

Hardware Reference Guide - dc5850 Small  
Form Factor Model  
HP Compaq Business PC

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#### **Hardware Reference Guide**

HP Compaq Business PC

dc5850 Small Form Factor Model

First Edition (January 2008)

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## About This Book

This guide provides basic information for upgrading this computer model.

- △ **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

The HP Compaq Small Form Factor 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). Instructions for using the utility are provided in the *Troubleshooting Guide*.

 **NOTE:** The Small Form Factor computer can also be used in a tower orientation. For more information, see [Using the Small Form Factor Computer in a Tower Orientation on page 14](#) in this guide.

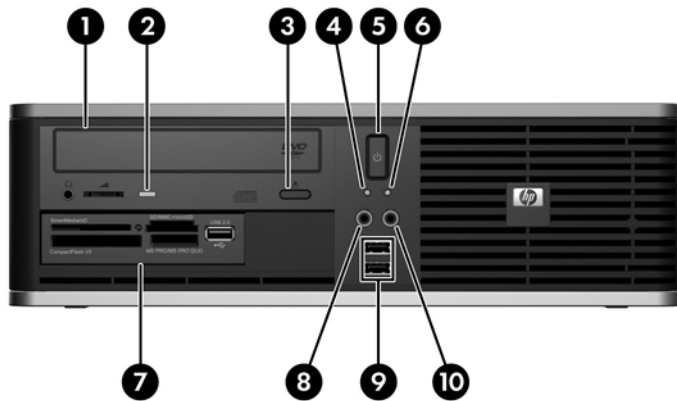
**Figure 1-1** Small Form Factor Configuration



# Front Panel Components

Drive configuration may vary by model.

**Figure 1-2** Front Panel Components



**Table 1-1** Front Panel Components

1	5.25-inch Optical Drive <sup>1</sup>	6	Power On Light
2	Optical Drive Activity Light	7	3.5-inch Media Card Reader (optional) <sup>2</sup>
3	Optical Drive Eject Button	8	Microphone Connector
4	Hard Drive Activity Light	9	USB (Universal Serial Bus) Ports
5	Dual-State Power Button	10	Headphone Connector

**NOTE:** The Power On Light is normally green 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 *Troubleshooting Guide* to interpret the code.

<sup>1</sup> Some models are configured with a bezel blank covering this bay.

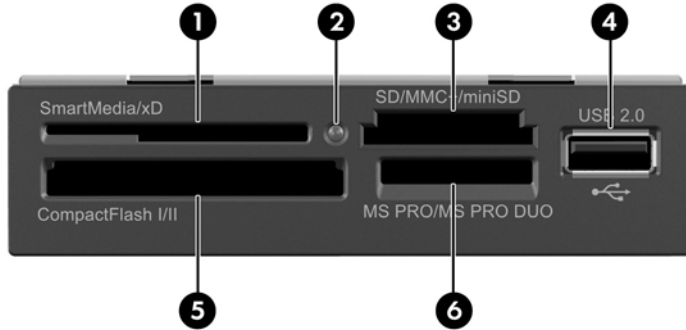
<sup>2</sup> Some models are configured with a diskette drive in the external 3.5-inch drive bay. Other models have a bezel blank covering this bay.



# Media Card Reader Components

The media card reader is an optional device available on some models only. Refer to the following illustration and table to identify the media card reader components.

**Figure 1-3** Media Card Reader Components



**Table 1-2** Media Card Reader Components

1	SmartMedia/xD <ul style="list-style-type: none"> <li>• 3.3V SmartMedia Card (SM)</li> <li>• D-Picture Card (xD)</li> </ul>	4	USB (Universal Serial Bus) Port
2	Media Card Reader Activity Light	5	CompactFlash I/II <ul style="list-style-type: none"> <li>• CompactFlash Card Type 1</li> <li>• CompactFlash Card Type 2</li> <li>• MicroDrive</li> </ul>
3	SD/MMC+/miniSD <ul style="list-style-type: none"> <li>• Secure Digital Card (SD)</li> <li>• MiniSD</li> <li>• MultiMediaCard (MMC)</li> <li>• Reduced Size MultiMediaCard (RS MMC)</li> <li>• MultiMediaCard 4.0 (Mobile Plus)</li> <li>• Reduced Size MultiMediaCard 4.0 (MMC Mobile)</li> <li>• MMC Micro (adapter required)</li> <li>• MicroSD (T-Flash) (adapter required)</li> </ul>	6	MS PRO/MS PRO DUO <ul style="list-style-type: none"> <li>• Memory Stick (MS)</li> <li>• MagicGate Memory Stick (MG)</li> <li>• MagicGate Memory Duo</li> <li>• Memory Stick Select</li> <li>• Memory Stick Duo (MS Duo)</li> <li>• Memory Stick PRO (MS PRO)</li> <li>• Memory Stick PRO Duo (MS PRO Duo)</li> </ul>

# Rear Panel Components

Figure 1-4 Rear Panel Components

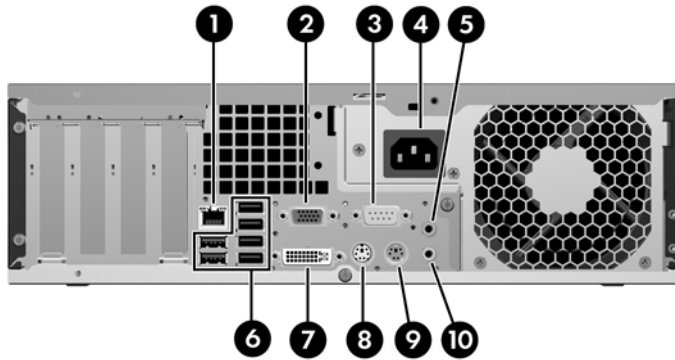


Table 1-3 Rear Panel Components

1	RJ-45 Network Connector	6	Universal Serial Bus (USB)
2	VGA Monitor Connector (blue)	7	Digital Video Interface (DVI-D) Monitor connector (white)
3	Serial Connector	8	PS/2 Mouse Connector (green)
4	Power Cord Connector	9	PS/2 Keyboard Connector (purple)
5	Line-In Audio Connector (blue)	10	Line-Out Connector for powered audio devices (green)

**NOTE:** Arrangement and number of connectors may vary by model.

The Line-in audio connector can be retasked as a microphone connector in the audio driver's control panel.

The monitor connectors on the system board are inactive when a PCI Express x16 graphics card is installed in the computer. The integrated graphics can be enabled if a graphics card based on an AMD graphics controller is plugged into the PCI Express x16 slot.

If a PCI or PCI Express x1 graphics card is installed, the connectors on the card and the system board may be used at the same time. Some settings may need to be changed in Computer Setup to use both connectors. For information about setting the boot VGA controller, refer to the *Computer Setup (F10) Utility Guide*.

# Keyboard

Figure 1-5 Keyboard Components

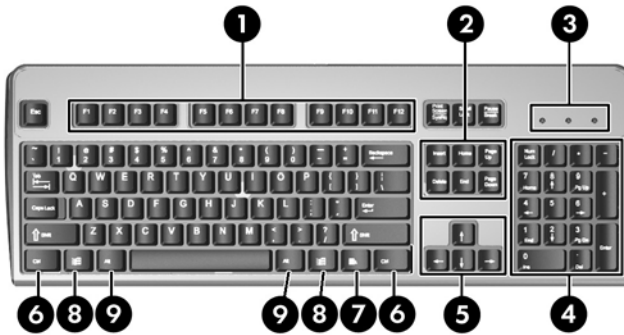


Table 1-4 Keyboard Components

1	Function Keys	Perform special functions depending on the software application being used.
2	Editing Keys	Includes the following: Insert, Home, Page Up, Delete, End, and Page Down.
3	Status Lights	Indicate the status of the computer and keyboard settings (Num Lock, Caps Lock, and Scroll Lock).
4	Numeric Keys	Work like a calculator keypad.
5	Arrow Keys	Used to navigate through a document or Web site. These keys allow you to move left, right, up, and down, using the keyboard instead of the mouse.
6	Ctrl Keys	Used in combination with another key; their effect depends on the application software you are using.
7	Application Key <sup>1</sup>	Used (like the right mouse button) to open pop-up menus in a Microsoft Office application. May perform other functions in other software applications.
8	Windows Logo Keys <sup>1</sup>	Used to open the Start menu in Microsoft Windows. Used in combination with other keys to perform other functions.
9	Alt Keys	Used in combination with another key; their effect depends on the application software you are using.

<sup>1</sup> Keys available in select geographic regions.

## Using the Windows Logo Key

Use the Windows Logo key in combination with other keys to perform certain functions available in the Windows operating system. Refer to [Keyboard on page 5](#) to identify the Windows Logo key.

**Table 1-5 Windows Logo Key Functions**

The following Windows Logo Key functions are available in Microsoft Windows XP and Microsoft Windows Vista.	
Windows Logo Key	Displays or hides the Start menu
Windows Logo Key + <b>d</b>	Displays the Desktop
Windows Logo Key + <b>m</b>	Minimizes all open applications
<b>Shift</b> + Windows Logo Key + <b>m</b>	Undoes Minimize All
Windows Logo Key + <b>e</b>	Launches My Computer
Windows Logo Key + <b>f</b>	Launches Find Document
Windows Logo Key + <b>Ctrl</b> + <b>f</b>	Launches Find Computer
Windows Logo Key + <b>F1</b>	Launches Windows Help
Windows Logo Key + <b>l</b>	Locks the computer if you are connected to a network domain, or allows you to switch users if you are not connected to a network domain
Windows Logo Key + <b>r</b>	Launches the Run dialog box
Windows Logo Key + <b>u</b>	Launches the Utility Manager
Windows Logo Key + <b>Tab</b>	Cycles through the Taskbar buttons (Windows XP)  Cycles through programs on the Taskbar using the Windows Flip 3-D (Windows Vista)
In addition to the Windows Logo Key functions described above, the following functions are also available in Microsoft Windows Vista.	
<b>Ctrl</b> + Windows Logo Key + <b>Tab</b>	Use the arrow keys to cycle through programs on the Taskbar by using Windows Flip 3-D
Windows Logo Key + <b>Spacebar</b>	Bring all gadgets to the front and select Windows Sidebar
Windows Logo Key + <b>g</b>	Cycle through Sidebar gadgets
Windows Logo Key + <b>u</b>	Launches Ease of Access Center
Windows Logo Key + <b>x</b>	Launches Windows Mobility Center
Windows Logo Key + <b>any number key</b>	Launches the Quick Launch shortcut that is in the position that corresponds to the number (for example, Windows Logo Key + 1 launches the first shortcut in the Quick Launch menu)

## Serial Number Location

Each computer has a unique serial number and product ID number in the location shown below. Keep these numbers available for use when contacting customer service for assistance.

**Figure 1-6** Serial Number and Product ID Location



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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.

---

⚠ **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>.

⚠ **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 Appendix D, [Electrostatic Discharge on page 56](#) for more information.

