



# Hardware Reference Guide

HP 402 G1 Small Form Factor Business PC

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#### **Hardware Reference Guide**

HP 402 G1 Small Form Factor Business PC

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#### **Product Notice**

This 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 8. This computer may require upgraded and/or separately purchased hardware, drivers and/or software to take full advantage of Windows 8 functionality. See <http://www.microsoft.com> for details.


This computer may require upgraded and/or separately purchased hardware and/or a DVD drive to install the Windows 7 software and take full advantage of Windows 7 functionality. See <http://windows.microsoft.com/en-us/windows7/get-know-windows-7> for details.

## About This Book

This guide provides basic information for upgrading the HP Business PC.

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 **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 Product features

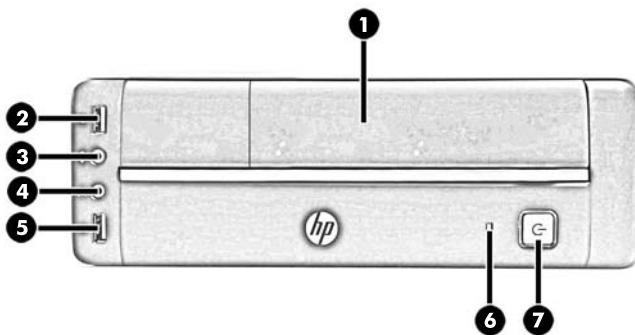
## Standard configuration features

Features may vary depending on the model. For a complete listing of the hardware and software installed in the computer, run the diagnostic utility (included on some computer models only).

 **NOTE:** This computer model can be used in a tower orientation or a desktop orientation.



## Front panel components

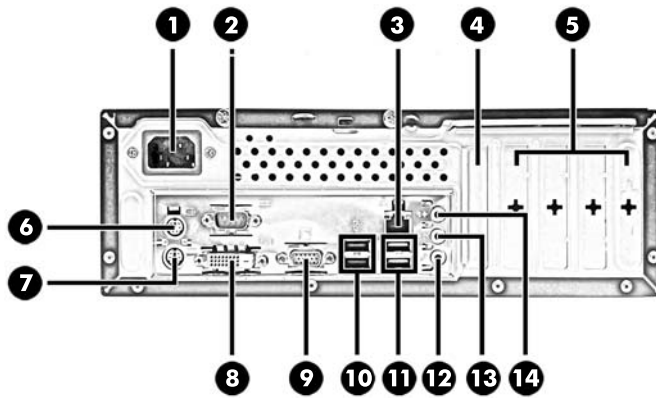










Drive configuration may vary by model.

1	Slim optical disc drive (optional)	5	USB 2.0 Port (black)
2	USB 2.0 Port (black)	6	Hard Drive Activity Light
3	Microphone Connector	7	Dual-State Power Button
4	Headphone Connector		

**NOTE:** The Power On Light is normally white when the power is on. If it is flashing red, there is a problem with the computer and it is displaying a diagnostic code. Refer to the *Maintenance and Service Guide* to interpret the code.

## Rear panel components



1	Power Cord Connector	8	 DVI-D Monitor Connector (white)
2	IO/IOA Serial Connector (green)	9	 VGA Monitor Connector (blue)
3	 RJ-45 Network Connector	10	 USB 2.0 Ports (black)
4	PCI x16 Expansion Card Slot Cover	11	USB 3.0 Ports (blue)
5	PCI Expansion Slot Covers	12	Microphone Connector (pink)
6	 PS/2 Mouse Connector (green)	13	 Line-Out Connector for powered audio devices (green)
7	 PS/2 Keyboard Connector (purple)	14	 Line-In Audio Connector (blue)

**NOTE:** An optional second serial port and an optional parallel port are available from HP.

When a graphics card is installed in one of the system board slots, the video connectors on the graphics card and the integrated graphics on the system board may be used at the same time. However, for such a configuration, only the display connected to the discrete graphics card will display POST messages.

The system board graphics can be disabled by changing settings in Computer Setup.

## Serial number location

Each computer has a unique serial number and a product ID number that are located on the exterior of the computer. Keep these numbers available for use when contacting customer service for assistance.





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## 2 Hardware upgrades


### Serviceability features

The computer includes features that make it easy to upgrade and service. No tools are needed for most of the installation procedures described in this chapter.

### Warnings and cautions

Before performing upgrades be sure to carefully read all of the applicable instructions, cautions, and warnings in this guide.

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 **WARNING!** To reduce the risk of personal injury from electrical shock, hot surfaces, or fire:

Disconnect the power cord from the wall outlet and allow the internal system components to cool before touching.

Do not plug telecommunications or telephone connectors into the network interface controller (NIC) receptacles.

Do not disable the power cord grounding plug. The grounding plug is an important safety feature.


Plug the power cord in a grounded (earthed) outlet that is easily accessible at all times.

To reduce the risk of serious injury, read the *Safety & Comfort Guide*. It describes proper workstation, setup, posture, and health and work habits for computer users, and provides important electrical and mechanical safety information. This guide is located on the Web at <http://www.hp.com/ergo>.

 **WARNING!** Energized and moving parts inside.

Disconnect power to the equipment before removing the enclosure.

Replace and secure the enclosure before re-energizing the equipment.

 **CAUTION:** Static electricity can damage the electrical 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 [Electrostatic discharge on page 25](#) for more information.

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 damage to internal components.

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## Removing the computer access panel

To access internal components, you must remove the access panel:

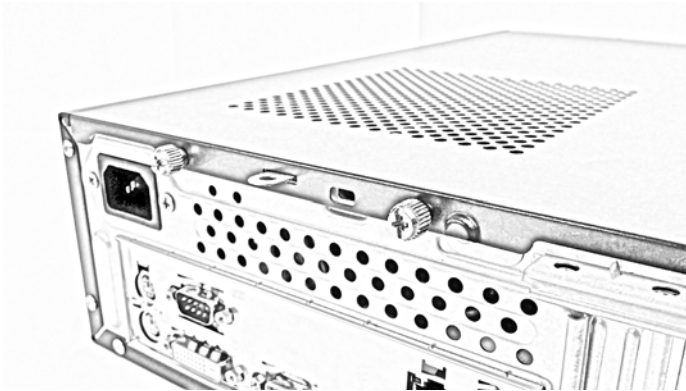
1. Remove/disengage any security devices that prohibit opening the computer.
2. Remove all removable media, such as optical discs or USB flash drives, from the computer.
3. Turn off the computer properly through the operating system, then turn off any external devices.
4. Disconnect the power cord from the power outlet and disconnect any external devices.

