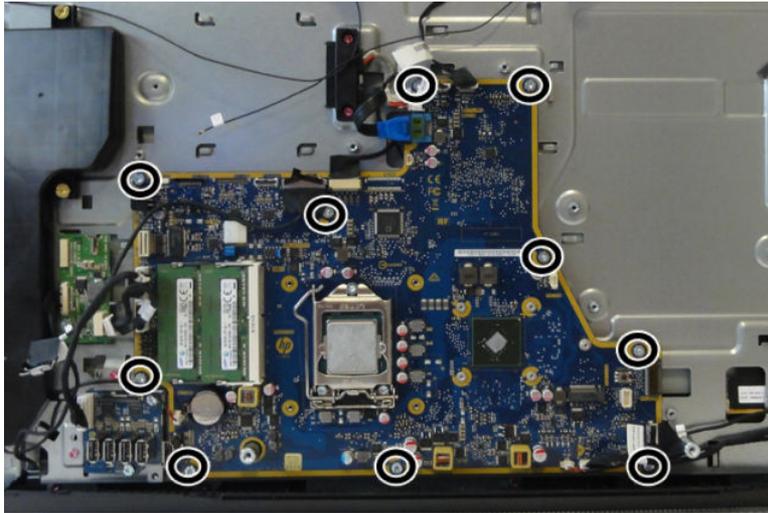
To install the system board, reverse the removal procedures.

Make sure the thermal pads below the system board are installed as shown in the following image.
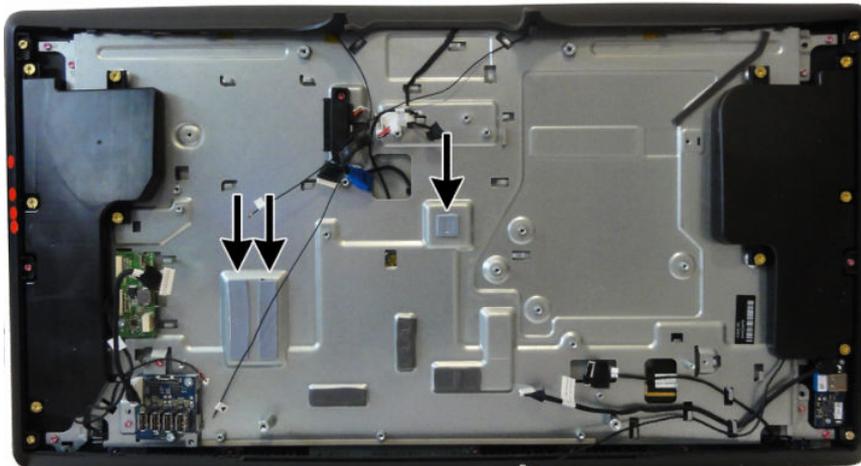
Updating the display panel manufacturer setting in BIOS

After replacing the system board, make sure the display panel manufacturer setting is correct in BIOS. If the incorrect panel manufacturer is set in BIOS, the display panel may function incorrectly.

The display panel manufacturer is identified on the jumper setting label on the base pan.

After confirming the manufacturer of the display panel on the computer, go into BIOS and make sure the **LVDS Panel Select** setting is correct.

To update BIOS with display panel model information:

1. Boot the computer.

2. Repeatedly press F10 when the monitor light turns green to access the F10 Setup utility.

3. Select **Advanced**, select **Device Options**, select **LVDS Panel Select**, and then select the manufacturer for the new display panel.

4. Save your settings, exit F10 Setup, and allow the computer to continue to the operating system.

When you change the LVDS setting to the installed panel type, the BIOS reprograms the EDID with the correct data. You must set the panel before the Auto-select setting functions correctly.

Updating SMBIOS Information

When replacing the system board, you must reprogram the SMBIOS information on the affected computer. Failure to reprogram the board will result in eventual failure, such as an activation failure (need to reactivate the system) or a system recovery failure.

To update SMBIOS information in Computer Setup:

1. Turn on or restart the computer.

2. Press Esc while the "Press the ESC key for Startup Menu" message is displayed at the bottom of the screen.

   📝 **NOTE:** If you do not press Esc at the appropriate time, you must restart the computer and again press Esc when the monitor light turns green to access the utility.

3. Press F10 to enter Computer Setup.

4. Go to **Security** > **System ID's**.

5. If necessary, press Ctrl+A to initiate edit mode.

6. Edit the fields listed. If the feature byte has data or is not editable, then it was not cleared and cannot be edited.

System ID Setup Page

Setup Field Name	Comment	Label
Product Name	Enter the Model name/number or marketing name.	Flexbuild
Serial Number	Enter the Serial Number of Unit.	Support
SKU Number	Enter the SKU or Product Number including Localization Code.	Support
Asset Tag	Enter the 18-byte identifier assigned to the computer.	Support
Feature Byte	Enter the Feature Byte string. The feature byte string is case sensitive. The label includes spaces after every four characters. You can enter or ignore these spaces – their only purpose is to help with data entry. There is a character limitation of 40 bytes per line. When you reach this limit, go to the next line to continue data entry. BIOS ignores the spaces and lines. If you make an error during data entry, the data will not validate, and the computer asks you to correct your data input.	Flexbuild
Build ID	The Build ID of the unit.	Flexbuild

System board callouts
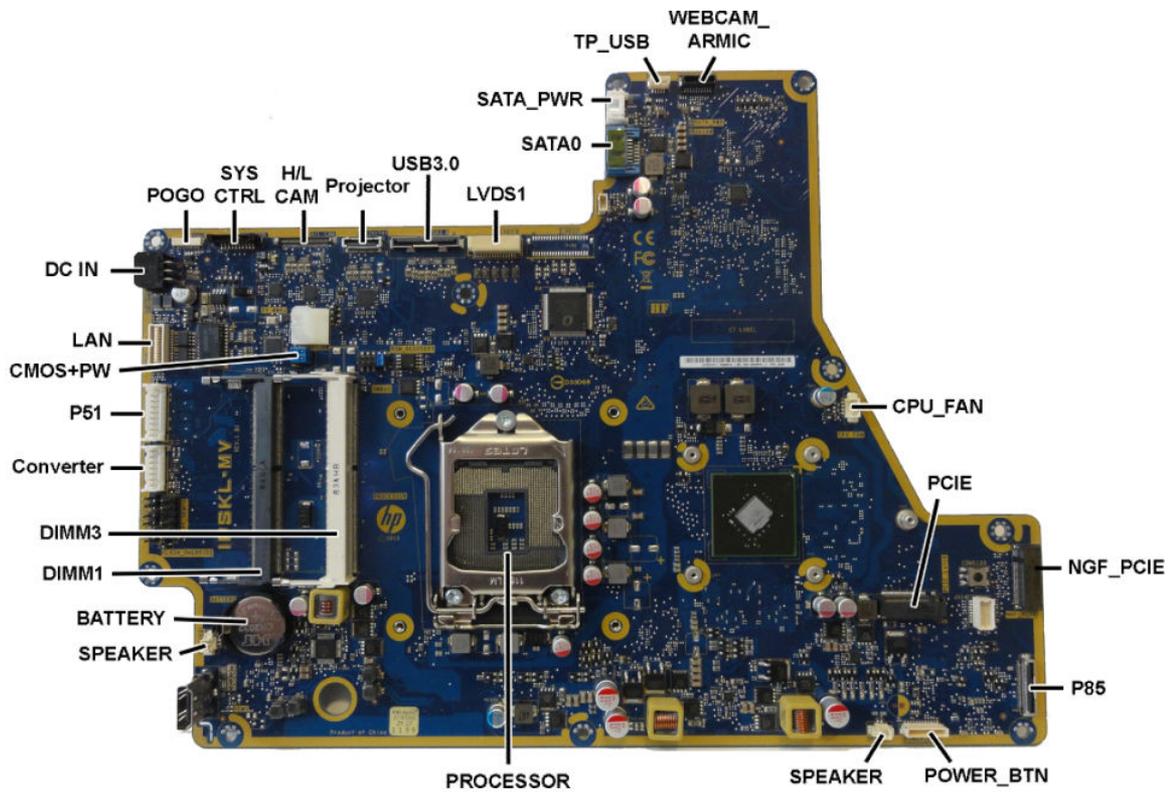
Sys Bd Label	Color	Component	Sys Bd Label	Color	Component
POGO	White	POGO connector (TouchMat)	POWER_BTN	White	Power button board
SYS CTRL	Black	Projector connector	SPEAKER	White	Speaker
H/L CAM	Black	Projector connector	PROCESSOR	Black	Processor socket
Projector	Black	Projector connector (projector located in column)	SPEAKER	White	Speaker
USB3.0	Black	USB board connector	BATTERY	Black	RTC battery
LVDS1	White	Display connector	DIMM1	White	Memory socket
SATA0	Blue	Hard drive data	DIMM3	Black	Memory socket
SATA_PWR	White	Hard drive power connector	Converter	White	Converter board
TP_USB	White	Touch connector	P51	White	USB board connector
WCAM_ARMIC	Black	Webcam	CMOS+PW	Blue	Clear CMOS and system passwords
CPUFAN	White	Fan connector	LAN	White	LAN connector (to column)
P85	Black	Card reader/audio board connector	DC-IN	Black	Power connector

Speakers

Speakers are located on both sides of the computer. Each speaker is secured by five Torx screws.

To remove the speakers:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 23).

2. Remove the rear covers (see Removing the rear covers from the computer on page 24).

3. Remove the memory cover (see Memory on page 29).

4. Separate the computer from the column (see Separating the computer from the column on page 41).

5. Remove the M.2 cover (see M.2 cover and solid-state drive on page 33).

6. Remove the system board cover (see System board cover on page 43).

7. Remove five Torx screws **(1)** that secure the right speaker (left when viewed from behind) to the computer.

8. Remove the speaker cable from its routing path, and then disconnect the cable from the system board **(2)**.
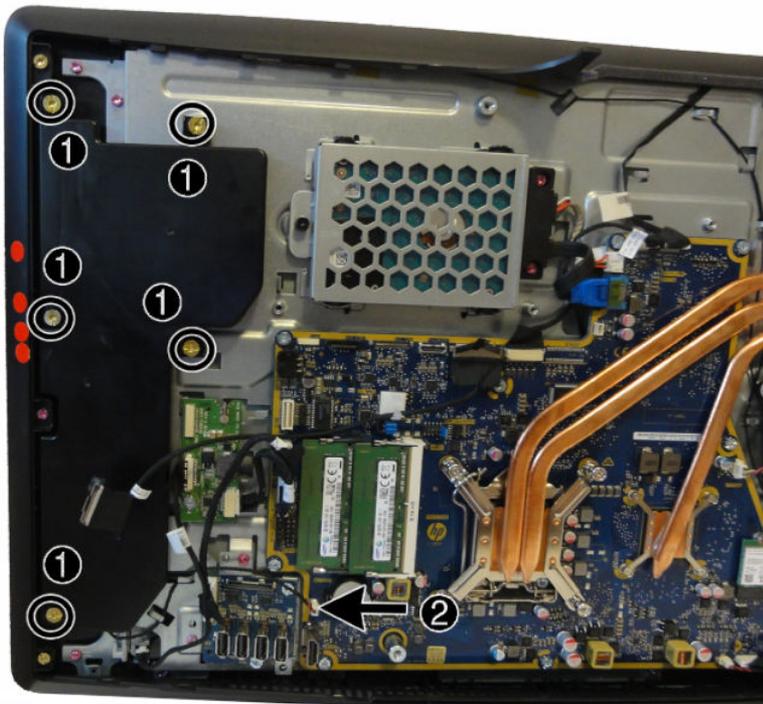
9. Remove the five Torx screws **(1)** that secure the left speaker to the computer.

10. Remove the speaker cable from its routing path, and then disconnect the cable from the system board **(2)**.

To install the speakers, reverse the removal procedures.

Hard drive connector

The hard drive connector is located above the system board.

To remove the hard drive connector:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 23).

2. Remove the rear covers (see Removing the rear covers from the computer on page 24).

3. Remove the hard drive (see Hard drive on page 26).

4. Remove the memory cover (see Memory on page 29).

5. Separate the computer from the column (see Separating the computer from the column on page 41).

6. Remove the system board cover (see System board cover on page 43).

7. Disconnect the hard drive cable from the system board **(1)**.

8. Remove two Torx screws **(2)** that secure the hard drive connector to the computer.

9. Remove the connector from the computer.
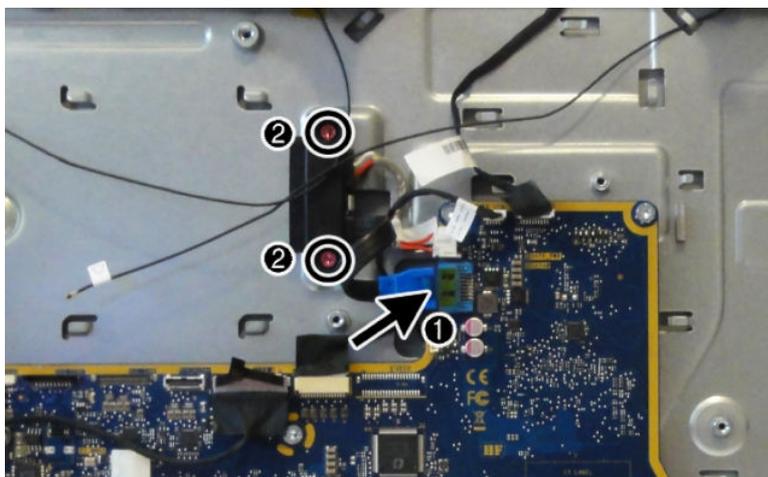
To install the hard drive connector, reverse the removal procedures.

Outer plastic trim

The outer plastic trim is located around the edge of the computer.

To remove the outer plastic trim:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 23).

2. Remove the rear covers (see Removing the rear covers from the computer on page 24).

3. Remove the memory cover (see Memory on page 29).

4. Separate the computer from the column (see Separating the computer from the column on page 41).

5. Remove the four longer corner Torx screws **(1)** and the two shorter middle Torx screws **(2)**.

6. Pry around the edges of the outer trim to disengage it from the computer **(3)**.

To install the outer plastic trim, reverse the removal procedures.

Card reader/audio board

When viewing the back of the computer, the card reader/audio board is located on the right, bottom of the computer.

To remove the card reader/audio board:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 23).

2. Remove the rear covers (see Removing the rear covers from the computer on page 24).

3. Remove the memory cover (see Memory on page 29).

4. Separate the computer from the column (see Separating the computer from the column on page 41).

5. Remove the outer plastic trim (see Outer plastic trim on page 55).

6. Disconnect the cable from the top of the board **(1)**, and then remove the two Torx screws **(2)** that secure the board to the computer.

