Dell™ OptiPlex™ 330 User's Guide

Model DCSM and DCNE

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.

Abbreviations and Acronyms

For a complete list of abbreviations and acronyms, see the "Glossary" on page 271.

If you purchased a Dell™ n Series computer, any references in this document to Microsoft® Windows® operating systems are not applicable.

Model DCSM and DCNE

September 2007 P/N RW281 Rev. A00

Contents

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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?	Find It Here
• A diagnostic program for my computer • Drivers for my computer • Desktop System Software (DSS)	**Drivers and Utilities Media** **NOTE:** The *Drivers and Utilities* media may be optional and may not ship with your computer. Drivers are already installed on your computer. You can use the media to reinstall drivers (see "Reinstalling Drivers and Utilities" on page 134), to run the Dell Diagnostics (see "Dell Diagnostics" on page 111). 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?	Find It Here
• Basic troubleshooting information • How to run the Dell Diagnostics • Tools and utilities • How to set up a printer	**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**.
• Warranty information • Terms and Conditions (U.S. only) • Safety instructions • Regulatory information • Ergonomics information • End User License Agreement	**Dell™ Product Information Guide** 
• How to remove and replace parts • Specifications • How to configure system settings • How to troubleshoot and solve problems	**Dell OptiPlex™ 330 User's Guide** *Microsoft Windows Help and Support Center* 1 Click the Windows Vista **start button**→ **Help and Support**→ **Dell User and System Guides**→ **System Guides**. 2 Click the *User's Guide* for your computer.

What Are You Looking For?	Find It Here
• Service Tag and Express Service Code • Microsoft Windows License Label	**Service Tag and Microsoft® Windows® License** These labels are located on your computer. • 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.  **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?	Find It Here
• Solutions — Troubleshooting hints and tips, articles from technicians, and online courses, 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	**Dell Support Website — support.dell.com** **NOTE:** Select your region or business segment to view the appropriate support site.
• 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 processors, optical drives, USB devices, and so on. 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.	To download Desktop System Software: **1** Go to **support.dell.com**, select your region or business segment, and enter your Service Tag. **2** Select **Drivers & Downloads** and click **Go**. **3** Click your operating system and search for the keyword *Desktop System Software*. **NOTE:** The **support.dell.com** user interface may vary depending on your selections.

What Are You Looking For?	Find It Here
• How to use Windows Vista™ • How to work with programs and files • How to personalize my desktop	**Windows Help and Support Center** **1** Click the Windows Vista start button → **Help and Support**. **2** Type a word or phrase that describes your problem and click the arrow icon. **3** Click the topic that describes your problem. **4** Follow the instructions on the screen.
• How to reinstall my operating system	**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* disc. See "Restoring Your Operating System" on page 137. 

What Are You Looking For?	Find It Here
	After you reinstall your operating system, use the *Drivers and Utilities* disc 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 disc varies based on the operating system you ordered.

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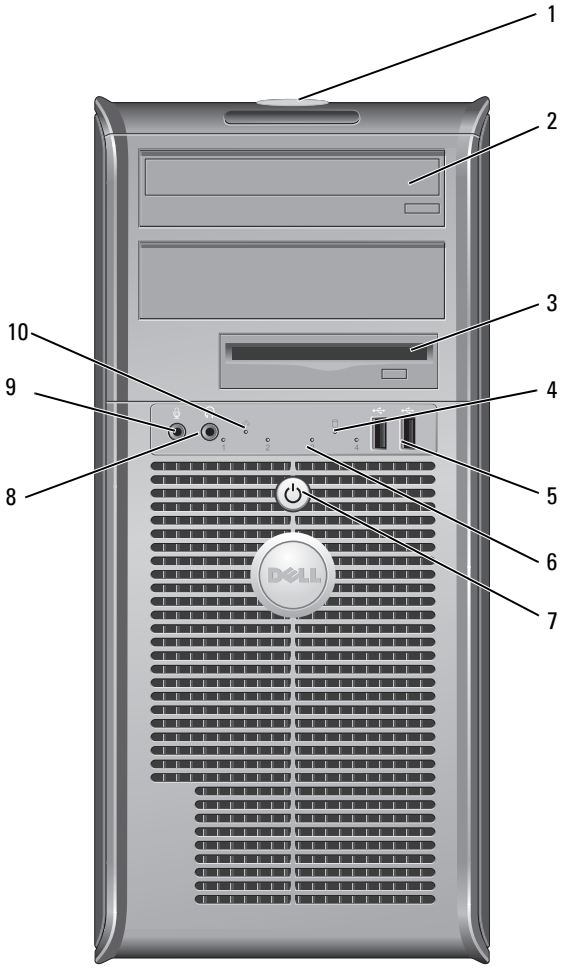
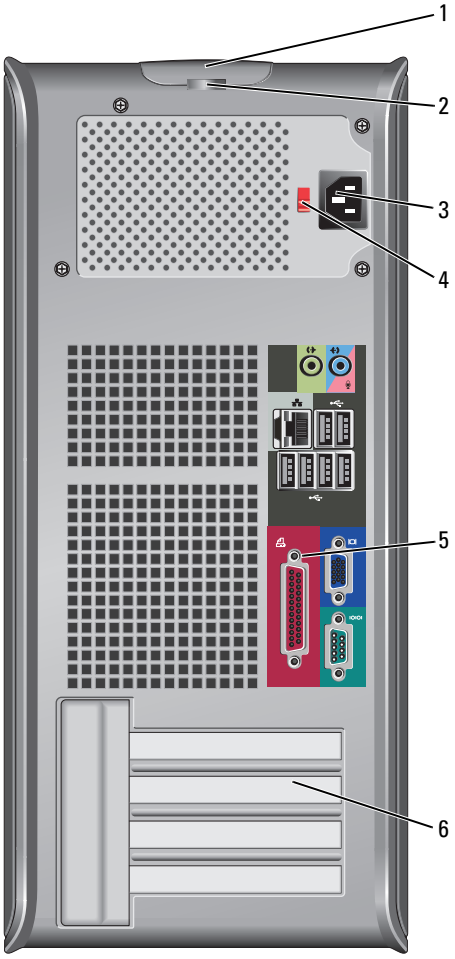
Mini Tower Computer Views

Front View



1	Service Tag	Use the Service Tag to identify your computer when you access the Dell Support website or call Support.
2	optical drive	Use the optical drive to play a CD/DVD.
3	floppy drive	The floppy drive is optional.
4	drive activity light	The drive activity light is on when the computer reads data from or writes data to the hard drive. The light might also be on when a device such as an optical drive is operating.
5	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 Options" on page 80 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.
6	diagnostic lights	Use these lights to help you troubleshoot a computer problem based on the diagnostic code. For more information, see "Diagnostic Lights" on page 106.
7	power button, power light	Press the power button to turn on the computer. The light in the center of this button indicates power state. **NOTICE:** To avoid losing data, do not use the power button to turn off the computer. Instead, perform an operating system shutdown.
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 personal computer microphone. On computers with a sound card, the microphone connector is on the card.
10	LAN indicator light	This light indicates that a LAN (local area network) connection is established.

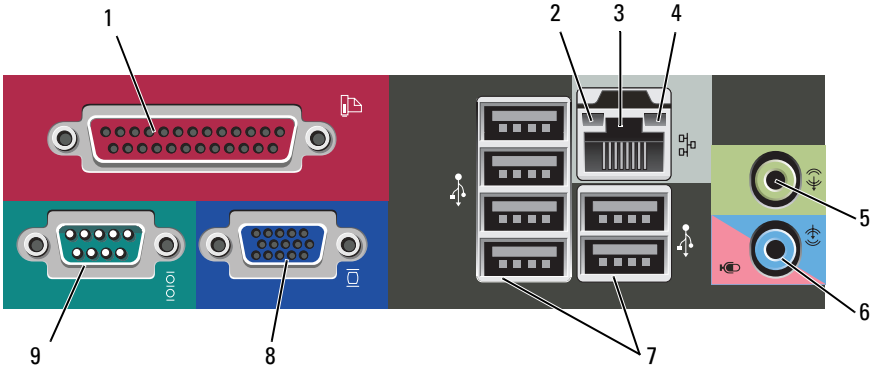
Back View



1	cover release latch	This latch allows you to open the computer cover.
2	padlock rings	Padlock rings are for attaching a commercially available antitheft device. The padlock rings allow you to secure the computer cover to the chassis with a padlock to prevent unauthorized access to the inside of the computer. To use the padlock rings, insert a commercially available padlock through the rings, and then lock the padlock.
3	power connector	Insert the power cable.
4	voltage selector switch	For selecting voltage rating.
5	back panel connectors	Plug USB, audio, and other devices into the appropriate connector (see "Back Panel Connectors" on page 24 for more information.
6	card slots	Access connectors for any installed PCI and PCI Express cards.

CAUTION: Ensure that none of the system air vents are blocked. Blocking them would cause serious thermal problems.

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 80.
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 (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 adapter 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	This light flashes yellow 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	microphone/line-in connector	Use the blue and pink line-in connector to attach a record/playback device such as a cassette player, CD player, or VCR; or a personal computer microphone.
7	USB 2.0 connectors (6)	Use the back USB connectors for devices that typically remain connected, such as printers and keyboards. It is recommended that you use the front USB connectors for devices that you connect occasionally, such as joysticks or cameras.
8	VGA video connector	Connect the monitor's VGA cable to the VGA connector on the computer. On computers with a video card, use the connector on the card.
9	serial connector	Connect a serial device, such as a handheld device, to the serial port. The default designation is COM1 for serial connector 1. For more information, see "System Setup Options" on page 80.

Mini Tower Specifications

NOTE: Offerings may vary by region. For more information regarding the configuration of your computer, click **Start→ Help and Support** and select the option to view information about your computer.

Processor	
Processor type	Intel® Core™ 2 Duo Intel® Pentium® Dual Core Intel® Celeron®
Internal cache	up to 6 MB
Front Side Bus frequency	800 MHz and 1066 MHz

System Information	
Chipset	Intel® G31 Express Chipset w/ICH7R
Data bus width	64 bits
Address bus width	36 bits
DMA channels	eight
Interrupt levels	24
BIOS chip (NVRAM)	8 MB
NIC	integrated network interface with ASF 1.03 and 2.0 support as defined by DMTF Capable of 10/100/1000 communication

Memory	
Type	667 or 800 MHz DDR2 SDRAM
Memory connectors	2
Memory modules supported	512-MB, 1-GB, or 2-GB non-ECC
Minimum memory	dual-channel: 1 GB single-channel: 512 MB **NOTE:** 512 MB is the minimum shipping configuration.

Memory *(continued)*	
Maximum memory	4 GB **NOTE:** When using 4 GB of memory, the Microsoft® Windows® Operating Systems may report less memory in the system than is physically installed in the DIMM slots.
BIOS address	F0000h

Ports and Connectors	
External connectors:	
Serial	9-pin connector; 16550C-compatible
Parallel	25-pin connector (bidirectional)
Video	15-pin VGA connector
Network adapter	RJ45 connector
Optional PS/2 with secondary serial port adapter	two 6-pin mini-DINs
USB	two front-panel and six back panel USB 2.0–compliant connectors
Audio	two connectors for line-in/microphone and line-out; two front-panel connectors for headphones and microphone
System board connectors:	
SATA	four 7-pin connectors
Floppy drive	34-pin connector
Fan	5-pin connector
PCI 2.3	two 120-pin connectors
PCI Express	one 164-pin (x16) connector
Front Panel	40-pin connector

Power	
DC power supply:	**NOTE:** Power consumption from an AC power source can be zero when the computer is unplugged from that power source. However, the system draws a minute amount of power from the internal coin cell battery even when the computer is not drawing power from the AC power source.
Wattage	305 W
Heat dissipation	1041 BTU/hr **NOTE:** Heat dissipation is calculated based upon the power supply rating.
Voltage	manual selection power supplies—90 to 135 V at 60 Hz; 180 to 265 V at 50 Hz
Backup battery	3-V CR2032 lithium coin cell

Controls and Lights	
Power control	push button
Power light	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 124.)
hard drive access light	green
Link light (on front of chassis)	solid green light indicates network connection
Link integrity light (on integrated network adapter)	• green light = 10 Mbps • orange light = 100 Mbps • yellow light = 1000 Mbps (1 Gbs)
Activity light (on integrated network adapter)	yellow blinking light

Controls and Lights	
Diagnostic lights	four lights on the front panel (See "Diagnostic Lights" on page 106.)
Standby power light	AUX_PWR on the system board

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: 8 GB/s bidirectional speed SATA: 1.5 Gbps and 3.0 Gbps USB: 480 Mbps
Cards:	full-height cards supported
PCI:	
connectors	two
connector size	two 120 pin connectors
connector data width (maximum)	32 bits
PCI Express:	
connectors	one x16
power	25 W (x16) maximum
connector size	164 pins (x16)
connector data width (maximum)	16 PCI Express lanes (x16)

Communications	
Network adapter	10/100/1000 Ethernet LAN on system board

Drives	
Externally accessible	• one 3.5-inch drive • two 5.25-inch drive bays
Available devices	• hard drive, DVD+/-RW drive, DVD-ROM, CD-RW drive, floppy drive
Internally accessible	• two bays for 1-inch-high hard drives

Video	
Type	• Intel G31 (integrated on system board) • PCI Express x16 slot can support either a PCI Express graphics card or a DVI graphics card (for dual-monitor support)

Audio	
Type	ADI 1984 High Definition Audio

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	5 to 350 Hz at 0.0002 G^2/Hz

Environmental *(continued)*	
Storage	5 to 500 Hz at 0.001 to 0.01 G^2/Hz
Maximum shock:	
Operating	40 G +/- 5% with pulse duration of 2 msec +/- 10% (equivalent to 51 cm/sec [20 in/sec])
Storage	105 G +/- 5% with pulse duration of 2 msec +/- 10% (equivalent to 127 cm/sec [50 in/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)

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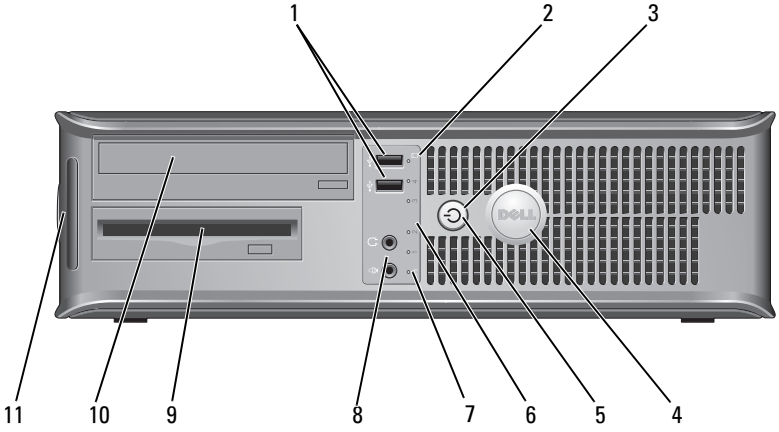
Desktop Computer Views

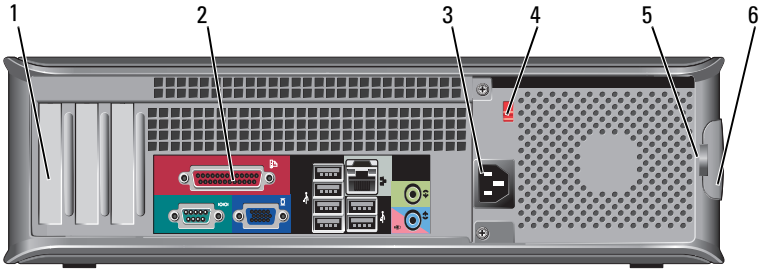
Front View



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 Options" on page 80 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.
2	drive activity light	The drive activity light is on when the computer reads data from or writes data to the hard drive. The light might also be on when a device such as an optical drive is operating.
3	power button, power light	Press the power button to turn on the computer. The light in the center of this button indicates power state. **NOTICE:** To avoid losing data, do not use the power button to turn off the computer. Instead, perform an operating system shutdown.

4	Dell badge	This badge can be rotated to match the orientation of your computer. To rotate the badge, place your 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	The power light illuminates and blinks or remains solid to indicate different operating states: • 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 124. 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 66. See "Diagnostic Lights" on page 106 for a description of light codes that can help you troubleshoot problems with your computer.
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 106.
7	LAN indicator light	This light indicates that a LAN (local area network) connection is established.
8	headphone and microphone connectors	Use the microphone connector to attach a personal computer microphone. On computers with a sound card, the microphone connector is on the card. Use the headphone connector to attach headphones and most kinds of speakers.
9	floppy drive	The floppy drive is optional.
10	optical drive	Use the optical drive to play a CD/DVD.
11	Service Tag	Use the Service Tag to identify your computer when you access the Dell Support website or call Support.