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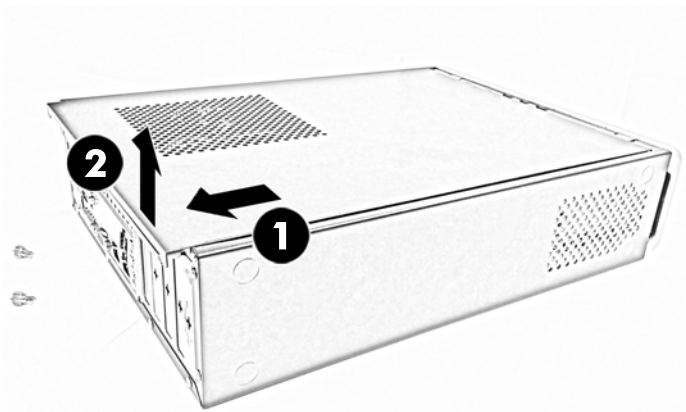
**⚠ CAUTION:** Regardless of the power-on state, voltage is always present on the system board as long as the system is plugged into an active AC outlet. You must disconnect the power cord to avoid damage to the internal components of the computer.

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5. Unscrew the two screws on the rear of the computer.

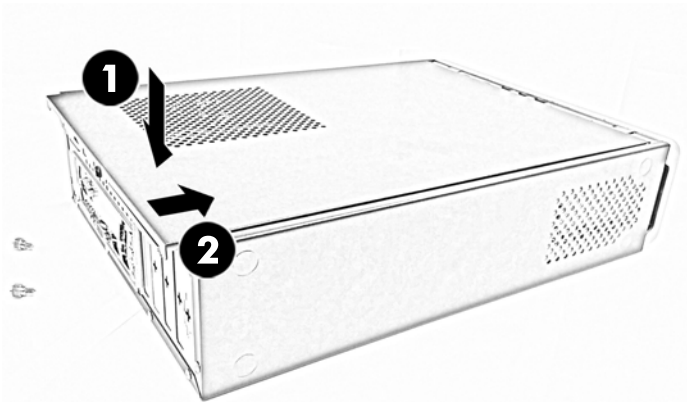


6. Slide the panel back (1) and lift it off the computer (2).

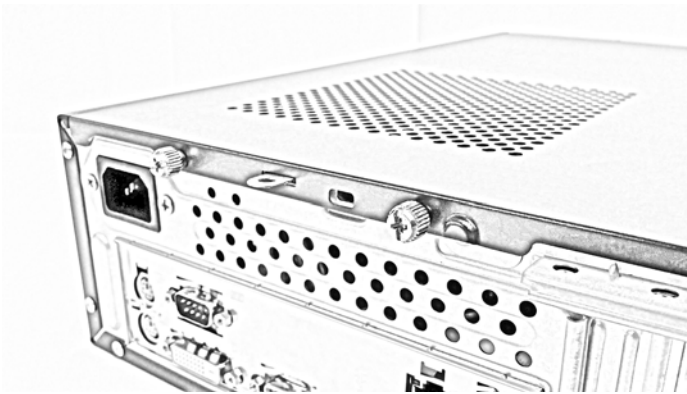


## Replacing the computer access panel

1. Place the panel on the computer (1), and then slide it forward (2).



2. Fasten the two screws (3) to secure the panel in place.



## Changing from desktop to tower configuration

The computer can be used in either a horizontal or a tower orientation.

1. Remove/disengage any security devices that prohibit opening the computer.
2. Remove all removable media, such as optical discs or USB flash drives, from the computer.
3. Turn off the computer properly through the operating system, then turn off any external devices.
4. Disconnect the power cord from the power outlet and disconnect any external devices.


**⚠ CAUTION:** Regardless of the power-on state, voltage is always present on the system board as long as the system is plugged into an active AC outlet. You must disconnect the power cord to avoid damage to the internal components of the computer.

5. Position the computer so that its left side is down and the optical disc drive is up. Set the computer down on the left side.

The right side, with the optical disc drive, should be uppermost.

6. Reconnect the power cord and any external devices, then turn on the computer.

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 **NOTE:** Ensure at least 10.2 centimeters (4 inches) of space on all sides of the computer remains clear and free of obstructions.

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7. Lock any security devices that were disengaged when the access panel was removed.

## Installing additional memory

The computer comes with double data rate 3 synchronous dynamic random access memory (DDR3-SDRAM) dual inline memory modules (DIMMs).

### DIMMs

The memory sockets on the system board can be populated with up to two industry-standard DIMMs. These memory sockets are populated with at least one preinstalled DIMM. To achieve the maximum memory support, you can populate the system board with up to 16-GB of memory configured in a high-performing dual channel mode.

### DDR3-SDRAM DIMMs

For proper system operation, the DDR3-SDRAM DIMMs must be:

- industry-standard 240-pin
- unbuffered non-ECC PC3-12800 DDR3-1600 MHz-compliant
- 1.35 volt or 1.5 volt DDR3/DDR3L-SDRAM DIMMs


The DDR3-SDRAM DIMMs must also:

- support CAS latency 11 DDR3 1600 MHz (11-11-11 timing)
- contain the mandatory JEDEC SPD information

In addition, the computer supports:

- 512-Mbit, 1-Gbit, and 2-Gbit non-ECC memory technologies
- single-sided and double-sided DIMMs
- DIMMs constructed with x8 and x16 DDR devices; DIMMs constructed with x4 SDRAM are not supported

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 **NOTE:** The system will not operate properly if you install unsupported DIMMs.


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### Populating DIMM sockets

There are two DIMM sockets on the system board, with one socket per channel. The sockets are labeled DIMM1 and DIMM2. Socket DIMM1 operates in memory channel B. Socket DIMM2 operates in memory channel A.

The system will automatically operate in single channel mode, dual channel mode, or flex mode, depending on how the DIMMs are installed.

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 **NOTE:** Single channel and unbalanced dual channel memory configurations will result in inferior graphics performance.

