Hardware Reference Guide - dx7500 Microtower Model

HP Compaq Business PC

Hardware Reference Guide

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dx7500 Microtower Model

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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 Microtower 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*.

Figure 1-1 HP Compaq dx7500 Microtower

NOTE: The drive configuration shown above may be different than your computer model.

The illustration shown above may look different than your computer model.

Serviceability Features

The Microtower computer includes features that make it easy to upgrade and service. A Torx T-15 or flat blade screwdriver is needed for many of the installation procedures described in this chapter.

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 Drives[1]	6	Hard Drive Activity Light
2	Optical Drive Activity Lights	7	Optical Drive Eject Buttons
3	3.5-inch Media Card Reader (optional)[2]	8	Headphone Connector
4	Microphone Connector	9	USB (Universal Serial Bus) 2.0 Ports
5	Dual-State Power Button	10	1394 Port

[1] Some models have bezel blanks covering one or both of the 5.25-inch drive bays.

[2] Some models have a bezel blank covering the 3.5-inch drive bay. An optional diskette drive is available from HP for this drive 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
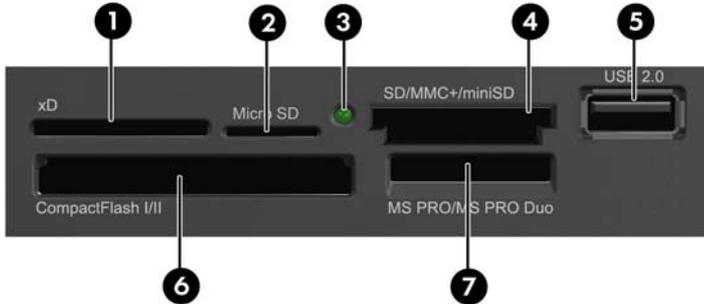
Table 1-2 Media Card Reader Components

No.	Slot	Media		
1	**xD**	● xD-Picture Card (xD)		
2	**MicroSD**	● MicroSD (T-Flash)	● MicroSDHC	
3	**Media Card Reader Activity Light**			
4	**SD/MMC+/miniSD**	● Secure Digital (SD)	● MiniSDHC	● MultiMediaCard 4.0 (MMC Plus)
		● Secure Digital High Capacity (SDHC)	● MultiMediaCard (MMC)	● Reduced Size MultiMediaCard 4.0 (MMC Mobile)
		● MiniSD	● Reduced Size MultiMediaCard (RS MMC)	● MMC Micro (adapter required)
5	**USB**	● USB (Universal Serial Bus) Port		
6	**CompactFlash I/II**	● CompactFlash Card Type 1	● CompactFlash Card Type 2	● MicroDrive
7	**MS PRO/MS PRO DUO**	● Memory Stick (MS)	● Memory Stick Select	● Memory Stick PRO Duo (MS PRO Duo)
		● MagicGate Memory Stick (MG)	● Memory Stick Duo (MS Duo)	● Memory Stick PRO-HG Duo
		● MagicGate Memory Duo	● Memory Stick PRO (MS PRO)	● Memory Stick Micro (M2) (adapter required)

Rear Panel Components

Figure 1-4 Rear Panel Components
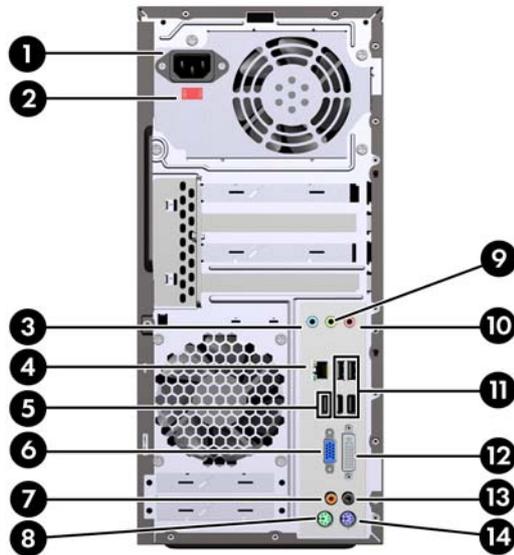
Table 1-3 Rear Panel Components

1	Power Cord Connector	8	PS/2 Mouse Connector (green)
2	Voltage Select Switch	9	Line-Out Connector for powered audio devices (green)
3	Line-In Audio Connector (blue)	10	Microphone Connector (pink)
4	RJ-45 Network Connector	11	Universal Serial Bus (USB) Ports
5	1394 Port	12	DVI Monitor Connector (white)
6	VGA Monitor Connector (blue)	13	Digital Line-In Audio (black)
7	Digital Line-Out Audio (orange)	14	PS/2 Keyboard Connector (purple)

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

The monitor connector on the system board is inactive when a PCI Express x16 graphics card is installed in the computer.

If a 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
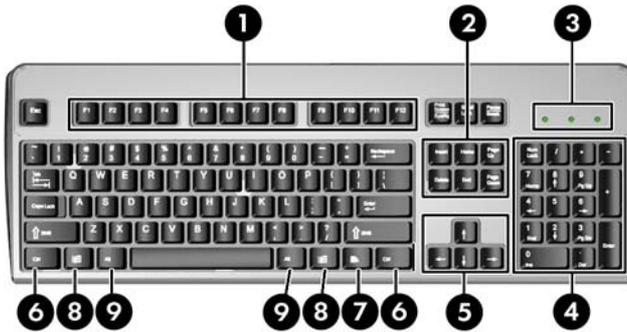
Table 1-4 Keyboard Components

1	Function Keys	Perform special functions depending on the software application being used.
2	Editing Keys	Include 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[1]	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[1]	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.

[1] 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 + d	Displays the Desktop
Windows Logo Key + m	Minimizes all open applications
Shift + Windows Logo Key + m	Undoes Minimize All
Windows Logo Key + e	Launches My Computer

Table 1-5 Windows Logo Key Functions (continued)

Windows Logo Key + f	Launches Find Document
Windows Logo Key + Ctrl + f	Launches Find Computer
Windows Logo Key + F1	Launches Windows Help
Windows Logo Key + l	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 + r	Launches the Run dialog box
Windows Logo Key + u	Launches the Utility Manager
Windows Logo Key + Pause/Break	Launches the System Properties dialog box
Windows Logo Key + Tab	Windows XP - Cycles through the Taskbar buttons Windows Vista - Cycles through programs on the Taskbar using the Windows Flip 3-D
In addition to the Windows Logo Key functions described above, the following functions are also available in Microsoft Windows Vista.	
Ctrl + Windows Logo Key + Tab	Use the arrow keys to cycle through programs on the Taskbar by using Windows Flip 3-D
Windows Logo Key + Spacebar	Brings all gadgets to the front and select Windows Sidebar
Windows Logo Key + g	Cycles through Sidebar gadgets
Windows Logo Key + u	Launches Ease of Access Center
Windows Logo Key + x	Launches Windows Mobility Center
Windows Logo Key + any number key	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 that are located on the upper left side of the computer. Keep these numbers available for use when contacting customer service for assistance.

Figure 1-6 Serial Number and Product ID Location

2 Hardware Upgrades

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 48 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. Remove the screw (1) that secures the access panel to the computer chassis.

6. Slide the access panel back (2) about 1.3 cm (1/2 inch), then lift it off the unit.

    📝 **NOTE:** You may want to lay the computer on its side to install internal parts. Be sure the side with the access panel is facing up.

    Figure 2-1 Removing the Computer Access Panel

Replacing the Computer Access Panel

Place the access panel on the chassis with about 1.3 cm (1/2 inch) of the panel hanging off the back of the chassis and slide it into place (1). Ensure that the hole for the screw is aligned with the hole in the chassis and tighten the screw (2).

Figure 2-2 Replacing the Computer 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 computer access panel.

6. Press outward on the three latches on the right side of the bezel (1), then rotate the right side of the bezel off the chassis (2) followed by the left side.

