

Dell™ OptiPlex™ 740

User's Guide

Models DCSM, DCNE, DCCY

www.dell.com | support.dell.com

Notes, Notices, and Cautions



NOTE: A NOTE indicates important information that helps you make better use of your computer.



NOTICE: A NOTICE indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.



CAUTION: A CAUTION indicates a potential for property damage, personal injury, or death.

Information in this document is subject to change without notice.

© 2007–2008 Dell Inc. All rights reserved.

Reproduction in any manner whatsoever without the written permission of Dell Inc. is strictly forbidden.

Trademarks used in this text: *Dell*, the *DELL* logo, *OptiPlex*, *Inspiron*, *Dimension*, *Latitude*, *Dell Precision*, *DellNet*, *TravelLite*, *Dell OpenManage*, *PowerVault*, *Axim*, *PowerEdge*, *PowerConnect*, and *PowerApp* are trademarks of Dell Inc.; *AMD*, *AMD Athlon*, *AMD Phenom*, and combinations thereof, and *Cool 'n' Quiet* are trademarks of Advanced Micro Devices, Inc; *Microsoft* and *Windows* are registered trademarks of Microsoft Corporation; *IBM* is a registered trademark of International Business Machines Corporation; *Bluetooth* is a trademark owned by Bluetooth SIG, Inc. and is used by Dell Inc. under license. *ENERGY STAR* is a registered trademark of the U.S. Environmental Protection Agency. As an ENERGY STAR partner, Dell Inc. has determined that this product meets the ENERGY STAR guidelines for energy efficiency.

Other trademarks and trade names may be used in this document to refer to either the entities claiming the marks and names or their products. Dell Inc. disclaims any proprietary interest in trademarks and trade names other than its own.

Models: DCSM, DCNE, and DCCY

March 2008

RP699

Rev. A03

Contents

1	Finding Information	13
2	Before You Begin.	19
	Recommended Tools	19
	Turning Off Your Computer	19
	Before Working Inside Your Computer	20
3	Mini Tower Computer.	21
	About Your Mini Tower Computer	21
	Front View.	21
	Back View.	23
	Back-Panel Connectors	25
	Inside Your Computer	26
	System Board Components.	28
	Mini Tower Computer (Model #DCSM) Specifications	31
	I/O Panel	37
	Removing the I/O Panel.	37
	Replacing the I/O Panel.	38
	Removing the Computer Cover	39
	PCI, PCI Express Cards, and PS/2 Serial Port Adapters	41
	PCI Cards	41
	PCI Express Cards	46
	PS/2 Serial Port Adapters.	56
	Drives	61
	General Installation Guidelines.	61
	Hard Drive.	63
	Drive-Panel Inserts	70
	Floppy Drive.	73
	Media Card Reader.	76

Optical Drive	78
Processor	83
Removing the Processor	83
Installing the Processor	85
Power Supply	89
Replacing the Power Supply	89
DC Power Connectors	91
4 Desktop Computer	97
About Your Desktop Computer	97
Front View	97
Back View	98
Back-Panel Connectors	99
Inside Your Computer	101
System Board Components	102
Desktop Computer (Model # DCNE) Specifications	105
I/O Panel	111
Removing the I/O Panel	111
Replacing the I/O Panel	112
Drives	113
General Installation Guidelines	113
Optical Drive	115
Floppy Drive	118
Media Card Reader	121
Hard Drive	125
PCI, PCI Express Cards, and PS/2 Serial Port Adapters	135
PCI Cards	135
PCI Express and DVI Cards	146
PS/2 Serial Port Adapters	163
Power Supply	169
Replacing the Power Supply	169
DC Power Connectors	171
Removing the Computer Cover	177

Processor	179
Removing the Processor	179
Installing the Processor	182
5 Small Form Factor Computer	185
About Your Small Form Factor Computer	185
Front View	185
Back View	186
Back-Panel Connectors	187
Inside Your Computer	188
System Board Components	190
Small Form Factor Computer (Model # DCCY) Specifications	193
I/O Panel	199
Removing the I/O Panel	199
Replacing the I/O Panel	201
Removing the Computer Cover	203
Drives	205
General Installation Guidelines	205
Hard Drive	208
Optical Drive	215
Floppy Drive and Media Card Reader	217
PCI, PCI Express Cards, and PS/2 Serial Port Adapters	223
PCI Cards	223
PCI Express and DVI Cards	227
PS/2 Serial Port Adapters	233
Power Supply	237
Replacing the Power Supply	237
DC Power Connectors	239
Processor	243
Removing the Processor	243
Installing the Processor	245

6	Advanced Features	249
	LegacySelect Technology Control	249
	Manageability	249
	Alert Standard Format	249
	Dell OpenManage™ IT Assistant	250
	Dell OpenManage Client Instrumentation	250
	Security	250
	Chassis Intrusion Detection	250
	Option Settings	251
	Padlock Ring and Security Cable Slot	251
	Password Protection	252
	System Password	252
	Administrator Password	254
	Disabling a Forgotten Password and Setting a New Password	255
	Trusted Platform Module (TPM)	255
	Enabling the TPM Feature	255
	System Setup	257
	Overview	257
	Entering System Setup	257
	System Setup Options.	258
	Booting to a USB Device.	264
	Memory Key.	264
	Floppy Drive.	264
	Jumper Settings	265
	Mini Tower, Desktop, and Small Form Factor Computers	265
	Clearing Forgotten Passwords.	265
	Clearing CMOS Settings	266
	HyperTransport™ and Dual-Core Technology.	267
	Power Management	267
	About RAID Configurations	268
	Verifying That RAID Is Working.	269
	RAID Level 0 Configuration	269
	RAID Level 1 Configuration	270

	Configuring Your Hard Drives for RAID	270
	Using the NVIDIA MediaShield ROM Utility	271
	Using NVIDIA MediaShield	272
	Enabling Cool 'n' Quiet™ Technology	275
7	Chassis Intrusion Switch	277
	Removing the Chassis Intrusion Switch	277
	Mini Tower Computer	278
	Desktop Computer	279
	Small Form Factor Computer	280
	Replacing the Chassis Intrusion Switch	280
	Resetting the Chassis Intrusion Detector	280
8	Battery	283
	Replacing the Battery	283
9	Replacing the System Board	287
	Removing the System Board: Mini Tower, Desktop, and Small Form Factor Computers.	287
	Replacing the System Board: Mini Tower, Desktop, and Small Form Factor Computers.	290
10	Memory	291
	DDR2 Memory Overview	291
	Addressing Memory With 4-GB or Greater Configurations (32-bit Operating Systems Only)	292
	Removing Memory	293
	Installing Memory	294


11	Replacing the Computer Cover	297
12	Cleaning Your Computer	299
	Computer, Keyboard, and Monitor	299
	Mouse	299
	Cleaning a Non-Optical Mouse	299
	Cleaning an Optical Mouse	300
	Floppy Drive	300
	CDs and DVDs	300
13	Reinstalling Drivers and the Operating System	301
	Drivers	301
	What Is a Driver?	301
	Identifying Drivers	301
	Reinstalling Drivers and Utilities	302
	Restoring Your Operating System	305
	Windows Vista	305
	Windows XP	305
	Creating a Restore Point	305
	Restoring the Computer to an Earlier Operating State	306
	Undoing the Last System Restore.	306
	Reinstalling Microsoft® Windows Vista® and Windows® XP.	307
	Before You Begin	307
14	Solving Problems.	311
	Troubleshooting Tips	311
	Battery Problems	311
	Card Problems	311
	Drive Problems	313
	CD and DVD drive problems	313
	Hard drive problems	314


E-Mail, Modem, and Internet Problems	314
Keyboard Problems	315
Fan Problems	316
Lockups and Software Problems	316
The computer does not start up	316
The computer stops responding	316
A program stops responding	317
A program crashes repeatedly	317
A solid blue screen appears	317
Other software problems	317
Media Card Reader Problems	318
Memory Problems	318
Mouse Problems	319
Network Problems	320
Power Problems	321
Printer Problems	322
Restoring Default Settings	323
Serial or Parallel Device Problems	323
Sound and Speaker Problems	323
No sound from speakers	323
No sound from headphones	325
Video and Monitor Problems	325
If the screen is blank	325
If the screen is difficult to read	326
15 Troubleshooting Tools and Utilities	327
Dell Diagnostics	327
When to Use the Dell Diagnostics	327
System Lights	329
Diagnostic Lights	330
Beep Codes	332

Error Messages	333
Resolving Software and Hardware Incompatibilities	337
Microsoft® Windows® XP	337
16 Microsoft® Windows® XP and Windows Vista®	
Features	339
Transferring Information to a New Computer	339
Microsoft Windows Vista®	339
Microsoft® Windows® XP	339
User Accounts and Fast User Switching	342
Adding User Accounts	342
Fast User Switching.	343
Setting Up a Home and Office Network	343
Connecting to a Network Adapter	343
.	344
Network Setup Wizard	344
17 Getting Help	347
Obtaining Assistance	347
Online Services	347
AutoTech Service	348
Automated Order-Status Service	348
Support Service.	348
Problems With Your Order	349
Product Information	349
Returning Items for Warranty Repair or Credit	349
Before You Call.	349
Contacting Dell.	351

18	Warranty	353
19	FCC Regulatory Model (U.S. Only)	355
	Glossary	357

Finding Information

 **NOTE:** Some features or media may be optional and may not ship with your computer. Some features or media may not be available in certain countries.

 **NOTE:** Additional information may ship with your computer.

What Are You Looking For?

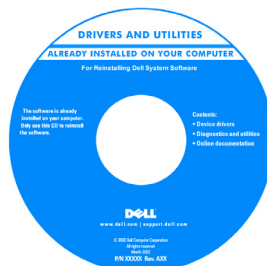
- A diagnostic program for my computer
- Drivers for my computer
- My device documentation
- Desktop System Software (DSS)

Find It Here

Drivers and Utilities Media

NOTE: The *Drivers and Utilities* media may be optional and may not ship with your computer.

Documentation and drivers are already installed on your computer. You can use the *Drivers and Utilities* media to reinstall drivers (see "Reinstalling Drivers and Utilities" on page 302) or to run the Dell Diagnostics (see "Dell Diagnostics" on page 327).



Readme files may be included on your media to provide last-minute updates about technical changes to your computer or advanced technical-reference material for technicians or experienced users.

NOTE: Drivers and documentation updates can be found at support.dell.com.

What Are You Looking For?

- How to set up my computer
- Basic troubleshooting information
- How to run the Dell Diagnostics
- Error codes and diagnostic lights
- Tools and utilities
- Additional information about setting up my computer
- How to troubleshoot and solve problems
- How to remove and install parts

- Warranty information
- Terms and Conditions (U.S. only)
- Safety instructions
- Regulatory information
- Ergonomics information
- End User License Agreement

Find It Here

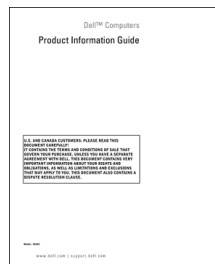
Quick Reference Guide

NOTE: This document may be optional and may not ship with your computer.



NOTE: This document is available as a PDF at support.dell.com.

Dell™ Product Information Guide



What Are You Looking For?

- Service Tag and Express Service Code
- Microsoft Windows License Label

Find It Here

Service Tag and Microsoft® Windows® License

NOTE: Your computer's Service Tag and Microsoft® Windows® License labels are located on your computer.

Your computer's Service Tag contains both a Service Tag number and an Express Service Code.



- Use the Service Tag to identify your computer when you use support.dell.com or contact support.
- Enter the Express Service Code to direct your call when contacting support.

Use the product key on the Microsoft Windows License Label if you need to reinstall your operating system.



- Use the product key on the License Label if you need to reinstall your operating system.

NOTE: As an increased security measure, the newly designed Microsoft Windows license label incorporates a missing portion or "hole" to discourage removal of the label.

What Are You Looking For?

- Solutions — Troubleshooting hints and tips, articles from technicians, online courses, and frequently asked questions
- Community — Online discussion with other Dell customers
- Upgrades — Upgrade information for components, such as memory, the hard drive, and the operating system
- Customer Care — Contact information, service call and order status, warranty, and repair information
- Service and support — Service call status and support history, service contract, online discussions with technical support
- Dell Technical Update Service — Proactive e-mail notification of software and hardware updates for your computer
- Reference — Computer documentation, details on my computer configuration, product specifications, and white papers
- Downloads — Certified drivers, patches, and software updates
- Desktop System Software (DSS)— If you reinstall the operating system for your computer, you should also reinstall the DSS utility. DSS provides critical updates for your operating system and support for Dell™ 3.5-inch USB floppy drives, AMD™ processors, optical drives, and USB devices. DSS is necessary for correct operation of your Dell computer. The software automatically detects your computer and operating system and installs the updates appropriate for your configuration.

- Software upgrades and troubleshooting hints — Frequently asked questions, hot topics, and general health of your computing environment

Find It Here

Dell Support Website — support.dell.com

NOTE: Select your region or business segment to view the appropriate support site.


To download Desktop System Software:

- 1 Go to support.dell.com and click **Drivers and Downloads**.
- 2 Click **Select Model**.
- 3 Select your product model and click **Confirm**, or enter a service tag and click **Go**.
- 4 Click **System Utilities**.
- 5 Click **Desktop System Software** under **Dell - Utility**, and click **Download Now**.
- 6 Click **Run** to run the driver, or **Save** to save the driver to your computer.

NOTE: The support.dell.com user interface may vary depending on your selections.

NOTE: DSS may or may not be available for your computer model.

Dell Support 3


Dell Support 3 is an automated upgrade and notification system installed on your computer. This support provides real-time health scans of your computing environment, software updates, and relevant self-support information. Access Dell Support 3 from the  icon in the taskbar.

What Are You Looking For?

- How to find information about my computer and its components
- How to connect to the Internet
- How to add user accounts for different people
- How to transfer files and settings from another computer

Find It Here

Windows Welcome Center

The Windows Welcome Center automatically appears when you use the computer for the first time. You can choose to have it appear every time you start your computer by placing a check in the **Run at startup** checkbox. Another method of accessing the Welcome Center is to click the Windows Vista Start button , and then click **Welcome Center**.


Windows Help and Support

Microsoft Windows XP:

- How to use Microsoft Windows XP or Windows Vista®
- How to work with programs and files
- How to personalize my desktop

- 1** Click the **Start** button and click **Help and Support**.
- 2** Either select one of the topics listed, or type a word or phrase that describes your problem into the **Search** box, click the arrow icon, and then click the topic that describes your problem.
- 3** Follow the instructions on the screen.

Microsoft Windows Vista:

- 1** Click the Windows Vista Start button , and then click **Help and Support**.
- 2** In *Search Help*, type a word or phrase that describes your problem, and then press <Enter> or click the magnifying glass.
- 3** Click the topic that describes your problem.
- 4** Follow the instructions on the screen.

-
- Remote help with troubleshooting my computer

DellConnect™ Service and Support

Dell associates can diagnose and repair your computer remotely over a broadband connection. To learn more and get started with DellConnect, go to support.dell.com and click **Revolutionary remote help—DellConnect**.

What Are You Looking For?

- How to reinstall my operating system

Find It Here

Operating System Media

NOTE: The *Operating System* media may be optional and may not ship with your computer.

The operating system is already installed on your computer. To reinstall your operating system, use the *Operating System* media. See "Reinstalling Microsoft® Windows Vista® and Windows® XP" on page 307.



After you reinstall your operating system, use the optional *Drivers and Utilities* media to reinstall drivers for the devices that came with your computer.

Your operating system product key label is located on your computer.

NOTE: The color of your media varies based on the operating system you ordered.

Before You Begin

This chapter provides procedures for removing and installing the components in your computer. Unless otherwise noted, each procedure assumes that the following conditions exist:


- You have performed the steps in "Turning Off Your Computer" on page 19 and "Before Working Inside Your Computer" on page 20.
- You have read the safety information in your Dell™ *Product Information Guide*.
- A component can be replaced by performing the removal procedure in reverse order.

Recommended Tools

The procedures in this document may require the following tools:

- Small flat-blade screwdriver
- Phillips screwdriver
- Flash BIOS update program floppy disk, CD, USB key

Turning Off Your Computer

 **NOTICE:** To avoid losing data, save and close any open files and exit any open programs before you turn off your computer.


1 Shut down the operating system:

- a Save and close any open files, and exit any open programs.
- b Click the **Start** button, and then click **Shut Down**.
- c In the **Shut Down Windows** window, select **Shut down**, and then click **OK**.

The computer turns off after the operating system shutdown process finishes.

2 Ensure that the computer and any attached devices are turned off.

If your computer and attached devices did not automatically turn off when you shut down your operating system, turn them off now.

 **NOTICE:** To turn off your computer without shutting down the operating system is not recommended, because you may lose data. If, however, it is necessary to do so, it may be done by pressing down and holding the power button for 6 seconds.

Before Working Inside Your Computer

Use the following safety guidelines to help protect your computer from potential damage and to help ensure your own personal safety.



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.



CAUTION: Handle components and cards with care. Do not touch the components or contacts on a card. Hold a card by its edges or by its metal mounting bracket. Hold a component such as a processor by its edges, not by its pins.



NOTICE: Only a certified service technician should perform repairs on your computer. Damage due to servicing that is not authorized by Dell is not covered by your warranty.



NOTICE: When you disconnect a cable, pull on its connector or on its strain-relief loop, not on the cable itself. Some cables have a connector with locking tabs; if you are disconnecting this type of cable, press in on the locking tabs before you disconnect the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before you connect a cable, ensure that both connectors are correctly oriented and aligned.



NOTICE: To avoid damaging the computer, perform the following steps before you begin working inside the computer.

1 Turn off your computer.



NOTICE: To disconnect a network cable, first unplug the cable from your computer and then unplug it from the network wall jack.

2 Disconnect any telephone or telecommunication lines from the computer.

3 Disconnect your computer and all attached devices from their electrical outlets, and then press the power button to ground the system board.

4 If applicable, remove the computer stand (for instructions, see the documentation that came with the stand).



CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.

5 Remove the computer cover:

- Remove the mini tower computer cover (see "Removing the Computer Cover" on page 39).
- Remove the desktop computer cover (see "Removing the Computer Cover" on page 177).
- Remove the small form factor computer cover (see "Removing the Computer Cover" on page 203).

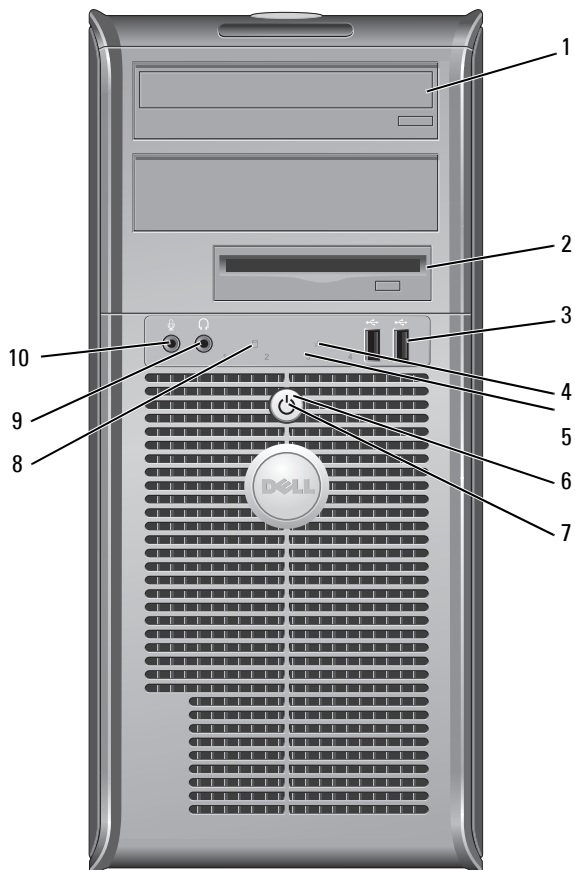


NOTICE: Before touching anything inside your computer, ground yourself by touching an unpainted metal surface, such as the metal at the back of the computer. While you work, periodically touch an unpainted metal surface to dissipate any static electricity that could harm internal components.

Mini Tower Computer


About Your Mini Tower Computer


Front View



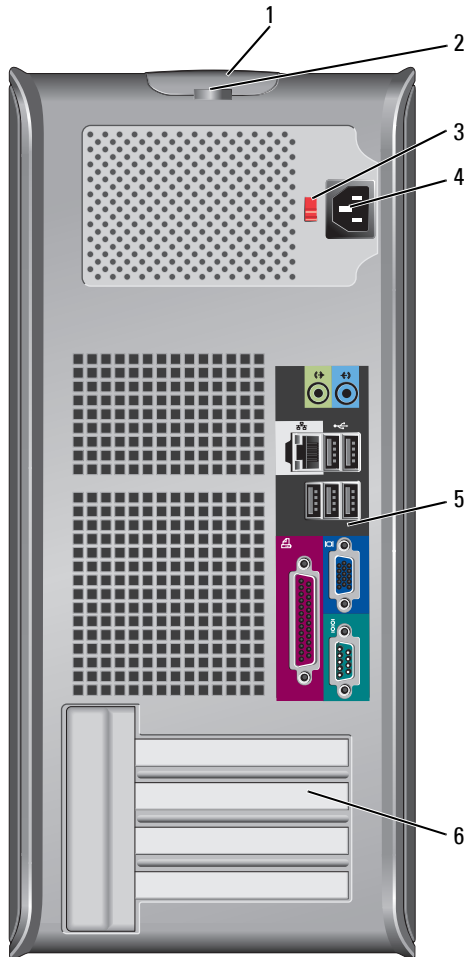
- | | | |
|----|---------------------------|---|
| 1 | optical drive (optional) | Insert media (if supported) into this drive. |
| 2 | Flexbay drive | Can contain an optional floppy drive or an optional media card reader. |
| 3 | USB 2.0 connectors (2) | Use the front USB connectors for devices that you connect occasionally, such as joysticks or cameras, or for bootable USB devices (see "System Setup" on page 257 for more information on booting to a USB device).


It is recommended that you use the back USB connectors for devices that typically remain connected, such as printers and keyboards. |
| 4 | LAN indicator light | This light indicates that a local area network (LAN) connection is established. |
| 5 | diagnostic lights | Use the lights to help you troubleshoot a computer problem based on the diagnostic code. For more information, see "Diagnostic Lights" on page 330. |
| 6 | power button | Press this button to turn on the computer.

 NOTICE: To avoid losing data, do not turn off the computer by pressing the power button. Instead, perform an operating system shutdown. See "Turning Off Your Computer" on page 19 for more information.

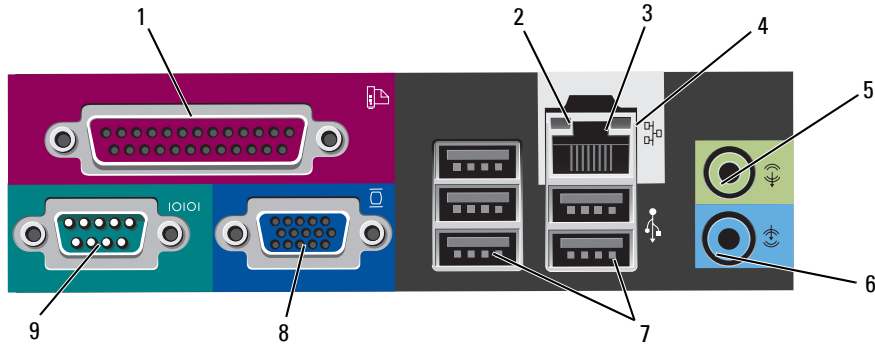
 NOTICE: If your operating system has ACPI enabled, when you press the power button the computer will perform an operating system shutdown. |
| 7 | power light | The power light illuminates and blinks or remains solid to indicate different operating modes: <ul style="list-style-type: none"> • No light — The computer is turned off. • Steady green — The computer is in a normal operating state. • Blinking green — The computer is in a power-saving mode. • Blinking or solid amber — See "Power Problems" on page 321. <p>To exit from a power-saving mode, press the power button or use the keyboard or the mouse if it is configured as a wake device in the Windows Device Manager. For more information about sleep modes and exiting from a power-saving mode, see "Power Management" on page 267.</p> <p>See "System Lights" on page 329 for a description of light codes that can help you troubleshoot problems with your computer.</p> |
| 8 | hard-drive activity light | This light flickers when the hard drive is being accessed. |
| 9 | headphone connector | Use the headphone connector to attach headphones and most kinds of speakers. |
| 10 | microphone connector | Use the microphone connector to attach a microphone. |

Back View



- 1 cover release latch This latch allows you to open the computer cover.
- 2 padlock ring Insert a padlock to lock the computer cover.
- 3 voltage selection switch Your computer is equipped with a manual voltage-selection switch.
To help avoid damaging a computer with a manual voltage selection switch, set the switch for the voltage that most closely matches the AC power available in your location.
 **NOTICE:** In Japan, the voltage selection switch must be set to the 115-V position even though the AC power available in Japan is 100 V.
Also, ensure that your monitor and attached devices are electrically rated to operate with the AC power available in your location.
- 4 power connector Insert the power cable.
- 5 back-panel connectors Plug serial, USB, and other devices into the appropriate connectors. See "Back-Panel Connectors" on page 25.
- 6 card slots Access connectors for any installed PCI and PCI Express cards.

Back-Panel Connectors



- | | | |
|---|---------------------------|---|
| 1 | parallel connector | <p>Connect a parallel device, such as a printer, to the parallel connector. If you have a USB printer, plug it into a USB connector.</p> <p>NOTE: The integrated parallel connector is automatically disabled if the computer detects an installed card containing a parallel connector configured to the same address. For more information, see "System Setup Options" on page 258.</p> |
| 2 | link integrity light | <ul style="list-style-type: none"> • Green — A good connection exists between a 10-Mbps network and the computer. • Orange — A good connection exists between a 100-Mbps network and the computer. • Yellow — A good connection exists between a 1-Gbps (or 1000-Mbps) network and the computer. • Off — The computer is not detecting a physical connection to the network. |
| 3 | network adapter connector | <p>To attach your computer to a network or broadband device, connect one end of a network cable to either a network jack or your network or broadband device. Connect the other end of the network cable to the network adapter connector on the back panel of your computer. A click indicates that the network cable has been securely attached.</p> <p>NOTE: Do not plug a telephone cable into the network connector.</p> <p>On computers with a network connector card, use the connector on the card.</p> <p>It is recommended that you use Category 5 wiring and connectors for your network. If you must use Category 3 wiring, force the network speed to 10 Mbps to ensure reliable operation.</p> |
| 4 | network activity light | <p>Flashes a yellow light when the computer is transmitting or receiving network data. A high volume of network traffic may make this light appear to be in a steady "on" state.</p> |
| 5 | line-out connector | <p>Use the green line-out connector to attach headphones and most speakers with integrated amplifiers.</p> <p>On computers with a sound card, use the connector on the card.</p> |

- | | | |
|---|------------------------|--|
| 6 | line-in connector | Use the line-in connector to attach a record/playback device such as a cassette player, CD player, or VCR.

On computers with a sound card, use the connector on the card. |
| 7 | USB 2.0 connectors (5) | Use the back USB connectors for devices that typically remain connected, such as printers and keyboards. |
| 8 | video connector | Plug the cable from your VGA-compatible monitor into the blue connector.
NOTE: If you purchased an optional graphics card, this connector will be covered by a cap. Do not remove the cap. Connect your monitor to the connector on the graphics card.
NOTE: If you are using a graphics card that supports dual monitors, use the y-cable that came with your computer. |
| 9 | serial connector | Connect a serial device, such as a handheld device, to the serial port. The default designations are COM1 for serial connector 1 and COM2 for serial connector 2.

For more information, see "System Setup Options" on page 258. |

Inside Your Computer



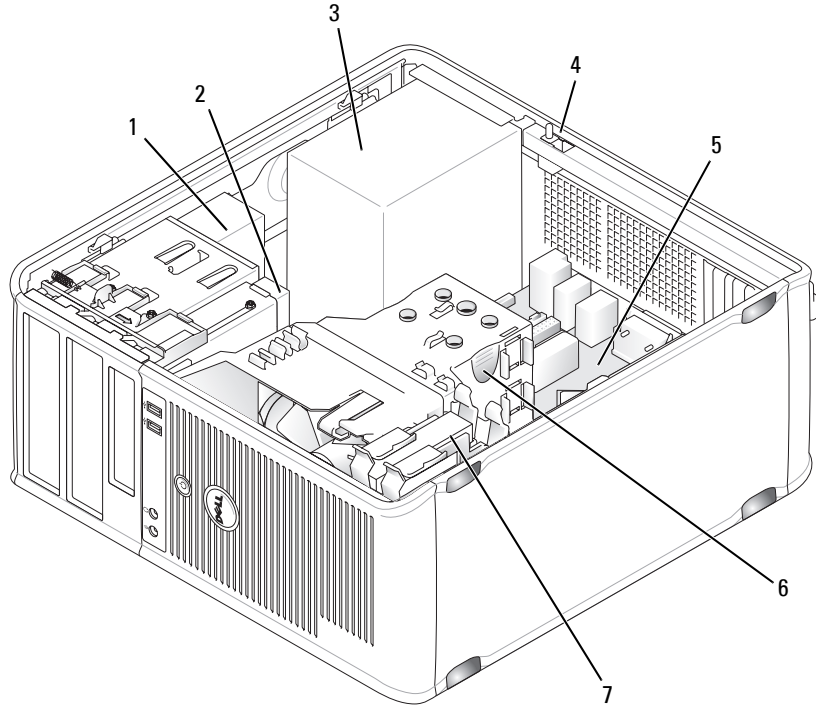
CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.



CAUTION: To avoid electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

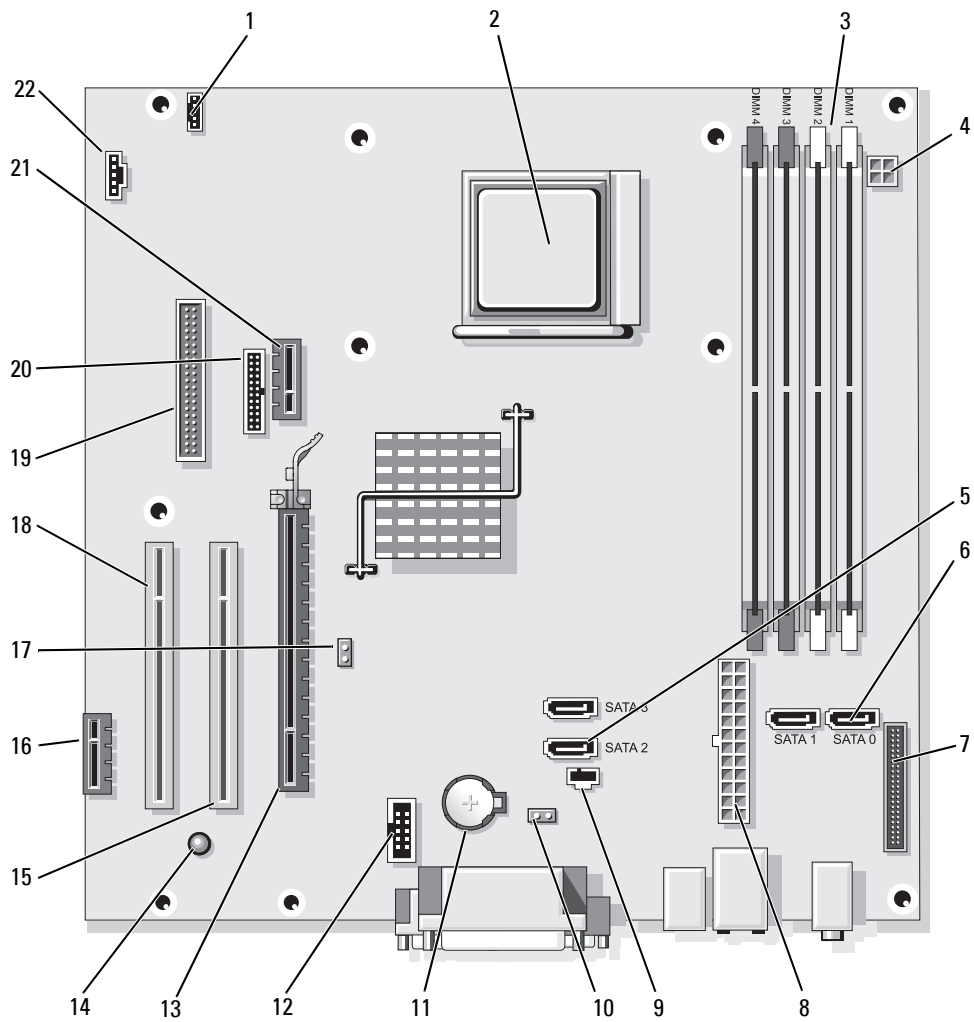


NOTICE: Be careful when opening the computer cover to ensure that you do not accidentally disconnect cables from the system board.



- | | | | | | |
|---|--|---|--------------|---|--------------------|
| 1 | optical drive | 2 | floppy drive | 3 | power supply |
| 4 | chassis intrusion switch
(optional) | 5 | system board | 6 | heat sink assembly |
| 7 | hard drive | | | | |

System Board Components



1	speaker connector (INT_SPKR)	2	processor socket (CPU)	3	memory module connectors (DIMM_1, DIMM_2, DIMM_3, DIMM_4)
4	power connector (PW_12V_A1)	5	SATA drive connectors (SATA2, SATA3)	6	SATA drive connectors (SATA0, SATA1)
7	front-panel connector (FRONTPANEL)	8	power connector (POWER1)	9	intrusion switch connector (INTRUDER)
10	CMOS reset jumper (RTCST)	11	battery socket (BATTERY)	12	internal USB (USB1)
13	PCI Express x16 connector (SLOT1)	14	standby power (AUX_PWR_LED)	15	PCI connector (SLOT2)
16	PCI Express x1 connector (SLOT4)	17	password jumper (PSWD)	18	PCI connector (SLOT3)
19	floppy drive connector (DSKT)	20	serial connector (PS2/SER2)	21	Optional DVI-card connector (DVI_HDR)
22	fan connector (FAN_CPU)				

Mini Tower Computer (Model #DCSM) Specifications

Microprocessor

Microprocessor type	AMD Phenom™ processors NOTE: The AMD Phenom processor requires the 8-Mb NVRAM chip and is therefore available only on models that include the 8-Mb NVRAM chip. If your computer has the 8-Mb NVRAM chip and the AMD Phenom processor, the word <i>enhanced</i> appears in the title on the BIOS splash screen and the system setup program screens. AMD Athlon™ 64 X2 Dual-Core processor
Internal cache	AMD Athlon 64 AMD Phenom Quad-Core: 2-MB L2 dedicated cache and 2-MB shared L3 cache AMD Phenom Triple-Core: 1.5-MB L2 dedicated cache and 2-MB shared L3 cache AMD Athlon 64 X2: 2-MB L2 dedicated cache AMD Athlon 64 X2: 1-MB L2 dedicated cache AMD Athlon: 1-MB L2 dedicated cache AMD Athlon: 512-KB L2 dedicated cache

Memory

Type	533-, 667-, or 800-MHz DDR2 SDRAM
Memory connectors	4
Memory modules supported	256 MB, 512 MB, 1 GB, or 2 GB non-ECC
Minimum memory	dual-channel: 512 MB single-channel: 256 MB
Maximum memory	8 GB

Computer Information

Chipset	nVidia GeForce 6150LE/Nforce 430
RAID support	RAID 0 and RAID 1 NOTE: RAID support is available only for select models.
Data bus width	64 bits

Computer Information

Address bus width	40 bits
DMA channels	eight
Interrupt levels	24
BIOS chip (NVRAM)	8 Mb or 4 Mb

NOTE: The AMD Phenom processor requires the 8-Mb NVRAM chip and is therefore available only on models that include the 8-Mb NVRAM chip. If your computer has the 8-Mb NVRAM chip and the AMD Phenom processor, the word *enhanced* appears in the title on the BIOS splash screen and the system setup program screens.

NIC	support for Atmel 1-Mb and 2-Mb EEPROM Capable of 10/100/1000 communication
-----	--

Video

Type	nVidia integrated video (DirectX 9.0c Shader Model 3.0 Graphics Processing Unit) or PCI Express x16 graphics card or DVI graphics card
------	--

Audio

Type	Sigma Tel 9200 CODEC (2.1 Channel Audio)
Stereo conversion	24-bit analog-to-digital; 24-bit digital-to-analog

Controllers

Drives	two SATA controllers supporting two devices each, including two 3.5-inch hard drives
--------	--

Expansion Bus

Bus type	PCI 2.3 PCI Express 1.0A SATA 1.0A and 2.0 USB 2.0
----------	---

Expansion Bus

Bus speed	PCI: 133 MB/s PCI Express x16: 40 GB/s bidirectional speed PCI Express x1: 2.5 Gbps SATA: 1.5 Gbps and 3.0 Gbps USB: 480-Mbps high speed, 12-Mbps full speed, 1.2-Mbps low speed
Cards:	full-height cards supported
PCI:	
connectors	two
connector size	124 pins
connector data width (maximum)	32 bits
PCI Express:	
connectors	one x1 and one x16
power	10 W (x1) and 75 W (x16) maximum
connector size	36 pins (x1) and 164 pins (x16)
connector data width (maximum)	one PCI Express lane (x1) and 16 PCI Express lanes (x16)

Drives

Externally accessible	two 3.5-inch drive bays, including support for up to two 3.5-inch hard drives two 5.25-inch drive bays
Internally accessible	two bays for 1-inch-high hard drives

Connectors

External connectors:	
Serial	9-pin connector; 16550C-compatible
Parallel	25-hole connector (bidirectional)
Video	15-hole VGA connector
Optional DVI	36-pin connector

NOTE: This option uses one of the PCI slots.

Connectors

Network adapter	RJ45 connector
Optional PS/2 with secondary serial port adapter	two 6-pin mini-DINs NOTE: This option uses one of the PCI slots.
USB	two front-panel and five back-panel USB 2.0-compliant connectors
Audio	two connectors for line-in and line-out; two front-panel connectors for headphones and microphone

System board connectors:

SATA	four 7-pin connectors
Floppy drive	34-pin connector
Serial	24-pin connector for optional second serial port card
Fan	5-pin connector
PCI 2.3	two 124-pin connectors
PCIe-x1	36-pin connector
PCIe-x16	164-pin connector
Internal USB	10-pin connector
Intrusion switch	3-pin connector
Speaker	5-pin connector
Memory modules	four 240-pin connector
Power 12V	4-pin connector
Power	24-pin connector
Battery	2-pin socket
Front panel	40-pin connector

Key Combinations

<Ctrl><Alt>	in Microsoft® Windows® XP and Windows Vista®, brings up the Windows Security window. If in MS-DOS® mode, restarts (reboots) the computer.
<F2> or <Ctrl><Alt><Enter>	starts embedded system setup (during start-up only)

Key Combinations

<F12> or <Ctrl><Alt><F8>	displays a boot device menu that allows the user to enter a device for a single boot (during start-up only) as well as options to run hard-drive and system diagnostics
<Ctrl><n>	starts the RAID setup menu if RAID is turned on in the system setup program
<Ctrl><Enter>	disables computer password at start-up (after correct password is entered)

Controls and Lights

Power control	front of chassis - push button
Power light (within the power button)	green light — Blinking green indicates sleep mode; solid green indicates power-on state. amber light — Blinking amber indicates a problem with an installed device; solid amber indicates an internal power problem (see "Power Problems" on page 321).
Hard-drive access light	front panel - green
Link light (on front panel)	front panel - solid green light indicates network connection
Link integrity light (on integrated network adapter)	rear panel - green light for 10-Mb operation; orange light for 100-Mb operation; yellow light for a 1000-Mb (1-Gb) operation
Activity light (on integrated network adapter)	rear panel - yellow blinking light
Diagnostic lights	front panel - four lights on the front panel. See "Diagnostic Lights" on page 330.
Standby power light	AUX_PWR on the system board

Power

DC power supply:	
Wattage	305 W
Heat dissipation	1040.7 BTU/hr maximum
Voltage	manual selection power supplies—90 to 135 V at 50/60 Hz; 180 to 265 V at 50/60 Hz
Backup battery	3-V CR2032 lithium coin cell

Physical

Height	41.4 cm (16.3 inches)
Width	18.5 cm (7.3 inches)
Depth	43.9 cm (17.3 inches)
Weight	12.34 kg (27.2 lb)

Environmental

Temperature:

Operating	10° to 35°C (50° to 95°F)
Storage	-40° to 65°C (-40° to 149°F)

Relative humidity 20% to 80% (noncondensing)

Maximum vibration:

Operating	0.25 G at 3 to 200 Hz at 0.5 octave/min
Storage	0.5 G at 3 to 200 Hz at 1 octave/min

Maximum shock:

Operating	bottom half-sine pulse with a change in velocity of 50.8 cm/sec (20 inches/sec)
Storage	27-G faired square wave with a velocity change of 508 cm/sec (200 inches/sec)

Altitude:

Operating	-15.2 to 3048 m (-50 to 10,000 ft)
Storage	-15.2 to 10,668 m (-50 to 35,000 ft)

Airborne contaminant level G2 or lower as defined by ISA-S71.04-1985

I/O Panel

Removing the I/O Panel



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.



CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.



NOTE: Note the routing of all cables as you remove them so that you can re-route them correctly when installing the new I/O panel.

1 Follow the procedures in "Before You Begin" on page 19.

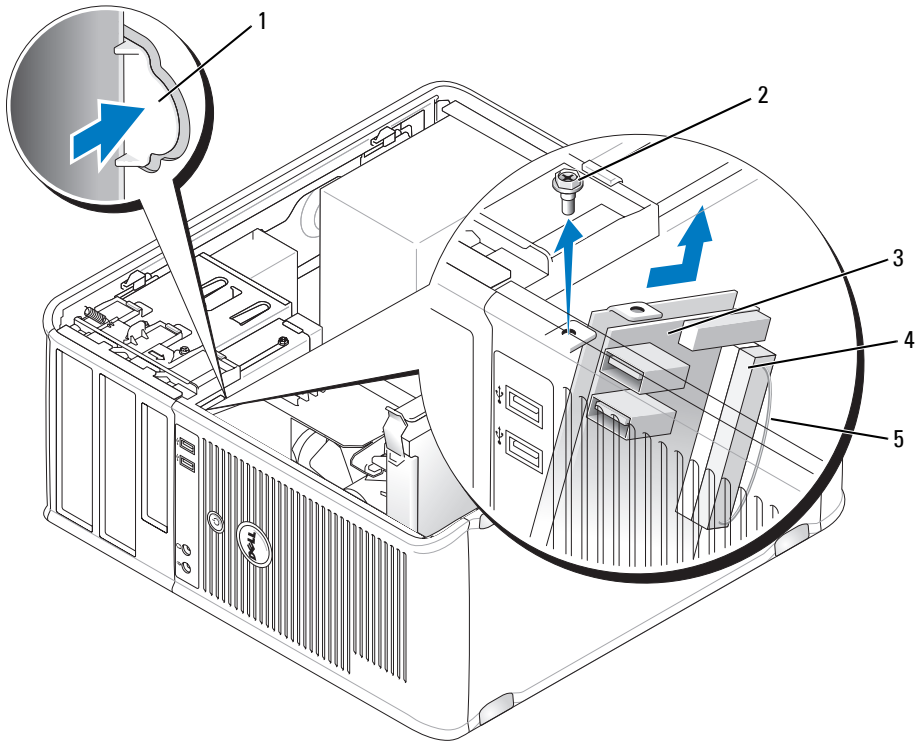


NOTICE: When sliding the I/O panel out of the computer, be extremely careful. Carelessness may result in damage to the cable connectors and the cable routing clips.

2 Remove the screw that secures the I/O panel. Press on the release button and slide the card away from the front of the computer.

3 Carefully remove the panel from the computer.


4 Disconnect all of the cables from the I/O panel.



- | | | | | | |
|---|--------------------------|---|----------------|---|-----------|
| 1 | I/O panel release button | 2 | securing screw | 3 | I/O panel |
| 4 | I/O cable connector | 5 | pull-loop | | |

Replacing the I/O Panel

To replace the I/O panel, follow the removal procedure in the reverse order.

 **NOTE:** Use the guides on the I/O panel bracket to help position the I/O panel in place, and use the notch on the I/O panel bracket to help seat the panel.

Removing the Computer Cover



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

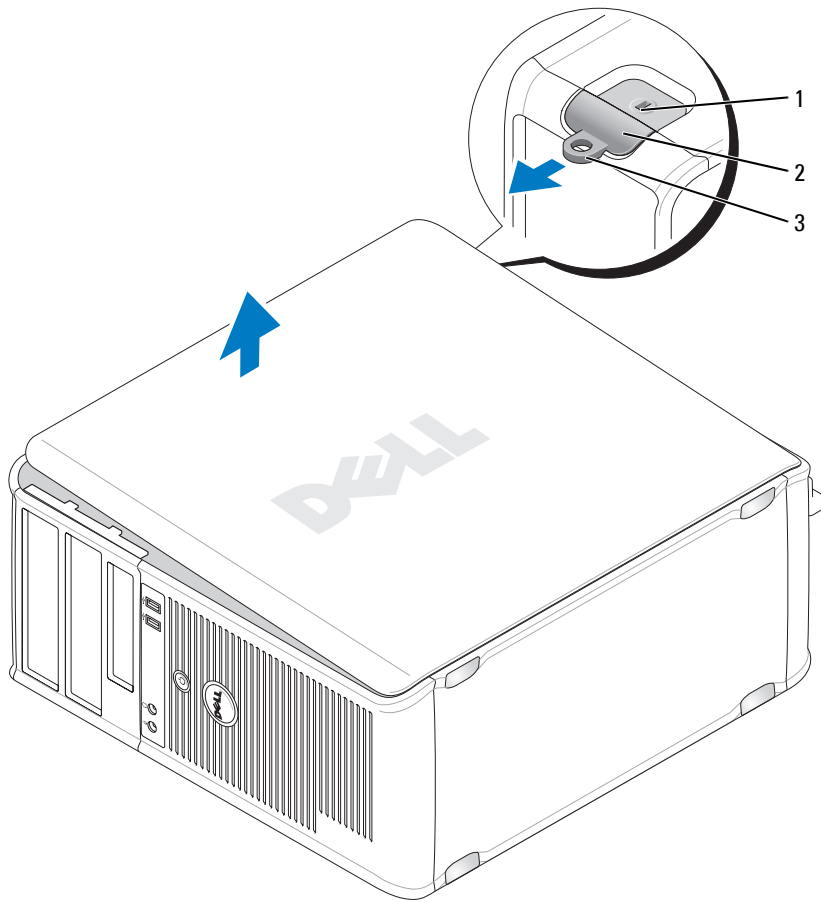


CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 Lay the computer on its side as shown in the illustration.
- 3 Locate the cover release latch shown in the illustration. Then, slide the release latch back as you lift the cover.
- 4 Grip the sides of the computer cover and pivot the cover up using the hinge tabs as leverage points.
- 5 Remove the cover from the hinge tabs and set it aside on a soft nonabrasive surface.



CAUTION: Graphic card heat sinks can become very hot during normal operation. Ensure that a graphic card heat sink has had sufficient time to cool before you touch it.



1 security cable slot

2 cover release latch

3 padlock ring

PCI, PCI Express Cards, and PS/2 Serial Port Adapters



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.



NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

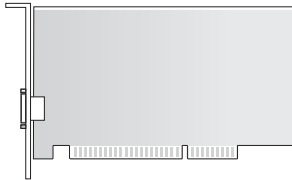
Your Dell™ computer supports a PS/2 serial adapter and provides the following connectors for PCI and PCI Express cards.

- Two PCI card slots
- One PCI Express x16 card slot
- One PCI Express x1 card slot



NOTE: Your Dell computer uses only PCI and PCI Express slots. ISA cards are not supported.

PCI Cards



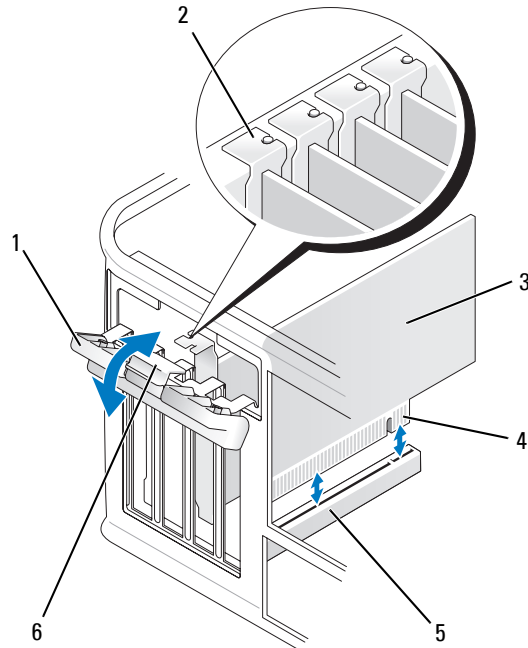
Installing a PCI Card

- 1 Follow the procedures in "Before You Begin" on page 19.



NOTE: For PCI card locations, see "System Board Components" on page 28.

- 2 Gently push the release tab on the card retention latch from the inside to pivot the latch open. The latch will remain in the open position.



- | | | | | | |
|---|----------------------|---|-----------------|---|-------------|
| 1 | card retention latch | 2 | alignment guide | 3 | card |
| 4 | card-edge connector | 5 | card connector | 6 | release tab |

- 3 If you are installing a new card, remove the filler bracket to create a card-slot opening. Then continue with step 5.
- 4 If you are replacing a card that is already installed in the computer, remove the card (see "Removing a PCI Card" on page 44). If necessary, disconnect any cables connected to the card. Then continue with step 6.
- 5 Prepare the new card for installation.



CAUTION: Some network adapters automatically start the computer when they are connected to a network. To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any cards.

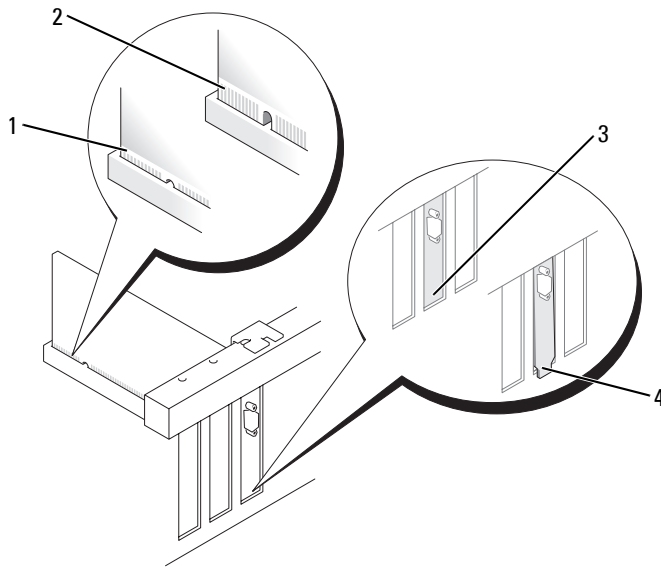


NOTE: See the documentation that came with the card for information on configuring the card, making internal connections, or customizing it for your computer

- 6 Place the card in the connector and press down firmly. Ensure that the card is fully seated in the slot.



NOTE: If the card is full-length, insert the end of the card into the card-guide bracket as you lower the card toward its connector on the system board. Insert the card firmly into the card connector on the system board.



- 1 fully seated card 2 not fully seated card 3 bracket within slot
4 bracket caught outside of slot

7 Secure the card(s) by closing the card retention latch and snapping it into place.

➔ **NOTICE:** Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

8 Connect any cables that should be attached to the card.

9 Replace the computer cover (see "Replacing the Computer Cover" on page 297).

➔ **NOTICE:** To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

✍ **NOTE:** See the documentation for the card for information about the card's cable connections.

10 If you installed a sound card:

- a Enter system setup, select **Integrated Audio** from the **Onboard Devices** group, and change the setting to **Off** (see "System Setup" on page 257).
- b Connect external audio devices to the sound card's connectors. Do not connect external audio devices to the line-in connector on the back panel of the computer (see "Back-Panel Connectors" on page 25).

11 If you installed a network adapter card and want to turn off the integrated network adapter:

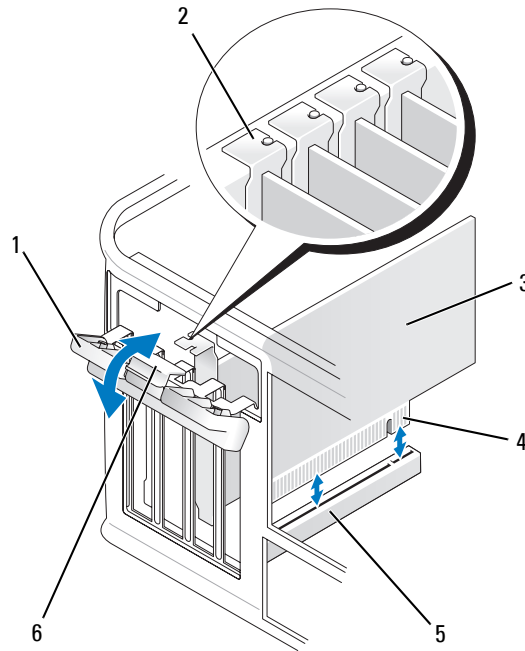
- a Enter system setup, select **Integrated NIC** from the **Onboard Devices** group, and change the setting to **Off** (see "System Setup" on page 257).

- b Connect the network cable to the network adapter card's connectors. Do not connect the network cable to the integrated network connector on the back panel of the computer.

12 Install any drivers required for the card as described in the card documentation.

Removing a PCI Card

- 1 Follow the procedures in "Before You Begin" on page 19
- 2 Gently push the release tab on the card retention latch from the inside to pivot the latch open. The latch will remain in the open position.



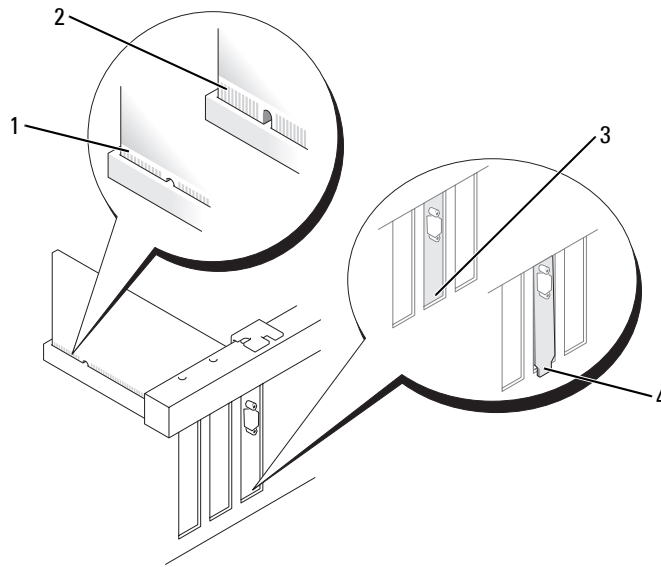
- | | | |
|------------------------|-------------------|---------------|
| 1 card retention latch | 2 alignment guide | 3 card |
| 4 card-edge connector | 5 card connector | 6 release tab |

- 3 If necessary, disconnect any cables connected to the card.
- 4 Grasp the card by its top corners, and ease it out of its connector.
- 5 If you are removing the card permanently, install a filler bracket in the empty card-slot opening.

NOTE: Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets also keep dust and dirt out of your computer.

- 6 Before you close the card retention mechanism, ensure that:
 - The tops of all cards and filler brackets are flush with the alignment bar.

- The notch in the top of the card or filler bracket fits around the alignment guide.

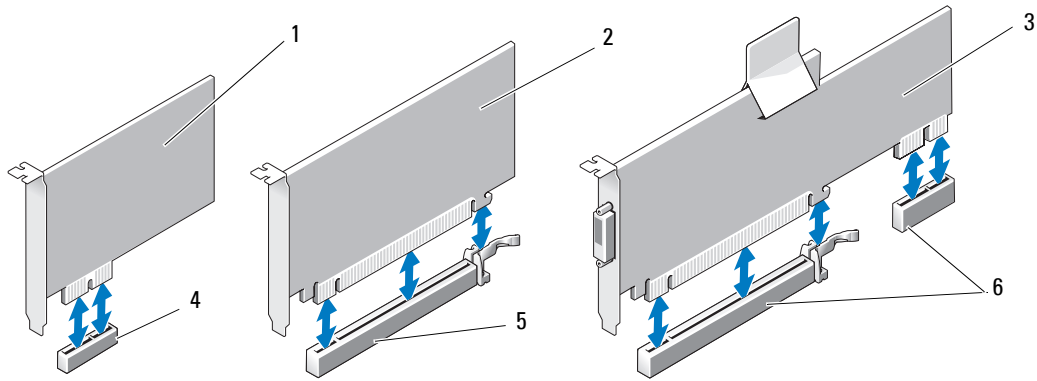


- 1 fully seated card 2 not fully seated card 3 bracket within slot
4 bracket caught outside of slot

- 7 Secure the card(s) by closing the card retention latch and snapping it into place.
- 8 Replace the computer cover (see "Replacing the Computer Cover" on page 297).
- 9 Uninstall the card's driver. See the documentation that came with the card for instructions.
- 10 If you removed a sound card:
 - a Enter system setup, select **Integrated Audio** from the **Onboard Devices** group, and change the setting to **On** (see "System Setup" on page 257).
 - b Connect external audio devices to the audio connectors on the back panel of the computer.
- 11 If you removed a network-adaptor card connector:
 - a Enter system setup, select **Integrated NIC** from the **Onboard Devices** group, and change the setting to **On** (see "System Setup" on page 257).
 - b Connect the network cable to the integrated network connector on the back panel of the computer.

PCI Express Cards

Your computer supports one PCI Express x16 card and one PCI Express x1 card. See "System Board Components" on page 28 for the location of the PCI Express card slots.

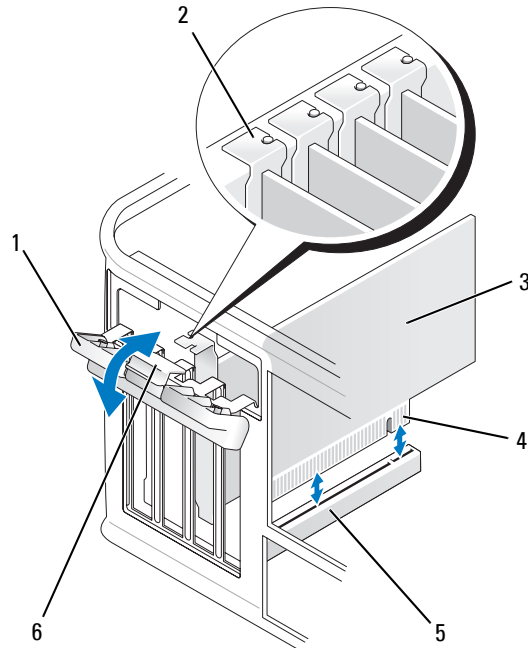


- | | | | | | |
|---|--------------------------|---|---------------------------|---|-------------------------------|
| 1 | PCI Express x1 card | 2 | PCI Express x16 card | 3 | PCI Express x16 DVI card |
| 4 | PCI Express x1 card slot | 5 | PCI Express x16 card slot | 6 | PCI Express x16 DVI card slot |

If you are replacing a card, uninstall the driver for the existing card. See the documentation that came with the card for instructions.

Installing a PCI Express x1 Card

- 1 Follow the procedures in "Before You Begin" on page 19.



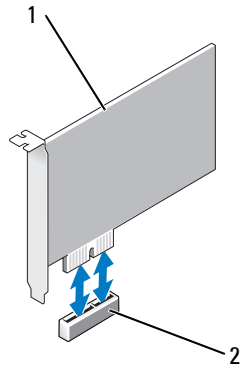
- | | | | | | |
|---|----------------------|---|-----------------|---|-------------|
| 1 | card retention latch | 2 | alignment guide | 3 | card |
| 4 | card-edge connector | 5 | card connector | 6 | release tab |

- 2 Gently push the release tab on the card retention latch from the inside to pivot the latch open. The latch will remain in the open position.
- 3 If you are installing a new card, remove the filler bracket to create a card-slot opening. Then continue with step 5.
- 4 If you are replacing a card that is already installed in the computer, remove the card (see "Removing a PCI Express x1 Card" on page 49).
If necessary, disconnect any cables connected to the card. Then continue with step 6.
- 5 Prepare the new card for installation.
See the documentation that came with the card for information on configuring the card, making internal connections, or otherwise customizing it for your computer.



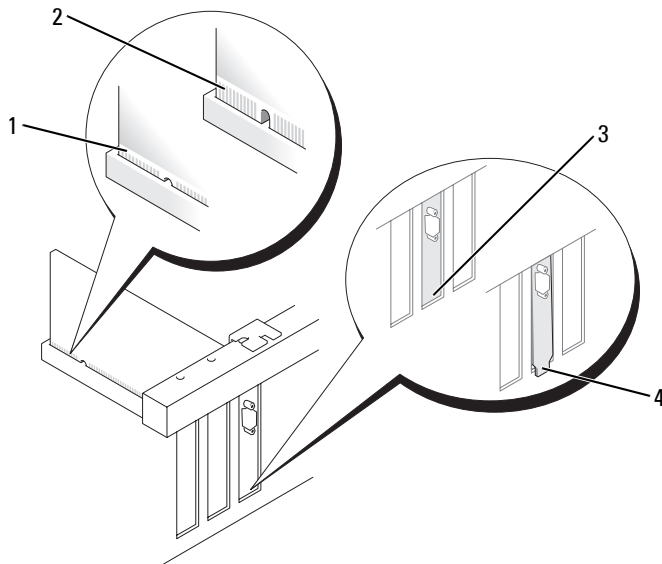
CAUTION: Some network adapters automatically start the computer when they are connected to a network. To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any cards.

- 6 Place the card in the connector and press down firmly. Ensure that the card is fully seated in the slot.



1 PCI Express x1 card

2 PCI Express x1 card connector



1 fully seated card

2 not fully seated card

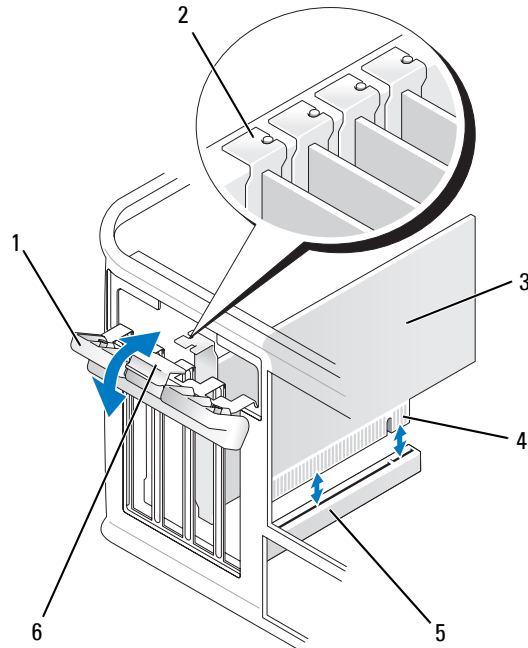
3 bracket within slot

4 bracket caught outside of slot

- 7 Before you close the card retention mechanism, ensure that:
 - The tops of all cards and filler brackets are flush with the alignment bar.
 - The notch in the top of the card or filler bracket fits around the alignment guide.
- 8 Close the card retention latch and gently press until it clicks into place.
- ➔ **NOTICE:** Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.
- ➔ **NOTICE:** To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.
- 9 Connect any cables that should be attached to the card.
See the documentation for the card for information about the card's cable connections.
- 10 Replace the computer cover (see "Replacing the Computer Cover" on page 297).
- 11 If you installed a sound card:
 - a Enter system setup, select **Integrated Audio** from the **Onboard Devices** group, and change the setting to **Off** (see "System Setup" on page 257).
 - b Connect external audio devices to the sound card's connectors. Do not connect external audio devices to the line-in connector on the back panel of the computer. "Back-Panel Connectors" on page 25.
- 12 If you installed a network adapter card and want to turn off the integrated network adapter:
 - a Enter system setup, select **Integrated NIC** from the **Onboard Devices** group, and change the setting to **Off** (see "System Setup" on page 257).
 - b Connect the network cable to the network adapter card's connectors. Do not connect the network cable to the integrated network connector on the back panel of the computer.
- 13 Install any drivers required for the card as described in the card documentation.

Removing a PCI Express x1 Card

- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 Gently push the release tab on the card retention latch from the inside to pivot the latch open. The latch will remain in the open position.



- | | | | | | |
|---|----------------------|---|-----------------|---|-------------|
| 1 | card retention latch | 2 | alignment guide | 3 | card |
| 4 | card-edge connector | 5 | card connector | 6 | release tab |


- 3 If necessary, disconnect any cables connected to the card.
- 4 Grasp the card by its top corners, and ease it out of its connector.
- 5 If you are removing the card permanently, install a filler bracket in the empty card-slot opening.

NOTE: Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets also keep dust and dirt out of your computer.


- 6 Before you close the card retention mechanism, ensure that:
 - The tops of all cards and filler brackets are flush with the alignment bar.
 - The notch in the top of the card or filler bracket fits around the alignment guide.
- 7 Secure the card(s) by closing the card retention latch and snapping it into place.
- 8 Replace the computer cover (see "Replacing the Computer Cover" on page 297).

Installing PCI Express x16 Cards and DVI-Cards

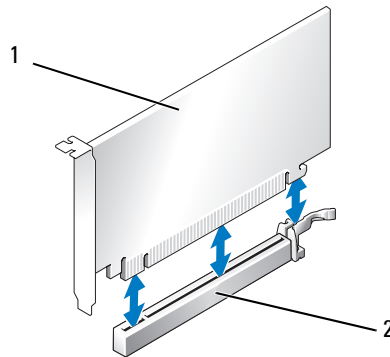
- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 If you are replacing a PCI Express x16 card, remove the installed card (see "Removing PCI Express x16 Cards and DVI-Cards" on page 54).

 **NOTE:** See the documentation that came with the card for information on configuring the card, making internal connections, or customizing it for your computer.

- 3 Prepare the card for installation.

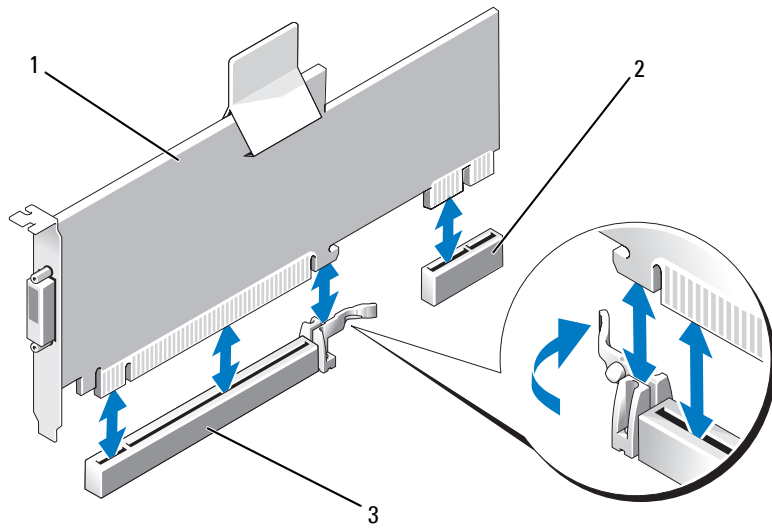
 **CAUTION:** Some network adapters automatically start the computer when they are connected to a network. To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any cards.

- 4 Place the card in the connector and press down firmly. Ensure that the card is fully seated in the slot.



1 PCI Express x16 card

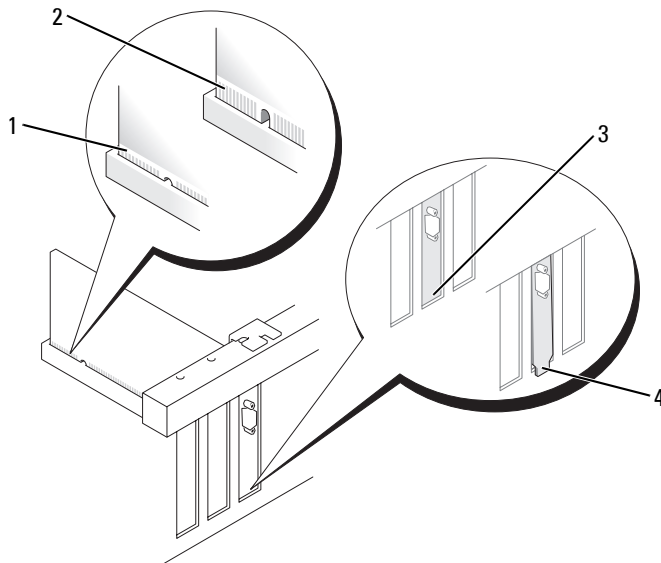
2 PCI Express x16 card connector



1 PCI Express x16 card

2 DVI-card connector

3 PCI Express x16 card connector



- 1 fully seated card 2 not fully seated card 3 bracket within slot
4 bracket caught outside of slot

5 Connect any cables that should be attached to the card.

➔ **NOTICE:** Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

6 Before you close the card retention mechanism, ensure that:

- The tops of all cards and filler brackets are flush with the alignment bar.
- The notch in the top of the card or filler bracket fits around the alignment guide.