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- The system will operate in single channel mode if the DIMM sockets are populated in one channel only.
- The system will operate in a higher-performing dual channel mode if the memory capacity of the DIMM in Channel A is equal to the memory capacity of the DIMM in Channel B.
- The system will operate in flex mode if the memory capacity of the DIMM in Channel A is not equal to the memory capacity of the DIMM in Channel B. In flex mode, the channel populated with the least amount of memory describes the total amount of memory assigned to dual channel and the remainder is assigned to single channel. If one channel will have more memory than the other, the larger amount should be assigned to Channel A.
- In any mode, the maximum operational speed is determined by the slowest DIMM in the system.

## Installing DIMMs

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**⚠ CAUTION:** You must disconnect the power cord and wait approximately 30 seconds for the power to drain before adding or removing memory modules. Regardless of the power-on state, voltage is always supplied to the memory modules as long as the computer is plugged into an active AC outlet. Adding or removing memory modules while voltage is present may cause irreparable damage to the memory modules or system board.

The memory module sockets have gold-plated metal contacts. When upgrading the memory, it is important to use memory modules with gold-plated metal contacts to prevent corrosion and/or oxidation resulting from having incompatible metals in contact with each other.

Static electricity can damage the electronic components of the computer or optional cards. Before beginning these procedures, ensure that you are discharged of static electricity by briefly touching a grounded metal object. For more information, refer to [Electrostatic discharge on page 25](#).

When handling a memory module, be careful not to touch any of the contacts. Doing so may damage the module.

- 
1. Remove/disengage any security devices that prohibit opening the computer.
  2. Remove all removable media, such as optical discs or USB flash drives, from the computer.
  3. Turn off the computer properly through the operating system, then turn off any external devices.
  4. Disconnect the power cord from the power outlet and disconnect any external devices.

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**⚠ CAUTION:** You must disconnect the power cord and wait approximately 30 seconds for the power to drain before adding or removing memory modules. Regardless of the power-on state, voltage is always supplied to the memory modules as long as the computer is plugged into an active AC outlet. Adding or removing memory modules while voltage is present may cause irreparable damage to the memory modules or system board.

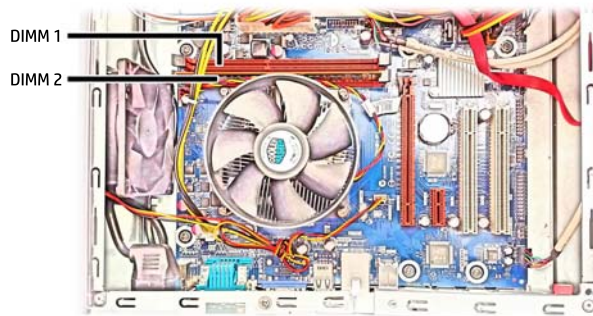
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5. Remove the computer access panel.

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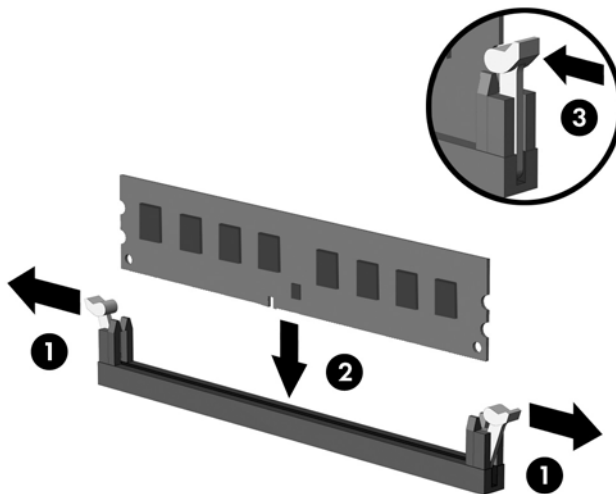
**⚠ WARNING!** To reduce risk of personal injury from hot surfaces, allow the internal system components to cool before touching.

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6. Locate the DIMM sockets.



7. Open both latches of the memory module socket (1), and insert the memory module into the socket (2).



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 **NOTE:** A memory module can be installed in only one way. Match the notch on the module with the tab on the memory socket.

For maximum performance, populate the sockets so that the memory capacity is spread as equally as possible between Channel A and Channel B. Refer to [Populating DIMM sockets on page 6](#) for more information.


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8. Push the module down into the socket, ensuring that the module is fully inserted and properly seated. Make sure the latches are in the closed position (3).
9. Repeat steps 7 and 8 to install an additional module.
10. Replace the access panel.
11. Reconnect the power cord and turn on the computer.
12. Lock any security devices that were disengaged when the access panel was removed.

The computer should automatically recognize the additional memory the next time you turn on the computer.

## Removing or installing an expansion card

The computer has one PCI Express x1 expansion slot, one PCI Express x16 expansion slot, and two PCI expansion slots.


 **NOTE:** The PCI Express slots support only low profile cards.

You can install a PCI Express x1, x4, x8, or x16 expansion card in the PCI Express x16 slot.

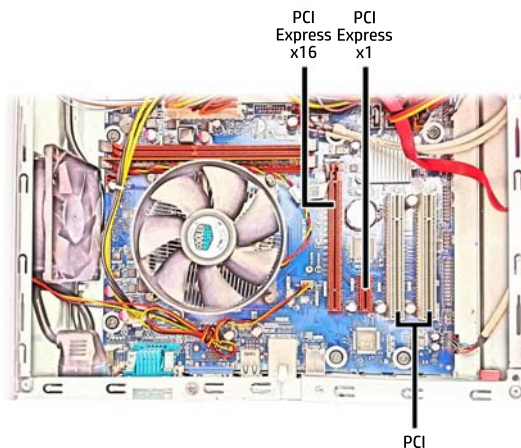
For dual graphics card configurations, the first (primary) card must be installed in the PCI Express x16 slot.

To remove, replace, or add an expansion card:


1. Remove/disengage any security devices that prohibit opening the computer.
2. Remove all removable media, such as optical discs or USB flash drives, from the computer.
3. Turn off the computer properly through the operating system, then turn off any external devices.
4. Disconnect the power cord from the power outlet and disconnect any external devices.

 **CAUTION:** Regardless of the power-on state, voltage is always present on the system board as long as the system is plugged into an active AC outlet. You must disconnect the power cord to avoid damage to the internal components of the computer.

5. Remove the computer access panel.
6. Locate the correct vacant expansion socket on the system board and the corresponding expansion slot on the back of the computer chassis.