   Figure 2-3 Removing the Front Bezel
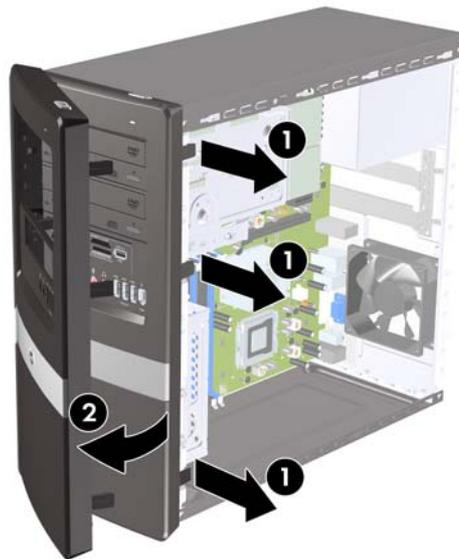
Removing Bezel Blanks

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. Follow the instructions described in Removing the Front Bezel on page 11.

2. Press the two retaining tabs towards the outer left edge of the bezel (1) and pull the bezel blank inwards to remove it (2).

Figure 2-4 Removing a Bezel Blank
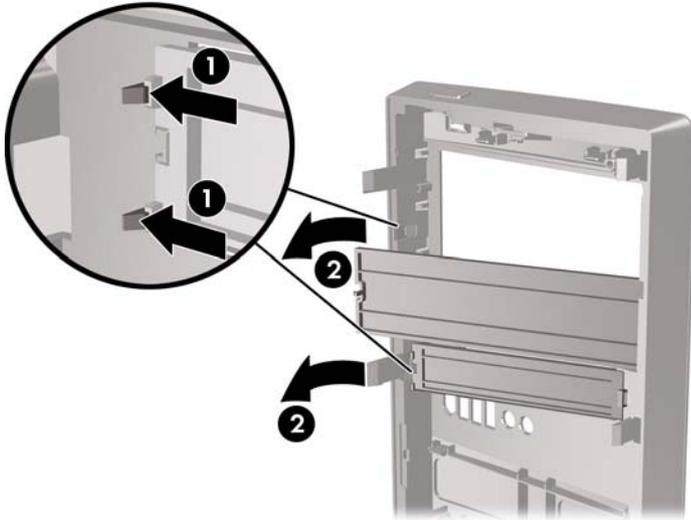
Replacing the Front Bezel

Insert the three hooks on the left side of the bezel into the slots on the chassis (1) and rotate the bezel on from left to right (2) so that it snaps in place.

Figure 2-5 Replacing the Front Bezel
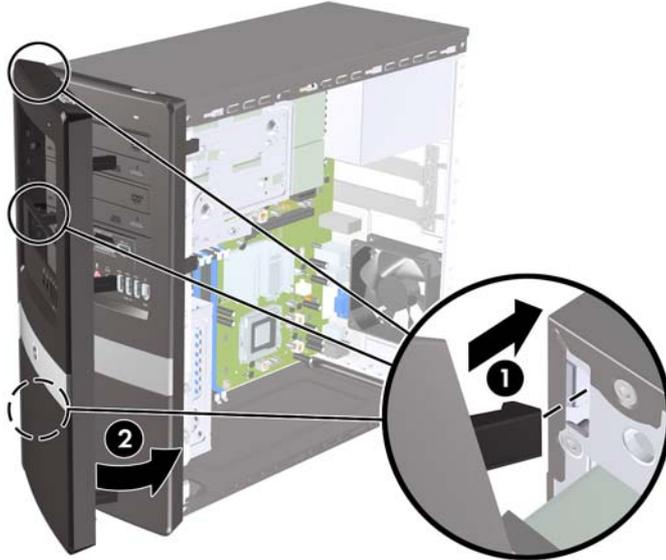
Installing Additional Memory

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 PC2-6400 800 MHz-compliant

● 1.8 volt DDR2-SDRAM DIMMs

The DDR2-SDRAM DIMMs must also:

● support 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, 1Gbit, and 2Gbit 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

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 DIMM1, DIMM2, DIMM3, and DIMM4. Sockets DIMM1 and DIMM2 operate in memory channel A. Sockets DIMM3 and DIMM4 operate in memory channel B.

Figure 2-6 DIMM Socket Locations
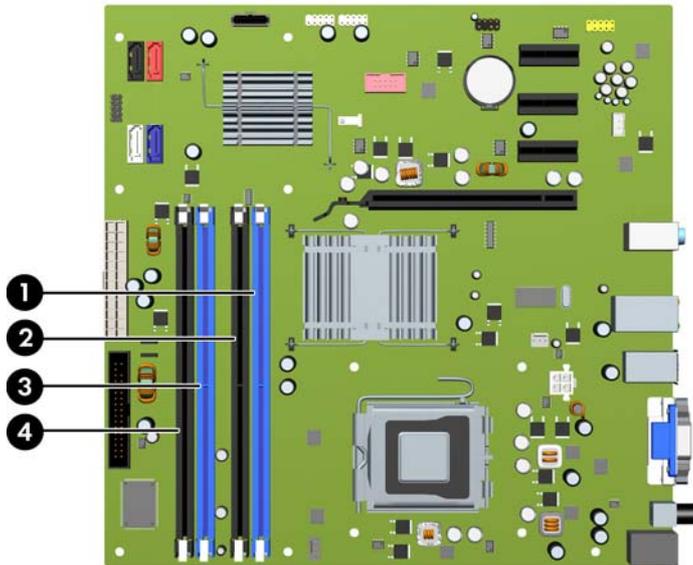
Table 2-1 DIMM Socket Locations

Item	Description	Socket Color
1	DIMM1 socket, Channel A (populate first)	Blue
2	DIMM2 socket, Channel A	Black
3	DIMM3 socket, Channel B (populate second)	Blue
4	DIMM4 socket, Channel B	Black

NOTE: A DIMM must occupy the DIMM1 socket.

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

- 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 total memory capacity of the DIMMs in Channel A is equal to the total memory capacity of the DIMMs in Channel B. The technology and device width can vary between the channels. For example, if Channel A is populated with two 512MB DIMMs and Channel B is populated with one 1GB DIMM, the system will operate in dual channel mode.

- The system will operate in flex mode if the total memory capacity of the DIMMs in Channel A is not equal to the total memory capacity of the DIMMs 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. For optimal speed, the channels should be balanced so that the largest amount of memory is spread between the two channels. If one channel will have more memory than the other, the larger amount should be assigned to Channel A. For example, if you are populating the sockets with one 1GB DIMM, and three 512MB DIMMs, Channel A should be populated with the 1GB DIMM and one 512MB DIMM, and Channel B should be populated with the two 512MB DIMMs. With this configuration, 2GB will run as dual channel and 512MB will run as single channel.

● In any 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.

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 48.

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.

5. Remove the computer access panel.

6. Locate the memory module sockets on the system board.

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

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

   Figure 2-7 Installing a DIMM
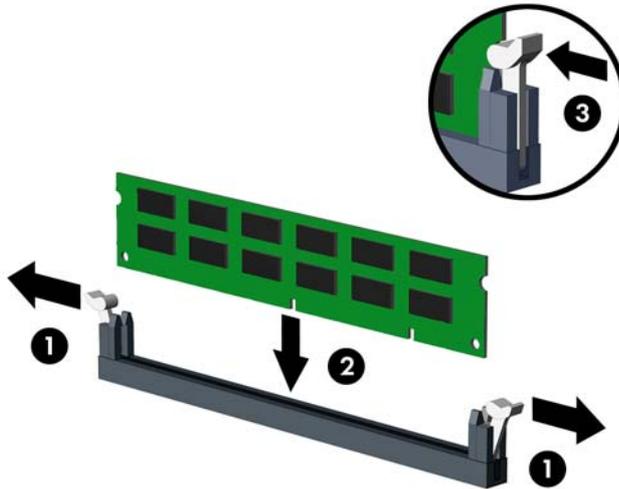
📝 **NOTE:** A memory module can be installed in only one way. Match the notch on the module with the tab on the memory socket.