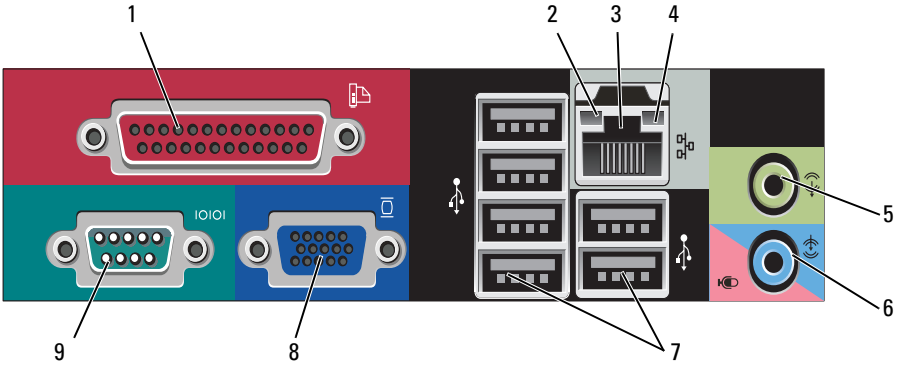
Back View



1	card slots	Access connectors for any installed PCI and PCI Express cards.
2	back panel connectors	Plug USB, audio, and other devices into the appropriate connector (see "Back Panel Connectors" on page 36 for more information).
3	power connector	Insert the power cable.
4	voltage selector switch	For selecting voltage rating.
5	padlock rings	Padlock rings are for attaching a commercially available antitheft device. The padlock rings allow you to secure the computer cover to the chassis with a padlock to prevent unauthorized access to the inside of the computer. To use the padlock rings, insert a commercially available padlock through the rings, and then lock the padlock.
6	cover release latch	Use this latch to open the computer cover.

CAUTION: Ensure that none of the system air vents are blocked. Blocking them would cause serious thermal problems.

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 80.
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 (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 adapter 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	This light flashes yellow 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	microphone/line-in connector	Use the blue line-in connector to attach a record/playback device such as a cassette player, CD player, or VCR. Use the pink microphone connector to attach a personal computer microphone. On computers with a sound card, use the connector on the card.
7	USB 2.0 connectors (6)	Use the back USB connectors for devices that typically remain connected, such as printers and keyboards. It is recommended that you use the front USB connectors for devices that you connect occasionally, such as joysticks or cameras.

8	VGA video connector	Connect the monitor's VGA cable to the VGA connector on the computer. On computers with a video card, use the connector on the card.
9	serial connector	Connect a serial device, such as a handheld device, to the serial port. The default designation is COM1 for serial connector 1. For more information, see "System Setup Options" on page 80.

Desktop Computer Specifications

NOTE: Offerings may vary by region. For more information regarding the configuration of your computer, click **Start→ Help and Support** and select the option to view information about your computer.

Processor	
Processor type	• Intel Core 2 Duo • Intel Pentium® • Intel Celeron®
Internal cache	Up to 6 MB
External bus frequency	800 MHz and 1066 MHz

System Information	
Chipset	Intel G31 Chipset w/ICH7R
Data bus width	64 bits
Address bus width	36 bits
DMA channels	eight
Interrupt levels	24
BIOS chip (NVRAM)	8 MB
NIC	integrated network interface with ASF 1.03 and 2.0 support as defined by DMTF Capable of 10/100/1000 communication

Memory	
Type	667 or 800 MHz DDR2 SDRAM
Memory connectors	2
Memory modules supported	512 MB, 1 GB, or 2 GB non-ECC
Minimum memory	dual-channel: 1 GB single-channel: 512 MB **NOTE:** 512 MB is the minimum shipping configuration.

Memory *(continued)*	
Maximum memory	4 GB **NOTE:** When using 4 GB of memory, the Microsoft® Windows® Operating Systems may report less memory in the system than is physically installed in the DIMM slots.

Ports and Connectors	
External connectors:	
Serial	9-pin connector; 16550C-compatible
Parallel	25-pin connector (bidirectional)
Video	15-pin VGA connector
Network adapter	RJ45 connector
Optional PS/2 with secondary serial port adapter	two 6-pin mini-DINs
USB	two front-panel and six back panel USB 2.0–compliant connectors
Audio	two connectors for line-in/microphone and line-out; two front-panel connectors for headphones and microphone
System board connectors:	
SATA	four 7-pin connectors
Floppy drive	34-pin connector
Fan	5-pin connector
PCI 2.3	two 120-pin connectors
PCI Express	one 164-pin (x16) connector
Front Panel	40-pin connector

Power	
DC power supply:	**NOTE:** Power consumption from an AC power source can be zero when the computer is unplugged from that power source, but the internal battery does draw a minute amount of power from the power supply even when the computer is not drawing power from the AC power source.
Wattage	280 W
Heat dissipation	955 BTU/hr **NOTE:** Heat dissipation is calculated based upon the power supply rating.
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

Controls and Lights	
Power control	push button
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 124.)
hard drive access light	green
Link light	solid green light indicates network connection
Link integrity light (on integrated network adapter)	• green light = 10 Mbps • orange light = 100 Mbps • yellow light = 1000 Mbps (1 Gbs)
Activity light (on integrated network adapter)	yellow blinking light

Controls and Lights	
Diagnostic lights	four lights on the front panel (See "Diagnostic Lights" on page 106.)
Standby power light	AUX_PWR on the system board
Communications	
Network adapter	10/100/1000 Ethernet LAN on system board

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: 8 GB/s bidirectional speed SATA: 1.5 Gbps and 3.0 Gbps USB: 480 Mbps
Cards	standard configuration supports low-profile cards only; with optional riser-card cage, computer supports half-length, full-height cards. Full-height cards are supported in the 6.875-inch riser card cage.
PCI: without riser-card cage	
connectors	two
card size	low profile
connector size	120 pins
connector data width (maximum)	32 bits
PCI Express: without riser-card cage	
connectors	one x16
card size	low profile
power	25 W (maximum)

Expansion Bus	
connector size	164 pins (x16)
connector data width (maximum)	16 PCI Express lanes (x16)
PCI and PCI Express: with optional, full-height PCI Express riser-card cage, supporting both low-profile and full-height cards	
PCI	
connectors	two
card size	one low-profile card and one full-height card
connector size	120 pins
connector data width (maximum)	32 bits
PCI Express	
connectors	one x16
card size	full-height
power	25 W maximum
connector size	164 pins (x16)
connector data width (maximum)	16 PCI Express lanes (x16)
PCI only: with optional, full-height PCI riser-card cage, supporting both low-profile and full-height cards	
connectors	three PCI
card size	one low-profile card and two full-height cards
connector size	120 pins
connector data width (maximum)	32 bits

Drives	
Externally accessible	• one 3.5-inch drive • one bay for CD/DVD or optional second hard drive
Available devices	• hard drive, DVD+/-RW drive, DVD-ROM, CD-RW drive, Floppy drive
Internally accessible	• one bay for 5.25-inch (1-inch-high) hard drive

Video	
Type	• Intel G31 (integrated on system board) • PCI Express x16 slot can support either a PCI Express graphics card or a DVI graphics card (for dual-monitor support)

Audio	
Type	ADI 1984 High Definition Audio
Stereo conversion	24-bit analog-to-digital; 24-bit digital-to-analog

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 pounds)

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)

Environmental *(continued)*	
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	40 G +/- 5% with pulse duration of 2 msec +/- 10% (equivalent to 51 cm/sec [20 in/sec])
Storage	105 G +/- 5% with pulse duration of 2 msec +/- 10% (equivalent to 127 cm/sec [50 in/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)

4

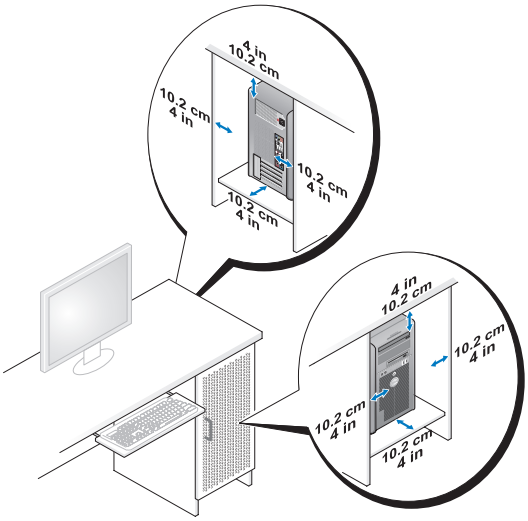
Setting Up Your Computer

Installing Your Computer in an Enclosure

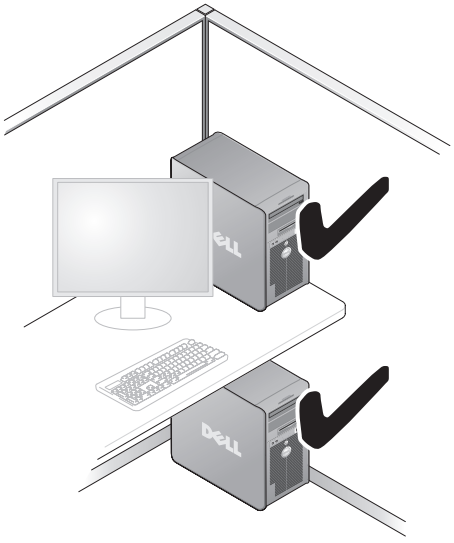
Installing your computer in an enclosure can restrict the airflow and impact your computer's performance, possibly causing it to overheat. Follow the guidelines below when installing your computer in an enclosure:

NOTICE: The operating temperature specifications indicated in this manual reflect the maximum ambient operating temperature. The room ambient temperature needs to be a consideration when installing your computer in an enclosure. For example, if the ambient room temperature is at 25°C (77°F), depending on your computer's specifications, you only have 5° to 10°C (9° to 18°F) temperature margin before you reach your computer's maximum operating temperature. For details about your computer's specifications, see "Desktop Computer Specifications" on page 39 or "Mini Tower Specifications" on page 27.

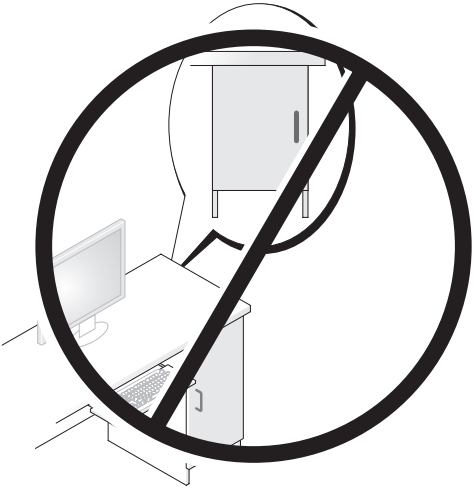
- Leave a 10.2 cm (4 in) minimum clearance on all vented sides of the computer to permit the airflow required for proper ventilation.
- If your enclosure has doors, they need to be of a type that allows at least 30 percent airflow through the enclosure (front and back).



- If your computer is installed in a corner on a desk or under a desk, leave at least 5.1 cm (2 in) clearance from the back of the computer to the wall to permit the airflow required for proper ventilation.



NOTICE: Do not install your computer in an enclosure that does not allow airflow. Restricting the airflow impacts your computer's performance, possibly causing it to overheat.



Setting Up a Home and Office Network

Connecting to a Network Adapter

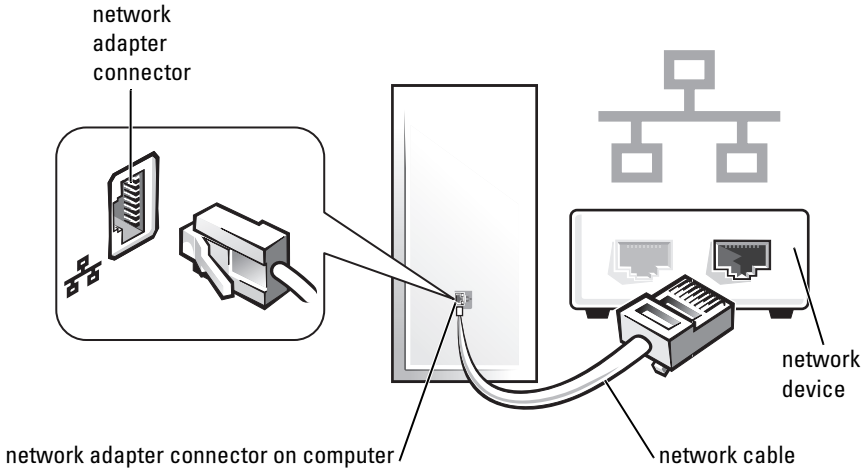
To connect a network cable:

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.



Network Setup

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.

Windows Vista

To make changes to your network setup in Microsoft® Windows Vista™:

1. Click the Windows Vista Start button,  , and then click **Network→ Network and Sharing Center.**
2. Click **Set up a connection or network**.
3. Select the type of network connection you want to make and follow the instructions on the screen.
4. When finished, close the Network and Sharing Center.

Connecting to the Internet

NOTE: ISPs and ISP offerings vary by country.

To connect to the Internet, you need a modem or network connection and an Internet service provider (ISP). Your ISP will offer one or more of the following Internet connection options:

- DSL connections that provide high-speed Internet access through your existing telephone line or cellular telephone service. With a DSL connection, you can access the Internet and use your telephone on the same line simultaneously.
- Cable modem connections that provide high-speed Internet access through your local cable TV line.
- Satellite modem connections that provide high-speed Internet access through a satellite television system.
- Dial-up connections that provide Internet access through a telephone line. Dial-up connections are considerably slower than DSL and cable (or satellite) modem connections.
- Wireless LAN connections that provide Internet access using Bluetooth® wireless technology.

If you are using a dial-up connection, connect a telephone line to the modem connector on your computer and to the telephone wall jack before you set up your Internet connection. If you are using a DSL or cable/satellite modem connection, contact your ISP or cellular telephone service for setup instructions.

Setting Up Your Internet Connection

To set up an Internet connection with a provided ISP desktop shortcut:

1 Save and close any open files, and exit any open programs.

2 Double-click the ISP icon on the Microsoft® Windows® desktop.

3 Follow the instructions on the screen to complete the setup.

If you do not have an ISP icon on your desktop or if you want to set up an Internet connection with a different ISP, perform the steps in the following section that corresponds to the operating system your computer is using.

NOTE: If you are having problems connecting to the Internet, see "Setting Up a Home and Office Network" on page 49. If you cannot connect to the Internet but have successfully connected in the past, the ISP might have a service outage. Contact your ISP to check the service status, or try connecting again later.

Windows XP

1 Save and close any open files, and exit any open programs.

2 Click **Start**→ **Internet Explorer**.

The **New Connection Wizard** appears.

3 Click **Connect to the Internet**.

4 In the next window, click the appropriate option:

- If you do not have an ISP and want to select one, click **Choose from a list of Internet service providers (ISPs)**.
- If you have already obtained setup information from your ISP but you did not receive a setup CD, click **Set up my connection manually**.
- If you have a CD, click **Use the CD I got from an ISP**.

5 Click **Next**.

If you selected **Set up my connection manually**, continue to step 6. Otherwise, follow the instructions on the screen to complete the setup.

NOTE: If you do not know which type of connection to select, contact your ISP.

6 Click the appropriate option under **How do you want to connect to the Internet?**, and then click **Next**.

7 Use the setup information provided by your ISP to complete the setup.

Windows Vista™

NOTE: Have your ISP information ready. If you do not have an ISP, the **Connect to the Internet** wizard can help you get one.

1. Save and close any open files, and exit any open programs.
2. Click the Windows Vista Start button , and click **Control Panel**.
3. Under **Network and Internet,** click **Connect to the Internet**.

   The **Connect to the Internet** window appears.
4. Click either **Broadband (PPPoE)** or **Dial-up**, depending on how you want to connect:
   - Choose **Broadband** if you will use a DSL, satellite modem, cable TV modem, or Bluetooth wireless technology connection.
   - Chose **Dial-up** if you will use a dial-up modem or ISDN.

NOTE: If you do not know which type of connection to select, click **Help me choose** or contact your ISP.

5. Follow the instructions on the screen and use the setup information provided by your ISP to complete the setup.

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® XP (Optional)

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.

Microsoft Windows Vista™ (Optional)

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.

Setting Up a Printer

NOTICE: Complete the operating system setup before you connect a printer to the computer.

See the documentation that came with the printer for setup information, including how to:

- Obtain and install updated drivers.
- Connect the printer to the computer.
- Load paper and install the toner or ink cartridge.

For technical assistance, refer to the printer owner's manual or contact the printer manufacturer.

Printer Cable

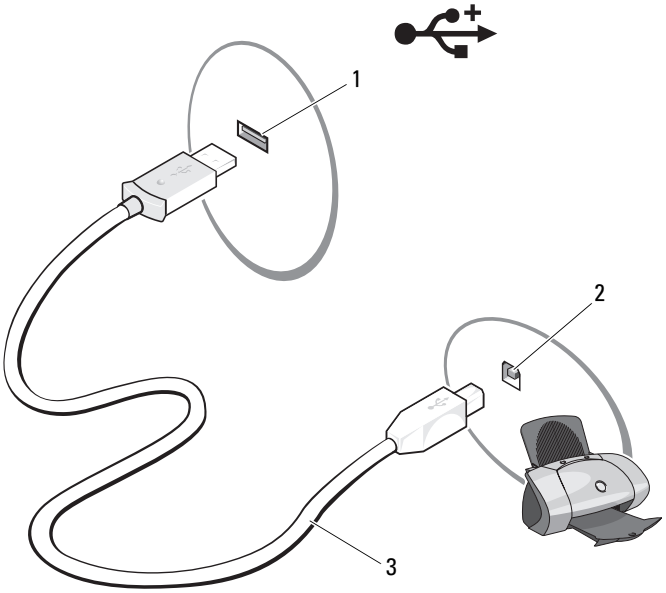
Your printer connects to your computer with either a USB cable or a parallel cable. Your printer may not come with a printer cable, so if you purchase a cable separately, ensure that it is compatible with your printer and computer. If you purchased a printer cable at the same time you purchased your computer, the cable may arrive in the computer's shipping box.