7. Rotate the slot cover retention latch on the rear of the chassis to the open position.
8. Before installing an expansion card, remove the expansion slot cover or the existing expansion card.

 **NOTE:** Before removing an installed expansion card, disconnect any cables that may be attached to the expansion card.



- a. If you are installing an expansion card in a vacant PCI x1 socket or a PCI socket, push out the appropriate expansion slot cover on the back of the chassis.
  - b. If you are installing an expansion card in a vacant PCI x16 socket, remove the appropriate expansion slot cover on the back of the chassis. Pull the slot cover straight up then away from the inside of the chassis.
  - c. If you are removing a PCI Express x1 card or a PCI card, hold the card at each end, and carefully rock it back and forth until the connectors pull free from the socket. Pull the expansion card straight up from the socket then away from the inside of the chassis to release it from the chassis frame. Be sure not to scrape the card against the other components.
  - d. If you are removing a PCI Express x16 card, pull the retention arm on the back of the expansion socket away from the card and carefully rock the card back and forth until the connectors pull free from the socket. Pull the expansion card straight up from the socket then away from the inside of the chassis to release it from the chassis frame. Be sure not to scrape the card against the other components.
9. Store the removed card in anti-static packaging.
  10. If you are not installing a new expansion card in the PCI x16 expansion slot, install the expansion slot cover to close the open slot.


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 **CAUTION:** After removing an expansion card, you must replace it with a new card or expansion slot cover for proper cooling of internal components during operation.

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11. To install a new expansion card, hold the card just above the expansion socket on the system board then move the card toward the rear of the chassis so that the bracket on the card is aligned with the open slot on the rear of the chassis. Press the card straight down into the expansion socket on the system board.

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 **NOTE:** When installing an expansion card, press firmly on the card so that the whole connector seats properly in the expansion card slot.

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12. Rotate the slot cover retention latch back in place to secure the expansion card.
13. Connect external cables to the installed card, if needed. Connect internal cables to the system board, if needed.
14. Replace the computer access panel.
15. Reconnect the power cord and turn on the computer.
16. Lock any security devices that were disengaged when the access panel was removed.
17. Reconfigure the computer, if necessary.



# Installing and removing drives

When installing drives, follow these guidelines:

- The Serial ATA (SATA) hard drive must be connected to the SATA connector on the system board labeled SATA1.
- Connect an optical disc drive to the SATA connector on the system board labeled SATA2.
- The power cable for the drives is a dual-headed cable coming from the power supply. The first connector is routed to the hard drive and the second connector is routed to the slim optical disc drive.

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**⚠ CAUTION:** To prevent loss of work and damage to the computer or drive:

If you are inserting or removing a drive, shut down the operating system properly, turn off the computer, and unplug the power cord. Do not remove a 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. For more information about preventing electrostatic damage, refer to [Electrostatic discharge on page 25](#).

Handle a drive carefully; do not drop it.

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.

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

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## Removing a slim optical disc drive

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**⚠ CAUTION:** All removable media should be taken out of a drive before removing the drive from the computer.

1. Remove/disengage any security devices that prohibit opening the computer.
2. Remove all removable media, such as optical discs or USB flash drives, from the computer.
3. Turn off the computer properly through the operating system, then turn off any external devices.
4. Disconnect the power cord from the power outlet and disconnect any external devices.

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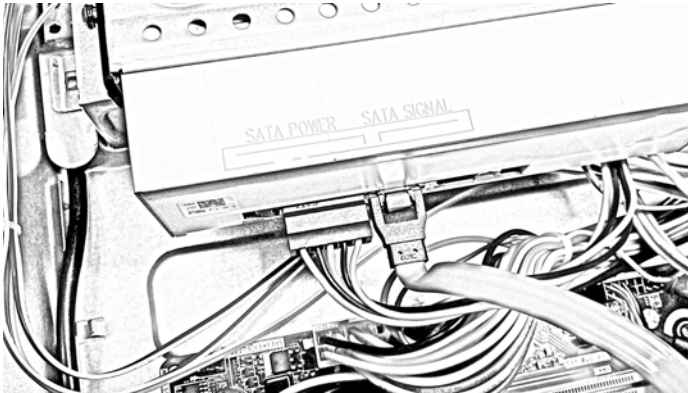
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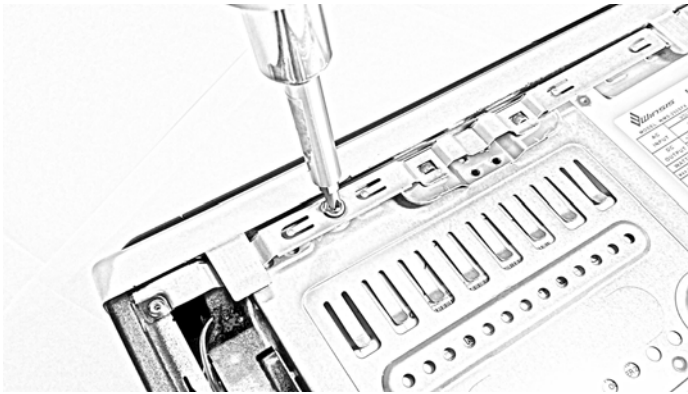
5. Remove the computer access panel.

6. Disconnect the power cable and data cable from the rear of the optical disc drive.

**⚠ CAUTION:** When removing the cables, pull the tab or connector instead of the cable itself to avoid damaging the cable.