A DIMM must occupy the DIMM1 socket. Always populate the blue sockets before the black sockets in each channel.

In order to create a dual-channel memory configuration, the memory capacity of Channel A must equal the memory capacity of Channel B. Refer to Populating DIMM Sockets on page 15 for more information.

8. 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).

9. Repeat steps 7 and 8 to install any additional modules.

10. Replace the computer access panel.

11. Reconnect the power cord and any external devices, then turn on the computer. The computer should automatically recognize the additional memory when you turn on the computer.

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

Removing or Installing an Expansion Card

The computer has three PCI Express x1 expansion slots and one PCI Express x16 expansion slot. The expansion slots accommodate full-height or half-height expansion cards.

Figure 2-8 Expansion Slot Locations
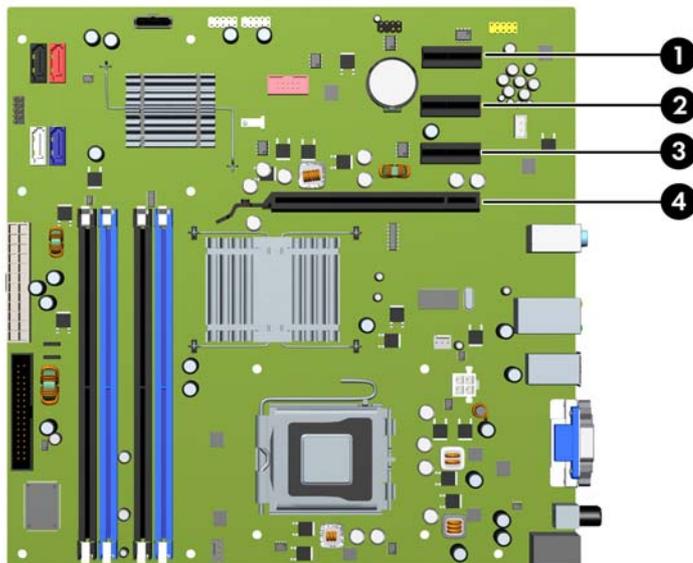
Table 2-2 Expansion Slot Locations

Item	Description
1	PCI Express x1 expansion slot
2	PCI Express x1 expansion slot
3	PCI Express x1 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 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 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 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. On the rear of the computer, a slot cover lock secures the expansion card brackets in place. Remove the screw from the slot cover lock then slide the slot cover lock up to remove it from the chassis.

Figure 2-9 Opening the Slot Cover Lock

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 socket, you must use a flatblade screwdriver to pry out the metal shield on the rear panel that covers the expansion slot. Be sure to remove the appropriate shield for the expansion card you are installing.

   **Figure 2-10** Removing an Expansion Slot Cover

    b. If you are removing a PCI Express x1 card, hold the card at each end and carefully rock it back and forth until the connectors pull free from the socket. Be sure not to scrape the card against the other components.

    Figure 2-11 Removing a PCI Express x1 Expansion Card
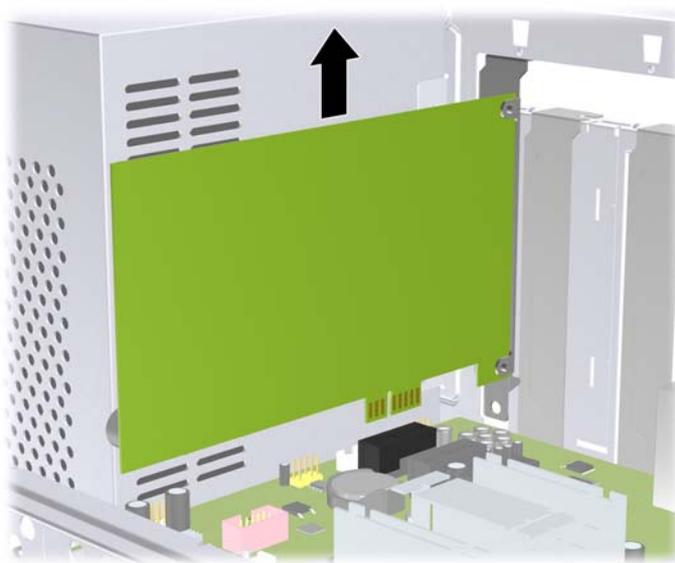
c. If you are removing a PCI Express x16 card, pull the retention arm on the back of the expansion socket away from the card and carefully rock the card back and forth until the connectors pull free from the socket. Be sure not to scrape the card against the other components.

Figure 2-12 Removing a PCI Express x16 Expansion Card
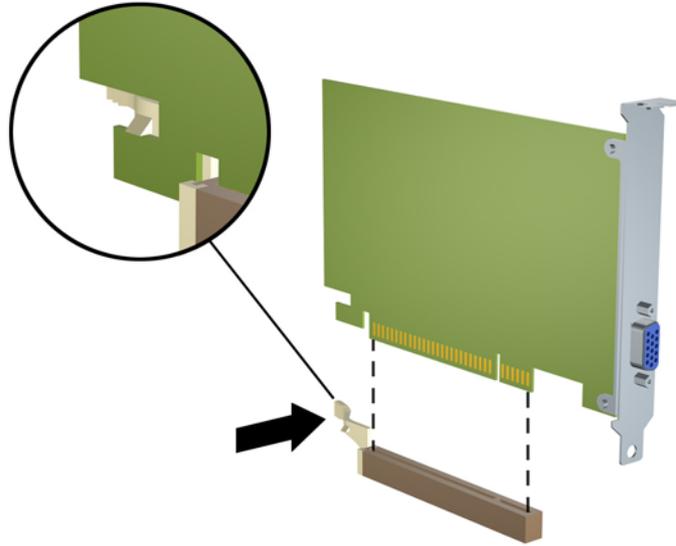
9. Store the removed card in anti-static packaging.

10. 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.

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 bottom of the bracket on the card slides into the small slot on the chassis. Press the card straight down into the expansion socket on the system board.

Figure 2-13 Installing an Expansion Card
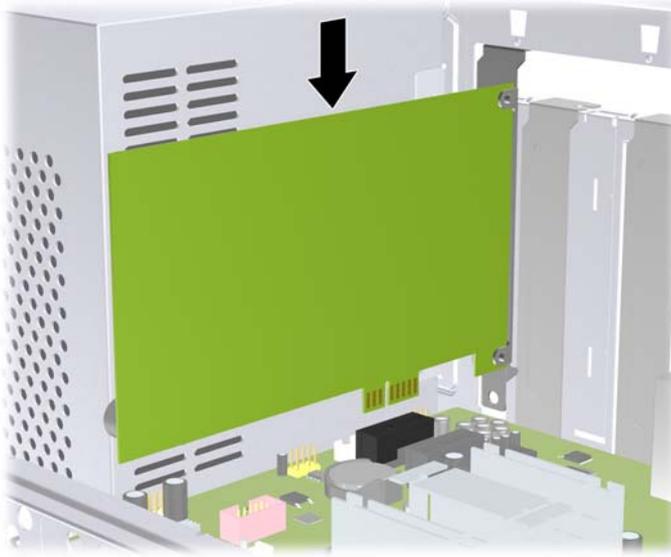
> **NOTE:** When installing an expansion card, press firmly on the card so that the whole connector seats properly in the expansion card slot.

12. Replace the slot cover lock and secure it in place with the screw that was previously removed.

Figure 2-14 Securing the Expansion Cards and Slot Covers


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 any external devices, then turn on the computer.

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

17. Reconfigure the computer, if necessary. Refer to the *Computer Setup (F10) Utility Guide* for instructions on using Computer Setup.