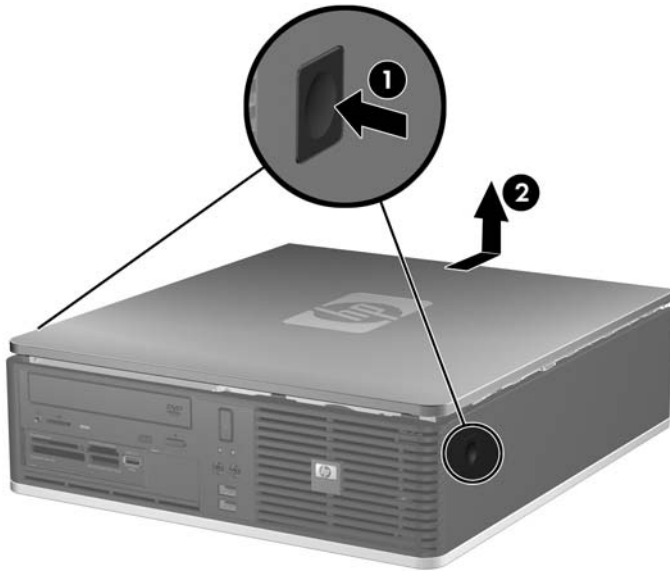
When the computer is plugged into an AC power source, voltage is always applied to the system board. You must disconnect the power cord from the power source before opening the computer to prevent damage to internal components.

---

## Removing the Computer Access Panel

1. Remove/disengage any security devices that prohibit opening the computer.
  2. Remove all removable media, such as diskettes or compact discs, 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. If the computer is on a stand, remove the computer from the stand.
  6. Press the buttons on the left and right sides of the computer (1) then slide the access panel back until it stops and lift it up and off the chassis (2).

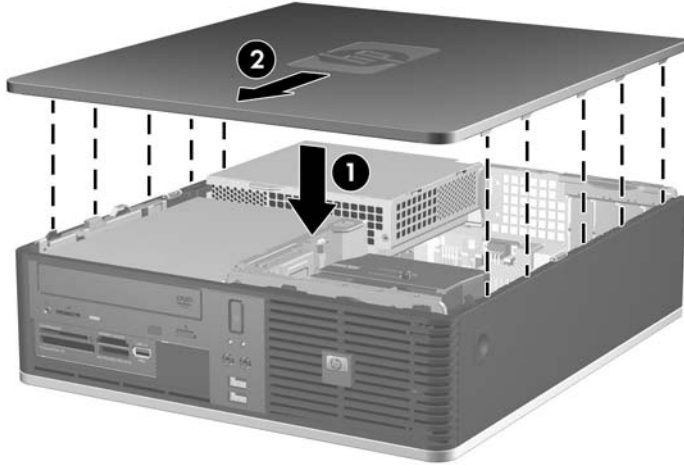
**Figure 2-1** Removing the Access Panel



## Replacing the Computer Access Panel

Align the tabs on the panel with the slots on the chassis (1) then slide the access panel all the way onto the chassis until it locks into place (2).

**Figure 2-2** Replacing the Access Panel





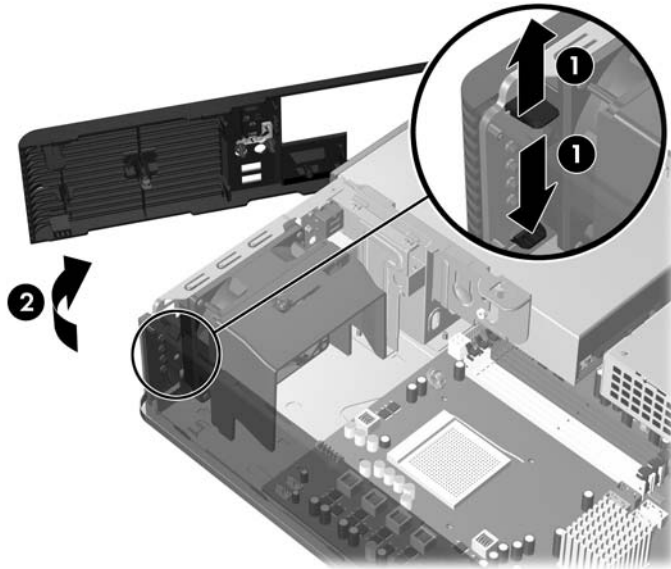
## Removing the Front Bezel

1. Remove/disengage any security devices that prohibit opening the computer.
2. Remove all removable media, such as diskettes or compact discs, 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 access panel.
6. Lift up the green latch behind the upper right side of the bezel and push down on the latch behind the lower right side of the bezel (1), then pull the right side of the bezel off the chassis (2), followed by the left side.

**Figure 2-3** Removing the Front Bezel

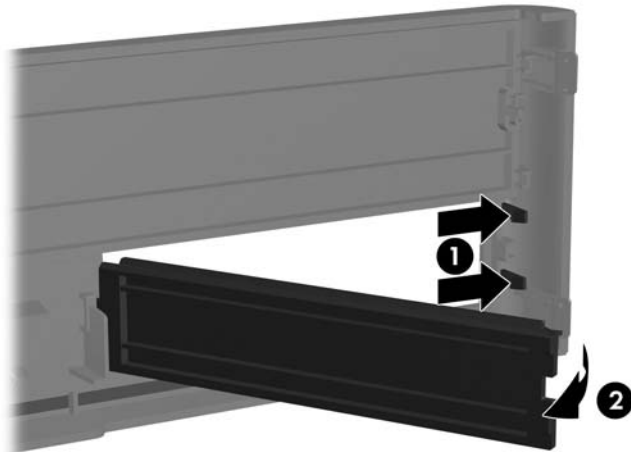


## Removing Bezel Blanks

On some models, there are bezel blanks covering the 3.5-inch and 5.25-inch external drive bays that need to be removed before installing a drive. To remove a bezel blank:

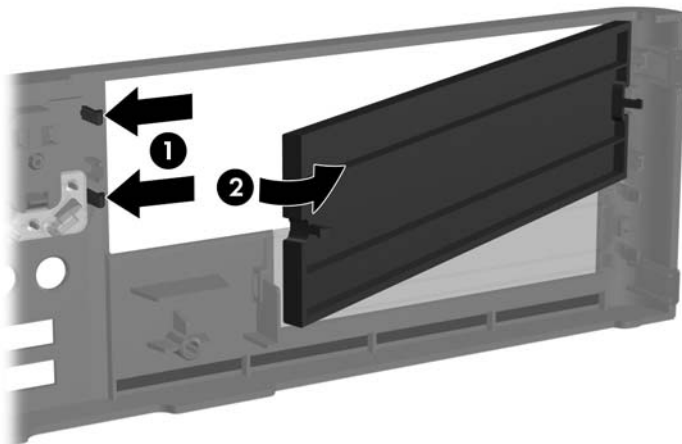
1. Remove the front bezel.
2. To remove the 3.5-inch bezel blank, push the two retaining tabs that hold the bezel blank in place towards the outer right edge of the bezel (1) and slide the bezel blank to the right to remove it (2).

**Figure 2-4** Removing a 3.5-inch Bezel Blank



3. To remove the 5.25-inch bezel blank, push the two retaining tabs that hold the bezel blank in place towards the outer left edge of the bezel (1) and pull the bezel blank inwards to remove it (2).

**Figure 2-5** Removing a 5.25-inch Bezel Blank

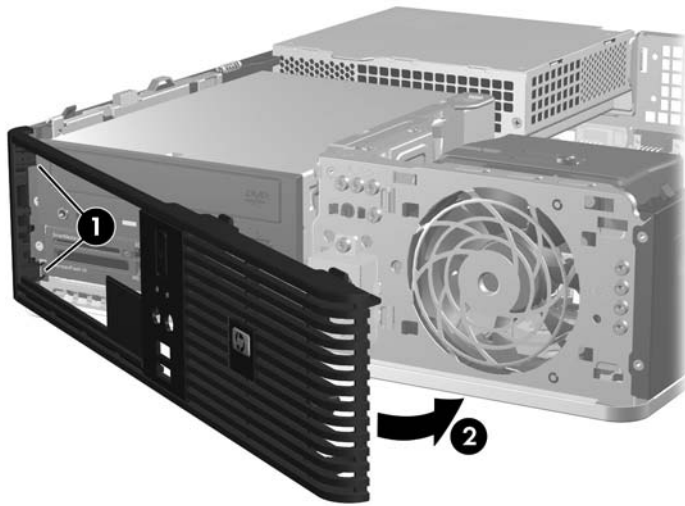


4. Replace the front bezel.

## Replacing the Front Bezel

Insert the two hooks on the left side of the bezel into the rectangular holes on the chassis (1) then rotate the right side of the bezel onto the chassis (2) and snap it into place.

**Figure 2-6** Replacing the Front Bezel



## Using the Small Form Factor Computer in a Tower Orientation

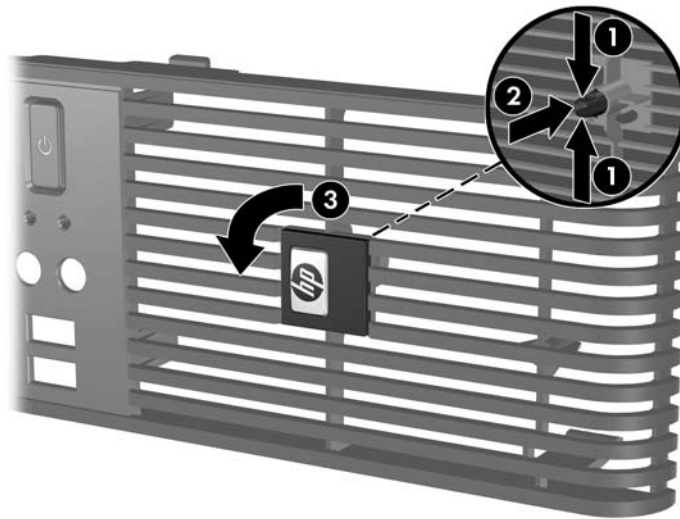
The Small Form Factor computer can be used in a tower orientation. The HP logo plate on the front bezel is adjustable for either desktop or tower orientation.

1. Remove/disengage any security devices that prohibit opening the computer.
2. Remove all removable media, such as diskettes or compact discs, 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 access panel.
6. Remove the front bezel.
7. Squeeze together the two sides of the peg on the back side of the logo plate (1) and push the peg inwards towards the front side of the bezel (2).
8. Rotate the plate 90 degrees (3) then pull back on the peg to lock the logo plate in place.

**Figure 2-7** Rotating the HP Logo Plate




9. Replace the front bezel.
10. Replace the access panel.

11. Orient the computer so that its right side is facing down.

**Figure 2-8** Changing from Desktop to Tower Orientation




---

 **NOTE:** To stabilize the computer in a tower orientation, HP recommends the use of the optional tower stand.

---

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

---

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

---

# Installing Additional Memory

The computer comes with double data rate 2 synchronous dynamic random access memory (DDR2-SDRAM) dual inline memory modules (DIMMs).

## DIMMs

The memory sockets on the system board can be populated with up to four 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 8 GB of memory configured in a high-performing dual channel mode.

## DDR2-SDRAM DIMMs

For proper system operation, the DDR2-SDRAM DIMMs must be:

- industry-standard 240-pin
- unbuffered PC2-5300 667 MHz-compliant or PC2-6400 800 MHz-compliant
- 1.8 volt DDR2-SDRAM DIMMs


The DDR2-SDRAM DIMMs must also:

- support CAS latency 5 DDR2 667 Mhz (5-5-5 timing), CAS latency 5 DDR2 800 Mhz (5-5-5 timing), and CAS latency 6 DDR2 800 Mhz (6-6-6 timing)
- contain the mandatory JEDEC SPD information

In addition, the computer supports:

- 512Mbit and 1Gbit 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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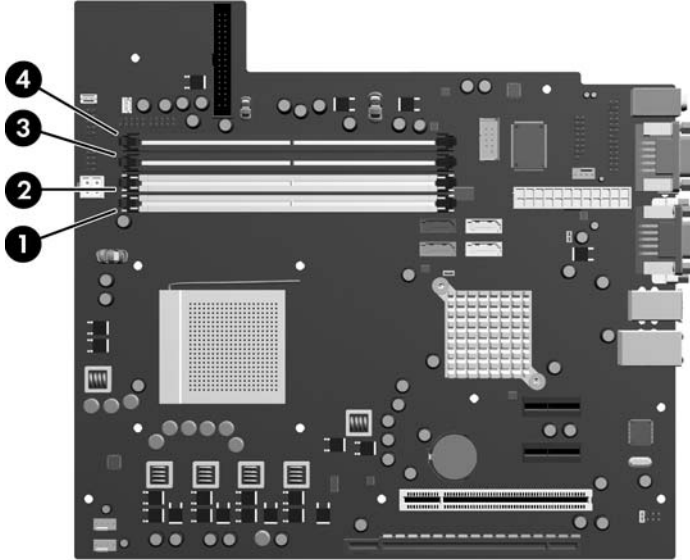
 **NOTE:** The system will not operate properly if you install unsupported DIMMs.