7. Remove the board from the computer.
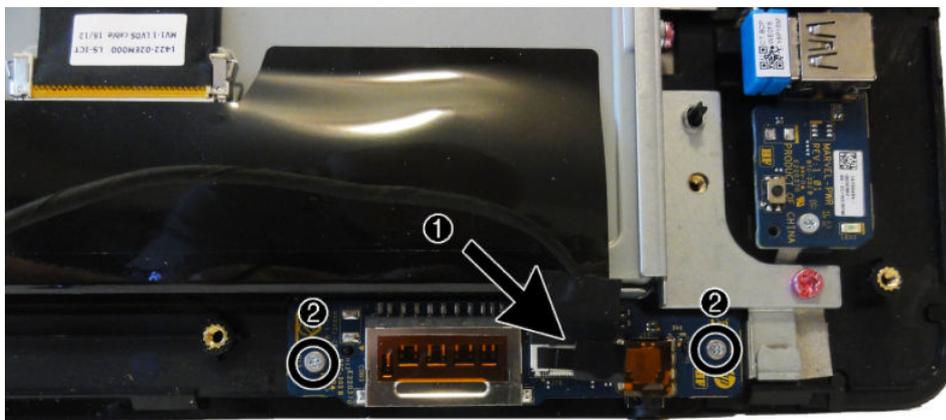
To install the card reader/audio board, reverse the removal procedures.

Main frame and display

You can separate the display from the frame while leaving most components installed. You must disconnect several cables.
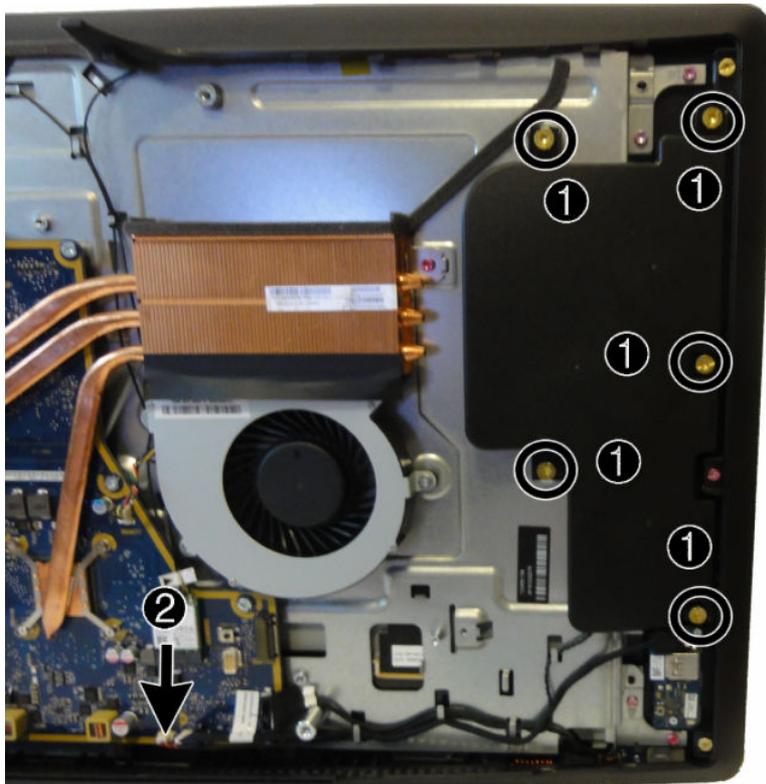
To remove the main frame:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 23).

2. Remove the rear covers (see Removing the rear covers from the computer on page 24).

3. Remove the memory cover (see Memory on page 29).

4. Separate the computer from the column (see Separating the computer from the column on page 41).

5. Remove the system board cover (see System board cover on page 43).

6. Remove the outer plastic trim (see Outer plastic trim on page 55).

7. Remove the 17 Torx screws that secure the main frame to the display.
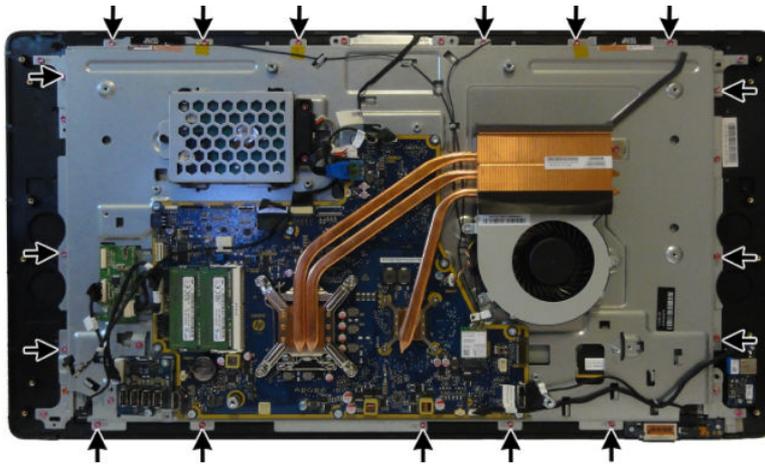
8. Disconnect the following cables:

   ● LVDS1

   ● TP_USB (display)

   ● WCAM

   ● RECEIVER

   ● P85 (card reader board)
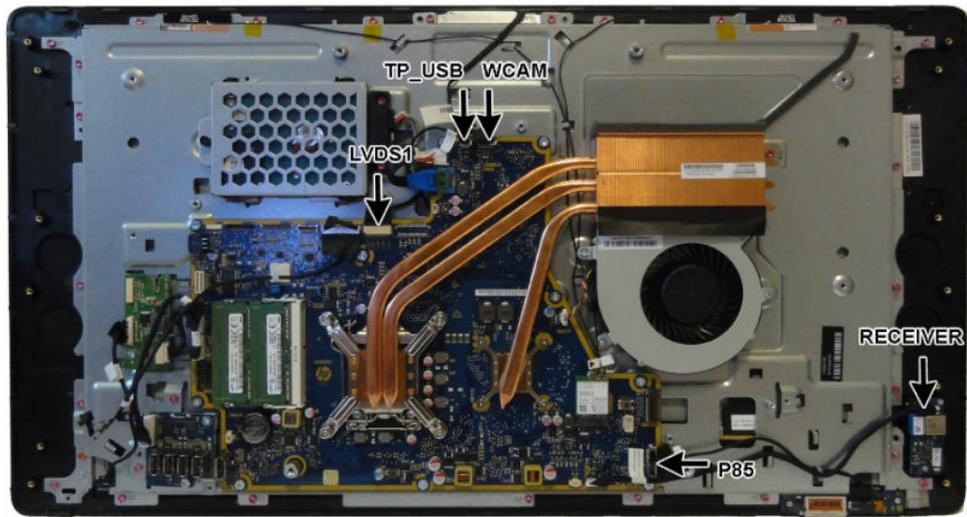
9. Lift the main frame off the display.

> **NOTE:** The main display cable (LVDS1) and the touch cable (TP_USB) route through the hole in the middle of the frame.

To install the main frame, reverse the removal procedures.

Webcam module

The webcam module is located at the top of the computer beneath the outer plastic trim.

To remove the webcam module:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 23).

2. Remove the rear covers (see Removing the rear covers from the computer on page 24).

3. Remove the memory cover (see Memory on page 29).

4. Separate the computer from the column (see Separating the computer from the column on page 41).

5. Remove the outer plastic trim (see Outer plastic trim on page 55).

6. Remove the two Torx screws **(1)** that secure the webcam module bracket to the computer.

7. Lift and rotate the assembly to gain access to the connector on the module **(2)**.
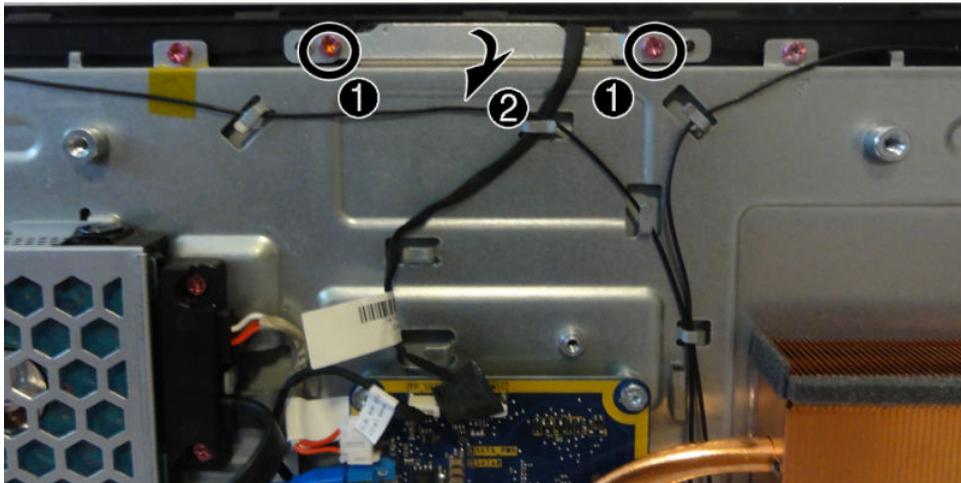
8. Disconnect the cable from the webcam module.
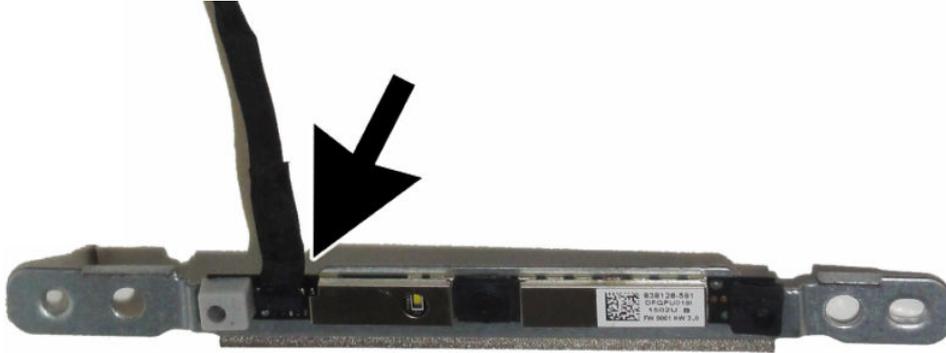
To install a webcam module, reverse the removal procedures.

Antennas

Antenna cables route from the WLAN card to antennas at the top of the computer.

To remove the antennas:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 23).

2. Remove the rear covers (see Removing the rear covers from the computer on page 24).

3. Remove the memory cover (see Memory on page 29).

4. Separate the computer from the column (see Separating the computer from the column on page 41).

5. Remove the system board cover (see System board cover on page 43).

6. Remove the outer plastic trim (see System board cover on page 43).

7. Disconnect the antennas from the WLAN module **(1)**.

8. Remove the antenna cables from the routing path and the clips built into the frame **(2)**.

9. Peel the antennas off the frame **(3)**. The antennas are secured using adhesive.
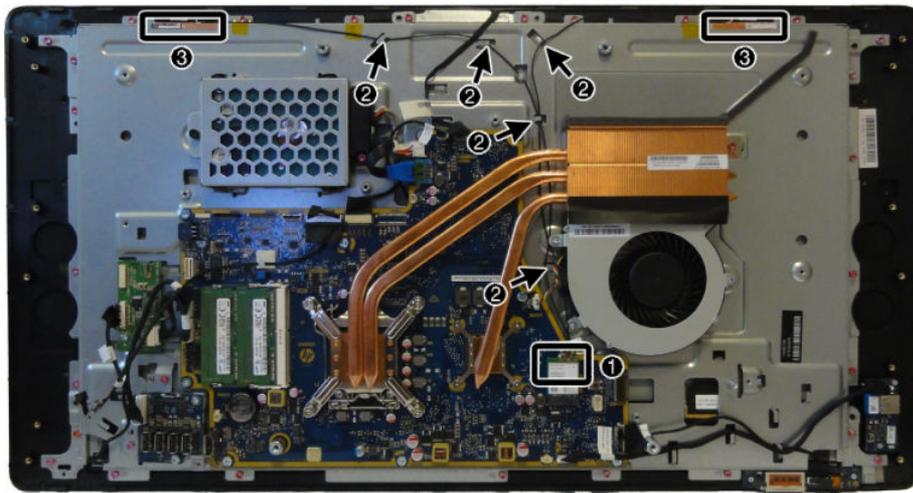
To install the antenna, reverse the removal procedures.

NOTE: When connecting the antennas cables to the WLAN module, connect the cable labeled "1" to the MAIN connector on the module and the cable labeled "2" to the AUX connector on the module.

Power supply (in column)

The power supply is located toward the bottom of the column below the projector.
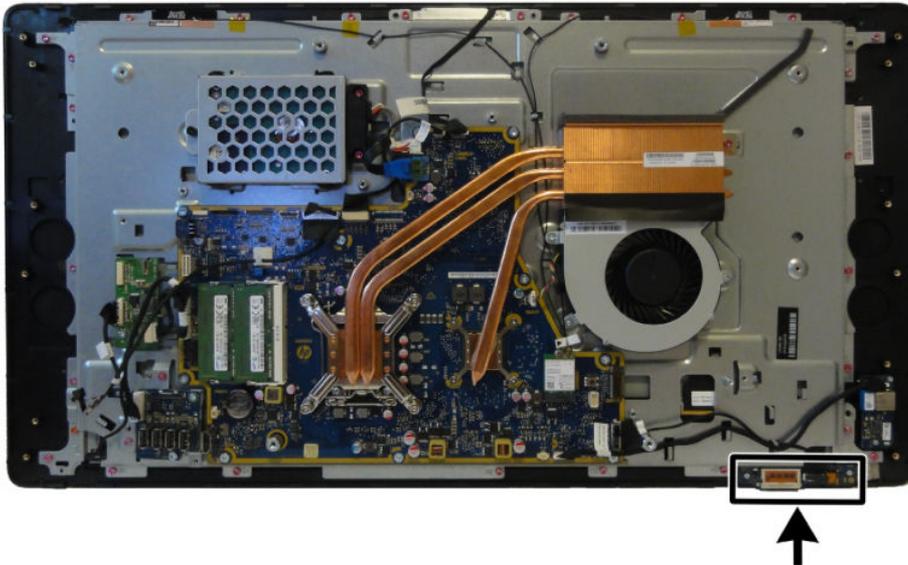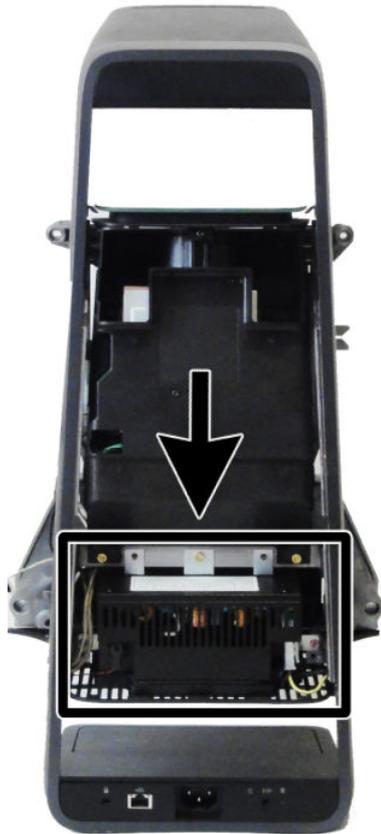