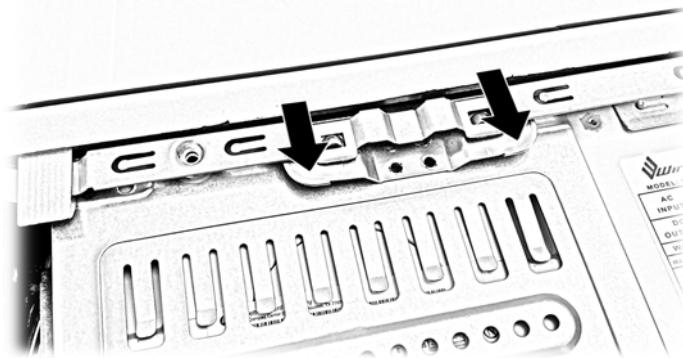


7. Unfasten the screw securing the optical disc drive cage to the chassis.



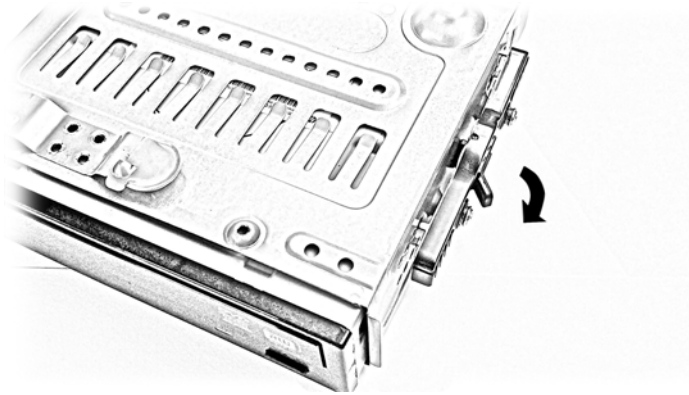
Retain the screw.

8. Press the both sides optical disc drive latch to release the optical disc drive cage and slide the cage away from the edge of the chassis.

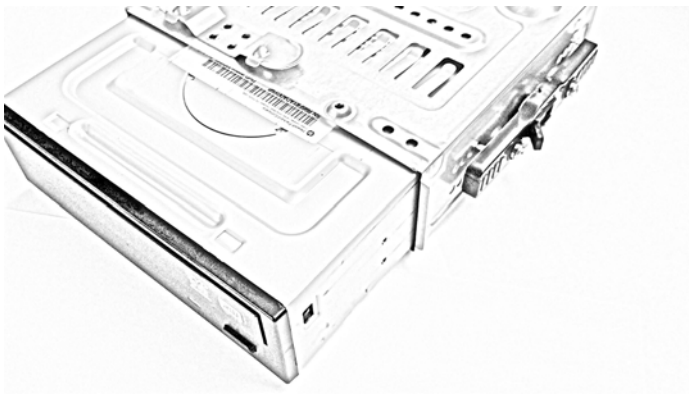


9. Lift the optical disc drive cage out of the chassis.

10. Open the latch on the side of the optical disc drive cage.



11. Push the optical disc drive out through the front of the cage.



## Installing a slim optical disc drive

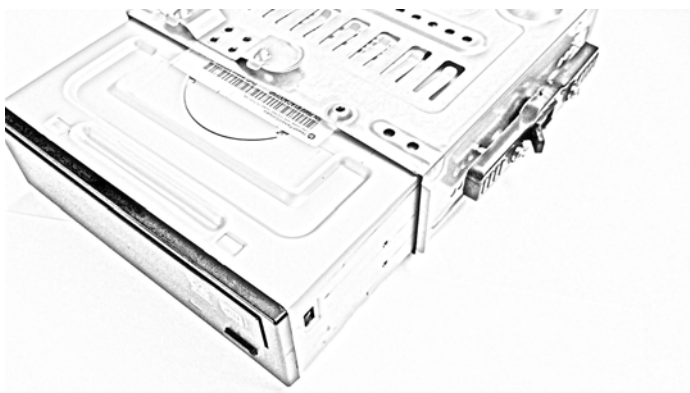
1. Remove/disengage any security devices that prohibit opening the computer.
2. Remove all removable media, such as optical discs or USB flash drives, from the computer.
3. Turn off the computer properly through the operating system, then turn off any external devices.
4. Disconnect the power cord from the power outlet and disconnect any external devices.

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**⚠ CAUTION:** Regardless of the power-on state, voltage is always present on the system board as long as the system is plugged into an active AC outlet. You must disconnect the power cord to avoid damage to the internal components of the computer.

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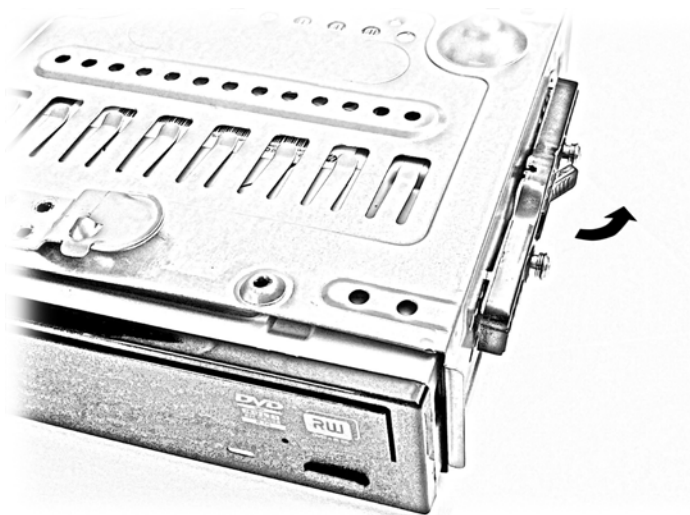
5. Remove the computer access panel.
6. Be sure both the optical disc drive and the cage are right side up and slide the rear of the optical disc drive into through the front of the drive cage.



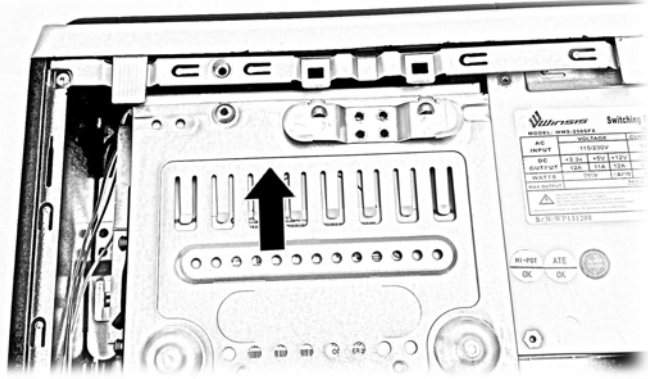
7. When the optical disc drive is positioned correctly, close the latch on the side of the drive cage.

**📌 IMPORTANT:** Be sure the latch has engaged properly by moving or attempting to move the optical disc drive in the drive cage. If the optical disc drive can be moved, do not open the bracket. Instead, slide the optical disc drive within the cage until you hear the click of the bracket engaging and you can no longer move the optical disc drive. When the optical disc drive cannot be moved, the latch has engaged properly.