Drive Positions

Figure 2-15 Drive Positions
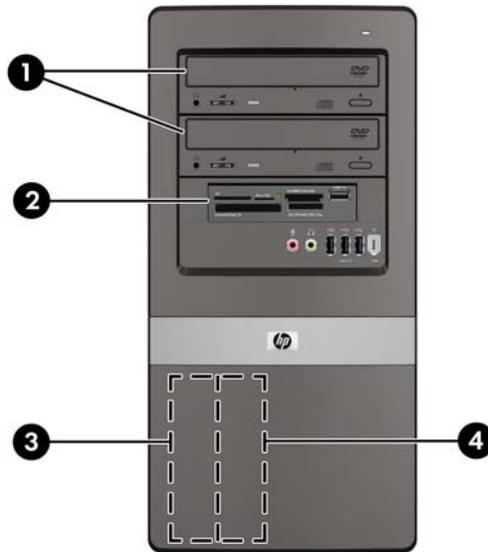
1	Two 5.25-inch external drive bays for optional drives (optical drives shown)
2	One 3.5-inch external drive bay for optional drive (media card reader shown)
3	Primary 3.5-inch internal hard drive bay
4	Secondary 3.5-inch internal hard drive bay for optional hard drive

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 Additional 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 the first SATA optical drive to the white SATA connector on the system board labeled SATA1.

- Connect a second SATA optical drive to the black SATA5 connector.

- Connect a second SATA hard drive to the red SATA4 connector.

- Connect a diskette drive to the connector labeled FLOPPY.

- Connect a media card reader to the USB connector labeled F_USB2.

- The system does not support Parallel ATA (PATA) optical drives or PATA hard drives.

- You may install either a third-height or a half-height drive into a half-height bay.

- If needed, HP has provided extra drive retainer screws on the interior of the front bezel that are used to secure the drives in the drive cage. Hard drives use 6-32 standard screws. All other drives use M3 metric screws. The HP-supplied M3 metric guide screws (1) are black. The HP-supplied 6-32 standard screws (2) are silver.

Figure 2-16 Extra Drive Retainer Screws Location
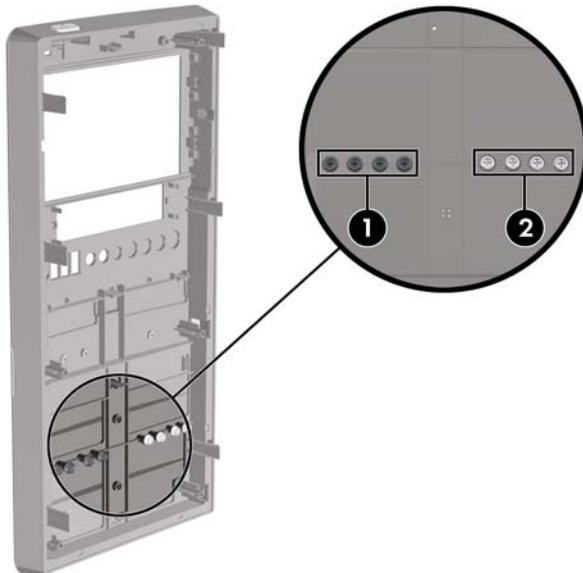
△ **CAUTION:** To prevent loss of work and damage to the computer or drive:

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 48.

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 2-17 System Board Drive Connections
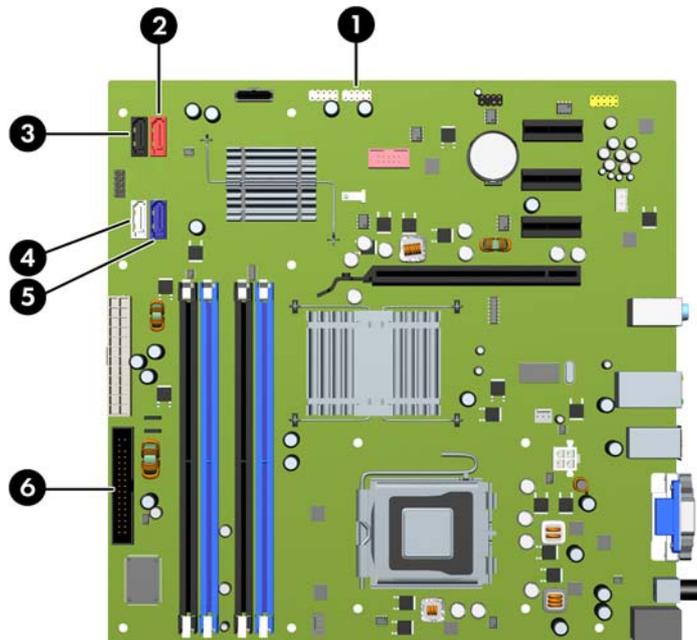
Table 2-3 System Board Drive Connections

No.	System Board Connector	System Board Label	Color
1	Media Card Reader	F_USB2	white
2	SATA4	SATA4	red
3	SATA5	SATA5	black
4	SATA1	SATA1	white

Table 2-3 System Board Drive Connections (continued)

| No.	System Board Connector	System Board Label	Color
5	SATA0	SATA0	dark blue
6	Diskette Drive	FLOPPY	black

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. Remove the access panel and front bezel.

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

Figure 2-18 Disconnecting the Power and Data Cables
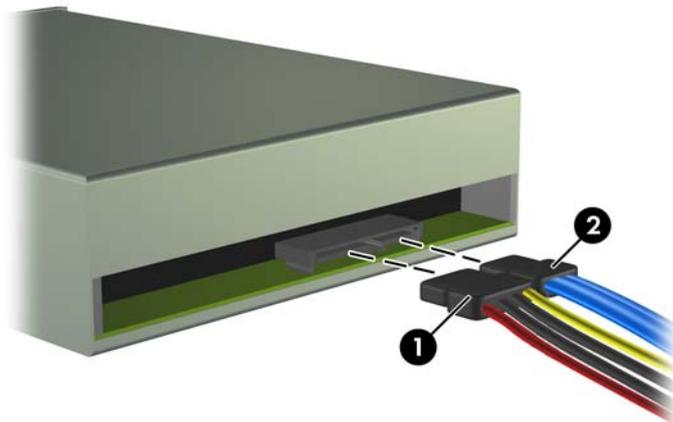
7. Remove the two screws that secure the drive to the drive cage (1), then slide the drive out of the front of the chassis (2).

Figure 2-19 Removing the Optical Drive
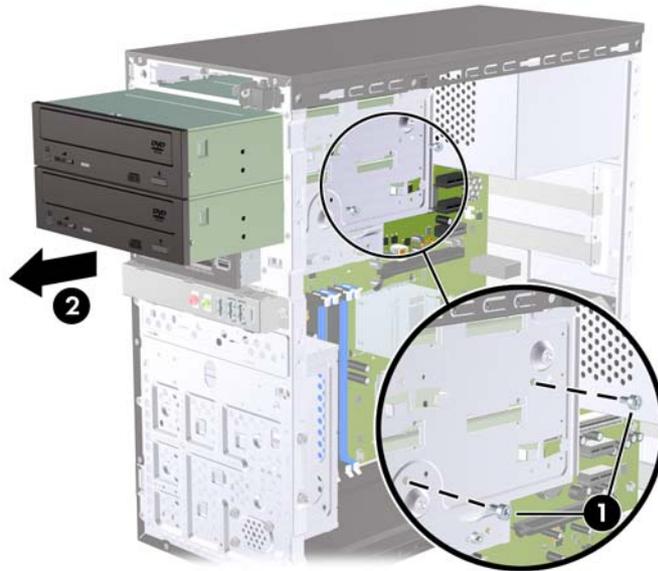
📝 **NOTE:** To install an optical drive, refer to Installing an Optical Drive into the 5.25-inch Drive Bay on page 27.

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. Remove the access panel and front bezel.

6. 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.

7. If you are adding a drive to an empty lower optical drive bay, you must remove the knockout plate from the bay. To do so, insert a flat screwdriver into the knockout plate slot and rotate the screwdriver to break the knockout plate out of the chassis. Discard the knockout plate.

8. If the new drive has screws installed on the sides of the drive, remove the screws before inserting the drive into the chassis.

9. Slide the drive in through the front of the chassis (1) until the screw holes on the drive are aligned with the screw holes on the drive cage and install the two M3 metric retainer screws (2) as shown in the following illustration.