---

## Populating DIMM Sockets

There are four DIMM sockets on the system board, with two sockets per channel. The sockets are labeled XMM1, XMM2, XMM3, and XMM4. Sockets XMM1 and XMM3 operate in memory channel A. Sockets XMM2 and XMM4 operate in memory channel B.

**Figure 2-9** DIMM Socket Locations



Item	Description	Socket Color
1	DIMM socket XMM1, Channel A	White
2	DIMM socket XMM2, Channel B	White
3	DIMM socket XMM3, Channel A (populate second)	Black
4	DIMM socket XMM4, Channel B (populate first)	Black

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

- The system will operate in a higher-performing dual channel mode if like-sized DIMMs of equal capacity are populated in one or both pairs of sockets. For example, if the Channel A far socket and Channel B far socket (the two black sockets) both have 1024MB DIMMs installed, the system will operate in dual channel mode. If this system had two additional DIMMs added into the white sockets, they could be a pair of 512MB or 1024MB DIMMs and the system would still operate in dual channel mode. For purposes of “like sizes,” a single-sided 512MB DIMM and a double-sided 512MB DIMM would not be the same size because they have different numbers of memory chips on them.
- The system will operate in single channel mode if the DIMMs are populated in any other supported configuration. Supported configurations consist of any combination of one, two, three, or four DIMMs as long as socket XMM4 is populated before socket XMM2 in Channel B, and socket XMM3 is populated before socket XMM1 in Channel A.

- If a single DIMM is installed, it must be installed in the XMM4 socket.
- In either mode, the maximum operational speed is determined by the slowest DIMM in the system.

## Installing DIMMs

---

△ **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. If you see an LED light on the system board, voltage is still present.

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 Appendix D, [Electrostatic Discharge on page 56](#).

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 diskettes or compact discs, 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:** 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. If you see an LED light on the system board, voltage is still present.

---

5. If the computer is on a stand, remove the computer from the stand.
6. Remove the access panel.
7. Rotate up the external drive bay housing and the power supply to access the memory module sockets on the system board.

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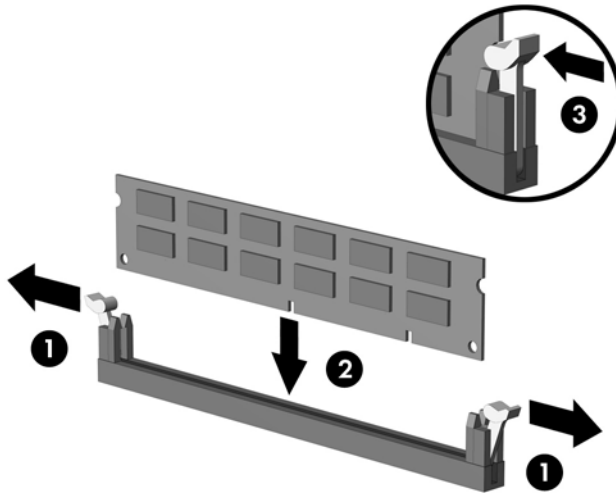
△ **WARNING!** To reduce risk of personal injury from hot surfaces, allow the internal system components to cool before touching.

---



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

**Figure 2-10** Installing a DIMM



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

A DIMM must occupy the XMM4 socket. Always populate XMM4 before XMM2, and XMM3 before XMM1 (populate the black sockets before white sockets in each channel).


In order to create a dual-channel memory configuration, the memory capacity of XMM4 must equal the memory capacity of XMM3 (and XMM2 must equal XMM1, if used). Refer to [Populating DIMM Sockets on page 17](#) for more information.

9. Push the DIMM module down firmly into the socket, ensuring that the module is fully inserted and properly seated. The DIMM must be pushed all the way down into the socket and sit evenly in the socket to avoid memory corruption. Make sure the latches are in the closed position (3).
10. Repeat steps 8 and 9 to install any additional modules.
11. Replace the access panel.
12. If the computer was on a stand, replace the stand.
13. Reconnect the power cord and turn on the computer.
14. Lock any security devices that were disengaged when the access panel was removed.

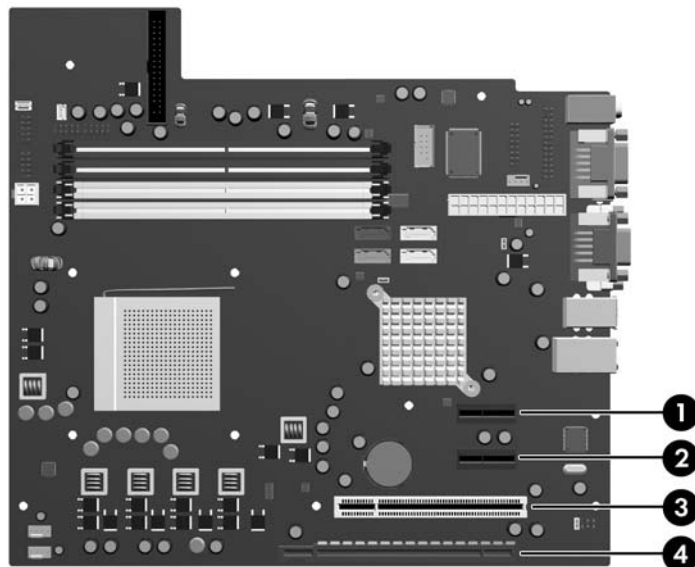
The computer should automatically recognize the additional memory the next time you turn on the computer.

## Removing or Installing an Expansion Card

The computer has one standard low-profile PCI expansion slot that can accommodate an expansion card up to 17.46 cm (6.875 inches) in length. The computer also has two PCI Express x1 expansion slots and one PCI Express x16 expansion slot.


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

**Figure 2-11** Expansion Slot Locations




**Table 2-1** Expansion Slot Locations

Item	Description
1	PCI Express x1 expansion slot
2	PCI Express x1 expansion slot
3	PCI expansion slot
4	PCI Express x16 expansion slot

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

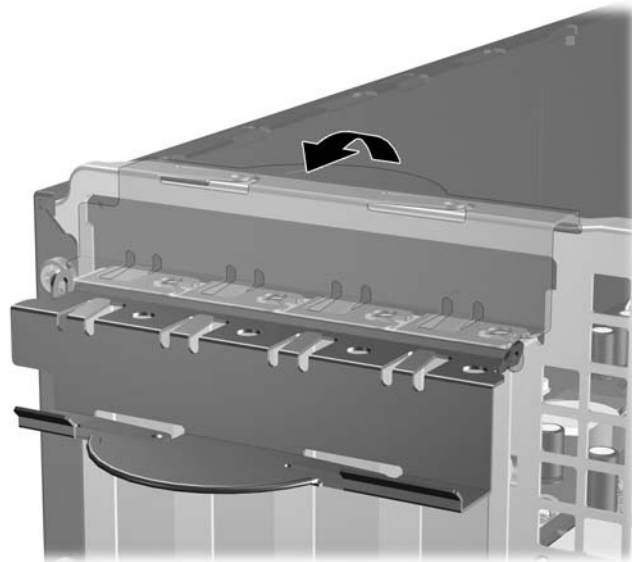
To install an expansion card:

1. Remove/disengage any security devices that prohibit opening the computer.
2. Remove all removable media, such as diskettes or compact discs, 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. If the computer is on a stand, remove the computer from the stand.
6. Remove the access panel.
7. Locate the correct vacant expansion socket on the system board and the corresponding expansion slot on the back of the computer chassis.
8. Release the slot cover retention latch that secures the PCI slot covers by lifting the green tab on the latch and rotating the latch to the open position.

**Figure 2-12** Opening the Expansion Slot Retainer

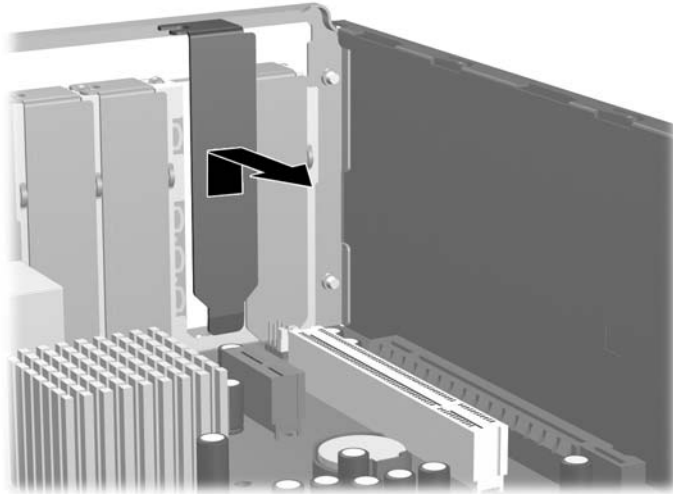


9. Before installing an expansion card, remove the expansion slot cover or the existing expansion card.

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

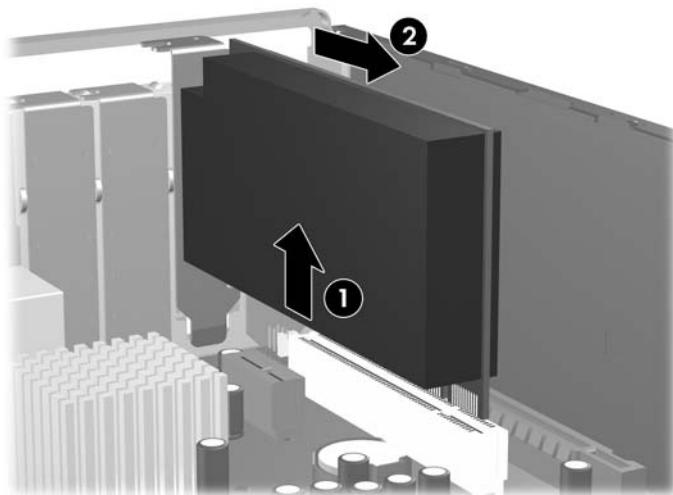
- a. If you are installing an expansion card in a vacant socket, remove the appropriate expansion slot cover on the back of the chassis. Pull the slot cover straight up then away from the inside of the chassis.