Connecting a USB Printer

NOTE: You can connect USB devices while the computer is turned on.

1. Complete the operating system setup if you have not already done so.

2 Attach the USB printer cable to the USB connectors on the computer and the printer. The USB connectors fit only one way.



1 USB connector on computer
2 USB connector on printer
3 USB printer cable

3 Turn on the printer and then turn on the computer.

4 Depending on your computer's operating system, a printer wizard may be available to help you install the printer driver:

If your computer is running the Microsoft® Windows® XP operating system and the **Add New Hardware Wizard** window appears, click **Cancel**.

If your computer is running the Windows Vista™ operating system, click the Windows Vista Start button , and click **Network→ Add a printer** to start the Add Printer Wizard.

5 Install the printer driver if necessary. See "Reinstalling Drivers and Utilities" on page 134, and the documentation that came with your printer.

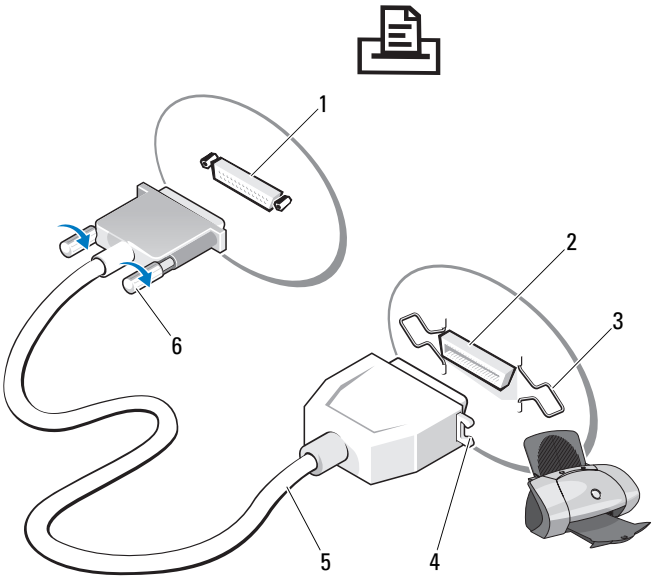
Connecting a Parallel Printer

1 Complete the operating system setup, if you have not already done so.

2 Turn off the computer (see "Turning Off Your Computer" on page 143).

NOTICE: For best results, use a 3-m (10-ft) or shorter parallel cable.

3 Attach the parallel printer cable to the parallel connector on the computer and tighten the two screws. Attach the cable to the connector on the printer and snap the two clips into the two notches.



1	parallel connector on computer	2	connector on printer
3	clips (2)	4	notches
5	parallel printer cable	6	screws (2)

4 Turn on the printer and then turn on the computer. If the **Add New Hardware Wizard** window appears, click **Cancel**.

5 Install the printer driver if necessary. See the documentation that came with your printer for instructions.

Connecting Two Monitors

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

If you purchased a graphics card that supports dual monitors, follow these instructions to connect and enable your monitors. The instructions tell you how to connect either two monitors (each with a VGA connector), one monitor with a VGA connector and one monitor with a DVI connector, or a TV.

NOTICE: If you are connecting two monitors that have VGA connectors, you must have the optional DVI adapter to connect the cable. If you are connecting two flat-panel monitors, at least one of them must have a VGA connector. If you are connecting a TV, you may connect only one monitor (VGA or DVI) in addition to the TV.

Connecting Two Monitors With VGA Connectors

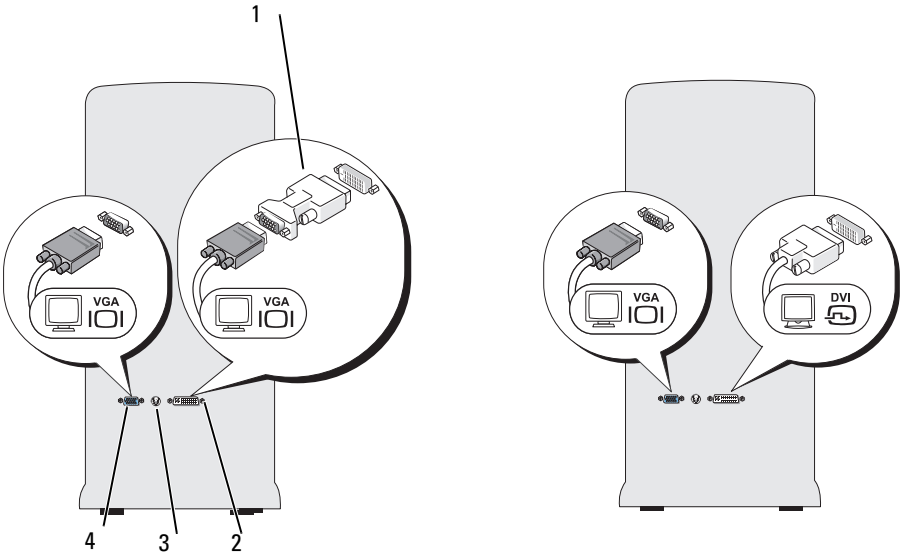
1 Shutdown your system.

NOTE: If your computer has integrated video, do not connect either monitor to the integrated video connector. If the integrated video connector is covered by a cap, do not remove the cap to connect the monitor or the monitor will not function.

2 Connect one of the monitors to the VGA (blue) connector on the back of the computer.

3 Connect the other monitor to the optional DVI adapter and connect the DVI adapter to the DVI (white) connector on the back of the computer.

4 Restart your system.



1	optional DVI adapter	2	DVI (white) connector
3	TV-OUT connector	4	VGA (blue) connector

Connecting One Monitor With a VGA Connector and One Monitor With a DVI Connector

1. Shutdown your system.
2. Connect the VGA connector on the monitor to the VGA (blue) connector on the back of the computer.
3. Connect the DVI connector on the other monitor to the DVI (white) connector on the back of the computer.
4. Restart your system.

Connecting a TV

NOTE: You must purchase an S-video cable, available at most consumer electronics stores, to connect a TV to your computer. It is not included with your computer.

1. Shutdown your system.
2. Connect one end of the S-video cable to the optional TV-OUT connector on the back of the computer.
3. Connect the other end of the S-video cable to the S-video input connector on your TV.
4. Connect the VGA or DVI monitor.
5. Restart your system.

Changing the Display Settings

1. After you connect the monitor(s) or TV, turn on the computer.

   The Microsoft® Windows® desktop displays on the primary monitor.
2. Enable extended desktop mode in the display settings. In extended desktop mode, you can drag objects from one screen to the other, effectively doubling the amount of viewable work space.

Power Protection Devices

Several devices are available to protect against power fluctuations and failures:

- Surge protectors
- Line conditioners
- Uninterruptible power supplies (UPS)

Surge Protectors

Surge protectors and power strips equipped with surge protection help prevent damage to your computer from voltage spikes that can occur during electrical storms or after power interruptions. Some surge protector manufacturers include warranty coverage for certain types of damage. Carefully read the device warranty when choosing a surge protector. A device with a higher joule rating offers more protection. Compare joule ratings to determine the relative effectiveness of different devices.

NOTICE: Most surge protectors do not protect against power fluctuations or power interruptions caused by nearby lightning strikes. When lightning occurs in your area, disconnect the telephone line from the telephone wall jack and disconnect your computer from the electrical outlet.

Many surge protectors have a telephone jack for modem protection. See the surge protector documentation for modem connection instructions.

NOTICE: Not all surge protectors offer network adapter protection. Disconnect the network cable from the network wall jack during electrical storms.

Line Conditioners

NOTICE: Line conditioners do not protect against power interruptions.

Line conditioners are designed to maintain AC voltage at a fairly constant level.

Uninterruptible Power Supplies

NOTICE: Loss of power while data is being saved to the hard drive may result in data loss or file damage.

NOTE: To ensure maximum battery operating time, connect only your computer to a UPS. Connect other devices, such as a printer, to a separate power strip that provides surge protection.

A UPS protects against power fluctuations and interruptions. UPS devices contain a battery that provides temporary power to connected devices when AC power is interrupted. The battery charges while AC power is available. See the UPS manufacturer documentation for information on battery operating time and to ensure that the device is approved by Underwriters Laboratories (UL).

5

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

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**.

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," in Windows Vista™, and "standby," in Windows® XP

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	• Press the power button • Auto power on • Move or click the mouse • Type on the keyboard • USB device activity • Power management event
Hibernate	• Press the power button • Auto power on • Power management event
Shutdown	• Press the power button • Auto power on • Power management event

NOTE: For more information on power management, see your operating system documentation.

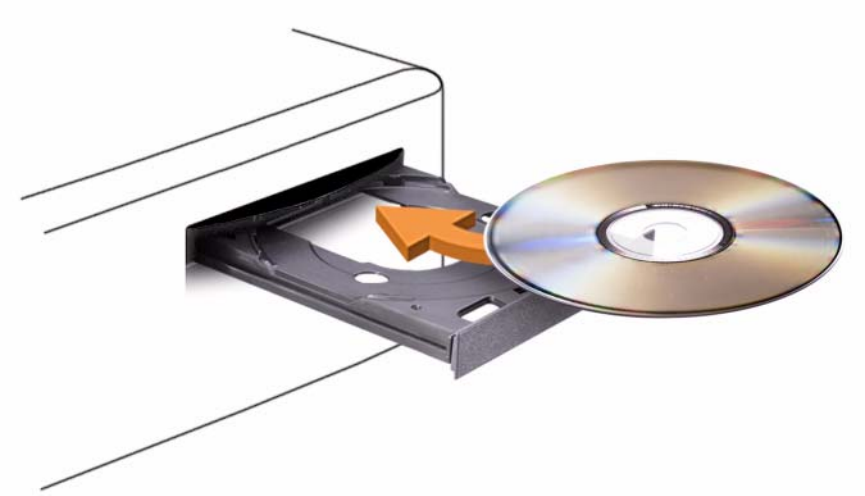
Using Multimedia

Playing CDs or DVDs

NOTICE: Do not press down on the CD/DVD tray when you open or close it. Keep the tray closed when you are not using the drive.

NOTICE: Do not move the computer while playing CDs or DVDs.

1. Press the eject button on the front of the drive.
2. Place the disc, label side up, in the center of the tray.
3. Press the eject button or gently push in the tray.



To format CDs for storing data, to create music CDs, or to copy CDs, see the CD software that came with your computer.

NOTE: Ensure that you follow all copyright laws when you create CDs.

A CD player includes the following basic buttons:

	Play.
	Move backward within the current track.
	Pause.

	Move forward within the current track.
	Stop.
	Go to the previous track.
	Eject.
	Go to the next track.

A DVD player includes the following basic buttons:

	Stop.
	Restart the current chapter.
	Play.
	Fast forward.
	Pause.
	Fast reverse.
	Advance a single frame while in pause mode.
	Go to the next title or chapter.
	Continuously play the current title or chapter.
	Go to the previous title or chapter.
	Eject.

For more information on playing CDs or DVDs, click **Help** on the CD or DVD player (if available).

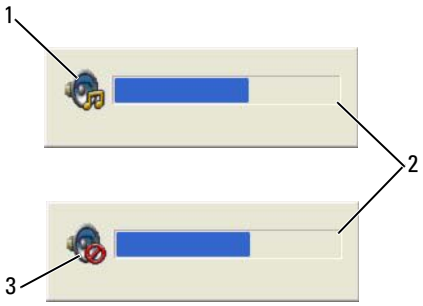
Adjusting the Volume

NOTE: When the speakers are muted, you do not hear the CD or DVD playing.

1. Open the **Volume Control** window.
2. Click and drag the bar in the **Volume Control** column and slide it up or down to increase or decrease the volume.

For more information on volume control options, click **Help** in the **Volume Control** window.

The Volume Meter displays the current volume level, including mute, on your computer. Either click the QuickSet icon in the taskbar and select or deselect **Disable On Screen Volume Meter**, or press the volume control buttons to enable or disable the Volume Meter on the screen.



1	volume icon	2	Volume Meter
3	mute icon		

Adjusting the Picture

If an error message notifies you that the current resolution and color depth are using too much memory and preventing DVD playback, adjust the display properties.

Microsoft Windows XP

1. Click **Start**→ **Control Panel**→ **Appearance and Themes**.
2. Under **Pick a task...**, click **Change the screen resolution**.
3. Under **Screen resolution**, click and drag the bar to reduce the resolution setting.
4. In the drop-down menu under **Color quality**, click **Medium (16 bit)** and click **OK**.

Microsoft Windows Vista™ Operating System

1. Click the Windows Vista Start button , click **Control Panel**, and then click **Appearance and Personalization**.
2. Under **Personalization**, click **Adjust Screen Resolution**.

The **Display Properties** window appears.

3. Under **Resolution:** click and drag the bar to reduce the resolution setting.
4. In the drop-down menu under **Colors:**, click **Medium (16 bit)**.
5. Click **OK**.

6

Securing Your Computer

Security Management Software

The security management software provides four features to help you secure your computer:

- Log-in management
- Pre-boot authentication (using a fingerprint reader, smart card, or password)
- Encryption
- Private information management

Password Types

There are several levels of passwords available in the system.

Type of Password	Features
Primary (or system)	• Protects the computer from unauthorized access
Administrator	• Gives system administrators or service technicians access to computers for repair or reconfiguration • Allows you to restrict access to system setup in the same way a primary password restricts access to the computer • Can be used instead of the primary password
Hard drive	• Helps protect the data on your hard drive or external hard drive (if one is being used) from unauthorized access

Activating the Security Management Software

1. Turn on (or restart) your computer.
2. When the DELL™ logo appears, press <F2> 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.

3 In the drop-down menu, select **Wave EMBASSY Trust Suite** and press <Enter> to create the icons for the software components on the computer desktop.

4 Press <Esc> to exit the setup program.

5 If prompted, click **Save/Exit**.

Using the Security Management Software

For information about how to use the software and the different security features, see the *Getting Started Guide* for the software:

Click **Start→ All Programs→ Wave EMBASSY Trust Suite→ Getting Started Guide**.

Computer Tracking Software

Computer tracking software may enable you to locate your computer if it is lost or stolen. The software is optional and may be purchased when you order your Dell™ computer, or you can contact your Dell sales representative for information about this security feature.

NOTE: Computer tracking software may not be available in certain countries.

NOTE: If you have computer tracking software and your computer is lost or stolen, you must contact the company that provides the tracking service to report the missing computer.

If Your Computer Is Lost or Stolen

- Call a law enforcement agency to report the lost or stolen computer. Include the Service Tag in your description of the computer. Ask that a case number be assigned and write down the number, along with the name, address, and phone number of the law enforcement agency. If possible, obtain the name of the investigating officer.

NOTE: If you know where the computer was lost or stolen, call a law enforcement agency in that area. If you do not know, call a law enforcement agency where you live.

- If the computer belongs to a company, notify the security office of the company.

- Contact Dell customer service to report the missing computer. Provide the computer Service Tag, the case number, and the name, address, and phone number of the law enforcement agency to which you reported the missing computer. If possible, give the name of the investigating officer.

The Dell customer service representative will log your report under the computer Service Tag and record the computer as missing or stolen. If someone calls Dell for technical assistance and gives your Service Tag, the computer is identified automatically as missing or stolen. The representative will attempt to get the phone number and address of the caller. Dell will then contact the law enforcement agency to which you reported the missing computer.

7

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.

NOTICE: Unless you are an expert computer user, do not change the settings for this program. Certain changes can make your computer work incorrectly.

Entering System Setup

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 (see "Turning Off Your Computer" on page 143) and try again.

System Setup Screens

The system setup screen displays current or changeable configuration information for your computer. Information on the screen is divided into three areas: the options list, active options field, and key functions.

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. Use the + and - keys on the numeric keypad to expand or collapse each option.	**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 or may not appear.

System	
System Info	Lists the **System** 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 **Processor Type**, **Processor Clock Speed**, **Processor Bus Speed**, **Processor L2 Cache** size, and **Processor ID**. States whether the processor is **Hyperthreading** and **Multiple Core** capable and whether it supports **64-bit Technology**. None of these fields can be modified.
Memory Info	Lists the **Installed Memory** size, **Memory Speed**, **Memory Channel Mode** (dual or single), **Memory Technology**, and memory slot information of installed memory. For each populated memory slot, System Setup lists the DIMM **Size**, **ECC** support, **Rank**, **Type**, and **Organization**. Empty memory slots are denoted as "Empty." None of these fields can be modified.
PCI Info	Identifies any installed PCI or PCI Express cards and their respective **Slot ID**. None of these fields can be modified.
Date/Time	Displays current date and time settings.
Boot Sequence	The computer attempts to boot from the sequence of devices specified in this list. This option allows you to control/modify the boot sequence (see "Boot Sequence" on page 88).

Drives	
Diskette Drive • With diskette drive : Internal is default • Without diskette drive : USB is default.	This option enables or disables the floppy drive. The options are **Off**, **Internal**, **USB**, and **Read Only**. **NOTE:** If USB is selected, ensure that the 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.