To remove the power supply:

1. Prepare the computer for disassembly (see Preparing to disassemble the computer on page 23).

2. Remove the rear covers (see Removing the rear covers from the computer on page 24).

3. Remove the memory cover (see Memory on page 29).

4. Separate the computer from the column (see Separating the computer from the column on page 41).

5. Position the column so you can access the screws on the bottom.

6. Remove the two Phillips screws that secure the cover to the column.

7. Position the column so you can access the sides of the column cover.

8. Push inward on the sides the cover to disengage it from the column **(1)**, and then lift the cover straight up and off the column **(2)**.
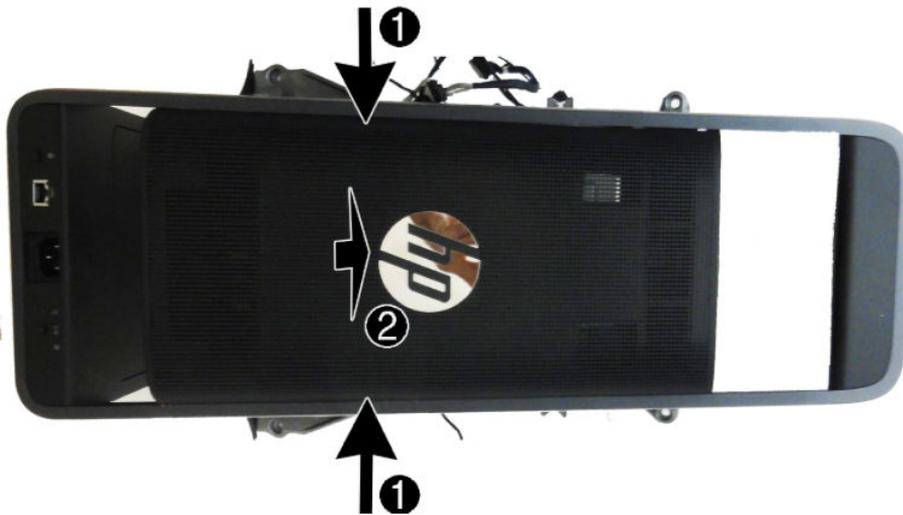
9. Remove the one larger Torx screw **(1)** and the two smaller Torx screws **(2)** that secure the power supply to the column.

10. Disconnect the white and black cables from the power supply **(3)**.
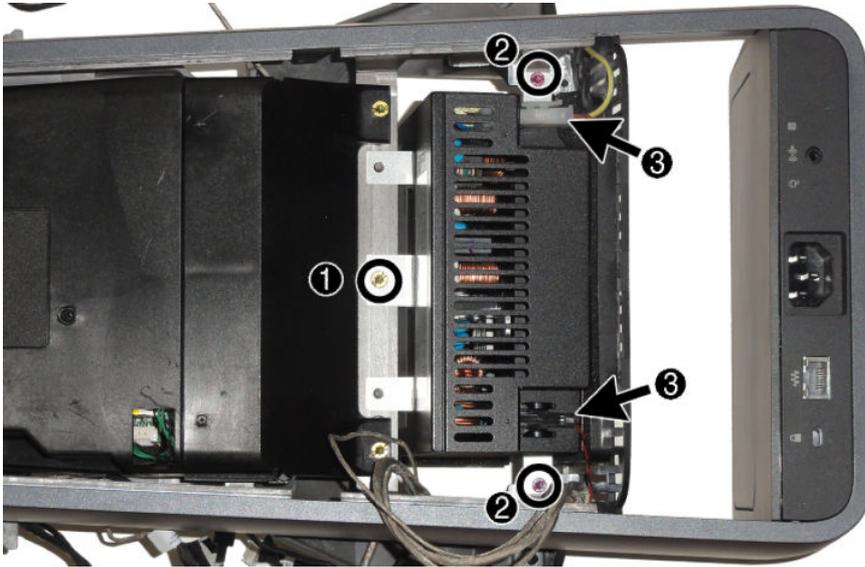
11. Position the column so you can access the power supply from the side.

12. Disconnect the cable from the top of the power supply **(1)**.

13. Slide the power connector out of the front of the column **(2)**.
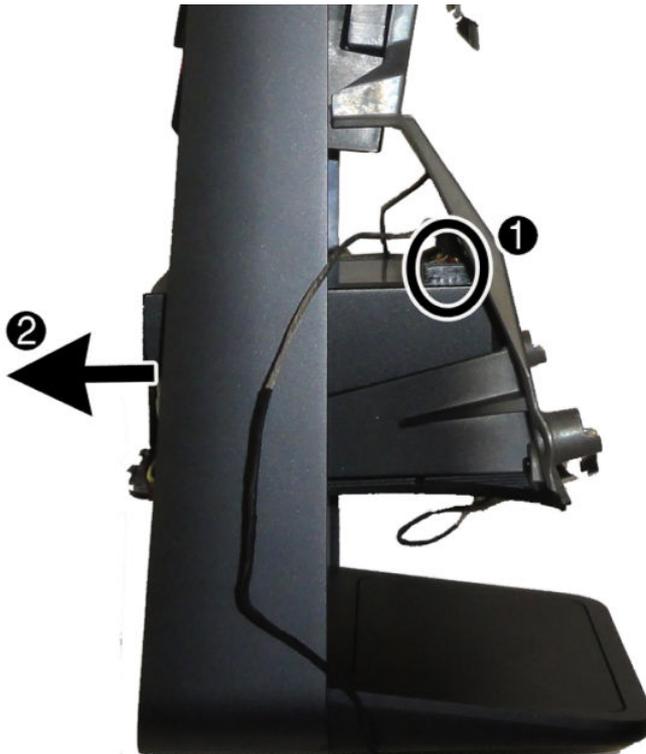
To install the power supply, reverse the removal procedures.

5 Computer Setup (F10) Utility

Computer Setup (F10) Utilities

Use Computer Setup (F10) Utility to do the following:

- Change factory default settings.

- Set the system date and time.

- Set, view, change, or verify the system configuration, including settings for processor, graphics, memory, audio, storage, communications, and input devices.

- Modify the boot order of bootable devices such as hard drives, optical drives, or USB flash media devices.

- Enable Quick Boot, which is faster than Full Boot but does not run all of the diagnostic tests run during a Full Boot. You can set the system to:

  - always Quick Boot (default);

  - periodically Full Boot (from every 1 to 30 days); or

  - always Full Boot.

- Select Post Messages Enabled or Disabled to change the display status of Power-On Self-Test (POST) messages. Post Messages Disabled suppresses most POST messages, such as memory count, product name, and other non-error text messages. If a POST error occurs, the error is displayed regardless of the mode selected. To manually switch to Post Messages Enabled during POST, press any key (except F1 through F12).

- Establish an Ownership Tag, the text of which is displayed each time the system is turned on or restarted.

- Enter the Asset Tag or property identification number assigned by the company to this computer.

- Enable the power-on password prompt during system restarts (warm boots) as well as during power-on.

- Establish a setup password that controls access to the Computer Setup (F10) Utility and the settings described in this section.

- Secure integrated I/O functionality, including the serial, USB, audio, or embedded NIC, so that they cannot be used until they are unsecured.

- Enable or disable removable media boot ability.

- Solve system configuration errors detected but not automatically fixed during the Power-On Self-Test (POST).

- Replicate the system setup by saving system configuration information on a USB device and restoring it on one or more computers.

- Execute self-tests on a specified ATA hard drive (when supported by drive).

Using Computer Setup (F10) Utilities

Computer Setup can be accessed only by turning the computer on or restarting the system. To access the Computer Setup Utilities menu, complete the following steps:

1. Turn on or restart the computer.

2. Repeatedly press F10 when the monitor light turns green to access the utility.

   You can also press Esc to a menu that allows you to access different options available at startup, including the Computer Setup utility.

   NOTE: If you do not press F10 at the appropriate time, you must restart the computer and again repeatedly press F10 when the monitor light turns green to access the utility.

3. A choice of five headings appears in the Computer Setup Utilities menu: File, Storage, Security, Power, and Advanced.

4. Use the arrow (left and right) keys to select the appropriate heading. Use the arrow (up and down) keys to select the option you want, then press Enter. To return to the Computer Setup Utilities menu, press Esc.

5. To apply and save changes, select **File** > **Save Changes and Exit**.

   - If you have made changes that you do not want applied, select **Ignore Changes and Exit**.

   - To reset to factory settings or previously saved default settings (some models), select **Apply Defaults and Exit**. This option will restore the original factory system defaults.

   NOTE: Not all settings shown in the following sections are available for all models

⚠ **CAUTION:** Do NOT turn the computer power OFF while the BIOS is saving the Computer Setup (F10) changes because the CMOS could become corrupted. It is safe to turn off the computer only after exiting the F10 Setup screen.

Computer Setup—File

NOTE: Support for specific Computer Setup options may vary depending on the hardware configuration.

Table 5-1 Computer Setup—File

Option	Description
System Information	Lists:
	• Manufacturer
	• Product name
	• SKU number
	• Serial number
	• Born on date
	• System Board ID
	• System Board CT Number
	• BIOS revision
	• BIOS date
	• Processor type/speed
	• Installed memory size/speed, number of channels (single or dual) (if applicable)
	• Integrated MAC address for embedded, enabled NIC (if applicable)
About	Displays copyright notice.
Set Time and Date	Allows you to set system time and date.
Default Setup	**Save Current Settings as Default**
	Saves the current system configuration settings as the default.
	Restore Factory Settings as Default
	Restores the factory system configuration settings as the default.
Apply Defaults and Exit	Applies the currently selected default settings and clears any established passwords.
Ignore Changes and Exit	Exits Computer Setup without applying or saving any changes.
Save Changes and Exit	Saves changes to system configuration or default settings and exits Computer Setup.

Computer Setup—Storage

NOTE: Support for specific Computer Setup options may vary depending on the hardware configuration.

Table 5-2 Computer Setup—Storage

Option	Description
Device Configuration	Lists all installed BIOS-controlled storage devices.
	When a device is selected, detailed information and options are displayed. The following options may be presented:
	• **Hard Disk**: Size, model, firmware version, serial number.
Storage Options	**SATA Emulation**
	Allows you to choose how the SATA controller and devices are accessed by the operating system. There are two supported options: IDE and AHCI (default).
	CAUTION: SATA emulation changes may prevent access to existing hard drive data and degrade or corrupt established volumes.
	IDE - This is the most backwards-compatible setting of the three options. Operating systems usually do not require additional driver support in IDE mode.
	AHCI (default option) - Allows operating systems with AHCI device drivers loaded to take advantage of more advanced features of the SATA controller.
DPS Self-Test	Allows you to execute self-tests on ATA hard drives capable of performing the Drive Protection System (DPS) self-tests.
	NOTE: This selection will only appear when at least one drive capable of performing the DPS self tests is attached to the system.
Boot Order	Allows you to configure:
	UEFI Boot Sources: Specify the order in which UEFI boot sources (such as a internal hard drive, USB hard drive, USB optical drive, or Ethernet controller) are checked for a bootable operating system image. Each device on the list may be individually excluded from or included for consideration as a bootable operating system source.
	UEFI boot sources always have precedence over legacy boot sources.
	Legacy Boot Sources: Specify the order in which legacy boot sources (such as a network interface card, internal hard drive, or USB optical drive) are checked for a bootable operating system image. Each device on the list may be individually excluded from or included for consideration as a bootable operating system source.
	Specify the order of attached hard drives. The first hard drive in the order will have priority in the boot sequence and will be recognized as drive C (if any devices are attached).
	NOTE: You must disable Secure Boot before you can configure this option.
	NOTE: To drag a device to a preferred place, press Enter. To remove the device from consideration as a bootable device, press F5.
	You can use F5 to disable individual boot items, as well as disable UEFI boot and/or legacy boot.
	NOTE: MS-DOS drive lettering assignments may not apply after a non-MS-DOS operating system has started.
	Shortcut to Temporarily Override Boot Order
	To boot **one time** from a device other than the default device specified in Boot Order, restart the computer and press Esc (to access the boot menu) and then F9 (Boot Order), or only F9 (skipping the boot menu) when the monitor light turns green. After POST is completed, a list of bootable devices is displayed. Use the arrow keys to select the preferred bootable device and press Enter. The computer then boots from the selected non-default device for this one time.

Computer Setup—Security

NOTE: Support for specific Computer Setup options may vary depending on the hardware configuration.

Table 5-3 Computer Setup—Security

Option	Description
Setup Password	Allows you to set and enable a setup (administrator) password. **NOTE:** If the setup password is set, it is required to change Computer Setup options, flash the ROM, and make changes to certain plug and play settings under Windows.
Power-On Password	Allows you to set and enable a power-on password. The power-on password prompt appears after a power cycle or reboot. If the user does not enter the correct power-on password, the unit will not boot.

Device Security	Allows you to set Device Available/Device Hidden (default is Device Available) for:
	
	● System audio
	
	   NOTE: Set this value to 'Device hidden' to disable all system volume.
	
	● Network controller
	
	   NOTE: You must disable AMT before trying to hide the network controller.
	
	● Onboard card reader
	
	● SATA ports

USB Security	Allows you to set Enabled/Disabled (default is Enabled) for: ● Front USB Ports ● Rear USB Ports ● Internal USB Ports
Slot Security	Allows you to disable the mini card slot. Default is enabled.
Network Boot	Enables/disables the computer's ability to boot from an operating system installed on a network server. Default is enabled.
System IDs	Allows you to view: ● Product Name ● Serial Number ● Universal Unique Identifier (UUID) number. The UUID can only be updated if the current chassis serial number is invalid. (These ID numbers are normally set in the factory and are used to uniquely identify the system.) ● SKU Number ● Family Name ● Feature Byte ● Build ID ● Keyboard locale setting for System ID entry.