**Figure 2-13** Removing an Expansion Slot Cover



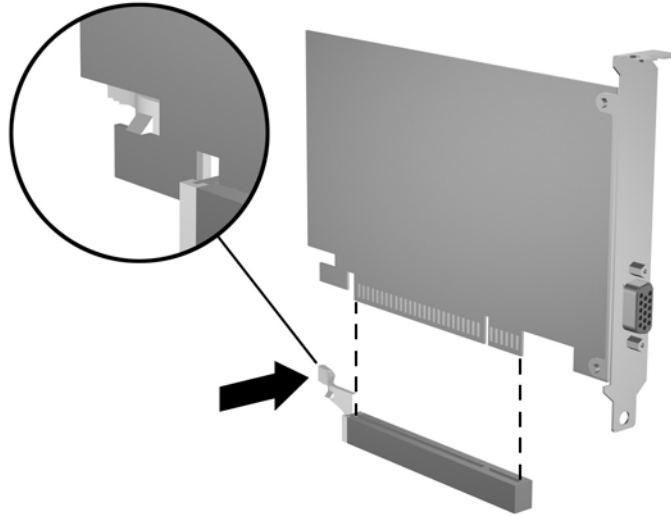
- b. If you are removing a standard PCI card, hold the card at each end, and carefully rock it back and forth until the connectors pull free from the socket. Pull the expansion card straight up from the socket (1) then away from the inside of the chassis (2) to release it from the chassis frame. Be sure not to scrape the card against the other components.

**Figure 2-14** Removing a Standard PCI Expansion Card



- c. 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.

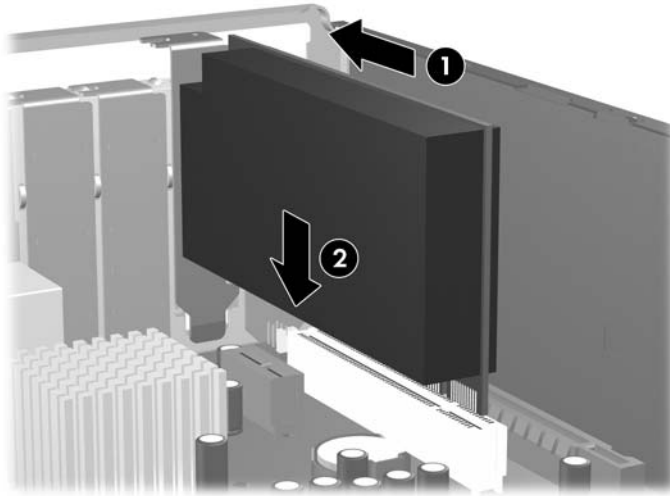
**Figure 2-15** Removing a PCI Express x16 Expansion Card




10. Store the removed card in anti-static packaging.
  11. If you are not installing a new expansion card, install an expansion slot cover to close the open slot.
- △ **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.

12. 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 (1) 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 (2).

**Figure 2-16** Installing an Expansion Card



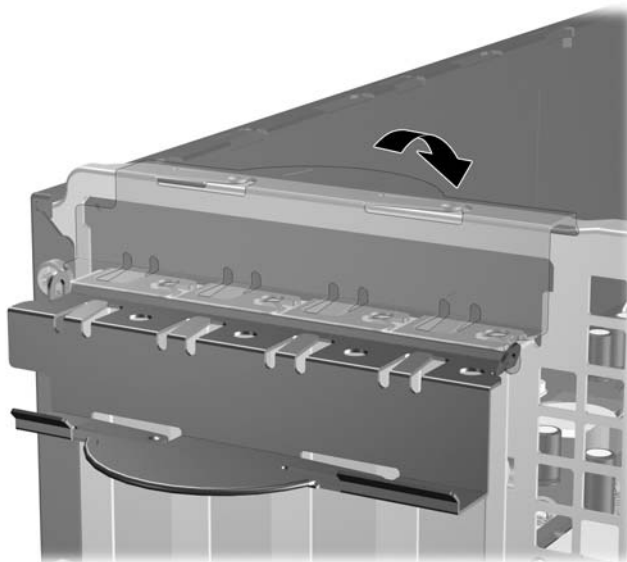
---

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

---

13. Rotate the slot cover retention latch back in place to secure the expansion card.

**Figure 2-17** Closing the Expansion Slot Retainer



14. Connect external cables to the installed card, if needed. Connect internal cables to the system board, if needed.
15. Replace the access panel.

16. If the computer was on a stand, replace the stand.
17. Reconnect the power cord and turn on the computer.
18. Lock any security devices that were disengaged when the access panel was removed.
19. Reconfigure the computer, if necessary. Refer to the *Computer Setup (F10) Utility Guide* for instructions on using Computer Setup.

## Drive Positions

Figure 2-18 Drive Positions



Table 2-2 Drive Positions

1	3.5-inch internal hard drive bay
2	3.5-inch external drive bay for optional drives (media card reader shown)
3	5.25-inch external drive bay for optional drives (optical drive shown)

**NOTE:** The 3.5-inch external drive bay can also be configured with a secondary internal hard drive covered by a bezel blank.

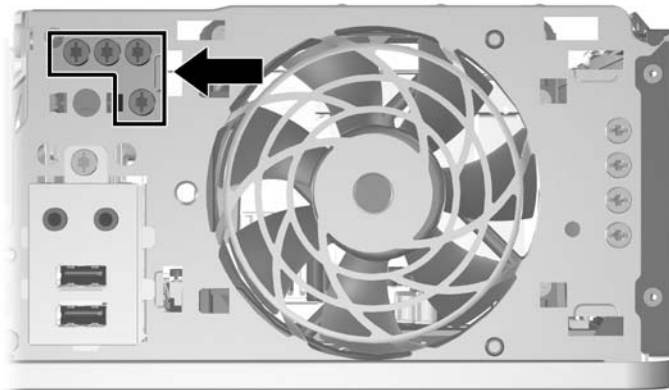
To verify the type, size, and capacity of the storage devices installed in the computer, run Computer Setup. Refer to the *Computer Setup (F10) Utility Guide* for more information.

# Installing and Removing Drives

When installing additional drives, follow these guidelines:

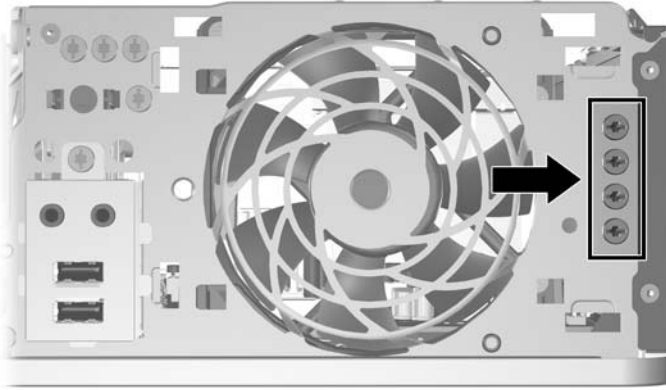
- The primary Serial ATA (SATA) hard drive must be connected to the dark blue primary SATA connector on the system board labeled SATA0.
- Connect a SATA optical drive to the white SATA connector on the system board labeled SATA1.
- Connect additional SATA hard drives to the next available (unpopulated) SATA connector on the system board in the following order: SATA0, SATA1, SATA3, SATA2.
- Always populate the dark blue SATA0 and white SATA1 connectors before the light blue SATA2 and orange SATA3 connectors.
- Connect a diskette drive to the connector labeled FLPY.
- Connect a media card reader to the USB connector labeled MEDIA.
- The system does not support Parallel ATA (PATA) optical drives or PATA hard drives.
- You must install guide screws to ensure the drive will line up correctly in the drive cage and lock in place. HP has provided extra guide screws for the external drive bays (four 6-32 standard screws and four M3 metric screws), installed in the front of the chassis, under the front bezel. The 6-32 standard screws are required for a secondary hard drive. All other drives (except the primary hard drive) use M3 metric screws. The HP-supplied metric screws are black and the HP-supplied standard screws are silver. If you are replacing the primary hard drive, you must remove the four silver and blue 6-32 isolation mounting guide screws from the old hard drive and install them in the new hard drive.

**Figure 2-19** Secondary Hard Drive 6-32 Guide Screws Location





**Figure 2-20** Extra Optical Drive M3 Guide Screws Location



---

△ **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 Appendix D, [Electrostatic Discharge on page 56](#).

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.

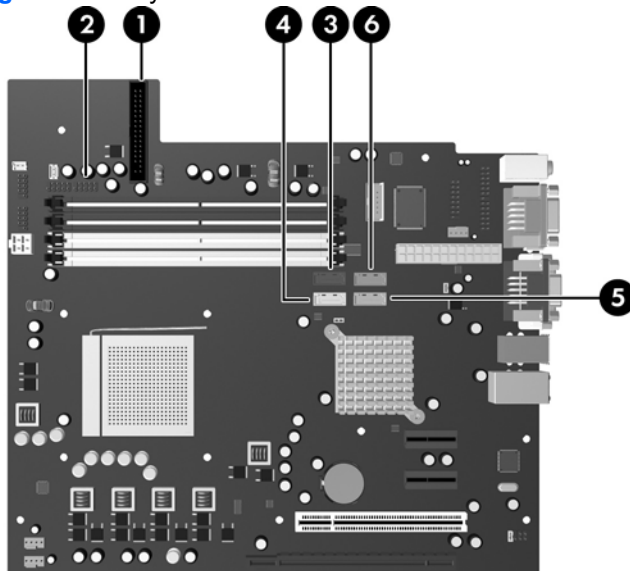
If a drive must be mailed, place the drive in a bubble-pack mailer or other protective packaging and label the package “Fragile: Handle With Care.”

---

## System Board Drive Connections

Refer to the following illustration and table to identify the system board drive connectors.

**Figure 2-21** System Board Drive Connections



**Table 2-3** System Board Drive Connections

No.	System Board Connector	System Board Label	Color
1	Diskette Drive	FLPY	black
2	Media Card Reader	MEDIA	black
3	SATA0	SATA0	dark blue
4	SATA1	SATA1	white
5	SATA2	SATA2	light blue
6	SATA3	SATA3	orange

## Removing an Optical Drive

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

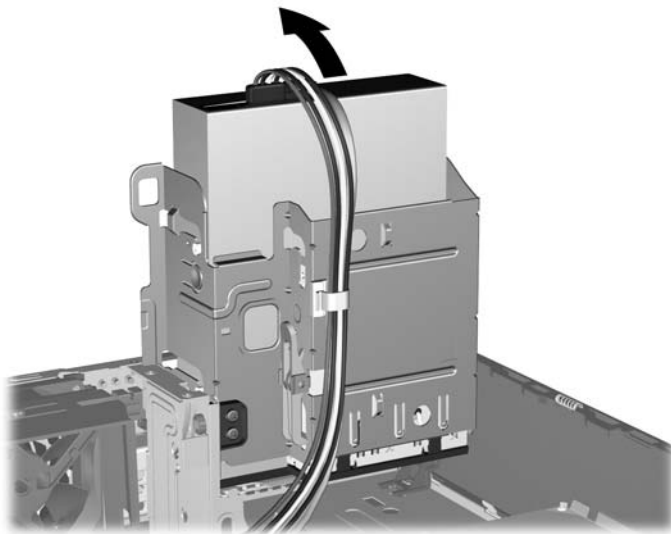
To remove an optical drive:

1. Remove/disengage any security devices that prohibit opening the computer.
2. Remove all removable media, such as diskettes or compact discs, 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.