SATA Operation (RAID Autodetect/AHCI default)	Options for Mini Tower and Desktop: • 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 system configures the drive as RAID if a RAID signature is detected on the drive. Otherwise the drive will be configured as AHCI or 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 **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.
Front USB (On default)	Enables or disables the front USB ports.
PCI Slots (On default)	Enables or disables all PCI slots.

LPT Port Mode (PS/2 default)	Determines the mode of operation of the internal parallel port. • **Off** disables the port. • **AT** configures the port for AT compatibility. • **PS/2** configures the port for PS/2 compatibility. • **EPP** configures the port for the EPP bidirectional protocol. • **ECP** configures the port for the ECP 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. **NOTE:** Only available if a PS/2 serial port adapter is installed. **Auto**, the default setting, automatically configures a connector to a particular designation (**COM2** or **COM4**).

Video	
Primary Video (Auto default)	This setting specifies which video controller is primary, **Auto** or **Onboard/PEG**. When **Auto** is selected, the add-in video controller will be used. **NOTE:** A PCI Express Graphics (PEG) card will override the integrated video controller.

Performance	
Multiple CPU Core (On default)	Determines whether the processor will have one or two cores enabled. **On** enables the second core.
SpeedStep (Off default)	Enables Intel® SpeedStep® for all supported processors in the computer. This setting changes the processor power consumption and frequency. **NOTE:** This option may not be available on your computer.
Limit CPUID Value (Off default)	Limits the maximum value the processor standard CPUID function will support. Some operating systems won't complete installation when the maximum CPUID function supported is greater than 3.
HDD Acoustic Mode (Bypass default)	• **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. **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.

Security	
Admin Password (Not Set default)	Displays the current status of your system setup program's password security feature and allows you to verify and assign a new admin password. The **Admin Password** may be disabled by a jumper on the system board.

`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. The **System Password** may be disabled by a jumper on the system board.
`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. If the drive is a CD or DVD, a password is not available.
`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.
`Execute Disable` (`On` default)	Enables or disables **Execute Disable** memory protection technology.
`Computrace(R)` (`Deactivate` default)	Enables or disables the BIOS interface of the optional Computrace® agent from Absolute® Software. This optional monitoring service must be purchased separately. • **Activate** *permanently* enables the BIOS interface of the Computrace agent. • **Disable** *permanently* disables the BIOS interface of the Computrace agent. • **Deactivate** *temporarily* deactivates the BIOS interface of the Computrace agent. By activating the service, you consent to transmission of data from your computer to the Computrace server.

`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 (*hours:minutes*). 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` (`Off` 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. • **S1** - A suspend state in which the computer is running in a low-power mode. • **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.
SERR Message (On default)	Some graphics cards require that the SERR message be disabled.
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**.
ASF Mode	Controls the NIC Alert Standard Format (ASF) management. This BIOS setup option is used to select the ASF 2.0 function, **Alert Only** or **Off**.

POST Behavior	
Fast Boot (On default)	When enabled, this feature reduces computer startup time by bypassing some compatibility steps. • **Off** - No steps are skipped during computer startup. • **On** - The system starts more quickly.
Numlock Key (On default)	Determines the functionality of the numeric keys on the right side of your keyboard. • **Off** - The right keypad keys function as arrows. • **On** - The right keypad keys function as numbers.
POST Hotkeys (Setup & Boot Menu default)	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 Quick Boot message only (F12=Boot Menu). • **None** displays no message.
Keyboard Errors (Report default)	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.

Boot Sequence

This feature allows you to change the boot sequence for devices.

Option Settings

- **USB Device —** The computer attempts to boot from the USB device. If no operating system is present, the computer generates an error message.

- **Onboard or USB Floppy Drive —** The computer attempts to boot from the floppy drive. If the floppy disk in the drive is not bootable, or if no floppy disk is in the drive, the computer generates an error message.
- **Onboard SATA Hard Drive** — The computer attempts to boot from the primary serial ATA hard drive. If no operating system is on the drive, the computer generates an error message.
- **Onboard or USB Optical Drive** — The computer attempts to boot from the optical drive. If no disc is in the drive, or if the disc has no operating system, the computer generates an error message.
- **Onboard Network Controller** — The computer attempts to boot from the network controller. If no operating system is present, the computer generates an error message.

Changing Boot Sequence for the Current Boot

You can use this feature, for example, to tell the computer to boot from the optical drive so that you can run the Dell Diagnostics on the *Drivers and Utilities* media, but you want the computer to boot from the hard drive when the diagnostic tests are complete. You can also use this feature to restart your computer from a USB device such as a floppy drive, memory key, or optical drive.

NOTE: If you are booting to a USB floppy drive, you must first set the floppy drive to USB in system setup (see "System Setup" on page 79).

1. If you are booting to a USB device, connect the USB device to a USB connector.
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 143) and try again.

   The **Boot Device Menu** appears, listing all available boot devices. Each device has a number next to it.
4. At the bottom of the menu, enter the number of the device that is to be used for the current boot only.

For example, if you are booting to a USB memory key, highlight **USB Device** and press <Enter>.

NOTE: To boot to a USB device, the device must be bootable. To make sure your device is bootable, check the device documentation.

Changing Boot Sequence for Future Boots

1. Enter system setup (see "Entering System Setup" on page 79).
2. Use the arrow keys to highlight the **Boot Sequence** menu option and press <Enter> to access the pop-up menu.

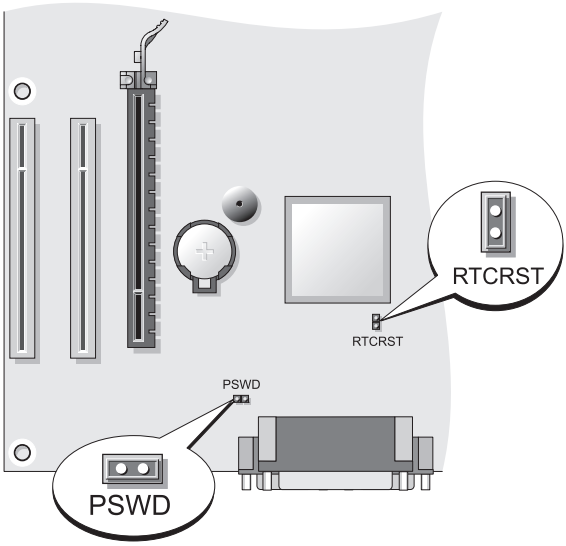
   NOTE: Write down your current boot sequence in case you want to restore it.
3. Press the up- and down-arrow keys to move through the list of devices.
4. Press the spacebar to enable or disable a device. (Enabled devices have a checkmark.)
5. Press <Shift><Up Arrow> or <Shift><Down Arrow> to move a selected device up or down the list.

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 143.
2. Remove the computer cover.
3. Locate the 2-pin password jumper (PSWD) on the system board. By default, Pin1 and Pin2 should be connected. You will need to remove the jumper and boot rhe system, as follows.
4. Remove the jumper.



5. Replace the computer cover (see "Replacing the Computer Cover" on page 207).
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 143).
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.

11 Locate the 2-pin password jumper (PSWD) on the system board and attach the jumper to reenable the password feature.

12 Replace the computer cover (see "Replacing the Computer Cover" on page 207).

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

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

NOTE: This procedure enables the password feature. When you enter system setup (see "Entering System Setup" on page 79), both system and administrator password options appear as **Not Set**—meaning that the password feature is enabled but no password is assigned.

14 Assign a new system and/or administrator password. Replace the computer cover (see "Replacing the Computer Cover" on page 207).

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

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

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 21.

2 Remove the computer cover.

3 Reset the current CMOS settings:

   a Locate the password (PSWD) and CMOS (RTCRST) jumpers on the system board (see "Clearing Forgotten Passwords" on page 91).

   b Remove the password jumper plug from its pins.

   c Place the password jumper plug on the RTCRST pins and wait approximately 5 seconds.

   d Remove the jumper plug from the RTCRST pins and place it back on the password pins.

4 Replace the computer cover (see "Replacing the Computer Cover" on page 323).

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

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

Flashing the BIOS

The BIOS may require flashing when an update is available or when replacing the system board.

1 Turn on the computer.

2 Locate the BIOS update file for your computer at the Dell Support website at **support.dell.com**.

3 Click **Download Now** to download the file.

4 If the **Export Compliance Disclaimer** window appears, click **Yes, I Accept this Agreement**.

The **File Download** window appears.

5 Click **Save this program to disk**, and then click **OK**.

The **Save In** window appears.

6 Click the down arrow to view the **Save In** menu, select **Desktop**, and then click **Save**.

The file downloads to your desktop.

7 Click Close when the **Download Complete** window appears.

The file icon appears on your desktop and is titled the same as the downloaded BIOS update file.

8 Double-click the file icon on the desktop and follow the on-screen instructions.

About RAID Configurations

This section provides an overview of the RAID configuration that you might have selected when you purchased your computer. Of the RAID configurations available in the computer industry for different uses, Dell offers RAID level 1 on your computer. A RAID level 1 configuration is recommended for users who desire a high level of data integrity.

The Intel 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.

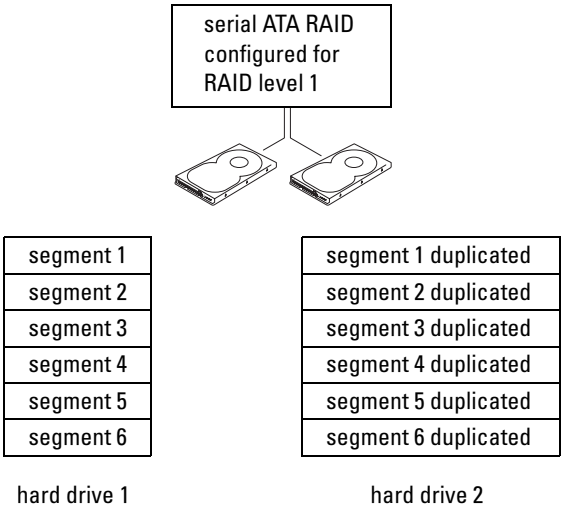
Verifying That RAID Is Working

Your computer displays information pertaining to your RAID configuration at startup, before loading the operating system. If RAID is not configured, the message `none defined` will be displayed under **RAID Volumes**, followed by a list of the physical drives installed in your system. 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 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. Also, because data is duplicated on both drives, for example, two 120-GB RAID level 1 drives collectively have a maximum of 120-GB on which to store data.

NOTE: In a RAID level 1 configuration, the size of the configuration is equal to the size of the smallest drive in the configuration.

Troubleshooting RAID

You can use one of two methods to troubleshoot RAID hard drive volumes. One method uses the Intel RAID Option ROM utility and can be performed without an operating system present on the hard drive. The second method uses the Intel Matrix Storage Manager, or Intel Matrix Storage Console, and is performed *after* the operating system and the Intel Matrix Storage Console

have been installed. Both methods require that you set your computer to RAID-enabled mode (see "Setting Your Computer to RAID-Enabled Mode" on page 98) before you begin.

Recovering From a Multiple Hard Drive Failure Using the Intel® RAID Option ROM Utility

NOTE: The following steps will not restore any data lost during the hard drive failure. It can be performed only after the failed hard drives have been replaced (see the appropriate Drives section for your system).

Although hard drives of any size may be combined to create a RAID configuration, the drives should ideally be of equal size when using the Intel RAID Option ROM utility. In a RAID level 1 configuration, the size of the configuration will be equivalent to the smaller of the two drives used.

1. Set your computer to RAID-enabled mode (see "Setting Your Computer to RAID-Enabled Mode" on page 98).
2. Press <Ctrl><i> when you are prompted to enter the Intel RAID Option ROM utility.
3. Use the up- and down-arrow keys to highlight **Create RAID Volume** and press <Enter>.
4. Enter a RAID volume name or accept the default and press <Enter>.
5. Select **RAID1(Mirror)** and press <Enter>.
6. Select the desired capacity for the volume, and press <Enter>. The default value is the maximum available size.
7. Press <Enter> to create the volume.
8. Press <y> to confirm that you want to create the RAID volume.
9. Confirm that the correct volume configuration is displayed on the main Intel RAID Option ROM utility screen.
10. Use the up- and down-arrow keys to select **Exit** and press <Enter>.
11. Install the operating system using the supplied media (see "Restoring Your Operating System" on page 137).

Recovering From a Single Hard Drive Failure Using the Intel Matrix Storage Manager

NOTE: The following steps can be performed only after the failed hard drive has been replaced (see the appropriate Drives section for your system).

1. Click the **Start** button and point to **Programs→ Intel(R) Matrix Storage Manager→ Intel Matrix Storage Console** to launch the Intel Storage Utility.
2. Click the **Restore RAID 1 data protection** button.
3. Click the **Rebuild RAID volume now** button.
4. Click the **Yes** button to start rebuilding the RAID volume to the new hard drive.

NOTE: You can use your computer while the computer is rebuilding the RAID level 1 volume.

Setting Your Computer to RAID-Enabled Mode

1. Enter system setup (see "Entering System Setup" on page 79).
2. Press the up- and down-arrow keys to highlight **Drives**, and press <Enter>.
3. Press the up- and down-arrow keys to highlight **SATA Operation**, and press <Enter>.
4. Press the left- and right-arrow keys to highlight **RAID On**, press <Enter>, and then press <Esc>.

NOTE: For more information about RAID options, see "System Setup Options" on page 80.

5. Press the left- and right-arrow keys to highlight **Save/Exit**, and press <Enter> to exit system setup and resume the boot process.

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. Disconnect the network or modem cable. 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.

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 CD/DVD 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.

8

Troubleshooting Tools

Power Lights

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

The power button light (bi-color LED) located on the front of the computer illuminates and blinks or remains solid to indicate different states:

- If the power light is off, the computer is either turned off or is not receiving power.
  - Reseat the power cable in 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.
- If the power light is steady green and the computer is not responding:
  - Ensure that the display is connected and powered on.
  - If the display is connected and powered on, see "Beep Codes" on page 102.
- If the power light is blinking green, the computer is in standby mode. Press a key on the keyboard, move the mouse, or press the power button to resume normal operation. If the power light is green and the computer is not responding:
  - Ensure the display is connected and powered on.
  - If the display is connected and powered on, see "Beep Codes" on page 102.
- If the power light is steady amber, the computer is receiving electrical power, but a device might be malfunctioning or incorrectly installed.

- Remove and then reinstall the memory modules (see "Memory" on page 155).
- Remove and then reinstall any cards (see "Cards" on page 157).
- Remove and then reinstall the graphics card, if applicable (see "Cards" on page 157).

• If the power light is blinking amber, there may be a power problem or an internal device malfunction.

- Ensure that all power cables are securely connected to the system board (see "System Board Components" on page 150).
- Ensure that the main power cable and front panel cable are securely connected to the system board (see "System Board Components" on page 150).

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. For example, beep code 1-3-1 (one possible beep code) consists of one beep, a burst of three beeps, and then one beep. This beep code tells you that the computer encountered a memory problem.

Reseating the memory modules may correct the following beep code errors. If the problem persists, contact Dell (see "Contacting Dell" in the *User's Guide*) for instructions on obtaining technical assistance.

Code	Cause
1-3-1 through 2-4-4	Memory not being properly identified or used
4-3-1	Memory failure above address 0FFFFh

If you experience any of the following beep code errors, see "Contacting Dell" in the *User's Guide* for instructions on obtaining technical assistance.

Code	Cause
1-1-2	Microprocessor register failure
1-1-3	NVRAM read/write failure

Code	Cause
1-1-4	ROM BIOS checksum failure
1-2-1	Programmable interval timer failure
1-2-2	DMA initialization failure
1-2-3	DMA page register read/write failure
1-3	Video Memory Test failure
1-3-1 through 2-4-4	Memory not being properly identified or used
3-1-1	Slave DMA register failure
3-1-2	Master DMA register failure
3-1-3	Master interrupt mask register failure
3-1-4	Slave interrupt mask register failure
3-2-2	Interrupt vector loading failure
3-2-4	Keyboard Controller Test failure
3-3-1	NVRAM power loss
3-3-2	Invalid NVRAM configuration
3-3-4	Video Memory Test failure
3-4-1	Screen initialization failure
3-4-2	Screen retrace failure
3-4-3	Search for video ROM failure
4-2-1	No timer tick
4-2-2	Shutdown failure
4-2-3	Gate A20 failure
4-2-4	Unexpected interrupt in protected mode
4-3-1	Memory failure above address 0FFFFh
4-3-3	Timer-chip counter 2 failure
4-3-4	Time-of-day clock stopped
4-4-1	Serial or parallel port test failure
4-4-2	Failure to decompress code to shadowed memory

Code	Cause
4-4-3	Math-coprocessor test failure
4-4-4	Cache test failure

System Messages

NOTE: If the message you received is not listed in the table, see the documentation for either the operating system or the program that was running when the message appeared.

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 — The computer failed to complete the boot routine three consecutive times for the same error (see "Contacting Dell" on page 267 for assistance).

CMOS CHECKSUM ERROR — Possible motherboard failure or RTC battery low. Replace battery (see "Replacing the Battery" on page 190 or see "Contacting Dell" on page 267 for assistance).

CPU FAN FAILURE — CPU fan failure. Replace the CPU fan (see "Removing the Processor and Heat Sink" on page 197).