Table 5-3 Computer Setup—Security (continued)

Option	Description
System Security (these options are hardware dependent)	Virtualization Technology (VTx/VTd) (enable/disable). Controls the virtualization features of the processor. Changing this setting requires turning the computer off and then back on. Default is disabled.
Secure Boot Configuration	This is a feature of Windows 8. • Legacy Support—Enable/Disable. Allows you to turn off all legacy support on the computer, including booting to DOS, running legacy graphics cards, booting to legacy devices, and so on. If set to disable, legacy boot options in **Storage > Boot Order** are not displayed. Default is enabled. • Secure Boot—Enable/Disable. Allows you to make sure an operating system is legitimate before booting to it, making Windows resistant to malicious modification from preboot to full OS booting, preventing firmware attacks. UEFI and Windows Secure Boot only allow code signed by pre-approved digital certificates to run during the firmware and OS boot process. Default is disabled, except for Windows 8 systems which have this setting enabled. Secure Boot enabled also sets **Legacy Support** to disabled. • Key Management—This option lets you manage the custom key settings. – Clear Secure Boot Keys—Don't Clear/Clear. Allows you to delete any previously loaded custom boot keys. Default is Don't Clear. – Key Ownership—HP Keys/Custom Keys. Selecting Custom Mode allows you to modify the contents of the secure boot signature databases and the platform key (PK) that verifies kernels during system start up, allowing you to use alternative operating systems. Selecting HP Keys causes the computer boot using the preloaded HP-specific boot keys. Default is HP Keys. • Fast Boot—Enable/Disable. Fast boot disables the ability to interrupt boot, such as pressing f keys to access items before the operating system loads. Default is disabled. **NOTE:** If Windows 8 detects a serious error, it will interrupt the boot process automatically and display advanced boot options. From Windows 8, you can press Shift and select **Restart** to access the screen that lets you boot to a device or troubleshoot your computer.

Computer Setup—Power

NOTE: Support for specific Computer Setup options may vary depending on the hardware configuration.

Table 5-4 Computer Setup—Power

Option	Description
OS Power Management	• Runtime Power Management— Enable/Disable. Allows certain operating systems to reduce processor voltage and frequency when the current software load does not require the full capabilities of the processor. Default is enabled. • Idle Power Savings—Extended/Normal. Allows certain operating systems to decrease the processors power consumption when the processor is idle. Default is extended.

Table 5-4 Computer Setup—Power (continued)

Option	Description
Hardware Power Management	SATA Power Management – Enables or disables SATA bus and/or device power management. Default is enabled.
	S4/S5 Wake on LAN – Enables or disables remotely waking up the computer from S4 (hibernation) or S5 (power is off) power state. Default is disabled.
	Enable/Disable USB Charging Port – The USB charging port allows an external device to charge until a specified battery charge level is reached. Default is enabled.
Thermal	CPU Fan Speed – Displays fan speed.
	NOTE: This setting only changes the minimum fan speed. The fans are still automatically controlled.

Computer Setup—Advanced

NOTE: Support for specific Computer Setup options may vary depending on the hardware configuration.

Table 5-5 Computer Setup—Advanced (for advanced users)

Option	Heading
Power-On Options	Allows you to set:
	• POST messages (enable/disable). Enabling this feature will cause the system to display POST error messages, which are error messages displayed on the monitor during the Power On Self Test if the BIOS encounters some kind of problem while starting the PC. A POST error message will only display on screen if the computer is capable of booting this far. If the POST detects an error before this point, a beep code is generated instead. Default is disabled.
	• After Power Loss (off/on/previous state). Default is Off. Setting this option to:
	– Off—causes the computer to remain powered off when power is restored.
	– On—causes the computer to power on automatically as soon as power is restored.
	– Previous state—causes the computer to power on automatically as soon as power is restored, if it was on when power was lost.
	NOTE: If you turn off power to the computer using the switch on a power strip, you will not be able to use the suspend/sleep feature or the Remote Management features.
	• POST Delay (in seconds). Enabling this feature will add a user-specified delay to the POST process. This delay is sometimes needed for hard disks on some PCI cards that spin up very slowly, so slowly that they are not ready to boot by the time POST is finished. The POST delay also gives you more time to select F10 to enter Computer (F10) Setup. Default is None.
BIOS Power-On	Allows you to set the computer to turn on automatically at a time you specify.
Onboard Devices	Allows you to set resources for or disable Legacy devices.
	Select the Legacy device's IRQ, DMA, and I/O Range. The settings may not take effect for all operating systems. To hide a device from the operating system, see Security > Device Security.

Table 5-5 Computer Setup—Advanced (for advanced users) (continued)

Option	Heading
Bus Options	Allows you to enable or disable:
	• PCI SERR# Generation. Default is enabled.
	• PCI VGA Palette Snooping, which sets the VGA palette snooping bit in PCI configuration space; only needed when more than one graphics controller is installed. Default is disabled.
Device Options	Allows you to set:
	• Num Lock State at Power-On (off/on). Enables numlock at boot. Default is On.
	• Multi-Processor (enable/disable). Controls whether or not the BIOS reports multiple processor cores to the OS. Default is enabled.
	• Hyper-Threading (enable/disable). Controls hyper-threading capability on Intel processors. Some programs may run better with this feature disabled. Default is enabled.
	• NIC PXE Option ROM Download (enable/disable). Controls whether or not NIC option ROM is downloaded and executed. Some systems may need to disable this feature to save NIC Option ROM address space for use by other devices.Default is enabled.

Updating the BIOS

Updated versions of the BIOS may be available on the HP website.

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

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

Determining the BIOS version

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

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

1. Start Setup Utility (BIOS).

2. Use the arrow keys to select **File**, select **System Information**, and then make note of your BIOS version.

To exit Setup Utility (BIOS):

1. Use the arrow keys to select **Ignore Changes and Exit**, and then press **enter**.

2. Select **Yes**.

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 power cord. Do not download or install a BIOS update while the computer is running on battery power, docked in an optional docking device, or connected to an optional power source. During the download and installation, follow these instructions:

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

- Do not shut down the computer or initiate Sleep.

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

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

1. From the Start screen, type `support`, and then select the **HP Support Assistant** app.

   – or –

   From the Windows desktop, click the question mark icon in the notification area, at the far right of the taskbar.

2. Click **Updates and tune-ups**, and then click **Check for HP updates now**.

3. Follow the on-screen instructions.

4. At the download area, follow these steps:

   a. Identify the most recent BIOS update and compare it to the BIOS version currently installed on your computer. If the update is more recent than your BIOS, 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.

      If the update is more recent than your BIOS, 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.

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

1. From the Start screen, type `file`, and then select **File Explorer**.

   – or –

   From the Windows desktop, right-click the **Start** button, and then select **File Explorer**.

2. Click your hard drive designation. The hard drive designation is typically Local Disk (C:).

3. Using the hard drive path you recorded earlier, open the folder on your hard drive that contains the update.

4. Double-click the file that has an .exe extension (for example, *filename*.exe).

   The BIOS installation begins.

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

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

Recovering the Configuration Settings

This method of recovery requires that you first perform the **Save to Removable Media** command with the Computer Setup (F10) Utility before **Restore** is needed. (See Computer Setup—File on page 67 in the Computer Setup—File table.)

NOTE: It is recommended that you save any modified computer configuration settings to a USB flash media device and save the device for possible future use.

To restore the configuration, insert the USB flash media device with the saved configuration and perform the **Restore from Removable Media** command with the Computer Setup (F10) Utility. (See Computer Setup—File on page 67 in the Computer Setup—File table.)

6 Using HP PC Hardware Diagnostics (UEFI)

HP PC Hardware Diagnostics is a Unified Extensible Firmware Interface (UEFI) that allows you to run diagnostic tests to determine whether the computer hardware is functioning properly. The tool runs outside the operating system so that it can isolate hardware failures from issues that are caused by the operating system or other software components.

When HP PC Hardware Diagnostics (UEFI) detects a failure that requires hardware replacement, a 24-digit Failure ID code is generated. This ID code can then be provided to support to help determine how to correct the problem.

NOTE: To start diagnostics on a convertible computer, your computer must be in notebook mode and you must use the keyboard attached.

To start HP PC Hardware Diagnostics (UEFI), follow these steps:

1. Turn on or restart the computer, and quickly press esc.

2. Press f2.

   The BIOS searches three places for the diagnostic tools, in the following order:

   a. Connected USB drive

      NOTE: To download the HP PC Hardware Diagnostics (UEFI) tool to a USB drive, see Downloading HP PC Hardware Diagnostics (UEFI) to a USB device on page 76.

   b. Hard drive

   c. BIOS

3. When the diagnostic tool opens, select the type of diagnostic test you want to run, and then follow the on-screen instructions.

NOTE: If you need to stop a diagnostic test, press esc.

Downloading HP PC Hardware Diagnostics (UEFI) to a USB device

NOTE: The HP PC Hardware Diagnostics (UEFI) download instructions are provided in English only, and you must use a Windows computer to download and create the HP UEFI support environment because only .exe files are offered.

There are two options to download HP PC Hardware Diagnostics to a USB device.

Download the latest UEFI version

1. Go to http://www.hp.com/go/techcenter/pcdiags. The HP PC Diagnostics home page is displayed.

2. In the HP PC Hardware Diagnostics section, select the **Download** link, and then select **Run**.

Download any version of UEFI for a specific product

1. Go to http://www.hp.com/support.

2. Select **Get software and drivers**.

3. Enter the product name or number.

4. Select your computer, and then select your operating system.

5. In the **Diagnostic** section, follow the on-screen instructions to select and download the UEFI version you want.

Additional BIOS crisis recovery tool

HP provides a BIOS crisis recovery tool through the HP PC Hardware Diagnostics 3-in-1 USB key. This tool can be used by HP authorized service providers to recover systems that have failed due to a corrupted BIOS. For more information about using the 3-in-1 USB key for BIOS crisis recovery, go to http://www.hp.com/go/techcenter/pcdiags. Additional information is included in the web-based training offered by HP University. See the modules that cover HP PC Hardware Diagnostics (UEFI).

7 Troubleshooting

Wireless connection problems

Some possible causes for wireless connection problems include the following:

- Wireless device is not turned on.

- Wireless device is not installed correctly or has been disabled.

- Wireless device encountered interference from other devices.

- Wireless device or router hardware has failed.

Cannot connect to a WLAN

If you have a problem connecting to a WLAN, confirm that the integrated WLAN device is turned on and properly installed on your Sprout.

1. Be sure that the wireless device is turned on.

2. Then try connecting to the WLAN again.

If you are still unable to connect, follow the steps below.

1. Type `control panel` in the taskbar search box, and then select **Control Panel**.

2. Select **System and Security**, select **System**, and then select **Device Manager**.

3. Select the arrow next to **Network adapters** to expand the list and show all adapters.

4. Identify the WLAN device from the Network adapters list. The listing for a WLAN device may include the term *wireless*, *wireless LAN*, *WLAN*, or *802.11*.

   If no WLAN device is listed, either your Sprout does not have an integrated WLAN device, or the driver for the WLAN device is not properly installed.

For more information about troubleshooting WLANs, see the website links provided in Help and Support.

Cannot connect to a preferred network

You may not be able to connect to a preferred network because it is a security-enabled WLAN. You must have the security code to connect to this type of WLAN. See the next section for additional information.

If entering a security code is not the problem, you may have a corrupted WLAN connection. Windows can often automatically repair a corrupted WLAN connection.

- If there is a network status icon at the far right of the taskbar, right-click the icon, and then select **Troubleshoot problems**.

  Windows resets your network device and attempts to reconnect to one of the preferred networks.

- If there is no network status icon at the far right of the taskbar, follow these steps:

  1. Type `control panel` in the taskbar search box, and then select **Control Panel**.

  2. Select **Network and Internet**, and then select **Network and Sharing Center**.

  3. Select **Troubleshoot problems**, and then select the network you want to repair.

Current network security codes are unavailable

If you are prompted for a security code (or network key) or a name (SSID) when connecting to a WLAN, the network is protected by security. The SSID and security code are alphanumeric codes that you enter into your Sprout to identify your Sprout to the network. You must have the current codes to connect to a secure network.

- For a network connected to your personal wireless router, review the router user guide for instructions on setting up the same codes on both the router and the WLAN device.

- For a private network, such as a network in an office or at a public Internet chat room, contact the network administrator to obtain the codes, and then enter the codes when you are prompted to do so.

  Some networks change the SSID or network keys used in their routers or access points on a regular basis to improve security. You must change the corresponding code in your Sprout accordingly.

If you are provided with a new wireless network key and SSID for a network, and if you have previously connected to that network, follow the steps below to reconnect to the network:

1. Right-click the network status icon at the far right of the taskbar.

   A list showing the available WLANs is displayed. If you are in a hotspot where several WLANs are active, several will be displayed.

2. Right-click the network, and then select **Properties**.

   NOTE: If the network you want is not listed, check with the network administrator to be sure that the router or access point is operating.

3. Select the **Security** tab, and then enter the correct wireless encryption data into the **Network security key** box.

4. Select **OK** to save these settings.

Cannot connect to the wireless router

If you are trying to connect to the wireless router and are unsuccessful, reset the wireless router by removing power from the router for 10 to 15 seconds.

If Sprout still cannot connect to a WLAN, restart the wireless router. For details, see the router manufacturer's instructions.

Network status icon is not displayed

If the network status icon is not displayed at the far right of the taskbar after you configure the WLAN, the software driver is either missing or corrupted. A Windows "Device not Found" error message may also be displayed.

To resolve this problem, get the latest version of the WLAN device software and drivers for your Sprout from http://www.hp.com.

1. Open your Internet browser.

2. For support, go to http://www.hp.com/support.

3. Select the option for software and driver downloads, and then type your computer model number in the search box.

4. Press enter, and then follow the on-screen instructions.

NOTE: If the WLAN device you are using was purchased separately, consult the manufacturer's website for the latest software.

Power problems

Sprout will not turn on or start

1. Test the AC outlet by connecting a different electrical device to it.

2. Reconnect the computer's cables, being sure that the connection from the power cord to the computer and the connection from the power cord to the AC outlet are secure.

3. Try to turn on Sprout.

    ●   If the power lights turn on, the power cord is working properly.

    ●   If the connections are secure and the power lights remain off, the power cord is not functioning and should be replaced.

    Contact support for information about obtaining a replacement power cord.

Hard drive error

1. Press the ctrl+alt+delete keys simultaneously.

2. Select the **Power** icon in the lower-right corner of the screen, and then select **Restart**.

    – or –

    Press and hold the power button on Sprout for 5 or more seconds to turn off Sprout, and then press the power button to turn on Sprout.

3. If Windows opens, immediately back up all important information to an external hard drive.

4. Whether Windows started or not, contact support. Either the hard drive or the system board may need to be replaced.

Sprout is not responding

Use the Windows Task Manager to close any programs that are not responding.

1. Press the ctrl+alt+delete keys.

2. Select **Task Manager**.

3. Select any program that is not responding, and then select **End Task**.

If closing programs does not work, restart Sprout.

1. Press the ctrl+alt+delete keys.

2. Select the **Power** icon, and then select **Restart**.

    – or –

    Press and hold the power button for 5 or more seconds to turn off Sprout, and then press the power button to turn on Sprout.

Sprout shuts down unexpectedly

- Sprout might be in an exceedingly hot environment. Turn it off and let it cool down.