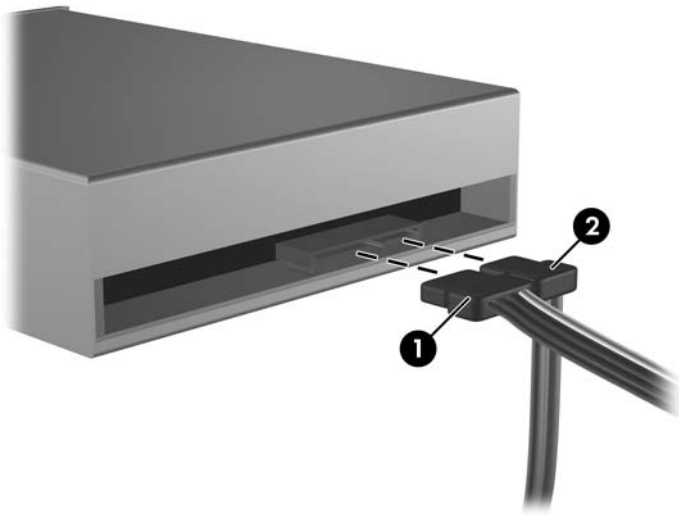
5. If the computer is on a stand, remove the computer from the stand.
6. Remove the access panel.
7. Rotate the drive cage to its upright position.

**Figure 2-22** Rotating the Drive Cage Up



8. Disconnect the power cable (1) and data cable (2) from the rear of the optical drive.

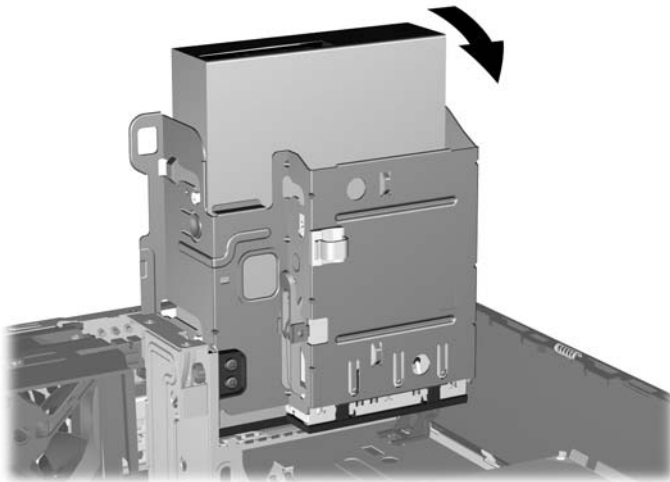
**Figure 2-23** Disconnecting the Power and Data Cables



9. Rotate the drive cage back down to its normal position.

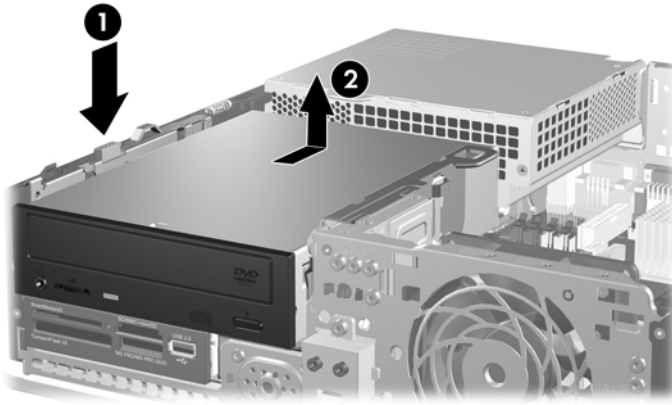
△ **CAUTION:** Be careful not to pinch any cables or wires when rotating the drive cage down.

**Figure 2-24** Rotating the Drive Cage Down




10. Press down on the green drive retainer button located on the left side of the drive to disengage the drive from the drive cage (1). While pressing the drive retainer button, slide the drive back until it stops, then lift it up and out of the drive cage (2).

**Figure 2-25** Removing the Optical Drive



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 **NOTE:** To replace the optical drive, reverse the removal procedure. When replacing a drive, transfer the four guide screws from the old drive to the new one.

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## Installing an Optical Drive into the 5.25-inch Drive Bay

To install an optional 5.25-inch optical drive:

1. Remove/disengage any security devices that prohibit opening the computer.
2. Remove all removable media, such as diskettes or compact discs, 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. If the computer is on a stand, remove the computer from the stand.
6. Remove the access panel.
7. If you are installing a drive in a bay covered by a bezel blank, remove the front bezel then remove the bezel blank. See [Removing Bezel Blanks on page 12](#) for more information.

8. Install two M3 metric guide screws in the lower holes on each side of the drive. HP has provided four extra M3 metric guide screws on the front of the chassis, under the front bezel. The M3 metric guide screws are black. Refer to [Installing and Removing Drives on page 26](#) for an illustration of the extra M3 metric guide screws location.

△ **CAUTION:** Use only 5-mm long screws as guide screws. Longer screws can damage the internal components of the drive.

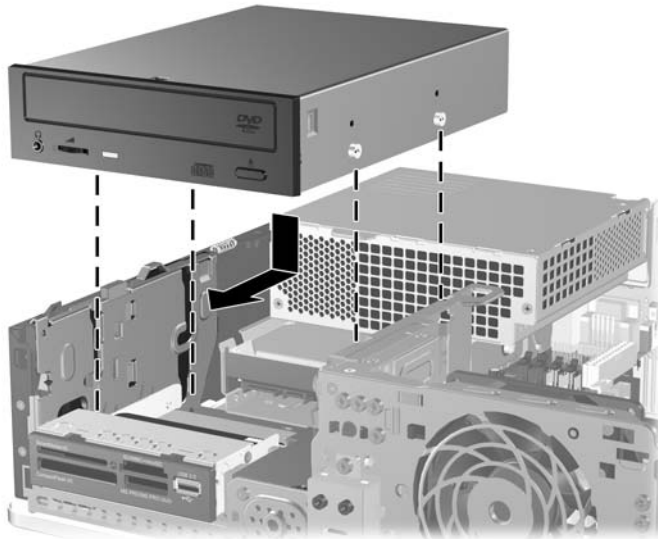
📝 **NOTE:** When replacing the drive, transfer the four M3 metric guide screws from the old drive to the new one.

**Figure 2-26** Installing Guide Screws in the Optical Drive



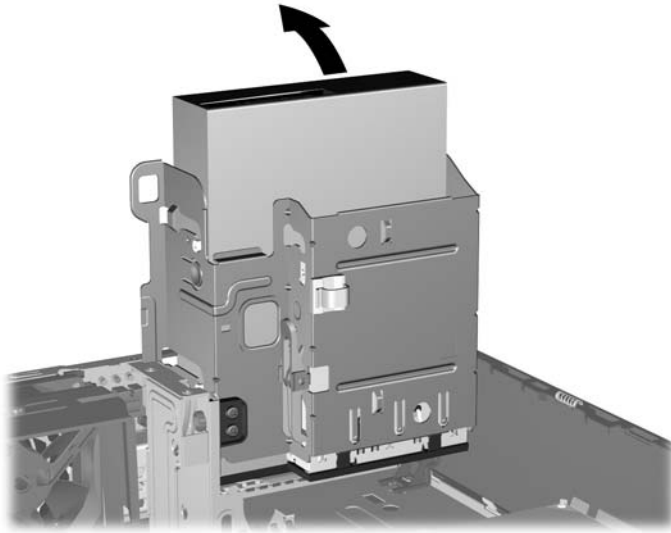
9. Position the guide screws on the drive into the J-slots in the drive bay. Then slide the drive toward the front of the computer until it locks into place.

**Figure 2-27** Installing the Optical Drive



10. Rotate the drive cage to its upright position.

**Figure 2-28** Rotating the Drive Cage Up

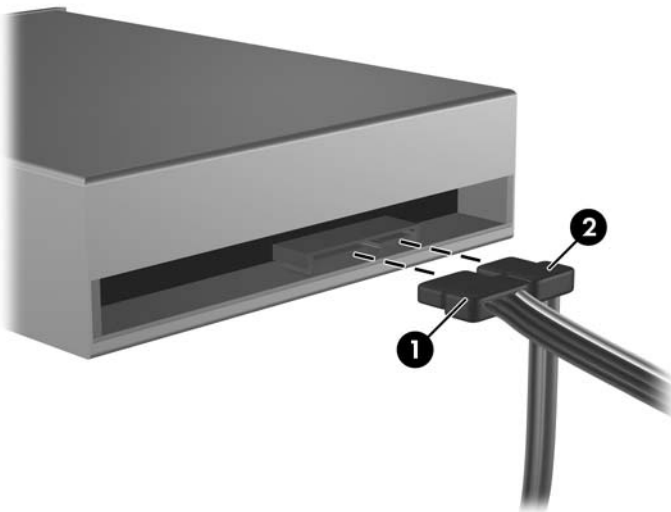


11. Connect the SATA data cable to the white system board connector labeled SATA1.
12. Route the data cable through the cable guides.

△ **CAUTION:** There are two cable guides that keep the data cable from being pinched by the drive cage when raising or lowering it. One is located on the bottom side of the drive cage. The other is located on the chassis frame under the drive cage. Ensure that the data cable is routed through these guides before connecting it to the optical drive.

13. Connect the power cable (1) and data cable (2) to the rear of the optical drive.

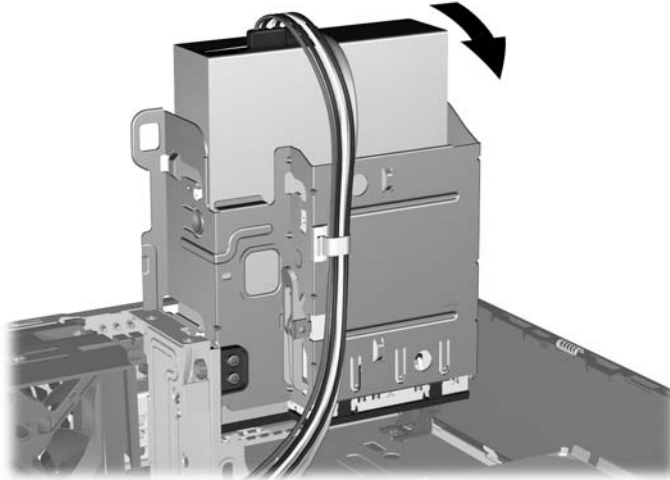
**Figure 2-29** Connecting the Power and Data Cables



14. Rotate the drive cage back down to its normal position.

△ **CAUTION:** Be careful not to pinch any cables or wires when rotating the drive cage down.

**Figure 2-30** Rotating the Drive Cage Down



15. Replace the access panel.
16. If the computer was on a stand, replace the stand.
17. Reconnect the power cord and turn on the computer.
18. Lock any security devices that were disengaged when the access panel was removed.

The system automatically recognizes the drive and reconfigures the computer.

## Removing an External 3.5-inch Drive

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

📝 **NOTE:** The 3.5-inch drive bay may contain a diskette drive or a media card reader.

The 3.5-inch drive is located underneath the optical drive. You must remove the optical drive before removing the external 3.5-inch drive.

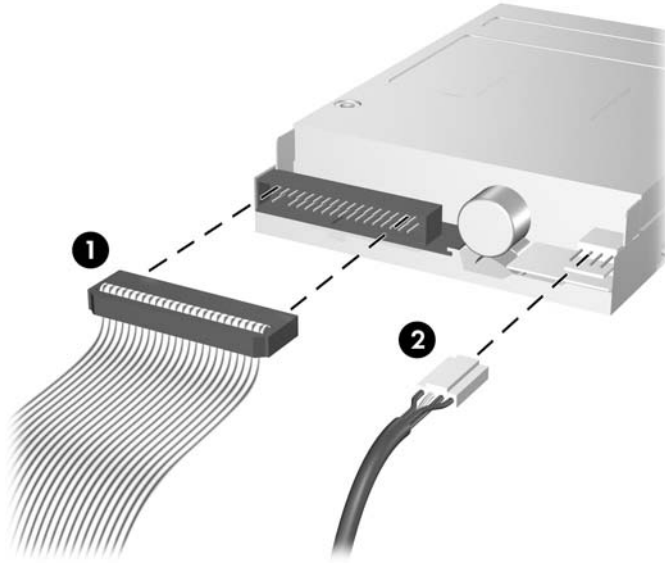
1. Follow the procedure in [Removing an Optical Drive on page 29](#) to remove the optical drive and access the 3.5-inch drive.