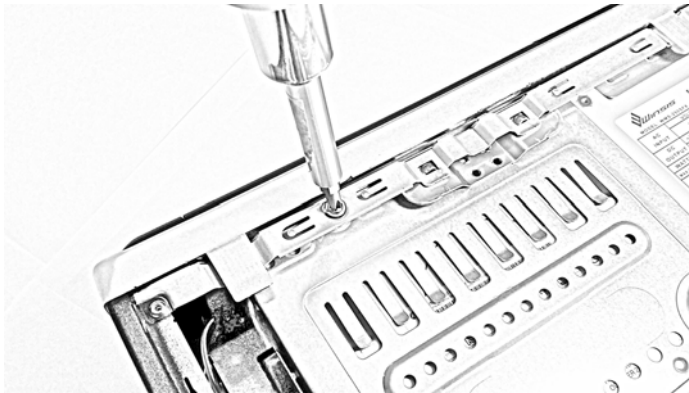
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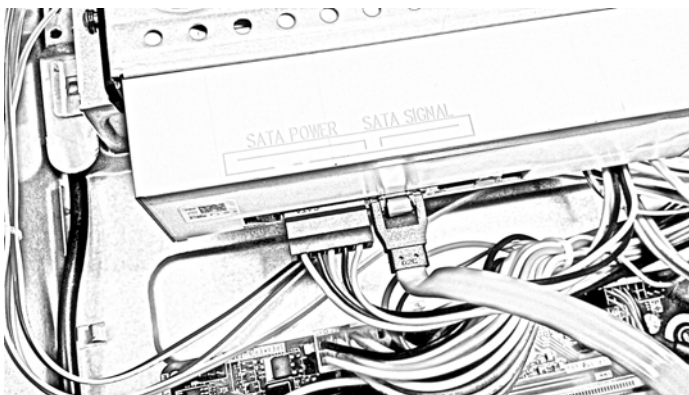
- Align the optical disc drive above the hard drive with the disc tray opening toward the front of the chassis. Lower the optical disc drive onto the hard drive and next to the power supply.
- Align the latch on the front edge of the optical disc drive cage with the slots on the front edge of the chassis. Hold both sides of the latch down and slide the drive cage forward until the latch engages.



- Fasten the screw to secure the optical disc drive cage to the chassis.

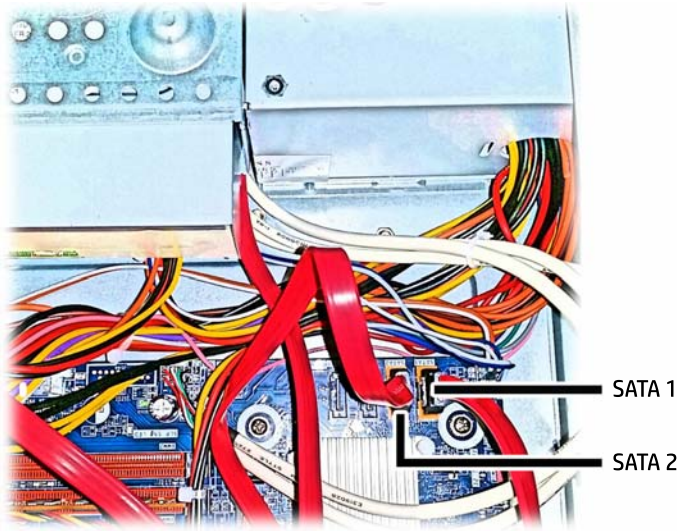


- Connect the power and data cables to the rear of the optical disc drive.






12. Connect the opposite end of the data cable to the SATA2 connector on the system board.




13. Replace the computer access panel.
14. Reconnect the power cord and any external devices, then turn on the computer.
15. Lock any security devices that were disengaged when the access panel was removed.

## Removing and replacing a 3.5-inch hard drive

 **NOTE:** Before you remove the old hard drive, be sure to back up the data from the old hard drive so that you can transfer the data to the new hard drive.

1. Remove/disengage any security devices that prohibit opening the computer.
2. Remove all removable media, such as optical discs or USB flash drives, from the computer.
3. Turn off the computer properly through the operating system, then turn off any external devices.
4. Disconnect the power cord from the power outlet and disconnect any external devices.

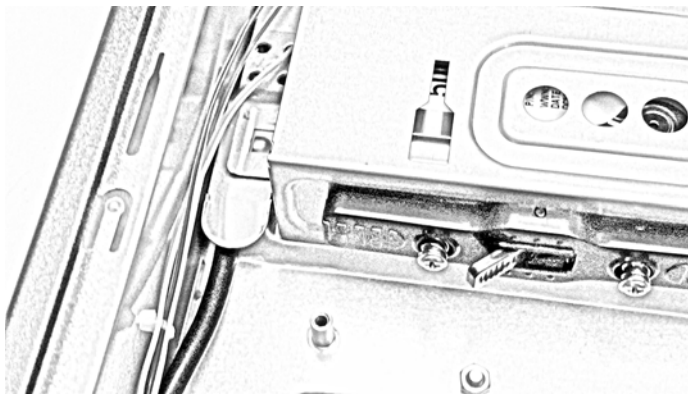
 **CAUTION:** Regardless of the power-on state, voltage is always present on the system board as long as the system is plugged into an active AC outlet. You must disconnect the power cord to avoid damage to the internal components of the computer.

5. Remove the computer access panel.
6. Remove the slim optical disc drive. For instructions, go to [Removing a slim optical disc drive on page 11](#).

7. Disconnect the power cable and data cable from the back of the hard drive.



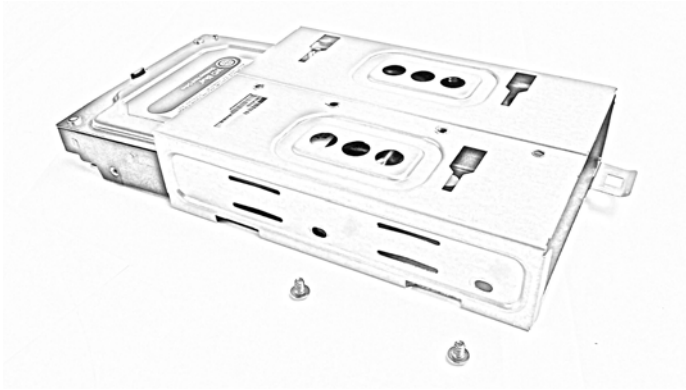
8. Press the tab to disengage the latch securing the hard drive in place.