DISKETTE DRIVE 0 SEEK FAILURE — A cable may be loose, or the computer configuration information may not match the hardware configuration. Check cable connections (see "Contacting Dell" on page 267 for assistance).

DISKETTE READ FAILURE — The floppy disk may be defective or a cable may be loose. Replace the floppy disk/check for a loose cable connection.

HARD-DISK DRIVE FAILURE — Possible hard disk drive failure during HDD POST. Check cables /swap hard disks (see "Contacting Dell" on page 267 for assistance).

HARD-DISK DRIVE READ FAILURE — Possible HDD failure during HDD boot test (see "Contacting Dell" on page 267 for assistance).

KEYBOARD FAILURE — Keyboard failure or keyboard cable loose (see "Keyboard Problems" on page 120).

NO BOOT DEVICE AVAILABLE — The system cannot detect a bootable device or partition.

- If the floppy drive is your boot device, ensure that the cables are connected and 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 79).

NO TIMER TICK INTERRUPT — A chip on the system board might be malfunctioning or motherboard failure (see "Contacting Dell" on page 267 for assistance).

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.

USB OVER CURRENT ERROR — Disconnect the USB device. Use an external power source for the USB device.

NOTICE - HARD DRIVE SELF MONITORING SYSTEM HAS REPORTED THAT A PARAMETER HAS EXCEEDED ITS NORMAL OPERATING RANGE. DELL RECOMMENDS THAT YOU BACK UP YOUR DATA REGULARLY. A PARAMETER OUT OF RANGE MAY OR MAY NOT INDICATE A POTENTIAL HARD DRIVE PROBLEM. —

S.M.A.R.T error, possible HDD failure. This feature can be enabled or disabled in BIOS setup.

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 or back 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. 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 "off" 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.	• If you have one memory module installed, reinstall it and restart the computer. (see "Memory" on page 155 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 (see "Contacting Dell" on page 267).

Light Pattern	Problem Description	Suggested Resolution
	A possible graphics card failure has occurred.	• 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 (see "Contacting Dell" on page 267).
	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.	• If you have one memory module installed, reinstall it and restart the computer. See "Memory" on page 155 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 (see "Contacting Dell" on page 267).

Light Pattern	Problem Description	Suggested Resolution
	Memory modules are detected, but a memory configuration or compatibility error exists.	• Ensure that no special memory module/memory connector placement requirements exist (see "Memory" on page 155). • Verify that the memory modules that you are installing are compatible with your computer (see "Memory" on page 155). • If the problem persists, (see "Contacting Dell" on page 267).
	A failure has occurred. This pattern also displays when you enter system setup and may not indicate a problem (see "System Setup" on page 79).	• Ensure that the cables are properly connected to the system board from the hard drive and the optical drive. • Check the computer message that appears on your monitor screen. • If the problem persists, (see "Contacting Dell" on page 267).
	After POST is complete, all four diagnostic lights turn green briefly before turning off to indicate normal operating condition.	None.

Dell Diagnostics

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

When to Use the Dell Diagnostics

If you experience a problem with your computer, perform the checks in Lockups and Software Problems (see "Lockups and Software Problems" on page 120) and run the Dell Diagnostics before you contact Dell for technical assistance.

It is recommended that you print these procedures before you begin.

NOTICE: The Dell Diagnostics works only on Dell™ computers.

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

See "System Setup" on page 79 to review your computer's configuration information, and ensure that the device that you want to test displays in the system setup program and is active.

Start the Dell Diagnostics from 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, see "Contacting Dell" on page 267.

1. Ensure that the computer is connected to an electrical outlet that is known to be working properly.
2. Turn on (or restart) your computer.
3. When the DELL™ logo appears, press <F12> immediately. Select **Diagnostics** from the boot menu and press <Enter>.

   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: If you see a message stating that no diagnostics utility partition has been found, run the Dell Diagnostics from the *Drivers and Utilities* media.
4. Press any key to start the Dell Diagnostics from the diagnostics utility partition on your hard drive.

Starting the Dell Diagnostics From the Drivers and Utilities media

1. Insert the *Drivers and Utilities* media.
2. Shut down and 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, the computer boots according to the devices specified in the system setup program.
3. When the boot device list appears, highlight **CD/DVD/CD-RW** and press <Enter>.
4. Select the **Boot from CD-ROM** option from the menu that appears and press <Enter>.
5. Type `1` to start the CD menu and press <Enter> to proceed.
6. Select **Run the 32 Bit Dell Diagnostics** from the numbered list. If multiple versions are listed, select the version appropriate for your computer.
7. 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.

NOTE: It is recommended that you select **Test System** to run a complete test on your computer.

Option	Function
Test Memory	Run the stand-alone memory test
Test System	Run System Diagnostics
Exit	Exit the Diagnostics

2 After you have selected the **Test System** option from the main menu, the following menu appears:

NOTE: It is recommended that you select **Extended Test** from the menu below to run a more thorough check of devices in the computer.

Option	Function
Express Test	Performs a quick test of devices in the system. This typically can take 10 to 20 minutes.
Extended Test	Performs a thorough check of devices in the system. This typically can take an hour or more.
Custom Test	Use to test a specific device or customize the tests to be run.
Symptom Tree	This option allows you to select tests based on a symptom of the problem you are having. This option lists the most common symptoms.

3 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 see "Contacting Dell" on page 267.

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.

4 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.

Tab	Function *(continued)*
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.

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.

6 Remove the Dell *Drivers and Utilities* media (if applicable).

9

Troubleshooting

Solving Problems

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 support personnel diagnose and fix the problem(s).
- If an error message occurs in a program, see the program's documentation.

NOTE: The procedures in this document were written for the Windows default view, so they may not apply if you set your Dell™ computer to the Windows Classic view.

Battery Problems

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 190). If the battery still does not work properly, contact Dell (see "Contacting Dell" on page 267).

Drive Problems

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

ENSURE THAT MICROSOFT® WINDOWS® RECOGNIZES THE DRIVE —

Windows XP:

- Click **Start** and click **My Computer**.

Windows Vista™:

- Click the Windows Vista Start button and click **Computer**.

If the drive is not listed, perform a full scan with your antivirus software to check for and remove viruses. Viruses can sometimes prevent Windows from recognizing the drive.

TEST THE DRIVE —

- Insert another disc to eliminate the possibility that the original drive is defective.
- Insert a bootable floppy disk and restart the computer.

CLEAN THE DRIVE OR DISK — See "Cleaning Your Computer" on page 99.

CHECK THE CABLE CONNECTIONS

RUN THE HARDWARE TROUBLESHOOTER — See "Troubleshooting Software and Hardware Problems" on page 136.

RUN THE DELL DIAGNOSTICS — See "Dell Diagnostics" on page 111.

Optical drive problems

NOTE: High-speed optical drive vibration is normal and may cause noise, which does not indicate a defect in the drive or the media.

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 slidebar and dragging it up.
- Ensure that the sound is not muted by clicking any boxes that are checked.

CHECK THE SPEAKERS AND SUBWOOFER —

Problems writing to an optical drive

CLOSE OTHER PROGRAMS — The optical drive must receive a steady stream of data during the writing process. If the stream is interrupted, an error occurs. Try closing all programs before you write to the optical.

TURN OFF STANDBY MODE IN WINDOWS BEFORE WRITING TO A DISC — See "Power Management" on page 66 or search for the keyword *standby* in Windows Help and Support for information on power management modes.

Hard drive problems

RUN CHECK DISK —

Windows XP:

1 Click **Start** and click **My Computer**.

2 Right-click **Local Disk C:**.

3 Click **Properties**→ **Tools**→ **Check Now**.

4 Click **Scan for and attempt recovery of bad sectors** and click **Start**.

Windows Vista:

1 Click **Start** and click **Computer**.

2 Right-click **Local Disk C:**.

3 Click **Properties**→ **Tools**→ **Check Now**.

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.

4 Follow the instructions on the screen.

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*.

NOTE: Do not plug a telephone cable into the network adapter connector (see "Back Panel Connectors" on page 24).

CHECK THE MICROSOFT OUTLOOK® EXPRESS SECURITY SETTINGS — If you cannot open your e-mail attachments:

1 In Outlook Express, click **Tools**→ **Options**→ **Security**.

2 Click **Do not allow attachments** to remove the checkmark, as needed.

CHECK THE TELEPHONE LINE CONNECTION
CHECK THE TELEPHONE JACK
CONNECT THE MODEM DIRECTLY TO THE TELEPHONE WALL JACK
USE A DIFFERENT TELEPHONE LINE —

- Verify that the telephone line is connected to the jack on the modem (the jack has either a green label or a connector-shaped icon next to it).
- Ensure that you hear a click when you insert the telephone line connector into the modem.
- Disconnect the telephone line from the modem and connect it to a telephone, then listen for a dial tone.

- If you have other telephone devices sharing the line, such as an answering machine, fax machine, surge protector, or line splitter, bypass them and use the telephone to connect the modem directly to the telephone wall jack. If you are using a line that is 3 meters (10 feet) or more in length, try a shorter one.

RUN THE MODEM DIAGNOSTIC TOOL —

Windows XP:

1. Click **Start**→ **All Programs**→ **Modem Helper**.
2. Follow the instructions on the screen to identify and resolve modem problems. Modem Helper is not available on certain computers.

Windows Vista:

1. Click **Start** → **All Programs**→ **Modem Diagnostic Tool**.
2. Follow the instructions on the screen to identify and resolve modem problems. Modem diagnostics are not available on all computers.

VERIFY THAT THE MODEM IS COMMUNICATING WITH WINDOWS —

Windows XP:

1. Click **Start**→ **Control Panel**→ **Printers and Other Hardware**→ **Phone and Modem Options**→ **Modems**.
2. Click the COM port for your modem→ **Properties**→ **Diagnostics**→ **Query Modem** to verify that the modem is communicating with Windows.

   If all commands receive responses, the modem is operating properly.

Windows Vista:

1. Click **Start** → **Control Panel**→ **Hardware and Sound**→ **Phone and Modem Options**→ **Modems**.
2. Click the COM port for your modem→ **Properties** → **Diagnostics**→ **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.

Error Messages

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

If the error 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:

Windows XP:

1 Click **Start**→ **Control Panel**→ **Add or Remove Programs**→ **Programs and Features**.

2 Select the program you want to remove.

3 Click **Uninstall**.

4 See the program documentation for installation instructions.

Windows Vista:

1 Click **Start** → **Control Panel**→ **Programs**→ **Programs and Features**.

2 Select the program you want to remove.

3 Click **Uninstall**.

4 See the program documentation for installation instructions.

***drive letter*:\ IS NOT ACCESSIBLE. THE DEVICE IS NOT READY —** The drive cannot read the disk. Insert a disk into the drive and try again.

INSERT BOOTABLE MEDIA — Insert a bootable floppy disk, CD, or DVD.

NON-SYSTEM DISK ERROR — Remove the floppy disk from the floppy drive 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 may 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 267.

IEEE 1394 Device Problems

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

NOTE: Your computer supports IEEE 1394a and IEEE 1394b standards.

ENSURE THAT THE CABLE FOR THE IEEE 1394 DEVICE IS PROPERLY INSERTED INTO THE DEVICE AND INTO THE CONNECTOR ON THE COMPUTER

ENSURE THAT THE IEEE 1394 DEVICE IS ENABLED IN SYSTEM SETUP — See "System Setup Options" on page 80.

ENSURE THAT THE IEEE 1394 DEVICE IS RECOGNIZED BY WINDOWS —

Windows XP:

1 Click **Start** and click **Control Panel**.

2 Under **Pick a Category**, click **Performance and Maintenance**→ **System**→ **System Properties** → **Hardware**→ **Device Manager**.

Windows Vista:

1 Click **Start** → **Control Panel**→ **Hardware and Sound**.

2 Click **Device Manager.**

If your IEEE 1394 device is listed, Windows recognizes the device.

IF YOU HAVE PROBLEMS WITH A DELL IEEE 1394 DEVICE — Contact Dell (see "Contacting Dell" on page 267).

IF YOU HAVE PROBLEMS WITH AN IEEE 1394 DEVICE NOT PROVIDED BY DELL —

Contact the IEEE 1394 device manufacturer.

Keyboard Problems

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

CHECK THE KEYBOARD CABLE —

- Ensure that the keyboard cable is firmly connected to the computer.
- Shut down the computer (see "Before Working Inside Your Computer" on page 144), reconnect the keyboard cable as shown on the setup diagram for your computer, and then restart the computer.
- Ensure that the cable is not damaged or frayed and check cable connectors for bent or broken pins. Straighten any bent pins.
- Remove any keyboard extension cables and connect the keyboard directly to the computer.

TEST THE KEYBOARD — Connect a properly working keyboard to the computer, then try using the keyboard.

RUN THE HARDWARE TROUBLESHOOTER — See "Troubleshooting Software and Hardware Problems" on page 136.

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 106.

ENSURE THAT THE POWER CABLE IS FIRMLY CONNECTED TO THE COMPUTER AND TO THE ELECTRICAL OUTLET

The computer stops responding

NOTICE: You may 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), and then restart your computer.

A program stops responding

END THE PROGRAM —

1 Press <Ctrl><Shift><Esc> simultaneously to access the Task Manager.
2 Click the **Applications** tab.
3 Click to select the program that is no longer responding.
4 Click **End Task**.

A program crashes repeatedly

NOTE: Most software includes installation instructions in its documentation or on a floppy disk, CD, or DVD.

CHECK THE SOFTWARE DOCUMENTATION — If necessary, uninstall and then reinstall the program.

A program is designed for an earlier Windows operating system

RUN THE PROGRAM COMPATIBILITY WIZARD —

Windows XP:

The Program Compatibility Wizard configures a program so that it runs in an environment similar to non-XP operating system environments.

1 Click **Start**→ **All Programs**→ **Accessories**→ **Program Compatibility Wizard**→ **Next**.
2 Follow the instructions on the screen.

Windows Vista:

The Program Compatibility Wizard configures a program so that it runs in an environment similar to non-Windows Vista operating system environments.

1 Click **Start** → **Control Panel**→ **Programs**→ **Use an older program with this version of Windows.**

2 In the welcome screen, click **Next**.

3 Follow the instructions on the screen.

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), and 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, CDS, OR DVDS

SAVE AND CLOSE ANY OPEN FILES OR PROGRAMS AND SHUT DOWN YOUR COMPUTER THROUGH THE START MENU

Memory Problems

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions 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 (see "Installing Memory" on page 156).

- Reseat the memory modules (see "Memory" on page 155) to ensure that your computer is successfully communicating with the memory.
- Run the Dell Diagnostics (see "Dell Diagnostics" on page 111).

IF YOU EXPERIENCE OTHER MEMORY PROBLEMS —

- Reseat the memory modules (see "Memory" on page 155) to ensure that your computer is successfully communicating with the memory.
- Ensure that you are following the memory installation guidelines (see "Installing Memory" on page 156).
- Ensure that the memory you are using is supported by your computer. For more information about the type of memory supported by your computer, see "Memory" on page 155.
- Run the Dell Diagnostics (see "Dell Diagnostics" on page 111).

Mouse Problems

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

CHECK THE MOUSE CABLE —

- Ensure that the cable is not damaged or frayed and check cable connectors for bent or broken pins. Straighten any bent pins.
- Remove any mouse extension cables, and connect the mouse directly to the computer.
- Verify that the mouse cable is connected as shown on the setup diagram for your computer.

RESTART THE COMPUTER —

1. Simultaneously press <Ctrl><Esc> to display the **Start** menu.
2. Press <u>, press the up- and down-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 setup diagram.
4. Turn on the computer.

TEST THE MOUSE — Connect a properly working mouse to the computer, then try using the mouse.

CHECK THE MOUSE SETTINGS —

Windows XP

1. Click **Start**→ **Control Panel**→ **Mouse**.
2. Adjust the settings as needed.

Windows Vista:

1 Click **Start** → **Control Panel**→ **Hardware and Sound**→ **Mouse**.

2 Adjust the settings as needed.

REINSTALL THE MOUSE DRIVER — See "Drivers" on page 133.

RUN THE HARDWARE TROUBLESHOOTER — "Troubleshooting Software and Hardware Problems" on page 136.

Network Problems

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

CHECK THE NETWORK CABLE CONNECTOR — Ensure that the network cable is firmly inserted into the network connector on the back of the computer and the network jack.

CHECK THE NETWORK LIGHTS ON THE BACK OF THE COMPUTER — If the link integrity light is off (see "Back Panel Connectors" on page 24), no network communication is occurring. 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.

RUN THE HARDWARE TROUBLESHOOTER — See "Troubleshooting Software and Hardware Problems" on page 136.

Power Problems

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

IF THE POWER LIGHT IS GREEN AND THE COMPUTER IS NOT RESPONDING — See "Diagnostic Lights" on page 106.

IF THE POWER LIGHT IS BLINKING GREEN — The computer is in standby mode. Press a key on the keyboard, move the mouse, or press the power button 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 in the power connector on the back of the computer and the electrical outlet.

- Bypass power strips, power extension cables, and other power protection devices to verify that the computer turns on properly.
- Ensure that any power strips being used are plugged into an electrical outlet and are turned on.
- 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 (see "System Board Components" on page 150).