△ **CAUTION:** Ensure that the computer is turned off and that the power cord is disconnected from the electrical outlet before proceeding.



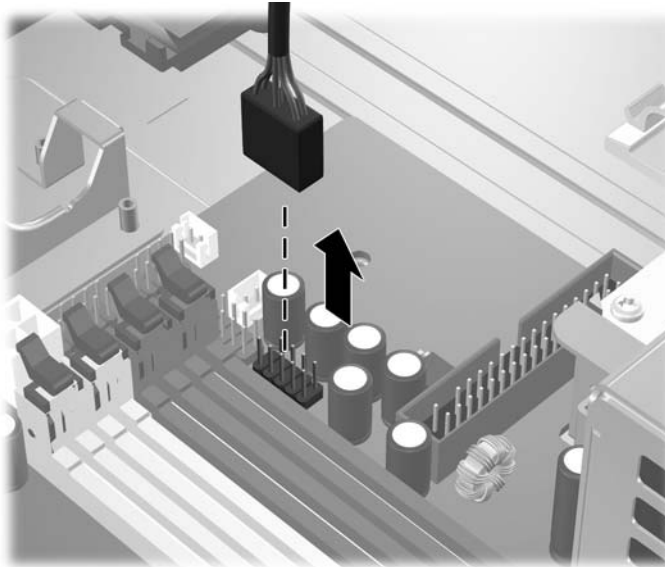
2. Disconnect the drive cables, as indicated in the following illustrations:
  - a. If you are removing a diskette drive, disconnect the data cable (1) and power cable (2) from the back of the drive.

**Figure 2-31** Disconnecting the Diskette Drive Cables



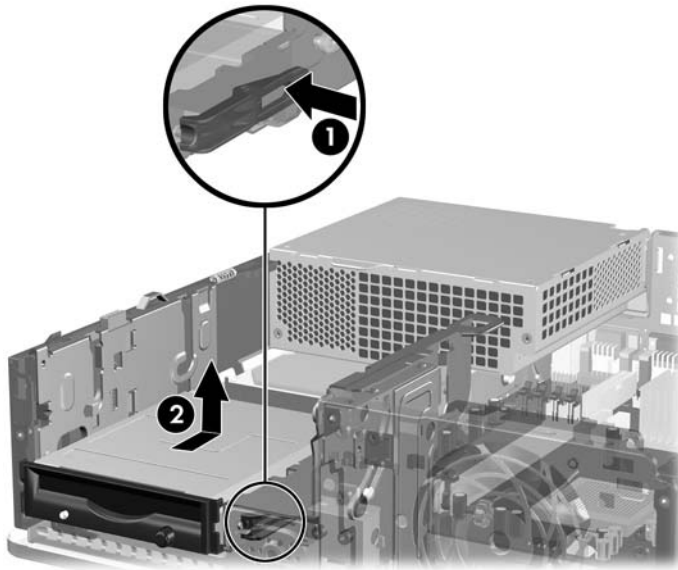
- b. If you are removing a media card reader, disconnect the USB cable from the system board.

**Figure 2-32** Disconnecting the Media Card Reader Cable



3. Press the green drive retainer latch (1) located on the right side of the drive to disengage the drive from the drive cage. While pressing the drive retainer latch, slide the drive back until it stops, then lift it up and out of the drive cage (2).

**Figure 2-33** Removing a 3.5-inch Drive (Diskette Drive shown)



**NOTE:** To replace the 3.5-inch drive, reverse the removal procedure.

When replacing a 3.5-inch drive, transfer the four guide screws from the old drive to the new one.

## Installing a Drive into the 3.5-inch External Drive Bay

Depending on the computer configuration, the 3.5-inch external drive bay on the front of the computer may be configured with a media card reader or a diskette drive, or it may be an empty drive bay.

If the computer was not configured with a 3.5-inch drive, you can install a media card reader, diskette drive, or hard drive into the drive bay.

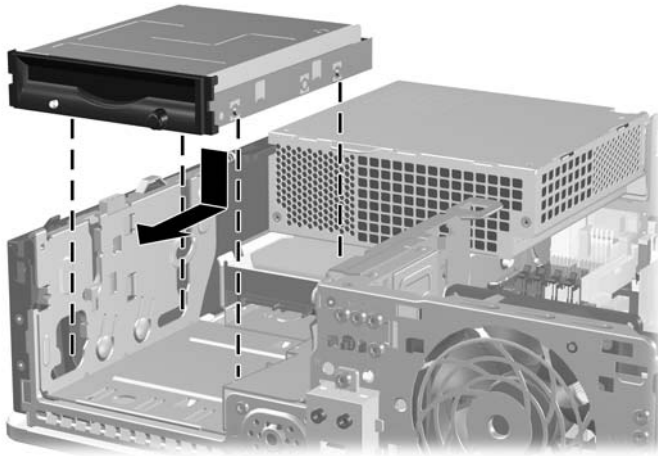
The 3.5-inch bay is located underneath the optical drive. To install a drive into the 3.5-inch bay:

**NOTE:** Install guide screws to ensure the drive will line up correctly in the drive cage and lock in place. HP has provided extra guide screws for the external drive bays (four 6-32 standard screws and four M3 metric screws), installed in the front of the chassis, under the front bezel. A secondary hard drive uses 6-32 standard screws. All other drives (except the primary hard drive) use M3 metric screws. The HP-supplied M3 metric screws are black and the HP-supplied 6-32 standard screws are silver. Refer to [Installing and Removing Drives on page 26](#) for illustrations of the guide screw locations.

1. Follow the procedure in [Removing an Optical Drive on page 29](#) to remove the optical drive and access the 3.5-inch drive bay.
  - △ **CAUTION:** Ensure that the computer is turned off and that the power cord is disconnected from the electrical outlet before proceeding.
2. If you are installing a diskette drive or media card reader in a bay covered by a bezel blank, remove the front bezel then remove the bezel blank. See [Removing Bezel Blanks on page 12](#) for more information.

3. Position the guide screws on the drive into the J-slots in the drive bay. Then slide the drive toward the front of the computer until it locks into place.

**Figure 2-34** Installing a Drive into the 3.5-inch Drive Bay (Diskette Drive shown)




4. Connect the appropriate drive cables:
  - a. If installing a diskette drive, connect the power and data cables to the rear of the drive and connect the other end of the data cable to the connector on the system board labeled FLPY.
  - b. If installing a second hard drive, connect the power and data cables to the rear of the drive and connect the other end of the data cable to the next available (unpopulated) SATA connector on the system board in the following order: SATA0, SATA1, SATA3, SATA2.
  - c. If installing a media card reader, connect the USB cable from the media card reader to the USB connector on the system board labeled MEDIA.

 **NOTE:** Refer to [System Board Drive Connections on page 28](#) for an illustration of the system board drive connectors.

5. Replace the optical drive.
6. Replace the front bezel and access panel.
7. If the computer was on a stand, replace the stand.
8. Reconnect the power cord and turn on the computer.
9. Lock any security devices that were disengaged when the access panel was removed.

## Removing and Replacing the Primary 3.5-inch Internal SATA Hard Drive

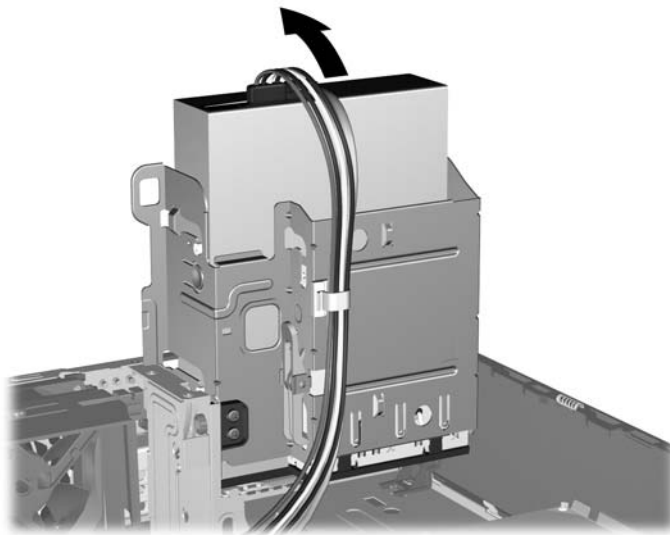
 **NOTE:** The system does not support Parallel ATA (PATA) hard drives.

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. Also, if you are replacing the primary hard drive, make sure you have created a Recovery Disc Set to restore the operating system, software drivers, and any software applications that were preinstalled on the computer. If you do not have this CD set, select **Start > HP Backup and Recovery** and create it now.

The preinstalled 3.5-inch hard drive is located under the power supply. To remove and replace the hard drive:

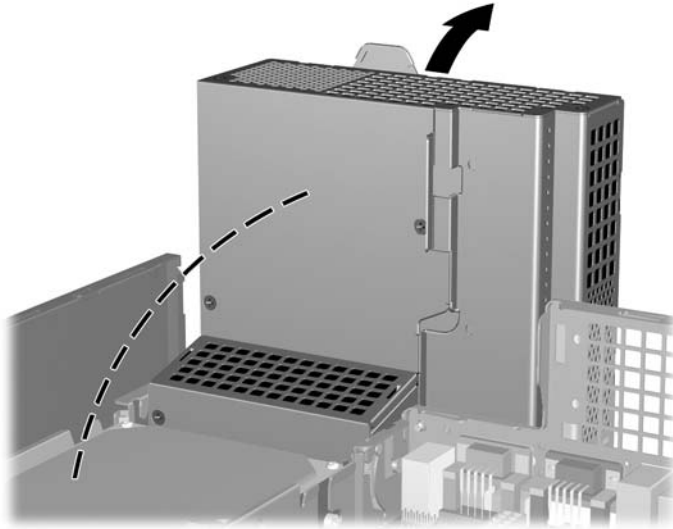
1. Remove/disengage any security devices that prohibit opening the computer.
  2. Remove all removable media, such as diskettes or compact discs, from the computer.
  3. Turn off the computer properly through the operating system, then turn off any external devices.
  4. Disconnect the power cord from 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. If the computer is on a stand, remove the computer from the stand.
  6. Remove the access panel.
  7. Rotate the drive cage for external drives to its upright position.

**Figure 2-35** Rotating the Drive Cage Up



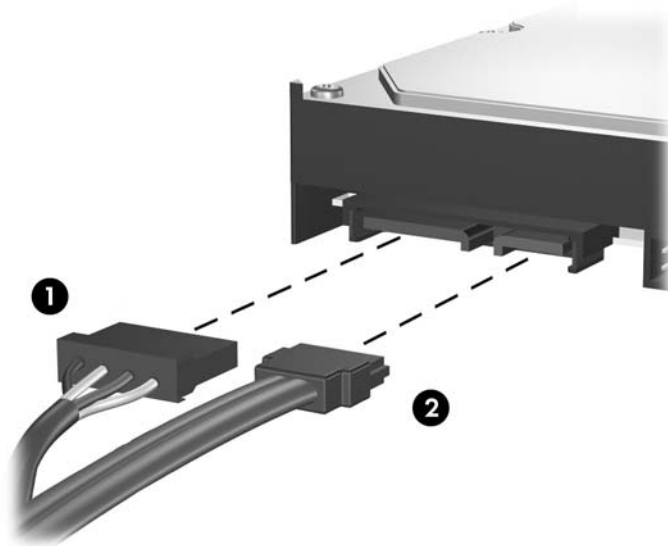
8. Rotate the power supply to its upright position. The hard drive is located beneath the power supply.