📝 **NOTE:** Extra drive retainer screws are provided on the interior of the front bezel if needed. The M3 metric retainer screws for optical drives are black. Refer to Installing Additional Drives on page 24 for an illustration of the retainer screws location.

Figure 2-20 Installing the Optical Drive
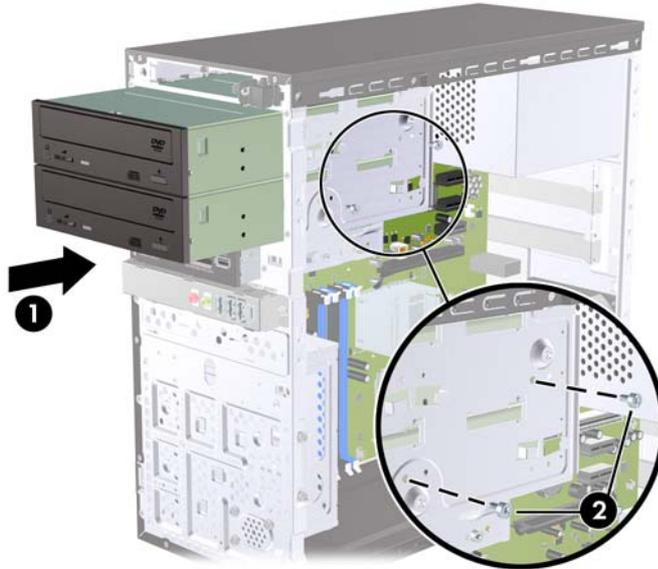
10. If the system configuration includes only one optical drive, connect the SATA data cable to the white system board connector labeled SATA1. If you are adding a second optical drive, connect the SATA data cable to the black system board connector labeled SATA5.

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

Figure 2-21 Connecting the Power and Data Cables
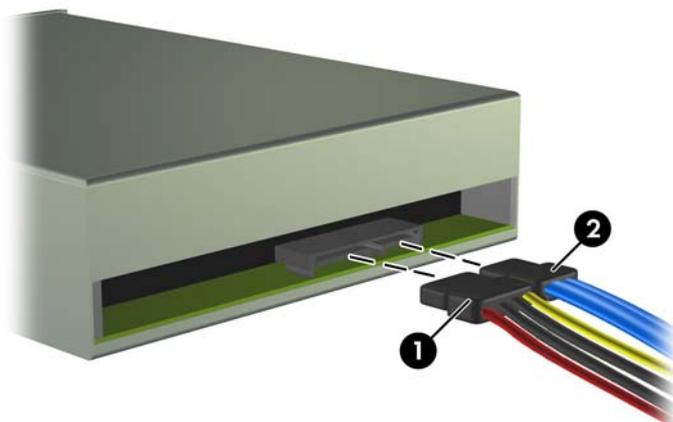
12. Replace the front bezel and access panel.

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 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.

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 and front bezel.

6. 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 2-22 Disconnecting the Diskette Drive Cables
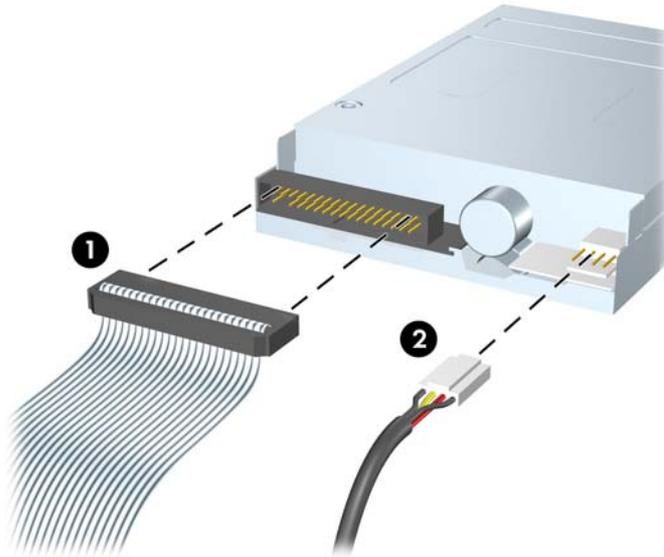
b. If you are removing a media card reader, disconnect the USB cable from the system board.

Figure 2-23 Disconnecting the Media Card Reader Cable
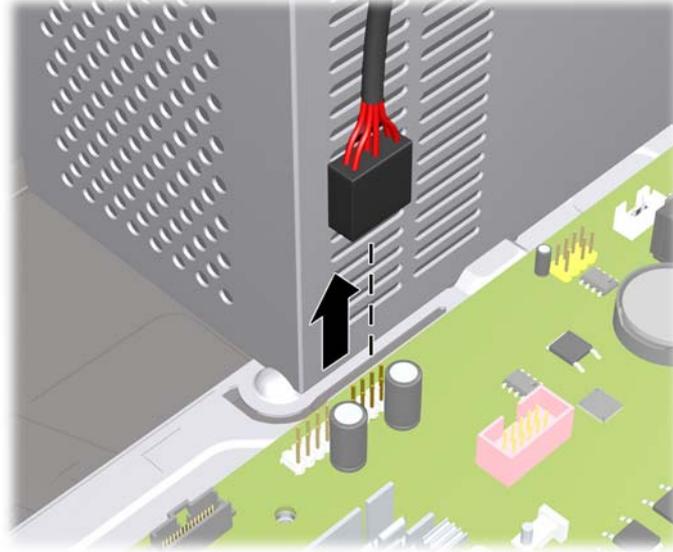
7. Remove the two retainer screws that secure the drive to the bay (1) then slide the drive forward and out of the bay (2).

Figure 2-24 Removing a 3.5-inch Device (Media Card Reader Shown)
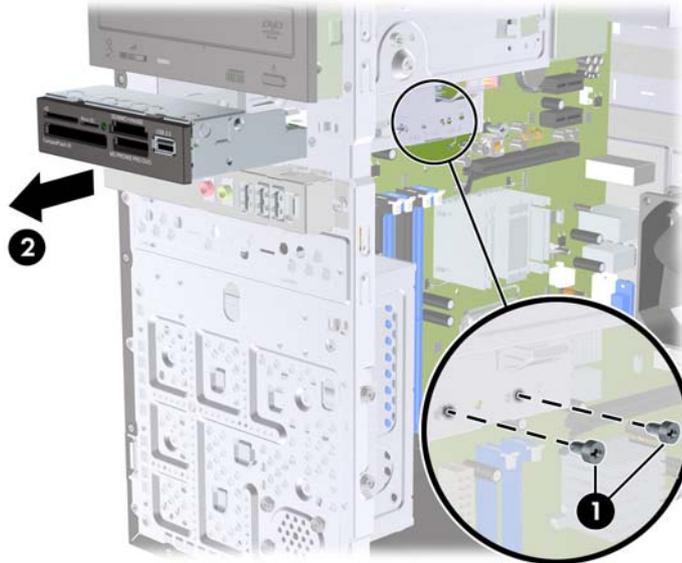
NOTE: To install an external 3.5-inch drive, refer to Installing a Drive into the 3.5-inch External Drive Bay on page 31.

Installing a Drive into the 3.5-inch External Drive Bay

The 3.5-inch external drive bay on the front of the computer can be configured with a media card reader or a diskette 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. Remove the access panel and front bezel.

6. 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.

7. If you are adding a drive to an empty drive bay for the first time, you must remove the knockout plate from the bay. To do so, insert a flat screwdriver into the knockout plate slot and rotate the screwdriver to break the knockout plate out of the chassis. Discard the knockout plate.

8. If the new drive has screws installed on the sides of the drive, remove them before inserting the drive into the chassis.

9. Slide the drive in through the front of the chassis (1) until the screw holes on the drive are aligned with the screw holes on the drive cage and install the two M3 metric retainer screws (2) as shown in the illustration below.

    📝 **NOTE:** Extra drive retainer screws are provided on the interior of the front bezel if needed. The M3 metric retainer screws for diskette drives or media card readers are black. Refer to Installing Additional Drives on page 24 for an illustration of the retainer screws location.