7 Secure the card(s) by closing the card retention latch and snapping it into place.

8 Replace the computer cover (see "Replacing the Computer Cover" on page 297).

9 If you installed a sound card:

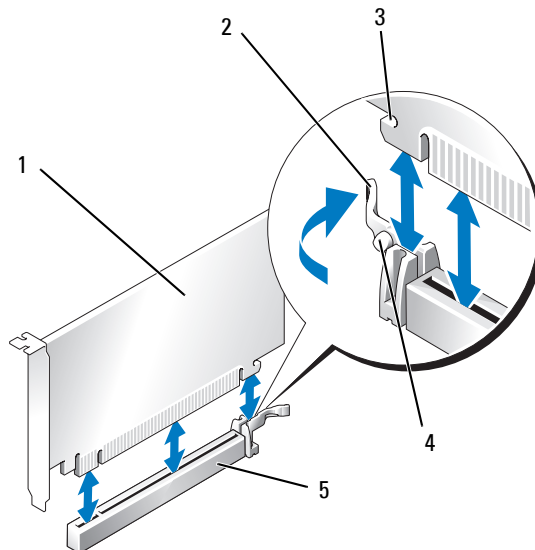
- a Enter system setup, select **Integrated Audio** from the **Onboard Devices** group, and change the setting to **Off** (see "System Setup" on page 257).
- b Connect external audio devices to the sound card's connectors. Do not connect external audio devices to the line-in connector on the back panel of the computer (see "Back-Panel Connectors" on page 99).

➔ **NOTICE:** To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

- 10 If you installed a network adapter card and want to turn off the integrated network adapter:
 - a Enter system setup, select **Integrated NIC** from the **Onboard Devices** group, and change the setting to **Off** (see "System Setup" on page 257).
 - b Connect the network cable to the network adapter card's connectors. Do not connect the network cable to the integrated network connector on the back panel of the computer.
- 11 Install any drivers required for the card as described in the card documentation.

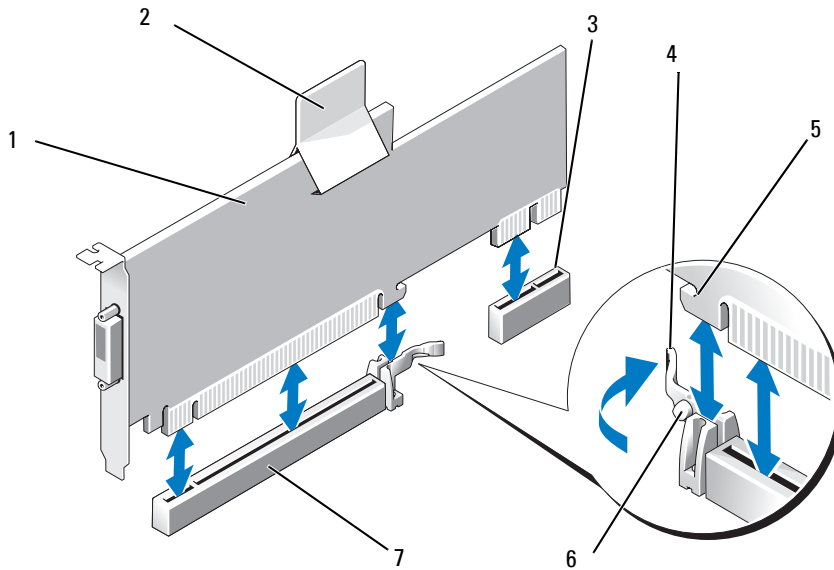
Removing PCI Express x16 Cards and DVI-Cards

- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 Gently lift the release tab on the card retention latch from the inside to pivot the latch open. Pivot the latch until it snaps into the open position.
- 3 If necessary, disconnect any cables connected to the card.
- 4 Press the lever with your thumb until you release the securing tab.
If you are removing a PCI Express x16 card, go to step 5.
If you are removing a DVI-card, go to step 6
- 5 While pressing the lever, pull the card up and out of the card connector.



- | | | | | | |
|---|----------------------|---|--------------------------------|---|---------------|
| 1 | PCI Express x16 card | 2 | lever | 3 | securing slot |
| 4 | securing tab | 5 | PCI Express x16 card connector | | |

- 6 While pressing the lever, pull the removal pull tab up and remove the card out of the card connector.



- | | | | | | |
|---|--------------------------------|---|------------------|---|--------------------|
| 1 | PCI Express x16 DVI-card | 2 | removal pull tab | 3 | DVI-card connector |
| 4 | lever | 5 | securing slot | 6 | securing tab |
| 7 | PCI Express x16 card connector | | | | |

- 7 If you are removing the card permanently, install a filler bracket in the empty card-slot opening.

NOTE: Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets also keep dust and dirt out of your computer.

- 8 Before you close the card retention mechanism, ensure that:

- The tops of all cards and filler brackets are flush with the alignment bar.
- The notch in the top of the card or filler bracket fits around the alignment guide.

- 9 Secure any remaining card(s) by closing the card retention latch and snapping it into place.

NOTICE: Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.


- 10 Replace the computer cover (see "Replacing the Computer Cover" on page 297).

- 11 Uninstall the card's driver. See the documentation that came with the card for instructions.

- 12 If you removed a sound card:

- a Enter system setup, select **Integrated Audio** from the **Onboard Devices** group, and change the setting to **On** (see "System Setup" on page 257).

b Connect external audio devices to the audio connectors on the back panel of the computer.

 **NOTICE:** To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

13 If you removed a network-adapter card connector:

- a Enter system setup, select **Integrated NIC** from the **Onboard Devices** group, and change the setting to **On** (see "System Setup" on page 257).
- b Connect the network cable to the integrated network connector on the back panel of the computer.

PS/2 Serial Port Adapters



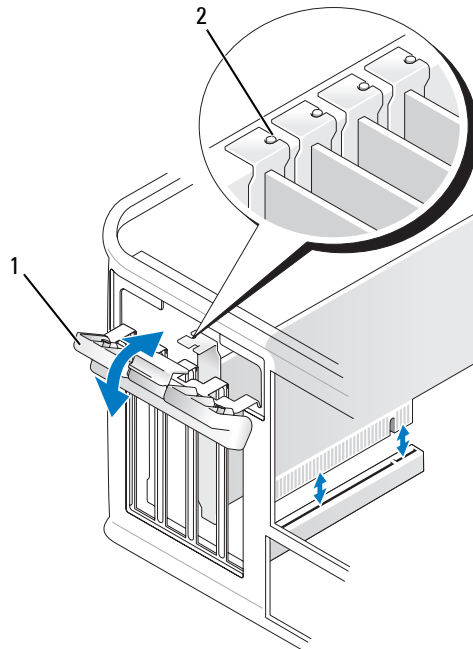
CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.



NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

Installing a PS/2 Serial Port Adapter

- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 Gently push the release tab on the card retention latch from the inside to pivot the latch open. The latch will remain in the open position.

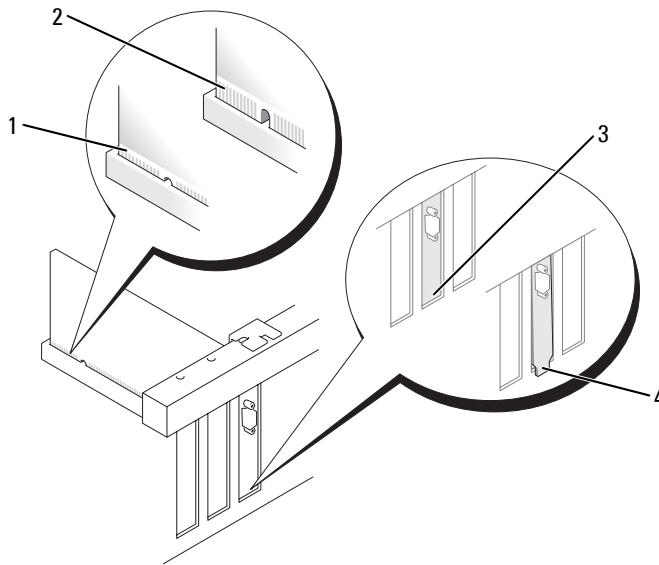


- 1 card retention latch 2 alignment guide

3 Remove the filler bracket (if applicable).

NOTE: See the documentation that came with the PS/2 serial port adapter for information on configuring the adapter, making internal connections, or customizing it for your computer.

4 Align the PS/2 serial-port adapter bracket in the retention slot and press down firmly. Ensure that the adapter is fully seated in the slot.



- 1 fully seated card 2 not fully seated card 3 bracket within slot
 4 bracket caught outside of slot

Before you close the card retention mechanism, ensure that:

- The tops of all adapters and filler brackets are flush with the alignment bar.
- The notch in the top of the adapter or filler bracket fits around the alignment guide.

5 Close the card retention latch and gently press until it snaps into place.

➔ NOTICE: Do not route cables over any installed cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

6 Connect the adapter cable to the serial port adapter connector (PS2/SER2) on the system board (see "System Board Components" on page 28 for connector locations).

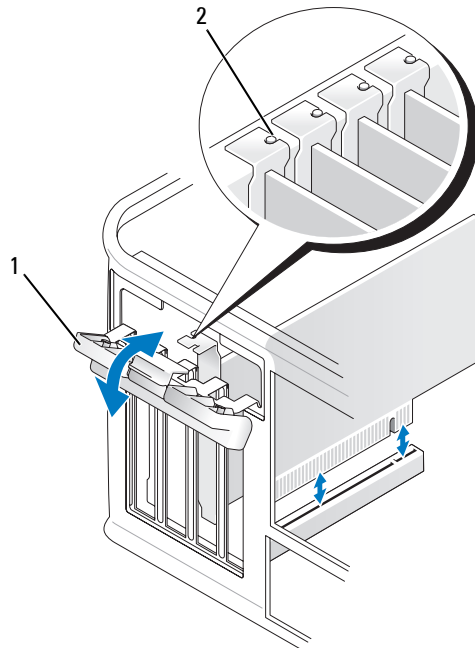
✍ NOTE: See the documentation for the PS/2 serial port adapter for information about the cable connections.

7 Replace the computer cover (see "Replacing the Computer Cover" on page 297).

Removing a PS/2 Serial Port Adapter

1 Follow the procedures in "Before You Begin" on page 19.

2 Gently push the release tab on the card retention latch from the inside to pivot the latch open. The latch will remain in the open position.



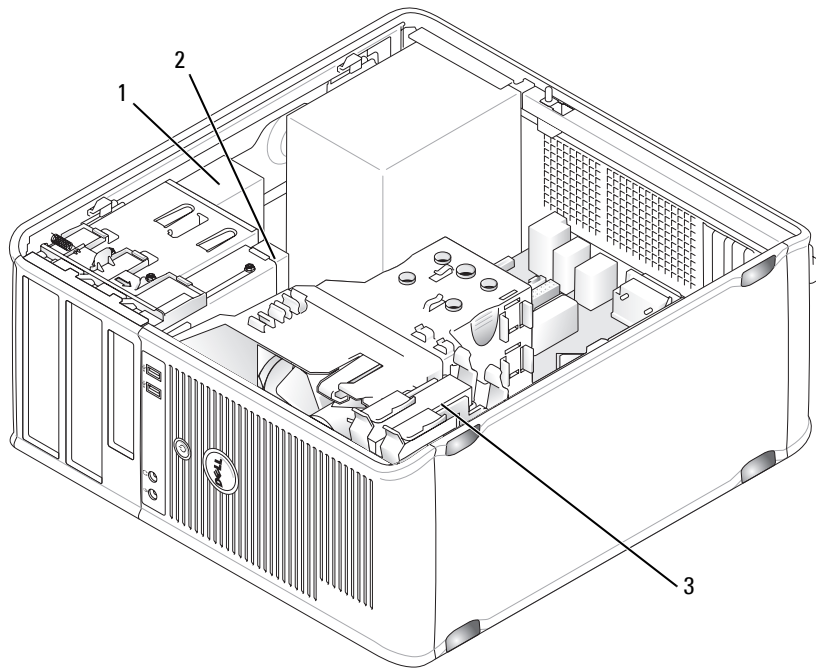
- 1 card retention latch 2 alignment guide

- 3 Disconnect the PS/2 serial adapter cable from the system board (see "System Board Components" on page 28).
 - 4 If necessary, disconnect any external cables connected to the adapter.
 - 5 Grasp the PS/2 serial-port adapter bracket by its top corners, and ease it out of its retention slot.
 - 6 If you are removing the adapter permanently, install a filler bracket in the empty card-slot opening.
- NOTE:** Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets also keep dust and dirt out of your computer.
- 7 Before you close the card retention mechanism, ensure that:
 - The tops of all cards and filler brackets are flush with the alignment bar.
 - The notch in the top of the card or filler bracket fits around the alignment guide.
 - 8 Secure the card(s) by closing the card retention latch and snapping it into place.
 - 9 Replace the computer cover (see "Replacing the Computer Cover" on page 297).

Drives

Your computer supports:

- Two SATA (Serial ATA) hard drives
- One optional floppy drive or Media Card Reader
- Two optical drives



1 optical drive

2 floppy drive or media card
reader

3 hard drive

General Installation Guidelines



NOTE: Connect the first SATA hard drive to the blue SATA0 connector.

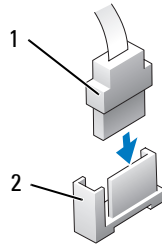
Connect SATA hard drives to the connectors labeled "SATA0" or "SATA1." Connect SATA CD or DVD drives to the connectors labeled "SATA2" or "SATA3" on the system board (see "System Board Components" on page 28 for information about mini tower system board connectors).

Connecting Drive Cables

When you install a drive, you connect two cables—a DC power cable and a data cable—to the back of the drive and to the system board.

Drive Interface Connectors

Serial ATA Connector

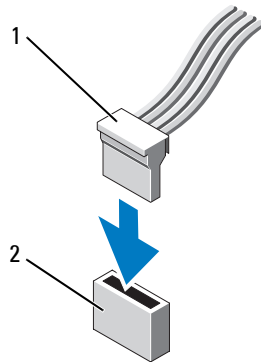


- 1 interface cable connector 2 interface connector

Interface connectors are keyed for correct insertion.

Power Cable Connectors

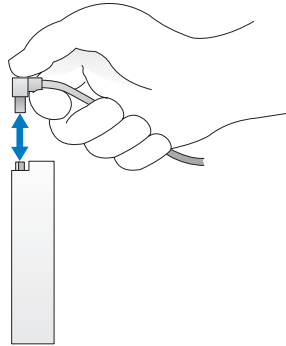
Serial ATA Power Connector



- 1 power cable 2 power input connector

Connecting and Disconnecting Drive Cables

When connecting and disconnecting a SATA data cable, hold the cable by the black connector at each end.



Hard Drive



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.



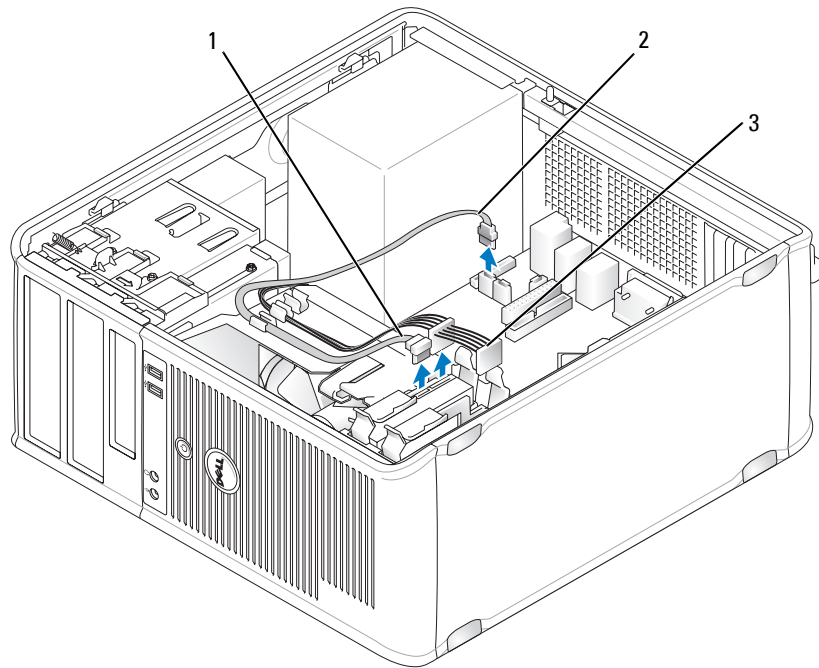
CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.



NOTICE: To avoid damage to the drive, do not set it on a hard surface. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.

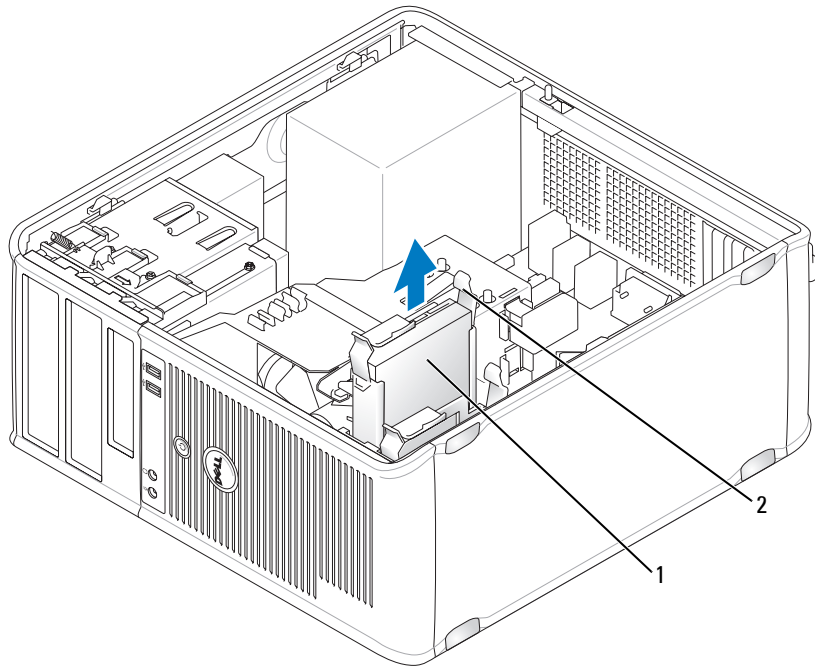
Removing a Hard Drive

- 1 If you are replacing a hard drive that contains data you want to keep, back up your files before you begin this procedure.
- 2 Follow the procedures in "Before You Begin" on page 19.
- 3 Disconnect the power and hard-drive cables from the drive.



- 1 hard-drive cable 2 hard-drive cable on system board 3 power cable board

4 Press in on the blue release tabs on each side of the drive and slide the drive up and out of the computer.

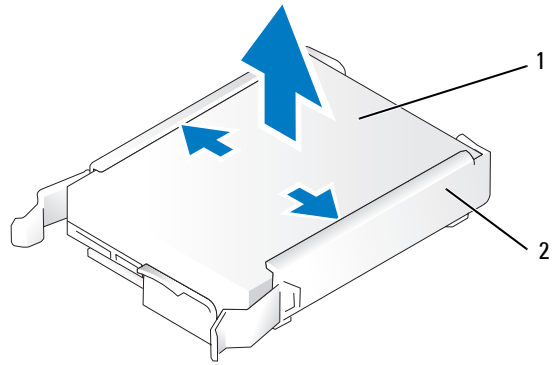


1 hard drive

2 release tabs (2)

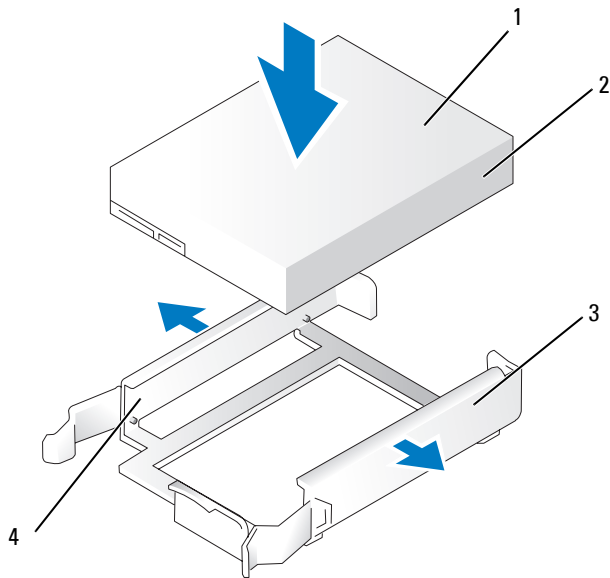
Installing a Hard Drive

- 1 Unpack the replacement hard drive, and prepare it for installation.
- 2 Follow the procedures in "Before You Begin" on page 19.
- 3 If your replacement hard drive does not have the plastic hard-drive bracket attached:
 - a Remove the bracket from the existing drive by gently spreading the plastic hard-bracket and removing the hard drive.
 - b Install the replacement drive into the bracket by inserting the drive into the bracket so that the bracket alignment tabs snaps into the mounting holes on the new drive.



1 hard drive

2 hard-drive bracket



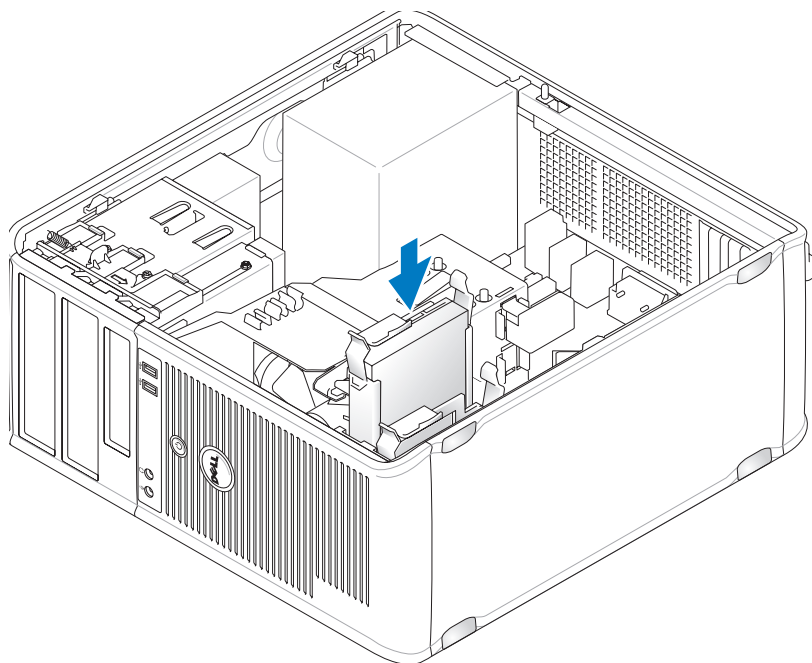
1 hard drive

2 hard drive mounting holes

3 hard-drive bracket

4 bracket alignment tabs

4 Carefully slide the hard drive into the drive bay until it clicks into place.



- 5 Connect the power and hard-drive cables to the drive.
- 6 Check all connectors to be certain that they are properly cabled and firmly seated.
- 7 Replace the computer cover (see "Replacing the Computer Cover" on page 297).
- 8 If the drive you just installed is the primary drive, insert a bootable medium into your boot drive. See the documentation that came with the drive for instructions on installing any software required for drive operation.
- 9 Enter system setup and update the appropriate **Primary Drive** option (0 or 1) (see "Entering System Setup" on page 257).
- 10 Exit system setup, and reboot the computer.
- 11 Partition and logically format your drive before you proceed to the next step.
See the documentation for your operating system for instructions.
- 12 Test the hard drive by running the Dell Diagnostics (see "Dell Diagnostics" on page 327).
- 13 If the drive you just installed is the primary drive, install your operating system on the hard drive.

Adding a Second Hard Drive



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.



CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

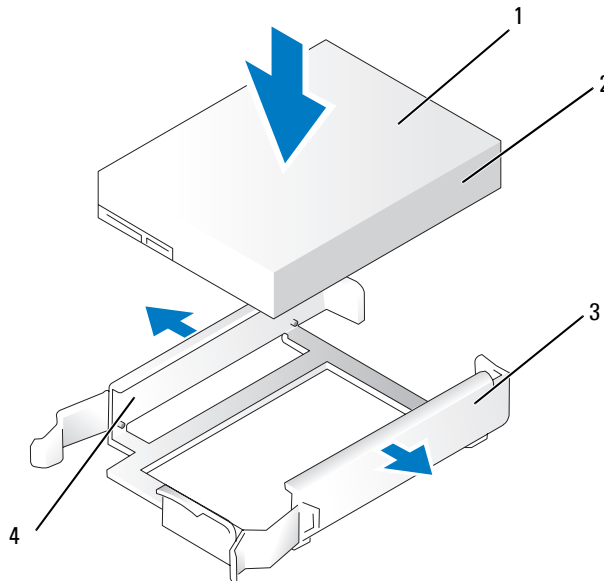


NOTICE: To avoid damage to the drive, do not set it on a hard surface. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.



NOTICE: If you are replacing a hard drive that contains data you want to keep, back up your files before you begin this procedure.

- 1 Check the documentation for the drive to verify that it is configured for your computer.
- 2 Follow the procedures in "Before You Begin" on page 19.
- 3 Remove the plastic hard-drive bracket from the inside of the hard-drive bay by squeezing the release tabs and gently pulling the bracket up and out of the bay.
- 4 Install the new drive into the bracket by inserting the drive into the bracket so that the bracket alignment tabs snaps into the mounting holes on the new drive.



1 hard drive

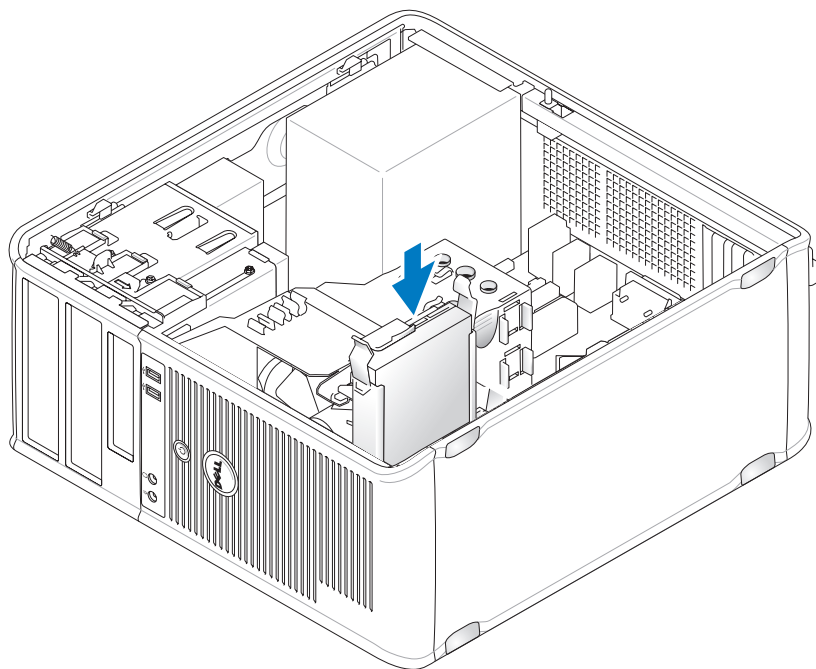
2 hard drive mounting holes

3 hard-drive bracket

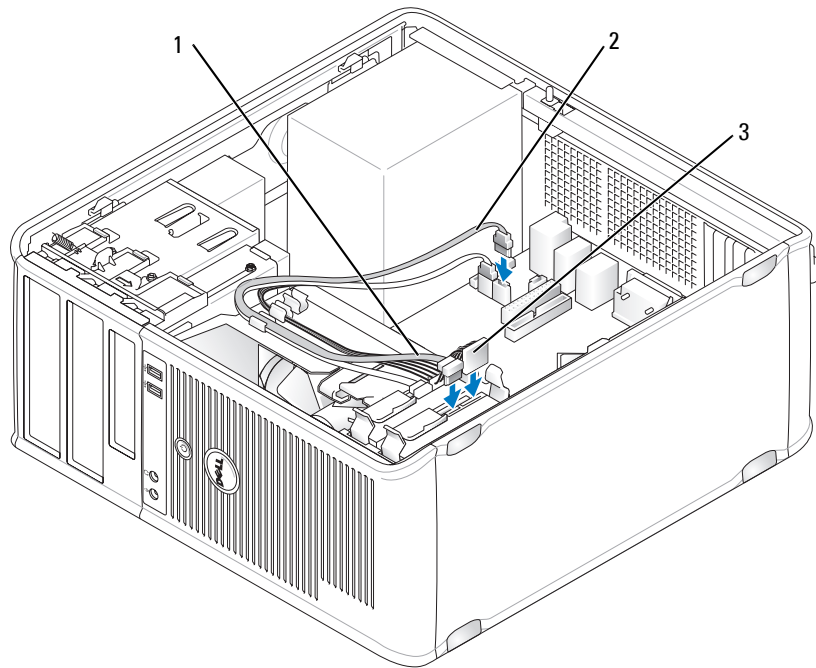
4 bracket alignment tabs

- 5 If necessary, disconnect the power and SATA cables from the hard drive that is currently installed.
- 6 Carefully slide the new hard drive into the unused bay until it clicks into place.

- 7 Connect the power and SATA cables to the drives.



- 8 Locate and connect a SATA cable to the SATA1 connector on the system board (see "System Board Components" on page 28 for mini tower computers).



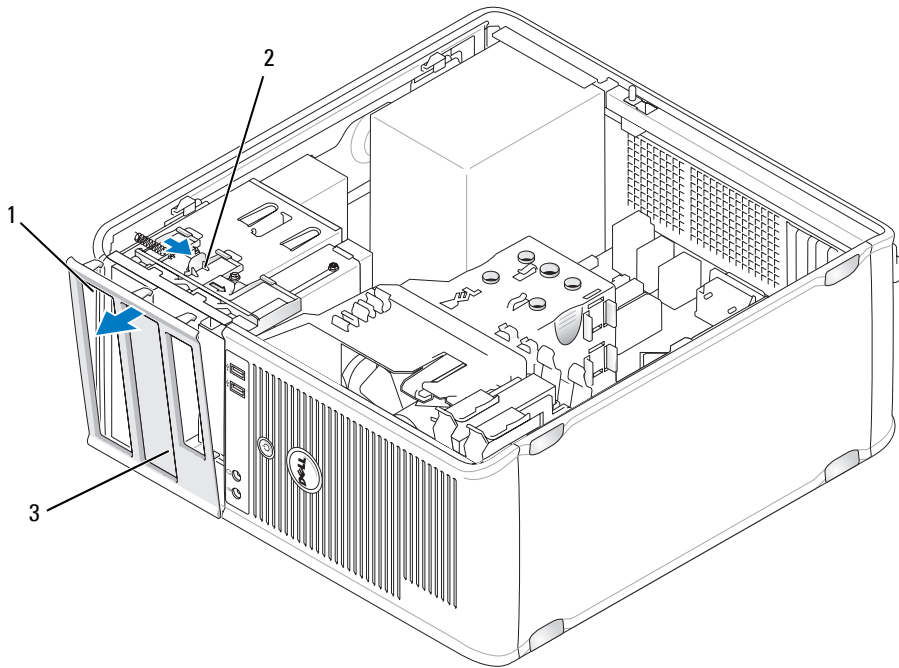
- 1 hard-drive data cable 2 hard-drive data cable on system board 3 hard-drive power cable

9 Replace the computer cover (see "Replacing the Computer Cover" on page 297).

Drive-Panel Inserts

If you are installing a new floppy drive, media card reader, or optical drive instead of replacing a drive, remove the drive-panel inserts.

- 1** Follow the procedures in "Before You Begin" on page 19.
- 2** Remove the drive panel by sliding the drive release latch in the direction indicated on the latch to open the panel. Then remove it from the hinges.

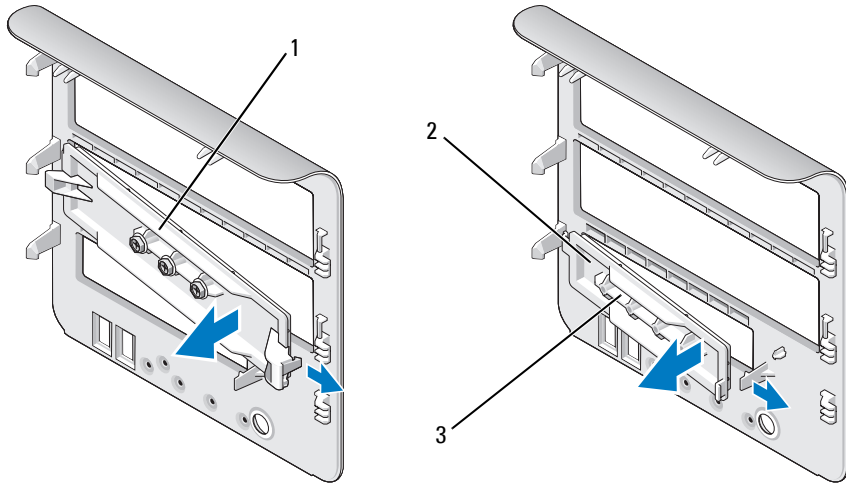


1 drive panel

2 release tab

3 drive-panel insert

- 3** Select the drive-panel insert in front of the drive bay that you want to use.
- 4** Gently press the release tab of the insert to remove it from the drive panel.

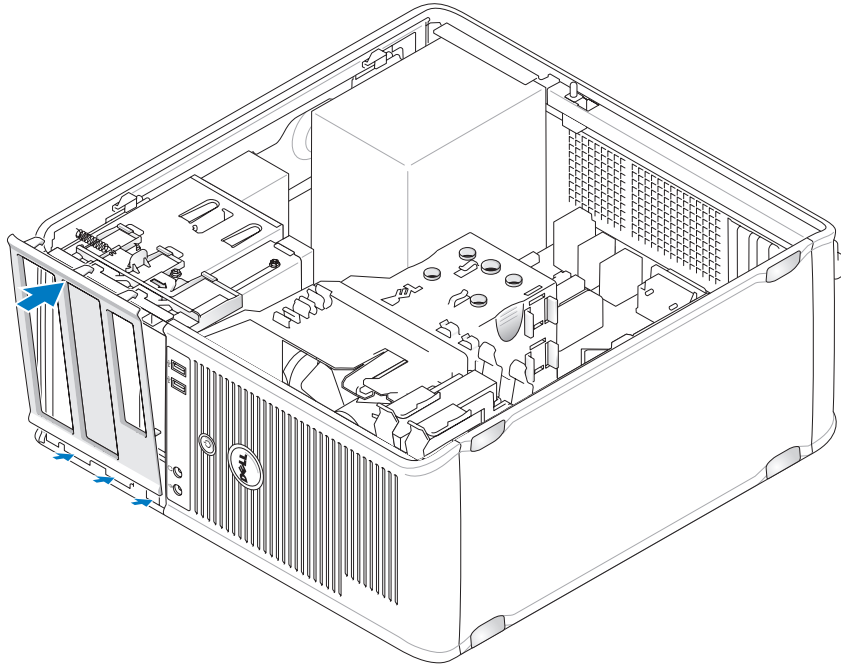


1 optical-drive panel insert

2 floppy-drive/media card
reader panel insert

3 holder for shoulder screws

- 5** Reattach the drive panel to the front of the computer.
The drive panel only fits one way.



Floppy Drive



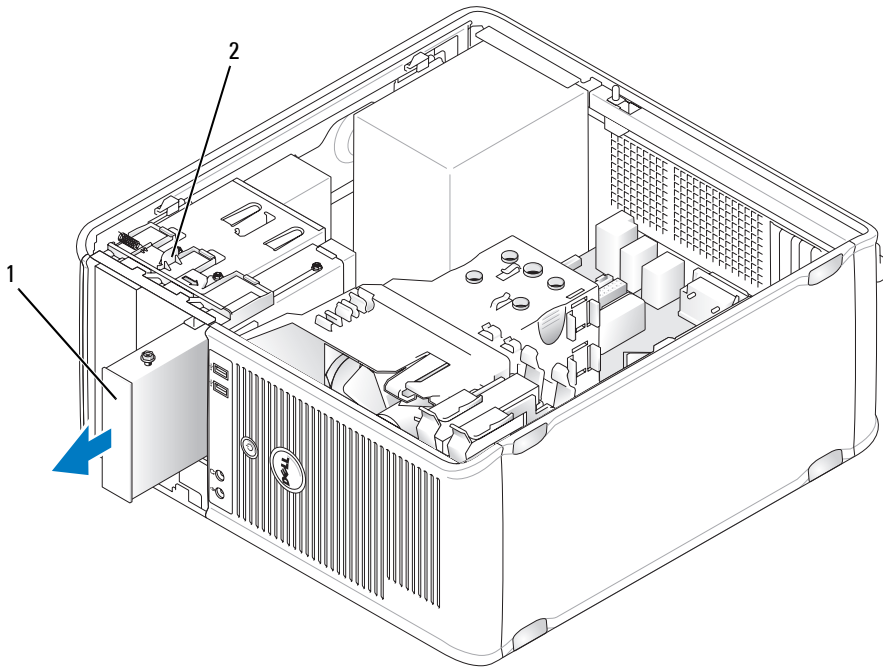
CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.



CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

Removing the Floppy Drive

- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 Remove the drive panel by sliding the drive release latch in the direction indicated on the latch to open the panel. Then remove it from the hinges.
- 3 Disconnect the power and floppy-drive cables from the back of the floppy drive.
- 4 Slide the drive release latch in the direction indicated on the latch until the floppy drive is released; while holding the latch open, slide the drive out of the computer.

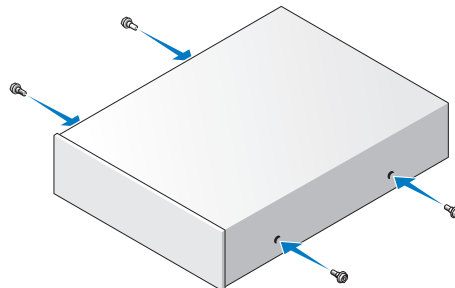


1 floppy drive

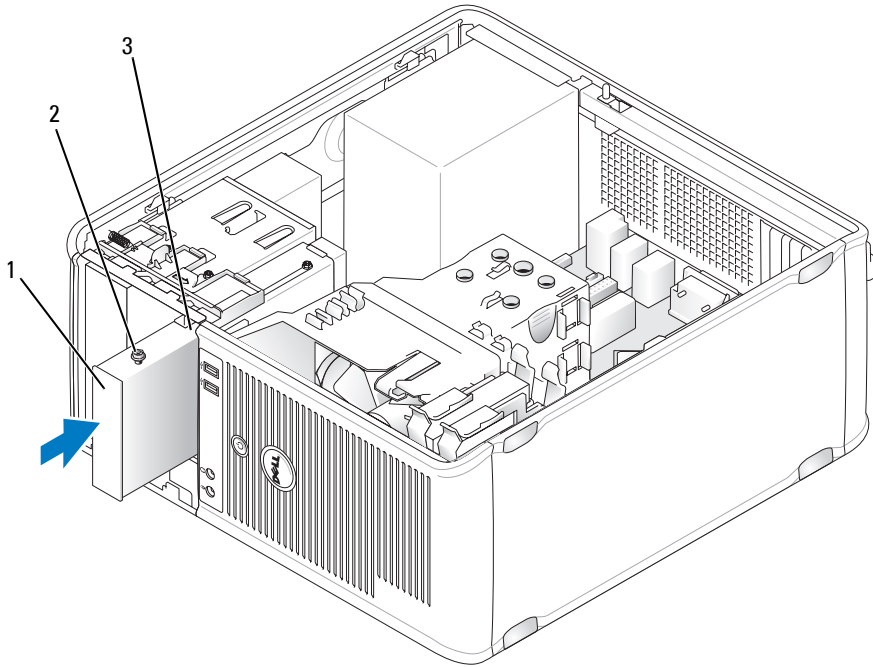
2 drive release latch

Installing the Floppy Drive

- 1 If you are replacing a floppy drive, remove the shoulder screws from the existing drive and attach the screws to the replacement drive.
- 2 If you are installing a new floppy drive, remove the drive-panel insert (see "Drive-Panel Inserts" on page 70) for your new drive, remove the shoulder screws from the inside of the drive-panel insert and attach the screws to the new drive.



- 3 Align the shoulder screws on the floppy drive with the shoulder screw slots, and gently slide the drive into the bay until it clicks into place.

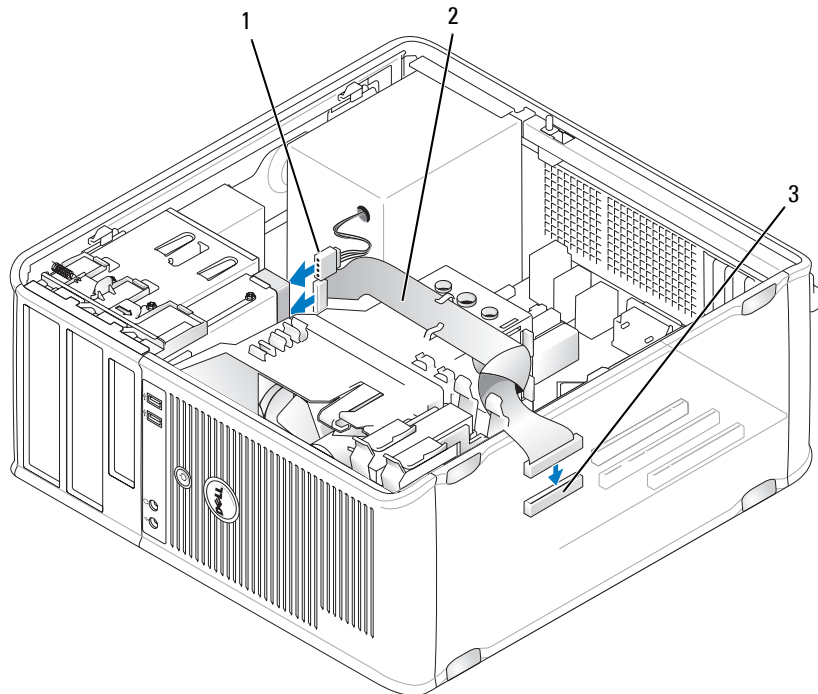


1 floppy drive

2 shoulder screws (4)

3 shoulder screw slots (2)

- 4 Attach the power and floppy-drive data cables to the floppy drive.
- 5 Connect the floppy-drive data cable to the DSKT connector on the system board (see "System Board Components" on page 28 for the connector location).
- 6 Install the drive panel to the front of the computer. The drive panel only fits one way (see "Drive-Panel Inserts" on page 70).



- 1 power cable 2 floppy-drive data cable 3 floppy-drive connector on system board (DSKT)

- 7 Replace the computer cover (see "Replacing the Computer Cover" on page 297).
- 8 Enter system setup and use the **Diskette Drive** option to enable your new floppy drive (see "Entering System Setup" on page 257).
- 9 Verify that your computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 327).

Media Card Reader

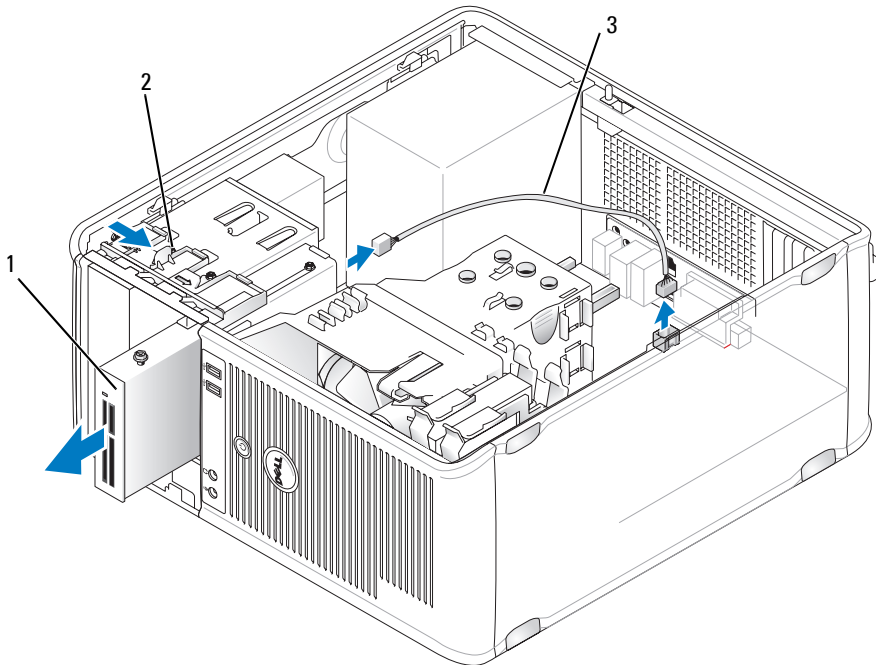
CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

Removing the Media Card Reader

- 1 Follow the procedures in "Before You Begin" on page 19.

- 2 Remove the drive panel by sliding the drive release latch in the direction indicated on the latch to open the panel. Then remove it from the hinges.
- 3 Disconnect the media card reader cable from the back of the media card reader.
- 4 Slide the drive release latch in the direction indicated on the latch until the media card reader is released; while holding the latch open, slide the device out of the computer.



1 media card reader

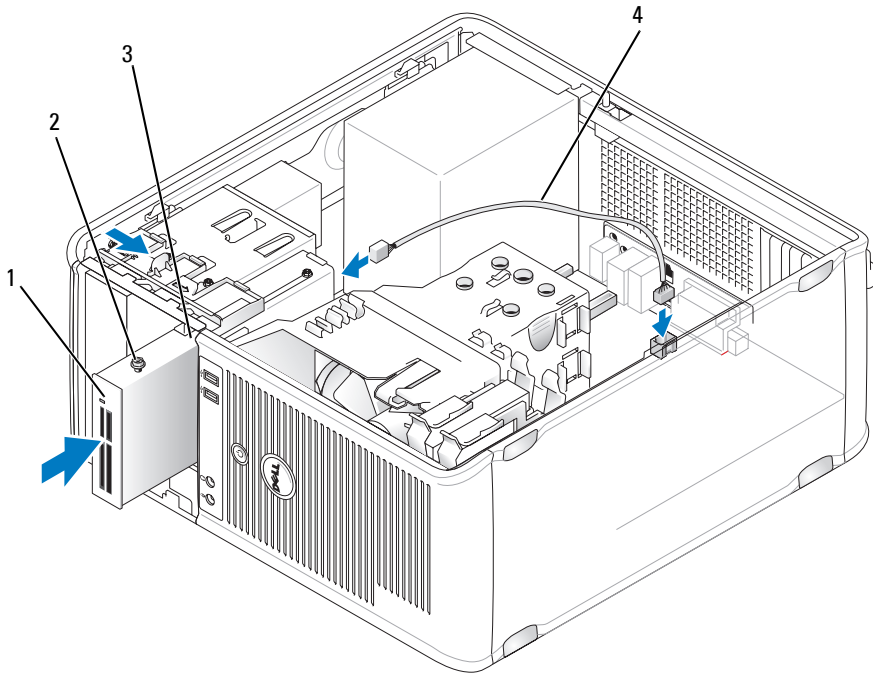
2 media card reader cable

3 drive release latch

Installing the Media Card Reader

- 1 If you are replacing a media card reader, remove the shoulder screws from the existing device and attach the screws to the replacement device.
- 2 If you are installing a new media card reader, remove the drive-panel insert (see "Drive-Panel Inserts" on page 70) for your new device, remove the shoulder screws from the inside of the drive-panel insert and attach the screws to the new device.
- 3 Align the shoulder screws on the media card reader with the shoulder screw slots, and gently slide the device into the bay until it clicks into place.
- 4 Attach the media card reader cable to the media card reader.

- 5 Connect the media card reader cable to the USB1 connector on the system board (see "System Board Components" on page 28 for the connector location).



- 1 media card reader 2 shoulder screws (4) 3 shoulder screw slots (2)
4 media card reader cable

- 6 Install the drive panel to the front of the computer. The drive panel only fits one way (see "Drive-Panel Inserts" on page 70).
- 7 Replace the computer cover (see "Replacing the Computer Cover" on page 297).
- 8 Enter system setup and use the **Diskette Drive** option to enable your new media card reader (see "Entering System Setup" on page 257).
- 9 Verify that your computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 327).

Optical Drive



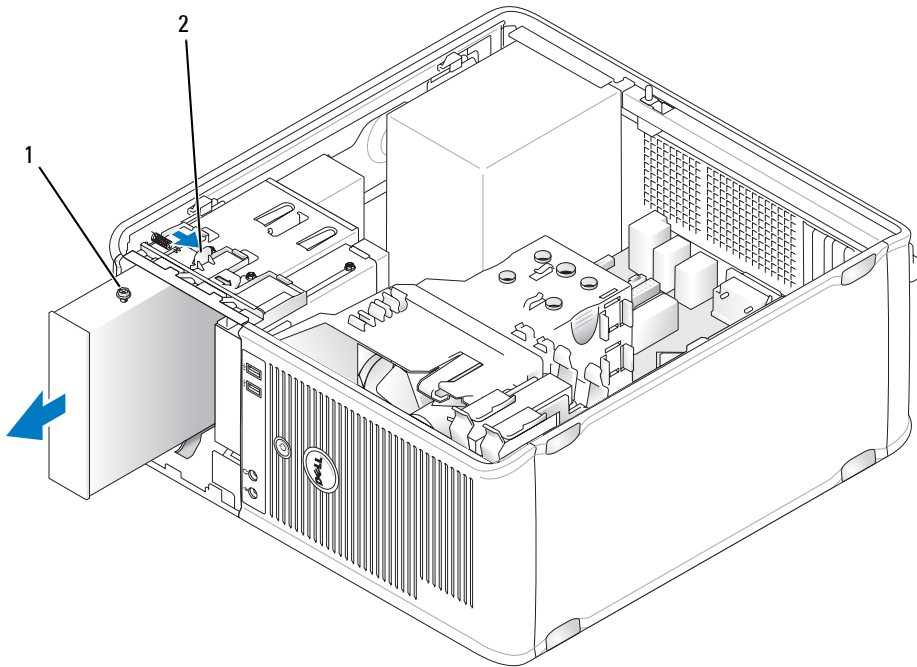
CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.



CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before replacing the cover.

Removing an Optical Drive

- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 Remove the drive panel by sliding the drive release latch in the direction indicated on the latch to open the panel. Then remove it from the hinges.
- 3 Disconnect the power and optical drive cables from the back of the drive.
- 4 Slide the drive release latch in the direction indicated on the latch until the optical drive is released; while holding the latch open, slide the drive out of the computer.



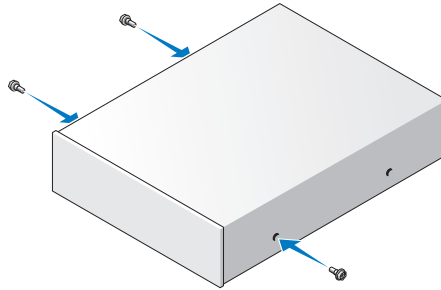
1 optical drive

2 drive release latch

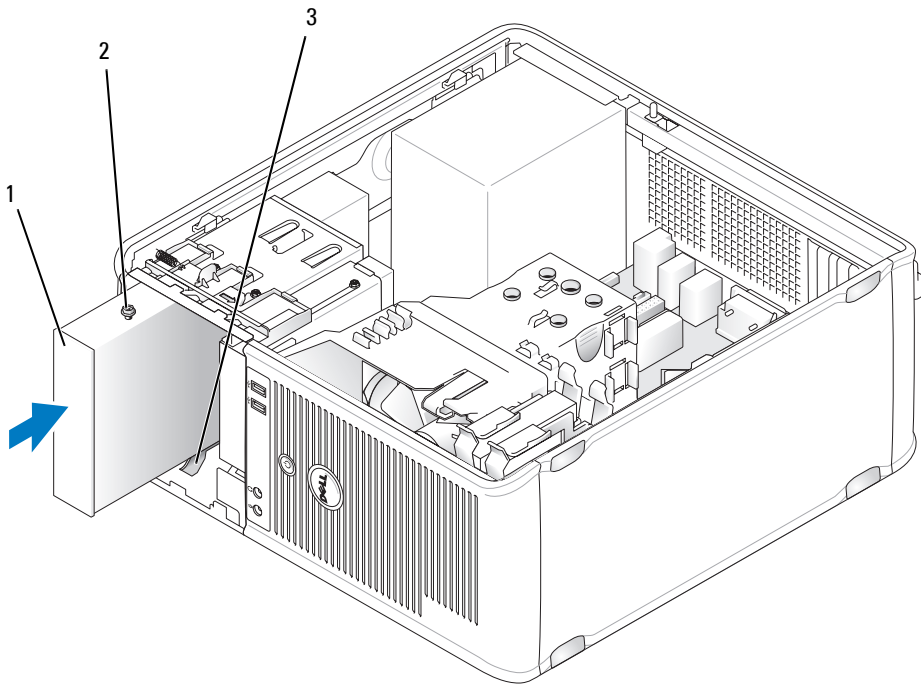
Installing an Optical Drive

- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 If you are replacing a optical drive, remove the shoulder screws from the existing drive and attach the screws to the replacement drive.

- 3** If you are installing a new optical drive, remove the drive-panel insert for your new drive (see "Drive-Panel Inserts" on page 70), remove the shoulder screws from the inside of the drive-panel insert, and attach the screws to the new drive.



- 4** Align the shoulder screws on the optical drive with the shoulder screw slots, and slide the drive into the bay until it clicks into place.



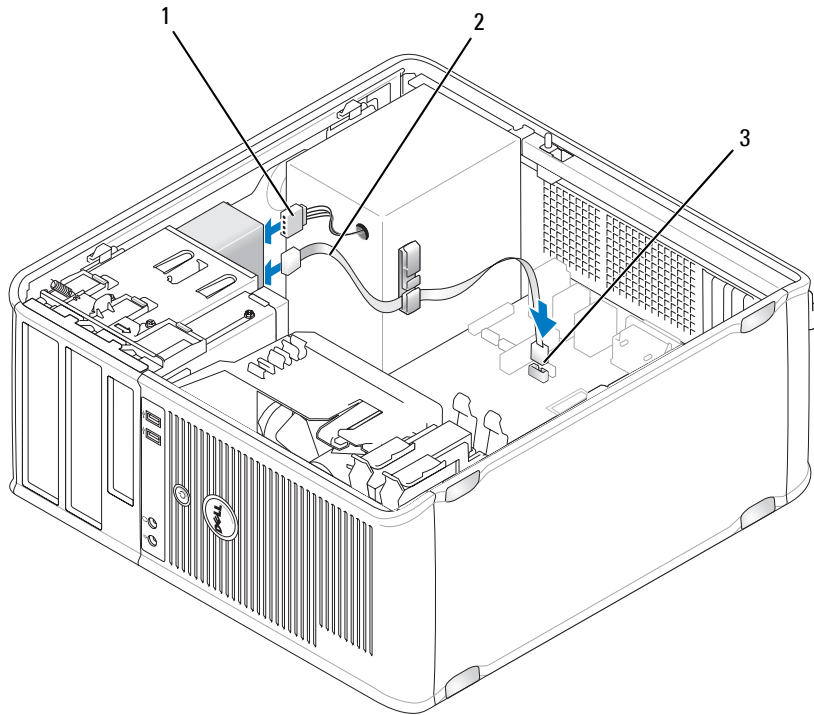
1 optical drive

2 shoulder screws (3)

3 shoulder screw slots (2)

- 5** Connect the power and optical drive cables to the drive.

- 6 Connect the drive cable to SATA2 or SATA3 on the system board (see "System Board Components" on page 28 for mini tower computers).



- 1 power cable 2 optical drive cable 3 optical drive connector (SATA)

See the documentation that accompanied the drive and controller card to verify that the configuration is correct for your computer. Change any settings necessary for correct configuration.

- 7 Check all cable connections, and fold cables out of the way to provide airflow for the fan and cooling vents.
- 8 Install the drive panel to the front of the computer. The drive panel only fits one way (see "Drive-Panel Inserts" on page 70).
- 9 Replace the computer cover (see "Replacing the Computer Cover" on page 297).
- 10 Update your configuration information in system setup (see "System Setup" on page 257) by setting the appropriate **Drive** option (0 or 1) under **Drives**.
- 11 Verify that your computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 327).

Processor



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.



NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

Removing the Processor

- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 Loosen the captive screw on each side of the heat sink assembly.

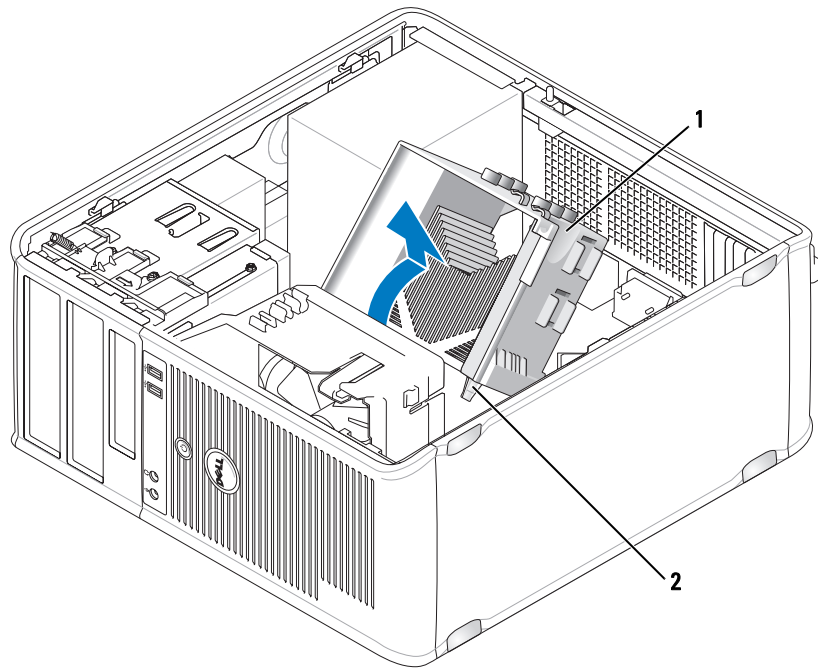


CAUTION: Despite having a plastic shield, the heat sink assembly may be very hot during normal operation. Be sure that it has had sufficient time to cool before you touch it.



NOTICE: Before rotating the heat sink assembly upward, twist the assembly side to side to help break the thermal grease bond between the heat sink and the processor. This is to prevent damage to the processor due to pulling the processor out of the socket while rotating the heat sink assembly upward.

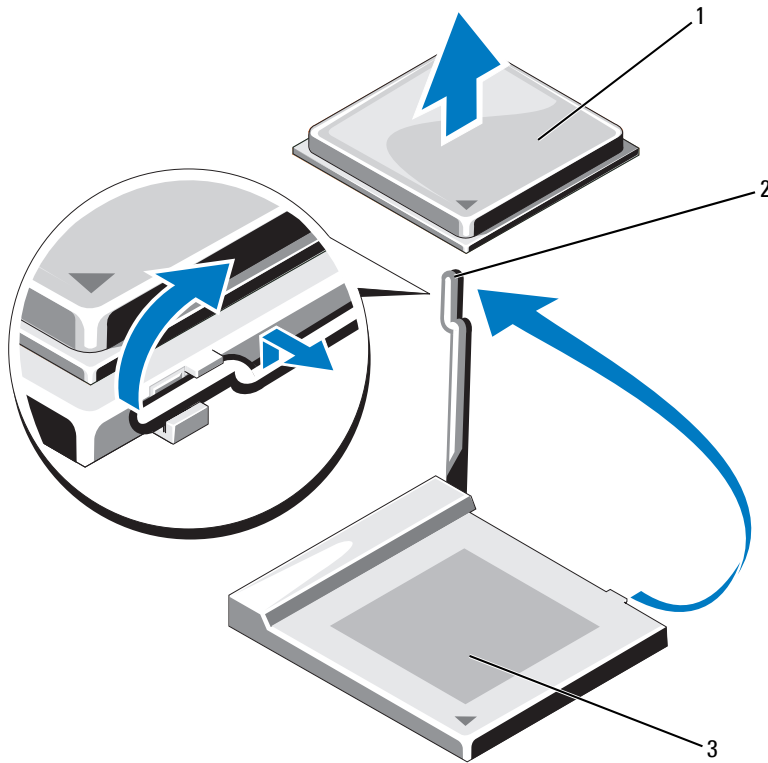
- 3 Rotate the heat sink assembly upward, and remove it from the computer.
Lay the heat sink assembly down on its top, with the thermal grease facing upward.



- 1 heat sink assembly 2 captive screw housings (2)

➔ NOTICE: Unless a new heat sink is required for the new processor, reuse the original heat sink assembly when you replace the processor.

- 4 Pull the release lever straight up until the processor is released.



1 processor

2 release lever

3 socket

➔ **NOTICE:** Be careful not to bend any of the pins when you remove the processor. Bending the pins can permanently damage the processor.

5 Remove the processor from the socket.

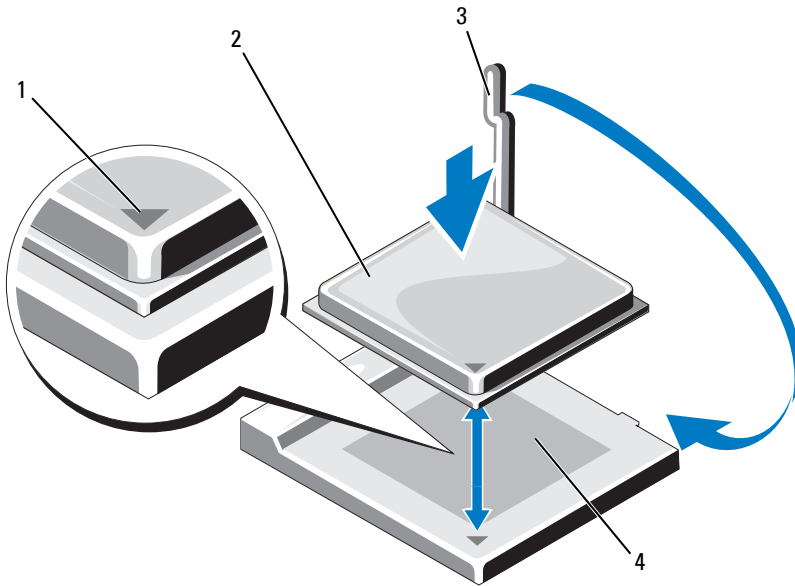
Leave the release lever extended in the release position so that the socket is ready for the new processor and go to "Installing the Processor" on page 85.

➔ **NOTICE:** After removing the processor, be careful not to get any thermal grease on the processor pins. Thermal grease on the pins can permanently damage the processor.

Installing the Processor

➔ **NOTICE:** Ground yourself by touching an unpainted metal surface on the back of the computer.

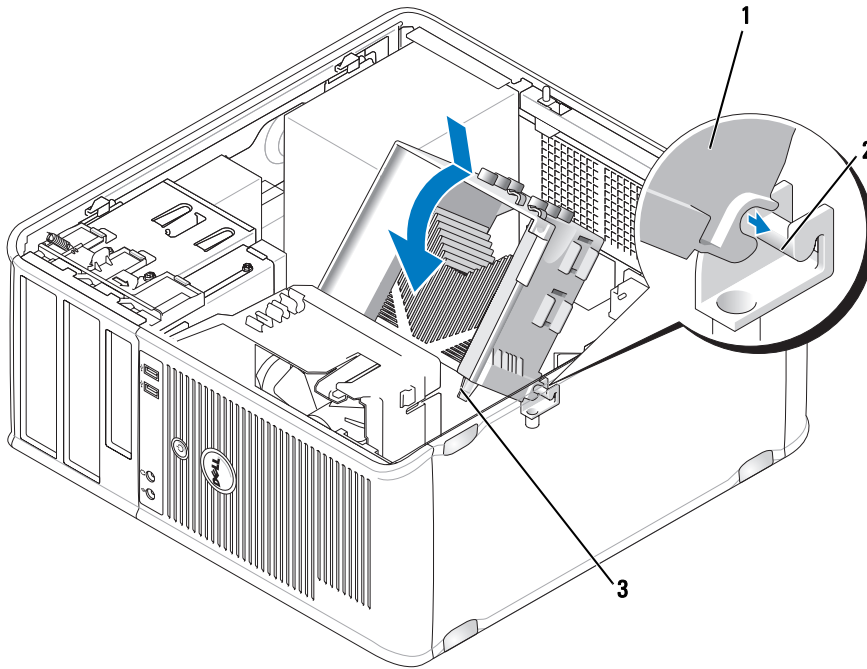
- ➡ **NOTICE:** When replacing the processor, do not bend any of the pins.
- 1 Follow the procedures in "Before You Begin" on page 19.
- ➡ **NOTICE:** Be careful not to bend any of the pins when you unpack the processor. Bending the pins can permanently damage the processor.
- 2 Unpack the new processor, being careful not to bend any of the processor pins.
- ➡ **NOTE:** You must position the processor correctly in the socket to avoid permanent damage to the processor and the computer when you turn on the computer.
- 3 If the release lever on the socket is not fully extended, move it to that position.
 - 4 Align the pin-1 corners of the processor and socket.



- 1 socket and processor pin-1 indicator 2 processor 3 release lever
- 4 processor socket

- ➡ **NOTICE:** To avoid damage, ensure that the processor aligns properly with the socket, and do not use excessive force when you install the processor.

- 5 Set the processor lightly in the socket and ensure that the processor is positioned correctly.
- 6 While lightly pressing down on the processor, rotate the release lever back toward the system board until it snaps into place, securing the processor.
- 7 Clean the thermal grease from the bottom of the heat sink.
- ➡ **NOTICE:** Ensure that you apply new thermal grease. New thermal grease is critical for ensuring adequate thermal bonding, which is a requirement for optimal processor operation.
- 8 Apply the new thermal grease to the top of the processor.
- ➡ **NOTICE:** Ensure that the CPU and audio cables are not routed so that they are pinched when the heat sink assembly is installed.
- 9 Install the heat sink assembly:
 - a Place the heat sink assembly back onto the heat-sink assembly bracket.
 - b Rotate the heat sink assembly down towards the computer base and ensure that the two captive screws are properly aligned with the holes in the system board.
 - c Tighten the two captive screws.
- ➡ **NOTICE:** Ensure that the heat sink assembly is correctly seated and secure.



- 1 heat sink assembly 2 heat-sink assembly bracket 3 captive screw housing (2)

10 Replace the computer cover (see "Replacing the Computer Cover" on page 297).

Power Supply

Replacing the Power Supply



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

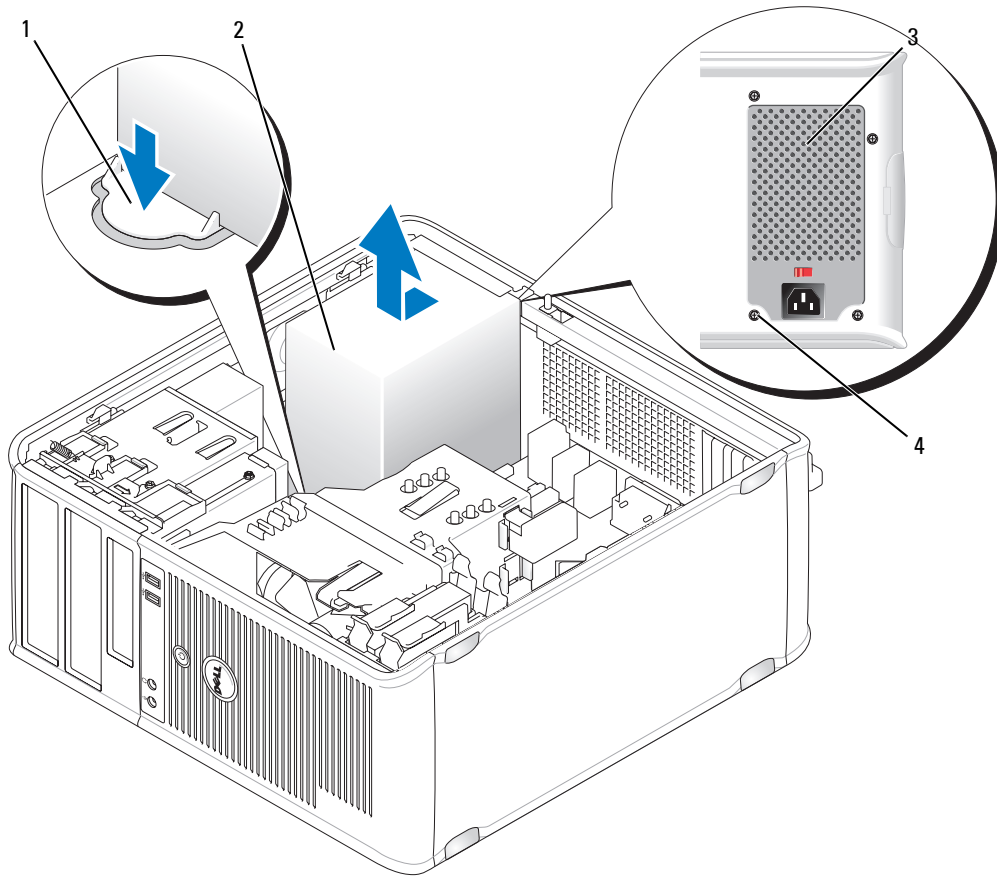


NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 Disconnect the DC power cables from the system board and the drives.

Note the routing of the DC power cables underneath the tabs in the computer chassis as you remove them from the system board and drives. You must route these cables properly when you replace them to prevent them from being pinched or crimped.

- 3 Remove the four screws that attach the power supply to the back of the computer chassis.
- 4 Press the release button located on the floor of the computer chassis.