- Be sure that Sprout vents are not blocked and that the internal fan is running. See Getting to know your Sprout on page 1 for the location of the computer vents.

Display problems

The display is blank

- Exit Sleep to redisplay the screen image.

  - Press the power button briefly.

  - Press a key on the external keyboard.

  - Press the space bar.

  - Press the esc key.

- Press the power button to turn on Sprout.

Images on the screen are too large or too small, or the images are fuzzy

Adjust the resolution settings.

1. Type `control panel` in the taskbar search box, and then select **Control Panel**.

2. Select **Appearance and Personalization**.

3. Under **Display**, select **Adjust Screen Resolution**.

4. Adjust resolution as necessary, and then select **Apply**.

Keyboard and mouse problems

- Be sure that you are using the keyboard or mouse within range of the receiver.

- Be sure that the mouse is not in Suspend mode, which occurs after 20 minutes of inactivity. Click the left mouse button to reactivate it.

- Replace the batteries in the keyboard and mouse.

- Remove the wireless USB receiver on the bottom of the stand, and then reinsert it. Pair the keyboard and mouse to the receiver.

📝 **NOTE:** The illustrations below may look slightly different from your keyboard and mouse.

📝 **IMPORTANT:** During these steps, place the keyboard and mouse on the same level as the receiver.

To pair the keyboard and mouse:

1. Remove the tabs from the keyboard and the mouse.

2. Slide the mouse power button to the right to turn on the mouse **(1)**.
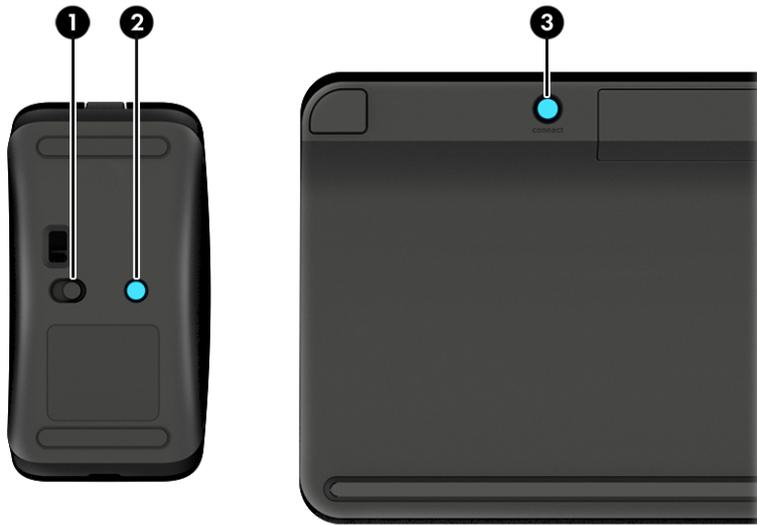
3. On the keyboard, press and hold the **Connect** button **(3)** for 5 to 10 seconds, until the light on the mouse **(2)** lights up or stops flashing. To confirm the connection, move the mouse and check for a response on the screen.

Touch mat problems

Projection remains when the touch mat is removed.

1. Restart **HPPCSERVICE**:

   a. Press ctrl+alt+delete.

   b. Select **Task Manager**, and then select the **Services** tab.

   c. In the Name column, select **HPPCSERVICE**.

   d. Right-click **HPPCSERVICE**, and then select **Stop**.

   e. Right-click **HPPCSERVICE**, and then select **Start**.

2. Select the **Power** icon, and then select **Restart**.

   – or –

   Press and hold the power button on Sprout for 5 or more seconds to turn off Sprout, and then press the power button to turn on Sprout.

Projection does not come back when the touch mat is connected again.

1. If the touch mat workspace icon is amber, touch the icon to enable the projector. When the projector is on, the icon is white.

2. Remove the touch mat, and remove any debris from the touch mat or the connector that would interrupt the connection.

   – or –

   Clean the touch mat and the connector with a cloth.

3. Select the Power icon, and then click **Restart**.

   – or –

   Press and hold the power button on Sprout for 5 or more seconds to turn off Sprout, and then press the power button to turn on Sprout.

The touch mat is not registering touches.

1. If the touch mat workspace icon is amber, touch the icon to enable the projector. When the projector is on, the icon is white.

2. Remove the touch mat, and remove any debris from the touch mat or the connector that would interrupt the connection.

   – or –

   Clean the touch mat and the connector with a cloth.

3. Select the **Power** icon, and then select **Restart**.

   – or –

   Press and hold the power button for 5 or more seconds to turn off Sprout, and then press the power button to turn on Sprout.

4. Remove any metal objects from the touch mat.

Audio problems

No sound is produced through external speakers (purchased separately)

- Be sure that you connected powered speakers and that they are turned on.

- Adjust the volume, either on the speakers or through the computer operating system.

- Turn off your Sprout, and then unplug and reconnect the speakers. Be sure that the speakers are properly connected.

- Unplug headphones if they are connected to your Sprout (or speaker system).

- If Sprout is in the Sleep state, exit Sleep by briefly pressing the power button.

- Check the audio functions.

To check the audio functions on your Sprout, follow these steps:

1. Type `control panel` in the taskbar search box, and then select **Control Panel**.

2. Select **Hardware and Sound**, and then select **Sound**.

3. When the Sound window opens, select the **Sounds** tab. Under **Program Events**, select any sound event, such as a beep or alarm, and then select **Test**.

   You should hear sound through the speakers.

To check the recording functions on your Sprout, follow these steps:

1. Type `sound` in the taskbar search box, and then select **Sound Recorder**.

2. Select **Start Recording** and speak into the microphone. Save the file to your Windows desktop.

3. Open a multimedia program and play back the sound.

NOTE: To confirm or change the audio settings on your Sprout, type `control panel` in the taskbar search box, and then select **Control Panel**. Select **Hardware and Sound**, and then select **Sound**.

Software problems

- Shut down Sprout, and then turn it on again.

- Update or reinstall the drivers. See Updating programs and drivers on page 107.

- Refresh or restore your Sprout. See Backing up, restoring, and recovering on page 85.

8 Backing up, restoring, and recovering

This chapter provides information about the following processes. The information in the chapter is standard procedure for most products.

- Creating recovery media and backups
- Restoring and recovering your system

For additional information, refer to the HP Support Assistant app.

▲ Type `support` in the taskbar search box, and then select the **HP Support Assistant** app.

– or –

Select the question mark icon in the taskbar.

IMPORTANT: If you will be performing recovery procedures on a tablet, the tablet battery must be at least 70% charged before you start the recovery process.

IMPORTANT: For a tablet with a detachable keyboard, connect the tablet to the keyboard base before beginning any recovery process.

Creating recovery media and backups

The following methods of creating recovery media and backups are available on select products only. Choose the available method according to your computer model.

- Use HP Recovery Manager to create HP Recovery media after you successfully set up the computer. This step creates a backup of the HP Recovery partition on the computer. The backup can be used to reinstall the original operating system in cases where the hard drive is corrupted or has been replaced. For information on creating recovery media, see Creating HP Recovery media (select products only) on page 86. For information on the recovery options that are available using the recovery media, see Using Windows tools on page 87.

- Use Windows tools to create system restore points and create backups of personal information.

  For more information, see Recovering using HP Recovery Manager on page 87.

  NOTE: If storage is 32 GB or less, Microsoft System Restore is disabled by default.

- On select products, use the HP Cloud Recovery Download Tool to create a bootable USB drive for your HP recovery media. Go to https://support.hp.com/us-en/document/c05115630?openCLC=true, select your country or region, and follow the on-screen instructions.

Creating HP Recovery media (select products only)

If possible, check for the presence of the Recovery partition and the Windows partition. Right-click the **Start** menu, select **File Explorer**, and then select **This PC**.

- If your computer does not list the Windows partition and the Recovery partition, you can obtain recovery media for your system from support. You can find contact information on the HP website. Go to http://www.hp.com/support, select your country or region, and follow the on-screen instructions.

  You can use Windows tools to create system restore points and create backups of personal information, see Using Windows tools on page 87.

- If your computer does list the Recovery partition and the Windows partition, you can use HP Recovery Manager to create recovery media after you successfully set up the computer. HP Recovery media can be used to perform system recovery if the hard drive becomes corrupted. System recovery reinstalls the original operating system and software programs that were installed at the factory and then configures the settings for the programs. HP Recovery media can also be used to customize the system or restore the factory image if you replace the hard drive.

  - Only one set of recovery media can be created. Handle these recovery tools carefully, and keep them in a safe place.

  - HP Recovery Manager examines the computer and determines the required storage capacity for the media that will be required.

  - To create recovery discs, your computer must have an optical drive with DVD writer capability, and you must use only high-quality blank DVD-R, DVD+R, DVD-R DL, or DVD+R DL discs. Do not use rewritable discs such as CD±RW, DVD±RW, double-layer DVD±RW, or BD-RE (rewritable Blu-ray) discs; they are not compatible with HP Recovery Manager software. Or, instead, you can use a high-quality blank USB flash drive.

  - If your computer does not include an integrated optical drive with DVD writer capability, but you would like to create DVD recovery media, you can use an external optical drive (purchased separately) to create recovery discs. If you use an external optical drive, it must be connected directly to a USB port on the computer; the drive cannot be connected to a USB port on an external device, such as a USB hub. If you cannot create DVD media yourself, you can obtain recovery discs for your computer from HP. You can find contact information on the HP website. Go to http://www.hp.com/support, select your country or region, and follow the on-screen instructions.

  - Be sure that the computer is connected to AC power before you begin creating the recovery media.

  - The creation process can take an hour or more. Do not interrupt the creation process.

  - If necessary, you can exit the program before you have finished creating all of the recovery DVDs. HP Recovery Manager will finish burning the current DVD. The next time you start HP Recovery Manager, you will be prompted to continue.

To create HP Recovery media:

IMPORTANT: For a tablet with a detachable keyboard, connect the tablet to the keyboard base before beginning these steps.

1. Type `recovery` in the taskbar search box, and then select **HP Recovery Manager**.

2. Select **Create recovery media**, and then follow the on-screen instructions.

If you ever need to recover the system, see Recovering using HP Recovery Manager on page 87.

Using Windows tools

You can create recovery media, system restore points, and backups of personal information using Windows tools.

NOTE: If storage is 32 GB or less, Microsoft System Restore is disabled by default.

For more information and steps, see the Get help app.

▲ Select the **Start** button, and then select the **Get Help** app.

NOTE: You must be connected to the Internet to access the Get help app.

Restore and recovery

There are several options for recovering your system. Choose the method that best matches your situation and level of expertise:

IMPORTANT: Not all methods are available on all products.

- Windows offers several options for restoring from backup, refreshing the computer, and resetting the computer to its original state. For more information see the Get help app.

  ▲ Select the **Start** button, and then select the **Get Help** app.

  NOTE: You must be connected to the Internet to access the Get help app.

- If you need to correct a problem with a preinstalled application or driver, use the Reinstall drivers and/or applications option (select products only) of HP Recovery Manager to reinstall the individual application or driver.

  ▲ Type `recovery` in the taskbar search box, select **HP Recovery Manager**, select **Reinstall drivers and/or applications**, and then follow the on-screen instructions.

- If you want to recover the Windows partition to original factory content, you can choose the System Recovery option from the HP Recovery partition (select products only) or use the HP Recovery media. For more information, see Recovering using HP Recovery Manager on page 87. If you have not already created recovery media, see Creating HP Recovery media (select products only) on page 86.

- On select products, if you want to recover the computer's original factory partition and content, or if you have replaced the hard drive, you can use the Factory Reset option of HP Recovery media. For more information, see Recovering using HP Recovery Manager on page 87.

- On select products, if you want to remove the Recovery partition to reclaim hard drive space, HP Recovery Manager offers the Remove Recovery Partition option.

  For more information, see Removing the HP Recovery partition (select products only) on page 89.

Recovering using HP Recovery Manager

HP Recovery Manager software allows you to recover the computer to its original factory state by using the HP Recovery media that you either created or that you obtained from HP, or by using the HP Recovery partition (select products only). If you have not already created recovery media, see Creating HP Recovery media (select products only) on page 86.

What you need to know before you get started

- HP Recovery Manager recovers only software that was installed at the factory. For software not provided with this computer, you must either download the software from the manufacturer's website or reinstall the software from the media provided by the manufacturer.

> **IMPORTANT:** Recovery through HP Recovery Manager should be used as a final attempt to correct computer issues.

- HP Recovery media must be used if the computer hard drive fails. If you have not already created recovery media, see Creating HP Recovery media (select products only) on page 86.

- To use the Factory Reset option (select products only), you must use HP Recovery media. If you have not already created recovery media, see Creating HP Recovery media (select products only) on page 86.

- If your computer does not allow the creation of HP Recovery media or if the HP Recovery media does not work, you can obtain recovery media for your system from support. You can find contact information from the HP website. Go to http://www.hp.com/support, select your country or region, and follow the on-screen instructions.

> **IMPORTANT:** HP Recovery Manager does not automatically provide backups of your personal data. Before beginning recovery, back up any personal data you want to retain.

Using HP Recovery media, you can choose from one of the following recovery options:

> **NOTE:** Only the options available for your computer display when you start the recovery process.

- System Recovery—Reinstalls the original operating system, and then configures the settings for the programs that were installed at the factory.

- Factory Reset—Restores the computer to its original factory state by deleting all information from the hard drive and re-creating the partitions. Then it reinstalls the operating system and the software that was installed at the factory.

The HP Recovery partition (select products only) allows System Recovery only.

Using the HP Recovery partition (select products only)

The HP Recovery partition allows you to perform a system recovery without the need for recovery discs or a recovery USB flash drive. This type of recovery can be used only if the hard drive is still working.

To start HP Recovery Manager from the HP Recovery partition:

> **IMPORTANT:** For a tablet with a detachable keyboard, connect the tablet to the keyboard base before beginning these steps (select products only).

1. Type recovery in the taskbar search box, select **HP Recovery Manager**, and then select **Windows Recovery Environment**.

   – or –

   For computers or tablets with keyboards attached, press f11 while the computer boots, or press and hold f11 as you press the power button.

   For tablets without keyboards:

   - Turn on or restart the tablet, and then quickly hold down the volume up button; then select **f11**.

– or –

- Turn on or restart the tablet, and then quickly hold down the volume down button; then select **f11**.

2. Select **Troubleshoot** from the boot options menu.

3. Select **Recovery Manager**, and then follow the on-screen instructions.

Using HP Recovery media to recover

You can use HP Recovery media to recover the original system. This method can be used if your system does not have an HP Recovery partition or if the hard drive is not working properly.

1. If possible, back up all personal files.

2. Insert the HP Recovery media, and then restart the computer.

    NOTE: If the computer does not automatically restart in HP Recovery Manager, change the computer boot order. See .