   **Figure 2-25** Installing a 3.5-inch Device (Media Card Reader Shown)
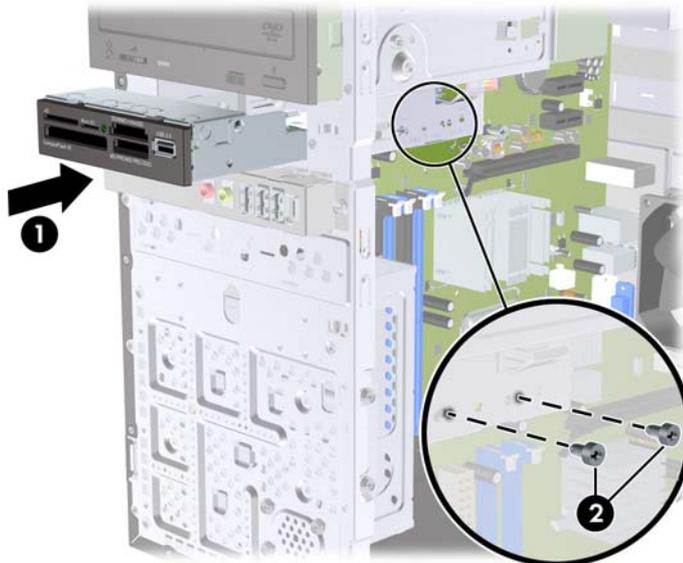
10. Connect the appropriate drive cables:

   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 FLOPPY.

   b. If installing a media card reader, connect the USB cable from the media card reader to the USB connector on the system board labeled F_USB2.

   > **NOTE:** Refer to System Board Drive Connections on page 25 for an illustration of the system board drive connectors.

11. Replace the front bezel and access panel.

12. Reconnect the power cord and turn on the computer.

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

Removing an Internal 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. 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. 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 computer access panel.

6. Remove the two screws that secure the hard drive cage to the chassis.

**Figure 2-26** Removing the Hard Drive Cage Screws
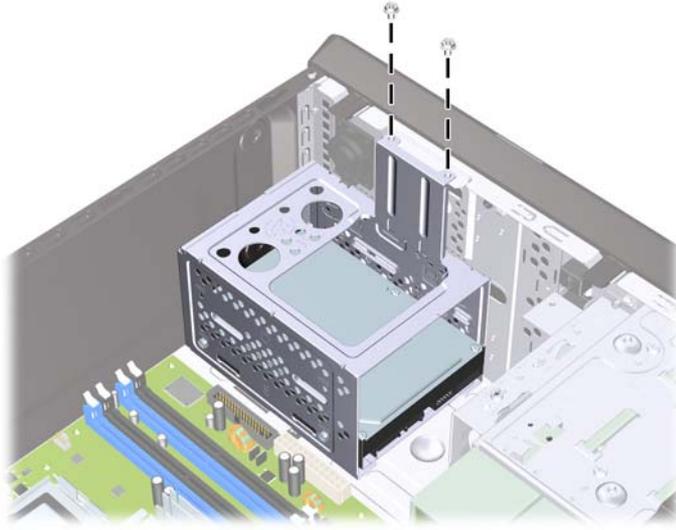
7. Push down the latch on the side of the hard drive cage (1), then slide the hard drive cage away from the bottom of the chassis (2) as shown below.

**Figure 2-27** Releasing the Hard Drive Cage
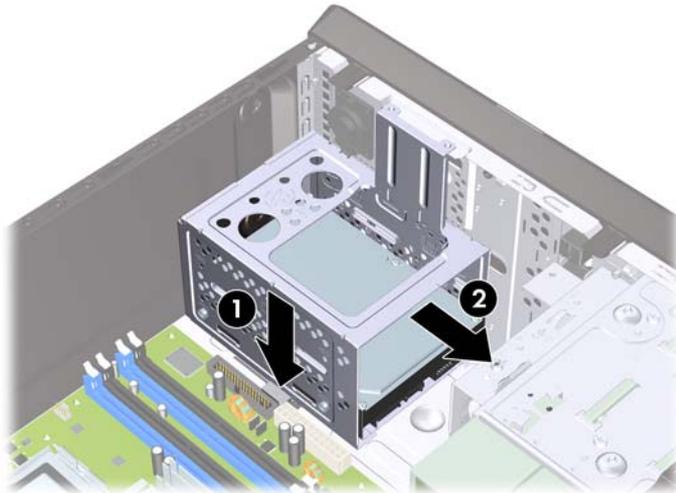
8. Lift the hard drive cage out of the chassis.

Figure 2-28 Removing the Hard Drive Cage
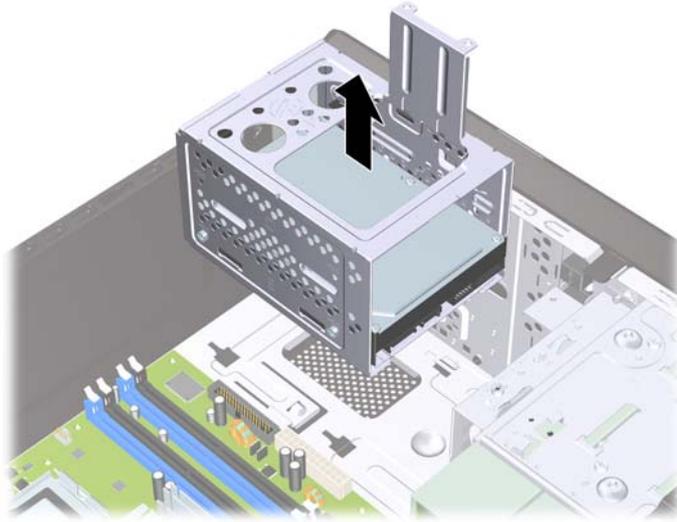
9. Disconnect the power cable (1) and data cable (2) from the back of the hard drive.

Figure 2-29 Disconnecting the Hard Drive Cables
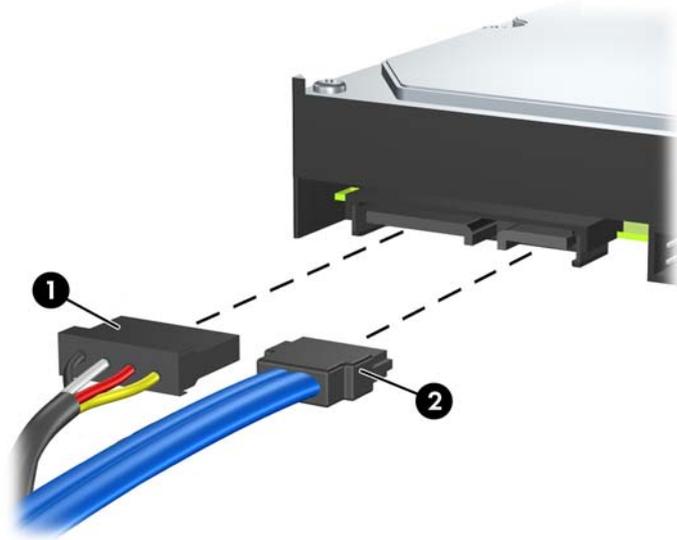
10. Remove the four screws that secure the hard disk drive to the hard drive cage (1), then slide the hard disk drive out of the hard drive cage (2).