**Figure 2-36** Raising the Power Supply



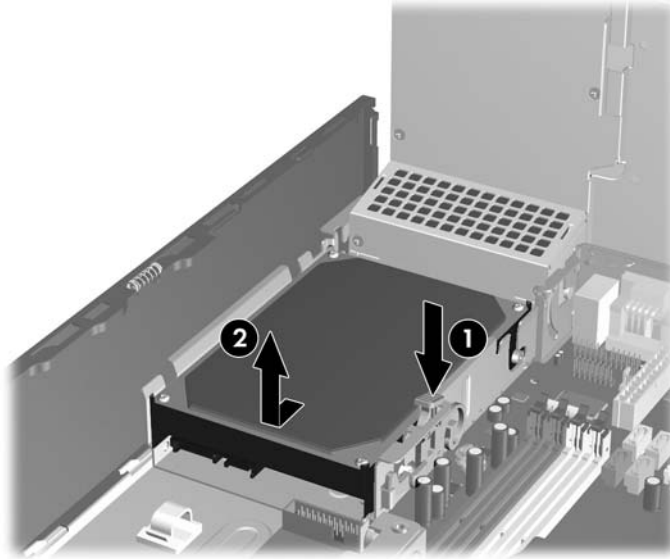
9. Disconnect the power cable (1) and data cable (2) from the back of the hard drive.

**Figure 2-37** Disconnecting the Hard Drive Power Cable and Data Cable



10. Press down on the green release latch next to the hard drive (1). While holding the latch down, slide the drive forward until it stops, then lift the drive up and out of the bay (2).

**Figure 2-38** Removing the Hard Drive



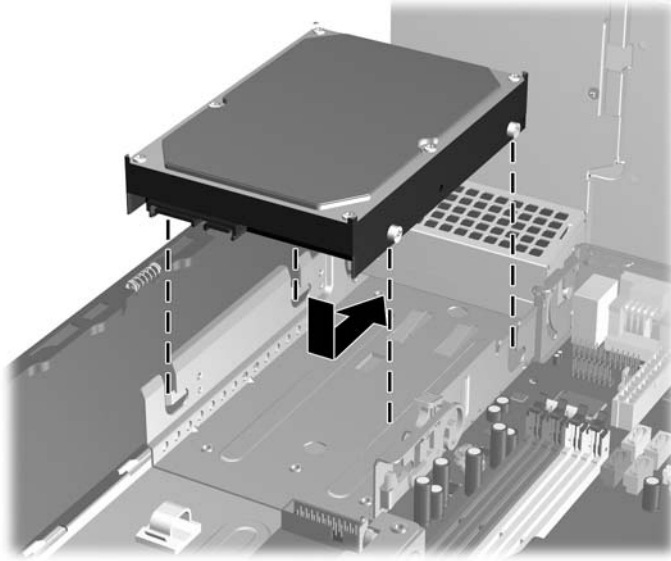
11. To install a hard drive, you must transfer the silver and blue isolation mounting guide screws from the old hard drive to the new hard drive.

**Figure 2-39** Installing Hard Drive Guide Screws




12. Align the guide screws with the slots on the chassis drive cage, press the hard drive down into the bay, then slide it back until it stops and locks in place.

**Figure 2-40** Installing the Hard Drive




13. Connect the power and data cables to the back of the hard drive.

 **NOTE:** When replacing the primary hard drive, be sure to route the SATA and power cables through the cable guide on the bottom of the chassis frame behind the hard drive.

If the system has only one SATA hard drive, the data cable must be connected to the dark blue connector labeled SATA0 on the system board to avoid any hard drive performance problems. If you are adding a second hard drive, connect the other end of the data cable to the next available (unpopulated) SATA connector on the system board in the following order: SATA0, SATA1, SATA3, SATA2.

14. Rotate the drive cage for external drives and the power supply down to their normal positions.
15. Replace the access panel.
16. If the computer was on a stand, replace the stand.
17. Reconnect the power cord and turn on the computer.
18. Lock any security devices that were disengaged when the access panel was removed.

 **NOTE:** If you are replacing the primary hard drive, use the Recovery Disc Set to restore the operating system, software drivers, and any software applications that were preinstalled on the computer.

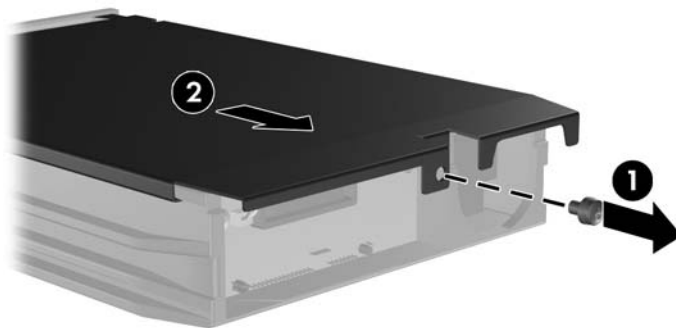
## Removing and Replacing a Removable 3.5-inch SATA Hard Drive

Some models are equipped with a Removable SATA Hard Drive Enclosure in the 5.25-inch external drive bay. The hard drive is housed in a carrier that can be quickly and easily removed from the drive bay. To remove and replace a drive in the carrier:

**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. Also, if you are replacing the primary hard drive, make sure you have created a Recovery Disc Set to restore the operating system, software drivers, and any software applications that were preinstalled on the computer. If you do not have this CD set, select **Start > HP Backup and Recovery** and create it now.

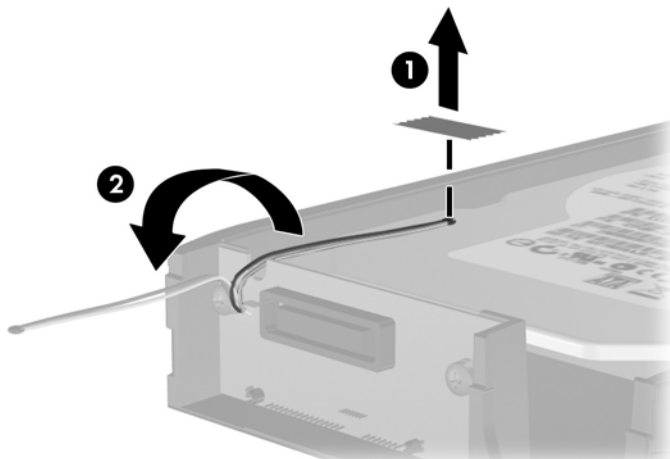
1. Unlock the hard drive carrier with the key provided and slide the carrier out of the enclosure.
2. Remove the screw from the rear of the carrier (1) and slide the top cover off the carrier (2).

**Figure 2-41** Removing the Carrier Cover



3. Remove the adhesive strip that secures the thermal sensor to the top of the hard drive (1) and move the thermal sensor away from the carrier (2).

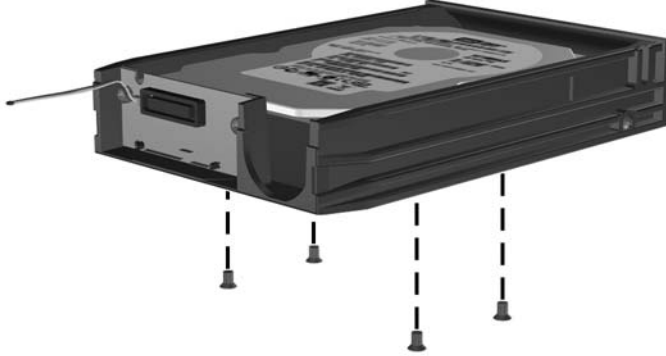
**Figure 2-42** Removing the Thermal Sensor





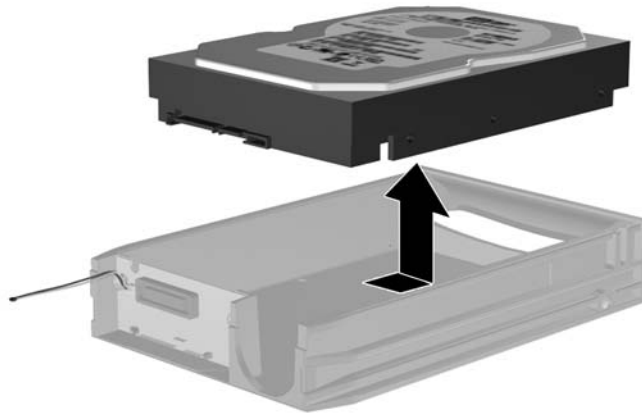
4. Remove the four screws from the bottom of the hard drive carrier.

**Figure 2-43** Removing the Security Screws



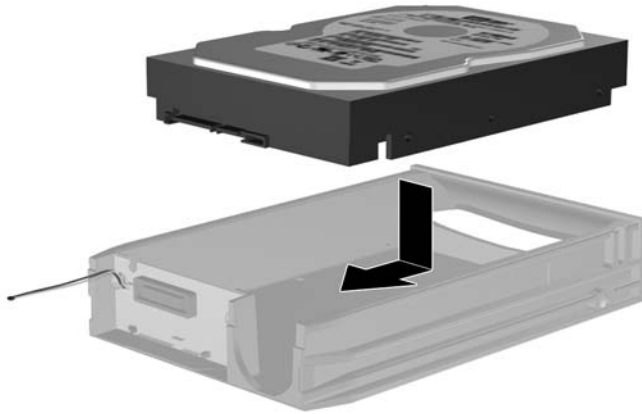
5. Slide the hard drive back to disconnect it from the carrier then lift it up and out of the carrier.

**Figure 2-44** Removing the Hard Drive



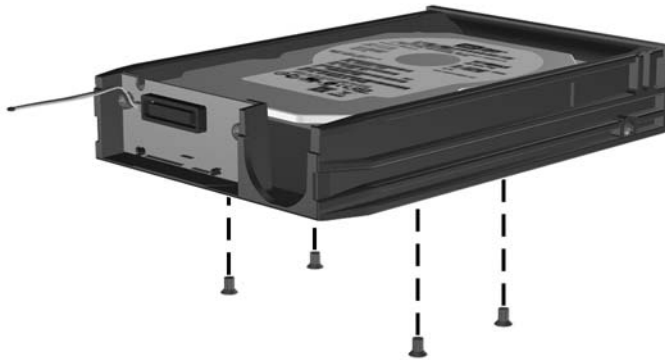
6. Place the new hard drive in the carrier then slide the hard drive back so that it seats in the SATA connector on the carrier's circuit board. Be sure the connector on the hard drive is pressed all the way into the connector on the carrier's circuit board.

**Figure 2-45** Replacing the Hard Drive



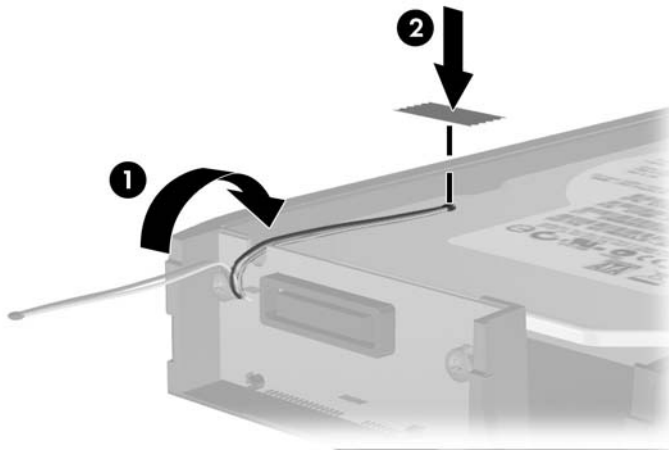
7. Replace the four screws in the bottom of the carrier to hold the drive securely in place.