3. Follow the on-screen instructions.

Changing the computer boot order

If your computer does not restart in HP Recovery Manager, you can change the computer boot order, which is the order of devices listed in BIOS where the computer looks for startup information. You can change the selection to an optical drive or a USB flash drive.

To change the boot order:

IMPORTANT: For a tablet with a detachable keyboard, connect the tablet to the keyboard base before beginning these steps.

1. Insert the HP Recovery media.

2. Access the system **Startup** menu.

    For computers or tablets with keyboards attached:

    ▲ Turn on or restart the computer or tablet, quickly press esc, and then press f9 for boot options.

    For tablets without keyboards:

    ▲ Turn on or restart the tablet, and then quickly hold down the volume up button; then select **f9**.

       – or –

       Turn on or restart the tablet, and then quickly hold down the volume down button; then select **f9**.

3. Select the optical drive or USB flash drive from which you want to boot.

4. Follow the on-screen instructions.

Removing the HP Recovery partition (select products only)

HP Recovery Manager software allows you to remove the HP Recovery partition to free up hard drive space.

IMPORTANT: After you remove the HP Recovery partition, you will not be able to perform System Recovery or create HP Recovery media from the HP Recovery partition. So before you remove the Recovery partition, create HP Recovery media; see Creating HP Recovery media (select products only) on page 86.

NOTE: The Remove Recovery Partition option is only available on products that support this function.

Follow these steps to remove the HP Recovery partition:

1. Type `recovery` in the taskbar search box, and then select **HP Recovery Manager**.

2. Select **Remove Recovery Partition**, and then follow the on-screen instructions.

9   POST error messages

This appendix lists the error codes, error messages, and the various indicator light and audible sequences that you may encounter during Power-On Self-Test (POST) or computer restart, the probable source of the problem, and steps you can take to resolve the error condition.

POST Message Disabled suppresses most system messages during POST, such as memory count and non-error text messages. If a POST error occurs, the screen will display the error message. To manually switch to the POST Messages Enabled mode during POST, press any key (except F10, F11, or F12). The default mode is POST Message Disabled.

The speed at which the computer loads the operating system and the extent to which it is tested are determined by the POST mode selection.

Full Boot may also be enabled to run every 1 to 30 days on a regularly scheduled basis. To establish the schedule, reconfigure the computer to the Full Boot Every x Days mode, using Computer Setup.

POST numeric codes and text messages

This section covers those POST errors that have numeric codes associated with them. The section also includes some text messages that may be encountered during POST.

📝 **NOTE:** The computer will beep once after a POST text message is displayed on the screen.

Control panel message	Description	Recommended action
101-Option ROM Checksum Error	System ROM checksum.	1. Verify the correct ROM. 2. Flash the ROM if needed. 3. Clear CMOS. (See Appendix B, Password security and resetting CMOS on page 101.) 4. Replace the system board.
103-System Board Failure	DMA or timers.	1. Clear CMOS. (See Appendix B, Password security and resetting CMOS on page 101.) 2. Replace the system board.
162-System Options Not Set	Configuration incorrect. RTC (real-time clock) battery may need to be replaced.	Run Computer Setup and check the configuration in **Advanced** > **Onboard Devices**. Reset the date and time under **Control Panel**. If the problem persists, replace the RTC battery. See the Removal and Replacement section for instructions on installing a new battery, or contact an authorized dealer or reseller for RTC battery replacement.
163-Time & Date Not Set	Invalid time or date in configuration memory. RTC (real-time clock) battery may need to be replaced.	Reset the date and time under **Control Panel** (Computer Setup can also be used). If the problem persists, replace the RTC battery. See the Removal and Replacement section for instructions on installing a new battery, or contact an authorized dealer or reseller for RTC battery replacement.
163-Time & Date Not Set	CMOS jumper may not be properly installed.	Check for proper placement of the CMOS jumper if applicable.
164-MemorySize Error	Memory amount has changed since the last boot (memory added or removed).	Press the F1 key to save the memory changes.
164-MemorySize Error	Memory configuration incorrect.	1. Run Computer Setup or Windows utilities. 2. Make sure the memory module(s) are installed properly. 3. If third-party memory has been added, test using HP-only memory. 4. Verify proper memory module type.

Control panel message	Description	Recommended action
201-Memory Error	RAM failure.	1. Ensure memory modules are correctly installed. 2. Verify proper memory module type. 3. Remove and replace the identified faulty memory module(s). 4. If the error persists after replacing memory modules, replace the system board.
213-Incompatible Memory Module in Memory Socket(s) X, X, ...	A memory module in memory socket identified in the error message is missing critical SPD information, or is incompatible with the chipset.	1. Verify proper memory module type. 2. Try another memory socket. 3. Replace DIMM with a module conforming to the SPD standard.
214-DIMM Configuration Warning	Populated DIMM Configuration is not optimized.	Rearrange the DIMMs so that each channel has the same amount of memory.
219-ECC Memory Module Detected ECC Modules not supported on this Platform	Recently added memory module(s) support ECC memory error correction.	1. If additional memory was recently added, remove it to see if the problem remains. 2. Check product documentation for memory support information.
301-Keyboard Error	Keyboard failure.	1. Reconnect keyboard with computer turned off. 2. Check connector for bent or missing pins. 3. Ensure that none of the keys are depressed. 4. Replace keyboard.
303-Keyboard Controller Error	I/O board keyboard controller.	1. Reconnect keyboard with computer turned off. 2. Replace the system board.
304-Keyboard or System Unit Error	Keyboard failure.	1. Reconnect the keyboard with computer turned off. 2. Ensure that none of the keys are depressed. 3. Replace the keyboard. 4. Replace the system board.
510-Flash Screen Image Corrupted	Flash Screen image has errors.	Reflash the system ROM with the latest BIOS image.
511-CPU, CPUA, or CPUB Fan not Detected	Fan is not connected or may have malfunctioned.	1. Reseat fan. 2. Reseat fan cable. 3. Replace fan.

Control panel message	Description	Recommended action
512-Chassis, Rear Chassis, or Front Chassis Fan not Detected	Fan is not connected or may have malfunctioned.	1. Reseat fan. 2. Reseat fan cable. 3. Replace fan.
514-CPU or Chassis Fan not Detected	Fan is not connected or may have malfunctioned.	1. Reseat fan. 2. Reseat fan cable. 3. Replace fan.
660-Display cache is detected unreliable	Integrated graphics controller display cache is not working properly and will be disabled.	Replace system board if minimal graphics degrading is an issue.
1720-SMART Hard Drive Detects Imminent Failure	Hard drive is about to fail. (Some hard drives have a hard drive firmware patch that will fix an erroneous error message.)	1. Determine if hard drive is giving correct error message. Enter Computer Setup and run the Drive Protection System test under **Storage** > **DPS Self-test**. 2. Apply hard drive firmware patch if applicable. (Available at http://www.hp.com/support.) 3. Back up contents and replace hard drive.
1801-Microcode Patch Error	Processor is not supported by ROM BIOS.	1. Upgrade BIOS to proper version. 2. Change the processor.
2200-PMM Allocation Error during MEBx Download	Memory error during POST execution of the Management Engine (ME) BIOS Extensions option ROM.	1. Reboot the computer. 2. Unplug the power cord, reseat the memory modules, and reboot the computer. 3. If the memory configuration was recently changed, unplug the computer, restore the original memory configuration, and reboot the computer. 4. If the error persists, replace the system board.
2201-MEBx Module did not checksum correctly	Memory error during POST execution of the Management Engine (ME) BIOS Extensions option ROM.	1. Reboot the computer. 2. Unplug the power cord, re-seat the memory modules, and reboot the computer. 3. If the memory configuration was recently changed, unplug the power cord, restore the original memory configuration, and reboot the computer. 4. If the error persists, replace the system board.

Control panel message	Description	Recommended action
2202-PMM Deallocation Error during MEBx cleanup	Memory error during POST execution of the Management Engine (ME) BIOS Extensions option ROM.	1. Reboot the computer. 2. Unplug the power cord, re-seat the memory modules, and reboot the computer. 3. If the memory configuration was recently changed, unplug the power cord, restore the original memory configuration, and reboot the computer. 4. If the error persists, replace the system board.
2203-Setup error during MEBx execution	MEBx selection or exit resulted in a setup failure.	1. Reboot the computer. 2. Unplug the power cord, re-seat the memory modules, and reboot the computer. 3. If the memory configuration was recently changed, unplug the power cord, restore the original memory configuration, and reboot the computer. 4. If the error persists, replace the system board.
2204-Inventory error during MEBx execution	BIOS information passed to the MEBx resulted in a failure.	1. Reboot the computer. 2. If the error persists, update to the latest BIOS version. 3. If the error still persists, replace the system board.
2205-Interface error during MEBx execution	MEBx operation experienced a hardware error during communication with ME.	1. Reboot the computer. 2. If the error persists, update to the latest BIOS version. 3. If the error still persists, replace the system board.
2211-Memory not configured correctly for proper MEBx execution.	XMM1 is not installed.	Make sure there is a memory module in the white XMM1 socket and that it is properly seated.
2212-USB Key Provisioning failure writing to device	USB device used for USB key provisioning will not allow BIOS to update provision file properly.	1. Try a different USB key device for provisioning. 2. If the error persists, update to the latest BIOS version and ME firmware version. 3. If the error still persists, replace the system board.
2217-ME Firmware Version request failure	ME firmware is not properly responding to BIOS query for version information.	1. Reboot the computer. 2. If the error persists, update to the latest BIOS version and ME firmware version. 3. If the error still persists, replace the system board.

Control panel message	Description	Recommended action
2218-ME Firmware Version should be updated	ME firmware must be updated to match current functionality contained in the system BIOS.	1. Update to the latest ME firmware version. 2. If the error persists and system BIOS has been recently updated, restore previous system BIOS version. 3. If the error still persists, replace the system board.
2219-USB Key Provisioning file has invalid header identifier	Provisioning file contained on the USB key has been corrupted or is not a valid version for the current ME firmware.	1. Recreate the provisioning file using third party management console software. 2. If the error persists and system BIOS has been recently updated, restore previous system BIOS version. Otherwise, update the ME firmware version. 3. If the error still persists, replace the system board.
2220-USB Key Provisioning file has mismatch version	Provisioning file contained on the USB key is not a valid version for the current ME firmware.	1. Reboot the computer. 2. If the error persists and system BIOS has been recently updated, restore previous system BIOS version. Otherwise, update the ME firmware version. 3. If the error still persists, replace the system board.
2230-General error during MEBx execution	Error occurred during MEBx execution which fails into the "General" grouping. Status information displayed along with the error provides further clarity into the failure. MEBx handles transference of information between the system BIOS and ME firmware.	1. Reboot the computer. 2. If the error persists, update to the latest BIOS version and ME firmware version. 3. If the error still persists, replace the system board.
2231-ME error during MEBx execution	Error occurred during MEBx execution which fails into "ME" grouping.	1. Reboot the computer. 2. If the error persists, update to the latest BIOS version and ME firmware version. 3. If the error still persists, replace the system board.
2232-AMT error during MEBx execution	Error occurred during MEBx execution which fails into "AMT" grouping.	1. Reboot the computer. 2. If the error persists, update to the latest BIOS version and ME firmware version. 3. If the error still persists, replace the system board.
2233-HECI error during MEBx execution	Error occurred during MEBx execution which fails into "MEI or HECI" grouping.	1. Reboot the computer. 2. If the error persists, update to the latest BIOS version and ME firmware version. 3. If the error still persists, replace the system board.

Control panel message	Description	Recommended action
2239-ME image lock failure	Special system configurations with reduced ME firmware image require BIOS control of ME firmware upgrading. A failure has occurred after the ME firmware update process in which the BIOS could not relock the ME firmware region.	1. Reboot the computer. 2. If the error persists, update to the latest BIOS version and ME firmware version. 3. If the error still persists, replace the system board.
2240-ME image unlock failure	Special system configurations with reduced ME firmware image require BIOS control of ME firmware upgrading. A failure has occurred prior to the ME firmware update process in which the BIOS could not unlock the ME firmware region.	1. Reboot the computer. 2. If the error persists, update to the latest BIOS version and ME firmware version. 3. If the error still persists, replace the system board.
Invalid Electronic Serial Number	Electronic serial number is missing.	Enter the correct serial number in Computer Setup.
Network Server Mode Active and No Keyboard Attached	Keyboard failure while Network Server Mode enabled.	1. Reconnect keyboard with computer turned off. 2. Check connector for bent or missing pins. 3. Ensure that none of the keys are depressed. 4. Replace keyboard.
Parity Check 2	Parity RAM failure.	Run Computer Setup and Diagnostic utilities.

Interpreting POST diagnostic front panel LEDs

This section covers the front panel LED codes as well as the audible codes that may occur before or during POST that do not necessarily have an error code or text message associated with them.

⚠ **WARNING!**   When the computer is plugged into an AC power source, voltage is always applied to the system board. To reduce the risk of personal injury from electrical shock and/or hot surfaces, be sure to disconnect the power cord from the wall outlet and allow the internal system components to cool before touching.

📝 **NOTE:**   Recommended actions in the following table are listed in the order in which they should be performed.

Not all diagnostic lights and audible codes are available on all models.

Activity	Beeps	Possible Cause	Recommended Action
White Power LED On.	None	Computer on.	None
White Power LED flashes every two seconds.	None	Computer in Suspend to RAM mode (some models only) or normal Suspend mode.	None required. Press any key or move the mouse to wake the computer.
Red Power LED flashes two times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	2	Processor thermal protection activated: A fan may be blocked or not turning. OR The heat sink assembly is not properly attached to the processor.	1. Ensure that the computer air vents are not blocked and the cooling fan is running. 2. Check whether the fan spins. If the fan is not spinning, make sure the fan's cable is plugged onto the system board header. 3. If fan is plugged in, but is not spinning, then replace fan assembly. 4. Contact an authorized reseller or service provider.
Red Power LED flashes three times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	3	Processor not installed (not an indicator of bad processor).	1. Check to see that the processor is present. 2. Reseat the processor.
Red Power LED flashes four times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	4	Power failure (power supply is overloaded).	1. Ensure the power supply cable is seated into the connector on the system board. 2. Check if a device is causing the problem by removing ALL attached devices. Power on the system. If the system enters the POST, then power off and replace one device at a time and repeat this procedure until failure occurs. Replace the device that is causing the failure. Continue adding devices one at a time to ensure all devices are functioning properly. 3. Replace the power supply. 4. Replace the system board.