Figure 2-30 Removing the Hard Drive
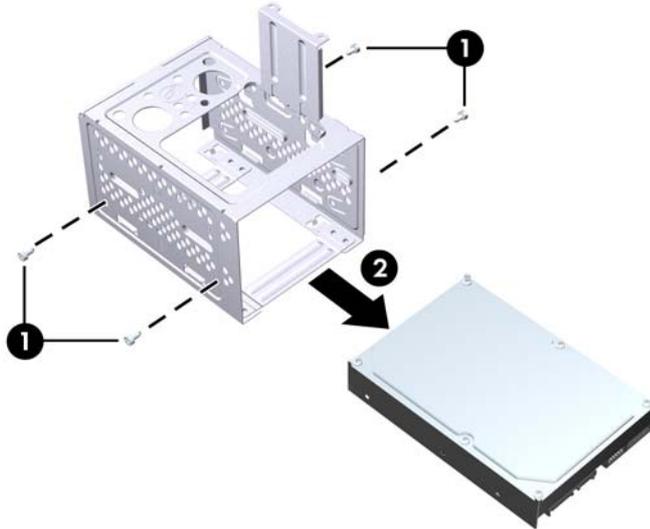
NOTE: To install an internal 3.5-inch hard drive, refer to Installing an Internal 3.5-inch Hard Drive on page 35.

Installing an Internal 3.5-inch Hard Drive

1. Follow the steps in Removing an Internal 3.5-inch Hard Drive on page 32 to remove the hard drive cage and, if necessary, the existing hard drive.

2. Slide the new drive into the hard drive cage (1), aligning the drive with the four screw holes on the cage. Install the four 6-32 standard screws that secure the hard disk drive to the hard drive cage (2). Make sure the hard disk drive cables are facing the top of the drive cage.

📝 **NOTE:** If you are replacing an old drive with a new drive, use the four retainer screws from the old drive to install the new drive.

NOTE: If you are installing a second hard drive, use four of the extra standard 6-32 screws that are installed on the interior of the front bezel. The 6-32 screws are silver. Refer to Installing Additional Drives on page 24 for an illustration of the retainer screws location.

**Figure 2-31** Installing the Hard Drive in the Drive Cage
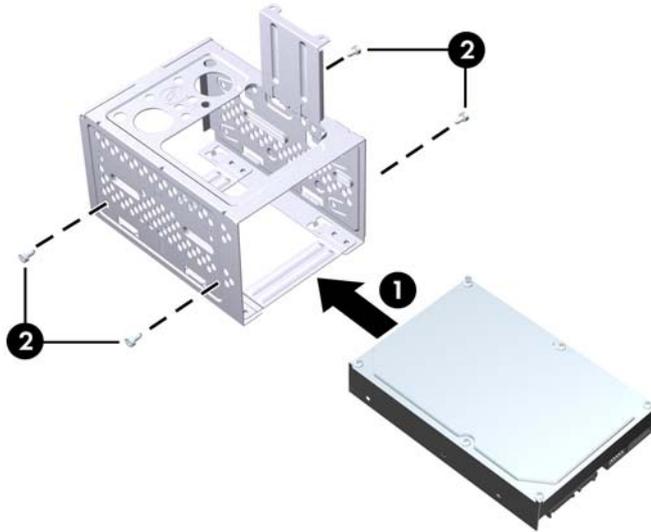
3. Connect the power cable (1) and data cable (2) to the back of the hard drive.

**Figure 2-32** Connecting the Hard Drive Cables
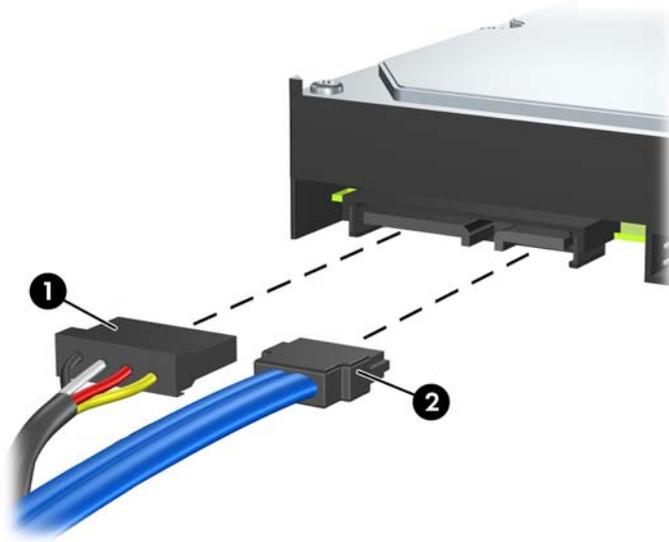
△ **CAUTION:** Never crease or bend a SATA data cable tighter than a 30 mm (1.18 in) radius. A sharp bend can break the internal wires.

4. Place the hard drive cage into the chassis (1), then slide it down toward the bottom of the chassis until it locks into place (2).

Figure 2-33 Installing the Hard Drive Cage
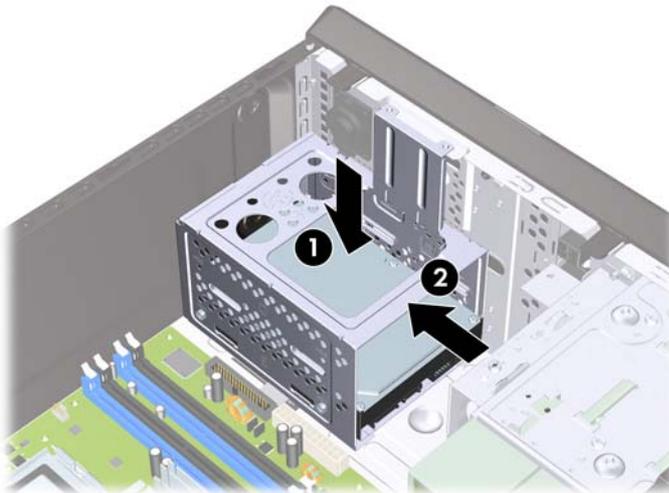
5. Attach the two screws that secure the hard drive cage to the chassis.

Figure 2-34 Securing the Hard Drive Cage
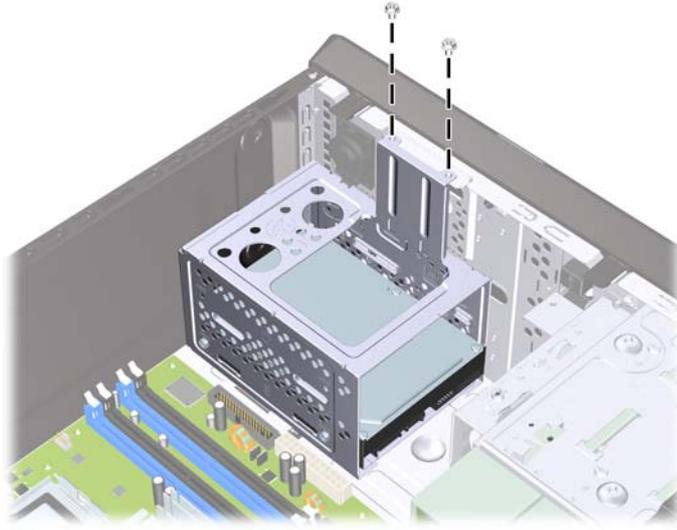
6. If installing a new drive, connect the opposite end of the data cable to the appropriate system board connector.

> **NOTE:** If your system has only one SATA hard drive, you must connect the hard drive data cable to the dark blue connector labeled SATA0 to avoid any hard drive performance problems. If you are adding a second hard drive, connect the data cable to the red connector labeled SATA4.

7. Replace the computer access panel.

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

9. 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.

A Specifications

Specifications

Desktop Dimensions		
Height	14.76 in	37.5 cm
Width	6.98 in	17.73 cm
Depth	16.88 in	42.87 cm
Approximate Weight	23.5 lb	10.66 kg
Temperature Range		
Operating	50° to 95°F	10° to 35°C
Nonoperating	-22° to 140°F	-30° to 60°C
Relative Humidity (noncondensing)		
Operating	10-90%	10-90%
Nonoperating (38.7°C max wet bulb)	5-95%	5-95%
Maximum Altitude (unpressurized)		
Operating	10,000 ft	3048 m
Nonoperating	30,000 ft	9144 m

NOTE: 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.