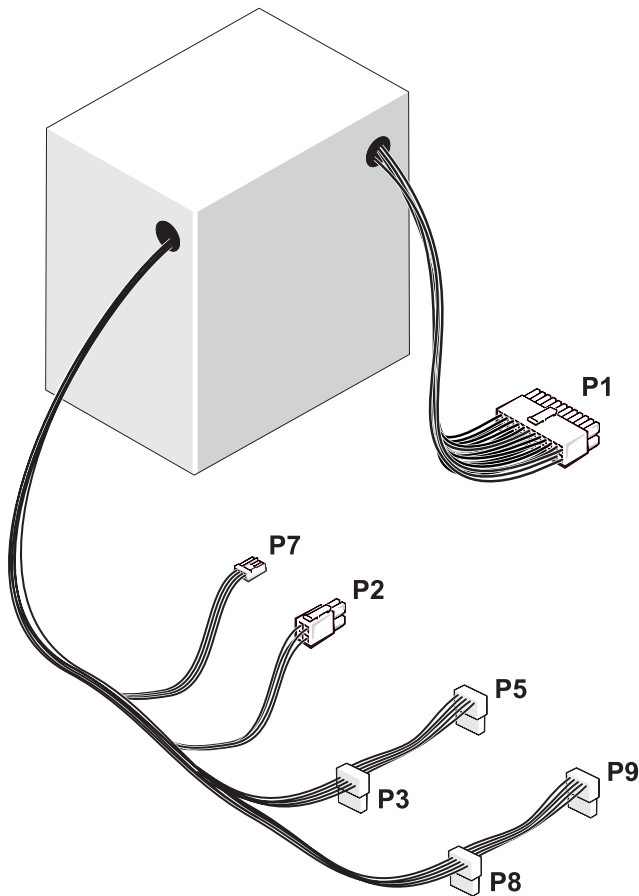
- 1 release button 2 power supply 3 screws (4)
4 AC power connector

- 5 Slide the power supply toward the front of the computer by approximately 1 inch.
- 6 Lift the power supply up and out of the computer.
- 7 Slide the replacement power supply into place.
- 8 Replace the screws that secure the power supply to the back of the computer chassis.

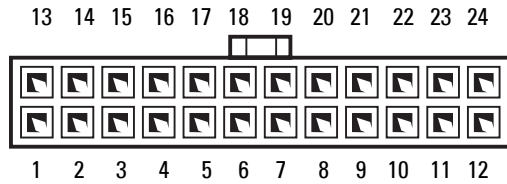
➔ NOTICE: Route the DC power cables under the chassis tabs. The cables must be properly routed to prevent the cables from being damaged.

- 9 Reconnect the DC power cables to the system board and drives.
- 10 Replace the computer cover (see "Replacing the Computer Cover" on page 297).
- 11 Connect the AC power cable to the AC power connector.

DC Power Connectors



DC Power Connector P1



Pin Number	Signal name	18-AWG Wire
1	+3.3 VDC	Orange
2	+3.3 VDC	Orange
3	GND	Black
4	+5 VDC	Red
5	GND	Black
6	+5 VDC	Red
7	GND	Black
8	PS_PWRGOOD	Gray
9	P5AUX	Purple
10	V_12P0_DIG	White
11	V_12P0_DIG	White

Pin Number	Signal name	18-AWG Wire
12	+3.3 VDC	Orange
13	+3.3VDC/SE*	Orange
14	-12 VDC	Blue
15	GND	Black
16	PWR_PS_ON	Green
17	GND	Black
18	GND	Black
19	GND	Black
20	NC	NC
21	+5 VDC	Red
22	+5 VDC	Red
23	+5 VDC	Red
24	GND	Black

DC Power Connector P2



Pin Number	Signal Name	18-AWG Wire
1	GND	Black
2	GND	Black
3	+12 VADC	Yellow
4	+12 VADC	Yellow

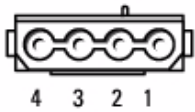
DC Power Connectors P3, P5, P8, and P9



Pin Number	Signal name	18-AWG Wire
1	+3.3 VDC	Orange
2	GND	Black
3	+5 VDC	Red

Pin Number	Signal name	18-AWG Wire
4	GND	Black
5	+12 VDC	White

DC Power Connector P7

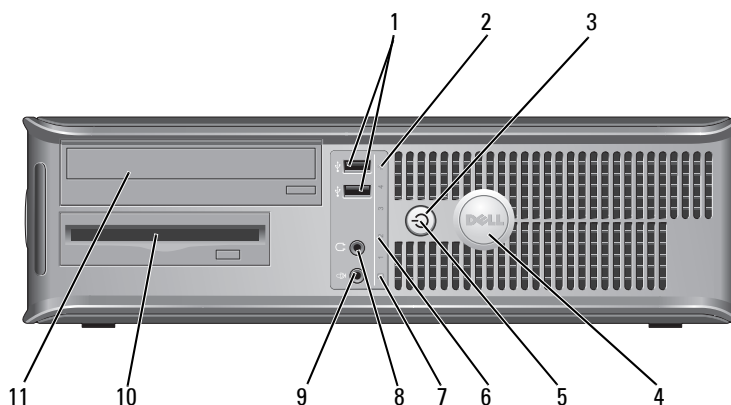


Pin Number	Signal Name	22-AWG Wire
1	+5 VDC	Red
2	GND	Black
3	GND	Black
4	+12 VADC	Yellow

Desktop Computer

About Your Desktop Computer

Front View



- | | | |
|---|------------------------|--|
| 1 | USB 2.0 connectors (2) | Use the front USB connectors for devices that you connect occasionally, such as joysticks or cameras, or for bootable USB devices (see "System Setup" on page 257 for more information about booting to a USB device).

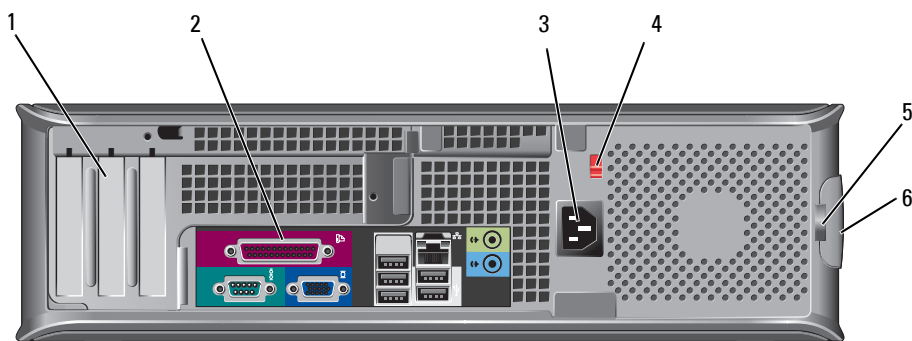
It is recommended that you use the back USB connectors for devices that typically remain connected, such as printers and keyboards. |
| 2 | LAN indicator light | This light indicates that a local area network (LAN) connection is established. |
| 3 | power button | Press this button to turn on the computer.

➡ NOTICE: To avoid losing data, do not turn off the computer by pressing the power button. Instead, perform an operating system shutdown. See "Turning Off Your Computer" on page 19 for more information.

➡ NOTICE: If your operating system has ACPI enabled, when you press the power button the computer will perform an operating system shutdown. |
| 4 | Dell badge | This badge can be rotated to match the orientation of your computer. To rotate, place fingers around the outside of the badge, press firmly, and turn the badge. You can also rotate the badge using the slot provided near the bottom of the badge. |

- | | | |
|----|---------------------------|---|
| 5 | power light | <p>The power light illuminates and blinks or remains solid to indicate different operating states:</p> <ul style="list-style-type: none"> • No light — The computer is turned off. • Steady green — The computer is in a normal operating state. • Blinking green — The computer is in a power-saving mode. • Blinking or solid amber — See "Power Problems" on page 321. <p>To exit from a power-saving mode, press the power button or use the keyboard or the mouse if it is configured as a wake device in the Windows Device Manager. For more information about sleep modes and exiting from a power-saving mode, see "Power Management" on page 267.</p> <p>See "System Lights" on page 329 for a description of light codes that can help you troubleshoot problems with your computer.</p> |
| 6 | diagnostic lights | Use the lights to help you troubleshoot a computer problem based on the diagnostic code. For more information, see "Diagnostic Lights" on page 330. |
| 7 | hard-drive activity light | This light flickers when the hard drive is being accessed. |
| 8 | headphone connector | Use the headphone connector to attach headphones and most kinds of speakers. |
| 9 | microphone connector | Use the microphone connector to attach a microphone. |
| 10 | floppy drive | Insert a floppy disk into this drive. |
| 11 | optical drive | Insert media (if supported) into this drive. |

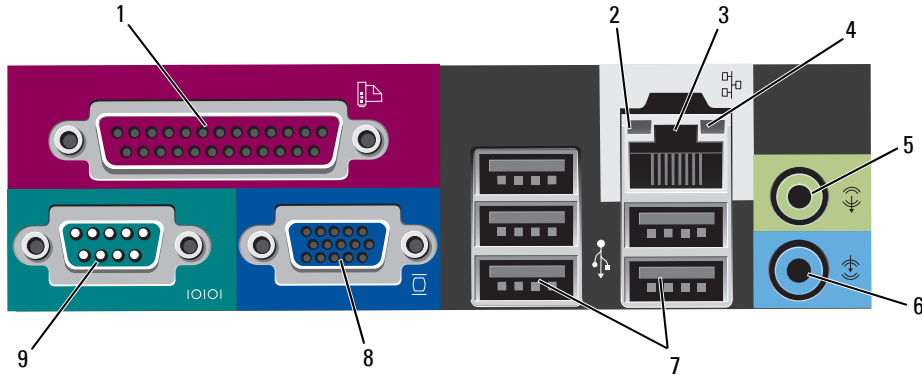
Back View



- | | | |
|---|-----------------------|---|
| 1 | card slots | Access connectors for any installed PCI and PCI Express cards. |
| 2 | back-panel connectors | Plug serial, USB, and other devices into the appropriate connectors (see "Back-Panel Connectors" on page 99). |
| 3 | power connector | Insert the power cable. |

- 4 voltage selection switch Your computer is equipped with a manual voltage-selection switch. To help avoid damaging a computer with a manual voltage selection switch, set the switch for the voltage that most closely matches the AC power available in your location.
- ➔ **NOTICE:** In Japan, the voltage selection switch must be set to the 115-V position even though the AC power available in Japan is 100 V.
- Also, ensure that your monitor and attached devices are electrically rated to operate with the AC power available in your location.
- 5 padlock ring Insert a padlock to lock the computer cover.
- 6 cover release latch Allows you to open the computer cover.

Back-Panel Connectors



- 1 parallel connector Connect a parallel device, such as a printer, to the parallel connector. If you have a USB printer, plug it into a USB connector.
- NOTE:** The integrated parallel connector is automatically disabled if the computer detects an installed card containing a parallel connector configured to the same address. For more information, see "System Setup Options" on page 258.
- 2 link integrity light
- Green — A good connection exists between a 10-Mbps network and the computer.
 - Orange — A good connection exists between a 100-Mbps network and the computer.
 - Yellow — A good connection exists between a 1-Gbps (or 1000-Mbps) network and the computer.
 - Off — The computer is not detecting a physical connection to the network.

- 3 network adapter connector To attach your computer to a network or broadband device, connect one end of a network cable to either a network jack or your network or broadband device. Connect the other end of the network cable to the network adapter connector on the back panel of your computer. A click indicates that the network cable has been securely attached.
- NOTE:** Do not plug a telephone cable into the network connector.
- On computers with a network connector card, use the connector on the card.
- It is recommended that you use Category 5 wiring and connectors for your network. If you must use Category 3 wiring, force the network speed to 10 Mbps to ensure reliable operation.
- 4 network activity light Flashes a yellow light when the computer is transmitting or receiving network data. A high volume of network traffic may make this light appear to be in a steady "on" state.
- 5 line-out connector Use the green line-out connector to attach headphones and most speakers with integrated amplifiers.
- On computers with a sound card, use the connector on the card.
- 6 line-in connector Use the line-in connector to attach a record/playback device such as a cassette player, CD player, or VCR.
- On computers with a sound card, use the connector on the card.
- 7 USB 2.0 connectors (5) Use the back USB connectors for devices that typically remain connected, such as printers and keyboards.
- 8 video connector Plug the cable from your VGA-compatible monitor into the blue connector.
- NOTE:** If you purchased an optional graphics card, this connector will be covered by a cap. Do not remove the cap. Connect your monitor to the connector on the graphics card.
- NOTE:** If you are using a graphics card that supports dual monitors, use the y-cable that came with your computer.
- 9 serial connector Connect a serial device, such as a handheld device, to the serial port. The default designations are COM1 for serial connector 1 and COM2 for serial connector 2.
- NOTE:** There is only a serial connector 2 if the optional PS2/serial adapter is used.
- For more information, see "System Setup Options" on page 258.

Inside Your Computer



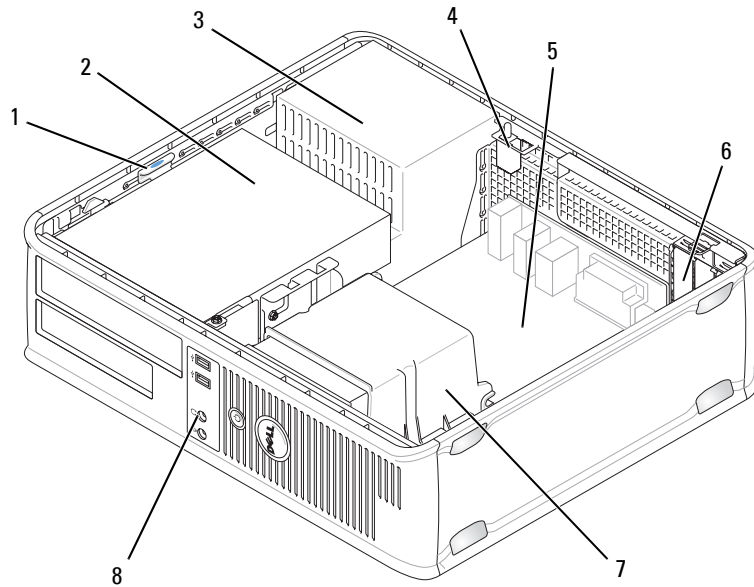
CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.



CAUTION: To avoid electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

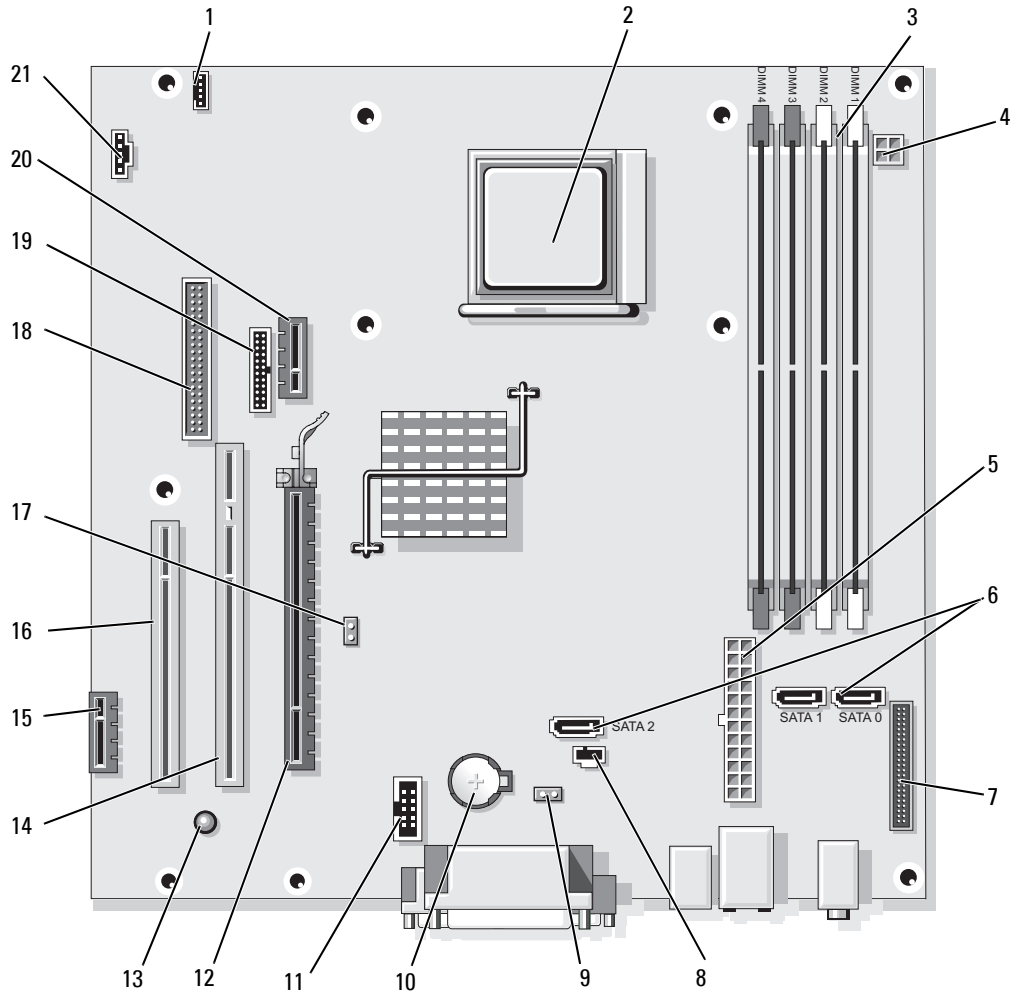


NOTICE: Be careful when opening the computer cover to ensure that you do not accidentally disconnect cables from the system board.



- | | | | | | |
|---|-------------------------------------|---|-----------------|---|--------------|
| 1 | drive release latch | 2 | optical drive | 3 | power supply |
| 4 | chassis intrusion switch (optional) | 5 | system board | 6 | card slots |
| 7 | heat sink assembly | 8 | front I/O panel | | |

System Board Components



1	speaker connector (INT_SPKR)	2	processor socket (CPU)	3	memory module connectors (DIMM_1, DIMM_2, DIMM_3, DIMM_4)
4	power connector (PW_12V_A1)	5	power connector (POWER1)	6	SATA drive connectors (SATA0, SATA1, SATA2)
7	front-panel connector (FRONTPANEL)	8	intrusion switch connector (INTRUDER)	9	CMOS reset jumper (RTCST)
10	battery socket (BATTERY)	11	internal USB (USB1)	12	PCI Express x16 connector (SLOT1)

13	standby (AUX_PWR_LED)	14	PCI connector (SLOT2)	15	PCI Express x1 connector (SLOT4)
16	PCI connector (SLOT3)	17	password jumper (PSWD)	18	floppy drive connector (DSKT)
19	serial connector (PS2/SER2)	20	optional DVI-card connector (DVI_HDR)	21	fan connector (FAN_CPU)

Desktop Computer (Model # DCNE) Specifications

Microprocessor

Microprocessor type	AMD Phenom™ processors NOTE: The AMD Phenom processor requires the 8-Mb NVRAM chip and is therefore available only on models that include the 8-Mb NVRAM chip. If your computer has the 8-Mb NVRAM chip and the AMD Phenom processor, the word <i>enhanced</i> appears in the title on the BIOS splash screen and the system setup program screens. AMD Athlon™ 64 X2 Dual-Core processor
Internal cache	AMD Athlon 64 AMD Phenom Quad-Core: 2-MB L2 dedicated cache and 2-MB shared L3 cache AMD Phenom Triple-Core: 1.5-MB L2 dedicated cache and 2-MB shared L3 cache AMD Athlon 64 X2: 2-MB L2 dedicated cache AMD Athlon 64 X2: 1-MB L2 dedicated cache AMD Athlon: 1-MB L2 dedicated cache AMD Athlon: 512-KB L2 dedicated cache

Memory

Type	533-, 667-, or 800-MHz DDR2 SDRAM
Memory connectors	4
Memory modules supported	256 MB, 512 MB, 1 GB, or 2 GB non-ECC
Minimum memory	dual-channel: 512 MB; single-channel: 256 MB
Maximum memory	8 GB

Computer Information

Chipset	nVidia GeForce 6150LE/Nforce 430
RAID support	RAID 0 and RAID 1 NOTE: RAID support is available only on select models.
Data bus width	64 bits

Computer Information

Address bus width	40 bits
DMA channels	eight
Interrupt levels	24
BIOS chip (NVRAM)	8 Mb or 4 Mb NOTE: The AMD Phenom processor requires the 8-Mb NVRAM chip and is therefore available only on models that include the 8-Mb NVRAM chip. If your computer has the 8-Mb NVRAM chip and the AMD Phenom processor, the word <i>enhanced</i> appears in the title on the BIOS splash screen and the system setup program screens.
NIC	integrated network interface with ASF 1.03 and 2.0 support as defined by DMTF Capable of 10/100/1000 communication

Video

Type	nVidia integrated video (DirectX 9.0c Shader Model 3.0 Graphics Processing Unit) or PCI Express x16 graphics card or DVI graphics card
------	--

Audio

Type	Sigma Tel 9200 CODEC (2.1 Channel Audio)
Stereo conversion	24-bit analog-to-digital; 24-bit digital-to-analog

Controllers

Drives	SATA controller supporting two 3.5-inch devices (two 3.5-inch hard drives supported)
--------	--

Expansion Bus

Bus type	PCI 2.3 PCI Express 1.0A SATA 1.0A and 2.0 USB 2.0
Bus speed	PCI: 133 MB/s PCI Express x16: 40 GB/s bidirectional speed SATA: 1.5 Gbps and 3.0 Gbps USB: 480 Mbps high speed, 12Mbps full speed, 1.2 Mbps low speed
Cards	half-length, full-height cards supported with optional riser-card cage

Expansion Bus

Default: no riser-card cage	low-profile cards supported
PCI	
connectors	two
card size	low profile
connector size	124 pins
connector data width (maximum)	32 bits
PCI Express	
connectors	one x16
card size	low profile
power	25 W maximum
connector size	164 pins (x16)
connector data width (maximum)	16 PCI Express lanes (x16)
Optional: full-height PCI Express riser-card cage	low-profile and full-height cards supported

Drives

Externally accessible	one 3.5-inch drive one bay for optical drive or optional second hard drive, supporting up to two 3.5-inch hard drives
Internally accessible	one bay for a 1-inch-high hard drive

Connectors

External connectors:

Serial	9-pin connector; 16550C-compatible
Parallel	25-hole connector (bidirectional)
Video	15-hole VGA connector
Network adapter	RJ45 connector
Optional PS/2 with secondary serial port adapter	two 6-pin mini-DINs NOTE: This option uses one of the PCI slots.
Optional DVI	36-pin connector NOTE: This option uses one of the PCI slots.

Connectors

USB	two front-panel and five back-panel USB 2.0-compliant connectors
Audio	two connectors for line-in and line-out; two front-panel connectors for headphones and microphone
System board connectors:	
SATA	three 7-pin connectors
Floppy drive	38-pin connector
Serial	24-pin connector for optional second serial port card
Fan	5-pin connector
PCI 2.3	two 124-pin connectors
PCIe-X16	164-pin connector
Internal USB	10-pin connector
Intrusion switch	3-pin connector
Speaker	5-pin connector
Memory modules	four 240-pin connector
Power 12V	4-pin connector
Power	24-pin connector
Battery	2-pin socket
Front panel	40-pin connector

Key Combinations

<Ctrl> <Alt> 	in Microsoft® Windows® XP and Windows Vista®, brings up the Windows Security window; in MS-DOS® mode, restarts (reboots) the computer
<F2> or <Ctrl> <Alt> <Enter>	starts embedded system setup (during system start-up only)
<Ctrl> <n>	starts the RAID setup menu if RAID is turned on in the system setup program
<F12> or <Ctrl> <Alt> <F8>	displays a boot device menu that allows the user to enter a device for a single boot (during system start-up only) as well as options to run hard-drive and system diagnostics

Controls and Lights

Power control	front panel — push button
---------------	---------------------------

Controls and Lights

Power light	green light. Blinking green indicates a sleep mode; solid green indicates a power-on state. amber light. Blinking amber indicates a problem with an installed device; solid amber indicates an internal power problem (see "Power Problems" on page 321).
Hard-drive access light	front panel — green
Link light	front panel — solid green light indicates network connection
Link integrity light (on integrated network adapter)	rear panel — green light for 10-Mb operation; orange light for 100-Mb operation; yellow light for a 1000-Mb (1-Gb) operation
Activity light (on integrated network adapter)	rear panel — yellow blinking light
Diagnostic lights	front panel — Four lights on the front panel. See "Diagnostic Lights" on page 330.
Standby power light	AUX_PWR on the system board

Power

DC power supply:	
Wattage	280 W
Heat dissipation	955.39 BTU/hr maximum
Voltage	manual selection power supplies — 90 to 135 V at 50/60 Hz; 180 to 265 V at 50/60 Hz
Backup battery	3-V CR2032 lithium coin cell

Physical

Height	11.4 cm (4.5 inches)
Width	39.9 cm (15.7 inches)
Depth	35.3 cm (13.9 inches)
Weight	10.4 kg (23 lb)

Environmental

Temperature:	
Operating	10° to 35°C (50° to 95°F)
Storage	-40° to 65°C (-40° to 149°F)
Relative humidity	20% to 80% (noncondensing)
Maximum vibration:	

Environmental

Operating	0.25 G at 3 to 200 Hz at 0.5 octave/min
Storage	0.5 G at 3 to 200 Hz at 1 octave/min
Maximum shock:	
Operating	bottom half-sine pulse with a change in velocity of 50.8 cm/sec (20 inches/sec)
Storage	27-G faired square wave with a velocity change of 508 cm/sec (200 inches/sec)
Altitude:	
Operating	-15.2 to 3048 m (-50 to 10,000 ft)
Storage	-15.2 to 10,668 m (-50 to 35,000 ft)
Airborne contaminant level	G2 or lower as defined by ISA-S71.04-1985

I/O Panel

Removing the I/O Panel



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.



CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.



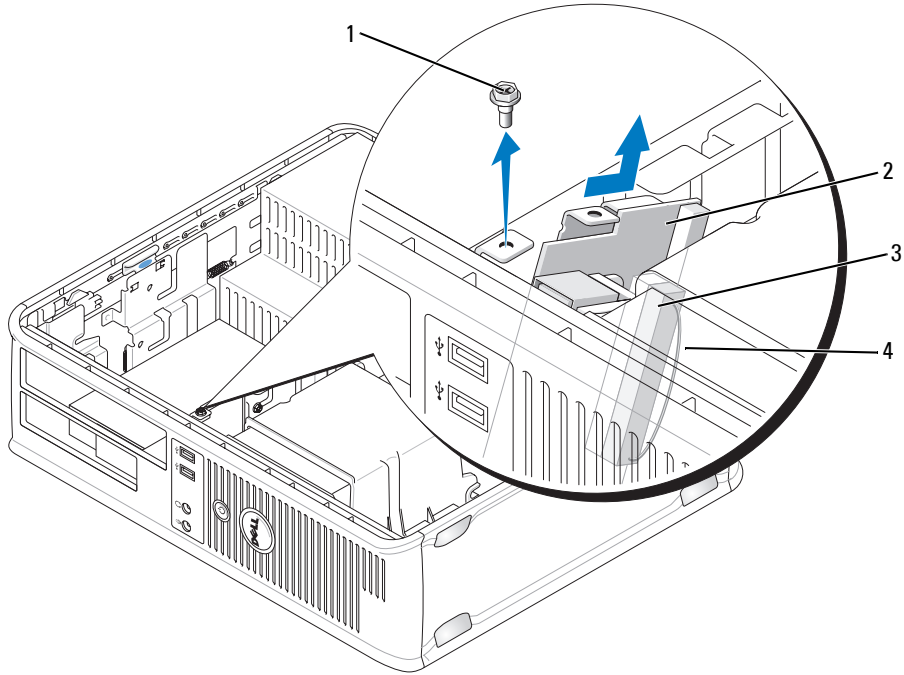
NOTE: Note the routing of all cables before disconnecting them, so that you can re-route them correctly when installing the new I/O panel.

- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 Remove the cable from the I/O panel by pulling on the pull-loop.
- 3 Remove the screw that secures the I/O panel to the desktop computer.



NOTICE: When sliding the I/O panel out of the computer, be extremely careful. Carelessness may result in damage to the cable connectors and the cable routing clips.

- 4 Gently rotate and slide the I/O panel away from the computer.



- 1 securing screw 2 I/O panel 3 I/O cable connector
4 I/O connector pull loop

Replacing the I/O Panel

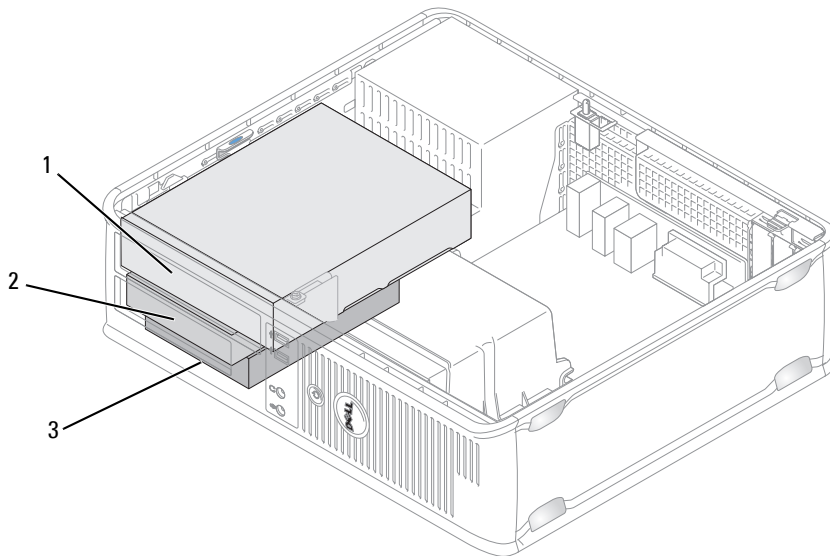
- 1 To replace the I/O panel, follow the removal procedures in the reverse order.

 **NOTE:** Use the guides on the I/O panel bracket to help position the I/O panel in place and use the notch on the I/O panel bracket to help seat the card.

Drives

Your computer supports:

- One SATA hard drive
- One optional floppy drive or media card reader or one second SATA hard drive
- One optional optical (CD or DVD) drive



1 optical drive

2 floppy drive or media card
reader or SATA hard drive

3 hard drive

General Installation Guidelines

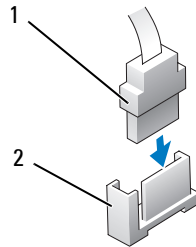
Connect the SATA hard drive to the connector labeled "SATA0." Connect the SATA CD or DVD drives to the connector labeled "SATA1" on the system board. Connect a second optional hard drive to the connector labeled "SATA2." See "System Board Components" on page 102 for information about system board connectors.

Connecting Drive Cables

When you install a drive, you connect two cables—a DC power cable and a data cable—to the back of the drive and to the system board.

Drive Interface Connectors

Serial ATA Connector

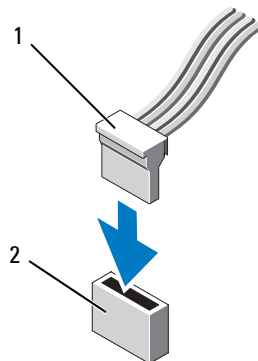


- 1 interface cable connector 2 interface connector

Interface connectors are keyed for correct insertion.

Power Cable Connectors

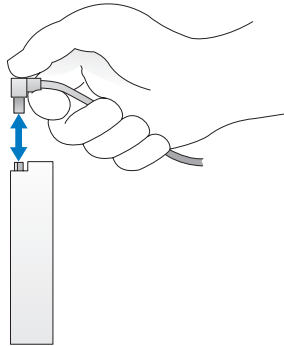
Serial ATA Power Connector



- 1 power cable 2 power input connector

Connecting and Disconnecting Drive Cables

When connecting and disconnecting a SATA data cable, hold the cable by the black connector at each end.



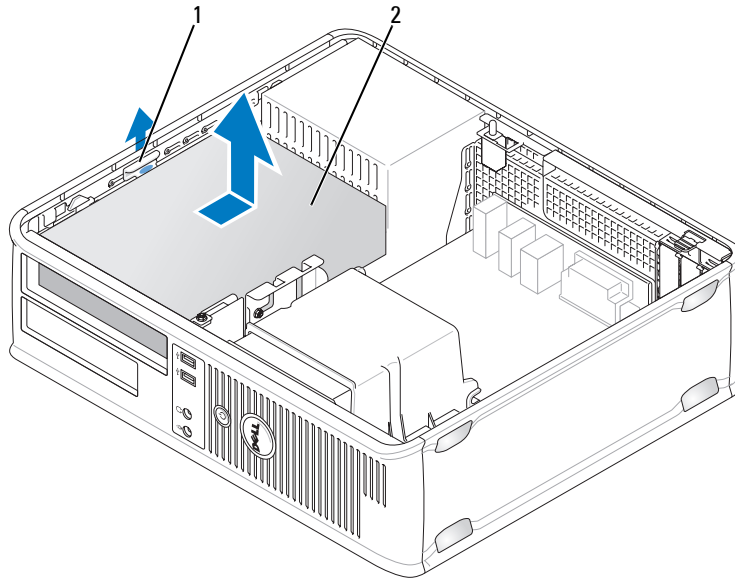
Optical Drive

⚠ CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

⚠ CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

Removing an Optical Drive

- 1 Follow the procedures in "Before You Begin" on page 21.
- 2 Remove the computer cover (see "Removing the Computer Cover" on page 168).
- ➡ NOTICE:** Do not pull the drive out of the computer by the drive cables. Doing so may cause damage to cables and the cable connectors.
- 3 Pull up on the drive release latch and slide the drive towards the back of the computer. Then lift up to remove the drive from the computer.



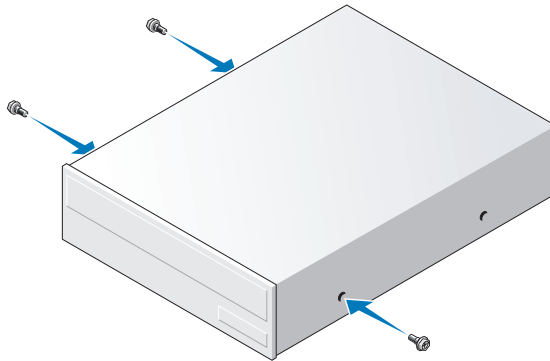
- 1 drive release latch
- 2 optical drive

- 4 Disconnect the power and data cables from the back of the drive.
- 5 If you are not replacing the optical drive at this time, install the optical drive insert by lowering it into the drive bay until it clicks into place. Contact Dell if you need a drive bay insert.

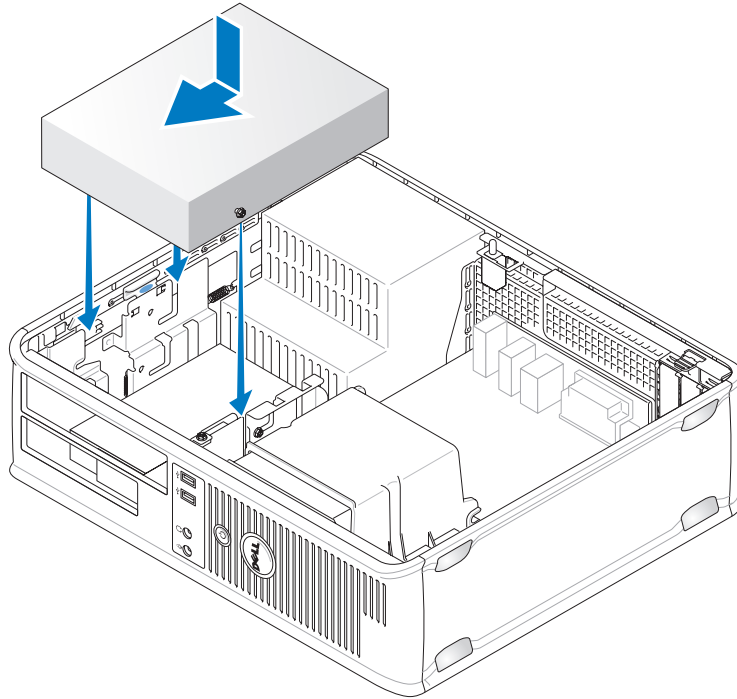
Installing an Optical Drive

- 1 Unpack the drive and prepare it for installation.
Check the documentation that accompanied the drive to verify that the drive is configured for your computer.
- 2 Pull up on the drive-release latch and slide the drive towards the back of the computer. Then, lift up to remove the drive from the computer.
- 3 If you are installing a new drive:
 - a Remove the inserts.
 - b Insert the three shoulder screws removed from the insert into the sides of the new drive and tighten them.

- c** Lift the drive release latch up and insert the new optical device.
- 4** If you are replacing an existing drive:
 - a** Follow procedures in "Removing an Optical Drive" on page 115 to remove the existing drive.
 - b** Remove the three shoulder screws from the existing drive.
 - c** Insert the three shoulder screws into the sides of the new drive and tighten them.



- 5** Connect the power and data cables to the drive.
- 6** Align the shoulder screws with the screw guides, and slide the drive into the bay until it clicks into place.



- 7 Check all cable connections, and fold cables out of the way to provide airflow for the fan and cooling vents.
- 8 Replace the computer cover (see "Replacing the Computer Cover" on page 317).
- 9 Update your configuration information by setting the appropriate **Drive** option (0 or 1) under **Drives**. See "Entering System Setup" on page 257 for more information.
- 10 Verify that your computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 327).

Floppy Drive




CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.




CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

Removing a Floppy Drive

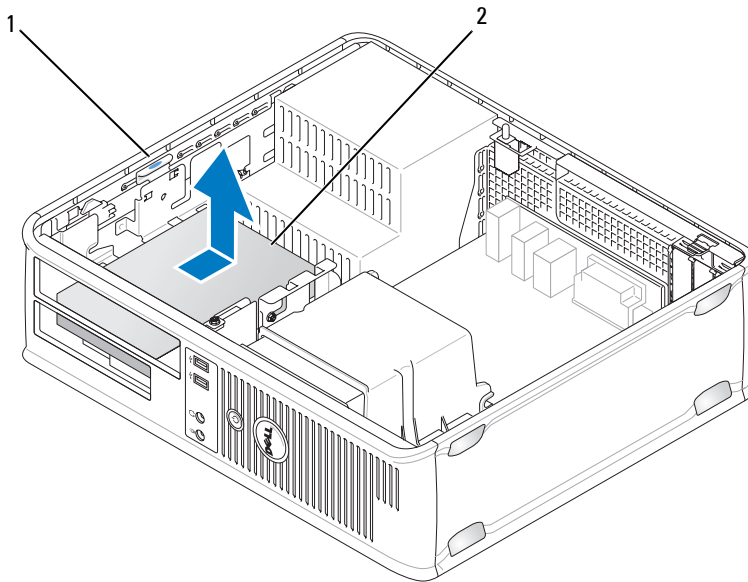
1 Follow the procedures in "Before You Begin" on page 19.

 **NOTE:** Since the following steps do not require the complete removal of the optical drive, it is not necessary to disconnect the cables connecting the optical drive.

2 Remove the optical drive (see "Removing an Optical Drive" on page 115) and carefully set it aside.

 **NOTICE:** Do not pull the drive out of the computer by the drive cables. Doing so may cause damage to cables and the cable connectors.

3 Pull up on the drive release latch and slide the floppy drive towards the back of the computer. Then, lift up to remove the drive from the computer.



1 drive release latch

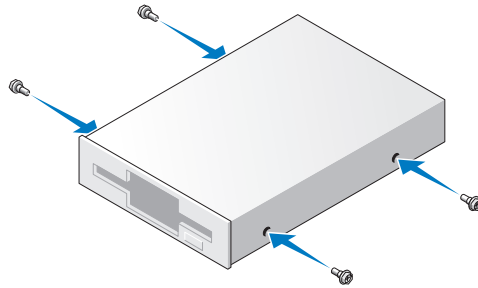
2 floppy drive

4 Disconnect the power and data cables from the back of the floppy drive.

Installing a Floppy Drive

1 If you are installing a new drive:

- a** Use a small flat-edge screw driver on the back side of the drive-panel insert to gently pop off the insert.
 - b** Remove the four shoulder screws from the drive-panel insert.
- 2** If you are replacing an existing drive:
Remove the four shoulder screws from the existing drive.
- 3** Insert the four shoulder screws into the sides of the new floppy drive and tighten them.



- 4** Attach the power and floppy-drive cables to the floppy drive.
- 5** Connect the floppy drive cable to the DSKT connector on the system board (see "System Board Components" on page 28 for the connector locations).
- 6** Align the shoulder screws with the screw guides, and slide the drive into the bay until it clicks into place.



CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

Removing the Media Card Reader

1 Follow the procedures in "Before You Begin" on page 19.



NOTE: Since the following steps do not require the complete removal of the optical drive, it is not necessary to disconnect the cables connecting the optical drive.

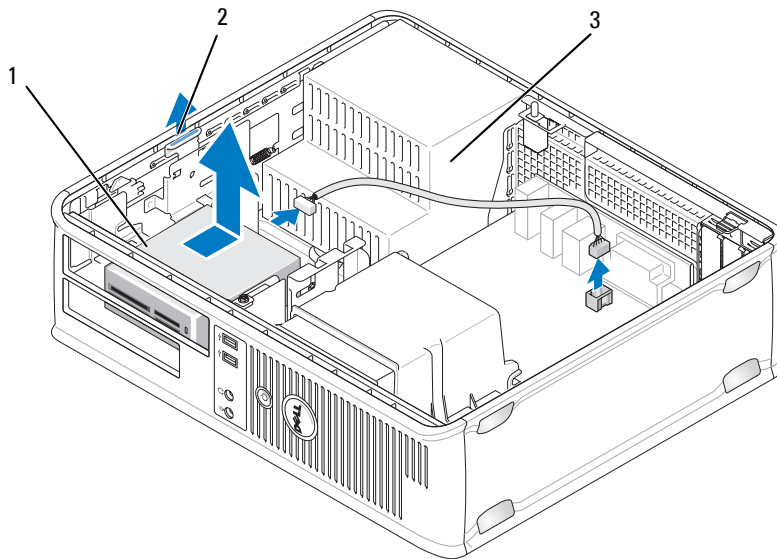
2 Remove the optical drive (see "Removing an Optical Drive" on page 115) and carefully set it aside.



NOTICE: Do not pull the drive out of the computer by the drive cables. Doing so may cause damage to cables and the cable connectors.

3 Pull up on the drive release latch and slide the media card reader towards the back of the computer. Then, lift up to remove the media card reader from the computer.

4 Disconnect the media card reader cable from the back of the media card reader.



1 media card reader

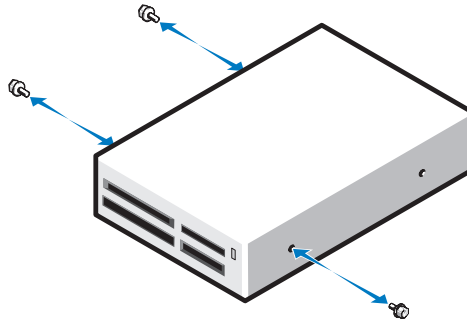
2 drive release latch

3 media card reader cable

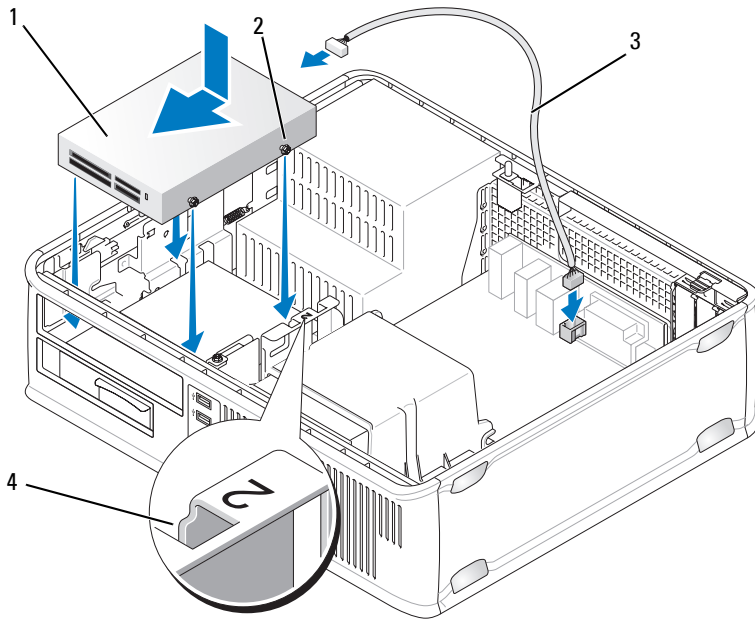
Installing the Media Card Reader

- 1** If you are installing a new media card reader:
 - a** Use a small flat-edge screw driver on the back side of the drive-panel insert to gently pop off the insert.
 - b** Remove the four shoulder screws from the drive-panel insert.
- 2** If you are replacing an existing media card reader:

Remove the four shoulder screws from the existing media card reader.
- 3** Insert the four shoulder screws into the sides of the new media card reader and tighten them.



- 4** Attach the media card reader cable to the media card reader.
- 5** Connect the card reader cable to the USB1 connector on the system board (see "System Board Components" on page 102 for the connector location).
- 6** Align the shoulder screws with the screw guides numbered as 2, and slide the media card reader forward into the bay until it clicks into place.



- 1 media card reader 2 shoulder screws (4) 3 media card reader cable
4 shoulder screw slots (2)

- 7** Replace the optical drive (see "Installing an Optical Drive" on page 116).
- 8** Check all cable connections, and fold cables out of the way to provide airflow for the fan and cooling vents.
- 9** Replace the computer cover (see "Replacing the Computer Cover" on page 297).
- 10** Enter system setup and set the **Diskette Drive** option to enable your new media card reader (see "Entering System Setup" on page 257).
- 11** Verify that your computer works correctly by running theDell Diagnostics (see "Dell Diagnostics" on page 327).

Hard Drive



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.



CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.



NOTICE: To avoid damage to the drive, do not set it on a hard surface. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.



NOTE: If you have two hard drives installed, see "Removing and Replacing a Second Hard Drive" on page 129 for removal and replacement instructions for the second hard drive.

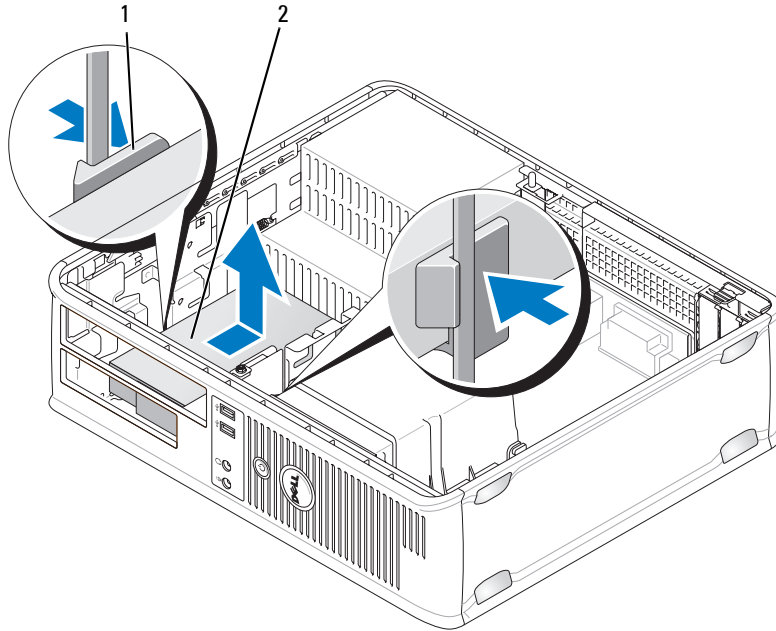
Removing the Hard Drive

- 1 If you are replacing a hard drive that contains data you want to keep, back up your files before you begin this procedure.
- 2 Follow the procedures in "Before You Begin" on page 19.



NOTE: Since the following steps do not require the complete removal of the optical drive and the floppy drive, it is not necessary to disconnect the cables connecting the two drives.

- 3 Remove the optical drive (see "Removing an Optical Drive" on page 115) from the bay and carefully set it aside.
- 4 Remove the floppy drive, media card reader, or second hard drive, if installed, (see "Removing a Floppy Drive" on page 119, "Removing the Media Card Reader" on page 122, or "Removing and Replacing a Second Hard Drive" on page 129) and carefully set it aside.
- 5 Squeeze the two plastic securing clips on each side of the hard drive and slide the drive towards the back of the computer.



- 1 securing clips (2) 2 hard drive

➔ **NOTICE:** Do not pull the drive out of the computer by the drive cables. Doing so may cause damage to cables and the cable connectors.

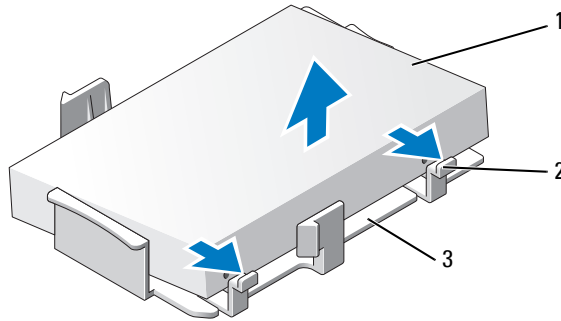
- 6 Lift the drive out of the computer and disconnect the power and hard-drive cables from the drive.

Installing a Hard Drive

- 1 Unpack the replacement hard drive, and prepare it for installation.

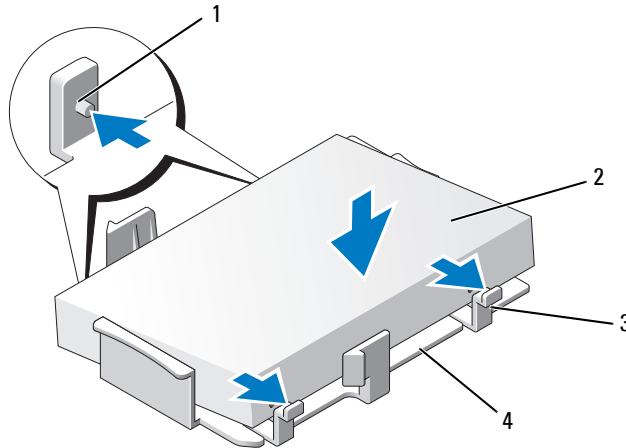
➔ **NOTICE:** To avoid damage to the drive, do not set it on a hard surface. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.

- 2 If your replacement hard drive does not have the plastic hard-drive bracket attached, remove the bracket from the existing drive by unsnapping it from the drive.



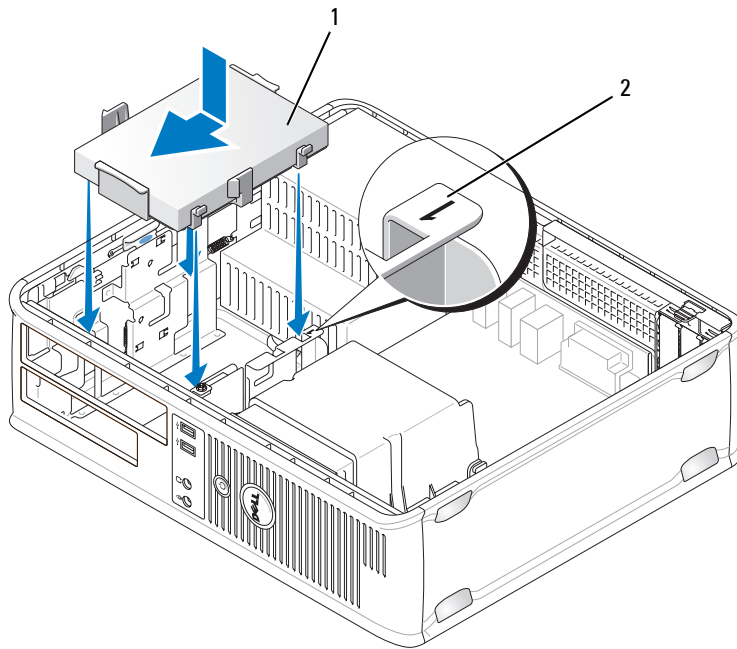
1 hard drive 2 release tabs (2) 3 plastic hard-drive bracket

3 Attach the bracket to the new drive by aligning the two securing tabs with the mounting holes in the hard drive and then rotating the drive down, snapping it onto the bracket



1 securing tabs (2) 2 drive 3 release tabs (2)
4 plastic hard-drive bracket

4 Connect the power and data cables to the drive.
5 Locate the correct slot for the drive, and slide the drive into the bay until it clicks into place.



- 1 hard drive 2 slot verification number

- 6 Replace the floppy drive, media card reader, or second hard drive (see "Installing a Floppy Drive" on page 119, "Installing the Media Card Reader" on page 123, or "Removing and Replacing a Second Hard Drive" on page 129).
- 7 Replace the optical drive (see "Installing an Optical Drive" on page 116).
- 8 Check all connectors to be certain that they are properly cabled and firmly seated.
- 9 Replace the computer cover (see "Replacing the Computer Cover" on page 297).
- 10 If the drive you just installed is the primary drive, insert a bootable medium into your boot drive.
- 11 Turn on the computer.
- 12 Enter system setup and update the appropriate **Primary Drive** option (0 or 2) (see "Entering System Setup" on page 257).
- 13 Exit system setup, and reboot the computer.
- 14 Partition and logically format your drive before you proceed to the next step.

For instructions, see the documentation that came with your operating system.

- 15 Verify that your computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 327).
- 16 Install your operating system on the hard drive.
For instructions, see the documentation that came with your operating system.

Removing and Replacing a Second Hard Drive

For information on RAID configuration, see "About RAID Configurations" on page 268



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.



CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.



NOTICE: To avoid damage to the drive, do not set it on a hard surface. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.

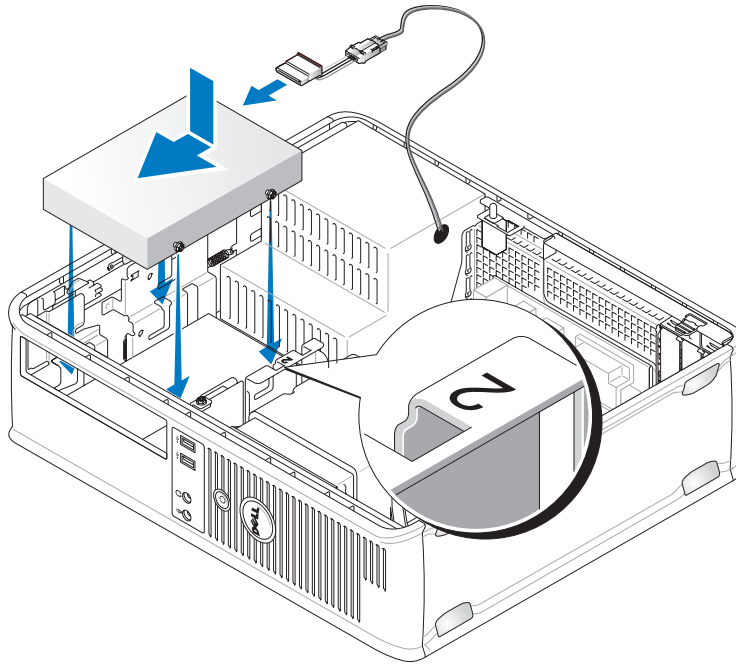


NOTICE: If you are replacing a hard drive that contains data you want to keep, back up your files before you begin this procedure.



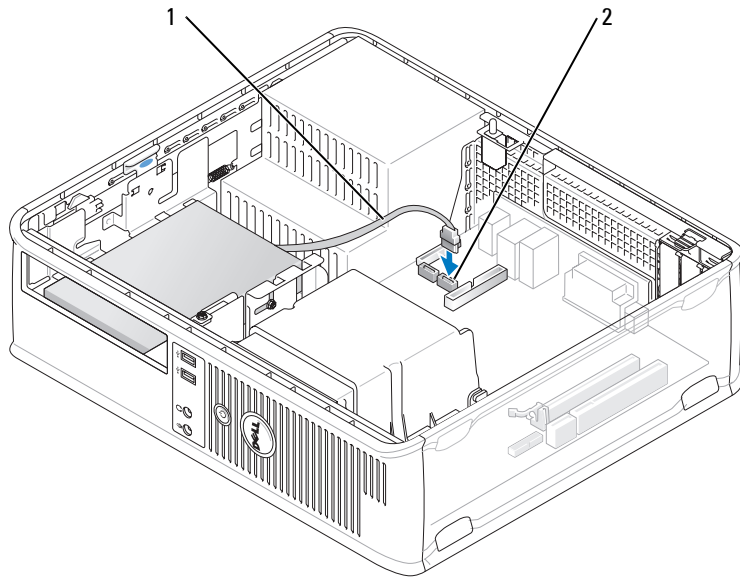
NOTE: Installation of a second hard drive is restricted to certain configurations of the desktop computer.

- 1 Check the documentation or the drive to verify that it is configured for your computer.
- 2 Follow the procedures in "Before You Begin" on page 21.
- 3 Remove the computer cover (see "Removing the Computer Cover" on page 90).
- 4 Remove the optical drive (if your configuration has one) (see "Removing an Optical Drive" on page 115).
- 5 To remove the second hard drive:
 - a Pull up on the drive release latch and slide the hard drive towards the back of the computer.
 - b Disconnect the data and power cables from the back of the drive.
 - c Then, lift up to remove the drive from the computer.
- 6 To replace the second hard drive:
 - a Align the shoulder screws with the screw guides, and slide the drive into the bay until it clicks into place.
 - b Connect the power and data cables to the back of the drive.





7 Ensure that the data cable from the second hard drive remains connected to the SATA1 connector on the system board.

➡ NOTICE: Always connect the data cable to the SATA1 connector when installing (replacing) a second hard drive.




1 data cable

2 hard drive system board connector

- 8 Replace the optical drive (if your configuration has one). See "Installing an Optical Drive" on page 116.
- 9 Replace the computer cover (see "Replacing the Computer Cover" on page 317).
- 10 Turn on the computer.
- 11 If you have installed a replacement second hard drive, complete step 12 through step 16.
- 12 Enter system setup, and update the SATA port option under the **Drives** option list (see "Entering System Setup" on page 257).
- 13 Exit system setup, and reboot the computer.
- 14 Partition and logically format your drive.
 **NOTE:** For instructions, see the documentation that came with your operating system.
- 15 Test the hard drive by running the Dell Diagnostics (see "Dell Diagnostics" on page 327).
- 16 Install your operating system on the (new) second hard drive.
 **NOTE:** For instructions, see the documentation that came with your operating system.


PCI, PCI Express Cards, and PS/2 Serial Port Adapters

 **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

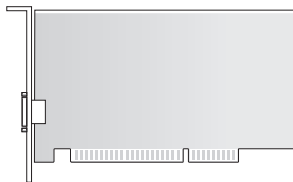
 **NOTICE:** To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

Your Dell™ computer supports a PS/2 serial port adapter and provides the following connectors for PCI and PCI Express cards:

- Two low-profile PCI card slots
- One low-profile PCI Express x16 card slot


 **NOTE:** Your Dell computer uses only PCI and PCI Express slots. ISA cards are not supported.

PCI Cards




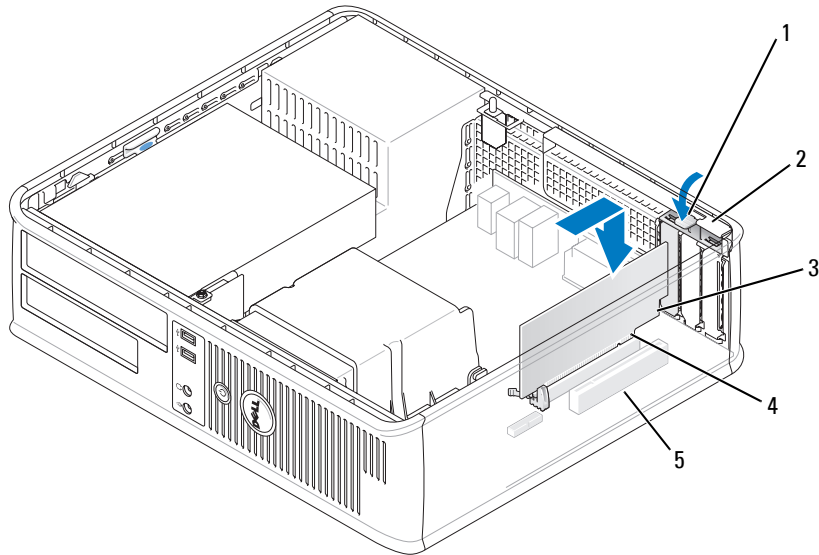
Installing a PCI Card

- 1 Follow the procedures in "Before You Begin" on page 19.

 **NOTE:** For PCI card locations, see "System Board Components" on page 102.

- 2 Gently lift the release tab on the card retention latch from the inside to pivot the latch open. Pivot the latch until it snaps into the open position.
- 3 If you are installing a new card, remove the filler bracket to create a card-slot opening. Then continue with step 5.
- 4 If you are replacing a card that is already installed in the computer, remove the card (see "Removing a PCI Card" on page 138). If necessary, disconnect any cables connected to the card. Then continue with step 6.
- 5 Prepare the card for installation.

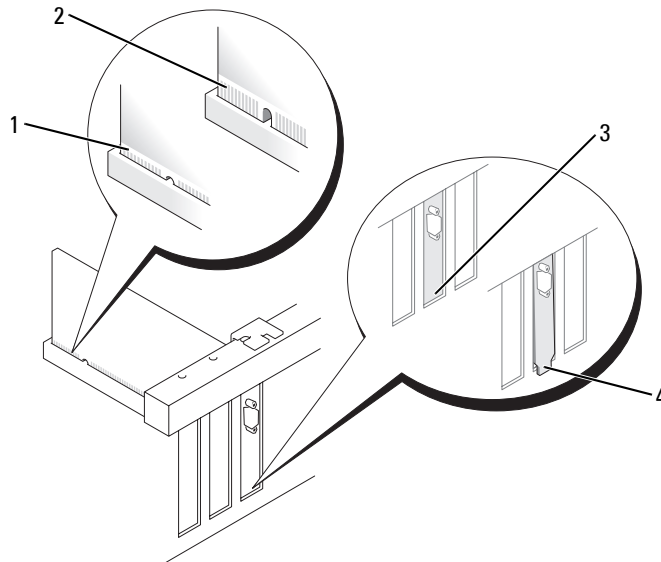
 **NOTE:** See the documentation that came with the card for information on configuring the card, making internal connections, or customizing it for your computer.



- | | | | | | |
|---|---------------------|---|----------------------|---|------|
| 1 | release tab | 2 | card retention latch | 3 | card |
| 4 | card-edge connector | 5 | card connector | | |

 **CAUTION:** Some network adapters automatically start the computer when they are connected to a network. To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any cards.

- 6 Place the card in the connector and press down firmly. Ensure that the card is fully seated in the slot.



- 1 fully seated card 2 not fully seated card 3 bracket within slot
 4 bracket caught outside of slot

7 Secure the card(s) by closing the card retention latch and snapping it into place.

➔ **NOTICE:** Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

8 Connect any cables that should be attached to the card.

9 Replace the computer cover (see "Replacing the Computer Cover" on page 297).

✍ **NOTE:** See the documentation for the card for information about the card's cable connections.

10 If you installed a sound card:

- a Enter system setup, select **Integrated Audio** from the **Onboard Devices** group, and change the setting to **Off** (see "System Setup" on page 257).
- b Connect external audio devices to the sound card's connectors. Do not connect external audio devices to the line-in connector on the back panel of the computer (see "Back-Panel Connectors" on page 99).

➔ NOTICE: To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

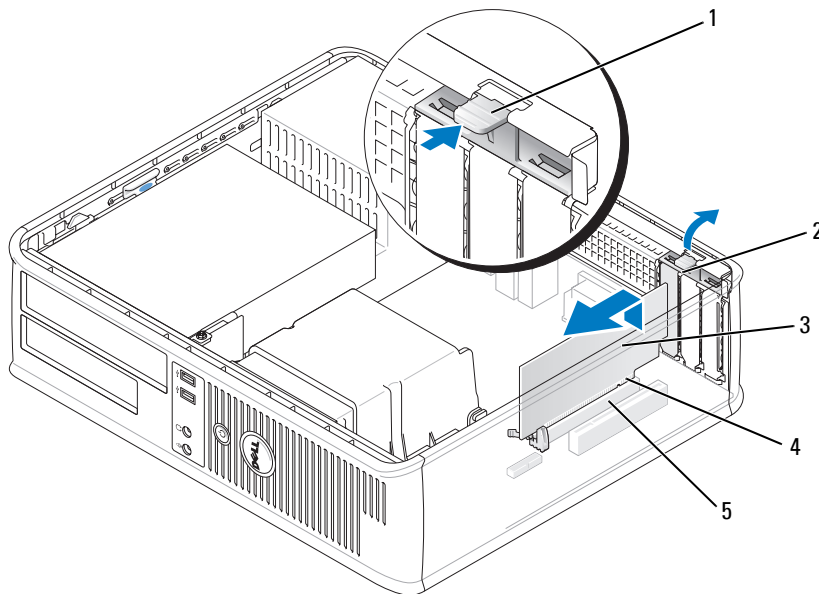
- 11 If you installed a network adapter card and want to turn off the integrated network adapter:
 - a Enter system setup, select **Integrated NIC** from the **Onboard Devices** group, and change the setting to **Off** (see "System Setup" on page 257).
 - b Connect the network cable to the network adapter card's connectors. Do not connect the network cable to the integrated network connector on the back panel of the computer.
- 12 Install any drivers required for the card as described in the card documentation.

Removing a PCI Card

- 1 Follow the procedures in "Before You Begin" on page 19.


✎ NOTE: For PCI card locations, see "System Board Components" on page 102.

- 2 Gently lift the release tab on the card retention latch from the inside to pivot the latch open. Pivot the latch until it snaps into the open position.
- 3 If necessary, disconnect any cables connected to the card.
- 4 Grasp the card by its top corners, and ease it out of its connector.




- | | | | | | |
|---|---------------------|---|----------------------|---|------|
| 1 | release tab | 2 | card retention latch | 3 | card |
| 4 | card-edge connector | 5 | card connector | | |

5 If you are removing the card permanently, install a filler bracket in the empty card-slot opening.

 **NOTE:** Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets also keep dust and dirt out of your computer.

6 Before you close the card retention mechanism, ensure that:

- The tops of all cards and filler brackets are flush with the alignment bar.
- The notch in the top of the card or filler bracket fits around the alignment guide.

 **NOTICE:** Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.


7 Secure any remaining card(s) by closing the card retention latch and snapping it into place.

8 Replace the computer cover (see "Replacing the Computer Cover" on page 297).

9 Uninstall the card's driver. See the documentation that came with the card for instructions.

10 If you removed a sound card:

- a Enter system setup, select **Integrated Audio** from the **Onboard Devices** group, and change the setting to **On** (see "System Setup" on page 257).
- b Connect external audio devices to the audio connectors on the back panel of the computer.

 **NOTICE:** To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

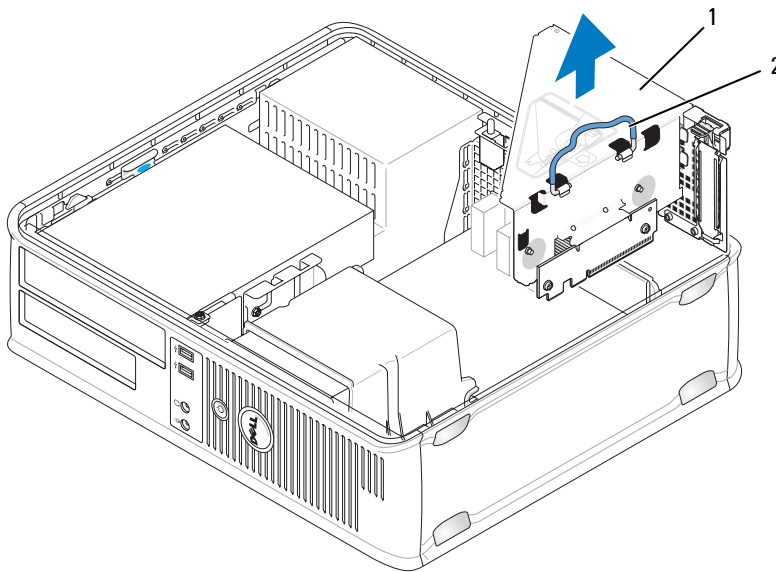
11 If you removed an network-adapter card connector:

- a Enter system setup, select **Integrated NIC** from the **Onboard Devices** group, and change the setting to **On** (see "System Setup" on page 257).
- b Connect the network cable to the integrated network connector on the back panel of the computer.

Installing a PCI Card in the Riser-Card Cage


- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 If applicable, remove the card installed in the PCI3 connector on the system board (see "Removing a PCI Card" on page 138).
- 3 Remove the riser-card cage:

- a Check any cables connected to cards through the back-panel openings. Disconnect any cables that will not reach the riser-card cage once they are removed from the computer.
- b Rotate the riser-card cage handle up and gently pull on the handle and lift the riser-card cage up and away from the computer.