Activity	Beeps	Possible Cause	Recommended Action
Red Power LED flashes five times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	5	Pre-video memory error.	**CAUTION:** To avoid damage to the SODIMMs or the system board, you must unplug the computer power cord before attempting to reseat, install, or remove a SODIMM module. **1.** Reseat SODIMMs. **2.** Replace SODIMMs one at a time to isolate the faulty module. **3.** Replace third-party memory with HP memory. **4.** Replace the system board.
Red Power LED flashes six times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	6	Pre-video graphics error.	Replace the system board.
Red Power LED flashes seven times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	7	System board failure (ROM detected failure prior to video).	Replace the system board.
Red Power LED flashes eight times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	8	Invalid ROM based on bad checksum.	**1.** Reflash the system ROM with the latest BIOS image. **2.** Replace the system board.
Red Power LED flashes nine times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	9	System powers on but is unable to boot.	**1.** Unplug the AC power cord from the computer, wait 30 seconds, then plug the power cord back in to the computer. **2.** Replace the system board. **3.** Replace the processor.

Activity	Beeps	Possible Cause	Recommended Action
Red Power LED flashes eleven times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	11	The current processor does not support a feature previously enabled on this system.	1. Install a TXT capable processor. 2. Disable TXT in the Computer Setup (F10) utility. 3. Reinstall the original processor.
System does not power on and LEDs are not flashing.	None	System unable to power on.	Press and hold the power button for less than 4 seconds. If the hard drive LED turns white, the power button is working correctly. Try the following: ▲ Replace the system board. OR Press and hold the power button for less than 4 seconds. If the hard drive LED does not turn on white then: 1. Check that the unit is plugged into a working AC outlet. 2. Check that the power button cable is properly connected to the system board. 3. Replace the AC adapter.

10 Password security and resetting CMOS

This computer supports security password features, which can be established through the Computer Setup Utilities menu.

This computer supports two security password features that are established through the Computer Setup Utilities menu: setup password and power-on password. When you establish only a setup password, any user can access all the information on the computer except Computer Setup. When you establish only a power-on password, the power-on password is required to access Computer Setup and any other information on the computer. When you establish both passwords, only the setup password will give you access to Computer Setup.

When both passwords are set, the setup password can also be used in place of the power-on password as an override to log in to the computer. This is a useful feature for a network administrator.

If you forget the password for the computer, you can clear that password so you can gain access to the information on the computer by resetting the password jumper.

CAUTION: Resetting CMOS will reset CMOS values to factory defaults. It is important to back up the computer CMOS settings before resetting them in case they are needed later. Back up is easily done through Computer Setup. See Computer Setup (F10) Utility on page 65 for information.

Resetting the password jumper

To disable the power-on or setup password features, or to clear the power-on or setup passwords, complete the following steps:

1. Shut down the operating system properly, then turn off the computer and any external devices, and disconnect the power cord from the power outlet.

2. With the power cord disconnected, press the power button again to drain the system of any residual power.

    WARNING! To reduce the risk of personal injury from electrical shock and/or hot surfaces, be sure to disconnect the power cord from the wall outlet, and allow the internal system components to cool before touching.

    CAUTION: When the computer is plugged in, the power supply always has voltage applied to the system board even when the unit is turned off. Failure to disconnect the power cord can result in damage to the system.

    Static electricity can damage the electronic components of the computer or optional equipment. Before beginning these procedures, ensure that you are discharged of static electricity by briefly touching a grounded metal object. See the *Safety & Regulatory Information* guide for more information.

3. Remove the right rear cover and the memory cover.

4. Locate the CMOS+PW header and jumper.

NOTE: The password jumper is blue so that it can be easily identified. For assistance locating the password jumper and other system board components, see the system board components image at System board callouts on page 51.

5. Remove the jumper from pins 3 and 5.

6. Place the jumper on pins 1 or 3.

7. Replace the memory cover and rear cover and reconnect the external equipment.

8. Plug in the computer and turn on power. Allow the operating system to start. This clears the current passwords and disables the password features.

9. Shut down the computer, unplug the power, and disconnect the external equipment.

10. Remove the rear cover.

11. Place the jumper back on pins 3 and 5.

12. Replace the rear cover.

13. Reconnect the external equipment and plug in the computer.

Establishing a setup or power-on password

To establish the power-on or setup password features, complete the following steps:

1. Turn on or restart the computer.

2. As soon as the computer turns on, press the Esc key while "Press the ESC key for Startup Menu" message is displayed at the bottom of the screen.

3. Press the F10 key to enter Computer Setup.

4. To establish Setup password, select **Security > Setup Password** and follow the instructions.

   – or –

   To establish a power-on password, select **Security > Power-On Password** and follow the instructions on the screen

5. Before exiting, click **File > Save Changes and Exit**.

Resetting the setup and power-on password

To disable the power-on or setup password features, or to clear the power-on or setup passwords, complete the following steps:

1. Shut down the operating system properly, then turn off the computer and any external devices, and disconnect the power cord from the power outlet.

2. With the power cord disconnected, press the power button again to drain the system of any residual power.

    WARNING!   To reduce the risk of personal injury from electrical shock and/or hot surfaces, be sure to disconnect the power cord from the wall outlet, and allow the internal system components to cool before touching.

    CAUTION: When the computer is plugged in, the power supply always has voltage applied to the system board even when the unit is turned off. Failure to disconnect the power cord can result in damage to the system.

    Static electricity can damage the electronic components of the computer or optional equipment. Before beginning these procedures, ensure that you are discharged of static electricity by briefly touching a grounded metal object. See the *Regulatory, Safety and Environmental Notices* guide for more information.

3. Remove the right rear cover and the memory cover.

4. Locate the header and jumper labeled CMOS+PW.

    NOTE: The password jumper is blue so that it can be easily identified. For assistance locating the password jumper and other system board components, see the Illustrated Parts & Service Map (IPSM). The IPSM can be downloaded from http://www.hp.com/support.

5. Remove the jumper.

6. Replace the jumper on the same pins.

7. Replace the memory cover and rear cover.

8. Reconnect the external equipment.

9. Plug in the computer and turn on power. Allow the operating system to start. This clears the current passwords and disables the password features.

10. Establish the new passwords in Computer Setup. See Computer Setup (F10) Utility on page 65 for information.

Changing a setup or power-on password

To change the power-on or setup password, complete the following steps:

1. Turn on or restart the computer.

   To change the setup password, go to step 2.

   To change the power-on password, go to step 3.

2. To change the setup password, as soon as the computer turns on:

   - Press the Esc key while "Press the ESC key for Startup Menu" message is displayed.

   - Press the F10 key to enter Computer Setup.

3. When the key icon appears, type your current password, a slash (/) or alternate delimiter character, your new password, another slash (/) or alternate delimiter character, and your new password again as shown:

   current password/new password/new password

   📝 **NOTE:** Type the new password carefully since the characters do not appear on the screen.

4. Press Enter.

The new password will take effect the next time the computer is restarted.

Clearing and resetting the CMOS

The computer's configuration memory (CMOS) stores information about the computer's configuration.

The CMOS jumper resets CMOS but does not clear the power-on and setup passwords.

Clearing CMOS will clear the Active Management Technology (AMT) settings in the Management Engine BIOS Extension (MEBx), including the password. The password will default to "admin" and will need to be reset. The AMT settings will also need to be reset. To access the MEBx, press Ctrl+P during POST.

1. Turn off the computer and any external devices, and disconnect the power cord from the power outlet.

2. Disconnect the keyboard, monitor, and any other external equipment connected to the computer.

   ⚠ **WARNING!** To reduce the risk of personal injury from electrical shock and/or hot surfaces, be sure to disconnect the power cord from the wall outlet, and allow the internal system components to cool before touching.

   ⚠ **CAUTION:** When the computer is plugged in, the power supply always has voltage applied to the system board even when the unit is turned off. Failure to disconnect the power cord can result in damage to the system.

   Static electricity can damage the electronic components of the computer or optional equipment. Before beginning these procedures, ensure that you are discharged of static electricity by briefly touching a grounded metal object. See the *Safety & Regulatory Information* guide for more information.

3. Remove the right rear cover and the memory cover.

4. Locate the CMOS+PW header and jumper.

NOTE: The password jumper is blue so that it can be easily identified. For assistance locating the password jumper and other system board components, see the system board components image at System board callouts on page 51.

5. Remove the jumper from pins 4 and 6.

6. Place the jumper on pins 2 or 4.

7. Replace the memory cover and rear cover and reconnect the external equipment.

8. Plug in the computer and turn on power. Allow the operating system to start. This clears the current passwords and disables the password features.

9. Shut down the computer, unplug the power, and disconnect the external equipment.

10. Remove the rear cover.

11. Place the jumper back on pins 4 and 6.

12. Replace the rear cover.

13. Reconnect the external equipment, plug in the computer and turn on power.

NOTE: You will receive POST error messages after clearing CMOS and rebooting advising you that configuration changes have occurred. Use Computer Setup to reset any special system setups along with the date and time.

For instructions on Computer Setup, see Computer Setup (F10) Utility on page 65.

11 Maintaining peak performance

Keep your Sprout at peak operating performance using the practices and tools described in this chapter. Start with routine maintenance, keep the equipment clean, and regularly update software. Also pay attention to important security issues, including passwords, virus protection, and anti-theft measures. Finally, find out how to access your system settings when you need to contact support or run diagnostics on your Sprout system.

Performing routine maintenance

Using Disk Cleanup

Disk Cleanup searches the hard drive for unnecessary files that you can safely delete to free up disk space and help the Sprout run more efficiently.

To run Disk Cleanup:

1. From the Start screen, type `disk`.

2. Select **Free up space on this PC**.

3. Follow the on-screen instructions.

Using Disk Defragmenter

As you use your Sprout over time, the files on the hard drive become fragmented. Because of this, the hard drive works harder to locate files, and the Sprout slows down. Disk Defragmenter consolidates and reorganizes the fragmented files on the hard drive so that the system can run more efficiently.

Depending on the size of your hard drive and the number of fragmented files, Disk Defragmenter may need more than an hour to complete the task.

To run Disk Defragmenter:

1. From the Start screen, type `disk defrag`.

2. Select **Defragment and optimize your drives**.

3. Follow the on-screen instructions.

Updating programs and drivers

HP recommends that you update your programs and drivers on a regular basis. Updates can resolve issues and bring new features and options to your Sprout. Without the latest driver, you would not be getting the most out of your equipment.

Go to http://www.hp.com/support to download the latest versions of HP programs and drivers. In addition, register to receive automatic notifications when updates become available.

If you would like to update your programs and drivers, follow these instructions:

1. From the Start screen, type `support`, and then select the **HP Support Assistant** app.

    – or –

    From the Windows desktop, click the question mark icon in the notification area, at the far right of the taskbar.

2. Click **Updates and tune-ups**, and then click **Check for HP updates now**.

3. Follow the on-screen instructions.

Cleaning your Sprout

Use the following products to safely clean your Sprout:

*   Dry microfiber cleaning cloth or a chamois (static-free cloth without oil)

*   Static-free cloth wipes

⚠ **CAUTION:** Avoid strong cleaning solvents that can permanently damage your Sprout. If you are not sure that a cleaning product is safe for your Sprout, check the product contents to make sure that ingredients such as alcohol, acetone, ammonium chloride, methylene chloride, and hydrocarbons are not included in the product.

Fibrous materials, such as paper towels, can scratch the Sprout. Over time, dirt particles and cleaning agents can get trapped in the scratches.

Cleaning procedures

Follow the procedures in this section to safely clean your Sprout.

⚠ **WARNING!** To prevent electric shock or damage to components, do not attempt to clean your Sprout while it is turned on.

Turn off the Sprout.

Disconnect external power.

Disconnect all powered external devices.

⚠ **CAUTION:** To prevent damage to internal components, do not spray cleaning agents or liquids directly on any Sprout surface. Liquids dripped on the surface can permanently damage internal components.

Cleaning the display and glass surfaces

⚠ **CAUTION:** Do not spray or place the cleaner directly on the screen, projector, or other glass surfaces.

Gently wipe the sides and the surface of the display, projector, and cameras using a soft, lint-free cloth moistened with an alcohol-free glass cleaner.

Cleaning the sides or cover

To clean the sides or cover, use a soft microfiber cloth or chamois moistened with one of the cleaning solutions listed previously or use an acceptable disposable wipe.

NOTE: When cleaning the cover of the Sprout, use a circular motion to aid in removing dirt and debris.

Cleaning the Touch mat

CAUTION: Do not spray or place the cleaner directly on the touch mat.

- Gently wipe the surface of the touch mat using a soft, lint-free cloth moistened with an alcohol-free glass cleaner.

- To prevent damage to the touch mat, avoid using strong chemicals.

Cleaning the keyboard or mouse

WARNING! To reduce the risk of electric shock or damage to internal components, do not use a vacuum cleaner attachment to clean the keyboard. A vacuum cleaner can deposit household debris on the keyboard surface.

CAUTION: To prevent damage to internal components, do not allow liquids to drip between the keys.

- To clean the keyboard or mouse, use a soft microfiber cloth or a chamois moistened with one of the cleaning solutions listed previously or use an acceptable disposable wipe.

- To prevent keys from sticking and to remove dust, lint, and particles from the keyboard, use a can of compressed air with a straw extension.

A Power cord set requirements

The power supplies on some computers have external power switches. The voltage select switch feature on the computer permits it to operate from any line voltage between 100-120 or 220-240 volts AC. Power supplies on those computers that do not have external power switches are equipped with internal switches that sense the incoming voltage and automatically switch to the proper voltage.

The power cord set received with the computer meets the requirements for use in the country where you purchased the equipment.

Power cord sets for use in other countries must meet the requirements of the country where you use the computer.

General requirements

The requirements listed below are applicable to all countries:

1. The power cord must be approved by an acceptable accredited agency responsible for evaluation in the country where the power cord set will be installed.

2. The power cord set must have a minimum current capacity of 10A (7A Japan only) and a nominal voltage rating of 125 or 250 volts AC, as required by each country's power system.

3. The diameter of the wire must be a minimum of 0.75 mm$_2$ or 18AWG, and the length of the cord must be between 1.8 m (6 feet) and 3.6 m (12 feet).

The power cord should be routed so that it is not likely to be walked on or pinched by items placed upon it or against it. Particular attention should be paid to the plug, electrical outlet, and the point where the cord exits from the product.

⚠ **WARNING!** Do not operate this product with a damaged power cord set. If the power cord set is damaged in any manner, replace it immediately.

Japanese power cord requirements

For use in Japan, use only the power cord received with this product.

⚠ **CAUTION:** Do not use the power cord received with this product on any other products.

Country-specific requirements

Additional requirements specific to a country are shown in parentheses and explained below.

Country	Accrediting Agency	Country	Accrediting Agency
Australia (1)	EANSW	Italy (1)	IMQ
Austria (1)	OVE	Japan (3)	METI
Belgium (1)	CEBC	Norway (1)	NEMKO
Canada (2)	CSA	Sweden (1)	SEMKO
Denmark (1)	DEMKO	Switzerland (1)	SEV
Finland (1)	SETI	United Kingdom (1)	BSI
France (1)	UTE	United States (2)	UL
Germany (1)	VDE		

1. The flexible cord must be Type HO5VV-F, 3-conductor, 0.75mm$_2$ 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 where it will be used.