**Figure 2-46** Replacing the Security Screws



8. Place the thermal sensor on top of the hard drive in a position that does not cover the label (1) and attach the thermal sensor to the top of the hard drive with the adhesive strip (2).

**Figure 2-47** Replacing the Thermal Sensor




9. Slide the cover on the carrier (1) and replace the screw on the rear of the carrier to secure the cover in place (2).

**Figure 2-48** Replacing the Carrier Cover



10. Slide the hard drive carrier into the enclosure on the computer and lock it with the key provided.

 **NOTE:** The carrier must be locked for power to be supplied to the hard drive.

# A Specifications

**Table A-1 Specifications**

<b>Desktop Dimensions</b>		
Height	3.95 in	10.0 cm
Width	13.3 in	33.8 cm
Depth	14.9 in	37.8 cm
<b>Approximate Weight</b>		
	19 lb	8.6 kg
<b>Weight Supported</b> (maximum distributed load in desktop position)		
	77 lb	35 kg
<b>Temperature Range</b>		
Operating	50° to 95°F	10° to 35°C
Nonoperating	-22° to 140°F	-30° to 60°C
<p><b>NOTE:</b> Operating temperature is derated 1.0° C per 300 m (1000 ft) to 3000 m (10,000 ft) above sea level; no direct sustained sunlight. Maximum rate of change is 10° C/Hr. The upper limit may be limited by the type and number of options installed.</p>		
<b>Relative Humidity (noncondensing)</b>		
Operating	10-90%	10-90%
Nonoperating (38.7°C max wet bulb)	5-95%	5-95%
<b>Maximum Altitude (unpressurized)</b>		
Operating	10,000 ft	3048 m
Nonoperating	30,000 ft	9144 m
<b>Heat Dissipation</b>		
Maximum (standard PS)	1260 BTU/hr	318 kg-cal/hr
Typical (idle; standard PS)	307 BTU/hr	77 kg-cal/hr
Maximum (80 Plus PS)	1,024 BTU/hr	258 kg-cal/hr
Typical (idle; 80 Plus PS)	239 BTU/hr	60 kg-cal/hr
<b>Power Supply</b>		
	<b>115V</b>	<b>230V</b>
Operating Voltage Range <sup>1</sup>	90-264 VAC	90-264 VAC
Rated Voltage Range	100-240 VAC	100-240 VAC
Rated Line Frequency	50-60 Hz	50-60 Hz

**Table A-1 Specifications (continued)**

<b>Power Output</b>	240 W	240 W
<b>Rated Input Current (maximum)<sup>1</sup></b>		
Standard PS	4A @ 100VAC	2A @ 200VAC
80 Plus PS	3.5A @ 100VAC	1.75A @ 200VAC

<sup>1</sup> This system utilizes an active power factor corrected power supply. This allows the system to pass the CE mark requirements for use in the countries of the European Union. The active power factor corrected power supply also has the added benefit of not requiring an input voltage range select switch.

---

## B 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. Refer to the *Computer Setup (F10) Utility Guide* for information on backing up the CMOS settings.

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 diskettes or compact discs, 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. If the computer is on a stand, remove the computer from the stand.
6. Remove the access panel.
7. Locate the battery and battery holder on the system board.

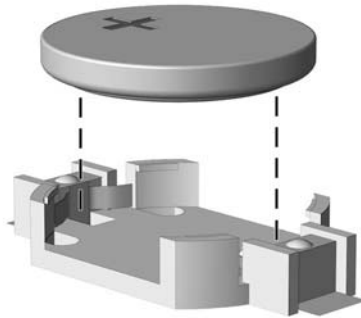
 **NOTE:** On some computer models, it may be necessary to remove an internal component to gain access to the battery.

8. 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.

**Figure B-1** Removing a Coin Cell Battery (Type 1)

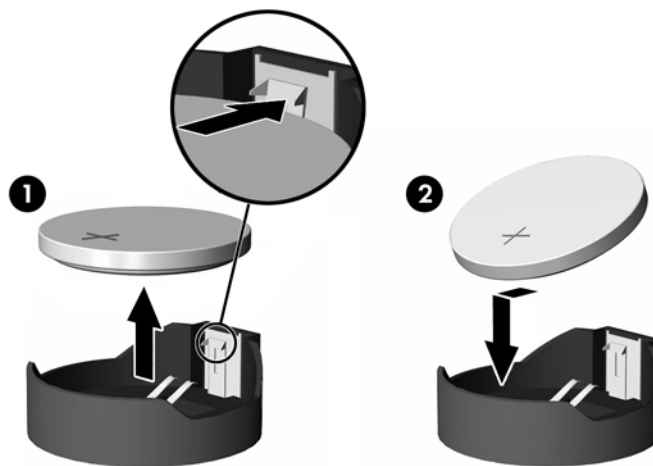


- b. Slide the replacement battery into position, positive side up. The battery holder automatically secures the battery in the proper position.

### 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).

**Figure B-2** Removing and Replacing a Coin Cell Battery (Type 2)

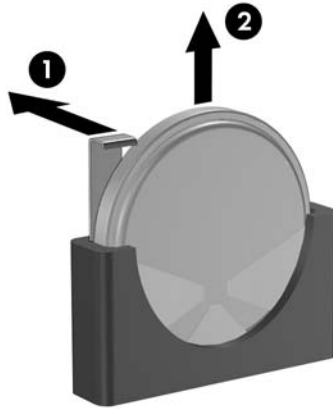


### Type 3


- 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.

**Figure B-3** Removing a Coin Cell Battery (Type 3)



---


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

9. Replace the access panel.
10. If the computer was on a stand, replace the stand.
11. Plug in the computer and turn on power to the computer.
12. Reset the date and time, your passwords, and any special system setups using Computer Setup. Refer to the *Computer Setup (F10) Utility Guide*.
13. Lock any security devices that were disengaged when the access panel was removed.



---

## C External Security Devices

 **NOTE:** For information on data security features, refer to the *Computer Setup (F10) Utility Guide*, the *Desktop Management Guide*, and the *HP ProtectTools Security Manager Guide* (some models) at <http://www.hp.com>.

### Installing a Security Lock

The security locks displayed below and on the following pages can be used to secure the computer.

#### Cable Lock

**Figure C-1** Installing a Cable Lock



## Padlock

Figure C-2 Installing a Padlock



## HP Business PC Security Lock

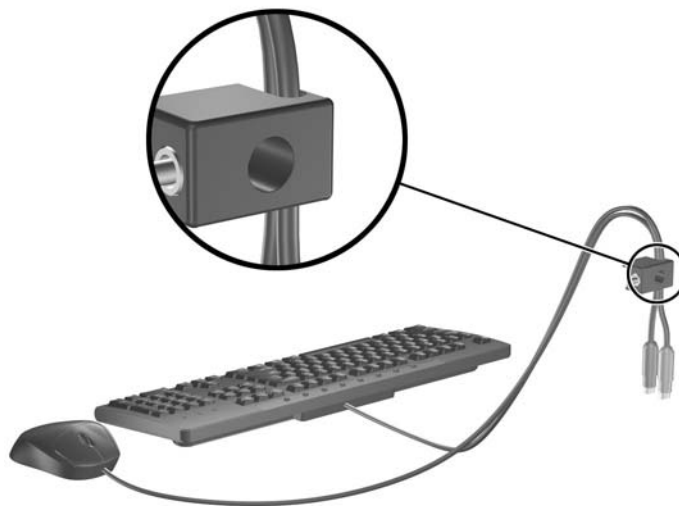
1. Fasten the security cable by looping it around a stationary object.

**Figure C-3** Securing the Cable to a Fixed Object



2. Thread the keyboard and mouse cables through the lock.

**Figure C-4** Threading the Keyboard and Mouse Cables



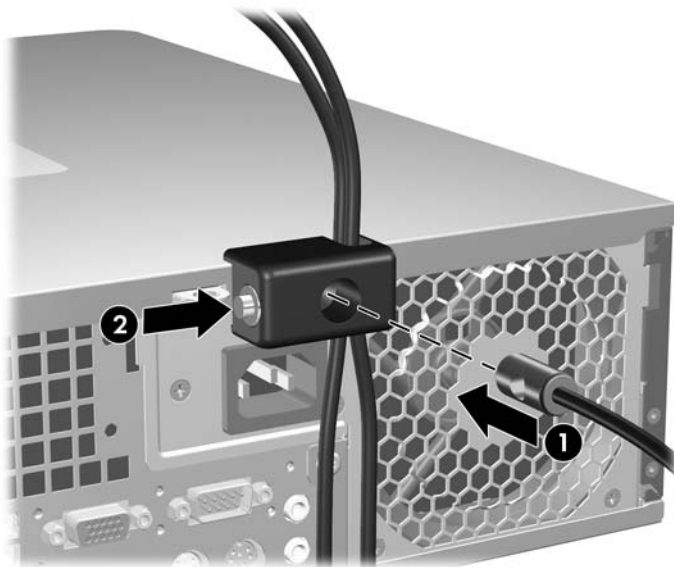
3. Screw the lock to the chassis using the screw provided.

**Figure C-5** Attaching the Lock to the Chassis



4. Insert the plug end of the security cable into the lock (1) and push the button in (2) to engage the lock. Use the key provided to disengage the lock.

**Figure C-6** Engaging the Lock

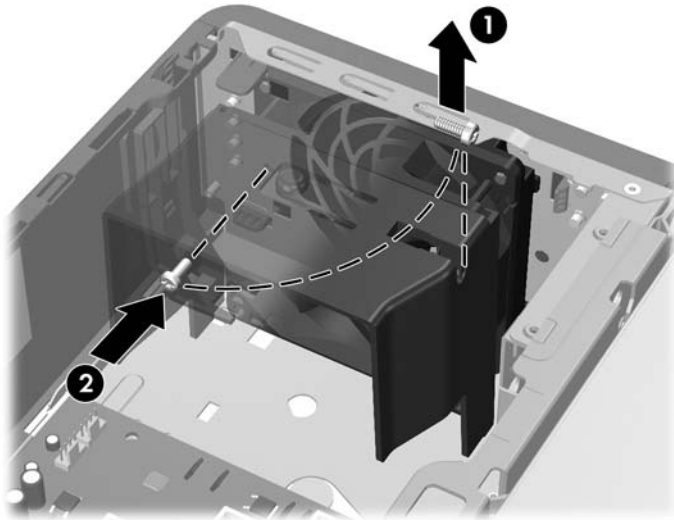


## Front Bezel Security

The front bezel can be locked in place by installing a security screw provided by HP.

The security screw is located on the fan duct inside the chassis. To lock the front bezel, remove the security screw from the fan duct (1) and install it through the chassis frame into the front bezel (2).

**Figure C-7** Installing the Front Bezel Security Screw



---

# D 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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# E 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 Drive Precautions

Be sure to observe the following guidelines while operating or cleaning the optical 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 on PD discs, tape cartridges, CDs, or diskettes. 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.

---

2. Remove and store all removable media.
3. Insert a blank diskette into the diskette drive to protect the drive while in transit. Do not use a diskette on which you have stored or plan to store data.
4. Turn off the computer and external devices.
5. Disconnect the power cord from the electrical outlet, then from the computer.
6. Disconnect the system components and external devices from their power sources, then from the computer.



---

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

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7. 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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