- 1 riser-card cage 2 handle

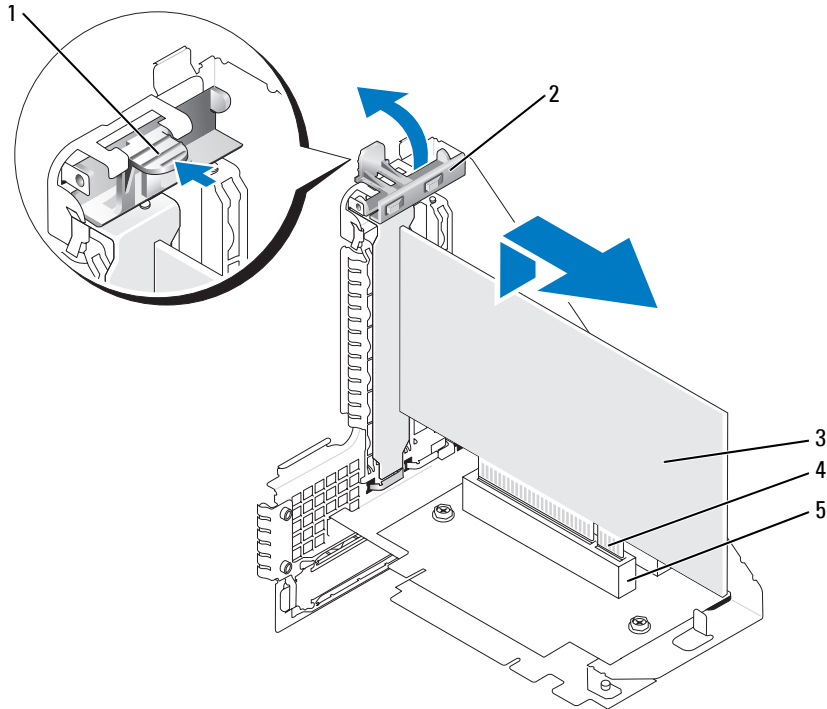
- 4 If you are installing a new card, remove the filler bracket to create an empty card-slot opening.
- 5 If you are replacing a card that is already installed in the computer, remove the card.
- 6 If necessary, disconnect any cables connected to the card.
- 7 Grasp the card by its corners, and ease it out of its connector.

 **NOTE:** See the documentation that came with the card for information on configuring the card, making internal connections, or customizing it for your computer.

- 8 Prepare the new card for installation.

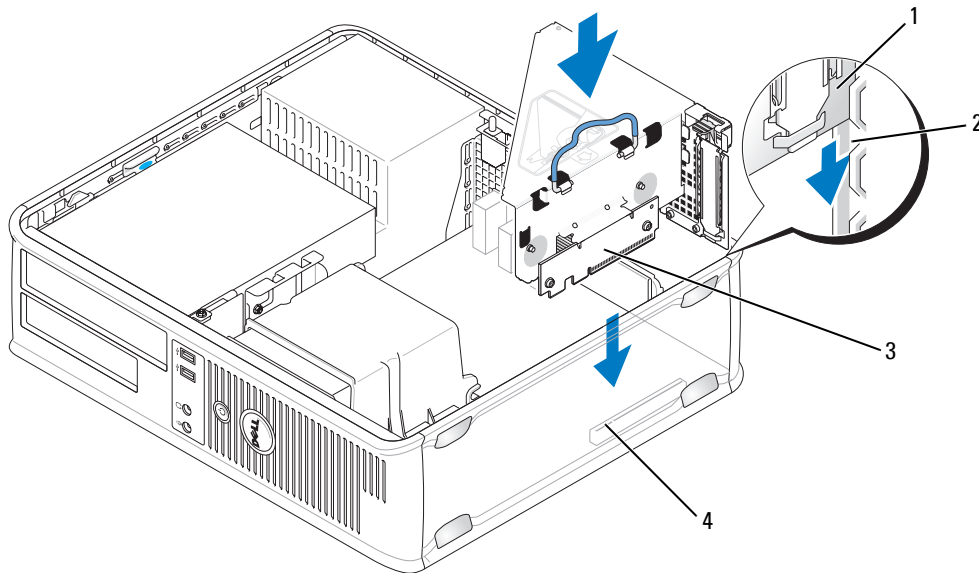
 **CAUTION:** Some network adapters automatically start the computer when they are connected to a network. To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any cards.

- 9** Gently lift the release tab on the card retention latch from the inside to pivot the latch open. Pivot the latch until it snaps into the open position.



- | | | | | | |
|---|---------------------|---|----------------------|---|------|
| 1 | release tab | 2 | card retention latch | 3 | card |
| 4 | card-edge connector | 5 | card connector | | |

- 10** Insert the card firmly into the card connector on the riser-card cage.
- 11** Secure the card(s) by closing the card retention latch and snapping it into place.
- 12** Replace the riser-card cage:
- a** Align the tabs in the side of the riser-card cage with the slots on the side of the computer, and slide the riser-card cage down into place.
 - b** Ensure that the riser-card connectors are fully seated in the connectors on the system board.
 - c** Rotate the riser-card cage handle to the down position.



- 1 riser-card cage 2 slots 3 riser cards (2)
 4 system board connectors (2)

13 Reconnect any cables that you removed in step 3.

➡ NOTICE: Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

14 Connect any cables that should be attached to the card.

15 Replace the computer cover (see "Replacing the Computer Cover" on page 297).

16 If you installed a sound card:

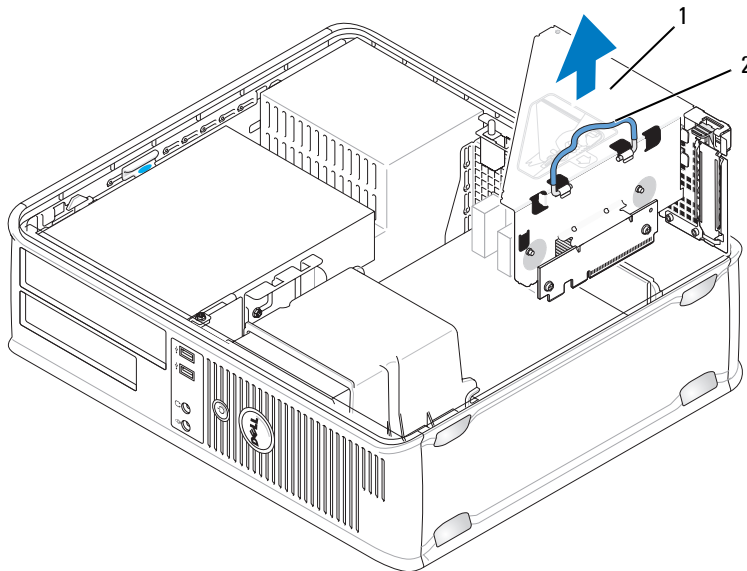
- a** Enter system setup, select **Integrated Audio** from the **Onboard Devices** group, and change the setting to **Off** (see "System Setup" on page 257).
- b** Connect external audio devices to the sound card's connectors. Do not connect external audio devices to the line-in connector on the back panel of the computer (see "Back-Panel Connectors" on page 99).

➡ NOTICE: To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

- 17** If you installed a network adapter card and want to turn off the integrated network adapter:
 - a** Enter system setup, select **Integrated NIC** from the **Onboard Devices** group, and change the setting to **Off** (see "System Setup" on page 257).
 - b** Connect the network cable to the network adapter card's connectors. Do not connect the network cable to the integrated network connector on the back panel of the computer.
- 18** Install any drivers required for the card as described in the card documentation.

Removing a PCI Card From the Riser-Card Cage

- 1** Follow the procedures in "Before You Begin" on page 19.
- 2** Remove the riser-card cage:
 - a** Check any cables connected to cards through the back-panel openings. Disconnect any cables that will not reach the riser-card cage once they are removed from the computer.
 - b** Rotate the riser-card cage handle up and gently pull on the handle and lift the riser-card cage up and away from the computer.



1 riser-card cage

2 handle

- 3 Gently lift the release tab on the card retention latch from the inside to pivot the latch open. Pivot the latch until it snaps into the open position.
- 4 If necessary, disconnect any cables connected to the card.
- 5 Grasp the card by its top corners, and ease it out of its connector.
- 6 If you are removing the card permanently, install a filler bracket in the empty card-slot opening.



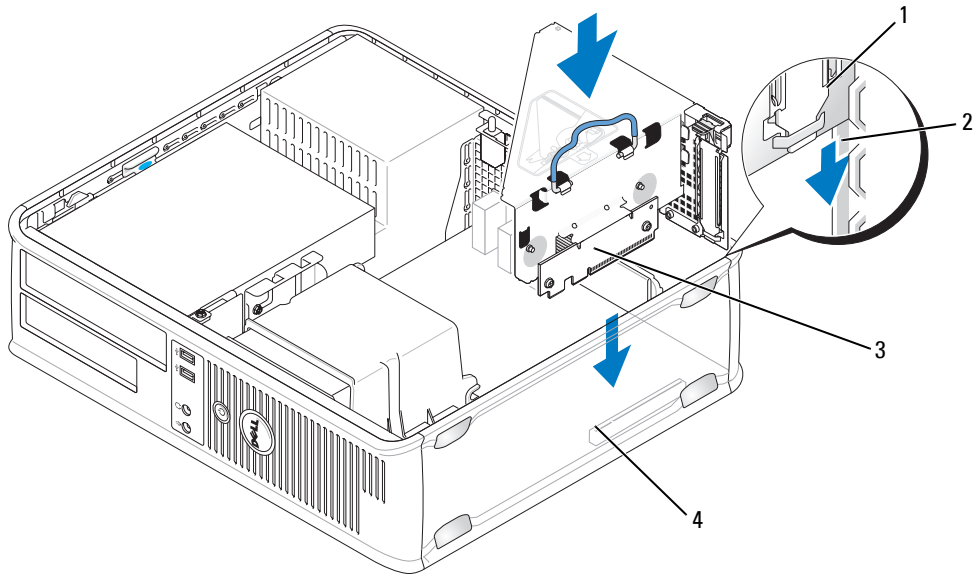
NOTE: Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets also keep dust and dirt out of your computer.

- 7 Before you close the card retention mechanism, ensure that:
 - The tops of all cards and filler brackets are flush with the alignment bar.
 - The notch in the top of the card or filler bracket fits around the alignment guide.



NOTICE: Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

- 8 Secure any remaining card(s) by closing the card retention latch and snapping it into place.
- 9 Replace the riser-card cage:
 - a Align the tabs in the side of the riser-card cage with the slots on the side of the computer, and slide the riser-card cage down into place.
 - b Ensure that the riser-card connectors are fully seated in the connectors on the system board.
 - c Rotate the riser-card cage handle to the down position.



- 1 riser-card cage
- 2 slots
- 3 riser cards (2)
- 4 system board connectors (2)

- 10** Replace the computer cover (see "Replacing the Computer Cover" on page 297).
- 11** Uninstall the card's driver. See the documentation that came with the card for instructions.

12 If you removed a sound card:

- a** Enter system setup, select **Integrated Audio** from the **Onboard Devices** group, and change the setting to **On** (see "System Setup" on page 257).
- b** Connect external audio devices to the audio connectors on the back panel of the computer.



NOTICE: To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

13 If you removed a network-adaptor card connector:

- a** Enter system setup, select **Integrated NIC** from the **Onboard Devices** group, and change the setting to **On** (see "System Setup" on page 257).
- b** Connect the network cable to the integrated network connector on the back panel of the computer.

PCI Express and DVI Cards

Your computer supports one low-profile PCI Express x16 card. If your computer contains a riser-card cage, you can not install a PCI Express DVI card because the riser-card cage blocks the DVI-card (DVI_HDR) connector on the system board.

If you are replacing a PCI Express card with a different type of PCI Express card, remove the current driver for the card from the operating system. See the documentation that came with the card for information.

Installing a PCI Express x16 Card or DVI-Card

- 1** Follow the procedures in "Before You Begin" on page 19.

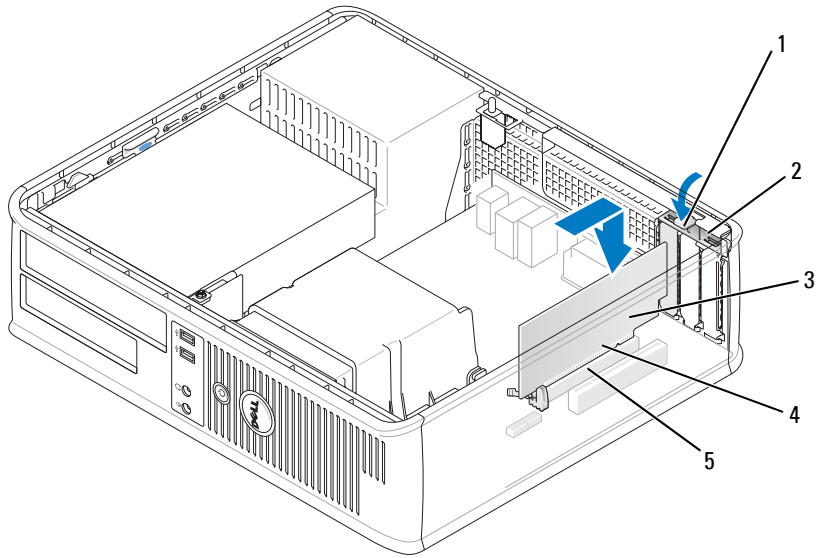


NOTE: For PCI card locations, see "System Board Components" on page 102.

- 2** Gently lift the release tab on the card retention latch from the inside and pivot the latch open.
- 3** If you are installing a new PCI Express x16 card or DVI-card, remove the filler bracket to create a card-slot opening. Then continue with step 5.
- 4** If you are replacing a PCI Express x16 card or DVI-card, remove the installed card (see "Removing a PCI Express x16 Card or DVI-Card" on page 151). If necessary, disconnect any cables connected to the card. Then continue with step 6.
- 5** Prepare the card for installation.



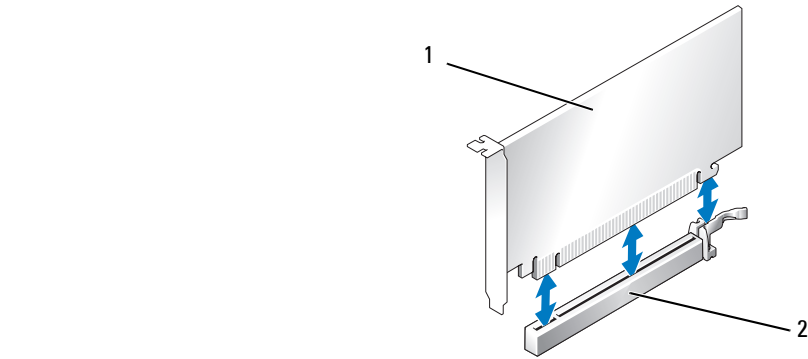
NOTE: See the documentation that came with the card for information on configuring the card, making internal connections, or customizing it for your computer.



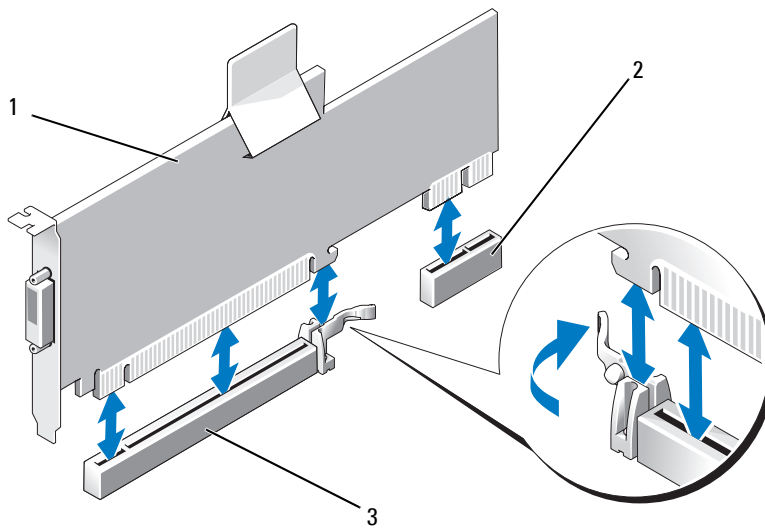
- | | | | | | |
|---|---------------------|---|----------------------|---|------|
| 1 | release tab | 2 | card retention latch | 3 | card |
| 4 | card-edge connector | 5 | card connector | | |

⚠ CAUTION: Some network adapters automatically start the computer when they are connected to a network. To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any cards.

- 6 Place the card in the connector and press down firmly. Ensure that the card is fully seated in the slot.



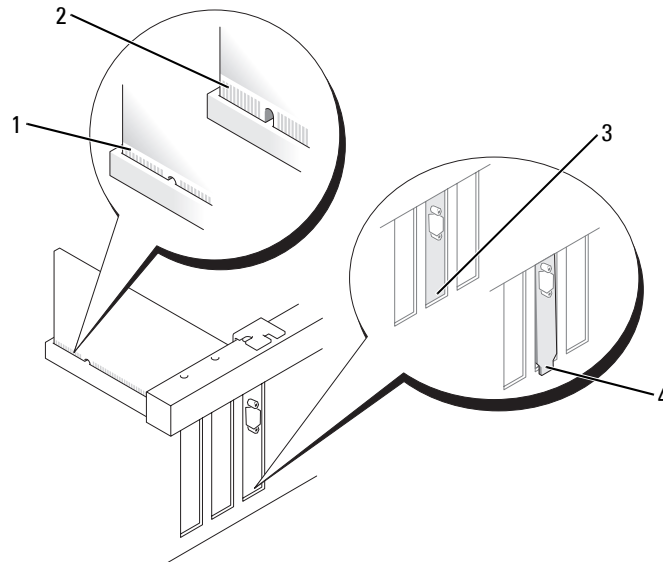
1 PCI Express x16 or DVI card 2 PCI Express x16 card connector



1 PCI Express x16 card

2 DVI card connector

3 PCI Express x16 card
connector



- 1 fully seated card 2 not fully seated card 3 bracket within slot
 4 bracket caught outside of slot

➔ NOTICE: Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

7 Connect any cables that should be attached to the card.

8 Before you close the card retention mechanism, ensure that:

- The tops of all cards and filler brackets are flush with the alignment bar.
- The notch in the top of the card or filler bracket fits around the alignment guide.

9 Secure the card(s) by closing the card retention latch and snapping it into place.

10 Replace the computer cover (see "Replacing the Computer Cover" on page 297).

✍ NOTE: See the documentation for the card for information about the card's cable connections.

11 If you installed a sound card:

- a** Enter system setup, select **Integrated Audio** from the **Onboard Devices** group, and change the setting to **Off** (see "System Setup" on page 257).

- b Connect external audio devices to the sound card's connectors. Do not connect external audio devices to the line-in connector on the back panel of the computer (see "Back-Panel Connectors" on page 99).

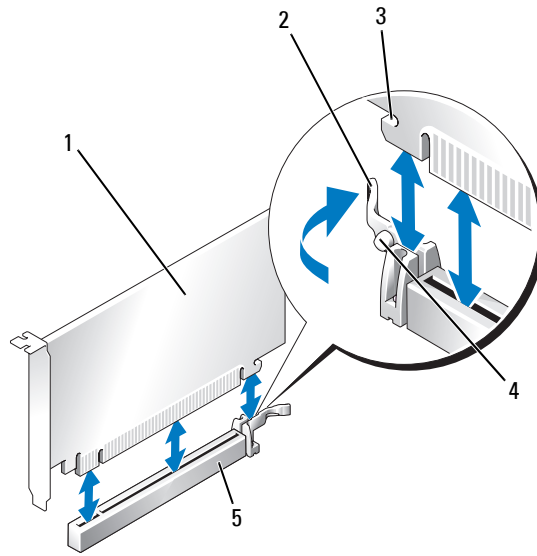


NOTICE: To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

- 12 If you installed a network adapter card and want to turn off the integrated network adapter:
 - a Enter system setup, select **Integrated NIC** from the **Onboard Devices** group, and change the setting to **Off** (see "System Setup" on page 257).
 - b Connect the network cable to the network adapter card's connectors. Do not connect the network cable to the integrated network connector on the back panel of the computer.
- 13 Install any drivers required for the card as described in the card documentation.

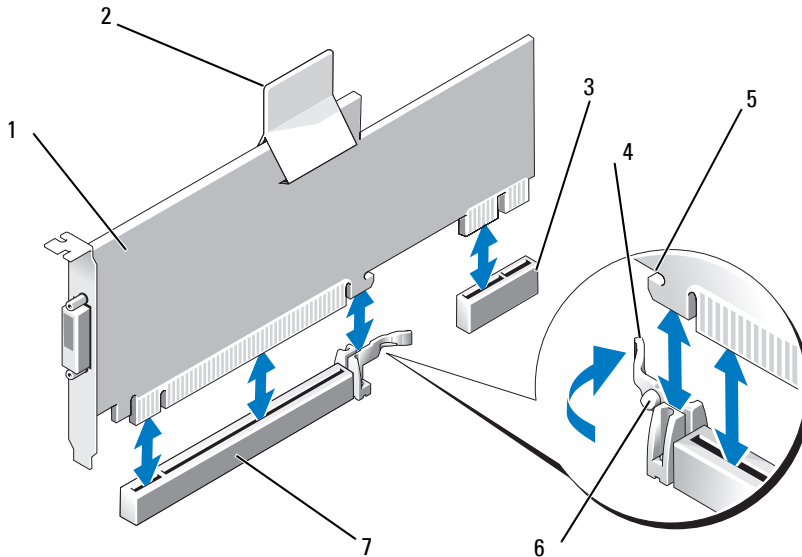
Removing a PCI Express x16 Card or DVI-Card

- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 Gently lift the release tab on the card retention latch from the inside to pivot the latch open. Pivot the latch until it snaps into the open position.
- 3 If necessary, disconnect any cables connected to the card.
- 4 Press the lever with your thumb until you release the securing tab.
If you are removing a PCI Express x16 card, go to step 5.
If you are removing a DVI card, go to step 6
- 5 While pressing the lever, pull the card up and out of the card connector.



- | | | | | | |
|---|----------------------|---|--------------------------------|---|-------------------------------|
| 1 | PCI Express x16 card | 2 | lever | 3 | securing slot (not all cards) |
| 4 | securing tab | 5 | PCI Express x16 card connector | | |

6 While pressing the lever, pull the removal pull tab up and remove the card out of the card connector.



- | | | | | | |
|---|--------------------------------|---|------------------|---|--------------------|
| 1 | PCI Express x16 DVI-card | 2 | removal pull tab | 3 | DVI card connector |
| 4 | lever | 5 | securing slot | 6 | securing tab |
| 7 | PCI Express x16 card connector | | | | |

7 If you are removing the card permanently, install a filler bracket in the empty card-slot opening.

NOTE: Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets also keep dust and dirt out of your computer.

8 Before you close the card retention mechanism, ensure that:


- The tops of all cards and filler brackets are flush with the alignment bar.
- The notch in the top of the card or filler bracket fits around the alignment guide.

9 Secure any remaining card(s) by closing the card retention latch and snapping it into place.

NOTICE: Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

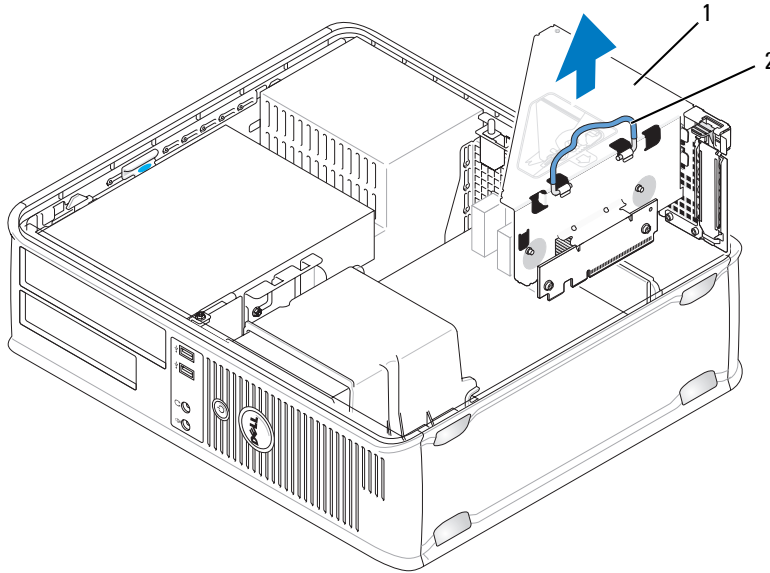
10 Replace the computer cover (see "Replacing the Computer Cover" on page 297).

NOTE: See the documentation for the card for information about the card's cable connections.

- 11 Uninstall the card's driver. See the documentation that came with the card for instructions.
- 12 If you removed a sound card:
 - a Enter system setup, select **Integrated Audio** from the **Onboard Devices** group, and change the setting to **On** (see "System Setup" on page 257).
 - b Connect external audio devices to the audio connectors on the back panel of the computer.
-  **NOTICE:** To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.
- 13 If you removed a network-adapter card:
 - a Enter system setup, select **Integrated NIC** from the **Onboard Devices** group, and change the setting to **On** (see "System Setup" on page 257).
 - b Connect the network cable to the integrated network connector on the back panel of the computer.


Installing a PCI Express Card in the Riser-Card Cage

- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 If applicable, remove the card installed in the PCI3 connector on the system board (see "Removing a PCI Card" on page 138).
- 3 Remove the riser-card cage:
 - a Check any cables connected to cards through the back-panel openings. Disconnect any cables that will not reach the riser-card cage once they are removed from the computer.
 - b Rotate the riser-card cage up and gently pull on the handle and lift the riser-card cage up and away from the computer.



- 1 riser-card cage 2 handle

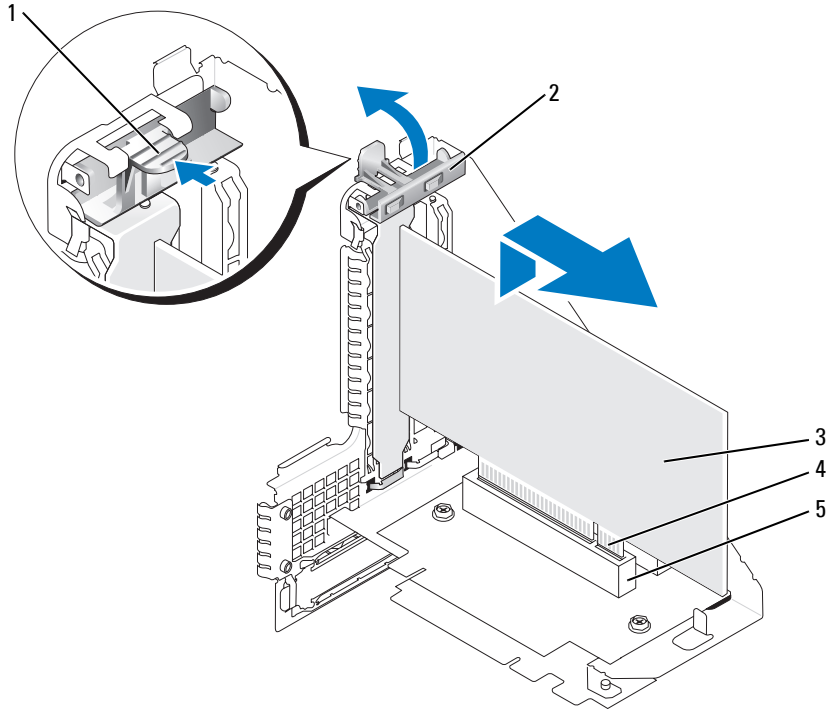
- 4 If you are installing a new card, remove the filler bracket to create an empty card-slot opening. If you are replacing a card that is already installed in the computer, remove the card. If necessary, disconnect any cables connected to the card. Grasp the card by its corners, and ease it out of its connector.

 **NOTE:** See the documentation that came with the card for information on configuring the card, making internal connections, or customizing it for your computer.

- 5 Prepare the new card for installation.

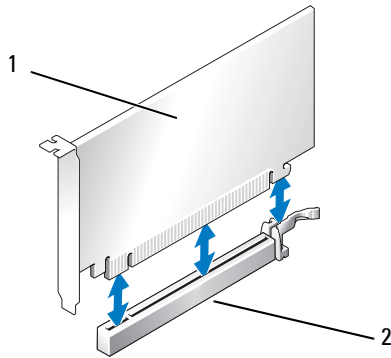
 **CAUTION:** Some network adapters automatically start the computer when they are connected to a network. To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any cards.

- 6 Gently lift the release tab on the card retention latch from the inside to pivot the latch open. Pivot the latch until it snaps into the open position.



- | | | | | | |
|---|---------------------|---|----------------------|---|------|
| 1 | release tab | 2 | card retention latch | 3 | card |
| 4 | card-edge connector | 5 | card connector | | |

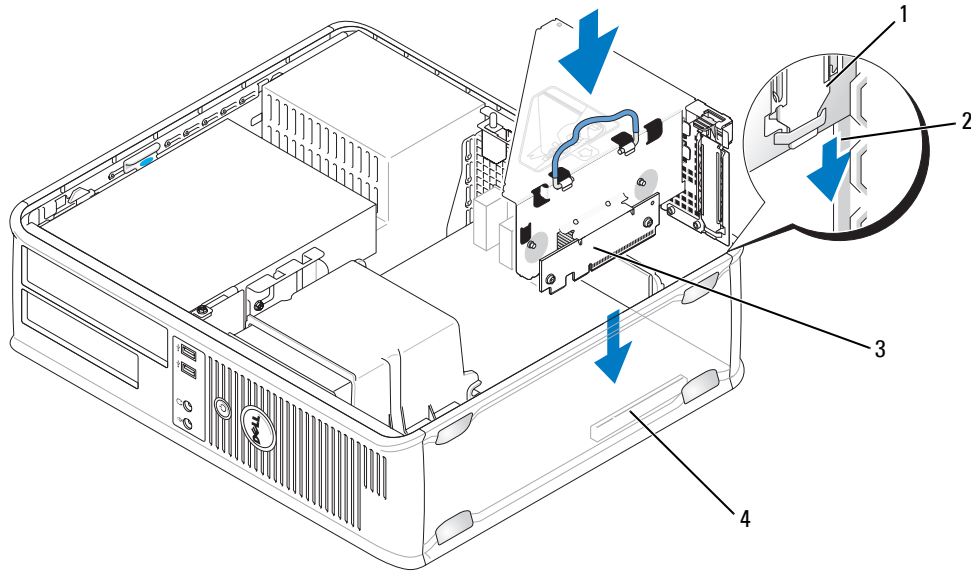
7 Insert the card firmly into the card connector on the riser-card cage.



1 PCI Express x16 card

2 PCI Express x16 card
connector

- 8** Secure the card(s) by closing the card retention latch and snapping it into place.
- 9** Replace the riser-card cage:
 - a** Align the tabs in the side of the riser-card cage with the slots on the side of the computer, and slide the riser-card cage down into place.
 - b** Ensure that the riser-card connectors are fully seated in the connectors on the system board.
 - c** Rotate the riser-card cage handle to the down position.



- 1 riser-card cage 2 slots 3 riser cards (2)
 4 system board connectors (2)

➔ **NOTICE:** Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

10 Reconnect any cables that you removed in step 3.

11 Connect any cables that should be attached to the card.

12 Replace the computer cover (see "Replacing the Computer Cover" on page 297).

13 If you installed a sound card:

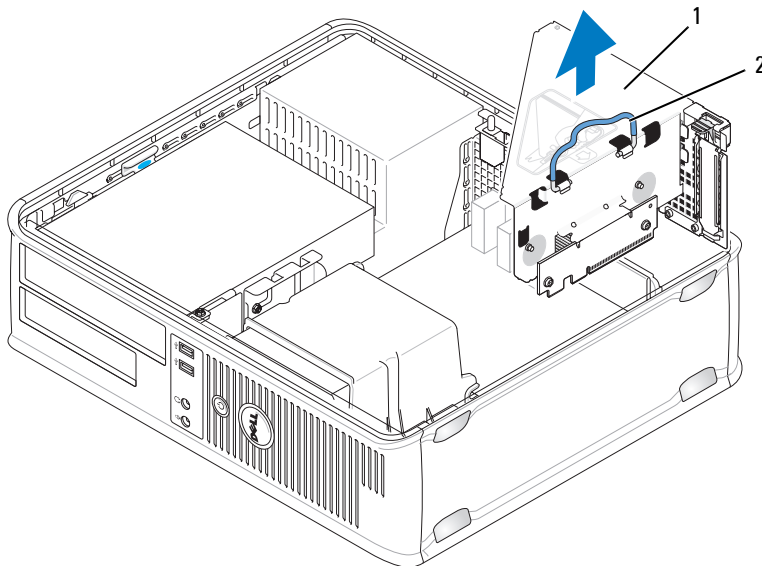
- a Enter system setup, select **Integrated Audio** from the **Onboard Devices** group, and change the setting to **Off** (see "System Setup" on page 257).
- b Connect external audio devices to the sound card's connectors. Do not connect external audio devices to the line-in connector on the back panel of the computer (see "Back-Panel Connectors" on page 99).

➔ **NOTICE:** To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

- 14 If you installed a network adapter card and want to turn off the integrated network adapter:
 - a Enter system setup, select **Integrated NIC** from the **Onboard Devices** group, and change the setting to **Off** (see "System Setup" on page 257).
 - b Connect the network cable to the network adapter card's connectors. Do not connect the network cable to the integrated network connector on the back panel of the computer.
- 15 Install any drivers required for the card as described in the card documentation.

Removing a PCI Express Card From the Riser-Card Cage

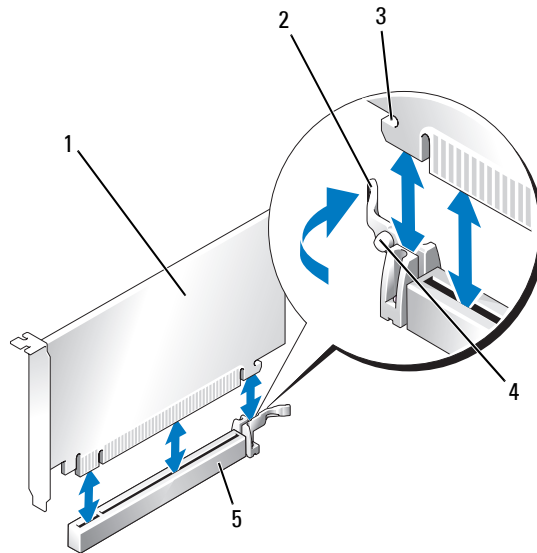
- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 Remove the riser-card cage:
 - a Check any cables connected to cards through the back-panel openings. Disconnect any cables that will not reach the riser-card cage once they are removed from the computer.
 - b Rotate the riser-card cage handle up and gently pull on the handle and lift the riser-card cage up and away from the computer.



1 riser-card cage

2 handle

- 3 Gently lift the release tab on the card retention latch from the inside to pivot the latch open. Pivot the latch until it snaps into the open position.
- 4 If necessary, disconnect any cables connected to the card.
- 5 Press the lever with your thumb until you release the securing tab.
- 6 While pressing the lever, pull the card up and out of the card connector.



- | | | | | | |
|---|----------------------|---|--------------------------------|---|-------------------------------|
| 1 | PCI Express x16 card | 2 | lever | 3 | securing slot (not all cards) |
| 4 | securing tab | 5 | PCI Express x16 card connector | | |

- 7 If you are removing the card permanently, install a filler bracket in the empty card-slot opening.

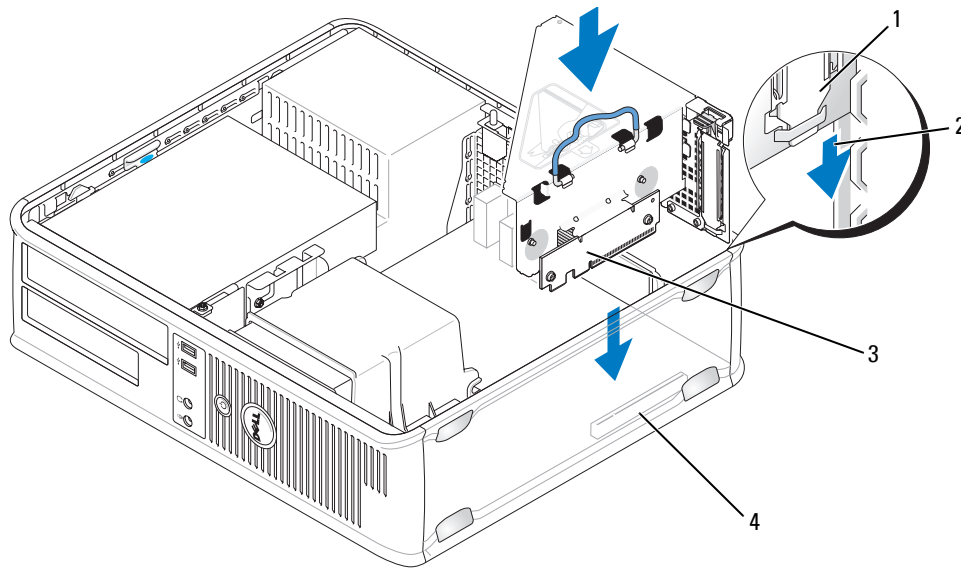
NOTE: Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets also keep dust and dirt out of your computer.

- 8 Before you close the card retention mechanism, ensure that:
 - The tops of all cards and filler brackets are flush with the alignment bar.
 - The notch in the top of the card or filler bracket fits around the alignment guide.
- 9 Secure any remaining card(s) by closing the card retention latch and snapping it into place.

ⓘ NOTICE: Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

10 Replace the riser-card cage:

- a Align the tabs in the side of the riser-card cage with the slots on the side of the computer, and slide the riser-card cage down into place.
- b Ensure that the riser-card connectors are fully seated in the connectors on the system board.
- c Rotate the riser-card cage handle to the down position.




- 1 riser-card cage 2 slots 3 riser cards (2)
4 system board connectors (2)

11 Replace the computer cover (see "Replacing the Computer Cover" on page 297).

12 Uninstall the card's driver. See the documentation that came with the card for instructions.

13 If you removed a sound card:

- a Enter system setup, select **Integrated Audio** from the **Onboard Devices** group, and change the setting to **On** (see "System Setup" on page 257).
- b Connect external audio devices to the audio connectors on the back panel of the computer.

 **NOTICE:** To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

14 If you removed a network-adapter card connector:

- a** Enter system setup, select **Integrated NIC** from the **Onboard Devices** group, and change the setting to **On** (see "System Setup" on page 257).
- b** Connect the network cable to the integrated network connector on the back panel of the computer.

PS/2 Serial Port Adapters



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.



NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

Installing a PS/2 Serial Port Adapter

- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 Gently lift the release tab on the card retention latch from the inside to pivot the latch open. Pivot the latch until it snaps into the open position.
- 3 Remove the filler bracket (if applicable).

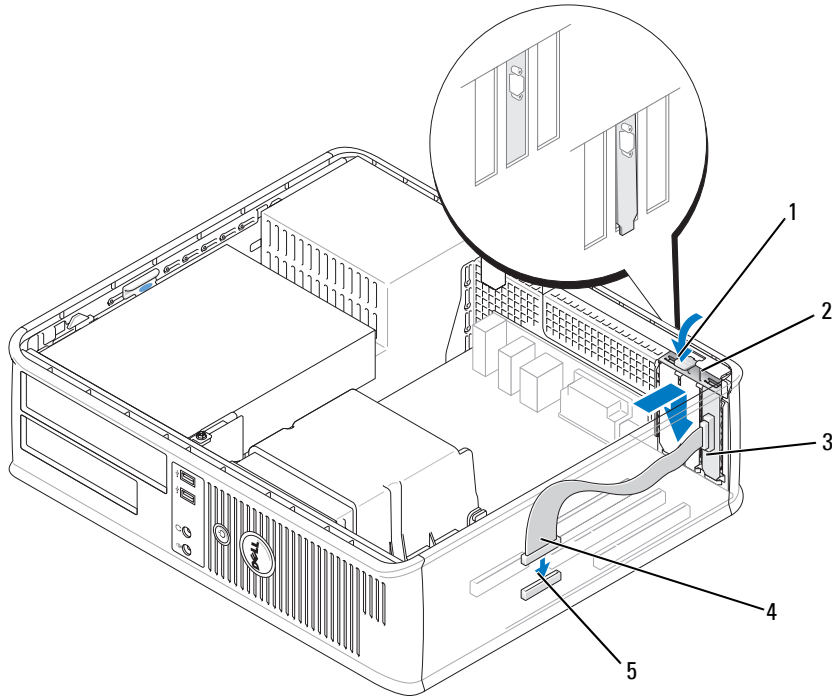


NOTE: See the documentation that came with the adapter for information on configuring the adapter, making internal connections, or customizing it for your computer.

- 4 Align the PS/2 serial-port adapter bracket in the retention slot and press down firmly. Ensure that the adapter is fully seated in the slot.
- 5 Before you close the card retention mechanism, ensure that:
 - The tops of all cards and filler brackets are flush with the alignment bar.
 - The notch in the top of the card or filler bracket fits around the alignment guide.
- 6 Secure the card(s) by closing the card retention latch and snapping it into place.



NOTICE: Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.



- | | | | | | |
|---|-------------------------------|---|---|---|-----------------------------|
| 1 | release tab | 2 | adapter retention latch | 3 | serial-port adapter bracket |
| 4 | serial port adapter connector | 5 | serial port adapter system board connector (PS2/SER2) | | |


7 Connect the adapter cable to the PS/2 serial port adapter connector (PS2/SER2) on the system board (see "System Board Components" on page 102).

NOTE: See the documentation for the PS/2 serial port adapter for information about the cable connections.

8 Replace the computer cover (see "Replacing the Computer Cover" on page 297).

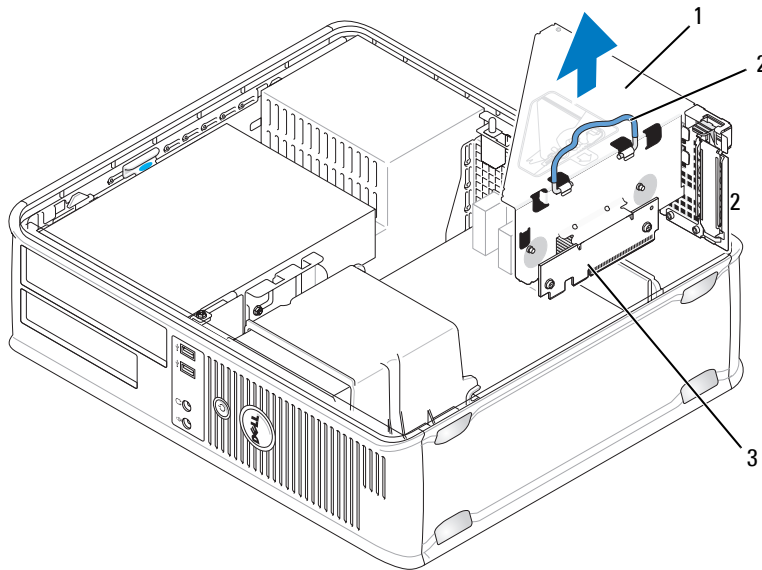
Removing a PS/2 Serial Port Adapter

- 1** Follow the procedures in "Before You Begin" on page 19.
- 2** Gently lift the release tab on the card retention latch from the inside to pivot the latch open. Pivot the latch until it snaps into the open position.

- 3 Disconnect the PS/2 serial-port cable from the system board (see "System Board Components" on page 102).
 - 4 Grasp the PS/2 serial-port adapter bracket by its top corners, and ease it out of its connector.
 - 5 If you are removing the adapter permanently, install a filler bracket in the empty card-slot opening.
-  **NOTE:** Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets also keep dust and dirt out of your computer.
- 6 Before you close the card retention mechanism, ensure that:
 - The tops of all cards and filler brackets are flush with the alignment bar.
 - The notch in the top of the card or filler bracket fits around the alignment guide.
 - 7 Secure any remaining card(s) by closing the card retention latch and snapping it into place.
 - 8 Replace the computer cover (see "Replacing the Computer Cover" on page 297).

Installing a Serial Port Adapter in the Riser-Card Cage

- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 Remove the riser-card cage:
 - a Check any cables connected to cards through the back-panel openings. Disconnect any cables that will not reach the riser-card cage once they are removed from the computer.
 - b Rotate the riser-card cage handle up and gently pull on the handle and lift the riser-card cage up and away from the computer.



1 riser-card cage 2 handle 3 riser cards (2)

- 3 Gently lift the release tab on the card retention latch from the inside to pivot the latch open. Pivot the latch until it snaps into the open position.
- 4 If you are installing a new serial port adapter, remove the filler bracket to create an empty card-slot opening.
- 5 If you are replacing an adapter that is already installed in the computer, remove the adapter.
- 6 If necessary, disconnect any cables connected to the adapter.
- 7 Grasp the serial port adapter by its top corners, and ease it out of its connector.
- 8 Prepare the serial port adapter for installation.



CAUTION: To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any cards or adapters.

- 9 Align the PS/2 serial-port adapter bracket in the retention slot and press down firmly. Ensure that the adapter is fully seated in the slot.
- 10 Before you close the card retention mechanism, ensure that:
 - The tops of all cards and filler brackets are flush with the alignment bar.
 - The notch in the top of the card or filler bracket fits around the alignment guide.
- 11 Secure the card(s) by closing the card retention latch and snapping it into place.



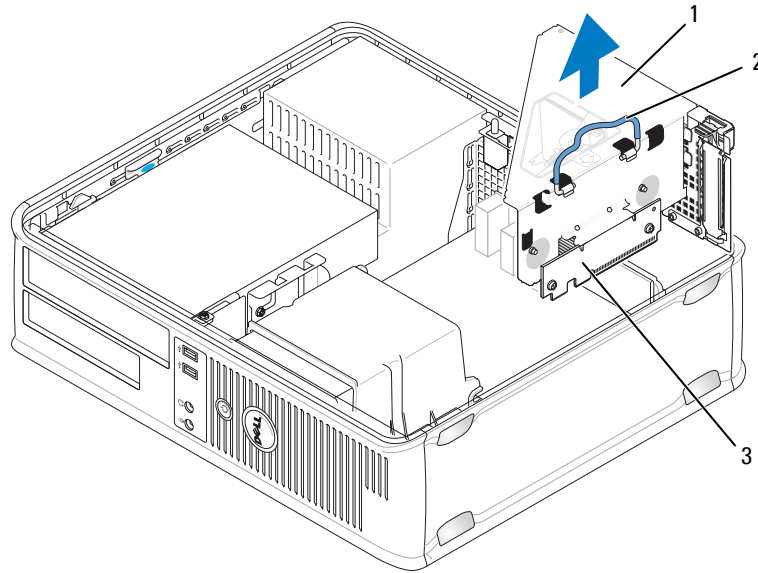
NOTICE: Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

- 12 Connect the adapter cable to the PS/2 serial port adapter connector (PS2/SER2) on the system board (see "System Board Components" on page 102).
- 13 Replace the riser-card cage:
 - a Align the tabs in the side of the riser-card cage with the slots on the side of the computer, and slide the riser-card cage down into place.
 - b Ensure that the riser-card connectors are fully seated in the connectors on the system board.
 - c Rotate the riser-card cage handle to the down position.
- 14 Connect any disconnected cables.
- 15 Replace the computer cover (see "Replacing the Computer Cover" on page 297).
- 16 Install any drivers required for the serial port adapter.


Removing a Serial Port Adapter From the Riser-Card Cage

- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 Remove the riser-card cage:

- a Check any cables connected to cards through the back-panel openings. Disconnect any cables that will not reach the riser-card cage once they are removed from the computer.
- b Rotate the riser-card cage handle up and gently pull on the handle and lift the riser-card cage up and away from the computer.



1 riser-card cage 2 handle 3 riser cards (2)

- 3 Gently lift the release tab on the card retention latch from the inside to pivot the latch open. Pivot the latch until it snaps into the open position.
- 4 Disconnect the PS/2 serial-port cable from the system board (see "System Board Components" on page 102).
- 5 Grasp the PS/2 serial-port adapter bracket by its top corners, and ease it out of its connector.
- 6 If you are removing the adapter permanently, install a filler bracket in the empty card-slot opening.
-  **NOTE:** Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets also keep dust and dirt out of your computer.
- 7 Before you close the card retention mechanism, ensure that:
 - The tops of all cards and filler brackets are flush with the alignment bar.
 - The notch in the top of the card or filler bracket fits around the alignment guide.
- 8 Secure the card(s) by closing the card retention latch and snapping it into place.
- 9 Replace the riser-card cage:

- a** Align the tabs in the side of the riser-card cage with the slots on the side of the computer, and slide the riser-card cage down into place.
 - b** Ensure that the riser-card connectors are fully seated in the connectors on the system board.
 - c** Rotate the riser-card cage handle to the down position.
- 10** Replace the computer cover (see "Replacing the Computer Cover" on page 297).
- 11** Uninstall the adapter's driver. See the documentation that came with the adapter for instructions.

Power Supply

Replacing the Power Supply



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

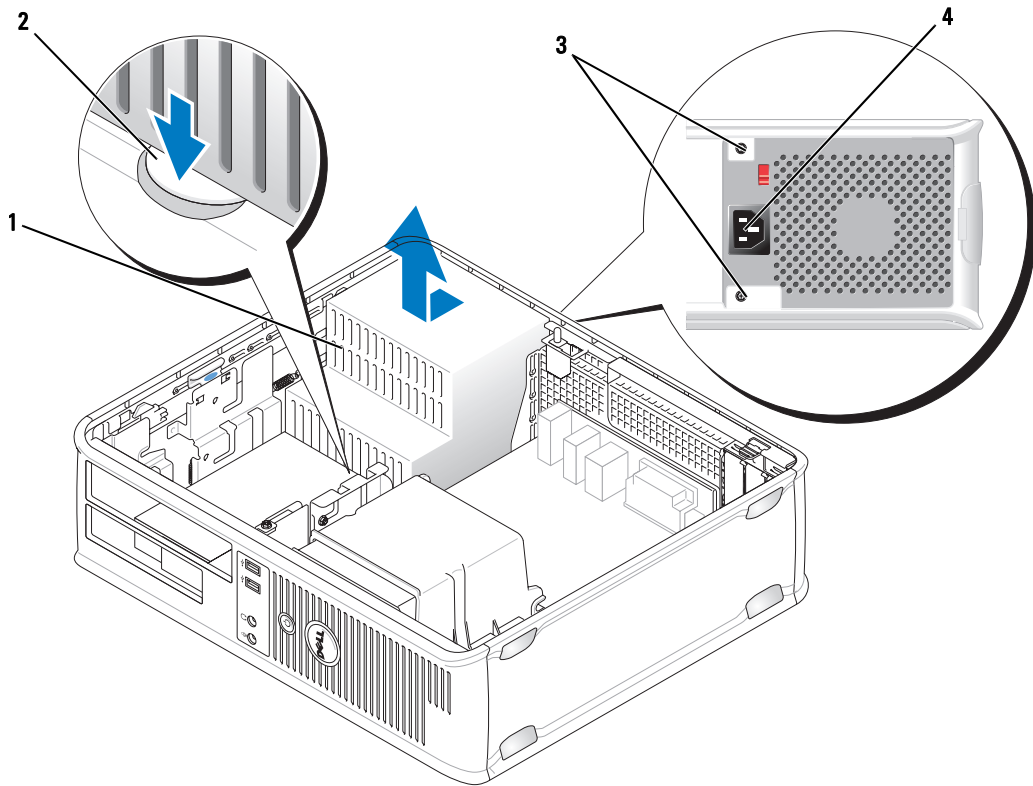


NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 Disconnect the DC power cables from the system board and the drives.

Note the routing of the DC power cables underneath the tabs in the computer chassis as you remove them from the system board and drives. You must route these cables properly when you replace them to prevent their being pinched or crimped.

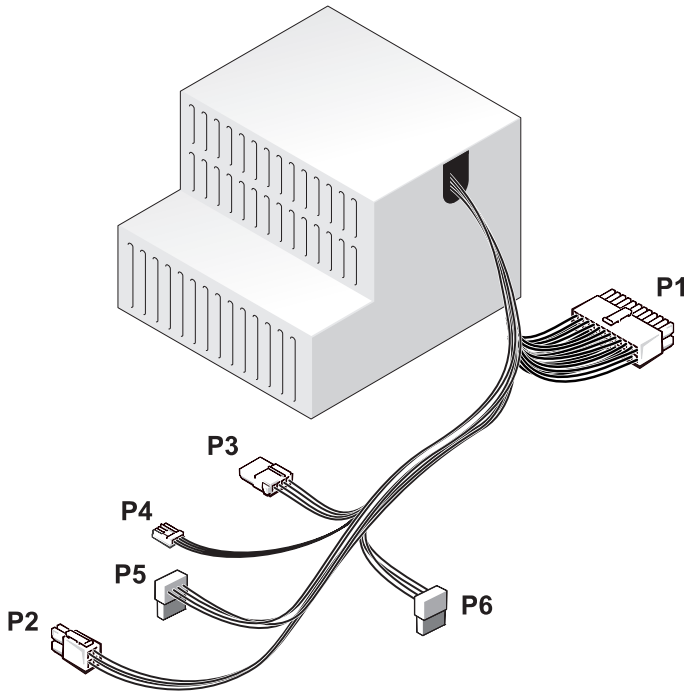
- 3 Remove the two screws that attach the power supply to the back of the computer chassis.
- 4 Remove the optical drive and carefully set it aside (see "Removing an Optical Drive" on page 115).
- 5 Press the release button located on the floor of the computer chassis.



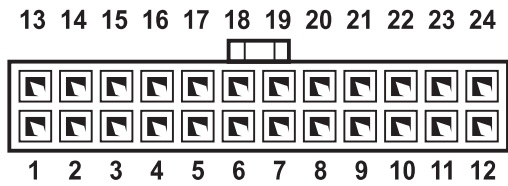
- 1 power supply
- 2 release button
- 3 screws (2)
- 4 AC power connector

- 6 Slide the power supply toward the front of the computer by approximately 1 inch.
- 7 Lift the power supply up and out of the computer.
- 8 Slide the replacement power supply into place.
- 9 Replace the screws that secure the power supply to the back of the computer chassis.
- 10 Reconnect the DC power cables (see "System Board Components" on page 102 for connector locations).
- 11 Replace the optical drive (see "Installing an Optical Drive" on page 116).
- 12 Replace the computer cover (see "Replacing the Computer Cover" on page 297).
- 13 Connect the AC power cable to the AC power connector.

DC Power Connectors



DC Power Connector P1



Pin Number	Signal name	18-AWG Wire
1	+3.3 VDC	Orange
2	+3.3 VDC	Orange
3	GND	Black

Pin Number	Signal name	18-AWG Wire
4	VCC (+5 V)	Red
5	GND	Black
6	VCC (+5 V)	Red
7	GND	Black
8	PS_PWRGOOD	Gray
9	P5AUX	Purple
10	V_12P0_DIG	Yellow
11	V_12P0_DIG	Yellow
12	+3.3 V	Orange
13	+3.3 V	Orange
14	-12 V*	Blue
15	GND	Black
16	PWR_PS_ON	Green
17	GND	Black
18	GND	Black
19	GND	Black
20	NC	N/C
21	VCC (+5V)	Red
22	VCC (+5V)	Red

Pin Number	Signal name	18-AWG Wire
23	VCC (+5V)	Red
24	GND	Black

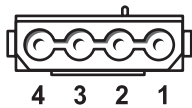
*Use 22-AWG wire instead of 18-AWG wire.

DC Power Connector P2



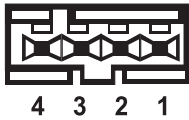
Pin Number	Signal Name	18-AWG Wire
1	COM	Black
2	COM	Black
3	+12 VDC	Yellow
4	+12 VDC	Yellow

DC Power Connector P3



Pin Number	Signal name	18-AWG Wire
1	+12VDC	Yellow
2	COM	Black
3	COM	Black
4	+5 VDC	Red

DC Power Connector P4



Pin Number	Signal Name	22-AWG Wire
1	+5 VCD	Red
2	COM	Black
3	COM	Black
4	+12 VDC	Yellow

DC Power Connector P5 and P6



Pin Number	Signal name	18-AWG Wire
1	+3.3 VDC	Orange
2	COM	Black
3	+5 VDC	Red
4	COM	Black
5	+12 VDC	Yellow

Removing the Computer Cover



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

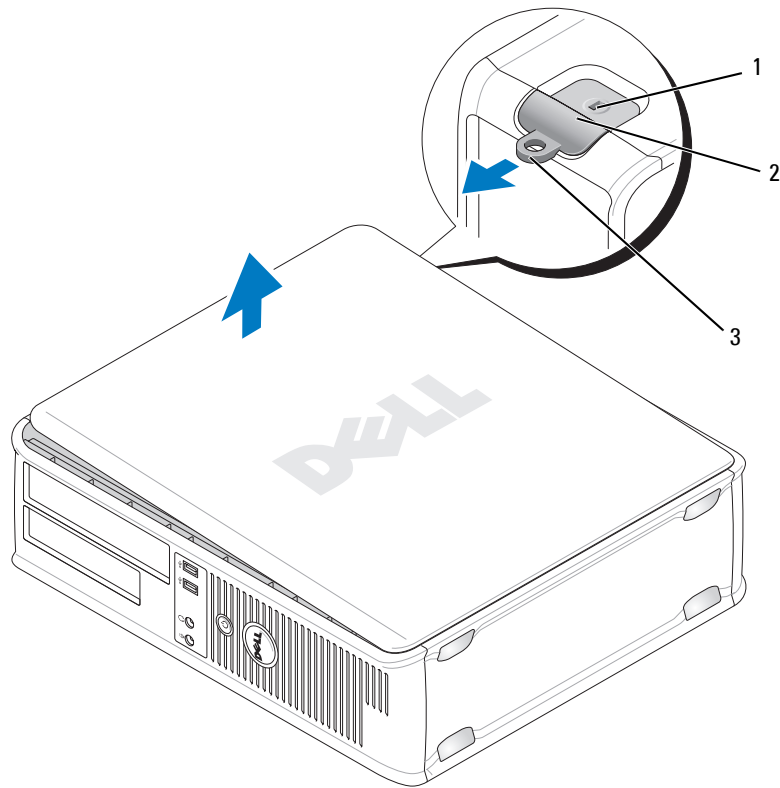


CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 If you have installed a padlock through the padlock ring on the back panel, remove the padlock.
- 3 Locate the cover release latch shown in the illustration. Then, slide the release latch back as you lift the cover.



CAUTION: Graphic card heat sinks can become very hot during normal operation. Ensure that a graphic card heat sink has had sufficient time to cool before you touch it.



1 security cable slot

2 cover release latch

3 padlock ring

- 4 Grip the sides of the computer cover and pivot the cover up using the hinge tabs as leverage points.
- 5 Remove the cover from the hinge tabs and set it aside on a soft nonabrasive surface.

Processor



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.



NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

Removing the Processor

- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 Loosen the captive screw on each side of the heat sink assembly.

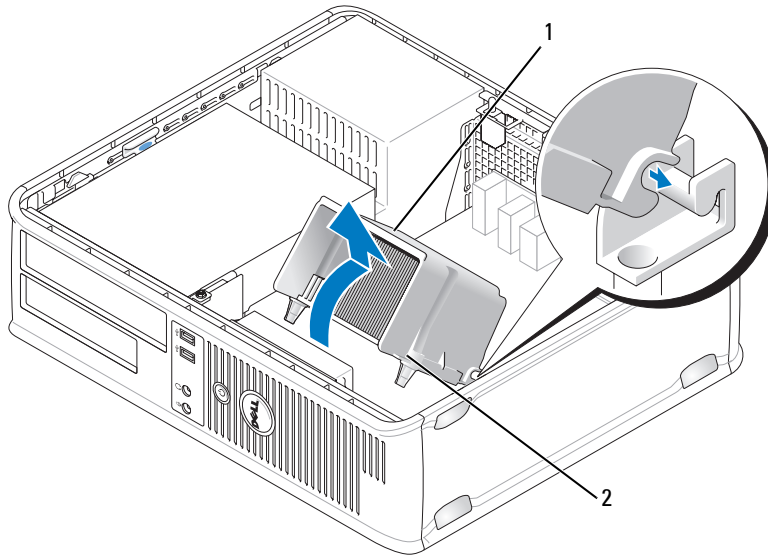


CAUTION: Despite having a plastic shield, the heat sink assembly may be very hot during normal operation. Be sure that it has had sufficient time to cool before you touch it.



NOTICE: Before rotating the heat sink assembly upward, twist the assembly side to side to help break the thermal grease bond between the heat sink and the processor. This is to prevent damage to the processor due to pulling the processor out of the socket while rotating the heat sink assembly upward.

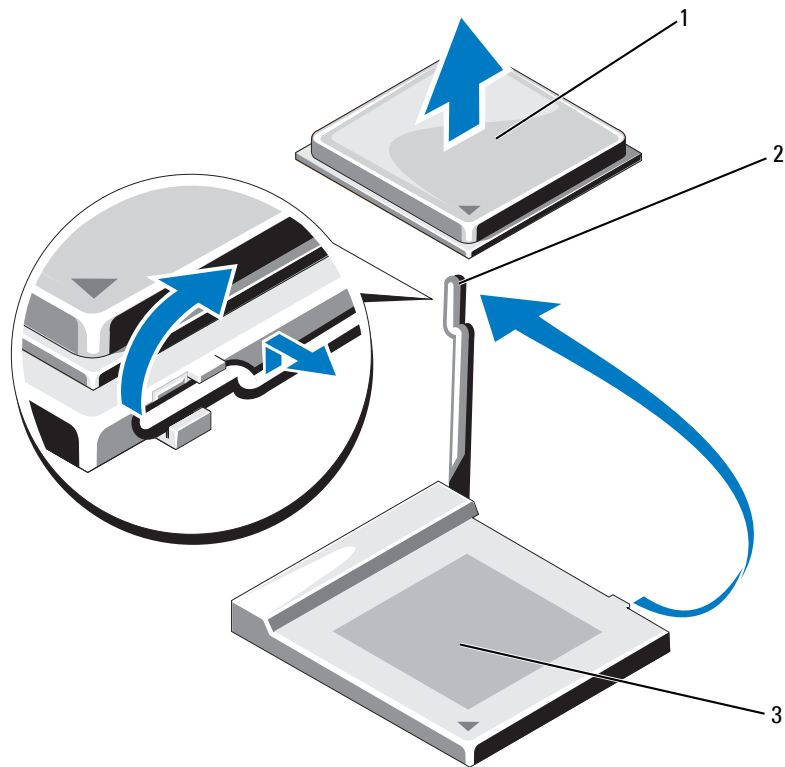
- 3 Rotate the heat sink assembly upward, and remove the assembly from the computer.
Lay the heat sink assembly down on its top, with the thermal grease facing upward.



- 1 heat sink assembly
- 2 captive screw housing (2)

➔ NOTICE: Unless a new heat sink is required for the new processor, reuse the original heat sink assembly when you replace the processor.

- 4 Pull the release lever straight up until the processor is released.



1 processor

2 release lever

3 socket

➔ **NOTICE:** Be careful not to bend any of the pins when you remove the processor from the socket. Bending the pins can permanently damage the processor.

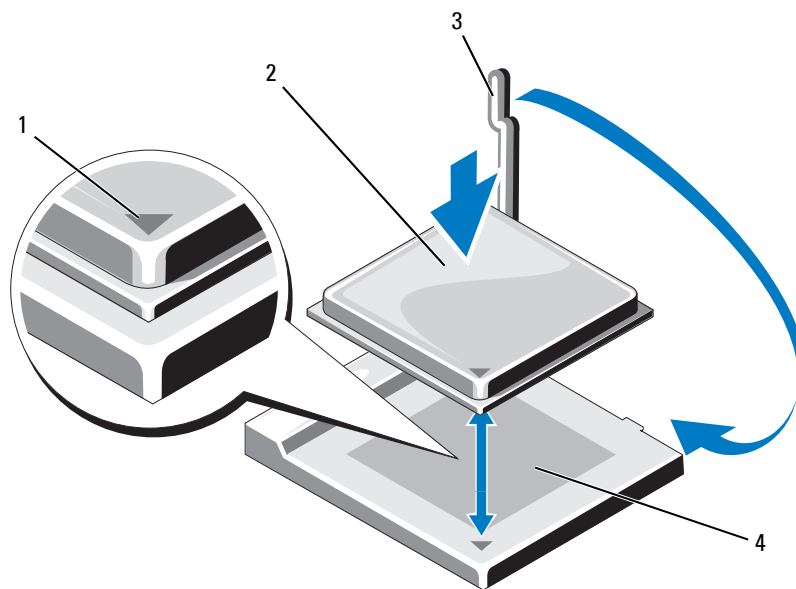
5 Remove the processor from the socket.

Leave the release lever extended in the release position so that the socket is ready for the new processor, and go to "Installing the Processor" on page 182.

➔ **NOTICE:** After removing the processor, be careful not to get any thermal grease on the processor pins. Thermal grease on the pins can permanently damage the processor.

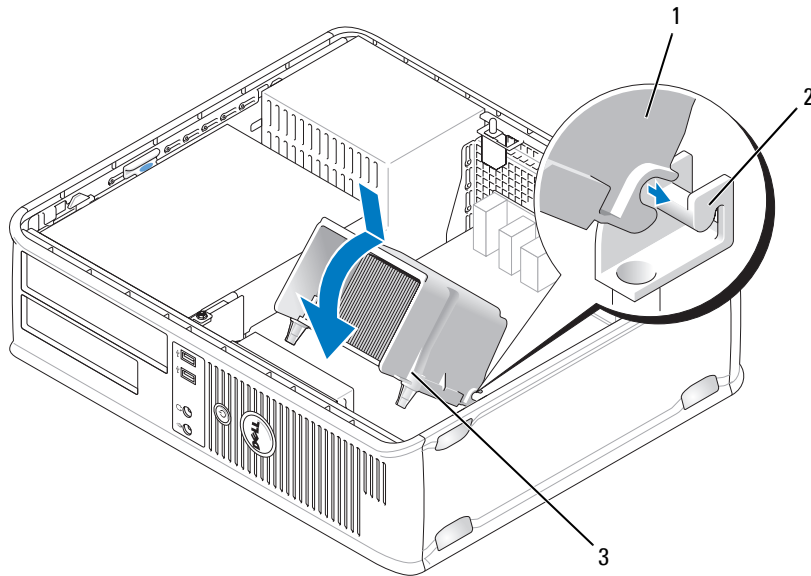
Installing the Processor

- ➔ **NOTICE:** Ground yourself by touching an unpainted metal surface on the back of the computer.
- ➔ **NOTICE:** Be careful not to bend any of the pins when you replace the processor. Bending the pins can permanently damage the processor.
- 1 Follow the procedures in "Before You Begin" on page 19.
- ➔ **NOTICE:** Be careful not to bend any of the pins when you unpack the processor. Bending the pins can permanently damage the processor.
- 2 Unpack the new processor, being careful not to bend any of the processor pins.
- ➔ **NOTE:** You must position the processor correctly in the socket to avoid permanent damage to the processor and the computer when you turn on the computer.
- 3 If the release lever on the socket is not fully extended, move it to that position.
- 4 Align the pin-1 corners of the processor and socket.



- 1 socket and processor pin-1 indicator
- 2 processor
- 3 release lever
- 4 processor socket

- ➔ **NOTICE:** To avoid damage, ensure that the processor aligns properly with the socket, and do not use excessive force when you install the processor.
- 5 Set the processor lightly in the socket and ensure that the processor is positioned correctly.
 - 6 While lightly pressing down on the processor, rotate the release lever back toward the system board until it snaps into place, securing the processor.
 - 7 Clean the thermal grease from the bottom of the heat sink.
- ➔ **NOTICE:** Ensure that you apply new thermal grease. New thermal grease is critical for ensuring adequate thermal bonding, which is a requirement for optimal processor operation.
- 8 Apply the new thermal grease to the top of the processor.
 - 9 Install the heat sink assembly:
 - a Place the heat sink assembly back onto the heat-sink assembly bracket.
 - b Rotate the heat sink assembly down towards the computer base and ensure that the two captive screws are properly aligned with the holes in the system board.
 - c Tighten the two captive screws.
- ➔ **NOTICE:** Ensure that the heat sink assembly is correctly seated and secure.



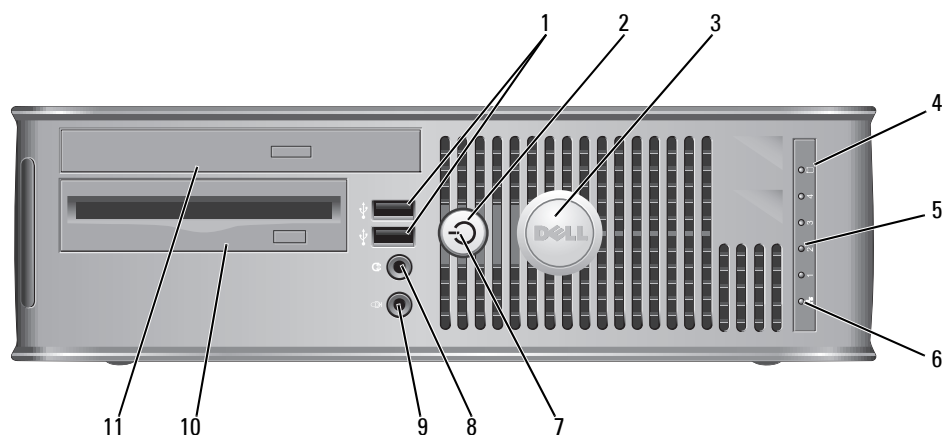
1 heat sink assembly 2 heat-sink assembly bracket 3 captive screw housing (2)

- 10 Replace the computer cover (see "Replacing the Computer Cover" on page 297).