IF THE POWER LIGHT IS BLINKING AMBER — The computer is receiving electrical power, but an internal power problem may exist.

- Ensure that the voltage selection switch is set to match the AC power at your location (if applicable).

Ensure that all components and cables are properly installed and securely connected to the system board (see "System Board Components" on page 150 and "System Board Components" on page 212).

IF THE POWER LIGHT IS STEADY AMBER — A device may be malfunctioning or incorrectly installed.

- Ensure that the processor power cable is securely connected to the system board power connector (POWER2) (see "System Board Components" on page 150).
- Remove and then reinstall all memory modules (see "Memory" on page 155).
- Remove and then reinstall any expansion cards, including graphics cards (see "Removing a PCI or PCI Express x16 Card" on page 163).

ELIMINATE INTERFERENCE — Some possible causes of interference are:

- Power, keyboard, and mouse extension cables
- Too many devices connected to the same power strip
- Multiple power strips connected to the same electrical outlet

Printer Problems

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions 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 —

Windows XP:

1. Click **Start**→ **Control Panel**→ **Printers and Other Hardware**→ **View installed printers or fax printers**.
2. If the printer is listed, right-click the printer icon.
3. Click **Properties**→ **Ports**. 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**.

Windows Vista:

1. Click **Start** → **Control Panel**→ **Hardware and Sound**→ **Printer**.
2. If the printer is listed, right-click the printer icon.
3. Click **Properties** and click **Ports**.
4. Adjust the settings, as needed.

REINSTALL THE PRINTER DRIVER —

See the printer documentation for information on reinstalling the printer driver.

Scanner Problems

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

NOTE: If you need technical assistance for your scanner, contact the scanner's manufacturer.

CHECK THE SCANNER DOCUMENTATION — See the scanner documentation for setup and troubleshooting information.

UNLOCK THE SCANNER — Ensure that your scanner is unlocked (if the scanner has a locking tab or button).

RESTART THE COMPUTER AND TRY THE SCANNER AGAIN

CHECK THE CABLE CONNECTIONS —

- See the scanner documentation for information on cable connections.

- Ensure that the scanner cables are securely connected to the scanner and the computer.

VERIFY THAT THE SCANNER IS RECOGNIZED BY MICROSOFT WINDOWS —

Windows XP:

1 Click **Start**→ **Control Panel**→ **Printers and Other Hardware**→ **Scanners and Cameras**.

2 If your scanner is listed, Windows recognizes the scanner.

Windows Vista:

1 Click **Start** → **Control Panel**→ **Hardware and Sound**→ **Scanners and Cameras**.

2 If the scanner is listed, Windows recognizes the scanner.

REINSTALL THE SCANNER DRIVER — See the scanner documentation for instructions.

Sound and Speaker Problems

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

No sound from speakers

NOTE: The volume control in MP3 and other media players may override the Windows volume setting. Always check to ensure that the volume on the media player(s) has not been turned 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 a sound 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.

ELIMINATE POSSIBLE INTERFERENCE — Turn off nearby fans, fluorescent lights, or

halogen lamps to check for interference.

RUN THE SPEAKER DIAGNOSTICS

REINSTALL THE SOUND DRIVER — See "Drivers" on page 133.

RUN THE HARDWARE TROUBLESHOOTER — See "Troubleshooting Software and Hardware Problems" on page 136.

No sound from headphones

CHECK THE HEADPHONE CABLE CONNECTION — Ensure that the headphone cable is securely inserted into the headphone connector (see "Front View" on page 21 and "Back View" on page 23).

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

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

NOTICE: If your computer came with a PCI graphics card installed, removal of the card is not necessary when installing additional graphics cards; however, the card is required for troubleshooting purposes. If you remove the card, store it in a safe and secure location. For information about your graphics card, go to support.dell.com.

The screen is blank

NOTE: For troubleshooting procedures, see the monitor's documentation.

The screen is difficult to read

CHECK THE MONITOR CABLE CONNECTION —

- Ensure that the monitor cable is connected to the correct graphics card (for dual graphics card configurations).
- If you are using the optional DVI-to-VGA adapter, ensure that the adapter is correctly attached to the graphics card and monitor.
- Ensure that the monitor cable is connected as shown on the setup diagram for your computer.
- Remove any video extension cables and connect the monitor directly to the computer.

- Swap the computer and monitor power cables to determine if the monitor's power cable is defective.
- Check the connectors 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 lit or blinking, the monitor has power.
- If the power light is off, firmly press the button to ensure that the monitor is turned on.
- If the power light is blinking, press a key on the keyboard or move the mouse to resume normal operation.

TEST THE ELECTRICAL OUTLET — Ensure that the electrical outlet is working by testing it with another device, such as a lamp.

CHECK THE DIAGNOSTIC LIGHTS — See "Diagnostic Lights" on page 106.

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 positioned at least 60 centimeters (2 feet) 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.

ROTATE THE MONITOR TO ELIMINATE SUNLIGHT GLARE AND POSSIBLE INTERFERENCE

ADJUST THE WINDOWS DISPLAY SETTINGS —

Windows XP:

1 Click **Start**→ **Control Panel**→ **Appearance and Themes**.
2 Click the area you want to change or click the **Display** icon.
3 Try different settings for **Color quality** and **Screen resolution**.

Windows Vista:

1 Click **Start** → **Control Panel**→ **Hardware and Sound**→ **Personalization**→ **Display Settings**.
2 Adjust **Resolution** and **Colors settings,** as needed.

3D image quality is poor

CHECK THE GRAPHICS CARD POWER CABLE CONNECTION — Ensure that the power

cable for the graphics card(s) is correctly attached to the card.

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.

If only part of the display is readable

CONNECT AN EXTERNAL MONITOR —

1. Shut down your computer and connect an external monitor to the computer.
2. Turn on the computer and the monitor and adjust the monitor brightness and contrast controls.

If the external monitor works, the computer display or video controller may be defective. Contact Dell (see "Contacting Dell" on page 267).

Power Lights

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

The power button light located on the front of the computer illuminates and blinks or remains solid to indicate different states:

- If the power light is green and the computer is not responding, see "Diagnostic Lights" on page 106.
- If the power light is blinking green, the computer is in standby mode. Press a key on the keyboard, move the mouse, or press the power button 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.
  - 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 (see "System Board Components" on page 150 and "System Board Components" on page 212).
- 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 (see "System Board Components" on page 150 and "System Board Components" on page 212).
- If the power light is steady amber, a device may be malfunctioning or incorrectly installed.
  - Remove and then reinstall the memory modules (see "Memory" on page 155).
  - Remove and then reinstall any cards (see "Cards" on page 157).
- 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

10

Reinstalling Software

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 *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.

Microsoft® Windows® XP

1 Click **Start**→ **Control Panel**.

2 Under **Pick a Category**, click **Performance and Maintenance**, and click **System**.

3 In the **System Properties** window, click the **Hardware** tab, and click **Device Manager**.

Microsoft Windows Vista™

1 Click the Windows Vista start button , 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 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..

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.

Using Windows 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.

Windows XP:

1 Click **Start**→ **My Computer**→ **Properties**→ **Hardware**→ **Device Manager**.

2 Right-click the device for which the new driver was installed and click **Properties**.

3 Click the **Drivers** tab→ **Roll Back Driver**.

Windows Vista:

1 Click the Windows Vista start button , 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 137) to return your computer to the operating state that existed before you installed the new driver.

Manually Reinstalling Drivers

After extracting the driver files to your hard drive as described in the previous section:

Windows XP:

1 Click **Start**→ **My Computer**→ **Properties**→ **Hardware**→ **Device Manager**.

2 Double-click the type of device for which you are installing the driver (for example, **Audio** or **Video**).

3 Double-click the name of the device for which you are installing the driver.

4 Click the **Driver** tab→ **Update Driver**.

5 Click **Install from a list or specific location (Advanced)**→ **Next**.

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 **Next**.

8 Click **Finish** and restart your computer.

Windows Vista:

1 Click the Windows Vista start button , 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 the **Driver** tab→ **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.

Troubleshooting Software and Hardware Problems

If a device is either not detected during the operating system setup or is detected but incorrectly configured, you can use the Hardware Troubleshooter to resolve the incompatibility.

To start the Hardware Troubleshooter:

Windows XP:

1 Click **Start**→ **Help and Support**.

2 Type `hardware troubleshooter` in the search field and press <Enter> to start the search.

3 In the **Fix a Problem** section, click **Hardware Troubleshooter**.

4 In the **Hardware Troubleshooter** list, select the option that best describes the problem and click **Next** to follow the remaining troubleshooting steps.

Windows Vista:

1 Click the Windows Vista start button , and click **Help and Support.**

2 Type `hardware troubleshooter` in the search field and press <Enter> to start the search.

3 In the search results, select the option that best describes the problem and follow the remaining troubleshooting steps.

Restoring Your Operating System

You can restore your operating system in the following ways:

- System Restore returns your computer to an earlier operating state without affecting data files. Use System Restore as the first solution for restoring your operating system and preserving data files.
- Dell PC Restore by Symantec (available in Windows XP) and Dell Factory Image Restore (available in Windows Vista) returns your hard drive to the operating state it was in when you purchased the computer. Both permanently delete all data on the hard drive and remove any programs installed after you received the computer. Use Dell PC Restore or Dell Factory Image Restore only if System Restore did not resolve your operating system problem.
- If you received an *Operating System* disc with your computer, you can use it to restore your operating system. However, using the *Operating System* disc also deletes all data on the hard drive. Use the disc *only* if System Restore did not resolve your operating system problem.

Using Microsoft Windows System Restore

The Windows operating systems provide a System Restore option which allows 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. Any changes that System Restore makes to your computer are completely reversible.

NOTICE: Make regular backups of your data files. System Restore does not monitor your data files or recover them.

NOTE: The procedures in this document were written for the Windows default view, so they may not apply if you set your Dell™ computer to the Windows Classic view.

Starting System Restore

Windows XP:

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 **Start**→ **All Programs**→ **Accessories**→ **System Tools**→ **System Restore**.

2 Click either **Restore my computer to an earlier time** or **Create a restore point**.

3 Click **Next** and follow the remaining on-screen prompts.

Windows Vista:

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 can 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.

Windows XP:

1 Click **Start**→ **All Programs**→ **Accessories**→ **System Tools**→ **System Restore**.

2 Click **Undo my last restoration** and click **Next**.

Windows Vista:

1 Click **Start** .

2 In the Start Search box, type `System Restore` and press <Enter>.

3 Click **Undo my last restoration** and click **Next**.

Enabling System Restore

NOTE: Windows Vista does not disable System Restore, regardless of low disk space. Therefore, the steps below apply only to Windows XP.

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 **Start**→ **Control Panel**→ **Performance and Maintenance**→ **System**.
2. Click the **System Restore** tab and ensure that **Turn off System Restore** is unchecked.

Using Dell™ PC Restore and Dell Factory Image Restore

NOTICE: Using Dell PC Restore or Dell Factory Image Restore permanently deletes all data on the hard drive and removes any programs or drivers installed after you received your computer. If possible, back up the data before using these options. Use PC Restore or Dell Factory Image Restore only if System Restore did not resolve your operating system problem.

NOTE: Dell PC Restore by Symantec and Dell Factory Image Restore may not be available in certain countries or on certain computers.

Use Dell PC Restore (Windows XP) or Dell Factory Image Restore (Windows Vista) only as the last method to restore your operating system. These options restore your hard drive to the operating state it was in when you purchased the computer. Any programs or files added since you received your computer—including data files—are permanently deleted from the hard drive. Data files include documents, spreadsheets, e-mail messages, digital photos, music files, and so on. If possible, back up all data before using PC Restore or Factory Image Restore.

Windows XP: Dell PC Restore

Using PC Restore:

1. Turn on the computer.

   During the boot process, a blue bar with **www.dell.com** appears at the top of the screen.

2. Immediately upon seeing the blue bar, press <Ctrl><F11>.

   If you do not press <Ctrl><F11> in time, let the computer finish starting, and then restart the computer again.

NOTICE: If you do not want to proceed with PC Restore, click **Reboot**.

3. Click **Restore** and click **Confirm**.

   The restore process takes approximately 6 to 10 minutes to complete.

4. When prompted, click **Finish** to reboot the computer.

NOTE: Do not manually shut down the computer. Click **Finish** and let the computer completely reboot.

5 When prompted, click **Yes**.

The computer restarts. Because the computer is restored to its original operating state, the screens that appear, such as the End User License Agreement, are the same ones that appeared the first time the computer was turned on.

6 Click **Next**.

The **System Restore** screen appears and the computer restarts.

7 After the computer restarts, click **OK**.

Removing PC Restore:

NOTICE: Removing Dell PC Restore from the hard drive permanently deletes the PC Restore utility from your computer. After you have removed Dell PC Restore, you will not be able to use it to restore your computer operating system.

Dell PC Restore enables you to restore your hard drive to the operating state it was in when you purchased your computer. It is recommended that you *do not* remove PC Restore from your computer, even to gain additional hard-drive space. If you remove PC Restore from the hard drive, you cannot ever recall it, and you will never be able to use PC Restore to return your computer operating system to its original state.

1 Log on to the computer as a local administrator.

2 In Microsoft Windows Explorer, go to **c:\dell\utilities\DSR**.

3 Double-click the filename **DSRIRRemv2.exe**.

NOTE: If you do not log on as a local administrator, a message appears stating that you that you must log on as administrator. Click **Quit**, and then log on as a local administrator.

NOTE: If the partition for PC Restore does not exist on your computer hard drive, a message appears stating that the partition was not found. Click **Quit**; there is no partition to delete.

4 Click **OK** to remove the PC Restore partition on the hard drive.

5 Click **Yes** when a confirmation message appears.

The PC Restore partition is deleted and the newly available disk space is added to the free space allocation on the hard drive.

6 Right-click **Local Disk (C)** in Windows Explorer, click **Properties**, and verify that the additional disk space is available as indicated by the increased value for **Free Space**.

7 Click **Finish** to close the **PC Restore Removal** window and restart the computer.

Windows Vista: Dell Factory Image Restore

1 Turn on the computer. When the Dell logo appears, press <F8> several times to access the Vista Advanced Boot Options Window.

2 Select **Repair Your Computer**.

The System Recovery Options window appears.

3 Select a keyboard layout and click **Next**.

4 To access the recovery options, log on as a local user. To access the command prompt, type `administrator` in the User name field, then click **OK**.

5 Click **Dell Factory Image Restore**.

NOTE: Depending upon your configuration, you may need to select **Dell Factory Tools**, then **Dell Factory Image Restore**.

The Dell Factory Image Restore welcome screen appears.

6 Click **Next.**

The Confirm Data Deletion screen appears.

NOTICE: If you do not want to proceed with Factory Image Restore, click **Cancel**.

7 Click the checkbox to confirm that you want to continue reformatting the hard drive and restoring the system software to the factory condition, then click **Next**.

The restore process begins and may take five or more minutes to complete. A message appears when the operating system and factory-installed applications have been restored to factory condition.

8 Click **Finish** to reboot the system.

Using the Operating System Media

Before you Begin

If you are considering reinstalling the Windows operating system to correct a problem with a newly installed driver, first try using Windows Device Driver Rollback. See "Using Windows Device Driver Rollback" on page 134. If Device Driver Rollback does not resolve the problem, then use System Restore to return your operating system to the operating state it was in before you installed the new device driver. See "Using Microsoft Windows System Restore" on page 137.

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, you need the following items:

- Dell™ *Operating System* media
- Dell *Drivers and Utilities* media

NOTE: The Dell *Drivers and Utilities* media contains drivers that were installed during the assembly of the computer. Use the Dell *Drivers and Utilities* media to load any required drivers. Depending on the region from which you ordered your computer, or whether you requested the media, the Dell *Drivers and Utilities* media and *Operating System* media may not ship with your computer.

Reinstalling Windows XP or 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.

NOTICE: The *Operating System* media provides options for reinstalling Windows XP. The options can overwrite files and possibly affect programs that are installed on your hard drive. Therefore, do not reinstall Windows XP unless a Dell technical support representative instructs you to do so.

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.

11

Adding and Replacing Parts

Before You Begin

This section 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 143 and "Before Working Inside Your Computer" on page 144.
- You have read the safety information in the Dell™ *Product Information Guide*.
- A component can be replaced or—if purchased separately—installed by performing the removal procedure in reverse order.

Recommended Tools

The procedures in this document may require the following tools:

- Small flat-blade screwdriver
- Small Phillips screwdriver
- Small plastic scribe
- Flash BIOS update program CD

Turning Off Your Computer

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

1. Shut down the operating system:
   a. Save and close all open files and exit all open programs.
   b. *In the Microsoft® Windows® XP operating system*, click **Start→ Shut Down→ Shut down**.

In Microsoft® Windows Vista™, click the Windows Vista Start button , in the lower-left corner of the desktop, click the arrow in the lower-right corner of the Start menu as shown below, and then click **Shut Down**.

The computer turns off after the operating system shutdown process is complete.

2 Ensure that the computer and all attached devices are turned off. If your computer and attached devices did not automatically turn off when you shut down your operating system, press and hold the power button for about 4 seconds to turn them off.

Before Working Inside Your Computer

Use the following safety guidelines to help protect your computer from potential damage and to help to 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: To guard against electrical shock, laceration by moving fan blades, or other unexpected injuries, always unplug your computer from the electrical outlet before opening the cover.