2. The flexible cord must be Type SVT or equivalent, No. 18 AWG, 3-conductor. The wall plug must be a two-pole grounding type with a NEMA 5-15P (15A, 125V) or NEMA 6-15P (15A, 250V) configuration.

3. Appliance coupler, flexible cord, and wall plug must bear a "T" mark and registration number in accordance with the Japanese Dentori Law. Flexible cord must be Type VCT or VCTF, 3-conductor, 0.75 mm$_2$ conductor size. Wall plug must be a two-pole grounding type with a Japanese Industrial Standard C8303 (7A, 125V) configuration.

B   Statement of memory volatility

The purpose of this chapter is to provide general information regarding nonvolatile memory in HP Business computers. This chapter also provides general instructions for restoring nonvolatile memory that can contain personal data after the system has been powered off and the hard drive has been removed.

HP Business computer products that use Intel®-based or AMD®-based system boards contain volatile DDR memory. The amount of nonvolatile memory present in the system depends upon the system configuration. Intel-based and AMD-based system boards contain nonvolatile memory subcomponents as originally shipped from HP, assuming that no subsequent modifications have been made to the system and assuming that no applications, features, or functionality have been added to or installed on the system.

Following system shutdown and removal of all power sources from an HP Business computer system, personal data can remain on volatile system memory (DIMMs) for a finite period of time and will also remain in nonvolatile memory. Use the steps below to remove personal data from the computer, including the nonvolatile memory found in Intel-based and AMD-based system boards.

NOTE: If your tablet has a keyboard base, connect to the keyboard base before beginning steps in this chapter.

Current BIOS steps

1. Follow steps (a) through (l) below to restore the nonvolatile memory that can contain personal data. Restoring or reprogramming nonvolatile memory that does not store personal data is neither necessary nor recommended.

   a. 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.

      NOTE: If the system has a BIOS administrator password, enter the password at the prompt.

   b. Select **Main**, select **Apply Factory Defaults and Exit**, and then select **Yes** to load defaults.

      The computer will reboot.

   c. During the reboot, press esc while the "Press the ESC key for Startup Menu" message is displayed at the bottom of the screen.

      NOTE: If the system has a BIOS administrator password, enter the password at the prompt.

   d. Select the **Security** menu, select **Restore Security Settings to Factory Defaults**, and then select **Yes** to restore security level defaults.

      The computer will reboot.

   e. During the reboot, press esc while the "Press the ESC key for Startup Menu" message is displayed at the bottom of the screen.

> **NOTE:** If the system has a BIOS administrator password, enter the password at the prompt.

f. If an asset or ownership tag is set, select the **Security** menu and scroll down to the **Utilities** menu. Select **System IDs**, and then select **Asset Tracking Number**. Clear the tag, and then make the selection to return to the prior menu.

g. If a DriveLock password is set, select the **Security** menu, and scroll down to **Hard Drive Utilities** under the **Utilities** menu. Select **Hard Drive Utilities**, select **DriveLock**, then uncheck the checkbox for **DriveLock password on restart**. Select **OK** to proceed.

h. Select the **Main** menu, and then select **Reset BIOS Security to factory default**. Click **Yes** at the warning message.

The computer will reboot.

i. During the reboot, press esc while the "Press the ESC key for Startup Menu" message is displayed at the bottom of the screen.

> **NOTE:** If the system has a BIOS administrator password, enter the password at the prompt.

j. Select the **Main** menu, select **Apply Factory Defaults and Exit**, select **Yes** to save changes and exit, and then select **Shutdown**.

k. Reboot the system. If the system has a Trusted Platform Module (TPM) and/or fingerprint reader, one or two prompts will appear—one to clear the TPM and the other to Reset Fingerprint Sensor; press or tap F1 to accept or F2 to reject.

l. Remove all power and system batteries for at least 24 hours.

2. Complete one of the following:

● Remove and retain the storage drive.

– or –

● Clear the drive contents by using a third party utility designed to erase data from an SSD.

– or –

● Clear the contents of the drive by using the following BIOS Setup Secure Erase command option steps:

> **IMPORTANT:** If you clear data using Secure Erase, it cannot be recovered.

a. 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.

b. Select the **Security** menu and scroll down to the **Utilities** menu.

c. Select **Hard Drive Utilities**.

d. Under **Utilities**, select **Secure Erase**, select the hard drive storing the data you want to clear, and then follow the on-screen instructions to continue.

Nonvolatile memory usage

Nonvolatile Memory Type	Amount (Size)	Does this memory store customer data?	Does this memory retain data when power is removed?	What is the purpose of this memory?	How is data input into this memory?	How is this memory write-protected?
HP Sure Start flash (select models only)	8 MBytes	No	Yes	Provides protected backup of critical System BIOS code, EC firmware, and critical computer configuration data for select platforms that support HP Sure Start. For more information, see Using HP Sure Start (select models only) on page 119.	Data cannot be written to this device via the host processor. The content is managed solely by the HP Sure Start Embedded Controller.	This memory is protected by the HP Sure Start Embedded Controller.
Real Time Clock (RTC) battery backed-up CMOS configuration memory	256 Bytes	No	Yes	Stores system date and time and noncritical data.	RTC battery backed-up CMOS is programmed using the Computer Setup (BIOS), or changing the Microsoft Windows date & time.	This memory is not write-protected.
Controller (NIC) EEPROM	64 KBytes (not customer accessible)	No	Yes	Stores NIC configuration and NIC firmware.	NIC EEPROM is programmed using a utility from the NIC vendor that can be run from DOS.	A utility is required to write data to this memory and is available from the NIC vendor. Writing data to this ROM in an inappropriate manner will render the NIC non-functional.
DIMM Serial Presence Detect (SPD) configuration data	256 Bytes per memory module, 128 Bytes programmable (not customer accessible)	No	Yes	Stores memory module information.	DIMM SPD is programmed by the memory vendor.	Data cannot be written to this memory when the module is installed in a computer. The specific write-protection method varies by memory vendor.

Nonvolatile Memory Type	Amount (Size)	Does this memory store customer data?	Does this memory retain data when power is removed?	What is the purpose of this memory?	How is data input into this memory?	How is this memory write-protected?
System BIOS	9 MBytes	Yes	Yes	Stores system BIOS code and computer configuration data.	System BIOS code is programmed at the factory. Code is updated when the system BIOS is updated. Configuration data and settings are input using the Computer Setup (BIOS) or a custom utility.	**NOTE:** Writing data to this ROM in an inappropriate manner can render the computer non-functional. A utility is required for writing data to this memory and is available on the HP website; go to http://www.hp.com/support. Select **Find your product**, and then follow the on-screen instructions.
Intel Management Engine Firmware (present only in select Elite or Z models. For more information, go to http://www.hp.com/support. Select **Find your product**, and then follow the on-screen instructions.)	1.5 MBytes or 7 MBytes	Yes	Yes	Stores Management Engine Code, Settings, Provisioning Data and iAMT third-party data store.	Management Engine Code is programmed at the factory. Code is updated via Intel secure firmware update utility. Unique Provisioning Data can be entered at the factory or by an administrator using the Management Engine (MEBx) setup utility. The third party data store contents can be populated by a remote management console or local applications that have been registered by an administrator to have access to the space.	The Intel chipset is configured to enforce hardware protection to block all direct read/write access to this area. An Intel utility is required for updating the firmware. Only firmware updates digitally signed by Intel can be applied using this utility.
Bluetooth flash (select products only)	2 Mbit	No	Yes	Stores Bluetooth configuration and firmware.	Bluetooth flash is programmed at the factory. Tools for writing data to this memory are not publicly available but can be obtained from the silicon vendor.	A utility is required for writing data to this memory and is made available through newer versions of the driver whenever the flash requires an upgrade.
802.11 WLAN EEPROM	4 Kbit to 8 Kbit	No	Yes	Stores configuration and calibration data.	802.11 WLAN EEPROM is programmed at the factory. Tools for writing data to this memory are not made public.	A utility is required for writing data to this memory and is typically not made available to the public unless a firmware upgrade is necessary to address a unique issue.

Nonvolatile Memory Type	Amount (Size)	Does this memory store customer data?	Does this memory retain data when power is removed?	What is the purpose of this memory?	How is data input into this memory?	How is this memory write-protected?
Webcam (select products only)	64 Kbit	No	Yes	Stores webcam configuration and firmware.	Webcam memory is programmed using a utility from the device manufacturer that can be run from Windows.	A utility is required for writing data to this memory and is typically not made available to the public unless a firmware upgrade is necessary to address a unique issue.
Fingerprint reader (select products only)	512 KByte flash	Yes	Yes	Stores fingerprint templates.	Fingerprint reader memory is programmed by user enrollment in HP ProtectTools Security Manager.	Only a digitally signed application can make the call to write to the flash.

Questions and answers

1. **How can the BIOS settings be restored (returned to factory settings)?**

   📝 **IMPORTANT:** Restore defaults does not securely erase any data on your hard drive. See question and answer 6 for steps to securely erase data.

   Restore defaults does not reset the Custom Secure Boot keys. See question and answer 7 for information about resetting the keys.

   a. 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.

   b. Select **Main**, and then select **Apply Factory Defaults and Exit**.

   c. Follow the on-screen instructions.

   d. Select **Main**, select **Save Changes and Exit**, and then follow the on-screen instructions.

2. **What is a UEFI BIOS, and how is it different from a legacy BIOS?**

   The Unified Extensible Firmware Interface (UEFI) BIOS is an industry-standard software interface between the platform firmware and an operating system (OS). It is a replacement for the older BIOS architecture, but supports much of the legacy BIOS functionality.

   Like the legacy BIOS, the UEFI BIOS provides an interface to display the system information and configuration settings and to change the configuration of your computer before an OS is loaded. BIOS provides a secure run-time environment that supports a Graphic User Interface (GUI). In this environment, you can use either a pointing device (Touchscreen, TouchPad, pointing stick, or USB mouse) or the keyboard to navigate and make menu and configuration selections. The UEFI BIOS also contains basic system diagnostics.

   The UEFI BIOS provides functionality beyond that of the legacy BIOS. In addition, the UEFI BIOS works to initialize the computer's hardware before loading and executing the OS; the run-time environment allows the loading and execution of software programs from storage devices to provide more functionality, such as advanced hardware diagnostics (with the ability to display more detailed system information) and advanced firmware management and recovery software.

   HP has provided options in Computer Setup (BIOS) to allow you to run in legacy BIOS, if required by the operating system. Examples of this requirement would be if you upgrade or downgrade the OS.

3. **Where does the UEFI BIOS reside?**

   The UEFI BIOS resides on a flash memory chip. A utility is required to write to the chip.

4. **What kind of configuration data is stored on the DIMM Serial Presence Detect (SPD) memory module? How would this data be written?**

   The DIMM SPD memory contains information about the memory module, such as size, serial number, data width, speed/timing, voltage, and thermal information. This information is written by the module manufacturer and stored on an EEPROM. This EEPROM cannot be written to when the memory module is installed in a computer. Third-party tools do exist that can write to the EEPROM when the memory module is not installed in a computer. Various third-party tools are available to read SPD memory.

5. **What is meant by "Restore the nonvolatile memory found in Intel-based system boards"?**

   This message relates to clearing the Real Time Clock (RTC) CMOS memory that contains computer configuration data.

6. **How can the BIOS security be reset to factory defaults and data erased?**

    IMPORTANT: Resetting will result in the loss of information.

    These steps will not reset Custom Secure Boot Keys. See question and answer 7 for information about resetting the keys.

    a. 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.

    b. Select **Main**, and then select **Reset Security to Factory Defaults**.

    c. Follow the on-screen instructions.

    d. Select **Main**, select **Save Changes and Exit**, and then follow the on-screen instructions.

7. **How can the Custom Secure Boot Keys be reset?**

    Secure Boot is a feature to ensure that only authenticated code can start on a platform. If you enabled Secure Boot and created Custom Secure Boot Keys, simply disabling Secure Boot will not clear the keys. You must also select to clear the Custom Secure Boot Keys. Use the same Secure Boot access procedure you used to create the Custom Secure Boot Keys, but make the selection to clear or delete all Secure Boot Keys.

    a. 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.

    b. Select the **Security** menu, select **Secure Boot Configuration**, and then follow the on-screen instructions.

    c. At the **Secure Boot Configuration** window, select **Secure Boot**, select **Clear Secure Boot Keys**, and then follow the on-screen instructions to continue.

Using HP Sure Start (select models only)

Select computer models are configured with HP Sure Start, a technology that continuously monitors your computer's BIOS for attacks or corruption. If the BIOS becomes corrupted or is attacked, HP Sure Start restores the BIOS to its previously safe state, without user intervention. Those select computer models ship with HP Sure Start configured and enabled. HP Sure Start is configured and already enabled so that most users can use the HP Sure Start default configuration. The default configuration can be customized by advanced users.

To access the latest documentation on HP Sure Start, go to http://www.hp.com/support. Select **Find your product**, and then follow the on-screen instructions.

C Specifications

DLP Projector

Item	Value
Native display resolution	1920x1280
Resolution (as displayed on the mat)	
Maximum	100 PPI
Median	95 PPI
Display refresh rate	60 Hz
Minimum brightness	220 lumens
Contrast ratio	> 800:1
Peak/typical power consumption	<150W/<80W
Environmental compliance	Yes

HP High-Resolution camera

Item	Value
Sensor native resolution	4416x3312 (14.6 megapixel)
Interface: command + data	USB 3.0
Frame rates	
4416x3312	7fps max
2208x1656	30fps max
1104x828	60fps max
Output format	YUV422
Motorized adjustable focus/zoom	No
Front focal distance range	570 mm nominal
Field of view	49.3º horizontal, 38.0º vertical, 60.0º diagonal

Item	Value
Relative illumination	>60% at max FOV
Typical power consumption	4.5W
Environmental compliance	Yes

HP Touch Mat

Item	Value
Active area aspect ratio	3:2
Overall dimensions	22.6" x 15.5" (573 mm x 394 mm)
Interface	USB 2.0
Touch technology	PCT (Projected Capacitance)
Touch points	True Multi-Touch, 20 points recognized by Windows 10
Touch detection	Fingers, HP Active Pen
Accuracy	± 1 mm
Hover sensing	~8mm with HP Active Pen
Buttons	3- Input WorkTool, Home (WorkTool launcher), Touch/ Projector enable/ disable - on Sprout Connector
Mechanical properties	Flexible
Stylus support	Capacitance, HP Active Pen
OS requirements	Microsoft Windows 10 WHQL
Active area IR reflectivity	58% ± 3
Total mat thickness	2.2 mm
Refresh rate	> 100 Hz
Latency	< 18 msec
Surface finish	Matte, non-glare ~ 10 GU

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