9. Slide the hard drive away from the edge of the chassis to disengage the hard drive cage, and then lift it out of the chassis.
10. Open the latch on the side of the hard drive cage.



11. Remove the two screws from the side of the hard drive cage, and then slide the hard drive out of the cage.



Retain the screws to use on the new hard drive.

12. Slide the new hard drive all the way into the hard drive cage.

Be sure the hard drive is positioned properly. The latch tab that secured the hard drive cage to the chassis is on the bottom side of the drive cage. The bottom of the hard drive should be on the same side as the tab and the connectors should be visible on the opposite end from the tab.

13. Close the latch on the side of the hard drive cage.

Be sure the latch is engaged by attempting to move the hard drive within the cage. If it moves, slide the hard drive to and from the end of the cage until the latch engages.



14. Fasten the two screws in the other side of the hard drive cage to secure the hard drive in the cage.

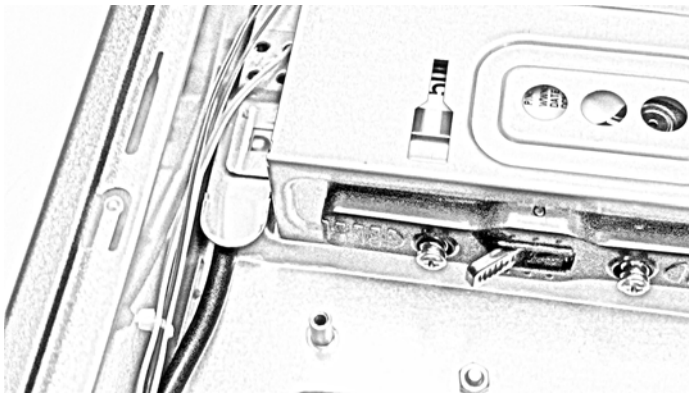




15. Hold the hard drive cage with the connectors next to the power supply and align the openings in the cage bottom with the raised clips on the bottom of the chassis.



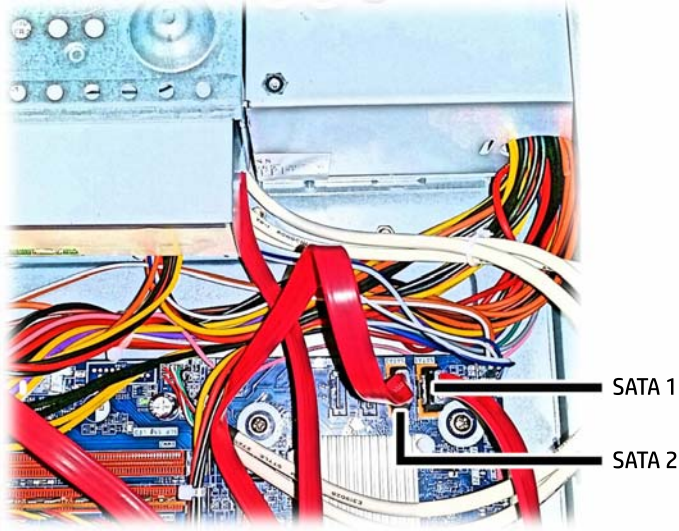
16. Set the cage down and slide it left to engage the clips on the chassis beneath the cage. Be sure the cage latch slides over and engages the chassis tab to lock the hard drive cage in place.



17. Connect the power cable and data cable to the back of the hard drive.



18. Connect the opposite end of the data cable to the SATA1 connector on the system board.



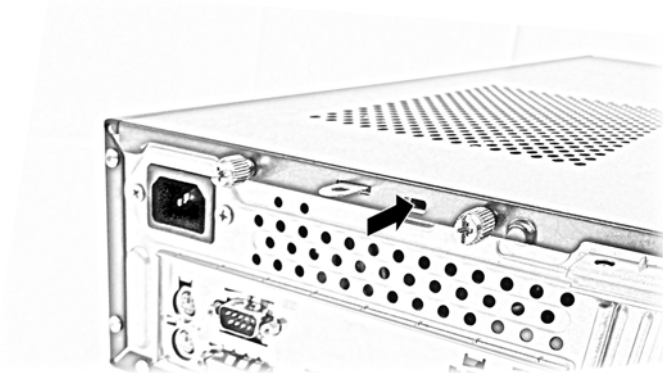
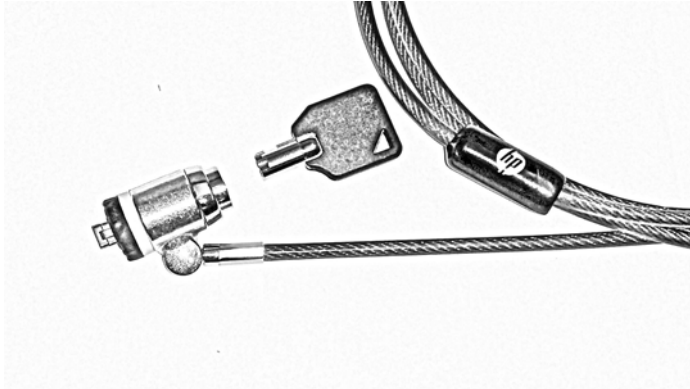
19. Replace the slim optical disc drive. For instructions, go to [Installing a slim optical disc drive on page 14](#).
20. Replace the access panel.
21. Reconnect the power cord and turn on the computer.
22. Lock any security devices that were disengaged when the access panel was removed.

## Installing a security lock

The security locks in the following sections can be used to secure the computer.

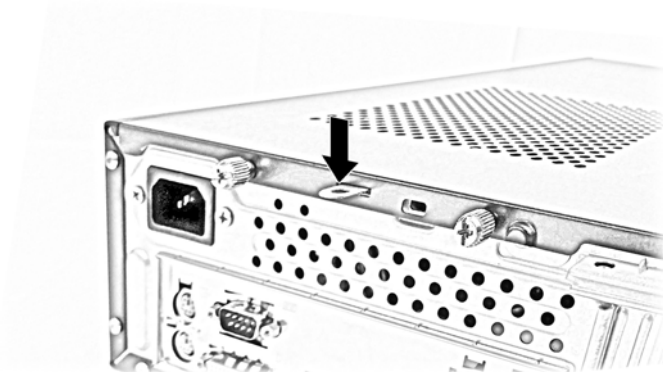
### Cable lock

The cable lock can be used to secure the computer.