CAUTION: Do not operate your computer with any covers removed, such as the computer cover, bezels, filler brackets, and front panels.

NOTICE: 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 pull-tab, not on the cable itself. Some cables have connectors 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 (see "Turning Off Your Computer" on page 143).

CAUTION: Never apply power to the computer when the cover has been removed.

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

CAUTION: Disconnect all telephone or network cables from the computer.

2 Disconnect your computer and all attached devices from their electrical outlets.

3 Press the power button to ground the system board.

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 static electricity, which could harm internal components.

12

Mini Tower Computer Parts

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, laceration by moving fan blades, or other unexpected injuries, always unplug your computer from the electrical outlet before removing the cover.

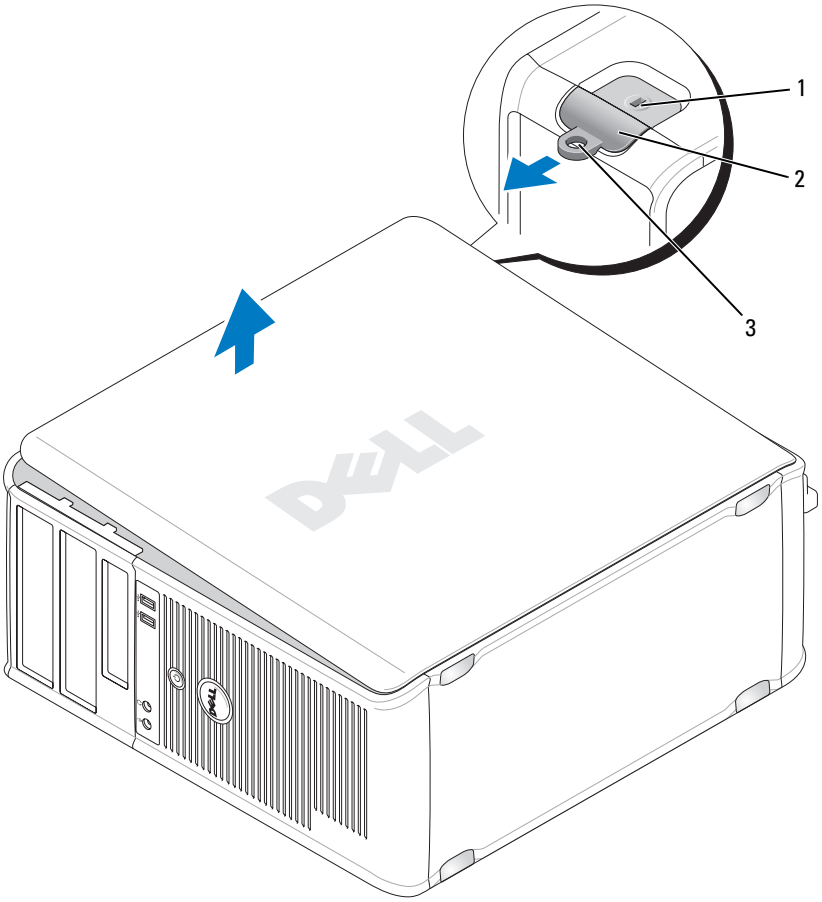
CAUTION: Some of the parts described in this chapter may be replacable by a certified service technician only and are not custom replacable.

1 Follow the procedures in "Before You Begin" on page 143.

NOTE: Ensure that sufficient space exists to support the removed cover.

NOTICE: Ensure that you are working on a level, protected surface to avoid scratching either the computer or the surface on which it is resting.

2 Lay your computer on its side with the computer cover facing up.

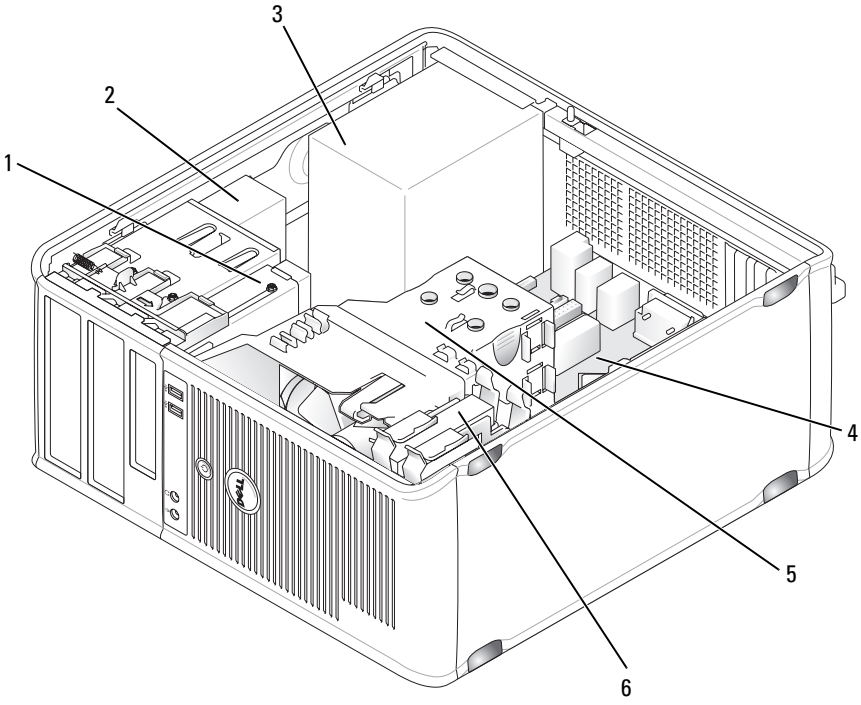


1	security cable slot	2	cover release latch
3	padlock ring		

3 Release the computer cover by pulling it away from the front of the computer and lifting it up.

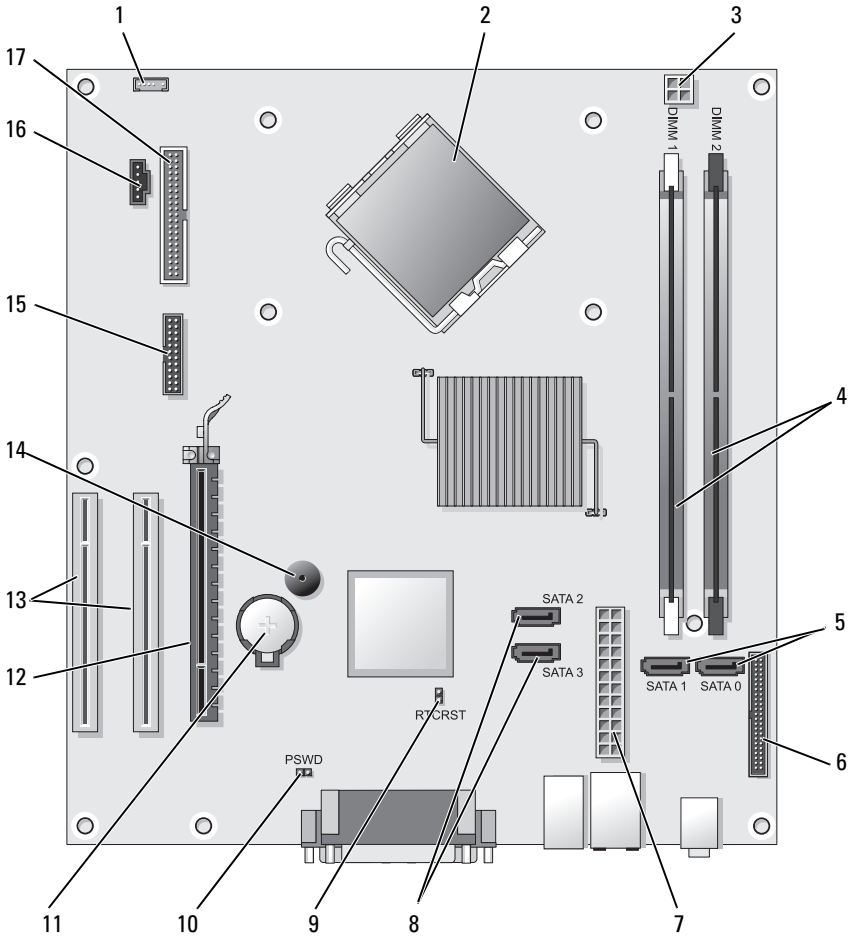
4 Set the cover aside in a secure location.

Inside View of Your Computer



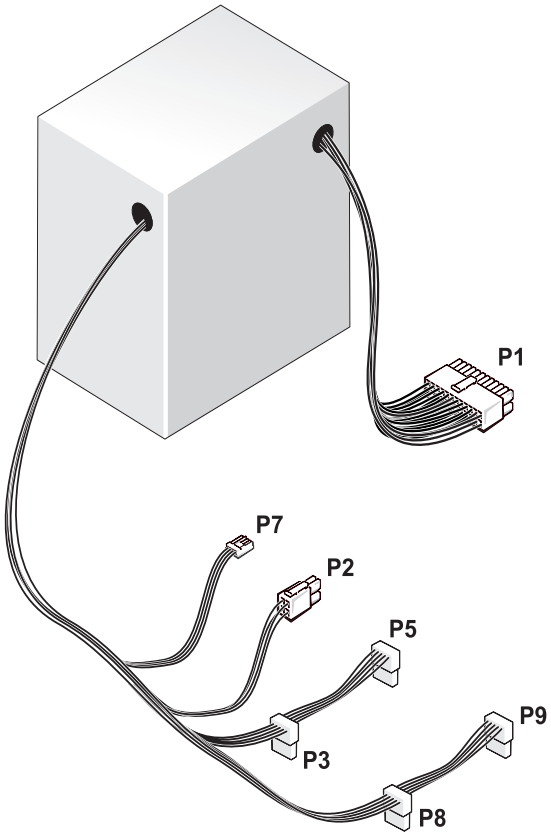
1	floppy drive	2	optical drive
3	power supply	4	system board
5	heat sink assembly	6	hard drive

System Board Components

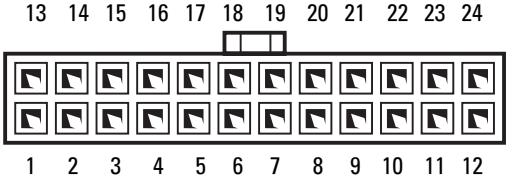


1	internal speaker connector (INT_SPKR)	2	processor connector (CPU)
3	processor power connector (12VPOWER)	4	memory module connectors (DIMM_1, DIMM_2)
5	SATA drive connectors (SATA0, SATA1)	6	front-panel connector (FRONTPANEL)
7	power connector (POWER)	8	SATA drive connectors (SATA2, SATA3)
9	RTC reset jumper (RTCRST)	10	password jumper (PSWD)
11	battery socket (BATTERY)	12	PCI Express x16 card connector (SLOT1)
13	PCI card connectors (SLOT2 and SLOT3)	14	internal buzzer (SPKR)
15	serial/ PS/2 connector (PS2/SER2)	16	fan connector (FAN_CPU)
17	floppy drive connector (FLOPPY)		

Power Supply DC Connector Pin Assignments



DC Power Connector P1

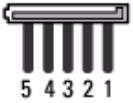


Pin Number	Signal name	Wire Color	Wire Size
1	3.3 V	Orange	20 AWG
2	3.3 V	Orange	20 AWG
3	RTN	Black	20 AWG
4	5 V	Red	20 AWG
5	RTN	Black	20 AWG
6	5 V	Red	20 AWG
7	RTN	Black	20 AWG
8	POK	Gray	22 AWG
9	5 V AUX	Purple	20 AWG
10	+12 V	Yellow	20 AWG
11	+12 V	Yellow	20 AWG
12	3.3 V	Orange	20 AWG
13	3.3 V	Orange	20 AWG
14	-12 V	Blue	22 AWG
15	RTN	Black	20 AWG
16	PS_ON	Green	22 AWG
17	RTN	Black	20 AWG
18	RTN	Black	20 AWG
19	RTN	Black	20 AWG
20	OPEN		
21	5 V	Red	20 AWG
22	5 V	Red	20 AWG
23	5 V	Red	20 AWG
24	RTN	Black	20 AWG

DC Power Connector P2

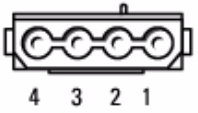
Pin Number	Signal Name	18-AWG Wire
1	GND	Black
2	GND	Black
3	+12 VADC	Yellow
4	+12 VADC	Yellow

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
4	GND	Black
5	+12 VBDC	White

DC Power Connector P7



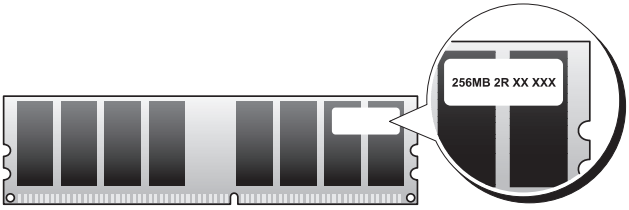
Pin Number	Signal Name	22-AWG Wire
1	+5 VDC	Red
2	GND	Black
3	GND	Black
4	+12 VADC	Yellow

Memory

You can increase your computer memory by installing memory modules on the system board. Your computer supports DDR2 memory. For information on the type of memory supported by your computer, see the "Memory" section of the specifications for your computer:

- Mini Tower — "Mini Tower Specifications" on page 27
- Desktop — "Desktop Computer Specifications" on page 39

NOTICE: Do not install ECC or buffered memory modules. Only unbuffered, non-ECC memory is supported.



Installation Guidelines

- If a single DIMM is installed, you must install it in connector DIMM_1.
- For best performance, memory modules should be installed in *pairs of matched memory size, speed, and technology.* If the memory modules are not installed in matched pairs, the computer will operate, but with a slight reduction in performance (see the label on the module to determine the module's capacity). For example, if you install a mixed pair of DDR2 667-MHz and DDR2 800-MHz memory, the modules function at the slowest speed installed.

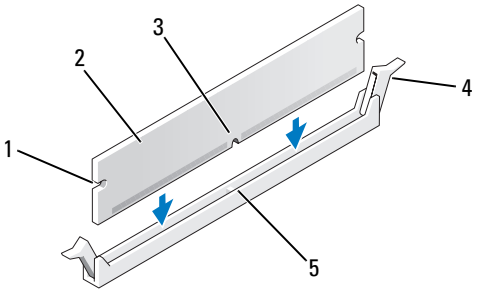
NOTE: Memory purchased from Dell is covered under your computer warranty.

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.

1. Follow the procedures in "Before You Begin" on page 143.
2. Remove the computer cover (see "Removing the Computer Cover" on page 147).
3. Press the securing clip at each end of the memory module connector.



1	cutouts (2)	2	memory module
3	notch	4	securing clip (2)
5	crossbar		

4. Align the notch on the bottom of the module with the crossbar in the connector.

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 Replace the computer cover.

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

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

8 Right-click the **My Computer** icon and click **Properties**.

9 Click the **General** tab.

10 To verify that the memory is installed correctly, check the amount of memory (RAM) listed.

Removing 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.

1 Follow the procedures in "Before You Begin" on page 143.

2 Remove the computer cover (see "Removing the Computer Cover" on page 147).

3 Press out the securing clip at each end of the memory module connector.

4 Grasp the module at the end of the board and lift up.

5 Replace the computer cover.

Cards

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 provides the following slots for PCI and PCI Express cards:

- One PCI Express x16 card slot (SLOT1)
- Two PCI card slots (SLOT2, SLOT3)

See "System Board Components" on page 150 for card slot location.

PCI and PCI Express Cards

Your computer supports two PCI cards and one PCI Express x16 card.

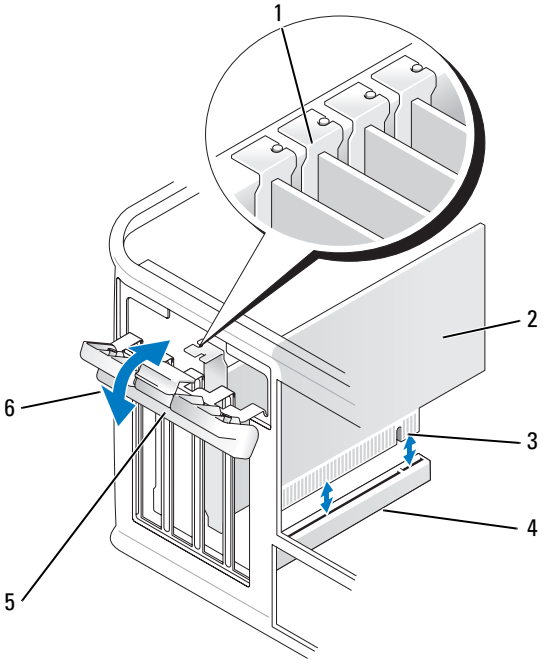
NOTICE: PCI Express graphics cards that run higher than 75 W require an additional cooling fan installed. Otherwise, your card could overheat and damage your computer.

If a card fan is not present in your computer and you are installing a graphics card that runs at 75 W or higher, Contact Dell to purchase a card fan.

- If you are installing or replacing a card, follow the procedures in the next section.
- If you are removing but not replacing a card, see "Removing a PCI or PCI Express x16 Card" on page 163.
- If you are replacing a card, remove the current driver for the card from the operating system.

Installing PCI and PCI Express x16 Cards

1. Follow the procedures in "Before You Begin" on page 143.
2. Remove the computer cover (see "Removing the Computer Cover" on page 147).