Small Form Factor Computer

About Your Small Form Factor Computer

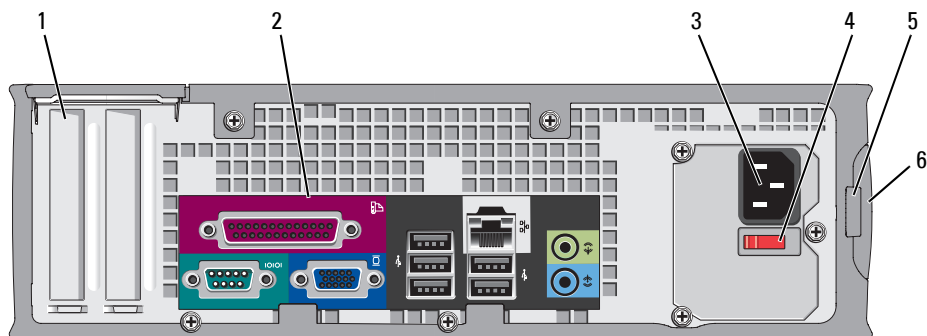
Front View



- 1 USB 2.0 connectors (2) Use the front USB connectors for devices that you connect occasionally, such as joysticks or cameras, or for bootable USB devices (see "System Setup" on page 257 for more information about booting to a USB device).
It is recommended that you use the back USB connectors for devices that typically remain connected, such as printers and keyboards.
- 2 power button Press to turn on the computer.
➔ NOTICE: To avoid losing data, do not turn off the computer by pressing the power button. Instead, perform an operating system shutdown. See "Turning Off Your Computer" on page 19 for more information.
➔ NOTICE: If your operating system has ACPI enabled, when you press the power button the computer will perform an operating system shutdown.
- 3 Dell badge This badge can be rotated to match the orientation of your computer. To rotate, place fingers around the outside of the badge, press firmly, and turn the badge. You can also rotate the badge using the slot provided near the bottom of the badge.

- | | | |
|----|---------------------------|--|
| 4 | hard drive activity light | This light flickers when the hard drive is being accessed. |
| 5 | diagnostic lights | Use the lights to help you troubleshoot a computer problem based on the diagnostic code. For more information, see "Diagnostic Lights" on page 330. |
| 6 | LAN indicator light | This light indicates that a LAN (local area network) connection is established. |
| 7 | power light | The power light illuminates and blinks or remains solid to indicate different operating states: <ul style="list-style-type: none"> • No light — The computer is turned off. • Steady green — The computer is in a normal operating state. • Blinking green — The computer is in a power-saving mode. • Blinking or solid amber — See "Power Problems" on page 321. <p>To exit from a power-saving mode, press the power button or use the keyboard or the mouse if it is configured as a wake device in the Windows Device Manager. For more information about sleep modes and exiting from a power-saving mode, see "Power Management" on page 267.</p> <p>See "System Lights" on page 329 for a description of light codes that can help you troubleshoot problems with your computer.</p> |
| 8 | headphone connector | Use the headphone connector to attach headphones and most kinds of speakers. |
| 9 | microphone connector | Use the microphone connector to attach a microphone. |
| 10 | 3.5-inch drive bay | Can contain an optional slimline floppy drive or optional slimline media card reader. |
| 11 | optical drive | Insert a slimline media (if supported) into this drive. |

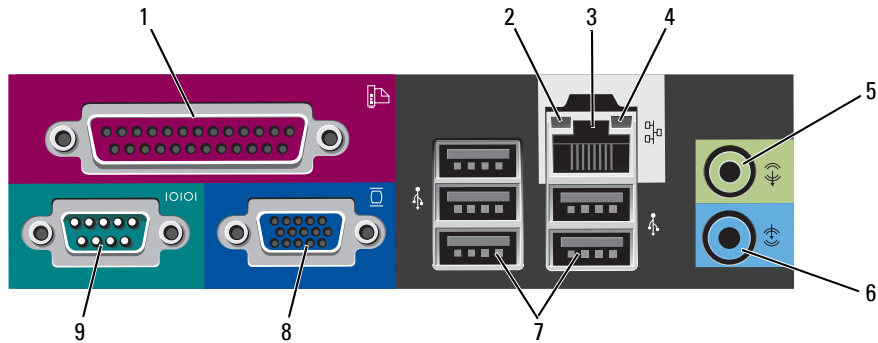
Back View



- | | | |
|---|-----------------------|--|
| 1 | card slots | Access connectors for any installed PCI and PCI Express cards. |
| 2 | back-panel connectors | Plug serial, USB, and other devices into the appropriate connectors (see "Back-Panel Connectors" on page 187). |

- | | | |
|---|--------------------------|---|
| 3 | power connector | Insert the power cable. |
| 4 | voltage selection switch | Your computer is equipped with a manual voltage-selection switch. To help avoid damaging a computer with a manual voltage selection switch, set the switch for the voltage that most closely matches the AC power available in your location. |
| | | <p>➔ NOTICE: In Japan, the voltage selection switch must be set to the 115-V position even though the AC power available in Japan is 100 V.</p> <p>Also, ensure that your monitor and attached devices are electrically rated to operate with the AC power available in your location.</p> |
| 5 | padlock ring | Insert a padlock to lock the computer cover. |
| 6 | cover release latch | Allows you to open the computer cover. |

Back-Panel Connectors



- | | | |
|---|----------------------|--|
| 1 | parallel connector | <p>Connect a parallel device, such as a printer, to the parallel connector. If you have a USB printer, plug it into a USB connector.</p> <p>NOTE: The integrated parallel connector is automatically disabled if the computer detects an installed card containing a parallel connector configured to the same address. For more information, see "System Setup Options" on page 258.</p> |
| 2 | link integrity light | <ul style="list-style-type: none"> • Green — A good connection exists between a 10-Mbps network and the computer. • Orange — A good connection exists between a 100-Mbps network and the computer. • Yellow — A good connection exists between a 1-Gbps (or 1000-Mbps) network and the computer. • Off — The computer is not detecting a physical connection to the network. |

- | | | |
|---|---------------------------|---|
| 3 | network adapter connector | <p>To attach your computer to a network or broadband device, connect one end of a network cable to either a network jack or your network or broadband device. Connect the other end of the network cable to the network adapter connector on the back panel of your computer. A click indicates that the network cable has been securely attached.</p> <p>NOTE: Do not plug a telephone cable into the network connector.</p> <p>On computers with a network connector card, use the connector on the card.</p> <p>It is recommended that you use Category 5 wiring and connectors for your network. If you must use Category 3 wiring, force the network speed to 10 Mbps to ensure reliable operation.</p> |
| 4 | network activity light | Flashes a yellow light when the computer is transmitting or receiving network data. A high volume of network traffic may make this light appear to be in a steady "on" state. |
| 5 | line-out connector | <p>Use the green line-out connector to attach headphones and most speakers with integrated amplifiers.</p> <p>On computers with a sound card, use the connector on the card.</p> |
| 6 | line-in connector | <p>Use the line-in connector to attach a record/playback device such as a cassette player, CD player, or VCR.</p> <p>On computers with a sound card, use the connector on the card.</p> |
| 7 | USB 2.0 connectors (5) | Use the back USB connectors for devices that typically remain connected, such as printers and keyboards. |
| 8 | video connector | <p>Plug the cable from your VGA-compatible monitor into the blue connector.</p> <p>NOTE: If you purchased an optional graphics card, this connector will be covered by a cap. Do not remove the cap. Connect your monitor to the connector on the graphics card.</p> <p>NOTE: If you are using a graphics card that supports dual monitors, use the y-cable that came with your computer.</p> |
| 9 | serial connector | <p>Connect a serial device, such as a handheld device, to the serial port. The default designations are COM1 for serial connector 1 and COM2 for serial connector 2.</p> <p>NOTE: There is only a serial connector 2 if the optional PS2/serial adapter is used.</p> <p>For more information, see "System Setup Options" on page 258.</p> |

Inside Your Computer



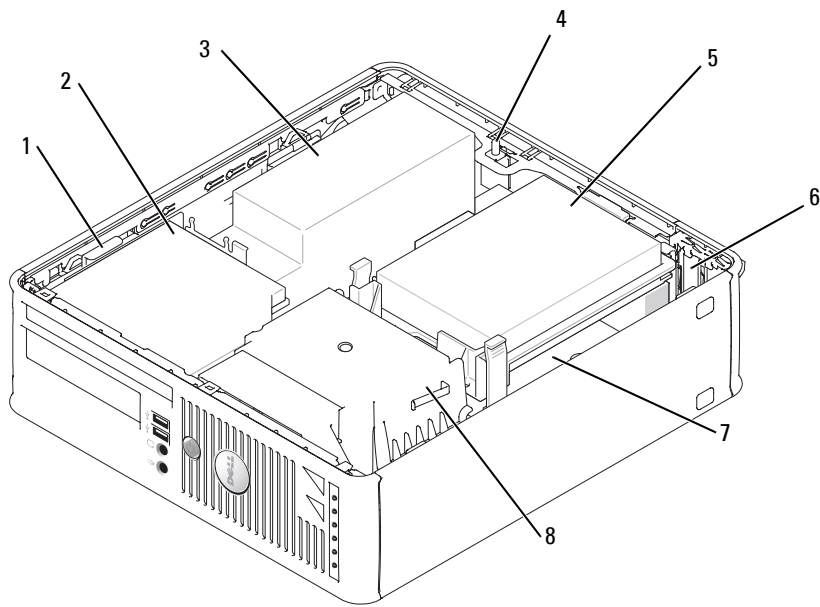
CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.



CAUTION: To avoid electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

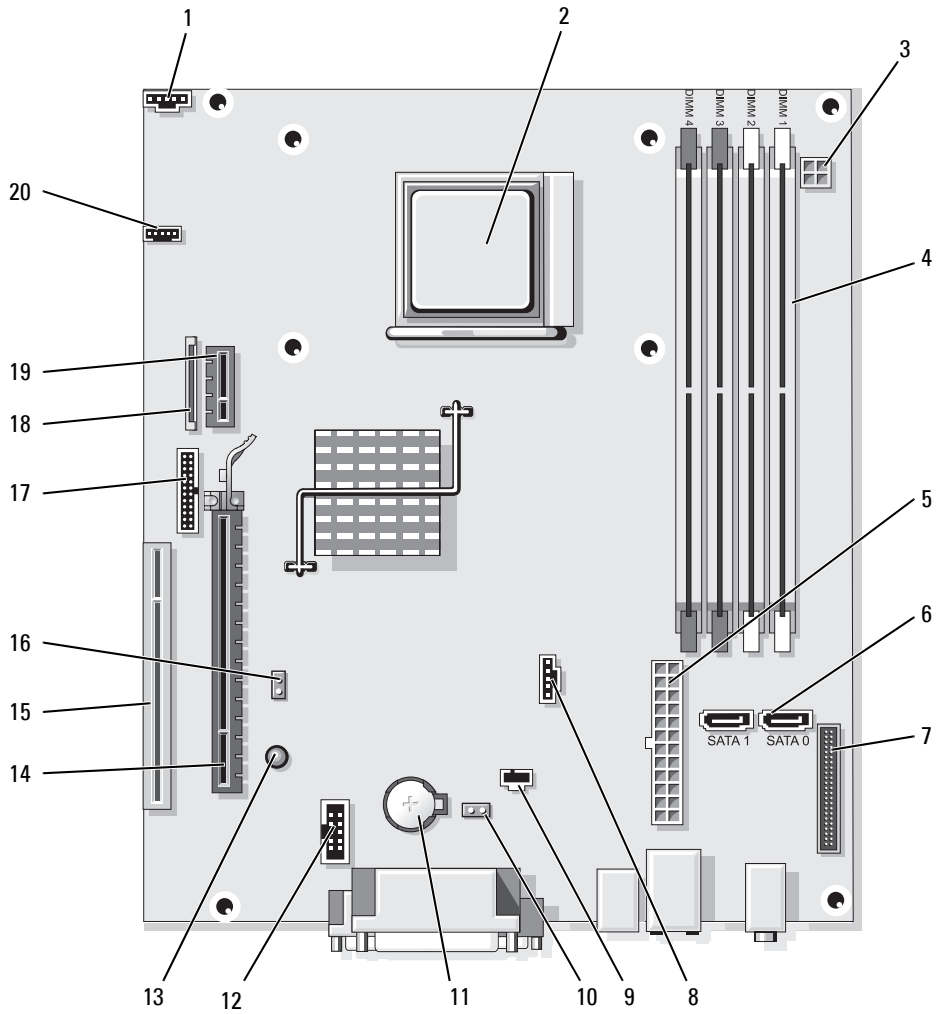


NOTICE: Be careful when opening the computer cover to ensure that you do not accidentally disconnect cables from the system board.



- | | | | | | |
|---|--|---|--------------------|---|----------------|
| 1 | drive-release latch | 2 | optical drive | 3 | power supply |
| 4 | chassis intrusion switch
(optional) | 5 | hard drive | 6 | card slots (2) |
| 7 | system board | 8 | heat sink assembly | | |

System Board Components



1	fan connector (FAN_CPU)	2	processor socket (CPU)	3	power connector (PW_12V_A1)
4	memory module connectors (DIMM_1, DIMM_2, DIMM_3, DIMM_4)	5	power connector (POWER1)	6	SATA drive connectors (SATA0, SATA1)
7	front-panel connector (FRONTPANEL)	8	fan connector (FAN_HDD)	9	intrusion switch connector (INTRUDER)
10	CMOS reset jumper (RTCST)	11	battery socket (BATTERY)	12	internal USB (USB1)
13	standby (AUX_PWR_LED)	14	PCI Express x16 connector (SLOT1)	15	PCI connector (SLOT2)
16	password jumper (PSWD)	17	serial connector (PS2/SER2)	18	slim floppy drive connector (DSKT)
19	Optional DVI-card connector (DVI_HDR)	20	speaker connector (INT_SPKR)		

Small Form Factor Computer (Model # DCCY) Specifications

Microprocessor

Microprocessor type	AMD Phenom™ processors NOTE: The AMD Phenom processor requires the 8-Mb NVRAM chip and is therefore available only on models that include the 8-Mb NVRAM chip. If your computer has the 8-Mb NVRAM chip and the AMD Phenom processor, the word <i>enhanced</i> appears in the title on the BIOS splash screen and the system setup program screens. AMD Athlon™ 64 X2 Dual-Core processor
Internal cache	AMD Athlon 64 AMD Phenom Quad-Core: 2-MB L2 dedicated cache and 2-MB shared L3 cache AMD Phenom Triple-Core: 1.5-MB L2 dedicated cache and 2-MB shared L3 cache AMD Athlon 64 X2: 2-MB L2 dedicated cache AMD Athlon 64 X2: 1-MB L2 dedicated cache AMD Athlon: 1-MB L2 dedicated cache AMD Athlon: 512-KB L2 dedicated cache

Memory

Type	667- or 800-MHz DDR2 SDRAM
Memory connectors	4
Memory modules supported	256 MB, 512 MB, 1 GB, or 2 GB non-ECC
Minimum memory	dual-channel: 512 MB; single-channel: 256 MB
Maximum memory	8 GB

Computer Information

Chipset	nVidia GeForce 6150LE/NForce 430
Data bus width	64 bits
Address bus width	40 bits
DMA channels	eight

Computer Information

Interrupt levels	24
BIOS chip (NVRAM)	8 Mb or 4 Mb NOTE: The AMD Phenom processor requires the 8-Mb NVRAM chip and is therefore available only on models that include the 8-Mb NVRAM chip. If your computer has the 8-Mb NVRAM chip and the AMD Phenom processor, the word <i>enhanced</i> appears in the title on the BIOS splash screen and the system setup program screens.
NIC	integrated network interface with ASF 1.03 and 2.0 support as defined by DMTF Capable of 10/100/1000 communication

Video

Type	nVidia integrated video (DirectX 9.0c Shader Model 3.0 Graphics Processing Unit), PCI Express x16 graphics card, or DVI graphics card.
------	--

Audio

Type	Sigma Tel 9200 CODEC (2.1 Channel Audio)
Stereo conversion	24-bit analog-to-digital; 24-bit digital-to-analog

Controllers

Drives	one SATA controller supporting two devices
--------	--

Expansion Bus

Bus type	PCI 2.3 PCI Express 1.0A SATA 1.0A and 2.0 USB 2.0
Bus speed	PCI: 133 MB/s PCI Express x16: 40 GB/s bidirectional speed SATA: 1.5 Gbps and 3.0 Gbps USB: 480-Mbps high speed, 12-Mbps full speed, 1.2-Mbps low speed
Cards	low-profile, half-length
PCI	
connectors	one
card size	low profile
connector size	124 pins

Expansion Bus

connector data width (maximum)	32 bits
PCI Express connectors	one x16
card size	low profile
power	25 W maximum
connector size	164 pins (x16)
connector data width (maximum)	16 PCI Express lanes (x16)

Drives

Externally accessible	one 3.5-inch drive one bay for slim optical drive
Internally accessible	one bay for a 1-inch-high hard drive

Connectors

External connectors:

Serial	9-pin connector; 16550C-compatible
Parallel	25-hole connector (bidirectional)
Video	15-hole VGA connector
Network adapter	RJ45 connector
Optional PS/2 with secondary serial port adapter	two 6-pin mini-DINs NOTE: This option uses one of the PCI slots.
Optional DVI	36-pin connector NOTE: This option uses one of the PCI slots.
USB	two front-panel and five back-panel USB 2.0-compliant connectors
Audio	two connectors for line-in and line-out; two front-panel connectors for headphones and microphone

System board connectors:

SATA	two 7-pin connectors
Floppy drive	38-pin connector
Serial	24-pin connector for optional second serial port card
Fan	two 5-pin connector fans

Connectors

PCI 2.3	124-pin connector
PCIe-X16	164-pin connector
Internal USB	10-pin connector
Intrusion switch	3-pin connector
Speaker	5-pin connector
Memory modules	four 240-pin connectors
Power 12V	4-pin connector
Power	24-pin connector
Battery	2-pin socket
Front panel	40-pin connector

Key Combinations

<Ctrl><Alt>	in Microsoft® Windows® XP and Windows Vista, brings up the Windows Security window; in MS-DOS® mode, restarts (reboots) the computer
<F2> or <Ctrl><Alt><Enter>	starts embedded system setup (during system start-up only)
<F12> or <Ctrl><Alt><F8>	displays a boot device menu that allows the user to enter a device for a single boot (during system start-up only) as well as options to run hard-drive and system diagnostics

Controls and Lights

Power control	front of chassis - push button
Power light (within the power button)	green light — Blinking green indicates a sleep mode; solid green indicates a power-on state. amber light — Blinking amber indicates a problem with an installed device; solid amber indicates an internal power problem (see "Power Problems" on page 321).
Hard-drive access light	front panel - green
Link light	front panel - solid green light indicates network connection
Link integrity light (on integrated network adapter)	rear panel - green light for 10-Mb operation; orange light for 100-Mb operation; yellow light for a 1000-Mb (1-Gb) operation
Activity light (on integrated network adapter)	rear panel - yellow blinking light
Diagnostic lights	front panel - four lights. See "Diagnostic Lights" on page 330.
Standby power light	AUX_PWR on the system board

Power	
DC power supply:	
Wattage	275 W
Heat dissipation	938.85 BTU/hr maximum
Voltage	manual selection power supplies — 90 to 135 V at 50/60 Hz; 180 to 265 V at 50/60 Hz
Backup battery	3-V CR2032 lithium coin cell

Physical	
Height	9.26 cm (3.65 inches)
Width	31.37 cm (12.35 inches)
Depth	34.03 cm (13.40 inches)
Weight	7.4 kg (16.4 lb)

Environmental	
Temperature:	
Operating	10° to 35°C (50° to 95°F)
Storage	-40° to 65°C (-40° to 149°F)
Relative humidity	20% to 80% (noncondensing)
Maximum vibration:	
Operating	0.25 G at 3 to 200 Hz at 0.5 octave/min
Storage	0.5 G at 3 to 200 Hz at 1 octave/min
Maximum shock:	
Operating	bottom half-sine pulse with a change in velocity of 50.8 cm/sec (20 inches/sec)
Storage	27-G faired square wave with a velocity change of 508 cm/sec (200 inches/sec)
Altitude:	
Operating	-15.2 to 3048 m (-50 to 10,000 ft)
Storage	-15.2 to 10,668 m (-50 to 35,000 ft)
Airborne contaminant level	G2 or lower as defined by ISA-S71.04-1985

I/O Panel

Removing the I/O Panel



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

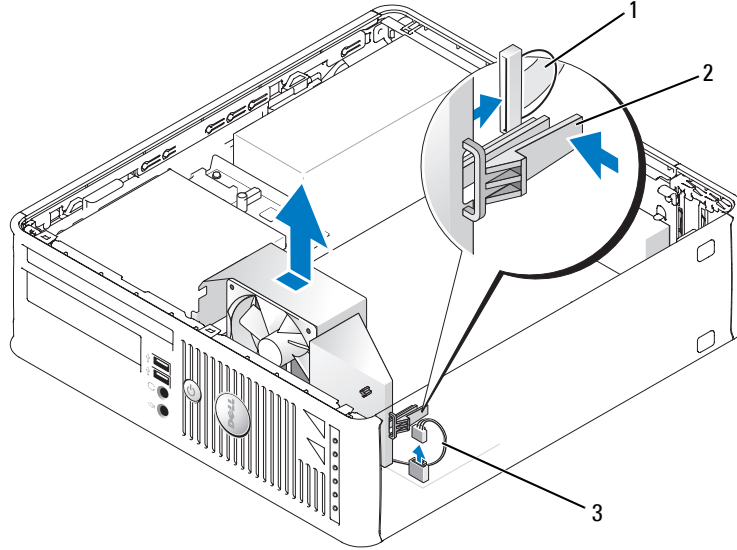


CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.



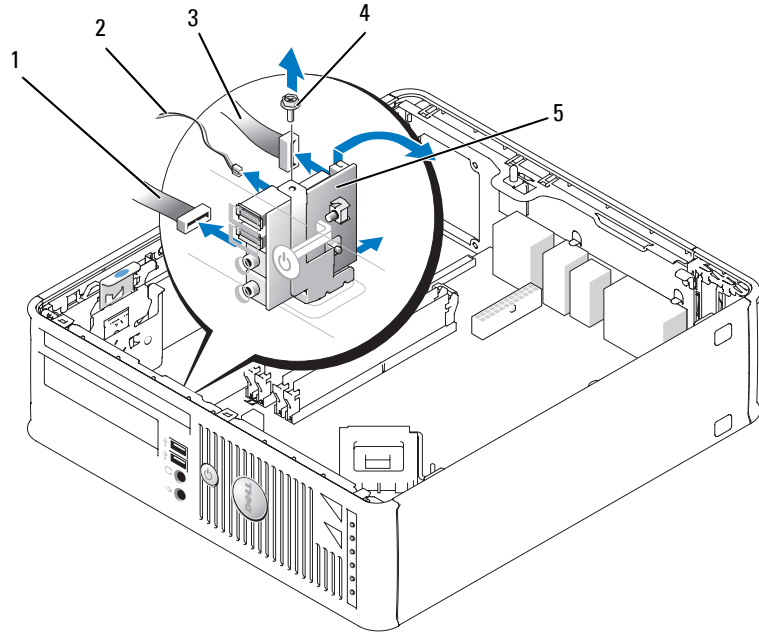
NOTE: Note the routing of all cables as you remove them so that you can re-route them correctly when installing the new I/O Panel.

- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 Remove the optical drive and floppy drive or Media Card Reader from the drive bays, if installed (see "Drives" on page 205).
- 3 Remove the processor heat sink (see "Processor" on page 243).
- 4 Remove the front fan:
 - a Disconnect the fan connector.
 - b Disconnect the fan control cable.
 - c Press the tab that secures the fan to the interior base of the computer and lift the fan from the computer; set the fan aside in the chassis.



1 fan control ribbon cable 2 fan release tab 3 fan cable

- 5 Disconnect all cables that are connected to the I/O panel that you can access without removing the I/O panel.
Note the routing of the cables as you lay them aside, so that you can replace them correctly.




- | | | | | | |
|---|---------------------|---|------------------------------|---|---------------------|
| 1 | fan cable connector | 2 | air temperature sensor cable | 3 | I/O cable connector |
| 4 | screw | 5 | I/O panel | | |

- 6 From inside the computer cover, remove the mounting screw that secures the I/O panel to the computer.
- 7 Ease the I/O panel back and forth to release its circular tabs from the two holes in the chassis that secure it.
- 8 Remove any remaining cables; note the routing of all cables, so that you can reroute them
- 9 Remove the I/O panel from the computer.

Replacing the I/O Panel

- 1 To replace the I/O panel, follow the removal procedures in the reverse order.

 **NOTE:** Use the guides on the I/O panel bracket to help position the I/O panel in place and use the notch on the I/O panel bracket to help seat the card.

Removing the Computer Cover



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

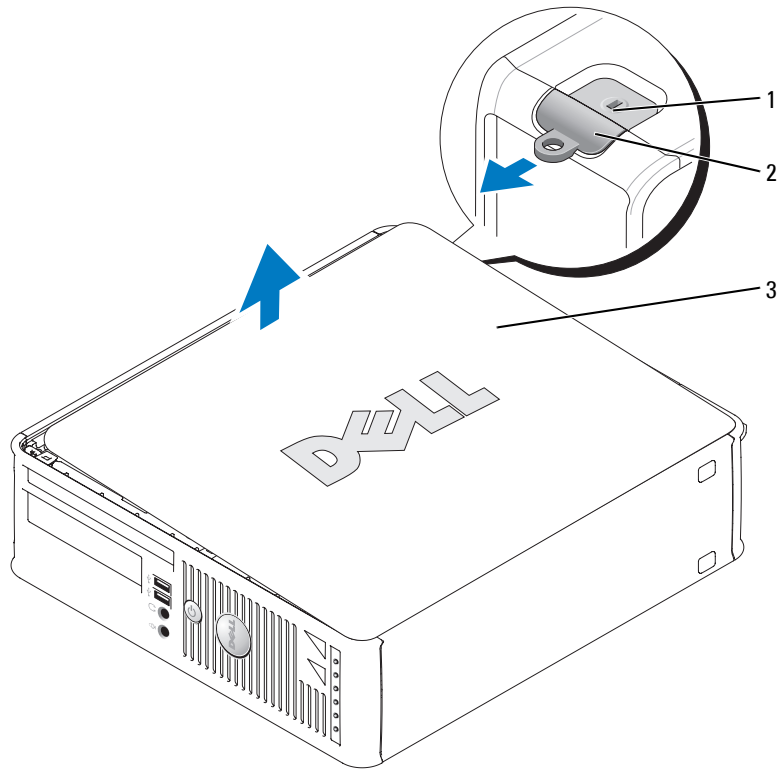


CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 If you have installed a padlock through the padlock ring on the back panel, remove the padlock.
- 3 Locate the cover release latch shown in the illustration. Then, slide the release latch back as you lift the cover.
- 4 Grip the sides of the computer cover and pivot the cover up using the bottom hinges as leverage points.
- 5 Remove the cover from the hinge tabs and set it aside on a soft nonabrasive surface.



CAUTION: Graphic card heat sinks can become very hot during normal operation. Ensure that a graphic card heat sink has had sufficient time to cool before you touch it.



1 security cable slot

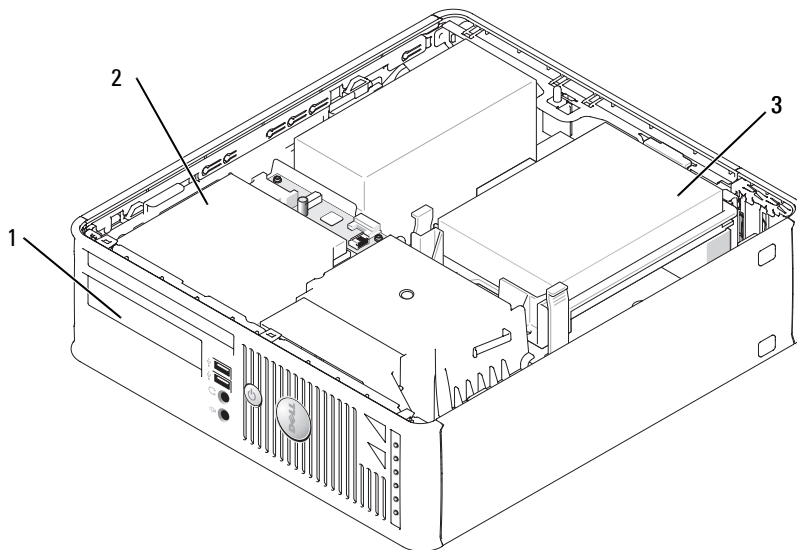
2 cover release latch

3 computer cover

Drives

Your computer supports:

- One SATA hard drive
- One floppy drive or Media Card Reader
- One SATA optical drive



- 1 FlexBay for floppy drive or Media Card Reader 2 optical drive 3 hard drive

General Installation Guidelines

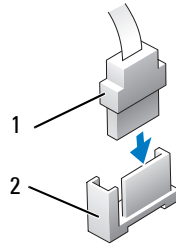
- 1 Connect a SATA hard drive to the connector labeled "SATA0" on the system board (see "System Board Components" on page 190).
- 2 Connect the SATA optical drive to the connector labeled "SATA1" on the system board.

Connecting Drive Cables

When you install a drive, you connect two cables—a DC power cable and a data cable—to the back of the drive.

Drive Interface Connectors

Serial ATA Connector



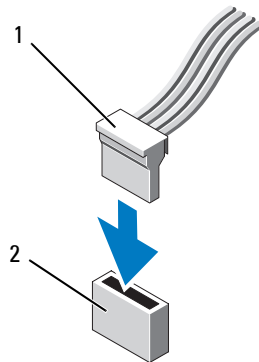
- 1 interface cable connector 2 interface connector

Interface connectors are keyed for correct insertion.

➔ NOTICE: Inserting a cable incorrectly prevents the drive from operating and could damage the controller, the drive, or both.

Power Cable Connectors

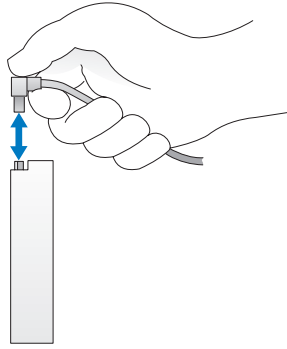
Serial ATA Power Connector



- 1 power cable 2 power input connector

Connecting and Disconnecting Drive Cables

When connecting and disconnecting a SATA data cable, hold the cable by the black connector at each end.



Hard Drive



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.




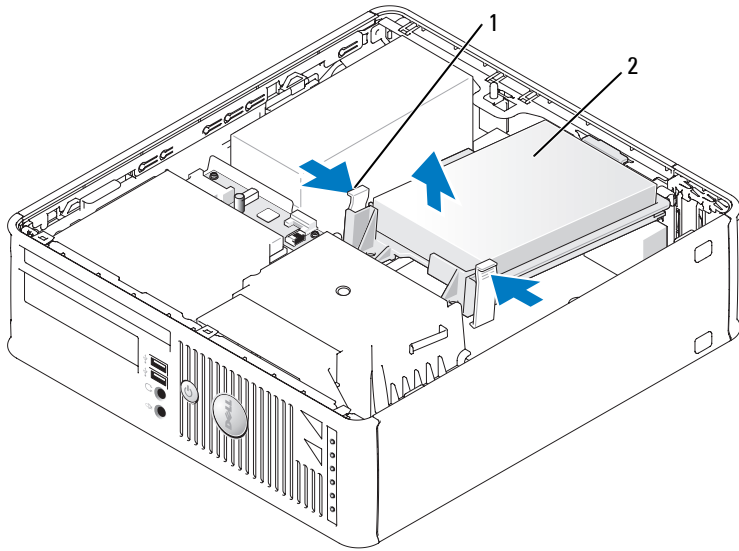
CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.



NOTICE: To avoid damage to the drive, do not set it on a hard surface. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.

Removing a Hard Drive

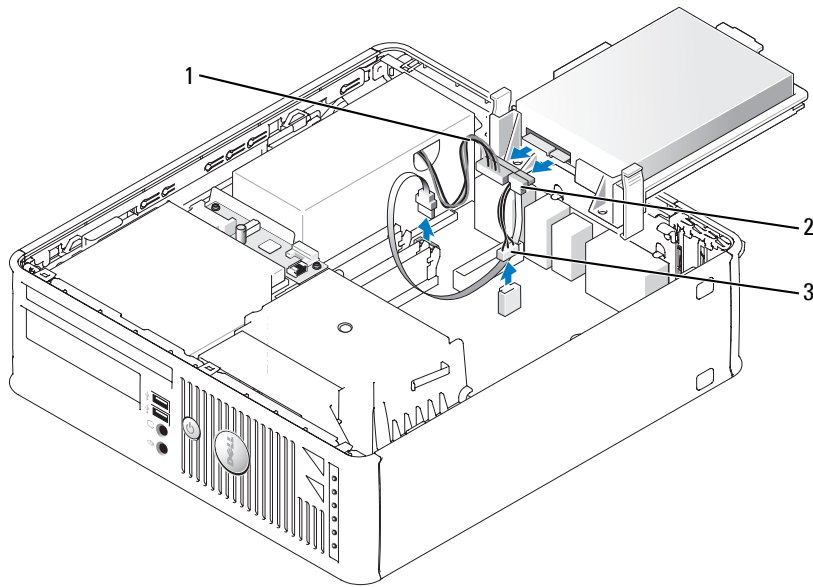
- 1 If you are replacing a hard drive that contains data you want to keep, back up your files before you begin this procedure.
 - 2 Check the documentation for the drive to verify that it is configured for your computer.
 - 3 Follow the procedures in "Before You Begin" on page 19.
 - 4 Lay the computer on its side so that the system board is on the bottom of the inside of the computer.
 - 5 Press in on the two blue securing tabs on each side of the drive and slide the drive up and out of the computer.
-  **NOTICE:** Do not pull the drive out of the computer by the drive cables. Doing so may cause damage to cables and the cable connectors.
- 6 Lift the drive out of the computer, careful not to pull the cables still attached to it.



1 securing tabs (2)

2 hard drive

- 7 Disconnect the power and data cable from the drive.



1 power cable

2 SATA data cable

3 fan cable

- 8 Disconnect the hard drive fan from the system board.

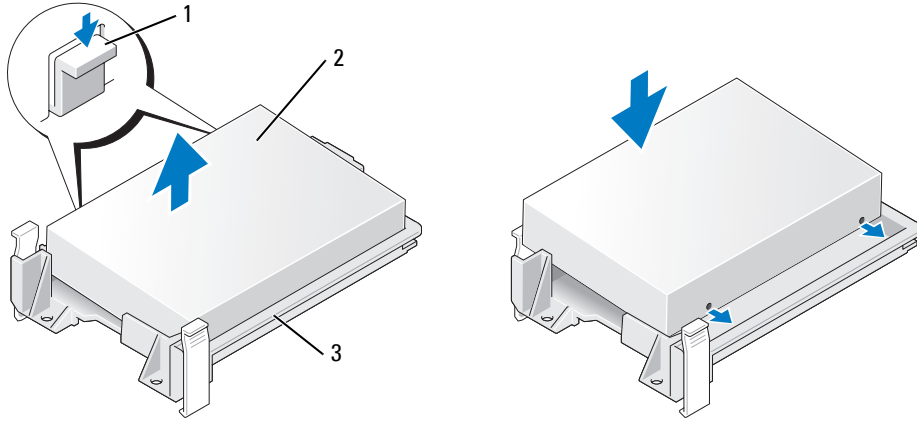
Installing a Hard Drive

- 1 Check the documentation for the drive to verify that it is configured for your computer.

➔ NOTICE: To avoid damage to the drive, do not set it on a hard surface. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.

- 2 Unpack the replacement hard drive, and prepare it for installation.

- 3 If your replacement hard drive does not have the plastic drive bracket attached, remove the bracket from the existing drive by unsnapping it from the drive.



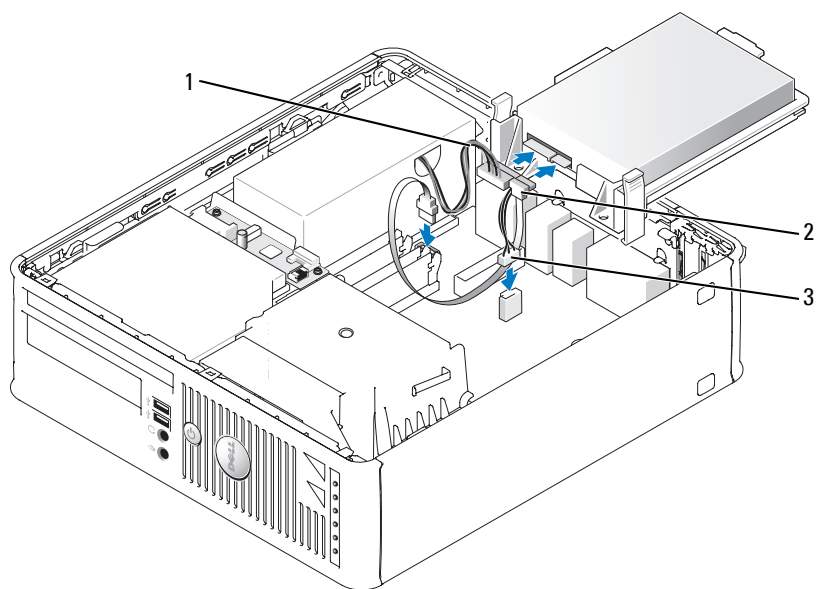
1 release tabs (2)

2 drive

3 hard drive bracket

4 Connect the hard drive fan to the system board (see "System Board Components" on page 190).

5 Connect the power and data cables to the drive.

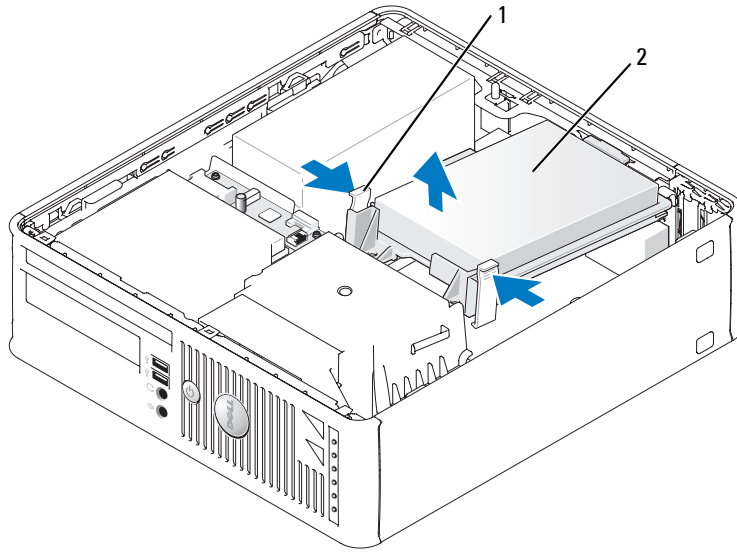


1 power cable

2 SATA data cable

3 fan cable

- 6 Gently position the drive until it clicks into place.



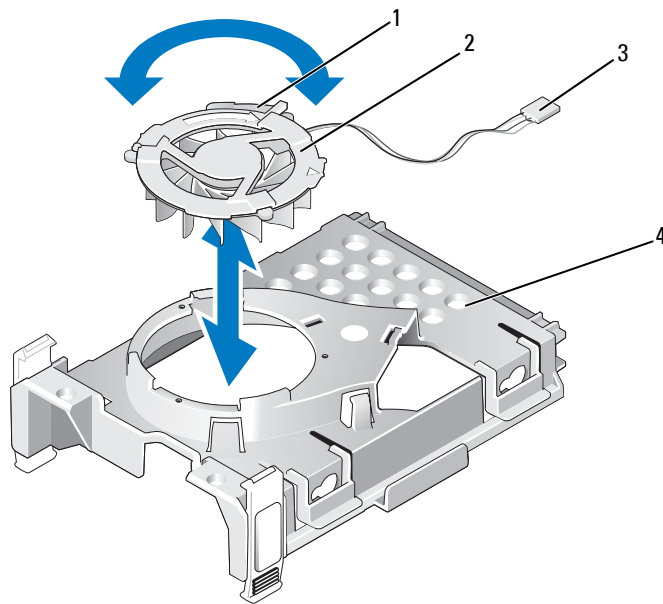
- 1 release tabs (2) 2 hard drive

- 7 Check all connectors to be certain that they are properly cabled and firmly seated.
- 8 Replace the computer cover (see "Replacing the Computer Cover" on page 297).
- 9 If the drive you just installed is the primary drive, insert bootable media into your boot drive.
- 10 Turn on the computer.
- 11 Enter system setup (see "Entering System Setup" on page 257) and update the appropriate **Primary Drive** option (0 or 2).
- 12 Exit system setup, and reboot the computer.
- 13 Partition and logically format your drive before you proceed to the next step.
For instructions, see the documentation that came with your operating system.
- 14 Test the hard drive by running the Dell Diagnostics (see "Dell Diagnostics" on page 327).
- 15 Install your operating system on the hard drive.
For instructions, see the documentation that came with your operating system.

Replacing a Hard-Drive Fan

- 1 Follow the instructions in "Before You Begin" on page 19.

- 2 Remove the hard drive (see "Removing a Hard Drive" on page 208).
- 3 Turn the hard drive upside down, so that the hard-drive fan is visible in the bottom of the drive bracket.
- 4 To remove the hard-drive fan:
 - a Lift the release tab on the back panel of the fan.
 - b Rotate the fan in the opposite direction from that indicated by the arrow on the back panel of the fan.
 - c Lift to remove the fan and its back panel from the hard-drive bracket.



- | | | |
|----------------------|---------------------------|---------------|
| 1 fan release tab | 2 fan with fan back panel | 3 power cable |
| 4 hard-drive bracket | | |

- 5 To replace the hard-drive fan:
 - a Turn the fan upside-down, so that its backing faces up and align the triangle on the fan's back panel with the corresponding triangle on the back of the hard-drive bracket.
 - b Rotate the fan and its backing in the direction of the arrow on the fan's back panel.
- 6 Install the hard drive (see "Installing a Hard Drive" on page 210).

Optical Drive




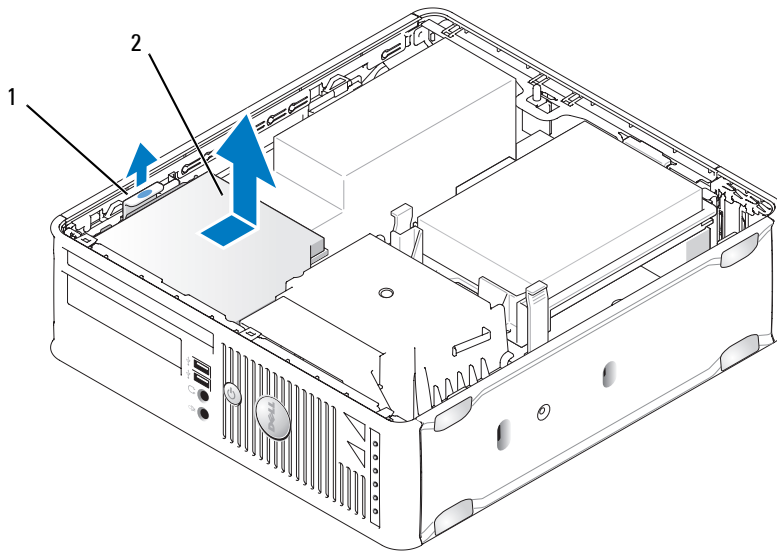
CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.



CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

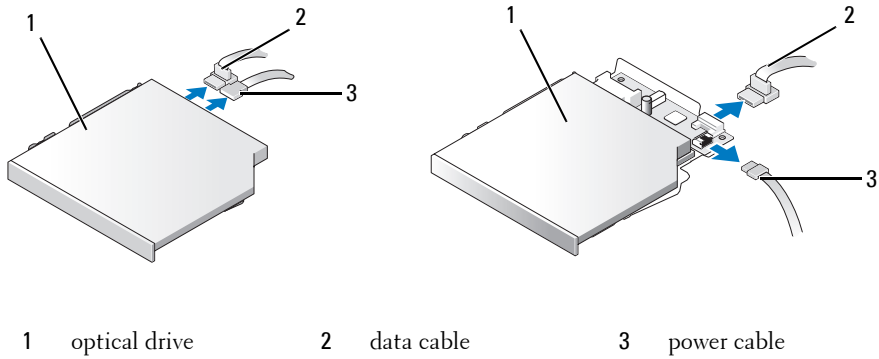
Removing an Optical Drive

- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 Lay the computer on its side so that the system board is on the bottom of the inside of the computer.
-  **NOTICE:** Do not pull the drive out of the computer by the drive cables. Doing so may cause damage to cables and the cable connectors.
- 3 Pull up on the drive release latch and slide the drive towards the back of the computer. Then lift up to remove the drive from the computer.



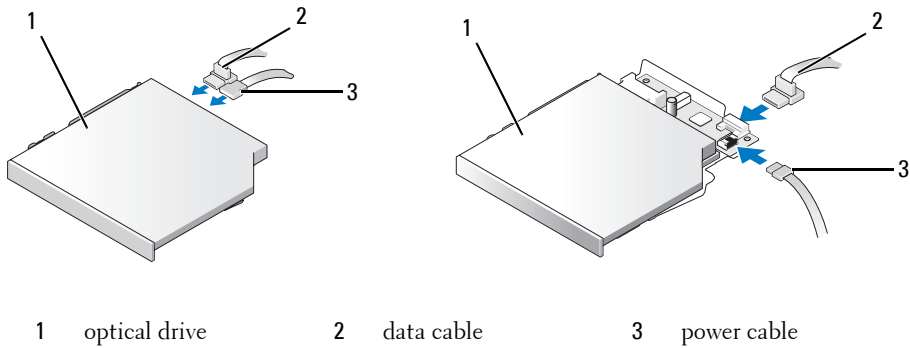
1 drive release latch 2 optical drive

- 4 Disconnect the power and data cable from the back of the drive.

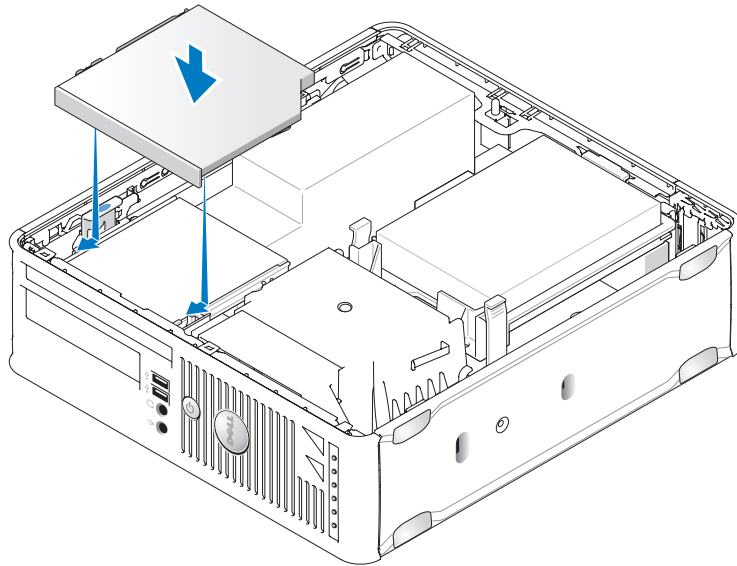


Installing an Optical Drive

- 1 Unpack the drive and prepare it for installation.
- 2 Check the documentation that accompanied the drive to verify that the drive is configured for your computer.
- 3 Connect the power and data cable to the drive.



- 4 Gently position the drive until it clicks into place.



- 5 Check all cable connections, and fold cables out of the way to provide airflow for the fan and cooling vents.
- 6 Replace the computer cover (see "Replacing the Computer Cover" on page 297).
- 7 See the documentation that came with the drive for instructions on installing any software required for drive operation.
- 8 Enter system setup and select the appropriate **Drive** option (see "Entering System Setup" on page 257).
- 9 Verify that your computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 327).

Floppy Drive and Media Card Reader



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.



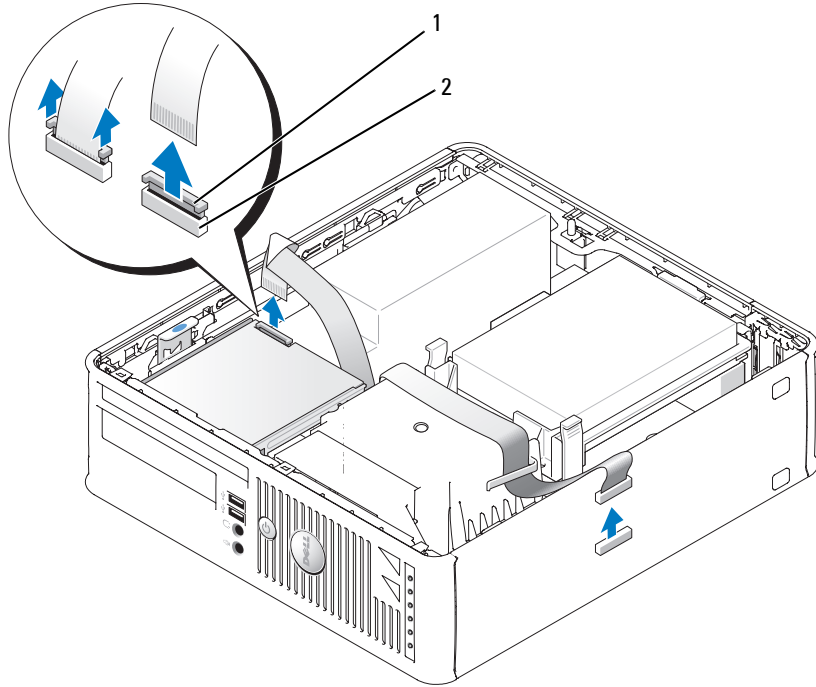
CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

Removing a Floppy Drive or Media Card Reader

- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 Lay the computer on its side so that the system board is on the bottom of the inside of the computer.
- 3 Remove the optical drive and carefully set it aside (see "Optical Drive" on page 215).

➔ **NOTICE:** Do not pull the drive out of the computer by the drive cables. Doing so may cause damage to cables and the cable connectors.

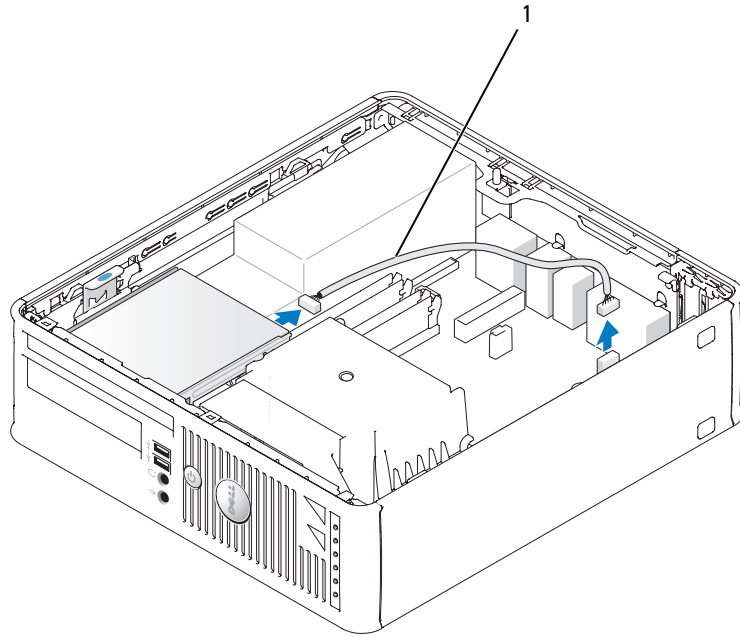
- 4 If you are removing a floppy drive, pull up the cable release tab to unlock it.
- 5 Gently lift the data cable from the floppy data cable edge connector.



1 cable release tab

2 data cable edge connector

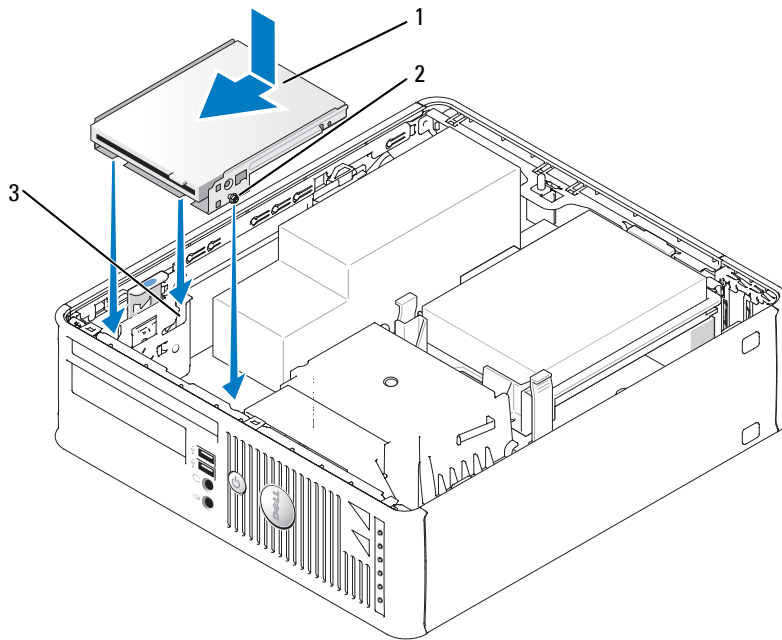
- 6** If you are removing a Media Card Reader, disconnect the data cable.
- 7** If you are removing the Media Card Reader, remove the hard drive (see "Removing a Hard Drive" on page 208).
- 8** Disconnect the data cable from the system board.



1 Media Card Reader data
cable

- 9** Pull up on the drive release latch and slide the floppy drive or Media Card Reader towards the back of the computer. Then lift up to remove the drive or Media Card Reader from the computer.

Installing a Floppy Drive or Media Card Reader

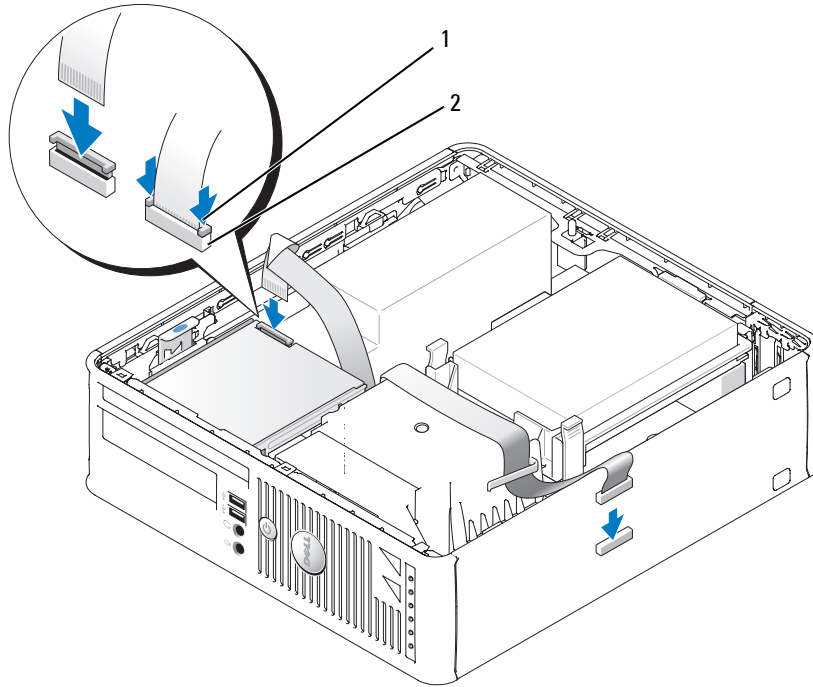


- 1 floppy drive or Media Card Reader 2 screws (3) 3 bracket rails (3)

- 1 If you are:
 - Installing a new floppy drive or Media Card Reader, remove the drive panel insert
 - Replacing a drive, remove the floppy drive or Media Card Reader (see "Floppy Drive and Media Card Reader" on page 217).
- 2 Align the screws on the drive or Media Card Reader with the bracket slots in the computer, and gently position the drive until it clicks into place.
- 3 If you are installing:
 - A floppy drive: insert the data cable into the cable release tab on the floppy drive and press down on the tab until it clicks to lock it in place.
 - A Media Card Reader: insert the cable into the connector on the Media Card Reader.

4 If you are installing:

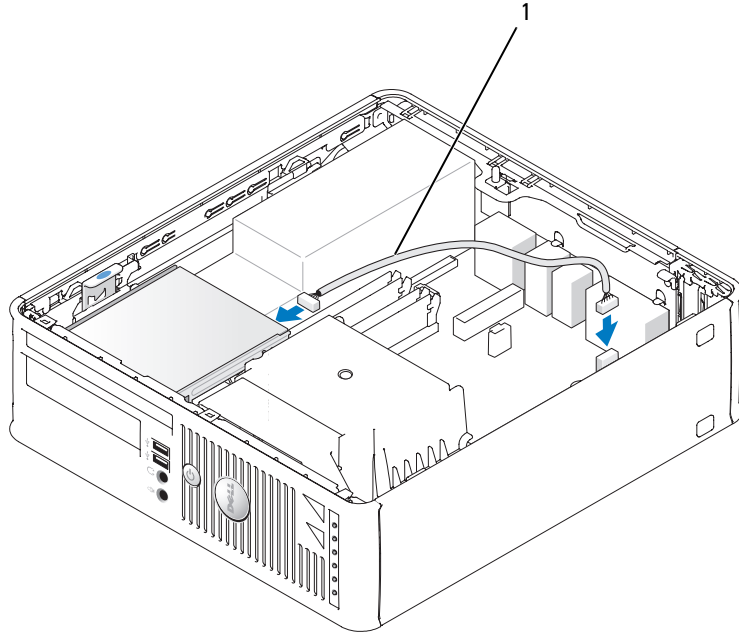
- A floppy drive: insert the data cable into the connector on the system board.



1 cable release tab

2 floppy drive data cable edge
connector

- A Media Card Reader: remove the hard drive (see "Removing a Hard Drive" on page 208) and connect the cable to the system board connector labeled "USB1" (see "System Board Components" on page 190).



1 media card reader data cable

- 5 Replace the optical drive (see "Optical Drive" on page 215).
- 6 Check all cable connections, and fold cables out of the way to provide airflow for the fan and cooling vents.
- 7 Replace the computer cover (see "Replacing the Computer Cover" on page 297).
- 8 Enter system setup and use the **Diskette Drive** option to enable your new floppy drive (see "System Setup" on page 257).
See the documentation that came with the drive for instructions on installing any software required for drive operation.
- 9 Verify that your computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 327).

PCI, PCI Express Cards, and PS/2 Serial Port Adapters



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.



NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

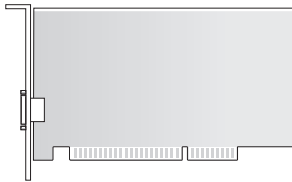
Your Dell™ computer supports a PS/2 serial port adapter and provides the following connectors for PCI and PCI Express cards:

- One low-profile PCI card slot
- One low-profile PCI Express x16 card slot



NOTE: Your Dell computer uses only PCI and PCI Express slots. ISA cards are not supported.

PCI Cards



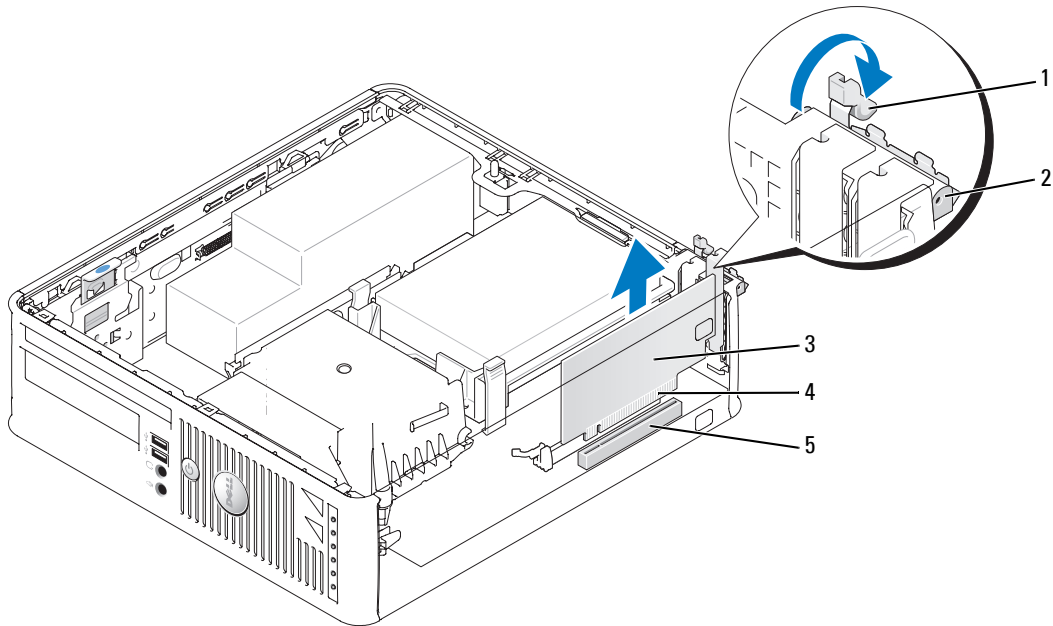
Installing a PCI Card

- 1 Follow the procedures in "Before You Begin" on page 19.



NOTE: For PCI card locations, see "System Board Components" on page 102.

- 2 Gently lift the release tab on the card retention latch from the inside and pivot the latch open.



- | | | | | | |
|---|---------------------|---|----------------------|---|------|
| 1 | release tab | 2 | card retention latch | 3 | card |
| 4 | card-edge connector | 5 | card connector | | |

- 3 If you are installing a new card, remove the filler bracket to create a card-slot opening. Then continue with step 5.
- 4 If you are replacing a card that is already installed in the computer, remove the card. If necessary, disconnect any cables connected to the card. Then continue with step 6.
- 5 Prepare the card for installation.

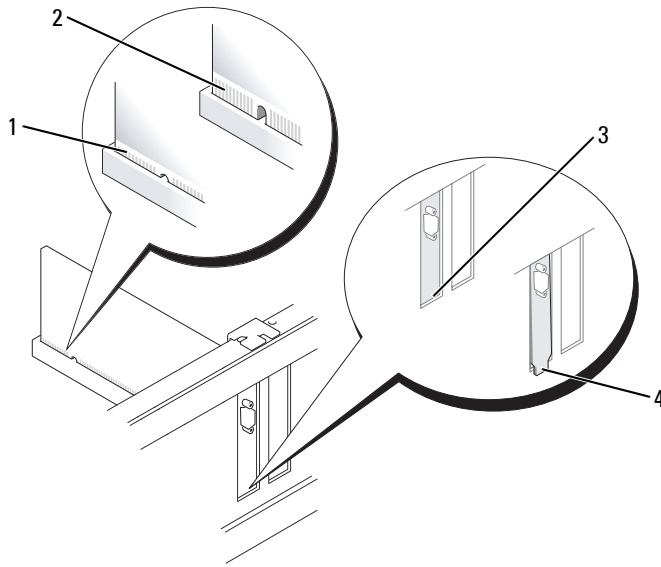


CAUTION: Some network adapters automatically start the computer when they are connected to a network. To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any cards.



NOTE: See the documentation that came with the card for information on configuring the card, making internal connections, or customizing it for your computer.

- 6 Place the card in the connector and press down firmly. Ensure that the card is fully seated in the slot.



- 1 fully seated card 2 not fully seated card 3 bracket within slot
 4 bracket caught outside of slot

7 Before closing the card retention latch, ensure that:

- The tops of all cards and filler brackets are flush with the alignment guide
- The notch in the top of the card or filler bracket fits around the alignment guide

8 Secure the card(s) by closing the card retention latch and snapping it into place.

➔ NOTICE: Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

9 Connect any cables that should be attached to the card.

10 Replace the computer cover (see "Replacing the Computer Cover" on page 297).

✍ NOTE: See the documentation for the card for information about the card's cable connections.

11 If you installed a sound card:

- a** Enter system setup, select **Integrated Audio** from the **Onboard Devices** group, and change the setting to **Off** (see "System Setup" on page 257).
- b** Connect external audio devices to the sound card's connectors. Do not connect external audio devices to the line-in connector on the back panel of the computer (see "Back-Panel Connectors" on page 99).

➡ NOTICE: To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

12 If you installed a network adapter card and want to turn off the integrated network adapter:

- a** Enter system setup, select **Integrated NIC** from the **Onboard Devices** group, and change the setting to **Off** (see "System Setup" on page 257).
- b** Connect the network cable to the network adapter card's connectors. Do not connect the network cable to the integrated network connector on the back panel of the computer.

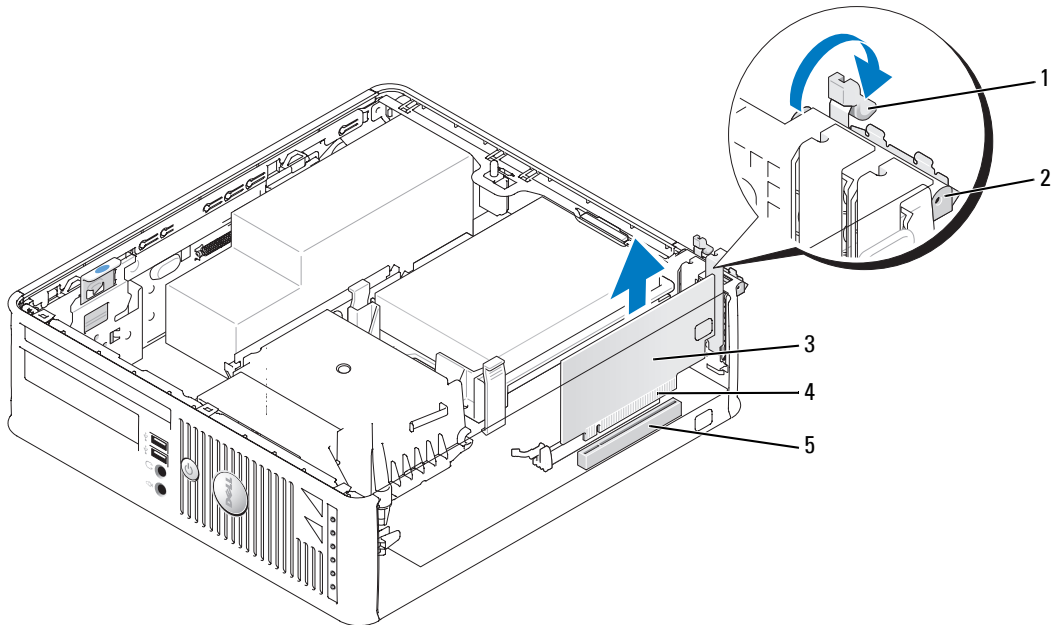
13 Install any drivers required for the card as described in the card documentation.

Removing a PCI Card

1 Follow the procedures in "Before You Begin" on page 19.

✎ NOTE: For PCI card locations, see "System Board Components" on page 102.

- 2** Gently lift the release tab on the card retention latch from the inside and pivot the latch open.
- 3** If necessary, disconnect any cables connected to the card.
- 4** Grasp the card by its top corners, and ease it out of its connector.



1 release tab


2 card retention latch

3 card

4 card-edge connector


5 card connector

5 If you are removing the card permanently, install a filler bracket in the empty card-slot opening.

 **NOTE:** Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets also keep dust and dirt out of your computer.

6 Before you close the card retention mechanism, ensure that:

- The tops of all cards and filler brackets are flush with the alignment bar.
- The notch in the top of the card or filler bracket fits around the alignment guide.

 **NOTICE:** Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.


7 Secure any remaining card(s) by closing the card retention latch and snapping it into place.


8 Replace the computer cover (see "Replacing the Computer Cover" on page 297).

9 Uninstall the card's driver. See the documentation that came with the card for instructions.

10 If you removed a sound card:

- a Enter system setup, select **Integrated Audio** from the **Onboard Devices** group, and change the setting to **On** (see "System Setup" on page 257).
- b Connect external audio devices to the audio connectors on the back panel of the computer.

 **NOTICE:** To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

 **NOTE:** See the documentation for the card for information about the card's cable connections.

11 If you removed a network-adapter card connector:

- a Enter system setup, select **Integrated NIC** from the **Onboard Devices** group, and change the setting to **On** (see "System Setup" on page 257).
- b Connect the network cable to the integrated network connector on the back panel of the computer.


PCI Express and DVI Cards

Your computer supports one low-profile PCI Express x16 card.

If you are replacing a PCI Express card with a different type of PCI Express card, remove the current driver for the card from the operating system. See the documentation that came with the card for information.

Installing a PCI Express x16 Card or DVI Card

1 Follow the procedures in "Before You Begin" on page 19.

 **NOTE:** For PCI card locations, see "System Board Components" on page 102.

2 Gently lift the release tab on the card retention latch from the inside and pivot the latch open.

3 If you are installing a new PCI Express x16 card or DVI card, remove the filler bracket to create a card-slot opening. Then continue with step 5.

4 If you are replacing a PCI Express x16 card or DVI card, remove the card (see "Removing a PCI Express x16 Card or DVI Card" on page 231). If necessary, disconnect any cables connected to the card. Then continue with step 6.