### Padlock

A padlock can be used to secure the access panel to the computer.




---

# A Battery replacement

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 (140°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. Remove/disengage any security devices that prohibit opening the computer.
  2. Remove all removable media, such as optical discs or USB flash drives, from the computer.
  3. Turn off the computer properly through the operating system, then turn off any external devices.
  4. Disconnect the power cord from the power outlet and disconnect any external devices.

---

 **CAUTION:** Regardless of the power-on state, voltage is always present on the system board as long as the system is plugged into an active AC outlet. You must disconnect the power cord to avoid damage to the internal components of the computer.

- 
5. Remove the computer access panel.
  6. Locate the battery and battery holder on the system board.

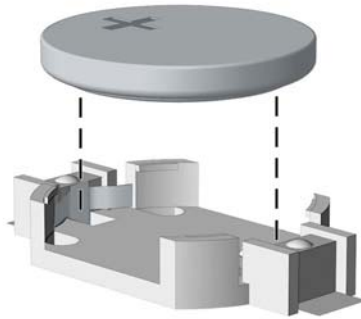
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 **NOTE:** On some computer models, it may be necessary to remove an internal component to gain access to the battery.

- 
7. Depending on the type of battery holder on the system board, complete the following instructions to replace the battery.

## Type 1

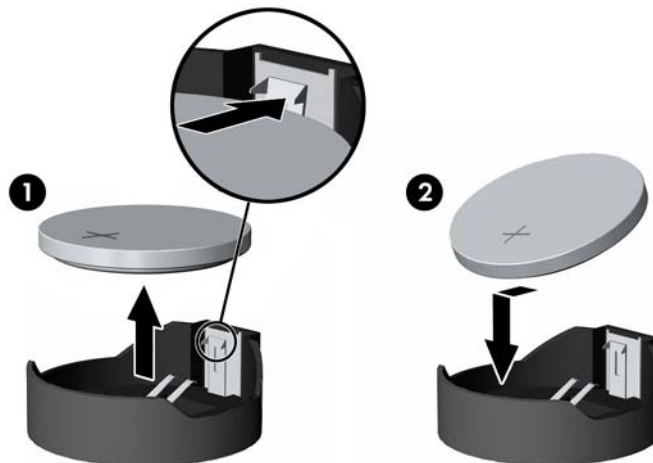
- a. Lift the battery out of its holder.



- b. Slide the replacement battery into position, positive side up. The battery holder automatically secures the battery in the proper position.

### Type 2

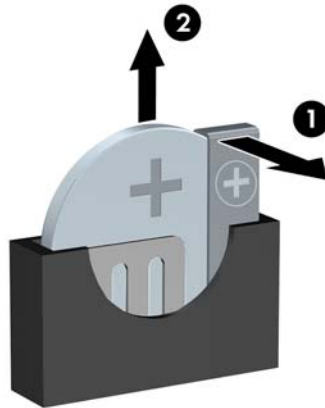
- a. To release the battery from its holder, squeeze the metal clamp that extends above one edge of the battery. When the battery pops up, lift it out (1).
- b. To insert the new battery, slide one edge of the replacement battery under the holder's lip with the positive side up. Push the other edge down until the clamp snaps over the other edge of the battery (2).




### Type 3

- a. Pull back on the clip (1) that is holding the battery in place, and remove the battery (2).

- b. Insert the new battery and position the clip back into place.



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 **NOTE:** After the battery has been replaced, use the following steps to complete this procedure.

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8. Replace the computer access panel.
9. Plug in the computer and turn on power to the computer.
10. Reset the date and time, your passwords, and any special system setups using Computer Setup.
11. Lock any security devices that were disengaged when the computer access panel was removed.

---

## B Electrostatic discharge

A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device.

### Preventing electrostatic damage

To prevent electrostatic damage, observe the following precautions:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always be properly grounded when touching a static-sensitive component or assembly.


### Grounding methods

There are several methods for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm +/- 10 percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.
- Use heelstraps, toestraps, or bootstraps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
- Use conductive field service tools.
- Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, contact an HP authorized dealer, reseller, or service provider.

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 **NOTE:** For more information on static electricity, contact an HP authorized dealer, reseller, or service provider.

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# C Computer operating guidelines, routine care and shipping preparation

## Computer operating guidelines and routine care

Follow these guidelines to properly set up and care for the computer and monitor:

- 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.
- Never operate the computer with the access panel or any of the expansion card slot covers removed.
- Do not stack computers on top of each other or place computers so near each other that they are subject to each other's re-circulated or preheated air.
- 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.
- Turn off the computer before you do either of the following:
  - Wipe the exterior of the computer with a soft, damp cloth as needed. Using cleaning products may discolor or damage the finish.
  - 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.



# Optical disc drive precautions

Be sure to observe the following guidelines while operating or cleaning the optical disc drive.

## Operation

- Do not move the drive during operation. This may cause it to malfunction during reading.
- Avoid exposing the drive to sudden changes in temperature, as condensation may form inside the unit. If the temperature suddenly changes while the drive is on, wait at least one hour before you turn off the power. If you operate the unit immediately, it may malfunction while reading.
- Avoid placing the drive in a location that is subject to high humidity, extreme temperatures, mechanical vibration, or direct sunlight.

## Cleaning

- Clean the panel and controls with a soft, dry cloth or a soft cloth lightly moistened with a mild detergent solution. Never spray cleaning fluids directly on the unit.
- Avoid using any type of solvent, such as alcohol or benzene, which may damage the finish.

## Safety

If any object or liquid falls into the drive, immediately unplug the computer and have it checked by an authorized HP service provider.

## Shipping preparation

Follow these suggestions when preparing to ship the computer:

1. Back up the hard drive files to an external storage device. Be sure that the backup media is not exposed to electrical or magnetic impulses while stored or in transit.



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**NOTE:** The hard drive locks automatically when the system power is turned off.

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2. Remove and store all removable media.
3. Turn off the computer and external devices.
4. Disconnect the power cord from the electrical outlet, then from the computer.
5. Disconnect the system components and external devices from their power sources, then from the computer.



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**NOTE:** Ensure that all boards are seated properly and secured in the board slots before shipping the computer.

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6. Pack the system components and external devices in their original packing boxes or similar packaging with sufficient packing material to protect them.

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