Heat Dissipation		
Maximum	1575 BTU/hr	397 kg-cal/hr
Typical (idle)	307 BTU/hr	77 kg-cal/hr
Power Supply	**115V**	**230V**
Operating Voltage Range[1]	90-132 VAC	180-264 VAC
Rated Voltage Range	100-127 VAC	200-240 VAC
Rated Line Frequency	50-60 Hz	50-60 Hz
Power Output	300 W	300 W

Table A-1 Specifications (continued)

Rated Input Current (maximum)[1]	8A @ 100 VAC	4A @ 200 VAC

[1] This system utilizes a passive power factor corrected power supply. The power factor correction is present in the 230V operating mode only. This allows the system to pass the CE mark requirements for use in the countries of the European Union. This supply requires the use of 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 (140ºF).

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.   Remove the computer access panel.

6.   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.

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.

**Figure B-1** Removing a Coin Cell Battery (Type 1)
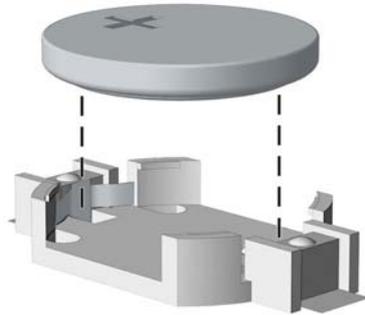
b. Slide the replacement battery into position, positive side up. The battery holder automatically secures the battery in the proper position.

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)
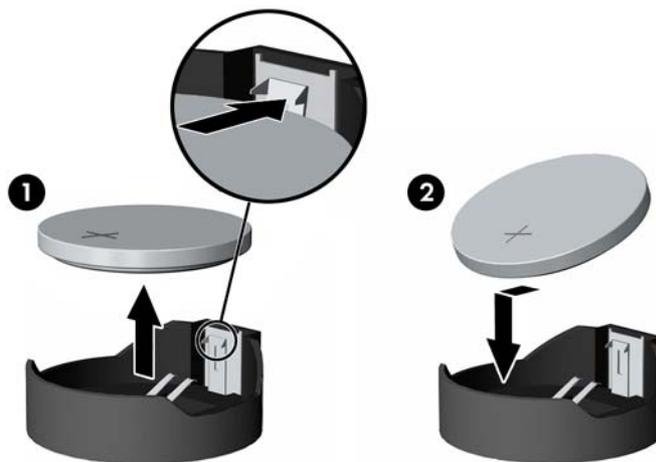
Type 3

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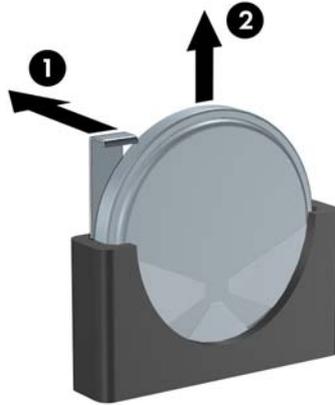
NOTE: After the battery has been replaced, use the following steps to complete this procedure.

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. Refer to the *Computer Setup (F10) Utility Guide*.

11. 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* and the *Desktop Management Guide*.

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
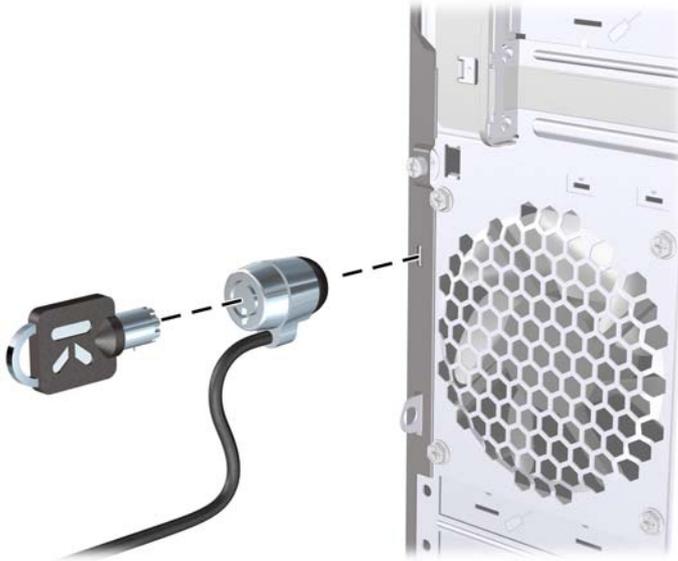
Padlock

Figure C-2 Installing a Padlock
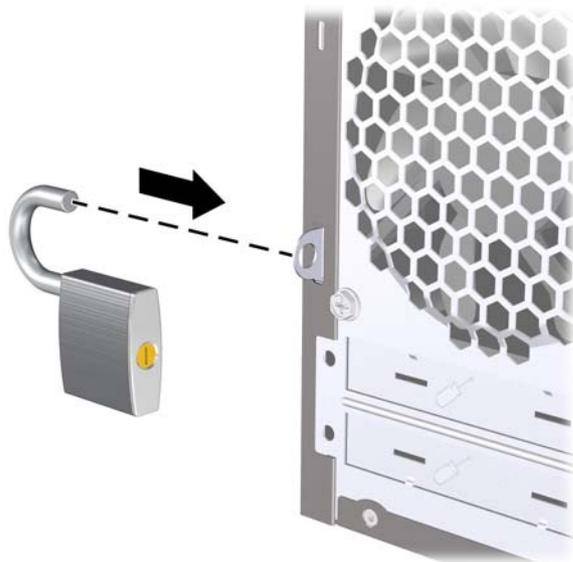
HP Business PC Security Lock

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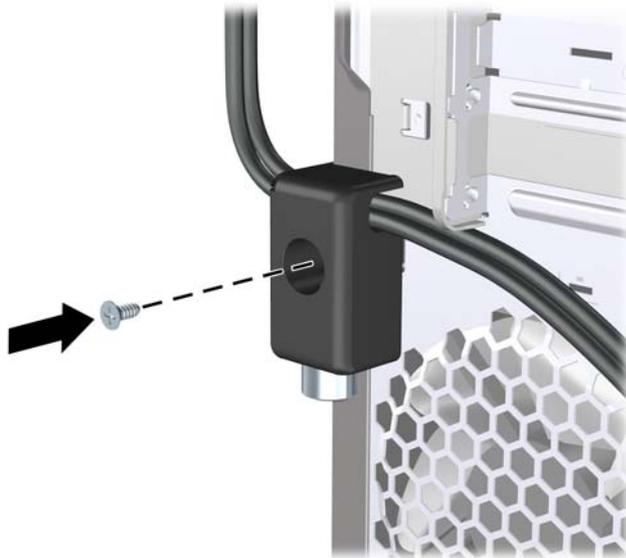
4. Insert the plug end of the security cable into the lock (1) and push the button in (2) to engage the lock. Use the key provided to disengage the lock.

Figure C-6 Engaging the Lock
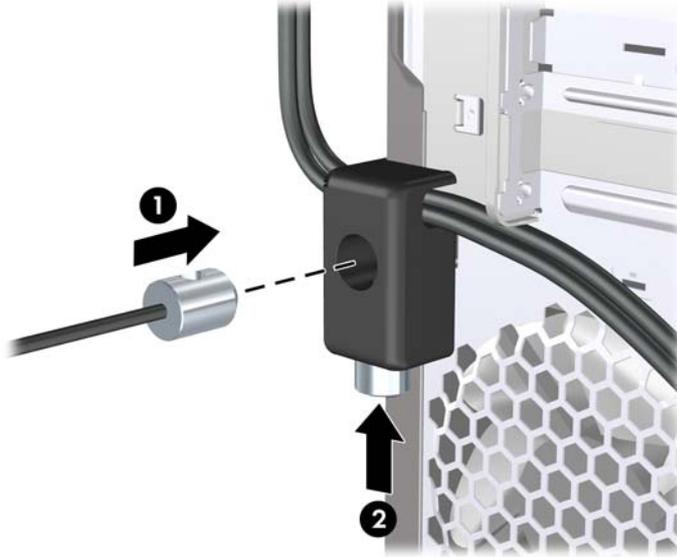
D Electrostatic Discharge

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.

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

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.

   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.

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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