5 Prepare the card for installation.

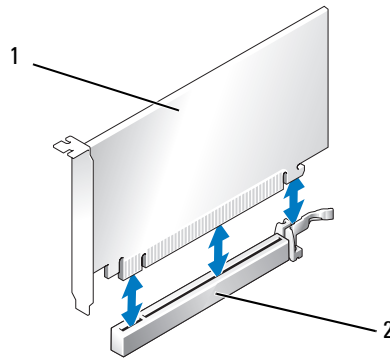


CAUTION: Some network adapters automatically start the computer when they are connected to a network. To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any cards.



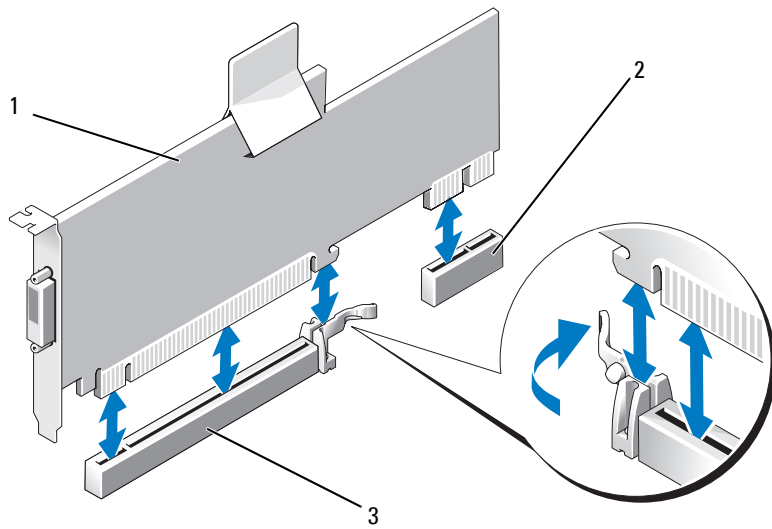
NOTE: See the documentation that came with the card for information on configuring the card, making internal connections, or customizing it for your computer.

6 Place the card in the connector and press down firmly. Ensure that the card is fully seated in the slot.



1 PCI Express x16 card

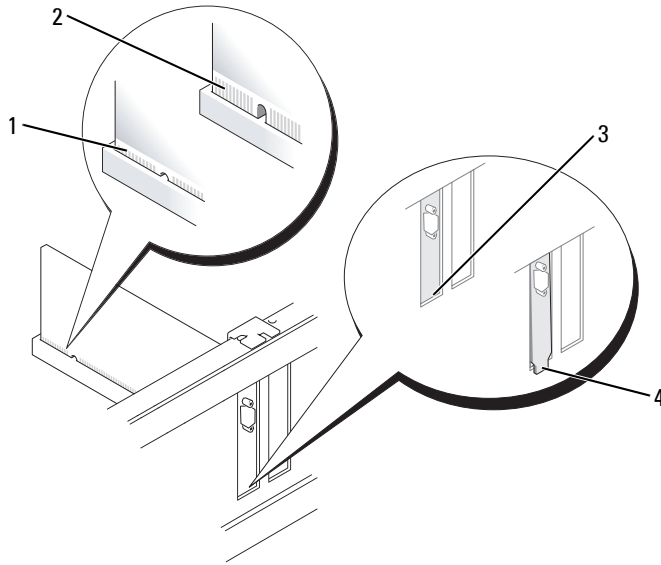
2 PCI Express x16 card connector



1 PCI Express x16 DVI-card

2 DVI card connector

3 PCI Express x16 card connector



- 1 fully seated card 2 not fully seated card 3 bracket within slot
 4 bracket caught outside of slot

➔ **NOTICE:** Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

7 Connect any cables that should be attached to the card.

8 Before you close the card retention mechanism, ensure that:

- The tops of all cards and filler brackets are flush with the alignment bar.
- The notch in the top of the card or filler bracket fits around the alignment guide.

9 Secure the card(s) by closing the card retention latch and snapping it into place.

10 Replace the computer cover (see "Replacing the Computer Cover" on page 297).

✎ **NOTE:** See the documentation for the card for information about the card's cable connections.

11 If you installed a sound card:

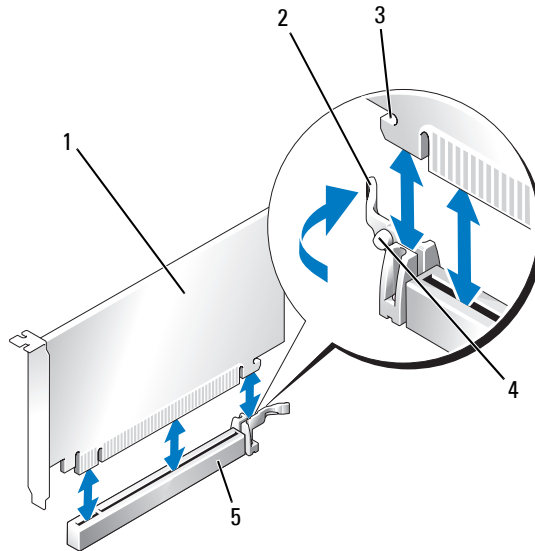
- a Enter system setup, select **Integrated Audio** from the **Onboard Devices** group, and change the setting to **Off** (see "System Setup" on page 257).
- b Connect external audio devices to the sound card's connectors. Do not connect external audio devices to the line-in connector on the back panel of the computer (see "Back-Panel Connectors" on page 99).

➔ **NOTICE:** To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

- 12 If you installed a network adapter card and want to turn off the integrated network adapter:
 - a Enter system setup, select **Integrated NIC** from the **Onboard Devices** group, and change the setting to **Off** (see "System Setup" on page 257).
 - b Connect the network cable to the network adapter card's connectors. Do not connect the network cable to the integrated network connector on the back panel of the computer.
- 13 Install any drivers required for the card as described in the card documentation.

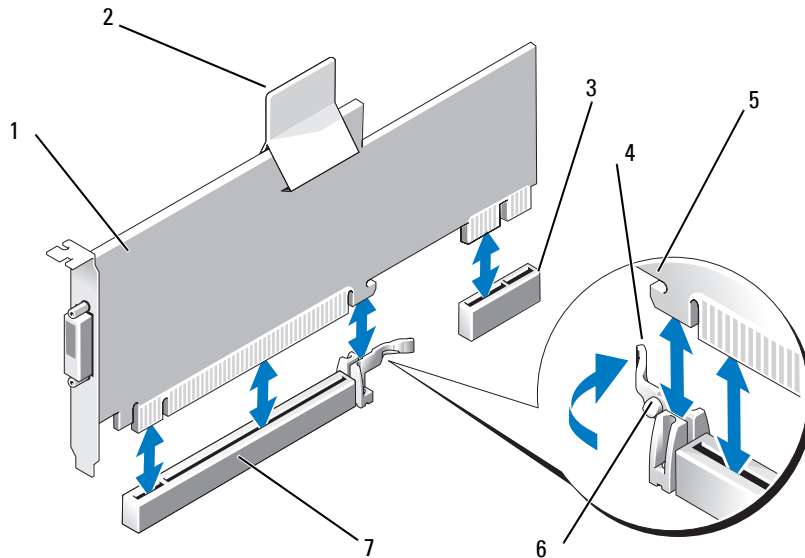
Removing a PCI Express x16 Card or DVI Card

- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 Gently lift the release tab on the card retention latch from the inside and pivot the latch open.
- 3 If necessary, disconnect any cables connected to the card.
- 4 Press the lever with your thumb until you release the securing tab.
If you are removing a PCI Express x16 card, go to step 5.
If you are removing a DVI card, go to step 6
- 5 While pressing the lever, pull the card up and out of the card connector.



- | | | | | | |
|---|----------------------|---|--------------------------------|---|-------------------------------|
| 1 | PCI Express x16 card | 2 | lever | 3 | securing slot (not all cards) |
| 4 | securing tab | 5 | PCI Express x16 card connector | | |

- 6 While pressing the lever, pull the removal pull tab up and remove the card out of the card connector.



- | | | | | | |
|---|--------------------------------|---|------------------|---|--------------------|
| 1 | PCI Express x16 DVI-card | 2 | removal pull tab | 3 | DVI card connector |
| 4 | lever | 5 | securing slot | 6 | securing tab |
| 7 | PCI Express x16 card connector | | | | |

7 If you are removing the card permanently, install a filler bracket in the empty card-slot opening.

NOTE: Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets also keep dust and dirt out of your computer.

8 Before you close the card retention mechanism, ensure that:

- The tops of all cards and filler brackets are flush with the alignment bar.
- The notch in the top of the card or filler bracket fits around the alignment guide.

9 Secure any remaining card(s) by closing the card retention latch and snapping it into place.


NOTICE: Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

10 Replace the computer cover (see "Replacing the Computer Cover" on page 297).

11 Uninstall the card's driver. See the documentation that came with the card for instructions.

12 If you removed a sound card:

- a Enter system setup, select **Integrated Audio** from the **Onboard Devices** group, and change the setting to **On** (see "System Setup" on page 257).
- b Connect external audio devices to the audio connectors on the back panel of the computer.

 **NOTICE:** To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

13 If you removed a network-adapter card connector:

- a Enter system setup, select **Integrated NIC** from the **Onboard Devices** group, and change the setting to **On** (see "System Setup" on page 257).
- b Connect the network cable to the integrated network connector on the back panel of the computer.

PS/2 Serial Port Adapters



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.



NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

Installing a PS/2 Serial Port Adapter

- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 Gently lift the release tab on the card retention latch from the inside and pivot the latch open.
- 3 Remove the filler bracket (if applicable).

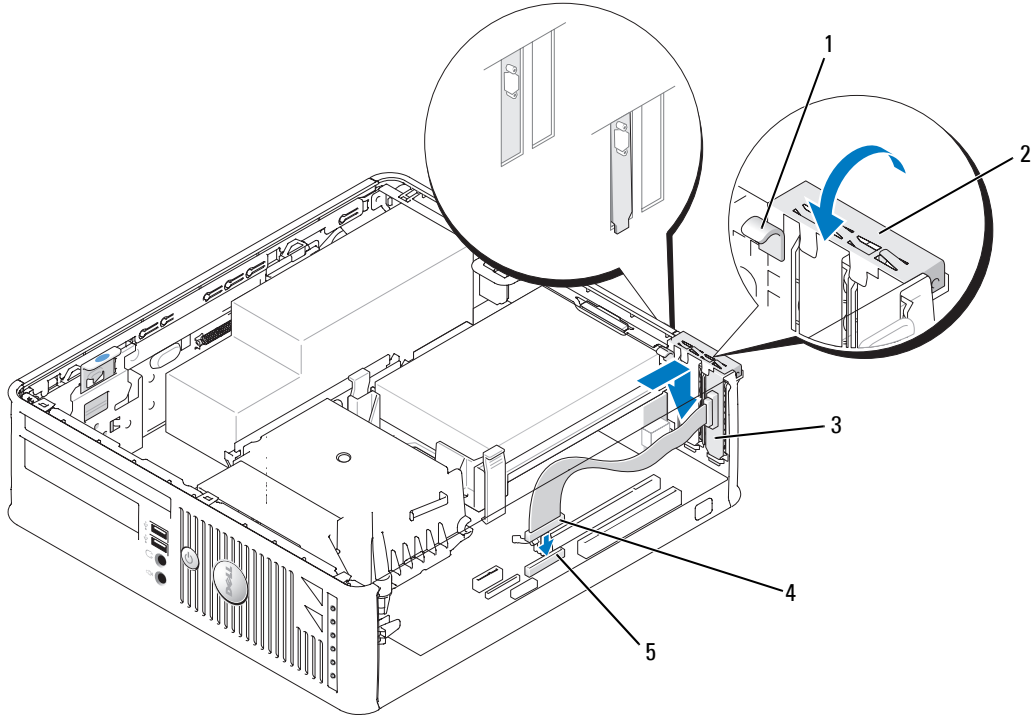


NOTE: See the documentation that came with the adapter for information on configuring the adapter, making internal connections, or customizing it for your computer.

- 4 Align the PS/2 serial-port adapter bracket in the retention slot and press down firmly. Ensure that the adapter is fully seated in the slot.
- 5 Before you close the card retention mechanism, ensure that:
 - The tops of all cards and filler brackets are flush with the alignment bar.
 - The notch in the top of the card or filler bracket fits around the alignment guide.
- 6 Secure the card(s) by closing the card retention latch and snapping it into place.



NOTICE: Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.



- | | | | | | |
|---|-------------------------------|---|---|---|-----------------------------|
| 1 | release tab | 2 | adapter retention latch | 3 | serial port adapter bracket |
| 4 | serial port adapter connector | 5 | serial port adapter system board connector (PS2/SER2) | | |


7 Connect the adapter cable to the PS/2 serial port adapter connector (PS2/SER2) on the system board (see "System Board Components" on page 102).

NOTE: See the documentation for the PS/2 serial port adapter for information about the cable connections.

8 Replace the computer cover (see "Replacing the Computer Cover" on page 297).

Removing a PS/2 Serial Port Adapter

- 1** Follow the procedures in "Before You Begin" on page 19.
- 2** Gently lift the release tab on the card retention latch from the inside and pivot the latch open.
- 3** Disconnect the PS/2 serial port cable from the system board (see "System Board Components" on page 102).
- 4** Grasp the PS/2 serial port adapter bracket by its top corners, and ease it out of its connector.
- 5** If you are removing the adapter permanently, install a filler bracket in the empty card-slot opening.

 **NOTE:** Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets also keep dust and dirt out of your computer.

- 6 Before you close the card retention mechanism, ensure that:
 - The tops of all cards and filler brackets are flush with the alignment bar.
 - The notch in the top of the card or filler bracket fits around the alignment guide.
- 7 Secure any remaining card(s) by closing the card retention latch and snapping it into place.
- 8 Replace the computer cover (see "Replacing the Computer Cover" on page 297).

Power Supply

Replacing the Power Supply



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

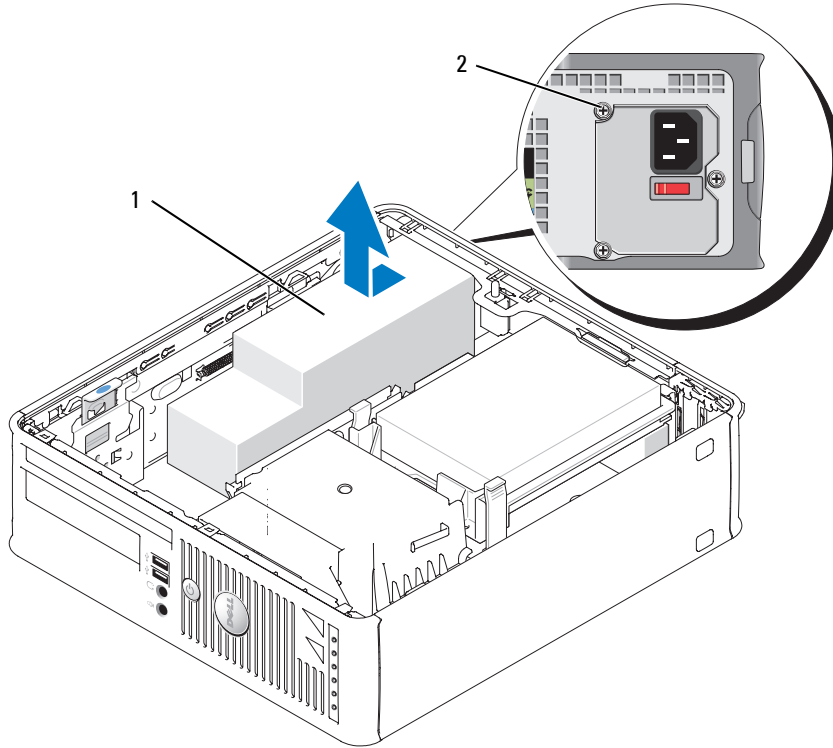


NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 If installed, remove the optical drive (see "Removing an Optical Drive" on page 215).
- 3 If installed, remove the floppy drive or Media Card Reader (see "Removing a Floppy Drive or Media Card Reader" on page 217).
- 4 Disconnect the DC power cables from the system board and the drives.

Note the routing of the DC power cables underneath the tabs in the computer frame as you remove them from the system board and drives. You must route these cables properly when you replace them to prevent their being pinched or crimped.

- 5 Remove the three screws that attach the power supply to the computer chassis.



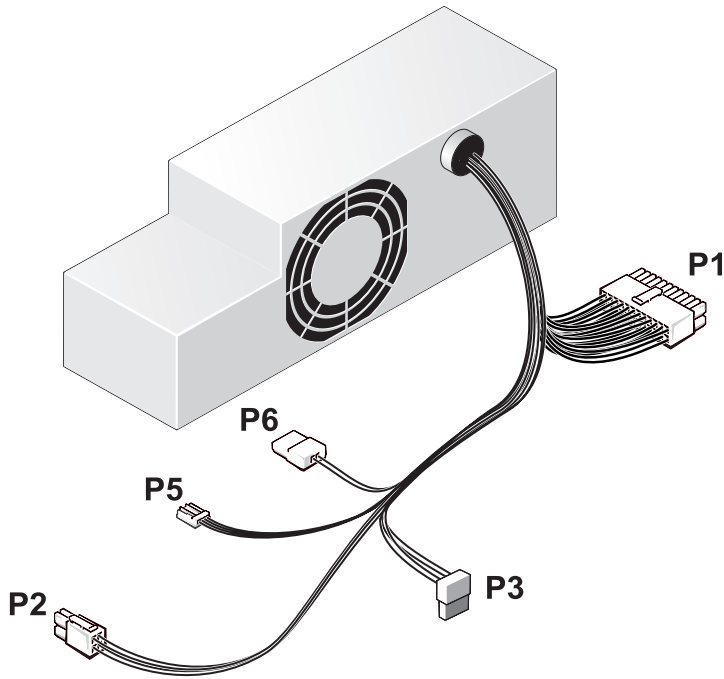
1 power supply

2 screw

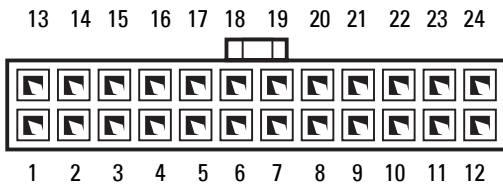
- 6 Slide the power supply toward the front of the computer approximately 1 inch.
 - 7 Lift the power supply up and out of the computer.
 - 8 Slide the replacement power supply into place.
 - 9 Replace the screws that secure the power supply to the back of the computer chassis.
 - 10 Reconnect the DC power cables to the system board and drives (see "System Board Components" on page 190 for connector locations).
 - 11 Replace the floppy drive or Media Card Reader (see "Installing a Floppy Drive or Media Card Reader" on page 220).
 - 12 Replace the optical drive (see "Installing an Optical Drive" on page 216).
 - 13 Replace the computer cover (see "Replacing the Computer Cover" on page 297).
 - 14 Connect the AC power cable to the power supply AC power connector.
- ➔ NOTICE:** To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

15 Connect your computer and devices to electrical outlets, and turn them on.

DC Power Connectors



DC Power Connector P1



Pin Number	Signal name	18-AWG Wire
1	+3.3 VDC	Orange
2	+3.3 VDC	Orange
3	GND	Black
4	VCC (+5 V)	Red

Pin Number	Signal name	18-AWG Wire
5	GND	Black
6	VCC (+5 V)	Red
7	GND	Black
8	PS_PWRGOOD*	Gray
9	P5AUX	Purple
10	V_12P0_DIG	Yellow
11	V_12P0_DIG	Yellow
12	+3.3 V	Orange
13 (optional)	+3.3V	Orange
14	-12 V*	Blue
15	GND	Black
16	PWR_PS_ON	Green
17	GND	Black
18	GND	Black
19	GND	Black
20	NC	NC
21	VCC (+5V)	Red

Pin Number	Signal name	18-AWG Wire
22	VCC (+5V)	Red
23	VCC (+5V)	Red
24	GND	Black

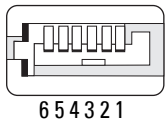
*Use 22-AWG wire instead of 18-AWG wire.

DC Power Connector P2



Pin Number	Signal Name	18-AWG Wire
1	GND	Black
2	GND	Black
3	+12 VDC	Yellow
4	+12 VDC	Yellow

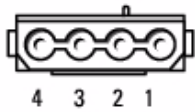
DC Power Connectors P3



Pin Number	Signal Name	24-AWG Wire
1	NC	NC
2	+5 VDC	Red
3	+5 VDC	Red
4	NC	NC

Pin Number	Signal Name	24-AWG Wire
5	GND	Black
6	GND	Black

DC Power Connector P5



Pin Number	Signal Name	24-AWG Wire
1	GND	Black
2	+5 VDC	Red
3	NA	NA
4	+3.3 VDC	Orange

Processor



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.



NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

Removing the Processor

- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 Remove the hard drive (see "Removing a Hard Drive" on page 208).
- 3 If installed, remove the floppy drive cable from the cable routing clips on the heat sink assembly.
- 4 Loosen the captive screw on each side of the heat sink assembly.

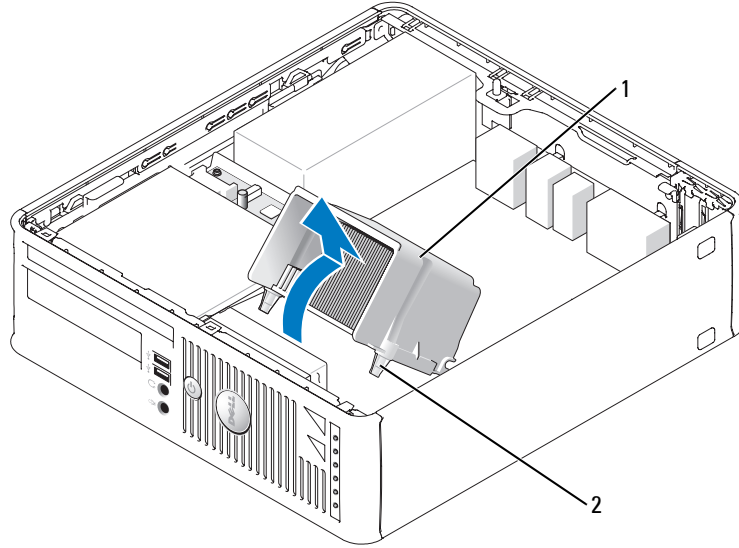


CAUTION: Despite having a plastic shield, the heat sink assembly may be very hot during normal operation. Be sure that it has had sufficient time to cool before you touch it.



NOTICE: Before rotating the heat sink assembly upward, twist the assembly side to side to help break the thermal grease bond between the heat sink and the processor. This is to prevent damage to the processor from pulling the processor out of the socket while rotating the heat sink assembly upward.

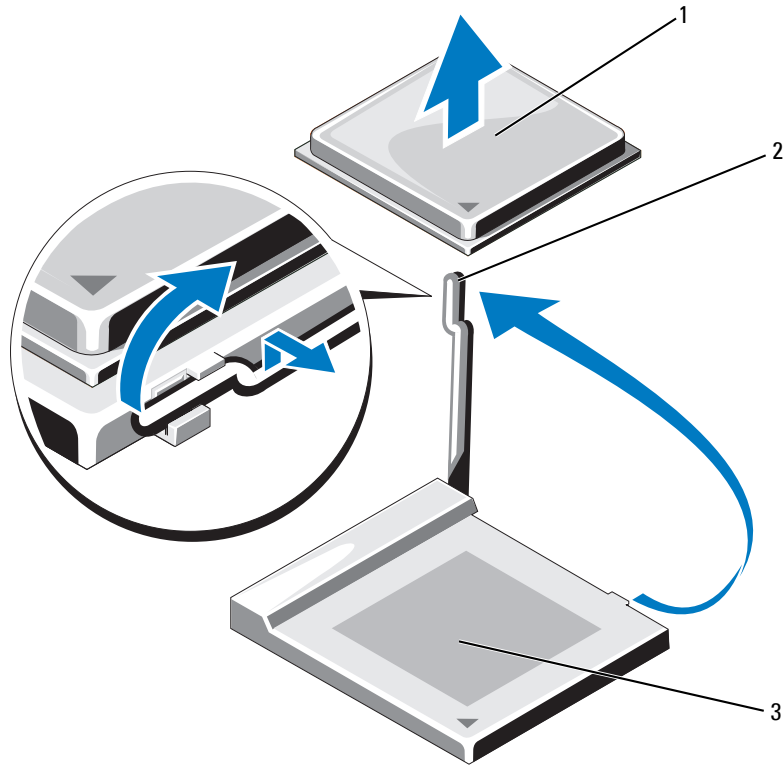
- 5 Rotate the heat sink assembly upward, and remove the assembly from the computer. Lay the heat sink down on its top, with the thermal grease facing upward.



- 1 heat sink assembly 2 captive screws in housing (2)

➔ **NOTICE:** Unless a new heat sink is required for the new processor, reuse the original heat sink assembly when you replace the processor.

6 Pull the release lever straight up until the processor is released.



1 processor

2 release lever

3 socket

➔ **NOTICE:** Be careful not to bend any of the pins when you remove the processor from the socket. Bending the pins can permanently damage the processor.

7 Remove the processor from the socket.

Leave the release lever extended in the release position so that the socket is ready for the new processor, and go to "Installing the Processor" on page 245.

➔ **NOTICE:** After removing the processor, be careful not to get any thermal grease on the processor pins. Thermal grease on the pins can permanently damage the processor.

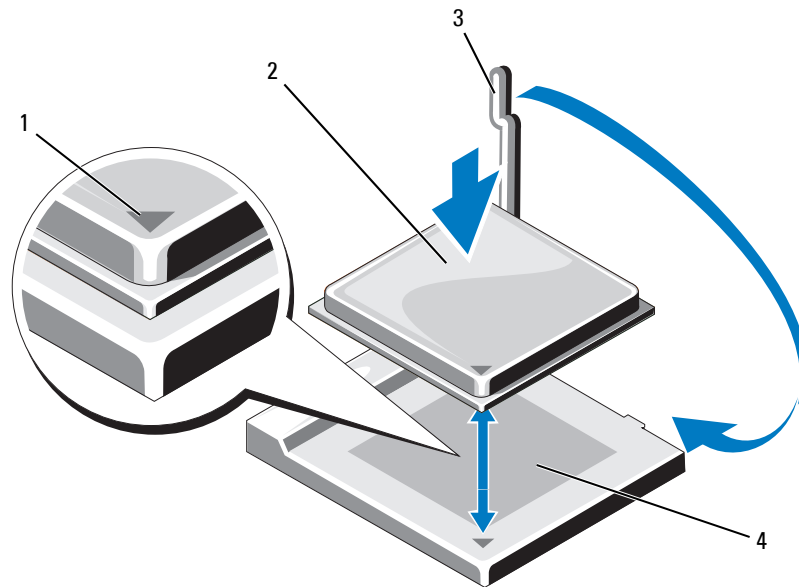
Installing the Processor

➔ **NOTICE:** Ground yourself by touching an unpainted metal surface on the back of the computer.

➔ **NOTICE:** Be careful not to bend any of the pins when you replace the processor from the socket. Bending the pins can permanently damage the processor.

1 Follow the procedures in "Before You Begin" on page 19.

- ➔ **NOTICE:** Be careful not to bend any of the pins when you unpack the processor. Bending the pins can permanently damage the processor.
- 2 Unpack the new processor, being careful not to bend any of the processor pins.
- ➔ **NOTE:** You must position the processor correctly in the socket to avoid permanent damage to the processor and the computer when you turn on the computer.
- 3 If the release lever on the socket is not fully extended, move it to that position.
- 4 Align the pin-1 corners of the processor and socket.



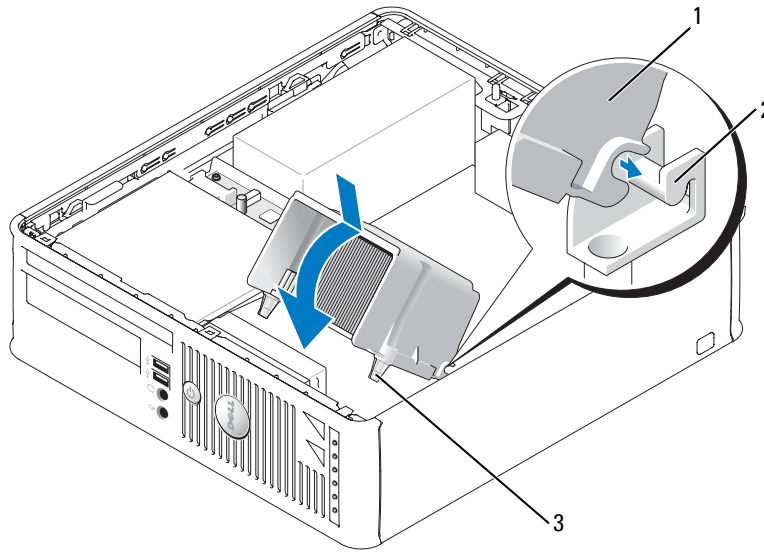
- 1 socket and processor pin-1 indicator
- 2 processor
- 3 release lever
- 4 processor socket

- ➔ **NOTICE:** To avoid damage, ensure that the processor aligns properly with the socket, and do not use excessive force when you install the processor.
- 5 Set the processor lightly in the socket and ensure that the processor is positioned correctly.
- 6 While lightly pressing down on the processor, rotate the release lever back toward the system board until it snaps into place, securing the processor.
- 7 Clean the thermal grease from the bottom of the heat sink.
- ➔ **NOTICE:** Ensure that you apply new thermal grease. New thermal grease is critical for ensuring adequate thermal bonding, which is a requirement for optimal processor operation.
- 8 Apply the new thermal grease to the top of the processor.

9 Install the heat sink assembly:

- a** Place the heat sink assembly back onto the heat-sink assembly bracket.
- b** Rotate the heat sink assembly down towards the computer base and ensure that the two captive screws are properly aligned with the holes in the system board
- c** Tighten the two captive screws.

➔ NOTICE: Ensure that the heat sink is correctly seated and secure.



1 heat sink assembly

2 heat-sink assembly bracket

3 captive screw in housing (2)

10 Route the floppy drive cable through the cable routing clips on the heat sink assembly.

11 Replace the hard drive (see "Installing a Hard Drive" on page 210).

12 Replace the computer cover (see "Replacing the Computer Cover" on page 297).

Advanced Features

LegacySelect Technology Control

LegacySelect technology control offers legacy-full, legacy-reduced, or legacy-free solutions based on common platforms, hard-drive images, and help desk procedures. Control is provided to the administrator through system setup, Dell OpenManage™ IT Assistant, or Dell custom factory integration.

LegacySelect allows administrators to electronically activate or deactivate connectors and media devices that include serial and USB connectors, a parallel connector, a floppy drive, PCI slots, and a PS/2 mouse. Connectors and media devices that are deactivated make resources available. You must restart the computer to effect the changes.

Manageability

Alert Standard Format

ASF is a DMTF management standard that specifies "pre-operating system" or "operating system-absent" alerting techniques. The standard is designed to generate an alert on potential security and fault conditions when the operating system is in a sleep mode or the system is turned off. ASF is designed to supersede previous operating-system-absent alerting technologies.

Your computer supports the following ASF version 1.03 and 2.0 alerts and remote capabilities:

Alert	Description
Chassis: Chassis Intrusion - Physical Security Violation/Chassis Intrusion - Physical Security Violation Event Cleared	The computer chassis with the chassis intrusion feature installed and enabled has been opened or the chassis intrusion alert has been cleared.
CPU: Emergency Shutdown Event	The processor temperature is too hot and the power supply has shut down.
Cooling Device: Generic Critical Fan Failure/Generic Critical Fan Failure Cleared	The fan speed (rpm) is out of limits or the fan speed (rpm) problem has been resolved.

Alert	Description
Temperature: Generic Critical Temperature Problem/Generic Critical Temperature Problem Cleared	The computer temperature is out of limits or the computer temperature problem has been resolved.
Battery Low	The system battery has reached a voltage of 2.2 V or lower.

For more information about Dell's ASF implementation, see the *ASF User's Guide* and the *ASF Administrator's Guide*, which are available on the Dell Support website at support.dell.com.

Dell OpenManage™ IT Assistant

IT Assistant configures, manages, and monitors computers and other devices on a corporate network. IT Assistant manages assets, configurations, events (alerts), and security for computers equipped with industry-standard management software. It supports instrumentation that conforms to SNMP, DMI, and CIM industry standards.

Dell OpenManage Client instrumentation, which is based on DMI and CIM, is available for your computer. For information on IT Assistant, see the *Dell OpenManage IT Assistant User's Guide* available on the Dell Support website at support.dell.com.

Dell OpenManage Client Instrumentation

Dell OpenManage Client Instrumentation is software that enables remote management programs such as IT Assistant to do the following:

- Access information about your computer, such as how many processors it has and what operating system it is running.
- Monitor the status of your computer, such as listening for thermal alerts from temperature probes or hard-drive failure alerts from storage devices.
- Change the state of your computer, such as updating its BIOS or shutting it down remotely.

A managed system is one that has Dell OpenManage Client Instrumentation set up on a network that uses IT Assistant. For information about Dell OpenManage Client Instrumentation, see the *Dell OpenManage Client Instrumentation User's Guide* available on the Dell Support website at support.dell.com.

Security

Chassis Intrusion Detection



NOTE: When the administrator password is enabled, you must know the administrator password before you can reset the **Chassis Intrusion** setting.

This feature, if installed and enabled, detects that the chassis was opened and alerts the user. To change the **Chassis Intrusion** setting:

- 1 Enter system setup (see "Entering System Setup" on page 257).
- 2 Press the down-arrow key to move to the **Security** option.
- 3 Press <Enter> to access the **Security** option's pop-up menu.
- 4 Press the down-arrow key to move to the **Chassis Intrusion** setting.
- 5 Press <Enter> to select an option setting.
- 6 Press <Enter> again after you update the option setting.
- 7 Exit and save system setup.

Option Settings

- **On** — If the computer cover is opened, the setting changes to **Detected**, and the following alert message displays during the boot routine at the next computer start-up:

Alert! Cover was previously removed.

To reset the **Detected** setting, enter system setup (see "Entering System Setup" on page 257). In the **Chassis Intrusion** option, press the left- or right-arrow key to select **Reset**, and then choose **On**, **On-Silent**, or **Off**.

- **On-Silent** (default setting) — If the computer cover is opened, the setting changes to **Detected**. No alert message appears during the boot sequence at the next computer start-up.
- **Off** — No intrusion monitoring occurs and no messages appear.

Padlock Ring and Security Cable Slot

Use one of the following methods to secure your computer:

- Use a padlock alone or a padlock and looped security cable with the padlock ring.
A padlock alone prevents the computer from being opened.
A security cable looped around a stationary object is used in conjunction with a padlock to prevent unauthorized movement of the computer.
- Attach a commercially available antitheft device to the security cable slot on the back of the computer.



NOTE: Before you purchase an antitheft device, make sure that it works with the security cable slot on your computer.

Antitheft devices usually include a segment of metal-stranded cable with an attached locking device and key. The documentation that comes with the device contains instructions for installing it.

Password Protection

- ➔ **NOTICE:** Although passwords provide security for the data on your computer, they are not foolproof. If your data requires more security, it is your responsibility to obtain and use additional forms of protection, such as data encryption programs.

System Password

- ➔ **NOTICE:** If you leave your computer running and unattended without having a system password assigned, or if you leave your computer unlocked so that someone can disable the password by changing a jumper setting, anyone can access the data stored on your hard drive.

Option Settings

You cannot change or enter a new system password if either of the following two options is displayed:

- **Set** — A system password is assigned.
- **Disabled** — The system password is disabled by a jumper setting on the system board.

You can only assign a system password when the following option is displayed:

- **Not Set** — No system password is assigned and the password jumper on the system board is in the enabled position (the default setting).

Assigning a System Password

- ✍ **NOTE:** To escape from the field without assigning a system password, press <Tab> or the <Shift><Tab> key combination to move to another field, or press <Esc> at any time before you complete step 5.

1 Enter system setup and verify that **Password Status** is set to **Unlocked**.

2 Highlight **System Password**, and then press the left- or right-arrow key.

The option heading changes to **Enter Password**, followed by an empty 32-character field in square brackets.

3 Type your new system password.

You can use up to 32 characters. To erase a character when entering your password, press <Backspace> or the left-arrow key. The password is not case sensitive.

Certain key combinations are not valid. If you enter one of these combinations, the speaker emits a beep.

As you press each character key (or the spacebar for a blank space), a placeholder appears in the field.

4 Press <Enter>.

If the new system password is less than 32 characters, the whole field fills with placeholders. Then the option heading changes to **Verify Password**, followed by another empty 32-character field in square brackets.

5 To confirm your password, type it a second time and press <Enter>.

The password setting changes to **Set**.

6 Exit system setup.

Password protection takes effect when you restart the computer.

Typing Your System Password

When you start or restart your computer, the following prompt appears on the screen.

If **Password Status** is set to **Locked**:

Type the password and press <Enter>.

If you have assigned an administrator password, the computer accepts your administrator password as an alternate system password.

If you type a wrong or incomplete system password, the following message appears on the screen:

```
** Incorrect password. **
```

If you again type an incorrect or incomplete system password, the same message appears on the screen. The third and subsequent times you type an incorrect or incomplete system password, the computer displays the following message:

```
** Incorrect password. **  
Number of unsuccessful password attempts: 3  
System halted! Must power down.
```

Even after your computer is turned off and on, the previous message is displayed each time you type an incorrect or incomplete system password.



NOTE: You can use **Password Status** in conjunction with **System Password** and **Admin Password** to further protect your computer from unauthorized changes.

Deleting or Changing an Existing System Password

1 Enter system setup (see "Entering System Setup" on page 257).

2 Highlight **System Password** and press <Enter>.

3 When prompted, type the system password.

4 Press <Enter> twice to clear the existing system password. The setting changes to **Not Set**.

If **Not Set** is displayed, the system password is deleted. If **Not Set** is not displayed, press <Esc>, press the left- and right-arrow keys to highlight **Save/Exit**, and then press <Enter> to restart the computer and implement your changes. Then repeat steps 3 and 4.

5 To assign a new password, follow the procedure in "Assigning a System Password" on page 252.

6 Exit system setup.

Administrator Password

Option Settings

You cannot change or enter a new administrator password if either of the following two options is displayed:

- **Set** — An administrator password is assigned.
- **Disabled** — The administrator password is disabled by a jumper setting on the system board.

You can only assign an administrator password when the following option is displayed:

- **Not Set** — No administrator password is assigned and the password jumper on the system board is in the enabled position (the default setting).

Assigning an Administrator Password



NOTE: To escape from the field without assigning an administrator password, press <Tab> or the <Shift><Tab> key combination to move to another field, or press <Esc> at any time before you complete step 3.

The administrator password can be the same as the system password.



NOTE: If the two passwords are different, the administrator password can be used as an alternate system password. However, the system password cannot be used in place of the administrator password.

- 1 Enter system setup and verify that **Admin Password** is set to **Not Set** (see "Entering System Setup" on page 257).
- 2 Highlight **Admin Password** and press the left- or right-arrow key.
The computer prompts you to type and verify the password. If you enter a character that is not permitted, the computer emits a beep.
- 3 Type and then verify the password.
After you verify the password, the **Admin Password** setting changes to **Set**. The next time you enter system setup, the computer prompts you for the administrator password.
- 4 Exit system setup.
A change to **Admin Password** becomes effective immediately (no need to restart the computer).

Operating Your Computer With an Administrator Password Enabled

When you enter system setup, the **Admin Password** option is highlighted, prompting you to type the password (see "Entering System Setup" on page 257).

If you do not type the correct password, the computer lets you view, but not modify, system setup options.



NOTE: You can use **Password Status** in conjunction with **Admin Password** to protect the system password from unauthorized changes.

Deleting or Changing an Existing Administrator Password

To change an existing administrator password, you must know the administrator password.

- 1 Enter system setup (see "Entering System Setup" on page 257).
- 2 Type the administrator password at the prompt.
- 3 Highlight **Admin Password** and press the left- or right-arrow key to delete the existing administrator password.

The setting changes to **Not Set**.


To assign a new administrator password, perform the steps in "Assigning an Administrator Password" on page 254.


- 4 Exit system setup.

Disabling a Forgotten Password and Setting a New Password


To reset system and/or administrator passwords, see "Clearing Forgotten Passwords" on page 265.

Trusted Platform Module (TPM)

 **NOTE:** Computers shipping into China are not equipped with TPM.

 **NOTE:** The TPM feature supports encryption only if the operating system supports TPM. For more information, see the TPM software documentation and the help files that came with the software.


TPM is a hardware-based security feature that can be used to create and manage computer-generated encryption keys. When combined with security software, the TPM enhances existing network and computer security by enabling features such as file protection capabilities and protected e-mail. The TPM feature is enabled through a system setup option.

 **NOTICE:** To secure your TPM data and encryption keys, follow the backup procedures documented in the Archive and Restore section of the EMBASSY Security Center help file. In the event of these backups being incomplete, lost, or damaged, Dell will be unable to assist in the recovery of encrypted data.

Enabling the TPM Feature

- 1 Enable the TPM software:
 - a Restart the computer and press <F2> during the Power On Self Test to enter the system setup program.
 - b Select **Security**, then select **TPM Security** and press <Enter>.
 - c Under **TPM Security**, select **On**.
 - d Press <Esc> to exit the setup program.
 - e If prompted, click **Save/Exit**.
- 2 Activate the TPM setup program:

- a Restart the computer and press <F2> during the Power On Self Test to enter the system setup program.
- b Select **Security**, then select **TPM Activation** and press <Enter>.
- c Under **TPM Activation**, select **Activate** and press <Enter>.

 **NOTICE:** You only need to activate TPM once.

Once the process is complete, the computer either restarts automatically or prompts you to restart your computer.

System Setup


Overview

Use system setup as follows:

- To change the system configuration information after you add, change, or remove any hardware in your computer
- To set or change a user-selectable option such as the user password
- To read the current amount of memory or set the type of hard drive installed

Before you use system setup, it is recommended that you write down the system setup screen information for future reference.

Entering System Setup

- 1 Turn on (or restart) your computer.
- 2 When the blue DELL™ logo is displayed, you must watch for the F2 prompt to appear.
- 3 Once this F2 prompt appears, press <F2> immediately.
 **NOTE:** The F2 prompt indicates that the keyboard has initialized. This prompt can appear very quickly, so you must watch for it to display, and then press <F2>. If you press <F2> before you are prompted, this keystroke will be lost.
- 4 If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft® Windows® desktop, then, shut down your computer (see "Turning Off Your Computer" on page 19) and try again.

System Setup Screen

The system setup screen displays current or changeable configuration information for your computer. Information on the screen is divided into four areas: the menu at the top, the main window, the Item Help field on the right, and key functions listed on the bottom.

Options List — This field appears on the left side of the system setup window. The field is a scrollable list containing features that define the configuration of your computer, including installed hardware, power conservation, and security features.

Scroll up and down the list by using the up- and down-arrow keys. As an option is highlighted, the **Option Field** displays more information about that option and the option's current and available settings.

Option Field — This field contains information about each option. In this field you can view your current settings and make changes to your settings.

Use the right- and left-arrow keys to highlight an option. Press <Enter> to make that selection active.

Key Functions — This field appears below the **Option Field** and lists keys and their functions within the active system setup field.

System Setup Options



NOTE: Depending on your computer and installed devices, the items listed in this section may not appear, or may not appear exactly as listed.

System

System Info	Lists the computer name, BIOS Version , Service Tag , Express Service Code , (if applicable), and the Asset Tag . None of these fields can be modified.
Processor Info	Identifies the CPU type, processor clock speed, bus speed, clock speed, and L2 cache size. States whether the processor is multiple-core capable and whether it supports 64-bit technology.
Memory Info	Lists the type, size, speed, and channel mode (dual or single) of installed memory.
PCI Info	Identifies any installed PCI or PCI Express cards.
Date/Time	Displays current date and time settings.
Boot Sequence	The computer attempts to boot from the sequence of devices specified in this list.
HDD Boot Sequence	Lists the order that the BIOS will search the available hard drives in the system.

Drives

Diskette Drive (Internal default)	This option enables or disables the floppy drive. The options are Off , USB , Internal , and Read Only . NOTE: If USB is selected, ensure that USB Controller setup option under Onboard Devices is set to On .
SATA 0 through SATA n	Identifies and enables and disables the drives attached to the SATA connectors on the system board and lists the capacities for the hard drives. NOTE: These options appear as SATA 0 through SATA 3 for the mini tower, SATA 0 through SATA 2 for the desktop, and SATA 0 and SATA1 for the small form factor.
External SATA	Identifies and enables and disables the drives attached to the eSATA connector on the system board and lists the capacities for the hard drives.
SATA Operation (RAID Autodetect/AHCI default for mini tower and desktop computers) (AHCI default for small form factor computers)	Options for mini tower and desktop computers: <ul style="list-style-type: none">• RAID Autodetect/AHCI (RAID if signed drives, otherwise AHCI)• RAID Autodetect/ATA (RAID if signed drives, otherwise ATA)• RAID On (SATA is configured for RAID on every boot) NOTE: When in Autodetect mode, the computer configures the drive as RAID if a RAID signature is detected on the drive. Otherwise the drive will be configured as AHCI or ATA. Options for small form factor computers: <ul style="list-style-type: none">• AHCI• ATA
SMART Reporting (Off default)	This setting determines whether integrated drive errors are reported or not during system startup.

Onboard Devices

Integrated NIC (On default)	Enables or disables the integrated NIC controller. Settings are Off , On , On w/ PXE , or On w/RPL . When the On w/ PXE or the On w/RPL setting is active, if a boot routine is not available from the network server, the computer attempts to boot from the next device in the boot sequence list.
Integrated Audio (On default)	Enables or disables the onboard audio controller.
USB Controller (On default)	Enables or disables the internal USB controller. No Boot enables the controller but disables the ability to boot from a USB device. NOTE: Operating systems with USB support will recognize USB floppy drives regardless of the No Boot setting.

USB 0 through 5 (On default)	Enables or disables the USB ports on the back of the computer.
Front USB Ports (On default)	Enables or disables the front USB ports.
LPT Port Mode (PS/2 default)	Determines the mode of operation of the internal parallel port. AT configures the port for AT compatibility. PS/2 configures the port for PS/2 compatibility. EPP configures the port for the Enhanced Parallel Port bidirectional protocol. ECP configures the port for the Extended Capability Port bidirectional protocol. NOTE: If you set the LPT Port Mode to ECP , the LPT Port DMA appears in the option menu.
LPT Port Address	Determines the address that the built-in parallel port uses.
Serial Port #1 (Auto default)	Determines how the serial port operates. Auto , the default setting, automatically configures a connector to a particular designation (COM1 or COM3).
Serial Port #2 (Auto default)	Determines how the serial port operates. Auto , the default setting, automatically configures a connector to a particular designation (COM2 or COM4).
PS/2 Mouse Port	Enables or disables the integrated legacy PS/2 mouse controller.

Video

Primary Video (Auto default)	This setting specifies which video controller is primary when there are two video controllers available (PCI , Onboard , Auto , and PEG). This selection only matters if there are two video controllers present. When Auto is selected, the add-in video controller will be used. NOTE: A PCI Express graphics card will override the integrated video controller.
Video Memory Size (64MB default)	This setting configures the amount of system memory that is reserved for the integrated video controller. The settings are Auto , 16MB , 32MB , 64MB , 128MB , or Off .

Performance

HDD Acoustic Mode (Bypass default)	<ul style="list-style-type: none"> • Bypass — Your computer does not test or change the current acoustics mode setting. • Quiet — The hard drive operates at its most quiet setting. • Suggested — The hard drive operates at the level suggested by the drive manufacturer. • Performance — The hard drive operates at its maximum speed. <p>NOTE: Switching to performance mode may cause the drive to be noisier, but its performance is not affected. Changing the acoustics setting does not alter your hard-drive image.</p>
---	---

Security

Unlock Setup	When an administrator password is being used, allows the user access to modify system setup settings. Enter the administrator password at the prompt to unlock system setup. If the correct password is not entered here, the user can view but not modify system setup fields.
Admin Password	Displays the current status of your system setup program's password security feature and allows you to verify and assign a new admin password.
System Password (Not Set default)	Displays the current status of the system's password security feature and allows a new system password to be assigned and verified.
Drive 0-n Password (Not Set default)	Displays the current status of the hard drive's password security feature and allows a new hard drive password to be assigned and verified.
Password Changes (Unlocked default)	Determines the interaction between the System password and the Admin password. Locked prevents a user without a valid Admin password from being able to modify the System password. Unlocked allows a user with a valid System password to modify the system password.
Chassis Intrusion (On-Silent default)	When enabled and the switch installed, this option alerts the user, during the next computer start-up, that the computer cover has been opened. The settings are On , On-Silent (default setting), and Off .
Intrusion Alert	Acknowledges and clears a chassis intrusion alert.
TPM Security (Off default)	Enables or disables the Trusted Platform Module security device.
TPM Activation (Deactivate default)	Activates or deactivates the Trusted Platform Module security device. The Clear option clears any data stored by a user that has previously activated and used TPM. NOTE: In order to activate Trusted Platform Module, the TPM Security option must be set to On .
Non-Execute Disable (On default)	Enables or disables Execute Disable memory protection technology.

Power Management

AC Recovery (Off default)	Determines how the system responds when AC power is re-applied after a power loss. Off commands the system to stay off when the power is re-applied. You must press the front-panel power button before the system turns on. On commands the system to turn on when the power is re-applied. Last commands the system to return to the last power state the system was in just before it was turned off.
Auto Power On (Off default)	Sets the computer to automatically turn on. Off disables this feature. Everyday turns the computer on every day at the time set in Auto Power Time . Weekdays turns the computer on every day from Monday through Friday at the time set in Auto Power Time . NOTE: This feature does not work if you turn off your computer using the switch on a power strip or surge protector.
Auto Power Time	Sets time to automatically turn on the computer. Time is kept in the standard 12-hour format (<i>hours:minutes</i>). Change the startup time by pressing the right- or left-arrow key to increase or decrease the numbers, or type numbers in both the date and time fields.
Low Power Mode (On default)	When Low Power Mode is selected, remote wakeup events will no longer power up the computer from Hibernate or Off via the onboard network controller.
Remote Wake-Up (Off default)	This option allows the system to power up when a Network Interface Controller or Remote Wakeup-capable modem receives a wake up signal. On is the default setting. On w/ Boot to NIC will allow the computer to attempt to boot from a network prior to using the boot sequence. NOTE: Normally, the system can be powered up remotely from suspend mode, hibernate mode, or when powered off. When Low Power Mode (in the Power Management menu) is enabled, the system can only be powered up remotely from Suspend .
Suspend Mode (S3 default)	Sets the computer's suspend mode. The options are S1 , a suspend state in which the computer is running in a low-power mode, and S3 , a suspend state in which the power is reduced or turned off for many components, however, system memory remains active.


Maintenance

Service Tag	Displays the service tag for your computer.
ASF Mode (On default)	This setting controls the ASF functionality. On enables full ASF functionality, Alert Only sends ASF messages on the event or error, and Off disables all ASF functionality.
Load Defaults	Restores system setup options to their factory defaults.

Event Log	Allows you to view the Event Log . Entries are marked R for Read and U for Unread . Mark All Entries Read puts an R to the left of all the entries. Clear Log clears the Event Log .
-----------	---


POST Behavior

Fastboot (On default)	When enabled, this feature reduces computer startup time by bypassing some compatibility steps. Off does not skip any steps during computer startup. On starts the system more quickly.
Numlock Key (On default)	Determines the functionality of the numeric keys on the right side of your keyboard. Off commands the right keypad keys to function as arrows. On commands the right keypad keys to function as numbers.
POST Hotkeys	Determines whether the sign-on screen displays a message stating the keystroke sequence that is required to enter the Setup program or the Quickboot feature. Setup & Boot Menu displays both messages (F2=Setup and F12=Boot Menu). Setup displays the setup message only (F2=Setup). Boot Menu displays the Quickboot message only (F12=Boot Menu). None displays no message.
Keyboard Errors	When set to Report (enabled) and an error is detected during POST, the BIOS will display the error message and prompt you to press <F1> to continue or press <F2> to enter system setup. When set to Do Not Report (disabled) and an error is detected during POST, the BIOS will display the error message and continue booting the system.

 **NOTE:** To boot to a USB device, the device must be bootable. To ensure that a device is bootable, check the device documentation.

Changing Boot Sequence for the Current Boot

You can use this feature, for example, to restart your computer to a USB device, such as a floppy drive, memory key, or CD-RW drive.

 **NOTE:** If you are booting to a USB floppy drive, you must first set **Diskette Drive** to **Off** in system setup (see "System Setup" on page 257).


- 1 If you are booting to a USB device, connect the USB device to a USB connector (see "Front View" on page 21 for mini tower computers, or "Front View" on page 97 for desktop computers).
- 2 Turn on (or restart) your computer.
- 3 When F2 = Setup, F12 = Boot Menu appears in the upper-right corner of the screen, press <F12>.

If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft Windows desktop, then shut down your computer (see "Turning Off Your Computer" on page 19) and try again.

- 4 Use the arrow keys to select **Continue**.


The **Boot Device Menu** appears, listing all available boot devices.

- 5 Use the arrow keys to select the appropriate device (for the current boot only).

 **NOTE:** To boot to a USB device, the device must be bootable. To ensure that a device is bootable, check the device documentation.


Changing Boot Sequence for Future Boots

- 1 Enter system setup (see "Entering System Setup" on page 257).
- 2 Use the left- and right-arrow keys to highlight the **Boot** menu option, then press <Enter> to access the menu.

 **NOTE:** Write down your current boot sequence in case you want to restore it.

- 3 Press the up- and down-arrow keys to highlight the appropriate **Boot Device** option (1st - 4th **Boot Device** are available options).
- 4 Press the up- and down-arrow keys to move through the list of devices.
- 5 Press <Enter> to select a device to be the 1st, 2nd, 3rd, or 4th **Boot Device**, (as applicable).

Booting to a USB Device

 **NOTE:** To boot to a USB device, the device must be bootable. To ensure that your device is bootable, check the device documentation.

Memory Key


- 1 Insert the memory key into a USB port and restart the computer.
- 2 When **F12 = Boot Menu** appears in the upper-right corner of the screen, press <F12>. The BIOS detects the device and adds the USB device option to the boot menu.
- 3 From the boot menu, select the number that appears next to the USB device. The computer boots to the USB device.

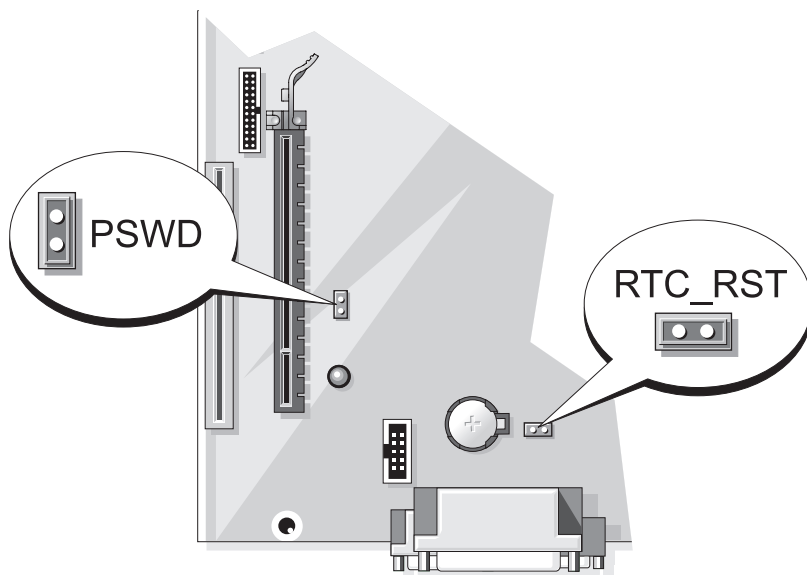
Floppy Drive

- 1 In system setup, set the **Diskette Drive** option to **USB**.
- 2 Save and exit system setup.
- 3 Connect the USB floppy drive, insert a bootable floppy, and re-boot the system.

Jumper Settings

Mini Tower, Desktop, and Small Form Factor Computers

 **NOTE:** The mini tower system board is displayed, but the jumper location is in the same location for all computers.



Jumper

PSWD

Setting



jumpered



unjumpered


Description

Password features are enabled (default setting).



Password features are disabled.

Clearing Forgotten Passwords

 **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

 **NOTICE:** This process erases both the system and administrator passwords.

- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 If clearing the password on a small form factor computer, remove the hard drive (see "Drives" on page 205).

- 3 Locate the 2-pin password jumper (PSWD) on the system board, and remove the jumper to clear the password (see "Jumper Settings" on page 265).
- 4 If clearing the password on a small form factor computer, install the hard drive (see "Drives" on page 205).
- 5 Replace the computer cover (see "Replacing the Computer Cover" on page 297).
- 6 Connect your computer and monitor to electrical outlets, and turn them on.
- 7 After the Microsoft® Windows® desktop appears on your computer, shut down your computer. (see "Turning Off Your Computer" on page 19)
- 8 Turn off the monitor and disconnect it from the electrical outlet.
- 9 Disconnect the computer power cable from the electrical outlet, and press the power button to ground the system board.
- 10 Open the computer cover (see "Removing the Computer Cover" on page 39 for mini tower computers, "Removing the Computer Cover" on page 177 for desktop computers and "Removing the Computer Cover" on page 203 for small form factor computers).
- 11 Remove the hard drive ("Removing a Hard Drive" on page 208).
- 12 Locate the 2-pin password jumper on the system board and attach the jumper to reenble the password feature.
- 13 Replace the hard drive ("Installing a Hard Drive" on page 210).
- 14 Replace the computer cover (see "Replacing the Computer Cover" on page 297).
-  **NOTICE:** To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.
- 15 Connect your computer and devices to electrical outlets, and turn them on.
-  **NOTE:** This procedure enables the password feature. When you enter system setup, both system and administrator password options appear as **Not Set**—meaning that the password feature is enabled but no password is assigned (see "Entering System Setup" on page 257).
- 16 Assign a new system and/or administrator password.


Clearing CMOS Settings

 **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

- 1 Follow the procedures in "Before You Begin" on page 19.

 **NOTE:** CMOS settings will not be cleared, if power is not removed from the system.

- 2 If clearing the CMOS setting on a small form factor computer, remove the hard drive (see "Removing a Hard Drive" on page 208).
- 3 Reset the current CMOS settings:

- a Locate the password and CMOS jumpers. Password (PSWD) and CMOS (RTC_RST) jumpers are on the system board (see "Jumper Settings" on page 265).
 - b Remove the password jumper plug from its pins.
 - c Place the password jumper plug on the RTC_RST pins and wait approximately 5 seconds.
 - d Remove the jumper plug from the RTC_RST pins and place it back on the password pins.
- 4 If clearing the CMOS setting on a small form factor computer, install the hard drive (see "Installing a Hard Drive" on page 210).
 - 5 Replace the computer cover (see "Replacing the Computer Cover" on page 297).
-  **NOTICE:** To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.
- 6 Connect your computer and devices to electrical outlets, and turn them on.

HyperTransport™ and Dual-Core Technology

HyperTransport technology can increase overall computer performance by removing I/O bottlenecks, increasing system bandwidth, and reducing system latency. A fully integrated DDR memory controller allows a direct connection between the processor and the main memory. Dual-Core is a technology in which two physical computational units exist inside a single processor package, thereby increasing computing efficiency and multi-tasking ability.

While many programs can benefit from HyperTransport and dual-core technology, some programs may have not been optimized for them and may require an update from the software manufacturer. Contact the software manufacturer for updates and information about using HyperTransport or dual-core technology with your software. To determine if your computer is using HyperTransport technology, check the system setup option for HyperTransport under the Performance tab (see "System Setup" on page 257).

Power Management

Your computer can be set to use less power when you are not working. You control the power usage through the operating system installed on your computer and certain option settings in system setup. These periods of reduced power are called "sleep modes."




NOTE: All components installed in the computer must support the hibernate and/or standby mode feature(s) and have the appropriate drivers loaded to enter either of these sleep modes. For more information, see the manufacturer's documentation for each component.

- **Standby.** In this sleep mode, power is reduced or turned off for most components, including the cooling fans. However, system memory remains active.
- **Hibernate.** This sleep mode reduces power consumption to a minimum by writing all data in system memory to a hard drive and then removing system power. Waking up from this mode restarts the computer, and the memory contents are restored. Operation then resumes where the computer left off when it entered the hibernation mode.


- **Shutdown.** This sleep mode removes all power from the computer except a small auxiliary amount. As long as the computer remains connected to an electrical outlet, it can be automatically or remotely started. For example, the **Auto Power On** option in system setup allows the computer to automatically start at a specified time. Also, your network administrator can remotely start your computer using a power management event such as Remote Wake Up.

The following table lists the sleep modes and the methods you can use to wake the computer from each mode.

Sleep Mode	Wake-Up Methods (Windows XP)
Standby	<ul style="list-style-type: none"> • Press the power button • Auto power on • Move or click the mouse • Type on the keyboard • USB device activity • Power management event
Hibernate	<ul style="list-style-type: none"> • Press the power button • Auto power on • Power management event
Shutdown	<ul style="list-style-type: none"> • Press the power button • Auto power on • Power management event

 **NOTE:** For more information on power management, see your operating system documentation.


About RAID Configurations

 **NOTICE:** In order to use the migrating option to convert a RAID configuration without losing data, your hard drive must initially be set up as a single drive RAID 0 array before the operating system is loaded onto the drive (see "Using the NVIDIA MediaShield ROM Utility" on page 271 for instructions).

This section provides an overview of the RAID configuration that you may have selected when you purchased your computer. A number of RAID configurations are available in the computer industry for different types of uses. The Dell mini tower and desktop models of your OptiPlex computer support RAID level 0 and RAID level 1. (RAID support is not available for the small form factor model.) A RAID level 0 configuration is recommended for high-performance programs, while RAID level 1 is recommended for users that desire a high level of data integrity.

 **NOTE:** RAID levels do not represent a hierarchy. A RAID level 1 configuration is not inherently better or worse than a RAID level 0 configuration.

The NVIDIA RAID controller on your computer can only create a RAID level configuration using two physical drives. The drives should be the same size to ensure that the larger drive does not contain unallocated (and therefore unusable) space.


 **NOTE:** If you purchased your Dell computer with RAID, your computer has been configured with two hard drives that are the same size.

Verifying That RAID Is Working

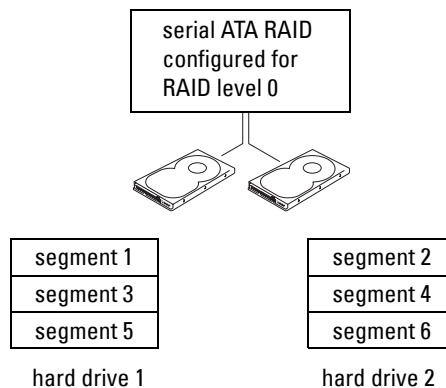
Your computer displays information pertaining to your RAID configuration at start-up, before loading the operating system. If RAID is not configured, the message `none defined` appears under **RAID Volumes**, followed by a list of the physical drives installed in your computer. If a RAID volume is identified, you can then check the **Status** field to determine the current state of your RAID configuration. The **Status** field contains information about the following conditions:

- **Normal** — Your RAID configuration is functioning properly.
- **Degraded** — One of your hard drives has failed. The computer is still bootable; however, RAID is not functioning and data is not being copied to the other drive.
- **Rebuild** — Following a degraded condition, the computer has detected the replacement/connection of a secondary hard drive and will automatically restore the RAID configuration the next time the operating system loads.


RAID Level 0 Configuration

 **NOTICE:** Because a RAID level 0 configuration provides no data redundancy, a failure of one drive results in the loss of all data. To protect your data when using a RAID level 0 configuration, perform regular backups.

RAID level 0 uses a storage technique known as *data striping* to provide a high data-access rate. Data striping is a method of writing consecutive segments, or *stripes*, of data sequentially across the physical drive(s) to create a large virtual drive. Data striping allows one of the drives to read data while the other drive is searching for and reading the next block.

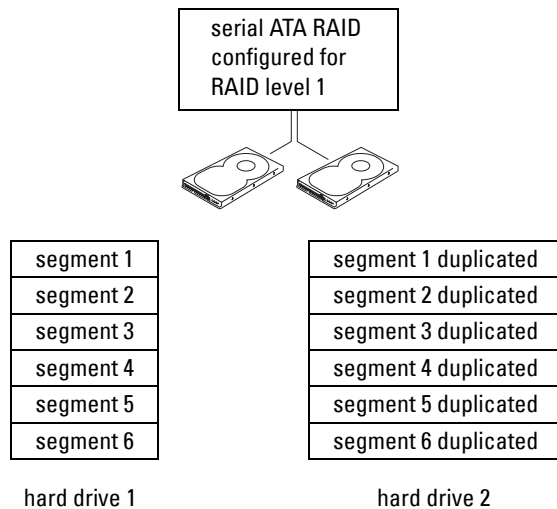


Another advantage of a RAID level 0 configuration is that it utilizes the full storage capacities of the drives. For example, two 120-GB hard drives combine to provide 240 GB of hard drive space on which to store data.


 **NOTE:** In a RAID level 0 configuration, the size of the configuration is equal to the size of the smallest drive multiplied by the number of drives in the configuration.

RAID Level 1 Configuration

RAID level 1 uses a data-redundancy storage technique known as *mirroring* to enhance data integrity. When data is written to the primary drive, the data is also duplicated, or *mirrored*, on the second drive in the configuration. A RAID level 1 configuration sacrifices high data-access rates for its data redundancy advantages.



If a drive failure occurs, subsequent read and write operations are directed to the surviving drive. A replacement drive can then be rebuilt using the data from the surviving drive.


 **NOTE:** In a RAID level 1 configuration, the size of the configuration is equal to the size of the smallest drive in the configuration.

Configuring Your Hard Drives for RAID



Your computer can be configured for RAID, even if you did not select a RAID configuration when the computer was purchased. For an explanation of RAID levels and their requirements, see "About RAID Configurations" on page 268. For information on how to install a hard drive, see "Installing a Hard Drive" on page 65 for your mini tower computer or "Installing a Hard Drive" on page 126 for your desktop computer.

You can use one of two methods to configure RAID hard drive volumes. The first method uses the NVIDIA MediaShield ROM utility and is performed *before* you install the operating system onto the hard drive. The second method uses NVIDIA MediaShield and is performed *after* you have installed the operating system and NVIDIA RAID drivers. Both methods require that you set your computer to RAID-enabled mode before you begin.

Setting Your Computer to RAID-Enabled Mode


- 1 Enter system setup (see "Entering System Setup" on page 257).
- 2 Press the up- and down-arrow keys to highlight **Drives**, then press <Enter>.
- 3 Press the up- and down-arrow keys to highlight the applicable SATA drive, then press <Enter>.
- 4 Press the left- and right-arrow keys to highlight **RAID On**, and then press <Enter>. Repeat the process, as needed, for each SATA hard drive.
 **NOTE:** For more information about RAID options, see "System Setup Options" on page 258.
- 5 Press <Esc>, press the left- and right-arrow keys to highlight **Save/Exit**, and then press <Enter> to exit system setup and resume the boot process.

Using the NVIDIA MediaShield ROM Utility

-  **NOTICE:** The following procedure will result in the loss of all data on your hard drive(s). Back up any data you want to keep before continuing.
-  **NOTE:** Do not use the following procedure to migrate an existing RAID configuration. See "Converting From One RAID Configuration to Another RAID Configuration" on page 273.


Hard drives of any size may be used to create a RAID configuration. Ideally, however, the drives should be of equal size to avoid unallocated or unused space. For an explanation of RAID levels and their requirements, see "About RAID Configurations" on page 268. For information on how to install a hard drive, see "Installing a Hard Drive" on page 65 for your mini tower computer or "Installing a Hard Drive" on page 126 for your desktop computer.

- 1 Enable RAID for each applicable hard drive on your computer (see "Setting Your Computer to RAID-Enabled Mode" on page 271).
- 2 Restart the computer.
- 3 Press <Ctrl><n> when prompted to enter the RAID BIOS.

 **NOTE:** If the operating system logo appears, continue to wait until you see the Microsoft Windows desktop; then shut down your computer and try again.


The **Define a New Array** window appears.

- 4 Press <Tab> to navigate to the **RAID Mode** field.
To create a RAID 0 configuration, use the arrow keys to select **Striping**.
To create a RAID 1 configuration, use the arrow keys to select **Mirroring**.
- 5 Press <Tab> to navigate to the **Free Disks** field.
- 6 Use the up- and down-arrow keys to select a hard drive to include in the RAID array and then use the right-arrow key to move the selected drive from the **Free Disks** field to the **Array Disks** field. Repeat for each disk you want to include in the RAID array.

 **NOTE:** Your computer supports a maximum of two drives per RAID array.

7 After assigning the hard drives to an array, press <F9>.

The **Clear disk data** prompt appears.


 **NOTICE:** You will lose all data on the selected drives in the next step.

8 Press <y> to clear all data from the selected drives.

The **Array List** window appears.

9 To review the details of the array that you set up, use the arrow keys to highlight the array in the **Array Detail** window and press <Enter>.

The **Array Detail** window appears.


 **NOTE:** To delete an array, use the arrow keys to select the array and press <d>.

10 Press <Enter> to return to the previous screen.

11 Press <Ctrl><x> to exit the RAID BIOS.


Using NVIDIA MediaShield


NVIDIA MediaShield allows you to create, view, and manage RAID configurations.

 **NOTE:** Use NVIDIA MediaShield to create a RAID configuration only when you are adding a new hard drive to an existing (non-RAID) single-hard-drive computer, and you want to configure the new drive into a RAID array.

Hard drives of any size may be used to create a RAID configuration using NVIDIA MediaShield. Ideally, however, the drives should be of equal size to avoid unallocated or unused space. For an explanation of RAID levels and their requirements, see "About RAID Configurations" on page 268.

Creating a RAID Array

 **NOTICE:** The following procedure will result in the loss of all data on your hard drive(s). Back up any data you want to keep before continuing.

 **NOTE:** Do not use the following procedure to migrate an existing RAID configuration (see "Converting From One RAID Configuration to Another RAID Configuration" on page 273).

1 Enable RAID on your hard drives (see "Setting Your Computer to RAID-Enabled Mode" on page 271).

2 After rebooting your computer, launch NVIDIA MediaShield.

3 Click **Create** under **System Tasks**.

The **NVIDIA Create Array Wizard** appears and lists the disks that are available for configuration.


4 Click **Next**.

5 Click **Custom**, then click **Next**.


6 Use the drop-down box to select **Striping (RAID 0)** or **Mirroring (RAID 1)**.

7 Click **Next**.


The **Free Disk Selection** window appears.

 **NOTE:** Only RAID-enabled hard drives are listed as free disks.

- 8 Click to select the drives that will make up the RAID configuration, click **Next**, and then click **Next** again.

 **NOTE:** Your computer supports a maximum of two drives per RAID array.

The **Clearing System Data** window appears.


-  **NOTICE:** The **Clear System Data** option deletes all data on the selected drive.


- 9 Click **Next**.

- 10 Click **Finish** to create the RAID configuration.

The MediaShield RAID management utility window appears and lists the array along with any other installed hard drives.

Deleting a RAID Array

-  **NOTICE:** While this procedure deletes the RAID 1 volume, it also splits the RAID 1 volume into two non-RAID hard drives with a partition, and leaves any existing data files intact. Deleting a RAID 0 volume, however, destroys all data on the volume.

-  **NOTICE:** If your computer currently boots to RAID and you delete the RAID volume, your computer will become unbootable.

- 1 Launch NVIDIA MediaShield.
- 2 Click to select the array you want to delete.
- 3 Click **Delete Array** in the **System Tasks** pane.

The **NVIDIA Delete Array Wizard** appears.


- 4 Click **Next**.

A confirmation screen appears with the name and size of the array that you have marked for deletion.

- 5 Click **Finish** to delete the RAID configuration.


The MediaShield RAID management utility window appears and lists any remaining arrays along with any other installed hard drives.


Converting From One RAID Configuration to Another RAID Configuration

-  **NOTICE:** In order to use the migrating option to convert a RAID configuration without losing data, your hard drive must initially be set up as a single drive RAID 0 array before the operating system is loaded onto the drive (see "Using the NVIDIA MediaShield ROM Utility" on page 271 for instructions).


NVIDIA MediaShield utilizes a one-step process known as *migrating* to change the current state of a disk or array without losing any data. If needed, additional hard drives can be added to an existing array, including a single-drive RAID 0 configuration for conversion to a two-drive RAID 0 configuration; however, the capacity of the resulting array must be equal to or greater than the size of the original configuration.

RAID 1 to RAID 1 conversions cannot be performed using the migrating process.

 **NOTICE:** Additional hard drives to be used in the (migrated) array must be no smaller than any of the drives in the current configuration.


 **NOTE:** Ensure that all drives to be used in the RAID configuration are RAID-enabled (see "Setting Your Computer to RAID-Enabled Mode" on page 271.)

- 1 Launch NVIDIA MediaShield.
- 2 Click to select the array you want to convert.
- 3 Click **Convert Array** in the **System Tasks** pane.
The **NVIDIA Convert Array Wizard** appears.
- 4 Click **Next**.
- 5 Under **RAID Mode Selection**, select **Mirroring** or **Striping** from the drop-down menu.
- 6 Click **Next**.

 **NOTICE:** You will lose all data on the selected drives in the next step.


- 7 Under **Free Disk Selection**, select the hard drive(s) you want to include in the (migrated) array by clicking the checkbox beside it.
- 8 Click **Finish**.

The MediaShield RAID management utility window appears and displays the status of the upgrade/migration process along with any other installed hard drives.

 **NOTE:** The time it takes to convert an array depends on several factors, such as the speed of the processor, the type and size of the hard drive being used, the operating system, and so on.

Rebuilding a RAID Configuration


If one of the hard drives in a RAID array fails, you can rebuild the array by restoring the data to a replacement drive.

 **NOTE:** Rebuilding an array can be performed only on RAID 1 configurations.

- 1 Launch NVIDIA MediaShield.
- 2 Click to select your RAID configuration (**Mirroring**) in the management utility window.
- 3 Select **Rebuild Array** in the **System Tasks** pane.
The **NVIDIA Rebuild Array Wizard** appears.
- 4 Click **Next**.

- 5 Select the hard drive you want to rebuild by clicking the checkbox beside it.
- 6 Click **Next**.
- 7 Click **Finish**.

The MediaShield RAID management utility window appears and displays the status of the rebuild process.

 **NOTE:** You can use your computer while the computer is rebuilding the array.

 **NOTE:** You can use any available (RAID-enabled) free disk to rebuild an array.

Enabling Cool 'n' Quiet™ Technology

The Cool 'n' Quiet technology controls your computer's processor performance automatically, dynamically adjusting the operating frequency and voltage, according to the task at hand. When an application does not require full performance, significant amounts of power can be saved. performance is designed to still be responsive, with maximum processor performance being delivered when required, and automatic power savings when possible.

- 1 Click on the **Start**→**Settings**→**Control Panel**→**Power Options** to access the **Power Options Properties** window.
- 2 From the **Power Schemes** tab, click the Power Schemes drop-down menu and select **Minimal Power Management** and then click **OK**.

Cool 'n' Quiet technology is now enabled.

Chassis Intrusion Switch



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

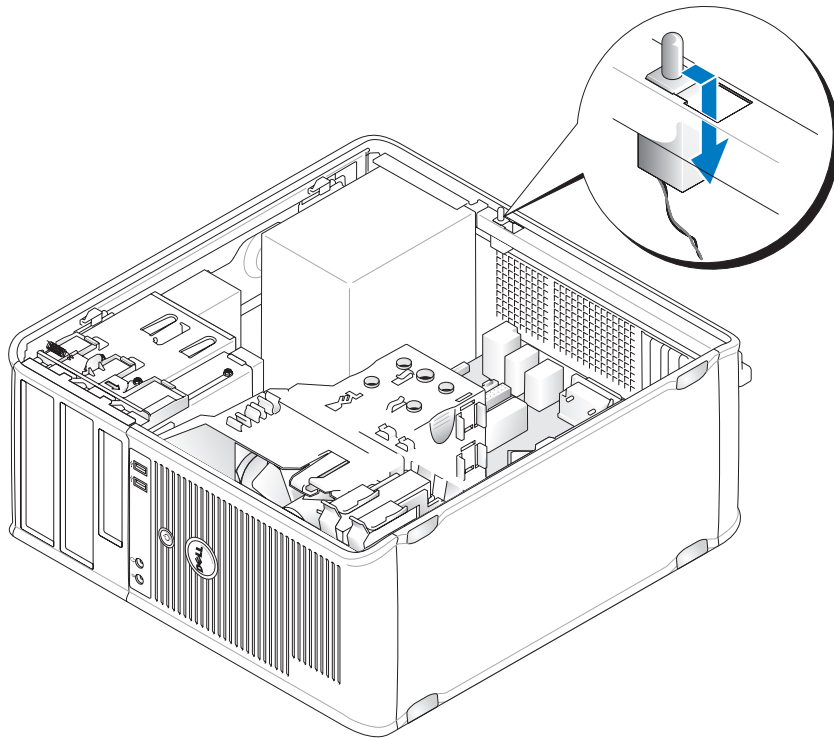
Removing the Chassis Intrusion Switch

- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 If removing the chassis intrusion switch on a small form factor computer, remove the hard drive (see "Drives" on page 205).
- 3 Disconnect the chassis intrusion switch cable from the system board (see "System Board Components" on page 28 for mini tower computers or "System Board Components" on page 102 for desktop computers or "System Board Components" on page 190 for small form factor computers).

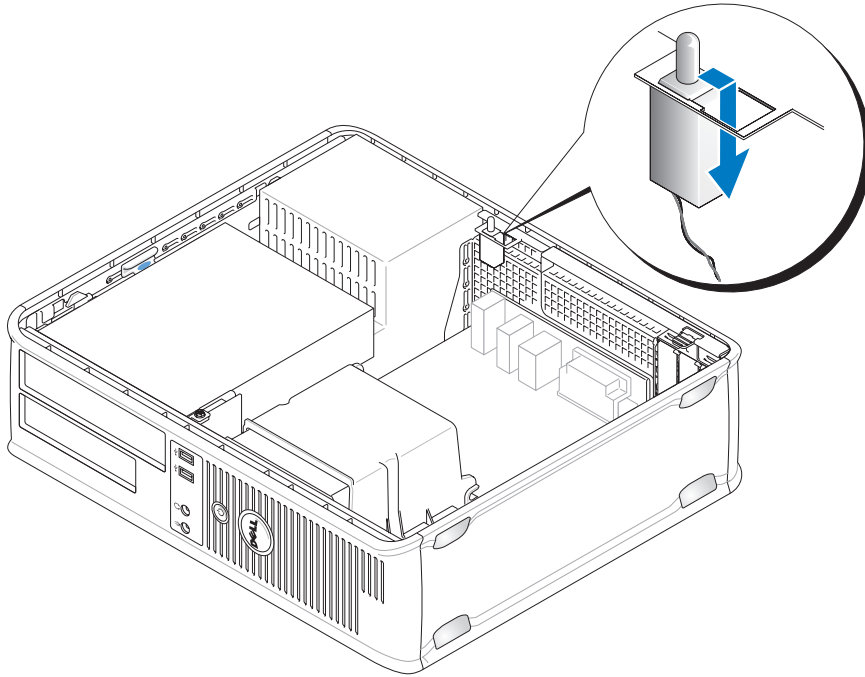
Note the routing of the chassis intrusion cable as you remove it from the chassis. Chassis hooks may hold the cable in place inside the chassis.

- 4 Slide the chassis intrusion switch out of its slot, and remove the switch and its attached cable from the computer.

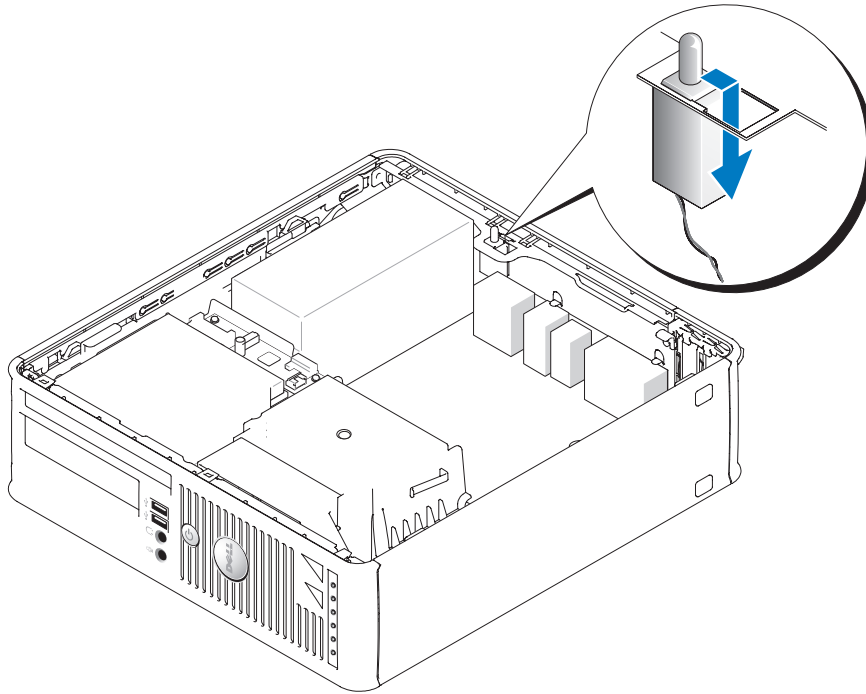
Mini Tower Computer



Desktop Computer



Small Form Factor Computer



Replacing the Chassis Intrusion Switch


- 1 Gently slide the chassis intrusion switch into its slot and reconnect the cable to the system board.
- 2 Replace the computer cover (see "Replacing the Computer Cover" on page 297).

Resetting the Chassis Intrusion Detector

- 1 Turn on (or restart) your computer.
- 2 When the blue DELL™ logo appears, press <F2> immediately.

If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft® Windows® desktop. Then shut down your computer and try again.

- 3 Select the **Chassis Intrusion** option and then press the left- or right-arrow key to select **Reset**. Change the setting to **On**, **On-Silent**, or **Disabled**.


 **NOTE:** The default setting is **On-Silent**.

- 4 Press <Esc>, press the left- and right-arrow keys to highlight Save/Exit, and then press <Enter> to restart the computer and implement your changes.

Battery

Replacing the Battery

 **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

 **NOTICE:** To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

A coin-cell battery maintains computer configuration, date, and time information. The battery can last several years.

The battery may need replacing if an incorrect time or date is displayed during the boot routine along with a message such as:

```
Time-of-day not set -  
please run SETUP program
```

or


```
Invalid configuration information -  
please run SETUP program
```

or

```
Strike the F1 key to continue,  
F2 to run the setup utility
```

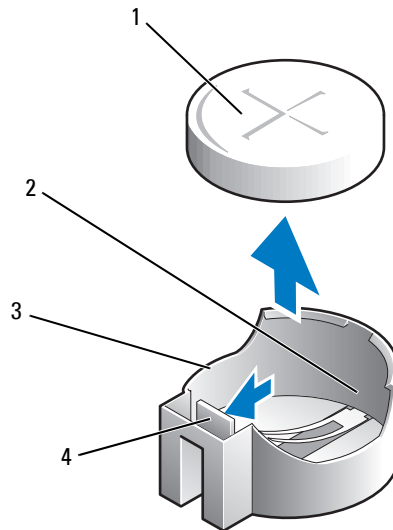
To determine whether you need to replace the battery, reenter the time and date in system setup and exit the program to save the information. Turn off your computer and disconnect it from the electrical outlet for a few hours; then reconnect the computer, turn it on, and enter system setup (see "Entering System Setup" on page 257). If the date and time are not correct in system setup, replace the battery.

You can operate your computer without a battery; however, without a battery, the configuration information is erased if the computer is turned off or unplugged from the electrical outlet. In this case, you must enter system setup and reset the configuration options.

 **CAUTION:** A new battery can explode if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

To remove the battery:

- 1 If you have not already done so, make a copy of your configuration information, found in system setup (see "System Setup" on page 257).
 - 2 Follow the procedures in "Before You Begin" on page 19.
 - 3 If you have a Small Form Factor chassis, remove the hard disk drive to access the battery on the system board (see "Removing a Hard Drive" on page 208).
 - 4 Locate the battery socket (see "System Board Components" on page 28 for mini tower computers or "System Board Components" on page 102 for desktop computers or "System Board Components" on page 190 for small form factor computers).
- ➔ NOTICE:** If you pry the battery out of its socket with a blunt object, be careful not to touch the system board with the object. Ensure that the object is inserted between the battery and the socket before you attempt to pry out the battery. Otherwise, you may damage the system board by prying off the socket or by breaking circuit traces on the system board.
- ➔ NOTICE:** To avoid damage to the battery connector, you must firmly support the connector while removing the battery.
- 5 Remove the system battery.
 - a Support the battery connector by pressing down firmly on the positive side of the connector.
 - b While supporting the battery connector, press the battery tab away from the positive side of the connector and pry the battery it up out of the securing tabs at the negative side of the connector.




1 system battery

2 positive side of battery connector

3 battery socket

4 battery socket tab

 **NOTICE:** To avoid damage to the battery connector, you must firmly support the connector while replacing the battery.

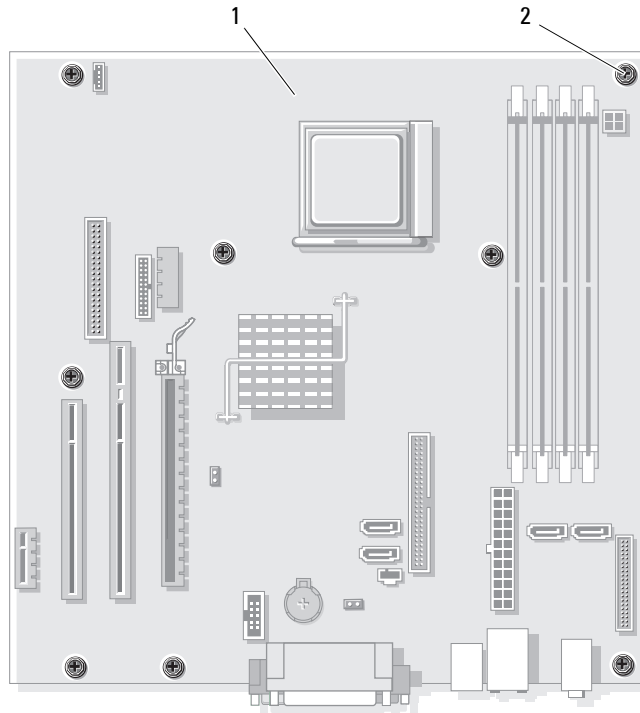
- 6** Install the new system battery.
 - a** Support the battery connector by pressing down firmly on the positive side of the connector.
 - b** Hold the battery with the "+" facing up, and slide it under the securing tabs at the positive side of the connector.
 - c** Press the battery straight down into the connector until it snaps into place.
- 7** If you have a Small Form Factor chassis, install the hard disk drive (see "Installing a Hard Drive" on page 210).
- 8** Replace the computer cover (see "Replacing the Computer Cover" on page 297).
- 9** Enter system setup and restore the settings you recorded in step 1 (see "Entering System Setup" on page 257).
- 10** Properly dispose of the old battery as described in the *Product Information Guide*.

Replacing the System Board

Removing the System Board: Mini Tower, Desktop, and Small Form Factor Computers

- 1 Follow the procedures in "Before You Begin" on page 19.
- ➡ **NOTICE:** Before touching anything inside your computer, ground yourself by touching an unpainted metal surface, such as the metal at the back of the computer. While you work, periodically touch an unpainted metal surface to dissipate any static electricity that could harm internal components.
- 2 Remove any components that restrict access to the system board such as: the (optical drive(s), floppy drive, hard drive, and I/O panel (as applicable).
- 3 Remove the processor and heat sink assembly:
 - Mini Tower: see "Processor" on page 83
 - Desktop: see "Processor" on page 179
 - Small Form Factor: see "Processor" on page 243
- 4 Disconnect all cables from the system board.
- 5 Remove the screws from the system board.
 - "Mini Tower System Board Screws" on page 288
 - "Desktop System Board Screws" on page 289
 - "Small Form Factor System Board Screws" on page 290
- 6 Slide the system board assembly toward the front of the computer, and then lift the board up and away.

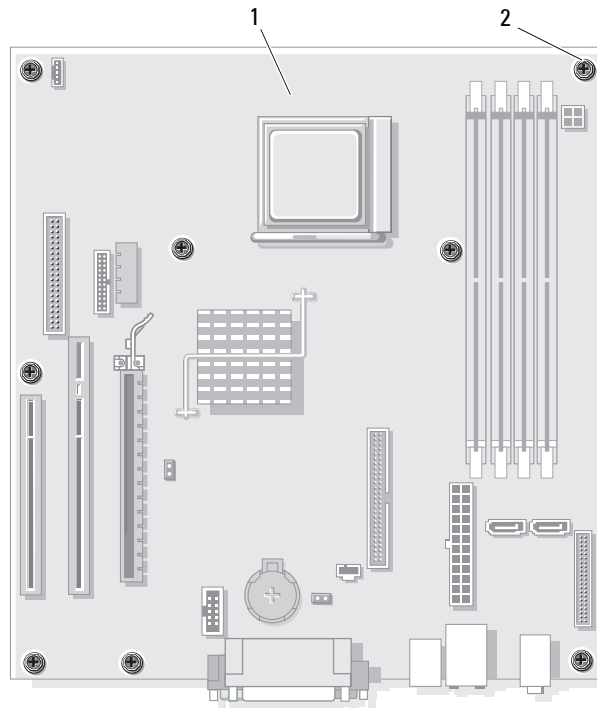
Mini Tower System Board Screws



1 mini tower system board

2 screws (8)

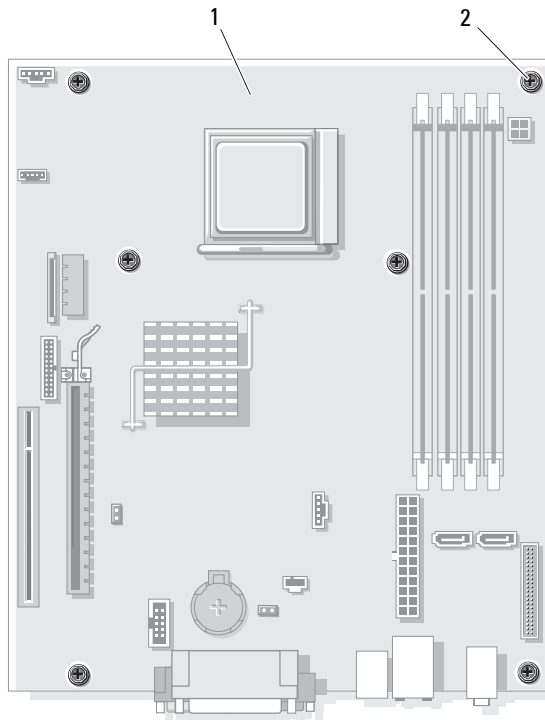
Desktop System Board Screws



1 desktop system board

2 screws (8)

Small Form Factor System Board Screws



- 1 small form factor system board 2 screws (6)

Place the system board assembly that you just removed next to the replacement system board to ensure it is identical.

Replacing the System Board: Mini Tower, Desktop, and Small Form Factor Computers

- 1 Gently align the board into the chassis and slide it toward the back of the computer.
- 2 Using the screws, secure the system board to the chassis.
- 3 Replace any components and cables that you removed from the system board.
- 4 Reconnect all cables to their connectors at the back of the computer.
- 5 Replace the computer cover (see "Replacing the Computer Cover" on page 297).

Memory

Your computer supports non-ECC DDR2 memory only. For more information on the type of memory supported by your computer, see the "Memory" section of the specifications for your computer:

- "Mini Tower Computer (Model #DCSM) Specifications" on page 31
- "Desktop Computer (Model # DCNE) Specifications" on page 105
- "Small Form Factor Computer (Model # DCCY) Specifications" on page 193

NOTICE: Before you install new memory modules, download the most recent BIOS for your computer from the Dell Support website at support.dell.com.

NOTE: Memory purchased from Dell is covered under your computer warranty.

DDR2 Memory Overview

Dual-channel DDR2 memory modules should be installed in *pairs of matched memory size*. If the DDR2 memory modules are not installed with the same amount of memory in each channel, the computer will continue to operate, but with a slight reduction in performance. See the label in the upper-right corner of the module to determine the module's capacity.



NOTICE: Do not install ECC memory modules. Doing so may cause the system not to boot or otherwise impact performance.

NOTE: Always install DDR2 memory modules in the order indicated on the system board.

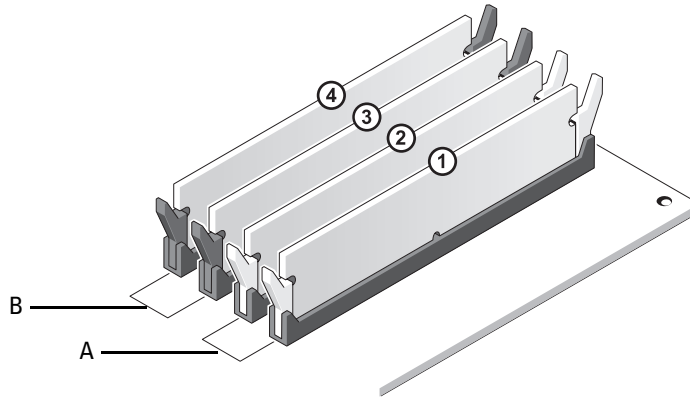
The recommended memory configurations are:

- A pair of matched memory modules installed in connectors DIMM1 and DIMM2
or
- A memory module installed in connector DIMM1
or

- A pair of matched memory modules installed in connectors DIMM1 and DIMM2 and another matched pair installed in connectors DIMM3 and DIMM4

Be sure to install a single memory module in DIMM1, the connector closest to the edge of the system board, before you install modules in the other connectors.

Mini Tower, Desktop, and Small Form Factor Matched Pairs



- A matched pair of memory modules in connectors DIMM1 and DIMM2 (white securing clips)
- B matched pair of memory modules in connectors DIMM3 and DIMM4 (black securing clips).

Addressing Memory With 4-GB or Greater Configurations (32-bit Operating Systems Only)

This computer supports a maximum of 8 GB of memory. Current 32-bit operating systems, such as Microsoft® Windows® XP, can use a maximum of 4 GB of address space; however, the amount of memory available to the operating system is less than that installed. Certain components within the computer require address space in the 4-GB range. Any address space reserved for these components cannot be used by computer memory.

The following components require memory address space:

- System ROM
- APIC(s)
- Integrated PCI devices, such as network connectors and SCSI controllers
- PCI cards
- Graphics card(s)
- PCI Express cards (if applicable)

At start-up, the BIOS identifies the components that require address space. The BIOS dynamically calculates the amount of reserved address space required. The BIOS then subtracts the reserved address space from 4 GB to determine the amount of usable space.

- If the total installed computer memory is less than the usable address space, all installed computer memory is available for use only by the operating system.
- If the total installed computer memory is equal to or greater than the usable address space, a portion of installed memory is not available for use by the operating system.

Removing Memory



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.



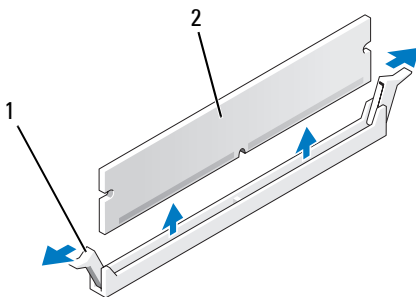
NOTICE: If you remove your original memory modules from the computer during a memory upgrade, keep them separate from any new modules that you may have, even if you purchased the new modules from Dell. If possible, *do not* pair an original memory module with a new memory module. Otherwise, your computer may not start properly.

You should install your original memory modules in pairs either in connectors DIMM1 and DIMM2 or connectors DIMM3 and DIMM4.



NOTICE: Removing memory modules from DIMM3 and DIMM4 on the desktop computer requires you to remove the optical drive (see "Optical Drive" on page 115). Failure to do so may cause damage to the memory module and the DIMM socket.

- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 If you are using:
 - a desktop computer: remove the optical drive (see "Removing an Optical Drive" on page 115).
 - a small form factor computer: first remove the optical drive (see "Removing an Optical Drive" on page 215) then remove the floppy drive or Media Card Reader. (see "Removing a Floppy Drive or Media Card Reader" on page 217).
- 3 Carefully press out the securing clip at each end of the memory module connector.



- 1 securing clip (2)
- 2 memory module

- 4 Remove the memory module. If you are replacing a memory module, see "Installing Memory" on page 294.
- 5 If you are using:
 - a desktop computer: replace the optical drive (see "Installing an Optical Drive" on page 116).
 - a small form factor computer: first replace the floppy drive or media card reader (see "Installing a Floppy Drive or Media Card Reader" on page 220) and then replace the optical drive (see "Installing an Optical Drive" on page 216).
- 6 Replace the computer cover (see "Replacing the Computer Cover" on page 297).

Installing Memory



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

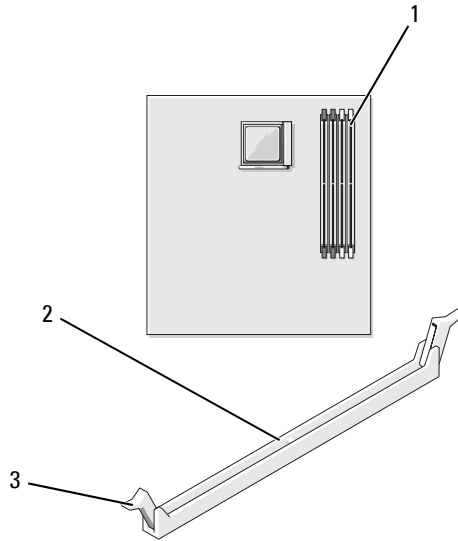


NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.



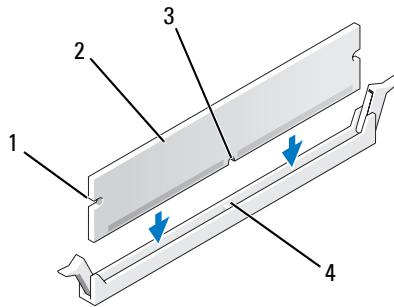
NOTE: Memory purchased from Dell is covered under your computer warranty.

- 1 Follow the procedures in "Before You Begin" on page 19.
- 2 If you are using:
 - a desktop computer: remove the optical drive (see "Removing an Optical Drive" on page 115).
 - a small form factor computer: first remove the optical drive (see "Removing an Optical Drive" on page 215) and then remove the floppy drive or media card reader (see "Removing a Floppy Drive or Media Card Reader" on page 217).
- 3 Press out the securing clip at each end of the memory module connector.



- 1 memory connector closest to processor 2 connector 3 securing clips (2)

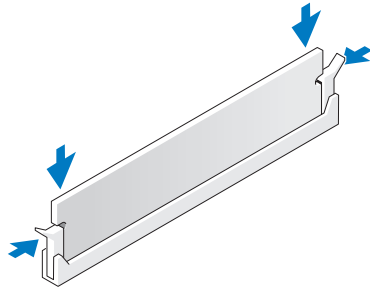
4 Align the notch on the bottom of the module with the crossbar in the connector.



- 1 cutouts (2) 2 memory module 3 notch
4 crossbar

➡ **NOTICE:** To avoid damage to the memory module, press the module straight down into the connector while you apply equal force to each end of the module.

5 Insert the module into the connector until the module snaps into position.
If you insert the module correctly, the securing clips snap into the cutouts at each end of the module.

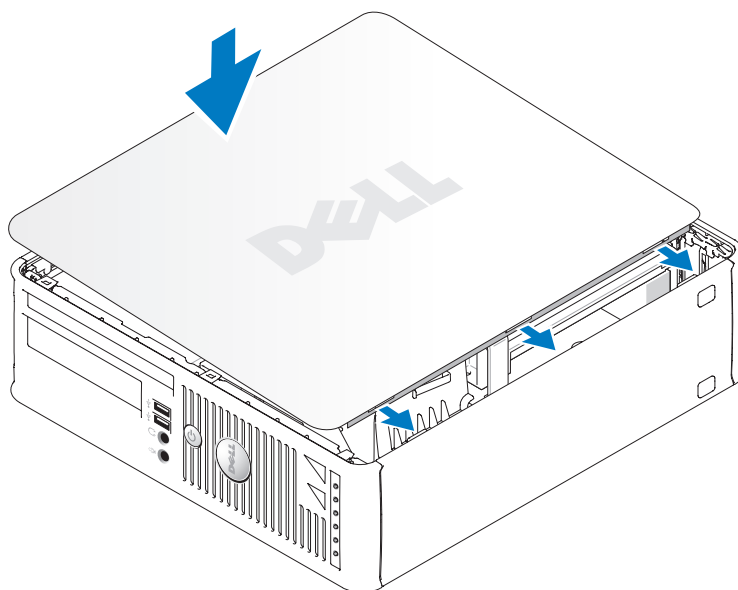


- 6 If you are using:
 - a desktop computer: replace the optical drive (see "Installing an Optical Drive" on page 116).
 - a small form factor computer: first replace the floppy drive or media card reader (see "Installing a Floppy Drive or Media Card Reader" on page 220) and then replace the optical drive (see "Installing an Optical Drive" on page 216).
- 7 Replace the computer cover (see "Replacing the Computer Cover" on page 297).
- 8 The computer detects that the new memory does not match the existing configuration information and generates the following message:
The amount of system memory has changed.
Strike the F1 key to continue, F2 to run the setup utility
- 9 Press <F2> to enter system setup and check the value for **System Memory**.
The computer should have changed the value of **System Memory** to reflect the newly installed memory. Verify the new total. If it is correct, skip to step 11.
- 10 If the memory total is incorrect, turn off and disconnect your computer and devices from their electrical outlets. Open the computer cover and check the installed memory modules to ensure that they are seated properly in their sockets. Then repeat steps 7, 8, and 9.
- 11 When the **System Memory** total is correct, press <Esc> to exit system setup.
- 12 Run the Dell Diagnostics (see "Dell Diagnostics" on page 327) to verify that the memory modules are operating properly.

Replacing the Computer Cover

⚠ CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

- 1 Ensure that all cables are connected, and fold cables out of the way.
Gently pull the power cables toward you so that they do not get caught underneath the drives.
- 2 Ensure that no tools or extra parts are left inside the computer.
- 3 To replace the cover:
 - a Align the bottom of the cover with the hinge tabs located along the bottom edge of the computer.
 - b Using the hinge tabs as leverage, rotate the cover downward until it snaps into place.



- c Ensure that the cover is seated correctly before moving the computer.

➔ NOTICE: To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

- 4 Connect your computer and devices to electrical outlets, and turn them on.

After you remove and replace the cover, the chassis intrusion detector, if installed and enabled, causes the following message to appear on the screen at the next computer start-up:

ALERT! Cover was previously removed.

- 5 Reset the chassis intrusion detector in System Setup by changing **Chassis Intrusion** to **On** or **On-Silent** (see "System Setup" on page 257).





NOTE: If an administrator password has been assigned by someone else, contact your network administrator for information on resetting the chassis intrusion detector.

Cleaning Your Computer

 **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.


Computer, Keyboard, and Monitor

 **CAUTION:** Before you clean your computer, disconnect the computer from the electrical outlet. Clean your computer with a soft cloth dampened with water. Do not use liquid or aerosol cleaners, which may contain flammable substances.

- Use a can of compressed air to remove dust from between the keys on the keyboard.
-  **NOTICE:** To prevent damage to the antiglare coating, do not wipe the display with soap or alcohol.
- To clean your monitor screen, lightly dampen a soft, clean cloth with water. You can also use a special screen-cleaning tissue or solution suitable for the monitor's antistatic coating.
- Wipe the keyboard, computer, and monitor plastics with a soft cleaning cloth moistened with a solution of three parts water and one part dishwashing detergent.

Do not soak the cloth or let water drip inside your computer or keyboard.

Mouse

 **NOTICE:** Disconnect the mouse from the computer before cleaning the mouse

If your screen cursor skips or moves abnormally, clean the mouse.

Cleaning a Non-Optical Mouse

- 1 Clean the outside casing of the mouse with a cloth moistened with a mild cleaning solution.
- 2 Turn the retainer ring on the underside of your mouse counterclockwise, and then remove the ball.
- 3 Wipe the ball with a clean, lint-free cloth.
- 4 Blow carefully into the ball cage or use a can of compressed air to dislodge dust and lint.
- 5 If the rollers inside the ball cage are dirty, clean the rollers with a cotton swab moistened lightly with isopropyl alcohol.
- 6 Recenter the rollers in their channels if they are misaligned. Ensure that fluff from the swab is not left on the rollers.
- 7 Replace the ball and retainer ring, and turn the retainer ring clockwise until it clicks into place.

Cleaning an Optical Mouse

Clean the outside casing of the mouse with a cloth moistened with a mild cleaning solution.

Floppy Drive

- ➡ **NOTICE:** Do not attempt to clean drive heads with a swab. You might accidentally misalign the heads which, prevents the drive from operating.

Clean your floppy drive using a commercially available cleaning kit. These kits contain pretreated floppy disks to remove contaminants that accumulate during normal operation.

CDs and DVDs

- ➡ **NOTICE:** Always use compressed air to clean the lens in the optical drive, and follow the instructions that come with the compressed-air product. Never touch the lens in the drive.

If you notice problems, such as skipping, with the playback quality of your CDs or DVDs, try cleaning the discs.

- 1 Hold the disc by its outer edge. You can also touch the inside edge of the center hole.


- ➡ **NOTICE:** To avoid damaging the surface, do not wipe in a circular motion around the disc.

- 2 With a soft, lint-free cloth, gently wipe the bottom of the disc (the unlabeled side) in a straight line from the center to the outer edge of the disc.

For stubborn dirt, try using water or a diluted solution of water and mild soap. You can also purchase commercial products that clean discs and provide some protection from dust, fingerprints, and scratches. Cleaning products for CDs are also safe to use on DVDs.

Reinstalling Drivers and the Operating System

 **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

 **NOTICE:** You must use Microsoft® Windows® XP Service Pack 1 or later when you reinstall the Microsoft Windows XP operating system.

 **NOTE:** If you installed a unique image on your computer or if you had to reinstall your operating system, run the DSS utility. DSS is available on your optional *Drivers and Utilities* media and at support.dell.com.


Drivers

What Is a Driver?

A driver is a program that controls a device such as a printer, mouse, or keyboard. All devices require a driver program.

A driver acts like a translator between the device and any other programs that use the device. Each device has its own set of specialized commands that only its driver recognizes.

Dell ships your computer to you with required drivers already installed—no further installation or configuration is needed.

 **NOTICE:** The optional *Drivers and Utilities* media may contain drivers for operating systems that are not on your computer. Ensure that you are installing software appropriate for your operating system.

Many drivers, such as the keyboard driver, come with your Microsoft Windows operating system. You may need to install drivers if you:


- Upgrade your operating system.
- Reinstall your operating system.
- Connect or install a new device.

Identifying Drivers

If you experience a problem with any device, identify whether the driver is the source of your problem and, if necessary, update the driver.

Windows Vista

If you experience a problem with any device, identify whether the driver is the source of your problem and, if necessary, update the driver.

- 1 Click **Start** , and right-click **Computer**.

- 2 Click **Properties**→ **Device Manager**.

NOTE: The **User Account Control** window may appear. If you are an administrator, click **Continue**; otherwise, contact your administrator to continue.

Scroll down the list to see if any device has an exclamation point (a yellow circle with a [!]) on the device icon.

If an exclamation point is next to the device name, you may need to reinstall the driver or install a new driver (see "Reinstalling Drivers and Utilities" on page 302).

Windows XP

- 1 Click the **Start** button and click **Control Panel**.
- 2 Under **Pick a Category**, click **Performance and Maintenance**.
- 3 Click **System**.
- 4 In the **System Properties** window, click the **Hardware** tab.
- 5 Click **Device Manager**.
- 6 Scroll down the list to see if any device has an exclamation point (a yellow circle with a [!]) on the device icon.

If an exclamation point is next to the device name, you may need to reinstall the driver or install a new driver.

Reinstalling Drivers and Utilities




NOTICE: The Dell Support website at support.dell.com and your *Drivers and Utilities* media provide approved drivers for Dell™ computers. If you install drivers obtained from other sources, your computer might not work correctly.



NOTE: The *Drivers and Utilities* media is optional, and as such, may not ship with certain computers.

Using Windows Vista Device Driver Rollback

If a problem occurs on your computer after you install or update a driver, use Windows Device Driver Rollback to replace the driver with the previously installed version.

- 1 Click **Start** , and right-click **Computer**.
- 2 Click **Properties**→ **Device Manager**.

NOTE: The **User Account Control** window may appear. If you are an administrator on the computer, click **Continue**; otherwise, contact your administrator to enter the Device Manager.

- 3 Right-click the device for which the new driver was installed and click **Properties**.
- 4 Click the **Drivers** tab→ **Roll Back Driver**.

If Device Driver Rollback does not resolve the problem, then use System Restore (see "Restoring Your Operating System" on page 305) to return your computer to the operating state that existed before you installed the new driver.

Using Windows XP Device Driver Rollback

If a problem occurs on your computer after you install or update a driver, use Windows XP Device Driver Rollback to replace the driver with the previously installed version.

- 1 Click the **Start** button and click **Control Panel**.
- 2 Under **Pick a Category**, click **Performance and Maintenance**.
- 3 Click **System**.
- 4 In the **System Properties** window, click the **Hardware** tab.
- 5 Click **Device Manager**.
- 6 Right-click the device for which the new driver was installed and click **Properties**.
- 7 Click the **Drivers** tab.
- 8 Click **Roll Back Driver**.

If Device Driver Rollback does not resolve the problem, then use System Restore (see "Enabling System Restore" on page 306), to return your computer to the operating state that existed before you installed the new driver.

Using the Optional Drivers and Utilities media

If using Device Driver Rollback or System Restore does not resolve your problem, (see "Restoring Your Operating System" on page 305), then reinstall the driver from the *Drivers and Utilities* media.



NOTE: The *Drivers and Utilities* media is optional, and as such, may not ship with all computers.



NOTE: To access device drivers and user documentation, you must use the *Drivers and Utilities* media while your computer is running Windows.

Windows Vista

- 1 Save and close any open files, and exit any open programs.
- 2 Insert the *Drivers and Utilities* media.

In most cases, the CD/DVD starts running automatically. If it does not, start Windows Explorer, click your CD/DVD drive directory to display the CD/DVD contents, and then double-click the **autorcd.exe** file. The first time that you run the CD/DVD, it might prompt you to install setup files. Click **OK**, and follow the instructions on the screen to continue.
- 3 From the **Language** drop-down menu in the toolbar, select your preferred language for the driver or utility (if available).
- 4 At the welcome screen, click **Next** and wait for the CD/DVD to complete the hardware scan.
- 5 To detect other drivers and utilities, under **Search Criteria**, select the appropriate categories from the **System Model**, **Operating System**, and **Topic** drop-down menus.


A link or links appear(s) for the specific drivers and utilities used by your computer.
- 6 Click the link of a specific driver or utility to display information about the driver or utility that you want to install.

- 7 Click the **Install** button (if present) to begin installing the driver or utility. At the welcome screen, follow the screen prompts to complete the installation.
- 8 At the welcome screen, follow the screen prompts to complete the installation.
If no **Install** button is present, automatic installation is not an option. For installation instructions, either see the appropriate instructions in the following subsections, or click **Extract**, follow the extracting instructions, and then read the readme file.

If instructed to navigate to the driver files, click the CD/DVD directory on the driver information window to display the files associated with that driver.

Manually Reinstalling Drivers for Windows Vista

After extracting the driver files to your hard drive as described in the previous section, do the following:

- 1 Click **Start** , and right-click **Computer**.
- 2 Click **Properties**→ **Device Manager**.
NOTE: The **User Account Control** window may appear. If you are an administrator on the computer, click **Continue**; otherwise, contact your administrator to enter the Device Manager.
- 3 Double-click the type of device for which you are installing the driver (for example, **Audio** or **Video**).
- 4 Double-click the name of the device for which you are installing the driver.
- 5 Click **Driver**→ **Update Driver**→ **Browse my computer for driver software**.
- 6 Click **Browse** and browse to the location to which you previously copied the driver files.
- 7 When the name of the appropriate driver appears, click the name of the driver→ **OK**→ **Next**.
- 8 Click **Finish** and restart your computer.

Using the Windows XP Drivers and Utilities Media


- 1 Insert the *Drivers and Utilities* media.
If this is your first time to use the *Drivers and Utilities* media, the **Installation** window opens to inform you that the media will begin the installation. Click **OK** and respond to the installation program prompts to complete the installation.
- 2 Click **Next** at the **Welcome Dell System Owner** screen.
- 3 Choose the appropriate selections for **System Model**, **Operating System**, **Device Type**, and **Topic**.
- 4 Click **My Drivers** in the **Topic** drop-down menu.
The *Drivers and Utilities* media scans your computer's hardware and operating system and then displays a list of device drivers for your system configuration.
- 5 Click the appropriate driver and follow the instructions to download the driver for your computer.

To view a list of all available drivers for your computer, click **Drivers** in the **Topic** drop-down menu.

To access the help files on the *Drivers and Utilities* media, click the question mark button or the **Help** link at the top of the screen.



Restoring Your Operating System

The Microsoft Windows operating system provides System Restore to allow you to return your computer to an earlier operating state (without affecting data files) if changes to the hardware, software, or other system settings have left the computer in an undesirable operating state. See the Windows Help and Support Center for information on using System Restore.

 **NOTICE:** Make regular backups of your data files. System Restore does not monitor your data files or recover them.



Windows Vista

Starting System Restore

- 1 Click **Start** .
- 2 In the **Start Search** box, type `System Restore` and press <Enter>.
 **NOTE:** The **User Account Control** window may appear. If you are an administrator on the computer, click **Continue**; otherwise, contact your administrator to continue the desired action.
- 3 Click **Next** and follow the remaining prompts on the screen.

In the event that System Restore did not resolve the issue, you may undo the last system restore.

Undoing the Last System Restore

-  **NOTICE:** Before you undo the last system restore, save and close all open files and exit any open programs. Do not alter, open, or delete any files or programs until the system restoration is complete.
- 1 Click **Start** .
 - 2 In the **Start Search** box, type `System Restore` and press <Enter>.
 - 3 Click **Undo my last restoration** and click **Next**.

Windows XP

Creating a Restore Point

- 1 Click the **Start** button and click **Help and Support**.
- 2 Click **System Restore**.
- 3 Follow the instructions on the screen.

Restoring the Computer to an Earlier Operating State

➔ NOTICE: Before you restore the computer to an earlier operating state, save and close any open files and exit any open programs. Do not alter, open, or delete any files or programs until the system restoration is complete.

- 1 Click the **Start** button, point to **All Programs**→**Accessories**→**System Tools**, and then click **System Restore**.
- 2 Ensure that **Restore my computer to an earlier time** is selected and click **Next**.
- 3 Click a calendar date to which you want to restore your computer.

The **Select a Restore Point** screen provides a calendar that allows you to see and select restore points. All calendar dates with available restore points appear in boldface type.

- 4 Select a restore point and click **Next**.

If a calendar date has only one restore point, then that restore point is automatically selected. If two or more restore points are available, click the restore point that you prefer.

- 5 Click **Next**.

The **Restoration Complete** screen appears after System Restore finishes collecting data and then the computer restarts.

- 6 After the computer restarts, click **OK**.

To change the restore point, you can either repeat the steps using a different restore point, or you can undo the restoration.

Undoing the Last System Restore

➔ NOTICE: Before you undo the last system restore, save and close all open files and exit any open programs. Do not alter, open, or delete any files or programs until the system restoration is complete.

- 1 Click the **Start** button, point to **All Programs**→**Accessories**→**System Tools**, and then click **System Restore**.
- 2 Click **Undo my last restoration** and click **Next**.
- 3 Click **Next**.

The **System Restore** screen appears and the computer restarts.

- 4 After the computer restarts, click **OK**.

Enabling System Restore

If you reinstall Windows XP with less than 200 MB of free hard-disk space available, System Restore is automatically disabled. To see if System Restore is enabled:

- 1 Click the **Start** button and click **Control Panel**.
- 2 Click **Performance and Maintenance**.
- 3 Click **System**.

- 4 Click the **System Restore** tab.
- 5 Ensure that **Turn off System Restore** is unchecked.

Reinstalling Microsoft® Windows Vista® and Windows® XP

Windows Vista

The reinstallation process can take 1 to 2 hours to complete. After you reinstall the operating system, you must also reinstall the device drivers, virus protection program, and other software.

- 1 Save and close any open files and exit any open programs.
- 2 Insert the *Operating System* disc.
- 3 Click **Exit** if the **Install Windows** message appears.
- 4 Restart the computer.

When the DELL logo appears, press <F12> immediately.



NOTE: If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft® Windows® desktop; then, shut down your computer and try again.



NOTE: The next steps change the boot sequence for one time only. On the next start-up, your computer boots according to the devices specified in the system setup program.

- 5 When the boot device list appears, highlight **CD/DVD/CD-RW Drive** and press <Enter>.
- 6 Press any key to **Boot from CD-ROM**.
- 7 Follow the instructions on the screen to complete the installation.

Windows XP



NOTICE: You must use Windows XP Service Pack 1 or later when you reinstall your operating system.

Before You Begin

If you are considering reinstalling the Windows XP operating system to correct a problem with a newly installed driver, first try using Windows XP Device Driver Rollback (see "Using Windows XP Device Driver Rollback" on page 303). If Device Driver Rollback does not resolve the problem, then use System Restore (see "Restoring Your Operating System" on page 305) to return your operating system to the operating state it was in before you installed the new device driver.



NOTICE: Before performing the installation, back up all data files on your primary hard drive. For conventional hard drive configurations, the primary hard drive is the first drive detected by the computer.

To reinstall Windows XP, you need the following items:


- Dell™ *Operating System* media
- Dell *Drivers and Utilities* media




NOTE: The *Drivers and Utilities* media contains drivers that were installed during assembly of the computer. Use the *Drivers and Utilities* media to load any required drivers.

To reinstall Windows XP, perform all the steps in the following sections in the order in which they are listed.

The reinstallation process can take 1 to 2 hours to complete. After you reinstall the operating system, you must also reinstall the device drivers, virus protection program, and other software.

 **NOTICE:** The *Operating System* media provides options for reinstalling Windows XP. The options can overwrite files and possibly affect programs installed on your hard drive. Therefore, do not reinstall Windows XP unless a Dell technical support representative instructs you to do so.

 **NOTICE:** To prevent conflicts with Windows XP, disable any virus protection software installed on your computer before you reinstall Windows XP. See the documentation that came with the software for instructions.

Booting From the Operating System Media

- 1 Save and close any open files and exit any open programs.
- 2 Insert the *Operating System* media. Click **Exit** if **Install Windows XP** message appears.
- 3 Restart the computer.
- 4 Press <F12> immediately after the DELL™ logo appears.


If the operating system logo appears, wait until you see the Windows desktop, and then shut down the computer and try again.


- 5 Press the arrow keys to select **CD-ROM**, and press <Enter>.
- 6 When the **Press any key to boot from CD** message appears, press any key.

Windows XP Setup

- 1 When the **Windows XP Setup** screen appears, press <Enter> to select **To set up Windows now**.
- 2 Read the information on the **Microsoft Windows Licensing Agreement** screen, and press <F8> to accept the license agreement.
- 3 If your computer already has Windows XP installed and you want to recover your current Windows XP data, type **r** to select the repair option, and remove the media.
- 4 If you want to install a new copy of Windows XP, press <Esc> to select that option.
- 5 Press <Enter> to select the highlighted partition (recommended), and follow the instructions on the screen.

The **Windows XP Setup** screen appears, and the operating system begins to copy files and install the devices. The computer automatically restarts multiple times.


 **NOTICE:** Do not press any key when the following message appears: **Press any key to boot from the CD**.

 **NOTE:** The time required to complete the setup depends on the size of the hard drive and the speed of your computer.


- 6 When the **Regional and Language Options** screen appears, select the settings for your location and click **Next**.

- 7 Enter your name and organization (optional) in the **Personalize Your Software** screen, and click **Next**.
- 8 At the **Computer Name and Administrator Password** window, enter a name for your computer (or accept the one provided) and a password, and click **Next**.
- 9 If the **Modem Dialing Information** screen appears, enter the requested information and click **Next**.
- 10 Enter the date, time, and time zone in the **Date and Time Settings** window, and click **Next**.
- 11 If the **Networking Settings** screen appears, click **Typical** and click **Next**.
- 12 If you are reinstalling Windows XP Professional and you are prompted to provide further information regarding your network configuration, enter your selections. If you are unsure of your settings, accept the default selections.

Windows XP installs the operating system components and configures the computer. The computer automatically restarts.

 **NOTICE:** Do not press any key when the following message appears: `Press any key to boot from the CD.`

- 13 When the **Welcome to Microsoft** screen appears, click **Next**.
- 14 When the **How will this computer connect to the Internet?** message appears, click **Skip**.
- 15 When the **Ready to register with Microsoft?** screen appears, select **No, not at this time** and click **Next**.
- 16 When the **Who will use this computer?** screen appears, you can enter up to five users.
- 17 Click **Next**.
- 18 Click **Finish** to complete the setup, and remove the media.
- 19 Reinstall the appropriate drivers with the *Drivers and Utilities* media.
- 20 Reinstall your virus protection software.
- 21 Reinstall your programs.

 **NOTE:** To reinstall and activate your Microsoft Office or Microsoft Works Suite programs, you need the Product Key number located on the back of the Microsoft Office or Microsoft Works Suite media sleeve.

Solving Problems

Troubleshooting Tips

Follow these tips when you troubleshoot your computer:

- If you added or removed a part before the problem started, review the installation procedures and ensure that the part is correctly installed.
- If a peripheral device does not work, ensure that the device is properly connected.
- If an error message appears on the screen, write down the exact message. This message may help technical support personnel diagnose and fix the problem(s).
- If an error message occurs in a program, see the program's documentation.

Battery Problems

Fill out the "Diagnostics Checklist" on page 351 as you complete these checks.

 **CAUTION:** There is a danger of a new battery exploding if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

 **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

REPLACE THE BATTERY — If you have to repeatedly reset time and date information after turning on the computer, or if an incorrect time or date displays during start-up, replace the battery (see "Replacing the Battery" on page 283). If the battery still does not work properly, contact Dell (see "Contacting Dell" on page 351).

Card Problems

Fill out the "Diagnostics Checklist" on page 351 as you complete these checks.

 **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

 **CAUTION:** To guard against electrical shock, always unplug your computer from the electrical outlet before opening the cover.



NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer.

CHECK THE CARD SEATING AND CABLE —

- 1 Turn off the computer and devices, disconnect them from their electrical outlets, wait 10 to 20 seconds, and then remove the computer cover (see "Removing the Computer Cover" on page 39 for mini tower computers, or "Removing the Computer Cover" on page 177 for desktop computers).
- 2 Ensure that each card is firmly seated in its connector. Reseat any loose cards.
- 3 Ensure that all cables are firmly connected to their corresponding connectors on the cards. If any cables appear loose, reconnect them.
For instructions on which cables should be attached to specific connectors on a card, see the card's documentation.
- 4 Close the computer cover (see "Replacing the Computer Cover" on page 297), reconnect the computer and devices to electrical outlets, and then turn them on.

TEST THE GRAPHICS CARD —

- 1 Turn off the computer and devices, disconnect them from their electrical outlets, wait 10 to 20 seconds, and then remove the computer cover (see "Removing the Computer Cover" on page 39 for mini tower computers, or "Removing the Computer Cover" on page 177 for desktop computers).
- 2 Remove all cards except the graphics card (see "PCI, PCI Express Cards, and PS/2 Serial Port Adapters" on page 41 for mini tower computers, or "Removing a PCI Card" on page 138 for desktop computers).
If your primary hard drive is connected to a drive controller card leave the drive controller card installed in the computer.
- 3 Close the computer cover (see "Replacing the Computer Cover" on page 297), reconnect the computer and devices to electrical outlets, and then turn them on.
- 4 Run the Dell Diagnostics (see "Dell Diagnostics" on page 327).


TEST THE CARDS —

- 1 Turn off the computer and devices, disconnect them from their electrical outlets, wait 10 to 20 seconds, and then remove the computer cover (see "Removing the Computer Cover" on page 39 for mini tower computers, or "Removing the Computer Cover" on page 177 for desktop computers).
- 2 Reinstall one of the cards that you removed previously (see "PCI, PCI Express Cards, and PS/2 Serial Port Adapters" on page 41 for mini tower computers, or "Installing a PCI Card" on page 135 for desktop computers).
- 3 Close the computer cover, (see "Replacing the Computer Cover" on page 297), reconnect the computer and devices to electrical outlets, and then turn them on.
- 4 Run the Dell Diagnostics (see "Dell Diagnostics" on page 327).
- 5 If any of the tests fail, the card you just reinstalled is faulty and needs to be replaced.
- 6 Repeat this process until you have reinstalled all cards.

Drive Problems

 **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

 **CAUTION:** To guard against electrical shock, always unplug your computer from the electrical outlet before opening the cover.

 **NOTICE:** To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer.

Fill out the "Diagnostics Checklist" on page 351 as you complete these checks.

TEST THE DRIVE — • Insert another floppy disk, CD, or DVD to eliminate the possibility that the original one is defective.
• Insert bootable media and restart the computer.


CLEAN THE DRIVE OR DISK — See "CDs and DVDs" on page 300.


CHECK THE CABLE CONNECTIONS

CHECK FOR SOFTWARE AND HARDWARE CONFLICTS — See "Resolving Software and Hardware Incompatibilities" on page 337.

RUN THE DELL DIAGNOSTICS — See "Dell Diagnostics" on page 327.

CD and DVD drive problems

 **NOTE:** High-speed CD or DVD drive vibration is normal and may cause noise, which does not indicate a defect in the drive or the CD or DVD.

 **NOTE:** Because of different regions worldwide and different disc formats, not all DVD titles work in all DVD drives.

ADJUST THE WINDOWS VOLUME CONTROL —

- Click the speaker icon in the lower-right corner of your screen.
- Ensure that the volume is turned up by clicking the sidebar and dragging it up.
- Ensure that the sound is not muted by clicking any boxes that are checked.

CHECK THE SPEAKERS AND SUBWOOFER — See "Sound and Speaker Problems" on page 323.

Problems writing to an Optical-RW drive

CLOSE OTHER PROGRAMS — The Optical-RW drive must receive a steady stream of data when writing. If the stream is interrupted, an error occurs. Try closing all programs before you write to the Optical-RW.

TURN OFF STANDBY MODE IN WINDOWS BEFORE WRITING TO A OPTICAL-RW DISC — See your computer documentation for information on Power Management modes (see "Power Management" on page 267).

Hard drive problems

RUN CHECK DISK —

- 1 Click the **Start** button and click **My Computer**.
- 2 Right-click **Local Disk C:**.
- 3 Click **Properties**.
- 4 Click the **Tools** tab.
- 5 Under **Error-checking**, click **Check Now**.
- 6 Click **Scan for and attempt recovery of bad sectors**.
- 7 Click **Start**.

E-Mail, Modem, and Internet Problems



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.



CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before opening the cover.



NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer.



NOTE: Connect the modem to an analog telephone jack only. The modem does not operate while it is connected to a digital telephone network.

RUN THE MODEM HELPER DIAGNOSTICS — Click the **Start** button, point to **All Programs**, and then click **Modem Helper**. Follow the instructions on the screen to identify and resolve modem problems. (Modem Helper is not available on all computers.)

VERIFY THAT THE MODEM IS COMMUNICATING WITH WINDOWS —

- 1 Click the **Start** button and click **Control Panel**.
 - 2 Click **Printers and Other Hardware**.
 - 3 Click **Phone and Modem Options**.
 - 4 Click the **Modems** tab.
 - 5 Click the COM port for your modem.
 - 6 Click **Properties**, click the **Diagnostics** tab, and then click **Query Modem** to verify that the modem is communicating with Windows.
- If all commands receive responses, the modem is operating properly.

ENSURE THAT YOU ARE CONNECTED TO THE INTERNET — Ensure that you have subscribed to an Internet provider. With the Outlook Express e-mail program open, click **File**. If **Work Offline** has a checkmark next to it, click the checkmark to remove it and connect to the Internet. For help, contact your Internet service provider.

Keyboard Problems



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

CHECK THE KEYBOARD CABLE —

- Ensure that the keyboard cable is firmly connected to the computer.
- Shut down the computer, reconnect the keyboard cable as shown in the *Quick Reference Guide* for your computer, and then restart the computer.
- Check the cable connector for bent or broken pins and for damaged or frayed cables. Straighten bent pins.
- Remove keyboard extension cables and connect the keyboard directly to the computer.

TEST THE KEYBOARD — Connect a properly working keyboard to the computer, and try using the keyboard. If the new keyboard works, the original keyboard is faulty.


RUN THE DELL DIAGNOSTICS — See "Dell Diagnostics" on page 327.

CHECK FOR SOFTWARE AND HARDWARE CONFLICTS — See "Resolving Software and Hardware Incompatibilities" on page 337.

Fan Problems

 **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

 **CAUTION:** To guard against electrical shock, always unplug your computer from the electrical outlet before opening the cover.

 **NOTICE:** To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer.

CHECK THE CABLE CONNECTIONS — Ensure that the card fan cable is connected firmly to the card fan connector on the system board (see "System Board Components" on page 28 for mini tower computers, and "System Board Components" on page 102 for desktop computers).

Lockups and Software Problems


 **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

The computer does not start up

CHECK THE DIAGNOSTIC LIGHTS — See "Diagnostic Lights" on page 330.

ENSURE THAT THE POWER CABLE IS FIRMLY CONNECTED TO THE COMPUTER AND TO THE ELECTRICAL OUTLET

The computer stops responding

 **NOTICE:** You might lose data if you are unable to perform an operating system shutdown.


TURN THE COMPUTER OFF — If you are unable to get a response by pressing a key on your keyboard or moving your mouse, press and hold the power button for at least 8 to 10 seconds until the computer turns off. Then restart your computer.

A program stops responding

END THE PROGRAM —

- 1 Press <Ctrl><Shift><Esc> simultaneously.
- 2 Click Applications.
- 3 Click the program that is no longer responding.
- 4 Click End Task.

A program crashes repeatedly

 **NOTE:** Software usually includes installation instructions in its documentation or on a floppy disk or CD.

CHECK THE SOFTWARE DOCUMENTATION — If necessary, uninstall and then reinstall the program.

A solid blue screen appears

TURN THE COMPUTER OFF — If you are unable to get a response by pressing a key on your keyboard or moving your mouse, press and hold the power button for at least 8 to 10 seconds until the computer turns off. Then restart your computer.

Other software problems

CHECK THE SOFTWARE DOCUMENTATION OR CONTACT THE SOFTWARE MANUFACTURER FOR TROUBLESHOOTING INFORMATION —

- Ensure that the program is compatible with the operating system installed on your computer.
- Ensure that your computer meets the minimum hardware requirements needed to run the software. See the software documentation for information.
- Ensure that the program is installed and configured properly.
- Verify that the device drivers do not conflict with the program.
- If necessary, uninstall and then reinstall the program.

BACK UP YOUR FILES IMMEDIATELY

USE A VIRUS-SCANNING PROGRAM TO CHECK THE HARD DRIVE, FLOPPY DISKS, OR CDs

SAVE AND CLOSE ANY OPEN FILES OR PROGRAMS AND SHUT DOWN YOUR COMPUTER THROUGH THE Start MENU

RUN THE DELL DIAGNOSTICS — If all tests run successfully, the error condition is related to a software problem (see "Dell Diagnostics" on page 327).

Media Card Reader Problems

NO DRIVE LETTER IS ASSIGNED —

When Microsoft Windows XP detects the media card reader, the device is automatically assigned a drive letter as the next logical drive after all other physical drives in the system. If the next logical drive after the physical drives is mapped to a network drive, Windows XP does not automatically assign a drive letter to the media card reader.

To manually assign a drive for the media card reader:

- 1 Right-click My Computer and select **Manage**.
- 2 Select the **Disk Management** option.
- 3 Right-click the corresponding drive letter in the right pane that needs to be changed.
- 4 Select **Drive Letter and Paths**.
- 5 From the drop-down list, select the new drive letter assignment for the media card reader.
- 6 Click **OK** to confirm your selection.

NOTE: Each slot in the media card reader is mapped to a drive letter. A media card reader slot only appears as a mapped drive when a media card is installed in it. If you attempt to access a drive that is mapped to an empty media card reader slot, you are prompted to insert media.

FLEXBAY DEVICE IS DISABLED —

There is a FlexBay disable option in the BIOS setup that appears only when the FlexBay device is installed. If the FlexBay device is physically installed, but it is not running, check to see if it is enabled in the BIOS setup.

Memory Problems



NOTE: Your computer might emit a series of beeps (beep code) during start-up if the monitor cannot display errors or problems. This series of beeps identifies a problem. See "Beep Codes" on page 332 for more information.

Fill out the "Diagnostics Checklist" on page 351 as you complete these checks.



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

IF YOU RECEIVE AN INSUFFICIENT MEMORY MESSAGE —

- Save and close any open files and exit any open programs you are not using to see if that resolves the problem.
- See the software documentation for minimum memory requirements. If necessary, install additional memory.
- Reseat the memory modules to ensure that your computer is successfully communicating with the memory.
- Run the Dell Diagnostics (see "Dell Diagnostics" on page 327).

IF YOU EXPERIENCE OTHER MEMORY PROBLEMS —

- Reseat the memory modules to ensure that your computer is successfully communicating with the memory.
- Ensure that you are following the memory installation guidelines.
- Run the Dell Diagnostics (see "Dell Diagnostics" on page 327).

Mouse Problems



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

CHECK THE MOUSE CABLE —

- 1 Check the cable connector for bent or broken pins and for damaged or frayed cables. Straighten bent pins.
- 2 Remove mouse extension cables, if used, and connect the mouse directly to the computer.
- 3 Shut down the computer, reconnect the mouse cable as shown in the *Quick Reference Guide* for your computer, and then restart the computer.

RESTART THE COMPUTER —

- 1 Simultaneously press <Ctrl><Esc> to display the **Start** menu.
- 2 Type **u**, press the keyboard arrow keys to highlight **Shut down** or **Turn Off**, and then press <Enter>.
- 3 After the computer turns off, reconnect the mouse cable as shown on the in the *Quick Reference Guide* for your computer.
- 4 Start the computer.

TEST THE MOUSE — Connect a properly working mouse to the computer, and try using the mouse. If the new mouse works, the original mouse is faulty.

CHECK THE MOUSE SETTINGS —

- 1 Click the **Start** button, click **Control Panel**, and then click **Printers and Other Hardware**.
- 2 Click **Mouse**.
- 3 Try adjusting the settings.

If you are using a PS/2 mouse

- 1 Enter system setup and ensure that the **Mouse Port** option is set to **On**.
- 2 Exit system setup and restart the computer.

REINSTALL THE MOUSE DRIVER — See "Reinstalling Drivers and Utilities" on page 302.

RUN THE DELL DIAGNOSTICS — •See "Dell Diagnostics" on page 327.

CHECK FOR SOFTWARE AND HARDWARE CONFLICTS — •See "Resolving Software and Hardware Incompatibilities" on page 337.

Network Problems

Fill out the "Diagnostics Checklist" on page 351 as you complete these checks.



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

CHECK THE NETWORK CABLE CONNECTOR — Ensure that the network cable is firmly inserted into both the network connector on the back of the computer and the network jack.

CHECK THE NETWORK LIGHTS ON THE FRONT OR BACK OF THE COMPUTER DEPENDING ON SYSTEM CHASSIS TYPE. — No connection speed light indicates that no network communication exists. Replace the network cable.

RESTART THE COMPUTER AND LOG ON TO THE NETWORK AGAIN

CHECK YOUR NETWORK SETTINGS — Contact your network administrator or the person who set up your network to verify that your network settings are correct and that the network is functioning.

CHECK FOR SOFTWARE AND HARDWARE CONFLICTS — •See "Resolving Software and Hardware Incompatibilities" on page 337.

Power Problems

Fill out the "Diagnostics Checklist" on page 351 as you complete these checks.



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

IF THE POWER LIGHT IS GREEN AND THE COMPUTER IS NOT RESPONDING — See "Diagnostic Lights" on page 330

IF THE POWER LIGHT IS BLINKING GREEN — The computer is in standby mode. Press a key on the keyboard or move the mouse to resume normal operation.

IF THE POWER LIGHT IS OFF — The computer is either turned off or is not receiving power.

- Reseat the power cable into both the power connector on the back of the computer and the electrical outlet.
- If the computer is plugged into a power strip, ensure that the power strip is plugged into an electrical outlet and that the power strip is turned on. Also bypass power protection devices, power strips, and power extension cables to verify that the computer turns on properly.
- Ensure that the electrical outlet is working by testing it with another device, such as a lamp.
- Ensure that the main power cable and front panel cable are securely connected to the system board.

IF THE POWER LIGHT IS AMBER AND GREEN OR STEADY AMBER — A device might be malfunctioning or incorrectly installed.

- Remove and then reinstall the memory modules (see "Memory" on page 291).
- Remove and then reinstall any cards.
- Remove and then reinstall the graphics card, if applicable.

IF THE POWER LIGHT IS BLINKING AMBER — The computer is receiving electrical power, but an internal power problem might exist.

- Ensure that the voltage selection switch is set to match the AC power at your location (if applicable).
- Ensure that the processor power cable is securely connected to the system board.

ELIMINATE INTERFERENCE — Some possible causes of interference are:

- Power, keyboard, and mouse extension cables
- Too many devices on a power strip
- Multiple power strips connected to the same electrical outlet

Printer Problems

Fill out the "Diagnostics Checklist" on page 351 as you complete these checks.



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.



NOTE: If you need technical assistance for your printer, contact the printer's manufacturer.

CHECK THE PRINTER DOCUMENTATION — See the printer documentation for setup and troubleshooting information.

ENSURE THAT THE PRINTER IS TURNED ON

CHECK THE PRINTER CABLE CONNECTIONS —

- See the printer documentation for cable connection information.
- Ensure that the printer cables are securely connected to the printer and the computer.

TEST THE ELECTRICAL OUTLET — Ensure that the electrical outlet is working by testing it with another device, such as a lamp. —

VERIFY THAT THE PRINTER IS RECOGNIZED BY WINDOWS —

1 Click the **Start** button, click **Control Panel**, and then click **Printers and Other Hardware**.

2 Click **View installed printers or fax printers**.

If the printer is listed, right-click the printer icon.

3 Click **Properties** and click the **Ports** tab. For a parallel printer, ensure that the **Print to the following port(s)**: setting is **LPT1 (Printer Port)**. For a USB printer, ensure that the **Print to the following port(s)**: setting is **USB**.

REINSTALL THE PRINTER DRIVER — See the printer documentation for instructions.

Restoring Default Settings

TO RESTORE THE COMPUTER'S SYSTEM SETTINGS TO THEIR DEFAULT VALUES —

- 1 Turn on or restart your computer.
- 2 When Press <F2> to Enter Setup appears in the upper-right corner of the screen, press <F2> immediately.
If you wait too long and the Microsoft® Windows® logo appears, continue to wait until you see the Windows desktop. Then shut down your computer through the **Start** menu and try again.
- 3 Under System Management, select the Maintenance option and follow the directions on the screen.

Serial or Parallel Device Problems

Fill out the "Diagnostics Checklist" on page 351 as you complete these checks.

 **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.


 **NOTE:** If you are having a problem with a printer, see Printer Problems.

CHECK THE OPTION SETTING — See the device's documentation for the recommended settings. Then enter system setup (see "System Setup" on page 257) and ensure that the **Serial Port #1** setting (or the **Serial Port #2** settings if you have an optional serial port adapter installed) or the **LPT Port Mode** setting matches the recommended settings.


RUN THE DELL DIAGNOSTICS — See "Dell Diagnostics" on page 327.

Sound and Speaker Problems

Fill out the "Diagnostics Checklist" on page 351 as you complete these checks.

 **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

No sound from speakers

 **NOTE:** The volume control in some MP3 players overrides the Windows volume setting. If you have been listening to MP3 songs, ensure that you did not turn the player volume down or off.

CHECK THE SPEAKER CABLE CONNECTIONS — Ensure that the speakers are connected as shown on the setup diagram supplied with the speakers. If you purchased an audio card, ensure that the speakers are connected to the card.

ENSURE THAT THE SUBWOOFER AND THE SPEAKERS ARE TURNED ON — See the setup diagram supplied with the speakers. If your speakers have volume controls, adjust the volume, bass, or treble to eliminate distortion.

ADJUST THE WINDOWS VOLUME CONTROL — Click or double-click the speaker icon in the lower-right corner of your screen. Ensure that the volume is turned up and that the sound is not muted.

DISCONNECT HEADPHONES FROM THE HEADPHONE CONNECTOR — Sound from the speakers is automatically disabled when headphones are connected to the computer's front-panel headphone connector.

TEST THE ELECTRICAL OUTLET — Ensure that the electrical outlet is working by testing it with another device, such as a lamp.

ENABLE DIGITAL MODE — Your speakers do not work if the CD drive is operating in analog mode.

- 1 Click the **Start** button, click **Control Panel**, and then click **Sounds, Speech, and Audio Devices**.
- 2 Click **Sounds and Audio Devices**.
- 3 Click the **Hardware** tab.
- 4 Double-click the name of your CD drive.
- 5 Click the **Properties** tab
- 6 Check the **Enable digital CD audio for this CD-ROM device** box.

ELIMINATE POSSIBLE INTERFERENCE — Turn off nearby fans, fluorescent lights, or halogen lamps to check for interference.

RUN THE SPEAKER DIAGNOSTICS

REINSTALL THE AUDIO DRIVER — See "Drivers" on page 301.

CHECK THE DEVICE OPTION SETTING — Enter system setup (see "System Setup" on page 257) and ensure that the **Audio Controller** option is set to **On**. Exit system setup and restart your computer.

RUN THE DELL DIAGNOSTICS — See "Dell Diagnostics" on page 327.

CHECK FOR SOFTWARE AND HARDWARE CONFLICTS — See "Resolving Software and Hardware Incompatibilities" on page 337.

No sound from headphones

CHECK THE HEADPHONE CABLE CONNECTION — Ensure that the headphone cable is securely inserted into the headphone connector.

DISABLE DIGITAL MODE — Your headphones do not work if the CD drive is operating in digital mode.

- 1 Click the **Start** button, click **Control Panel**, and then click **Sounds, Speech, and Audio Devices**.
- 2 Click **Sounds and Audio Devices**.
- 3 Click the **Hardware** tab.
- 4 Double-click the name of your CD drive.
- 5 Click the **Properties** tab.
- 6 Uncheck the **Enable digital CD audio for this CD-ROM device** box.

ADJUST THE WINDOWS VOLUME CONTROL — Click or double-click the speaker icon in the lower-right corner of your screen. Ensure that the volume is turned up and that the sound is not muted.

Video and Monitor Problems

Fill out the "Diagnostics Checklist" on page 351 as you complete these checks.



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

If the screen is blank



NOTE: See the monitor documentation for troubleshooting procedures.

CHECK THE MONITOR CABLE CONNECTION —

- If you purchased a graphics card, ensure that the monitor is connected to the card.
- Ensure that your monitor is properly connected (see the *Quick Reference Guide* that came with your computer).
- If you are using a video extension cable and removing the cable solves the problem, the cable is defective.
- Swap the computer and monitor power cables to determine if the power cable is defective.
- Check the connector for bent or broken pins. (It is normal for monitor cable connectors to have missing pins.)

CHECK THE MONITOR POWER LIGHT — If the power light is off, firmly press the button to ensure that the monitor is turned on. If the power light is lit or blinking, the monitor has power. If the power light is blinking, press a key on the keyboard or move the mouse.

TEST THE ELECTRICAL OUTLET — Ensure that the electrical outlet is working by testing it with another device, such as a lamp.

TEST THE MONITOR — Connect a properly working monitor to the computer, and try using the monitor. If the new monitor works, the original monitor is faulty.

CHECK THE DIAGNOSTIC LIGHTS — See "Diagnostic Lights" on page 330.

CHECK THE CARD SETTING — Enter system setup (see "System Setup" on page 257) and ensure that Primary Video option is set correctly. Exit system setup and restart your computer.

RUN THE MONITOR SELF-TEST — Check the monitor documentation for more information.

If the screen is difficult to read

CHECK THE MONITOR SETTINGS — See the monitor documentation for instructions on adjusting the contrast and brightness, demagnetizing (degaussing) the monitor, and running the monitor self-test.

MOVE THE SUBWOOFER AWAY FROM THE MONITOR — If your speaker system includes a subwoofer, ensure that the subwoofer is at least 60 cm (2 ft) away from the monitor.

MOVE THE MONITOR AWAY FROM EXTERNAL POWER SOURCES — Fans, fluorescent lights, halogen lamps, and other electrical devices can cause the screen image to appear "shaky." Turn off nearby devices to check for interference.

ADJUST THE WINDOWS DISPLAY SETTINGS —

- 1 Click the **Start** button, click **Control Panel**, and then click **Appearance and Themes**.
- 2 Click **Display** and click the **Settings** tab.
- 3 Try different settings for **Screen resolution** and **Color quality**.

Troubleshooting Tools and Utilities

Dell Diagnostics



CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

When to Use the Dell Diagnostics

If you experience a problem with your computer, perform the checks in this section and run the Dell Diagnostics before you contact Dell (see "Contacting Dell" on page 351) for technical assistance.

It is recommended that you print these procedures before you begin.



NOTICE: The Dell Diagnostics works only on Dell™ computers.

Enter system setup, review your computer's configuration information, and ensure that the device you want to test displays in system setup and is active (see "Entering System Setup" on page 257).

Start the Dell Diagnostics from either your hard drive or from the *Drivers and Utilities* media.

Starting the Dell Diagnostics From Your Hard Drive

The Dell Diagnostics is located on a hidden diagnostic utility partition on your hard drive.



NOTE: If your computer cannot display a screen image, contact Dell (see "Contacting Dell" on page 351).

- 1 Shut down the computer. Turn on (or restart) your computer.
- 2 When the DELL™ logo appears, press <F12> immediately.



NOTE: If you see a message stating that no diagnostics utility partition has been found, run the Dell Diagnostics from your *Drivers and Utilities* media (optional).

If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft® Windows® desktop. Then shut down your computer and try again.


- 3 When the boot device list appears, highlight **Boot to Utility Partition** and press <Enter>.
- 4 When the Dell Diagnostics **Main Menu** appears, select the test you want to run.

Starting the Dell Diagnostics From the Drivers and Utilities Media (Optional)

- 1 Insert the *Drivers and Utilities* media.
- 2 Shut down and restart the computer.

When the DELL™ logo appears, press <F12> immediately.

If you wait too long and the Windows logo appears, continue to wait until you see the Windows desktop. Then shut down your computer and try again.

 **NOTE:** The next steps change the boot sequence for one time only. On the next start-up, the computer boots according to the devices specified in system setup.

- 3 When the boot device list appears, highlight **IDE CD-ROM Device** and press <Enter>.
- 4 Select the **IDE CD-ROM Device** option from the CD boot menu.
- 5 Select the **Boot from CD-ROM** option from the menu that appears.
- 6 Type 1 to start the *Drivers and Utilities* media menu.
- 7 Type 2 to start the Dell Diagnostics.
- 8 Select **Run the 32 Bit Dell Diagnostics** from the numbered list. If multiple versions are listed, select the version appropriate for your computer.
- 9 When the Dell Diagnostics Main Menu appears, select the test you want to run.


Dell Diagnostics Main Menu

- 1 After the Dell Diagnostics loads and the **Main Menu** screen appears, click the button for the option you want.

Option	Function
Express Test	Performs a quick test of devices. This test typically takes 10 to 20 minutes and requires no interaction on your part. Run Express Test first to increase the possibility of tracing the problem quickly.
Extended Test	Performs a thorough check of devices. This test typically takes an hour or more and requires you to answer questions periodically.
Custom Test	Tests a specific device. You can customize the tests you want to run.
Symptom Tree	Lists the most common symptoms encountered and allows you to select a test based on the symptom of the problem you are having.

- 2 If a problem is encountered during a test, a message appears with an error code and a description of the problem. Write down the error code and problem description and follow the instructions on the screen.

If you cannot resolve the error condition, contact Dell (see "Contacting Dell" on page 351).

 **NOTE:** The Service Tag for your computer is located at the top of each test screen. If you contact Dell, technical support will ask for your Service Tag. Your computer's Service Tag is listed in the **System Info** option in system setup.

- 3 If you run a test from the **Custom Test** or **Symptom Tree** option, click the applicable tab described in the following table for more information.

Tab	Function
Results	Displays the results of the test and any error conditions encountered.
Errors	Displays error conditions encountered, error codes, and the problem description.
Help	Describes the test and may indicate requirements for running the test.
Configuration	Displays your hardware configuration for the selected device. The Dell Diagnostics obtains configuration information for all devices from system setup, memory, and various internal tests, and it displays the information in the device list in the left pane of the screen. The device list may not display the names of all the components installed on your computer or all devices attached to your computer.
Parameters	Allows you to customize the test by changing the test settings.

- 4 When the tests are completed, if you are running the Dell Diagnostics from the *Drivers and Utilities* media, remove the CD or DVD.
- 5 When the tests are complete, close the test screen to return to the **Main Menu** screen. To exit the Dell Diagnostics and restart the computer, close the **Main Menu** screen.

System Lights

Your power button light and hard-drive light may indicate a computer problem.


Power Light	Problem Description	Suggested Resolution
Solid green	Power is on, and the computer is operating normally. On the desktop computer, a solid green light indicates a network connection.	No corrective action is required.
Blinking green	The computer is in a power-saving mode (Microsoft® Windows® XP).	Press the power button, move the mouse, or press a key on the keyboard to wake the computer.
Blinks green several times and then turns off	A configuration error exists.	Check the diagnostic lights to see if the specific problem is identified.
Solid yellow	The Dell Diagnostics is running a test, or a device on the system board may be faulty or incorrectly installed.	If the Dell Diagnostics is running, allow the testing to complete. If the computer does not boot, contact Dell for technical assistance.
Blinking yellow	A power supply or system board failure has occurred.	See "Power Problems" on page 321.




Power Light	Problem Description	Suggested Resolution
Solid green and a beep code during POST	A problem was detected while the BIOS was executing.	See "Beep Codes" on page 332 for instructions on diagnosing the beep code. Also, check the diagnostic lights to see if the specific problem is identified.
Solid green power light and no beep code and no video during POST	The monitor or the graphics card may be faulty or incorrectly installed.	Check the diagnostic lights to see if the specific problem is identified (see "Video and Monitor Problems" on page 325).
Solid green power light and no beep code but the computer locks up during POST	An integrated system board device may be faulty.	Check the diagnostic lights to see if the specific problem is identified. If the problem is not identified, contact Dell for technical assistance.





Diagnostic Lights





 **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

To help you troubleshoot a problem, your computer has four lights labeled "1," "2," "3," and "4" on the front panel. The lights can be off or green. When the computer starts normally, the patterns or codes on the lights change as the boot process completes. If the POST portion of system boot completes successfully, all four lights display solid green. If the computer malfunctions during the POST process, the pattern displayed on the LEDs may help identify where in the process the computer halted.

 **NOTE:** The orientation of the diagnostic lights may vary depending on the system type. The diagnostic lights can appear either vertical or horizontal.

Light Pattern	Problem Description	Suggested Resolution
	The computer is in a normal <i>off</i> condition, or a possible pre-BIOS failure has occurred. The diagnostic lights are not lit after the computer successfully boots to the operating system.	Plug the computer into a working electrical outlet and press the power button.
	A possible BIOS failure has occurred; the computer is in the recovery mode.	Run the BIOS Recovery utility, wait for recovery completion, and then restart the computer.
	A possible processor failure has occurred.	Reinstall the processor and restart the computer.

Light Pattern	Problem Description	Suggested Resolution
	Memory modules are detected, but a memory failure has occurred.	<ul style="list-style-type: none"> • If you have one memory module installed, reinstall it and restart the computer (see "Memory" on page 291 for instructions on how to remove and install memory modules). • If you have two or more memory modules installed, remove the modules, reinstall one module, and then restart the computer. If the computer starts normally, reinstall an additional module. Continue until you have identified a faulty module or reinstalled all modules without error. • If available, install properly working memory of the same type into your computer. • If the problem persists, contact Dell.
	A possible graphics card failure has occurred.	<ul style="list-style-type: none"> • If the computer has a graphics card, remove the card, reinstall it, and then restart the computer. • If the problem still exists, install a graphics card that you know works and restart the computer. • If the problem persists or the computer has integrated graphics, contact Dell.
	A possible floppy or hard drive failure has occurred.	Reseat all power and data cables and restart the computer.
	A possible USB failure has occurred.	Reinstall all USB devices, check cable connections, and then restart the computer.

Light Pattern	Problem Description	Suggested Resolution
	No memory modules are detected.	<ul style="list-style-type: none"> • If you have one memory module installed, reinstall it and restart the computer (see "Memory" on page 291 for instructions on how to remove and install memory modules). • If you have two or more memory modules installed, remove the modules, reinstall one module, and then restart the computer. If the computer starts normally, reinstall an additional module. Continue until you have identified a faulty module or reinstalled all modules without error. • If available, install properly working memory of the same type into your computer. • If the problem persists, contact Dell.
	Memory modules are detected, but a memory configuration or compatibility error exists.	<ul style="list-style-type: none"> • Ensure that no special memory module/memory connector placement requirements exist (see "Memory" on page 291). • Verify that the memory modules that you are installing are compatible with your computer. • If the problem persists, contact Dell.
	A failure has occurred. This pattern also displays when you enter system setup and may not indicate a problem (see "Entering System Setup" on page 257).	<ul style="list-style-type: none"> • Ensure that the cables are properly connected to the system board from the hard drive, and optical drive. • Check the computer message that appears on your monitor screen. • If the problem persists, contact Dell.
	After POST is complete, all four diagnostic lights turn green briefly before turning off to indicate normal operating condition.	None.

Beep Codes

Your computer might emit a series of beeps during start-up if the monitor cannot display errors or problems. This series of beeps, called a beep code, identifies a problem. One possible beep code consists of one long beep and then two short beeps. This beep code tells you that the computer encountered a memory test failure.

If your computer beeps during start-up:

- 1 Write down the beep code on the Diagnostics Checklist (see "Diagnostics Checklist" on page 351).
- 2 Run the Dell Diagnostics to identify a more serious cause (see "Dell Diagnostics" on page 327).
- 3 Contact Dell for technical assistance (see "Contacting Dell" on page 351).

Code	Cause
2 short, 1 long	BIOS checksum error
1 long, 2 short	Memory test failure (bad memory during memory sizing)
1 long, 3 short, 2 short	No memory
1 short	F12 key pressed

Error Messages

Fill out the Diagnostics Checklist as you complete these checks (see "Diagnostics Checklist" on page 351).

 **CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.**

If the message is not listed, see the documentation for the operating system or the program that was running when the message appeared.

A FILENAME CANNOT CONTAIN ANY OF THE FOLLOWING CHARACTERS: \ / : * ? " < > | — Do not use these characters in filenames.

A REQUIRED .DLL FILE WAS NOT FOUND — The program that you are trying to open is missing an essential file. To remove and then reinstall the program:

- 1 Click the **Start** button, click **Control Panel**, and then click **Add or Remove Programs**.
- 2 Select the program you want to remove.
- 3 Click the **Change or Remove Program** icon.
- 4 See the program documentation for installation instructions.

ALERT! PREVIOUS ATTEMPTS AT BOOTING THIS SYSTEM HAVE FAILED AT CHECKPOINT [nnnn]. FOR HELP IN RESOLVING THIS PROBLEM, PLEASE NOTE THIS CHECKPOINT AND CONTACT DELL TECHNICAL SUPPORT — Contact Dell (see "Contacting Dell" on page 351) and report the checkpoint code (nnnn) to the support technician.

ALERT! AIR TEMPERATURE SENSOR NOT DETECTED — For any computer type except the ultra small form factor computer, ensure that all cables are securely fastened to the I/O panel and to the system board and reboot your computer. If this does not resolve the problem or if you have an ultra small form factor computer, contact Dell (see "Contacting Dell" on page 351).

ATTACHMENT FAILED TO RESPOND — See "Drive Problems" on page 313.

BAD COMMAND OR FILE NAME — Ensure that you spelled the command correctly, put spaces in the proper place, and used the correct pathname.

BAD ERROR-CORRECTION CODE (ECC) ON DISK READ — See "Drive Problems" on page 313.

CONTROLLER HAS FAILED — See "Drive Problems" on page 313.

DATA ERROR — See "Drive Problems" on page 313.

DECREASING AVAILABLE MEMORY — See "Lockups and Software Problems" on page 316.

DISKETTE DRIVE 0 SEEK FAILURE — See "Drive Problems" on page 313.

DISKETTE READ FAILURE — See "Drive Problems" on page 313.

DISKETTE SUBSYSTEM RESET FAILED — Run the Dell Diagnostics (see "Dell Diagnostics" on page 327).

DISKETTE WRITE PROTECTED — Slide the write-protect notch on the floppy disk to the open position.

DRIVE NOT READY — Put a floppy disk in the drive.

GATE A20 FAILURE — See "Lockups and Software Problems" on page 316.

HARD-DISK CONFIGURATION ERROR —

HARD-DISK CONTROLLER FAILURE —

HARD-DISK DRIVE FAILURE —

HARD-DISK DRIVE FAILURE —

See "Drive Problems" on page 313.

INSERT BOOTABLE MEDIA — Insert a bootable floppy disk or CD.

INVALID CONFIGURATION INFORMATION - PLEASE RUN SETUP PROGRAM — Enter system setup and correct the computer configuration information (see "Entering System Setup" on page 257).

KEYBOARD FAILURE — See "Keyboard Problems" on page 315.

MEMORY ADDRESS LINE FAILURE AT *address*, READ *value* EXPECTING *value* — See "Lockups and Software Problems" on page 316.

MEMORY ALLOCATION ERROR —

- 1 Turn off the computer, wait 30 seconds, and then restart the computer.
- 2 Try to run the program again.
- 3 If the error message appears again, see the software documentation for additional troubleshooting suggestions.

MEMORY DATA LINE FAILURE AT *address*, READ *value* EXPECTING *value* —
MEMORY DOUBLE WORD LOGIC FAILURE AT *address*, READ *value* EXPECTING *value* —
MEMORY ODD/EVEN LOGIC FAILURE AT *address*, READ *value* EXPECTING *value* —
MEMORY WRITE/READ FAILURE AT *address*, READ *value* EXPECTING *value* —
MEMORY SIZE IN CMOS INVALID —

See "Lockups and Software Problems" on page 316.

NO BOOT DEVICE AVAILABLE —

- If the floppy drive is your boot device, ensure that a bootable floppy disk is in the drive.
- If the hard drive is your boot device, ensure that the cables are connected and that the drive is installed properly and partitioned as a boot device.
- Enter system setup and ensure that the boot sequence information is correct (see "Entering System Setup" on page 257).

NO BOOT SECTOR ON HARD-DISK DRIVE — Enter system setup and ensure that the computer configuration information for the hard drive is correct (see "Entering System Setup" on page 257).

NO TIMER TICK INTERRUPT — Run the Dell Diagnostics (see "Dell Diagnostics" on page 327).

NON-SYSTEM DISK OR DISK ERROR — Replace the floppy disk with one that has a bootable operating system or remove the floppy disk from drive A and restart the computer.

NOT A BOOT DISKETTE — Insert a bootable floppy disk and restart your computer.

NOT ENOUGH MEMORY OR RESOURCES. CLOSE SOME PROGRAMS AND TRY AGAIN — Close all windows and open the program that you want to use. In some cases, you might have to restart your computer to restore computer resources. If so, run the program that you want to use first.

OPERATING SYSTEM NOT FOUND — Contact Dell (see "Contacting Dell" on page 351).

PLUG AND PLAY CONFIGURATION ERROR —

- 1 Turn your computer off, unplug it from the electrical outlet, and then remove all but one of the cards.
- 2 Plug in your computer and reboot it.
- 3 If the message reappears, the installed card might be malfunctioning. If the message does not reappear, turn off the computer and reinsert one of the other cards.
- 4 Repeat this process until you identify which card is malfunctioning.

READ FAULT —

REQUESTED SECTOR NOT FOUND —

RESET FAILED —

See "Drive Problems" on page 313.

SECTOR NOT FOUND —

- Run the Windows error-checking utility to check the file structure on the floppy disk or hard drive. See Windows Help for instructions.
- If a large number of sectors are defective, back up the data (if possible), and then reformat the floppy disk or hard drive.

SEEK ERROR — See "Drive Problems" on page 313.

SHUTDOWN FAILURE — Run the Dell Diagnostics (see "Dell Diagnostics" on page 327).

TIME-OF-DAY CLOCK STOPPED —

TIME-OF-DAY NOT SET-PLEASE RUN THE SYSTEM SETUP PROGRAM —

Enter system setup (see "Entering System Setup" on page 257) and correct the date or time. If the problem persists, replace the battery (see "Replacing the Battery" on page 283).

TIMER CHIP COUNTER 2 FAILED — Run the Dell Diagnostics (see "Dell Diagnostics" on page 327).

UNEXPECTED INTERRUPT IN PROTECTED MODE — Run the Dell Diagnostics (see "Dell Diagnostics" on page 327).

WARNING: DELL'S DISK MONITORING SYSTEM HAS DETECTED THAT DRIVE [0/1] ON THE [PRIMARY/SECONDARY] EIDE CONTROLLER IS OPERATING OUTSIDE OF NORMAL SPECIFICATIONS. IT IS ADVISABLE TO IMMEDIATELY BACK UP YOUR DATA AND REPLACE YOUR HARD DRIVE BY CALLING YOUR SUPPORT DESK OR DELL — If no replacement drive is immediately available and the drive is not the only bootable drive, enter system setup (see "Entering System Setup" on page 257) and change the appropriate drive setting to **None**. Then remove the drive from the computer.

WRITE FAULT —

WRITE FAULT ON SELECTED DRIVE —

See "Drive Problems" on page 313.

<DRIVE LETTER>:\ IS NOT ACCESSIBLE. THE DEVICE IS NOT READY — The selected drive cannot read its medium. Depending on its medium type, insert a floppy, CD, DVD, or Zip disk into the drive and try again.

Resolving Software and Hardware Incompatibilities

If a device is either not detected during the operating system setup or is detected but incorrectly configured, you can use Device Manager or the Hardware Troubleshooter to resolve the incompatibility.

Microsoft® Windows® XP

To resolve incompatibilities using Device Manager:

- 1 Click the **Start** button and click **Control Panel**.
- 2 Click **Performance and Maintenance** and click **System**.
- 3 Click the **Hardware** tab and click **Device Manager**.
- 4 In the **Device Manager** list, check for devices that are incorrectly configured.
Incorrectly configured devices are indicated by a yellow exclamation point [!] or a red X if the device has been disabled.
- 5 Double-click any device marked with an exclamation point to display the **Properties** window.
The **Device** status area in the **Properties** window reports the devices that need to be re-configured.
- 6 Reconfigure the devices or remove the devices from the **Device Manager**. See the documentation that came with the device for information on configuring the device.

To resolve incompatibilities using the Windows XP Hardware Troubleshooter:

- 1 Click the **Start** button and click **Help and Support**.


- 2 Type `hardware troubleshooter` in the **Search** field and click the arrow to start the search.
- 3 Click **Hardware Troubleshooter** in the **Search Results** list.
- 4 In the **Hardware Troubleshooter** list, click **I need to resolve a hardware conflict on my computer**, and click **Next**.

Microsoft® Windows® XP and Windows Vista® Features

Transferring Information to a New Computer

You can use your operating system "wizards" to help you transfer files and other data from one computer to another—for example, from an *old* computer to a *new* computer. For instructions, see the following section that corresponds to the operating system that your computer is running.

Microsoft Windows Vista®

- 1 Click the Windows Vista Start button  and then click **Transfer files and settings**→ **Start Windows Easy Transfer**.
- 2 In the **User Account Control** dialog box, click **Continue**.
- 3 Click **Start a new transfer** or **Continue a transfer in progress**.

Follow the instructions provided on the screen by the Windows Easy Transfer wizard.

Microsoft® Windows® XP

The Microsoft Windows XP operating system provides the Files and Settings Transfer Wizard to move data from a source computer to a new computer. You can transfer data, such as:

- E-mail messages
- Toolbar settings
- Window sizes
- Internet bookmarks

You can transfer the data to the new computer over a network or serial connection, or you can store it on removable media, such as a writable CD, for transfer to the new computer.



NOTE: You can transfer information from an old computer to a new computer by directly connecting a serial cable to the input/output (I/O) ports of the two computers. To transfer data over a serial connection, you must access the Network Connections utility from the Control Panel and perform additional configuration steps, such as setting up an advanced connection and designating the host computer and the guest computer.

For instructions on setting up a direct cable connection between two computers, see Microsoft Knowledge Base Article #305621, titled *How to Set Up a Direct Cable Connection Between Two Computers in Windows XP*. This information may not be available in certain countries.

For transferring information to a new computer, you must run the Files and Settings Transfer Wizard. You can use the optional *Operating System* media for this process or you can create a wizard disk with the Files and Settings Transfer Wizard.

Running the Files and Settings Transfer Wizard With the Operating System Media



NOTE: This procedure requires the *Operating System* media. This media is optional and may not be included with certain computers.

To prepare a new computer for the file transfer:

- 1 Open the Files and Settings Transfer Wizard: click **Start**→ **All Programs**→ **Accessories**→ **System Tools**→ **Files and Settings Transfer Wizard**.
- 2 When the **Files and Settings Transfer Wizard** welcome screen appears, click **Next**.
- 3 On the **Which computer is this?** screen, click **New Computer**→ **Next**.
- 4 On the **Do you have a Windows XP CD?** screen, click **I will use the wizard from the Windows XP CD**→ **Next**.
- 5 When the **Now go to your old computer** screen appears, go to your old or source computer. Do *not* click **Next** at this time.

To copy data from the old computer:

- 1 On the old computer, insert the Windows XP *Operating System* media.
- 2 On the **Welcome to Microsoft Windows XP** screen, click **Perform additional tasks**.
- 3 Under **What do you want to do?**, click **Transfer files and settings**→ **Next**.
- 4 On the **Which computer is this?** screen, click **Old Computer**→ **Next**.
- 5 On the **Select a transfer method** screen, click the transfer method you prefer.
- 6 On the **What do you want to transfer?** screen, select the items you want to transfer and click **Next**. After the information has been copied, the **Completing the Collection Phase** screen appears.
- 7 Click **Finish**.

To transfer data to the new computer:

- 1 On the **Now go to your old computer** screen on the new computer, click **Next**.
- 2 On the **Where are the files and settings?** screen, select the method you chose for transferring your settings and files and click **Next**.

The wizard reads the collected files and settings and applies them to your new computer.

When all of the settings and files have been applied, the **Finished** screen appears.

- 3 Click **Finished** and restart the new computer.

Running the Files and Settings Transfer Wizard Without the Operating System Media

To run the Files and Settings Transfer Wizard without the *Operating System* media, you must create a wizard disk that will allow you to create a backup image file to removable media.

To create a wizard disk, use your new computer with Windows XP and perform the following steps:


- 1 Open the Files and Settings Transfer Wizard: click **Start**→ **All Programs**→ **Accessories**→ **System Tools**→ **Files and Settings Transfer Wizard**.
- 2 When the **Files and Settings Transfer Wizard** welcome screen appears, click **Next**.
- 3 On the **Which computer is this?** screen, click **New Computer**→ **Next**.
- 4 On the **Do you have a Windows XP CD?** screen, click **I want to create a Wizard Disk in the following drive**→ **Next**.
- 5 Insert the removable media, such as a writable CD, and click **OK**.
- 6 When the disk creation completes and the **Now go to your old computer** message appears, *do not* click **Next**.
- 7 Go to the old computer.


To copy data from the old computer:

- 1 On the old computer, insert the wizard disk.
- 2 Click **Start**→ **Run**.
- 3 In the **Open** field on the **Run** window, browse to the path for **fastwiz** (on the appropriate removable media) and click **OK**.
- 4 On the **Files and Settings Transfer Wizard** welcome screen, click **Next**.
- 5 On the **Which computer is this?** screen, click **Old Computer**→ **Next**.
- 6 On the **Select a transfer method** screen, click the transfer method you prefer.
- 7 On the **What do you want to transfer?** screen, select the items you want to transfer and click **Next**.
After the information has been copied, the **Completing the Collection Phase** screen appears.
- 8 Click **Finish**.

To transfer data to the new computer:

- 1 On the **Now go to your old computer** screen on the new computer, click **Next**.
- 2 On the **Where are the files and settings?** screen, select the method you chose for transferring your settings and files and click **Next**. Follow the instructions on the screen.
The wizard reads the collected files and settings and applies them to your new computer.
When all of the settings and files have been applied, the **Finished** screen appears.
- 3 Click **Finished** and restart the new computer.

 **NOTE:** For more information about this procedure, search support.dell.com for document #154781 (*What Are The Different Methods To Transfer Files From My Old Computer To My New Dell™ Computer Using the Microsoft® Windows® XP Operating System?*).


 **NOTE:** Access to the Dell™ Knowledge Base document may not be available in certain countries.

User Accounts and Fast User Switching


Adding User Accounts

After the operating system is installed, the administrator or a user with administrator rights can create additional user accounts.

Windows Vista

- 1 Click the Windows Vista Start button  and click **Control Panel**.
- 2 Click **Add or remove user accounts**.
If the **User Account Control** dialog box appears, click **Continue** or type an administrator password and click **Submit**.
- 3 In the **Manage Accounts** window, click **Create a new account**.
- 4 Type the name you want to use for the new account and click the account type you want.
- 5 Click **Create Account**.
The new account name appears in the **User Accounts** window.


Windows XP

- 1 Click the **Start** button and click **Control Panel**.
 - 2 In the **Control Panel** window, click **User Accounts**.
 - 3 Under **Pick a task**, click **Create a new account**.
 - 4 Under **Name the new account**, type the name of the new user and click **Next**.
 - 5 Under **Pick an account type**, click one of the following options:
 - **Computer administrator** — You can change all computer settings.
 - **Limited** — You can change only your own personal settings, such as your password. You cannot install programs or use the Internet.
-  **NOTE:** Additional options may be available, depending on whether you are using Windows XP Home Edition or Windows XP Professional. Also, options available in Windows XP Professional vary depending on whether your computer is connected to a domain.
- 6 Click **Create Account**.

Fast User Switching

Fast User Switching allows multiple users to access one computer without requiring the previous user to log off.

Windows Vista


- 1 Click the Windows Vista Start button  and then click **Transfer files and settings**→ **Start Windows Easy Transfer**.

The current user's name and picture appear on the Start menu.

- 2 Click the right-arrow icon in the lower-right corner of the Start menu.
- 3 Click **Switch User**.
- 4 Click the name of the user account you want to switch to.
- 5 Enter your password, if applicable.
- 6 Click the **Go** arrow.
- 7 Click **Start**.

The user's name and picture now appear in the **Start** menu.

Windows XP


 **NOTE:** Fast User Switching is unavailable if your computer is running Windows XP Professional and is a member of a computer domain, or if your computer has less than 128 MB of memory.

- 1 Click the **Start** button and click **Log Off**.
- 2 In the **Log Off Windows** window, click **Switch User**.

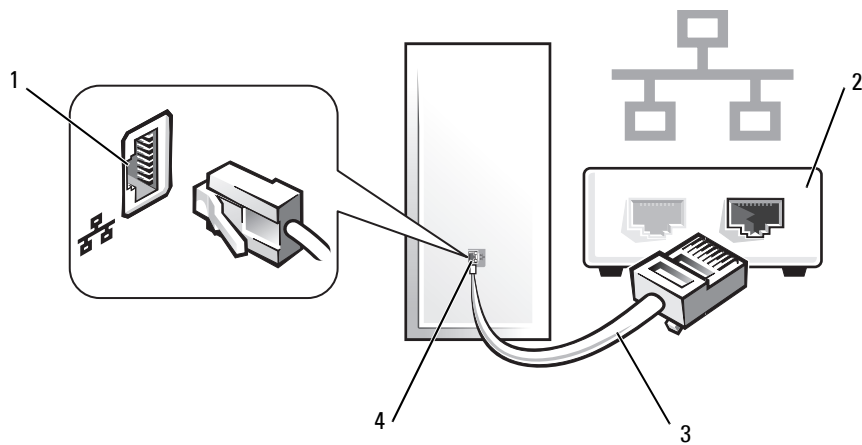
When you use Fast User Switching, programs that previous users were using remain running in the background, which might decrease your computer's response time. Also, multimedia programs, such as games and DVD software, might not work with Fast User Switching. For more information, see the Windows Help and Support Center.

Setting Up a Home and Office Network

Connecting to a Network Adapter

 **NOTE:** Plug the network cable into the network adapter connector on the computer. Do not plug the network cable into the modem connector on the computer. Do not plug a network cable into a telephone wall jack.


- 1 Connect the network cable to the network adapter connector on the back of your computer. Insert the cable until it clicks into place, and then gently pull it to ensure that it is secure.
- 2 Connect the other end of the network cable to a network device.



- | | | | | | |
|---|---------------------------------------|---|----------------|---|---------------|
| 1 | network adapter connector | 2 | network device | 3 | network cable |
| 4 | network adapter connector on computer | | | | |

Network Setup Wizard

Windows Vista

- 1 Click the Windows Vista Start button  and then click **Connect To**→ **Set up a connection or network**.
- 2 Select an option under **Choose a connection option**.
- 3 Click **Next**, and then follow the instructions in the wizard.

Windows XP

The Microsoft® Windows® XP operating system provides a Network Setup Wizard to guide you through the process of sharing files, printers, or an Internet connection between computers in a home or small office.

- 1 Click the **Start** button, point to **All Programs**→ **Accessories**→ **Communications**, and then click **Network Setup Wizard**.
- 2 On the **Network Setup Wizard** welcome screen, click **Next**.
- 3 Click **Checklist for creating a network**.



NOTE: Selecting the connection method **This computer connects directly to the Internet** enables the integrated firewall provided with Windows XP Service Pack 1 (SP1) or later.

- 4 Complete the checklist and required preparations.


- 5 Return to the Network Setup Wizard and follow the instructions on the screen.


Getting Help

Obtaining Assistance

 **CAUTION:** If you need to remove the computer covers, first disconnect the computer power and modem cables from all electrical outlets.


- 1 Complete the procedures in "" on page 311
- 2 Run the Dell Diagnostics (see "Dell Diagnostics" on page 327).
- 3 Make a copy of the Diagnostics Checklist (see "Diagnostics Checklist" on page 351) and fill it out.
- 4 Use Dell's extensive suite of online services available at Dell Support (support.dell.com) for help with installation and troubleshooting procedures.
- 5 If the preceding steps have not resolved the problem, contact Dell.

 **NOTE:** Call the support service from a telephone near or at the computer so that the support staff can assist you with any necessary procedures.

 **NOTE:** Dell's Express Service Code system may not be available in all countries.

When prompted by Dell's automated telephone system, enter your Express Service Code to route the call directly to the proper support personnel. If you do not have an Express Service Code, open the Dell Accessories folder, double-click the Express Service Code icon, and follow the directions.

For instructions on using the support service, see "Support Service" on page 348.

 **NOTE:** Some of the following services are not always available in all locations outside the continental U.S. Call your local Dell representative for information on availability.

Online Services

You can access Dell Support at support.dell.com. Select your region on the **WELCOME TO DELL SUPPORT** page, and fill in the requested details to access help tools and information.

You can contact Dell electronically using the following addresses:

- World Wide Web
www.dell.com/
www.dell.com/ap/ (Asian/Pacific countries only)
www.dell.com/jp (Japan only)
www.euro.dell.com (Europe only)

www.dell.com/la/ (Latin American and Caribbean countries)

www.dell.ca (Canada only)

- Anonymous file transfer protocol (FTP)

ftp.dell.com/

Log in as user: `anonymous`, and use your e-mail address as your password.

- Electronic Support Service

mobile_support@us.dell.com

support@us.dell.com

la-techsupport@dell.com (Latin America and Caribbean countries only)

apsupport@dell.com (Asian/Pacific countries only)

support.jp.dell.com (Japan only)

support.euro.dell.com (Europe only)

- Electronic Quote Service

apmarketing@dell.com (Asian/Pacific countries only)

sales_canada@dell.com (Canada only)

AutoTech Service

Dell's automated support service—AutoTech—provides recorded answers to the questions most frequently asked by Dell customers about their portable and desktop computers.

When you call AutoTech, use your touch-tone telephone to select the subjects that correspond to your questions.

The AutoTech service is available 24 hours a day, 7 days a week. You can also access this service through the support service. For the telephone number to call for your region, see "Contacting Dell" on page 351.

Automated Order-Status Service

To check on the status of any Dell™ products that you have ordered, you can go to support.dell.com, or you can call the automated order-status service. A recording prompts you for the information needed to locate and report on your order. For the telephone number to call for your region, see "Contacting Dell" on page 351.

Support Service

Dell's support service is available 24 hours a day, 7 days a week, to answer your questions about Dell hardware. Our support staff uses computer-based diagnostics to provide fast, accurate answers.

To contact Dell's support service, see "Obtaining Assistance" on page 347 and then call the number for your country as listed in "Contacting Dell" on page 351.

Problems With Your Order

If you have a problem with your order, such as missing parts, wrong parts, or incorrect billing, contact Dell for customer assistance. Have your invoice or packing slip handy when you call. For the telephone number to call for your region, see "Contacting Dell" on page 351.

Product Information

If you need information about additional products available from Dell, or if you would like to place an order, visit the Dell website at www.dell.com. For the telephone number to call for your region or to speak to a sales specialist, see "Contacting Dell" on page 351.

Returning Items for Warranty Repair or Credit

Prepare all items being returned, whether for repair or credit, as follows:

- 1 Call Dell to obtain a Return Material Authorization Number, and write it clearly and prominently on the outside of the box.
For the telephone number to call for your region, see "Contacting Dell" on page 351.
- 2 Include a copy of the invoice and a letter describing the reason for the return.
- 3 Include a copy of the Diagnostics Checklist (see "Diagnostics Checklist" on page 351), indicating the tests that you have run and any error messages reported by the Dell Diagnostics (see "Dell Diagnostics" on page 327).
- 4 Include any accessories that belong with the item(s) being returned (power cables, software floppy disks, guides, and so on) if the return is for credit.
- 5 Pack the equipment to be returned in the original (or equivalent) packing materials.

You are responsible for paying shipping expenses. You are also responsible for insuring any product returned, and you assume the risk of loss during shipment to Dell. Collect On Delivery (C.O.D.) packages are not accepted.

Returns that are missing any of the preceding requirements will be refused at Dell's receiving dock and returned to you.

Before You Call



NOTE: Have your Express Service Code ready when you call. The code helps Dell's automated-support telephone system direct your call more efficiently. You may also be asked for your Service Tag (located on the back or bottom of your computer).

Remember to fill out the Diagnostics Checklist (see "Diagnostics Checklist" on page 351). If possible, turn on your computer before you call Dell for assistance and call from a telephone at or near the computer. You may be asked to type some commands at the keyboard, relay detailed information during operations, or try other troubleshooting steps possible only at the computer itself. Ensure that the computer documentation is available.



CAUTION: Before working inside your computer, follow the safety instructions in your *Product Information Guide*.

Diagnostics Checklist

Name:

Date:

Address:

Phone number:

Service Tag (bar code on the back or bottom of the computer):

Express Service Code:

Return Material Authorization Number (if provided by Dell support technician):

Operating system and version:

Devices:

Expansion cards:

Are you connected to a network? Yes No

Network, version, and network adapter:

Programs and versions:


See your operating system documentation to determine the contents of the system's start-up files. If the computer is connected to a printer, print each file. Otherwise, record the contents of each file before calling Dell.

Error message, beep code, or diagnostic code:

Description of problem and troubleshooting procedures you performed:

Contacting Dell

For customers in the United States, call 800-WWW-DELL (800-999-3355).

 **NOTE:** If you do not have an active Internet connection, you can find contact information on your purchase invoice, packing slip, bill, or Dell product catalog.

Dell provides several online and telephone-based support and service options. Availability varies by country and product, and some services may not be available in your area. To contact Dell for sales, technical support, or customer service issues:

- 1 Visit support.dell.com.
- 2 Verify your country or region in the **Choose A Country/Region** drop-down menu at the bottom of the page.
- 3 Click **Contact Us** on the left side of the page.
- 4 Select the appropriate service or support link based on your need.
- 5 Choose the method of contacting Dell that is convenient for you.

Warranty

Dell Inc. (“Dell”) manufactures its hardware products from parts and components that are new or equivalent to new in accordance with industry-standard practices. For information about the Dell warranty for your computer, see the *Product Information Guide* or separate paper warranty document that shipped with your computer.

FCC Regulatory Model (U.S. Only)

The following information is provided on the device or devices covered in this document in compliance with the FCC regulations:

- Product name: Dell™ OptiPlex™ 740
- Model numbers: DCNE, DCSM, and DCCY
- Company name:
Dell Inc.
Worldwide Regulatory Compliance & Environmental Affairs
One Dell Way
Round Rock, TX 78682 USA
512-338-4400



NOTE: For additional FCC and other regulatory agency information, see your *Product Information Guide* (which accompanied your computer). Information is also available on the Internet at dell.com/regulatory_compliance.

Glossary

Terms in this Glossary are provided for informational purposes only and may or may not describe features included with your particular computer.

A

AC — alternating current — The form of electricity that powers your computer when you plug the AC adapter power cable in to an electrical outlet.

ACPI — advanced configuration and power interface — A power management specification that enables Microsoft® Windows® operating systems to put a computer in standby or hibernate mode to conserve the amount of electrical power allocated to each device attached to the computer.

AGP — accelerated graphics port — A dedicated graphics port that allows system memory to be used for video-related tasks. AGP delivers a smooth, true-color video image because of the faster interface between the video circuitry and the computer memory.

AHCI — Advanced Host Controller Interface — An interface for a SATA hard drive Host Controller which allows the storage driver to enable technologies such as Native Command Queuing (NCQ) and hot plug.

ALS — ambient light sensor — A feature that helps to control display brightness.

antivirus software — A program designed to identify, quarantine, and/or delete viruses from your computer.

ASF — alert standards format — A standard to define a mechanism for reporting hardware and software alerts to a management console. ASF is designed to be platform- and operating system-independent.

B

battery life span — The length of time (years) during which a portable computer battery is able to be depleted and recharged.

battery operating time — The length of time (minutes or hours) that a portable computer battery powers the computer.

BIOS — basic input/output system — A program (or utility) that serves as an interface between the computer hardware and the operating system. Unless you understand what effect these settings have on the computer, do not change them. Also referred to as *system setup*.

bit — The smallest unit of data interpreted by your computer.

Bluetooth® wireless technology — A wireless technology standard for short-range (9 m [29 feet]) networking devices that allows for enabled devices to automatically recognize each other.

boot sequence — Specifies the order of the devices from which the computer attempts to boot.

bootable media — A disk that you can use to start your computer. In case your hard drive is damaged or your computer has a virus, ensure that you always have a bootable DVD, CD, or floppy disk available. Your *Drivers and Utilities* media.

bps — bits per second — The standard unit for measuring data transmission speed.

BTU — British thermal unit — A measurement of heat output.

bus — A communication pathway between the components in your computer.

bus speed — The speed, given in MHz, that indicates how fast a bus can transfer information.

byte — The basic data unit used by your computer. A byte is usually equal to 8 bits.

C

C — Celsius — A temperature measurement scale where 0° is the freezing point and 100° is the boiling point of water.

cache — A special high-speed storage mechanism which can be either a reserved section of main memory or an independent high-speed storage device. The cache enhances the efficiency of many processor operations.

L1 cache — Primary cache stored inside the processor.

L2 cache — Secondary cache which can either be external to the processor or incorporated into the processor architecture.

carney — An international customs document that facilitates temporary imports into foreign countries. Also known as a *merchandise passport*.

CD-R — CD recordable — A recordable version of a CD. Data can be recorded only once onto a CD-R. Once recorded, the data cannot be erased or written over.

CD-RW — CD rewritable — A rewritable version of a CD. Data can be written to a CD-RW disc, and then erased and written over (rewritten).

CD-RW drive — A drive that can read CDs and write to CD-RW (rewritable CDs) and CD-R (recordable CDs) discs. You can write to CD-RW discs multiple times, but you can write to CD-R discs only once.

CD-RW/DVD drive — A drive, sometimes referred to as a combo drive, that can read CDs and DVDs and write to CD-RW (rewritable CDs) and CD-R (recordable CDs) discs. You can write to CD-RW discs multiple times, but you can write to CD-R discs only once.

clock speed — The speed, given in MHz, that indicates how fast computer components that are connected to the system bus operate.

COA — Certificate of Authenticity — The Windows alpha-numeric code located on a sticker on your computer. Also referred to as the *Product Key* or *Product ID*.

Control Panel — A Windows utility that allows you to modify operating system and hardware settings, such as display settings.

controller — A chip that controls the transfer of data between the processor and memory or between the processor and devices.

CRIMM — continuity rambus in-line memory module — A special module that has no memory chips and is used to fill unused RIMM slots.

cursor — The marker on a display or screen that shows where the next keyboard, touch pad, or mouse action will occur. It often is a blinking solid line, an underline character, or a small arrow.

D

DDR SDRAM — double-data-rate SDRAM — A type of SDRAM that doubles the data burst cycle, improving system performance.

DDR2 SDRAM — double-data-rate 2 SDRAM — A type of DDR SDRAM that uses a 4-bit prefetch and other architectural changes to boost memory speed to over 400 MHz.

device — Hardware such as a disk drive, printer, or keyboard that is installed in or connected to your computer.

device driver — See *driver*.

DIMM — dual in-line memory module — A circuit board with memory chips that connects to a memory module on the system board.

DIN connector — A round, six-pin connector that conforms to DIN (Deutsche Industrie-Norm) standards; it is typically used to connect PS/2 keyboard or mouse cable connectors.

disk striping — A technique for spreading data over multiple disk drives. Disk striping can speed up operations that retrieve data from disk storage. Computers that use disk striping generally allow the user to select the data unit size or stripe width.

DMA — direct memory access — A channel that allows certain types of data transfer between RAM and a device to bypass the processor.

docking device — See *APR*.

DMTF — Distributed Management Task Force — A consortium of hardware and software companies who develop management standards for distributed desktop, network, enterprise, and Internet environments.

domain — A group of computers, programs, and devices on a network that are administered as a unit with common rules and procedures for use by a specific group of users. A user logs on to the domain to gain access to the resources.

DRAM — dynamic random-access memory — Memory that stores information in integrated circuits containing capacitors.

driver — Software that allows the operating system to control a device such as a printer. Many devices do not work properly if the correct driver is not installed in the computer.

DSL — Digital Subscriber Line — A technology that provides a constant, high-speed Internet connection through an analog telephone line.

dual-core — A technology in which two physical computational units exist inside a single processor package, thereby increasing computing efficiency and multi-tasking ability.

dual display mode — A display setting that allows you to use a second monitor as an extension of your display. Also referred to as *extended display mode*.

DVD-R — DVD recordable — A recordable version of a DVD. Data can be recorded only once onto a DVD-R. Once recorded, the data cannot be erased or written over.

DVD+RW — DVD rewritable — A rewritable version of a DVD. Data can be written to a DVD+RW disc, and then erased and written over (rewritten). (DVD+RW technology is different from DVD-RW technology.)

DVD+RW drive — drive that can read DVDs and most CD media and write to DVD+RW (rewritable DVDs) discs.

DVI — digital video interface — A standard for digital transmission between a computer and a digital video display.

E

ECC — error checking and correction — A type of memory that includes special circuitry for testing the accuracy of data as it passes in and out of memory.

ECP — extended capabilities port — A parallel connector design that provides improved bidirectional data transmission. Similar to EPP, ECP uses direct memory access to transfer data and often improves performance.

EIDE — enhanced integrated device electronics — An improved version of the IDE interface for hard drives and CD drives.

EMI — electromagnetic interference — Electrical interference caused by electromagnetic radiation.

ENERGY STAR® — Environmental Protection Agency requirements that decrease the overall consumption of electricity.

EPP — enhanced parallel port — A parallel connector design that provides bidirectional data transmission.

ESD — electrostatic discharge — A rapid discharge of static electricity. ESD can damage integrated circuits found in computer and communications equipment.

expansion card — A circuit board that installs in an expansion slot on the system board in some computers, expanding the capabilities of the computer. Examples include video, modem, and sound cards.

expansion slot — A connector on the system board (in some computers) where you insert an expansion card, connecting it to the system bus.

ExpressCard — A removable I/O card adhering to the PCMCIA standard. Modems and network adapters are common types of ExpressCards. ExpressCards support both the PCI Express and USB 2.0 standard.

Express Service Code — A numeric code located on a sticker on your Dell™ computer. Use the Express Service Code when contacting Dell for assistance. Express Service Code service may not be available in some countries.

extended display mode — A display setting that allows you to use a second monitor as an extension of your display. Also referred to as *dual display mode*.

extended PC Card — A PC Card that extends beyond the edge of the PC Card slot when installed.

F

Fahrenheit — A temperature measurement scale where 32° is the freezing point and 212° is the boiling point of water.

FBD — fully-buffered DIMM — A DIMM with DDR2 DRAM chips and an Advanced Memory Buffer (AMB) that speeds communication between the DDR2 SDRAM chips and the system.

FCC — Federal Communications Commission — A U.S. agency responsible for enforcing communications-related regulations that state how much radiation computers and other electronic equipment can emit.

fingerprint reader — A strip sensor that uses your unique fingerprint to authenticate your user identity to help secure your computer.

folder — A term used to describe space on a disk or drive where files are organized and grouped. Files in a folder can be viewed and ordered in various ways, such as alphabetically, by date, and by size.

format — The process that prepares a drive or disk for file storage. When a drive or disk is formatted, the existing information on it is lost.

FSB — front side bus — The data path and physical interface between the processor and RAM.

FTP — file transfer protocol — A standard Internet protocol used to exchange files between computers connected to the Internet.

G

G — gravity — A measurement of weight and force.

GB — gigabyte — A measurement of data storage that equals 1024 MB (1,073,741,824 bytes). When used to refer to hard drive storage, the term is often rounded to 1,000,000,000 bytes.

GHz — gigahertz — A measurement of frequency that equals one thousand million Hz, or one thousand MHz. The speeds for computer processors, buses, and interfaces are often measured in GHz.

graphics mode — A video mode that can be defined as x horizontal pixels by y vertical pixels by z colors. Graphics modes can display an unlimited variety of shapes and fonts.

GUI — graphical user interface — Software that interacts with the user by means of menus, windows, and icons. Most programs that operate on the Windows operating systems are GUIs.

H

hard drive — A drive that reads and writes data on a hard disk. The terms hard drive and hard disk are often used interchangeably.

heat sink — A metal plate on some processors that helps dissipate heat.

hibernate mode — A power management mode that saves everything in memory to a reserved space on the hard drive and then turns off the computer. When you restart the computer, the memory information that was saved to the hard drive is automatically restored.

HTTP — hypertext transfer protocol — A protocol for exchanging files between computers connected to the Internet.

HyperTransport — HyperTransport is an AMD™ technology that can increase overall computer performance by removing bottlenecks, increasing system bandwidth, and reducing system latency.

Hz — hertz — A unit of frequency measurement that equals 1 cycle per second. Computers and electronic devices are often measured in kilohertz (kHz), megahertz (MHz), gigahertz (GHz), or terahertz (THz).

I

IC — integrated circuit — A semiconductor wafer, or chip, on which thousands or millions of tiny electronic components are fabricated for use in computer, audio, and video equipment.

IDE — integrated device electronics — An interface for mass storage devices in which the controller is integrated into the hard drive or CD drive.

IEEE 1394 — Institute of Electrical and Electronics Engineers, Inc. — A high-performance serial bus used to connect IEEE 1394-compatible devices, such as digital cameras and DVD players, to the computer.

infrared sensor — A port that allows you to transfer data between the computer and infrared-compatible devices without using a cable connection.

integrated — Usually refers to components that are physically located on the computer's system board. Also referred to as *built-in*.

I/O — input/output — An operation or device that enters and extracts data from your computer. Keyboards and printers are I/O devices.

I/O address — An address in RAM that is associated with a specific device (such as a serial connector, parallel connector, or expansion slot) and allows the processor to communicate with that device.

IrDA — Infrared Data Association — The organization that creates international standards for infrared communications.

IRQ — interrupt request — An electronic pathway assigned to a specific device so that the device can communicate with the processor. Each device connection must be assigned an IRQ. Although two devices can share the same IRQ assignment, you cannot operate both devices simultaneously.

ISP — Internet service provider — A company that allows you to access its host server to connect directly to the Internet, send and receive e-mail, and access websites. The ISP typically provides you with a software package, user name, and access phone numbers for a fee.

K

Kb — kilobit — A unit of data that equals 1024 bits. A measurement of the capacity of memory integrated circuits.

KB — kilobyte — A unit of data that equals 1024 bytes but is often referred to as 1000 bytes.

key combination — A command requiring you to press multiple keys at the same time.

kHz — kilohertz — A measurement of frequency that equals 1000 Hz.

L

LAN — local area network — A computer network covering a small area. A LAN usually is confined to a building or a few nearby buildings. A LAN can be connected to another LAN over any distance through telephone lines and radio waves to form a wide area network (WAN).

LCD — liquid crystal display — The technology used by portable computer and flat-panel displays.

LED — light-emitting diode — An electronic component that emits light to indicate the status of the computer.

local bus — A data bus that provides a fast throughput for devices to the processor.

LPT — line print terminal — The designation for a parallel connection to a printer or other parallel device.

M

Mb — megabit — A measurement of memory chip capacity that equals 1024 Kb.

Mbps — megabits per second — One million bits per second. This measurement is typically used for transmission speeds for networks and modems.

MB — megabyte — A measurement of data storage that equals 1,048,576 bytes. 1 MB equals 1024 KB. When used to refer to hard drive storage, the term is often rounded to 1,000,000 bytes.

MB/sec — megabytes per second — One million bytes per second. This measurement is typically used for data transfer ratings.

media bay — A bay that supports devices such as optical drives, a second battery, or a Dell TravelLite™ module.

memory — A temporary data storage area inside your computer. Because the data in memory is not permanent, it is

recommended that you frequently save your files while you are working on them, and always save your files before you shut down the computer. Your computer can contain several different forms of memory, such as RAM, ROM, and video memory. Frequently, the word memory is used as a synonym for RAM.

memory address — A specific location where data is temporarily stored in RAM.

memory mapping — The process by which the computer assigns memory addresses to physical locations at start-up. Devices and software can then identify information that the processor can access.

memory module — A small circuit board containing memory chips, which connects to the system board.

MHz — megahertz — A measure of frequency that equals 1 million cycles per second. The speeds for computer processors, buses, and interfaces are often measured in MHz.

Mini PCI — A standard for integrated peripheral devices with an emphasis on communications such as modems and NICs. A Mini PCI card is a small external card that is functionally equivalent to a standard PCI expansion card.

Mini-Card — A small card designed for integrated peripherals, such as communication NICs. The Mini-Card is functionally equivalent to a standard PCI expansion card.

modem — A device that allows your computer to communicate with other computers over analog telephone lines. Three types of modems include: external, PC Card, and internal. You typically use your modem to connect to the Internet and exchange e-mail.

module bay — See *media bay*.

MP — megapixel — A measure of image resolution used for digital cameras.

ms — millisecond — A measure of time that equals one thousandth of a second. Access times of storage devices are often measured in ms.

N

network adapter — A chip that provides network capabilities. A computer may include a network adapter on its system board, or it may contain a PC Card with an adapter on it. A network adapter is also referred to as a *NIC* (network interface controller).

NIC — See *network adapter*.

notification area — The section of the Windows taskbar that contains icons for providing quick access to programs and computer functions, such as the clock, volume control, and print status. Also referred to as *system tray*.

ns — nanosecond — A measure of time that equals one billionth of a second.

NVRAM — nonvolatile random access memory — A type of memory that stores data when the computer is turned off or loses its external power source. NVRAM is used for maintaining computer configuration information such as date, time, and other system setup options that you can set.

O

optical drive — A drive that uses optical technology to read or write data from CDs, DVDs, or DVD+RWs. Example of optical drives include CD drives, DVD drives, CD-RW drives, and CD-RW/DVD combo drives.

P

parallel connector — An I/O port often used to connect a parallel printer to your computer. Also referred to as an *LPT port*.

partition — A physical storage area on a hard drive that is assigned to one or more logical storage areas known as logical drives. Each partition can contain multiple logical drives.

PC Card — A removable I/O card adhering to the PCMCIA standard. Modems and network adapters are common types of PC Cards.

PCI — peripheral component interconnect — PCI is a local bus that supports 32-and 64-bit data paths, providing a high-speed data path between the processor and devices such as video, drives, and networks.

PCI Express — A modification to the PCI interface that boosts the data transfer rate between the processor and the devices attached to it. PCI Express can transfer data at speeds from 250 MB/sec to 4 GB/sec. If the PCI Express chip set and the device are capable of different speeds, they will operate at the slower speed.

PCMCIA — Personal Computer Memory Card International Association — The organization that establishes standards for PC Cards.

PIO — programmed input/output — A method of transferring data between two devices through the processor as part of the data path.

pixel — A single point on a display screen. Pixels are arranged in rows and columns to create an image. A video resolution, such as 800 x 600, is expressed as the number of pixels across by the number of pixels up and down.

Plug-and-Play — The ability of the computer to automatically configure devices. Plug and Play provides automatic installation, configuration, and compatibility with existing hardware if the BIOS, operating system, and all devices are Plug and Play compliant.

POST — power-on self-test — Diagnostics programs, loaded automatically by the BIOS, that perform basic tests on the major computer components, such as memory, hard drives, and video. If no problems are detected during POST, the computer continues the start-up.

processor — A computer chip that interprets and executes program instructions. Sometimes the processor is referred to as the CPU (central processing unit).

PS/2 — personal system/2 — A type of connector for attaching a PS/2-compatible keyboard, mouse, or keypad.

PXE — pre-boot execution environment — A WfM (Wired for Management) standard that allows networked computers that do not have an operating system to be configured and started remotely.

R

RAID — redundant array of independent disks — A method of providing data redundancy. Some common implementations of RAID include RAID 0, RAID 1, RAID 5, RAID 10, and RAID 50.

RAM — random-access memory — The primary temporary storage area for program instructions and data. Any information stored in RAM is lost when you shut down your computer.

readme file — A text file included with a software package or hardware product. Typically, readme files provide installation information and describe new product enhancements or corrections that have not yet been documented.

read-only — Data and/or files you can view but cannot edit or delete. A file can have read-only status if:

- It resides on a physically write-protected floppy disk, CD, or DVD.

- It is located on a network in a directory and the system administrator has assigned rights only to specific individuals.

refresh rate — The frequency, measured in Hz, at which your screen's horizontal lines are recharged (sometimes also referred to as its *vertical frequency*). The higher the refresh rate, the less video flicker can be seen by the human eye.

resolution — The sharpness and clarity of an image produced by a printer or displayed on a monitor. The higher the resolution, the sharper the image.

RFI — radio frequency interference — Interference that is generated at typical radio frequencies, in the range of 10 kHz to 100,000 MHz. Radio frequencies are at the lower end of the electromagnetic frequency spectrum and are more likely to have interference than the higher frequency radiations, such as infrared and light.

ROM — read-only memory — Memory that stores data and programs that cannot be deleted or written to by the computer. ROM, unlike RAM, retains its contents after you shut down your computer. Some programs essential to the operation of your computer reside in ROM.

RPM — revolutions per minute — The number of rotations that occur per minute. Hard drive speed is often measured in rpm.

RTC — real time clock — Battery-powered clock on the system board that keeps the date and time after you shut down the computer.

RTCST — real-time clock reset — A jumper on the system board of some computers that can often be used for troubleshooting problems.

S

SAS — serial attached SCSI — A faster, serial version of the SCSI interface (as opposed to the original SCSI parallel architecture).

SATA — serial ATA — A faster, serial version of the ATA (IDE) interface.

ScanDisk — A Microsoft utility that checks files, folders, and the hard disk's surface for errors. ScanDisk often runs when you restart the computer after it has stopped responding.

SCSI — small computer system interface — A high-speed interface used to connect devices to a computer, such as hard drives, CD drives, printers, and scanners. The SCSI can connect many devices using a single controller. Each device is accessed by an individual identification number on the SCSI controller bus.

SDRAM — synchronous dynamic random-access memory — A type of DRAM that is synchronized with the optimal clock speed of the processor.

serial connector — An I/O port often used to connect devices such as a handheld digital device or digital camera to your computer.

Service Tag — A bar code label on your computer that identifies your computer when you access Dell Support at support.dell.com or when you call Dell for customer service or technical support.

setup program — A program that is used to install and configure hardware and software. The **setup.exe** or **install.exe** program comes with most Windows software packages. *Setup program* differs from *system setup*.

shortcut — An icon that provides quick access to frequently used programs, files, folders, and drives. When you place a shortcut on your Windows desktop and double-click the icon, you can open its corresponding folder or file without having to find it first. Shortcut icons do not change the location of files. If you delete a shortcut, the original file is not affected. Also, you can rename a shortcut icon.

SIM — Subscriber Identity Module — A SIM card contains a microchip that encrypts voice and data transmissions. SIM

cards can be used in phones or portable computers.

smart card — A card that is embedded with a processor and a memory chip. Smart cards can be used to authenticate a user on computers equipped for smart cards.

S/PDIF — Sony/Philips Digital Interface — An audio transfer file format that allows the transfer of audio from one file to another without converting it to and from an analog format, which could degrade the quality of the file.

standby mode — A power management mode that shuts down all unnecessary computer operations to save energy.

Strike Zone™ — Reinforced area of the platform base that protects the hard drive by acting as a dampening device when a computer experiences resonating shock or is dropped (whether the computer is on or off).

surge protectors — Prevent voltage spikes, such as those that may occur during an electrical storm, from entering the computer through the electrical outlet. Surge protectors do not protect against lightning strikes or against brownouts, which occur when the voltage drops more than 20 percent below the normal AC-line voltage level.

Network connections cannot be protected by surge protectors. Always disconnect the network cable from the network connector during electrical storms.

SVGA — super-video graphics array — A video standard for video cards and controllers. Typical SVGA resolutions are 800 x 600 and 1024 x 768.

The number of colors and resolution that a program displays depends on the capabilities of the monitor, the video controller and its drivers, and the amount of video memory installed in the computer.

S-video TV-out — A connector used to attach a TV or digital audio device to the computer.

SXGA — super-extended graphics array — A video standard for video cards and controllers that supports resolutions up to 1280 x 1024.

SXGA+ — super-extended graphics array plus — A video standard for video cards and controllers that supports resolutions up to 1400 x 1050.

system board — The main circuit board in your computer. Also known as the *motherboard*.

system setup — A utility that serves as an interface between the computer hardware and the operating system. System setup allows you to configure user-selectable options in the BIOS, such as date and time or system password. Unless you understand what effect the settings have on the computer, do not change the settings for this program.

T

TAPI — telephony application programming interface — Enables Windows programs to operate with a wide variety of telephony devices, including voice, data, fax, and video.

text editor — A program used to create and edit files that contain only text; for example, Windows Notepad uses a text editor. Text editors do not usually provide word wrap or formatting functionality (the option to underline, change fonts, and so on).

TPM — trusted platform module — A hardware-based security feature that when combined with security software enhances network and computer security by enabling features such as file and e-mail protection.

travel module — A plastic device designed to fit inside the module bay of a portable computer to reduce the weight of the computer.

U

UMA — unified memory allocation — System memory dynamically allocated to video.

UPS — uninterruptible power supply — A backup power source used when the electrical power fails or drops to an unacceptable voltage level. A UPS keeps a computer running for a limited amount of time when there is no electrical power. UPS systems typically provide surge suppression and may also provide voltage regulation. Small UPS systems provide battery power for a few minutes to enable you to shut down your computer.

USB — universal serial bus — A hardware interface for a low-speed device such as a USB-compatible keyboard, mouse, joystick, scanner, set of speakers, printer, broadband devices (DSL and cable modems), imaging devices, or storage devices. Devices are plugged directly in to a 4-pin socket on your computer or in to a multi-port hub that plugs in to your computer. USB devices can be connected and disconnected while the computer is turned on, and they can also be daisy-chained together.

UTP — unshielded twisted pair — Describes a type of cable used in most telephone networks and some computer networks. Pairs of unshielded wires are twisted to protect against electromagnetic interference, rather than relying on a metal sheath around each pair of wires to protect against interference.

UXGA — ultra extended graphics array — A video standard for video cards and controllers that supports resolutions up to 1600 x 1200.

V

video controller — The circuitry on a video card or on the system board (in computers with an integrated video controller) that provides the video capabilities—in combination with the monitor—for your computer.

video memory — Memory that consists of memory chips dedicated to video functions. Video memory is usually faster than system memory. The amount of video memory installed primarily influences the number of colors that a program can display.

video mode — A mode that describes how text and graphics are displayed on a monitor. Graphics-based software, such as Windows operating systems, displays in video modes that can be defined as x horizontal pixels by y vertical pixels by z colors. Character-based software, such as text editors, displays in video modes that can be defined as x columns by y rows of characters.

video resolution — See *resolution*.

virus — A program that is designed to inconvenience you or to destroy data stored on your computer. A virus program moves from one computer to another through an infected disk, software downloaded from the Internet, or e-mail attachments. When an infected program starts, its embedded virus also starts.

A common type of virus is a boot virus, which is stored in the boot sectors of a floppy disk. If the floppy disk is left in the drive when the computer is shut down and then turned on, the computer is infected when it reads the boot sectors of the floppy disk expecting to find the operating system. If the computer is infected, the boot virus may replicate itself onto all the floppy disks that are read or written in that computer until the virus is eradicated.

V — volt — The measurement of electric potential or electromotive force. One V appears across a resistance of 1 ohm when a current of 1 ampere flows through that resistance.

W

W — watt — The measurement of electrical power. One W is 1 ampere of current flowing at 1 volt.

Whr — watt-hour — A unit of measure commonly used to indicate the approximate capacity of a battery. For example, a 66-Whr battery can supply 66 W of power for 1 hour or 33 W for 2 hours.

wallpaper — The background pattern or picture on the Windows desktop. Change your wallpaper through the Windows Control Panel. You can also scan in your favorite picture and make it wallpaper.

WLAN — wireless local area network. A series of interconnected computers that communicate with each other over the air waves using access points or wireless routers to provide Internet access.

write-protected — Files or media that cannot be changed. Use write-protection when you want to protect data from being changed or destroyed. To write-protect a 3.5-inch floppy disk, slide its write-protect tab to the open position.

WWAN — wireless wide area network. A wireless high-speed data network using cellular technology and covering a much larger geographic area than WLAN.

WXGA — wide-aspect extended graphics array — A video standard for video cards and controllers that supports resolutions up to 1280 x 800.

X

XGA — extended graphics array — A video standard for video cards and controllers that supports resolutions up to 1024 x 768.

Z

ZIF — zero insertion force — A type of socket or connector that allows a computer chip to be installed or removed with no stress applied to either the chip or its socket.

Zip — A popular data compression format. Files that have been compressed with the Zip format are called Zip files and usually have a filename extension of **.zip**. A special kind of zipped file is a self-extracting file, which has a filename extension of **.exe**. You can unzip a self-extracting file by double-clicking it.

Zip drive — A high-capacity floppy drive developed by Iomega Corporation that uses 3.5-inch removable disks called Zip disks. Zip disks are slightly larger than regular floppy disks, about twice as thick, and hold up to 100 MB of data.