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

3 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.

4 Open the card retention mechanism that secures the card in place from the top:

a Place your thumb on the top of the card retention mechanism and grip the bottom of the retention mechanism with your fingers.

b With your free hand, gently squeeze the sides of the card retention mechanism to release it from the tab slots holding it in place.

c Pivot the card retention mechanism outward to release it from the two tab slots.

5 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.

- For a PCI card, grasp the card by its top corners, and ease it out of its connector.
- For a PCI Express x16 card, pull the securing tab, grasp the card by its top corners, and then ease it out of its connector.

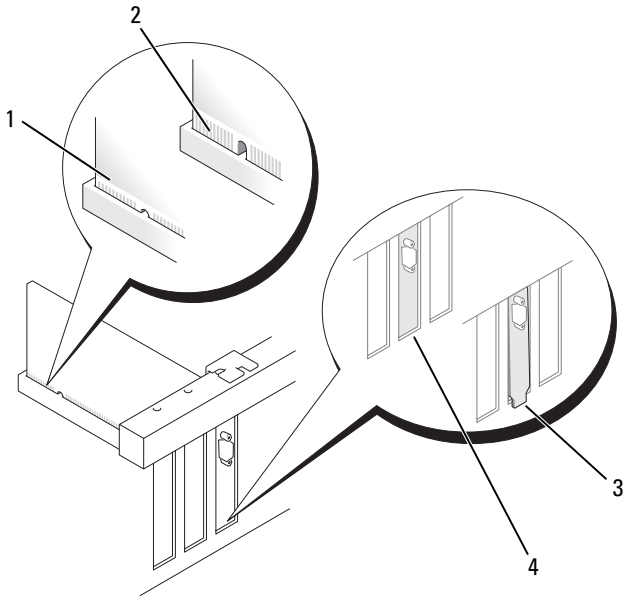
NOTE: The position of the card shown in the illustration is indicative and may vary from the original.

6 Prepare the 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.

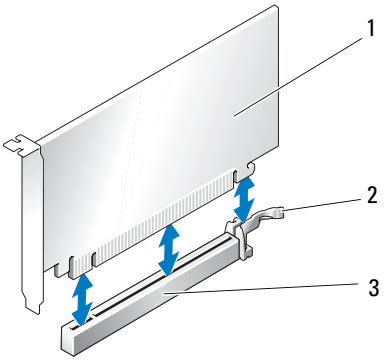
CAUTION: Some network adapters automatically start the computer when they are connected to a network. To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any cards.

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



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

8 If you are installing the PCI Express card into the x16 card connector, position the card so the securing slot is aligned with the securing tab.



1	PCI Express x16 card	2	PCI Express x16 securing tab
3	PCI Express x16 card slot		

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

10 Pivot and secure the card retention latch

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

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

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

12 Replace the computer cover.

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

13 Reconnect your computer and devices to electrical outlets, and then turn them on.

14 If you installed a sound card:

a Enter system setup (see "Entering System Setup" on page 79), go to **Onboard Devices** and select **Integrated Audio**, and then change the setting to **Off**.

b Connect external audio devices to the sound card's connectors. Do not connect external audio devices to the microphone, speaker/headphone, or line-in connectors on the back panel (see "Back Panel Connectors" on page 24).

15 If you installed an add-in network adapter and want to disable the integrated network adapter:

a Enter system setup (see "Entering System Setup" on page 79), go to **Onboard Devices** and select **Integrated NIC,** and then change the setting to **Off**.

b Connect the network cable to the add-in network adapter's connectors. Do not connect the network cable to the integrated connector on the back panel (see "Back Panel Connectors" on page 24).

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

Removing a PCI or PCI Express x16 Card

1 Follow the procedures in "Before You Begin" on page 143.

2 Remove the computer cover (see "Removing the Computer Cover" on page 147).

3 Remove the screw holding the card retention bracket.

4 Lift the card retention bracket and set it aside in a secure location.

5 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.

- For a PCI card, grasp the card by its top corners, and ease it out of its connector.
- For a PCI Express x16 card, pull the securing tab, grasp the card by its top corners, and then 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 Replace the card retention bracket, ensuring that:
   - The guide clamp is aligned with the guide notch.
   - 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 Fix the card retention bracket by replacing and tightening the screw.
9 Replace the computer cover.

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

10 Reconnect the computer and devices to electrical outlets, and then turn them on.
11 Remove the card's driver from the operating system.
12 If you removed a sound card:
   a Enter system setup (see "Entering System Setup" on page 79), go to **Onboard Devices** and select **Integrated Audio**, and then change the setting to **On**.
   b Connect external audio devices to the audio connectors on the back panel of the computer (see "Back Panel Connectors" on page 24).
13 If you removed an add-in network connector:
   a Enter system setup (see "Entering System Setup" on page 79), go to **Onboard Devices** and select **Integrated NIC**, and then change the setting to **On**.
   b Connect the network cable to the integrated connector on the back panel of the computer (see "Back Panel Connectors" on page 24).

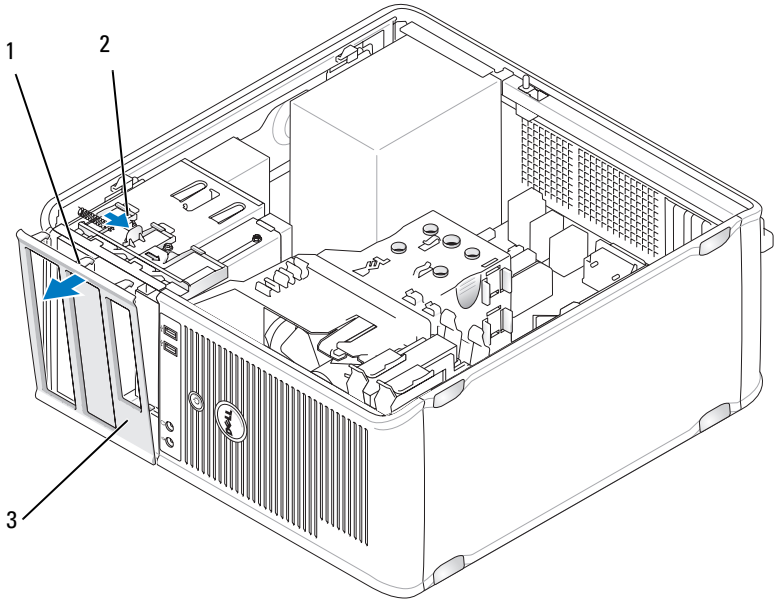
Bezel

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, laceration by moving fan blades, or other unexpected injuries, always unplug your computer from the electrical outlet before removing the cover.

Removing the Bezel

1. Follow the procedures in "Before You Begin" on page 143.
2. Remove the computer cover (see "Removing the Computer Cover" on page 147).



1	bezel clamps (3)	2	clamp release tab
3	bezel		

3. Push down on the clamp release tab to release the bezel clamps from the front panel.
4. Rotate and pull the bezel away from the front of the computer to release bezel clamps from bezel clamp slot.
5. Set aside the bezel in a secure location.

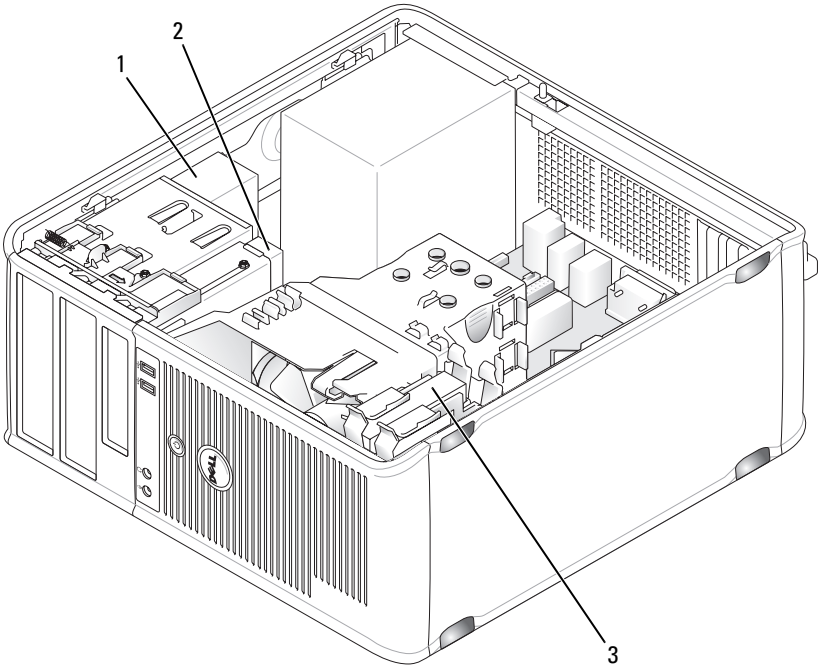
Replacing the Bezel

1. Align and insert the bezel clamps in the bezel clamp slots.
2. Rotate the bezel toward the computer until it snaps into place on the front panel.

Drives

Your computer supports a combination of these devices:

- Up to two serial ATA hard drives
- One optional floppy drive
- Up to two optical drives



1	optical drive bays (2)	2	floppy drive (optional)
3	hard drive bays (2)		

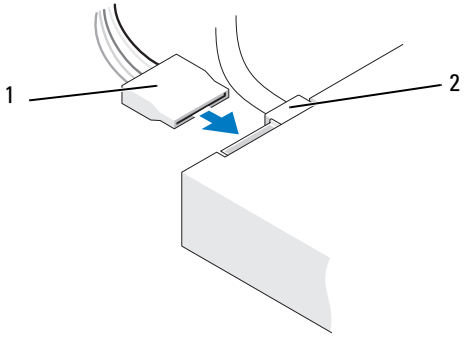
Recommended Drive Cable Connections

- Connect serial ATA hard drives to connectors labeled "SATA0" or "SATA1" on the system board.
- Connect serial ATA CD or DVD drives to connectors labeled "SATA2" or "SATA3" 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.

SATA Connectors

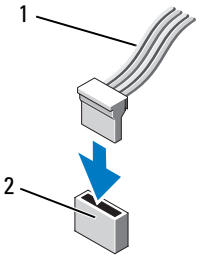


1 power cable 2 data cable

Drive Interface Connectors

The drive cable connectors are keyed for correct insertion. Properly align the cable connector key on the cable and the drive before connecting.

Serial ATA Connector



1 interface cable 2 interface connector

Connecting and Disconnecting Drive Cables

When connecting and disconnecting a serial ATA data cable, disconnect the cable using the pull-tab.

The serial ATA interface connectors are keyed for correct insertion; that is, a notch or a missing pin on one connector matches a tab or a filled-in hole on the other connector.

Hard Drives

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, laceration by moving fan blades, or other unexpected injuries, always unplug your computer from the electrical outlet before removing the 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.

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

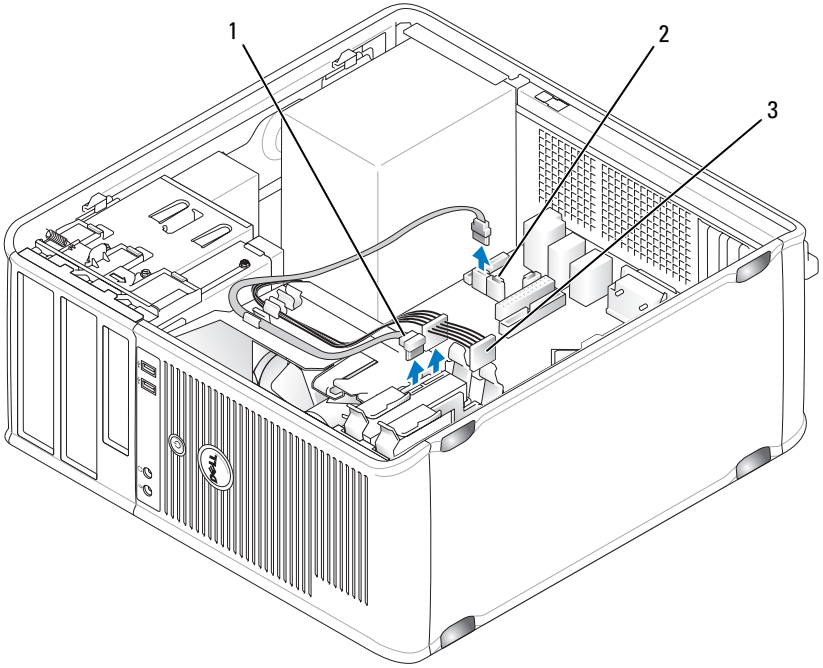
Removing a Hard Drive

1 Follow the procedures in "Before You Begin" on page 143.

2 Remove the computer cover (see "Removing the Computer Cover" on page 147).

3 Disconnect the power and data cables from the drive.

4 Disconnect the data cable from the system board.



1 hard-drive data cable

2 hard-drive data connector on system board

3 power cable

5 Remove the four screws securing the hard drive.

6 Slide the drive out away from the front of the computer.

7 If removing this drive changes the drive configuration, then be sure to reflect these changes in system setup. When you restart your computer, enter system setup (see "System Setup" on page 79), then go to the "Drives" section of the system setup and under **Drive 0 through 3**, set the Drive to the correct configuration.

8 Replace the computer cover (see "Replacing the Computer Cover" on page 207).

NOTICE: To connect a network cable, first plug the cable into the network port or device and then plug it into the computer.

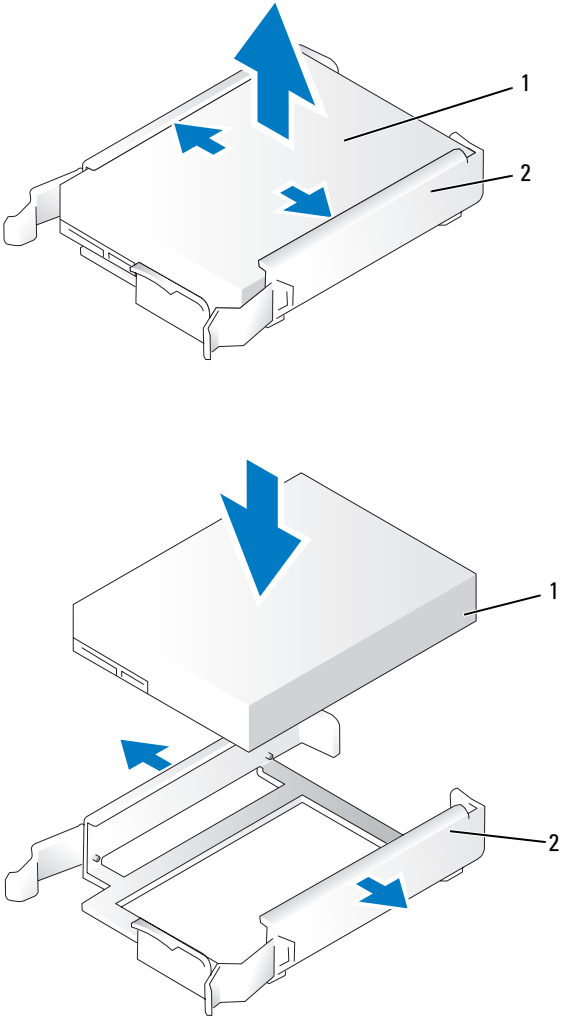
9 Connect your computer and devices to electrical outlets and turn them on.

Installing a Hard Drive

1 Follow the procedures in "Before You Begin" on page 143.

2 Remove the computer cover (see "Removing the Computer Cover" on page 147).

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

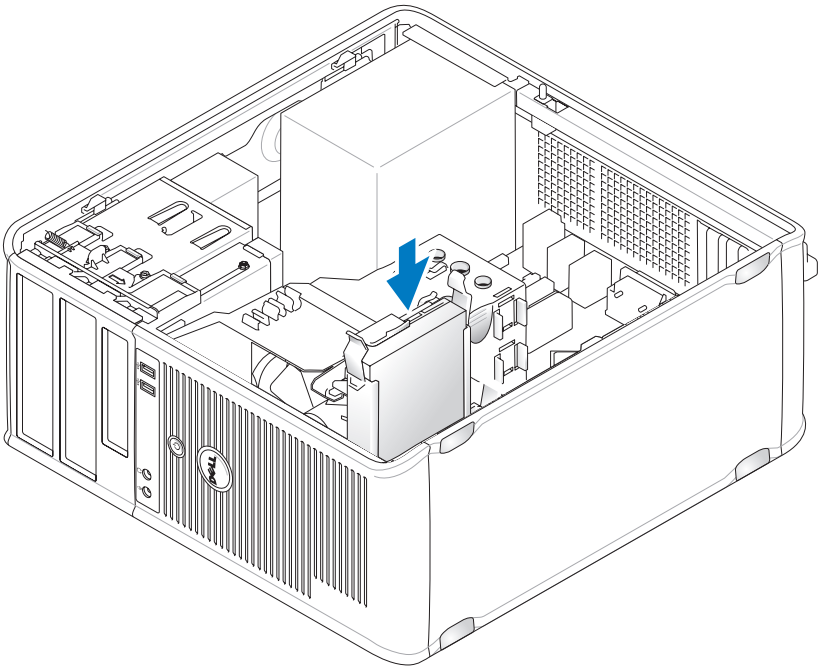


1 hard drive

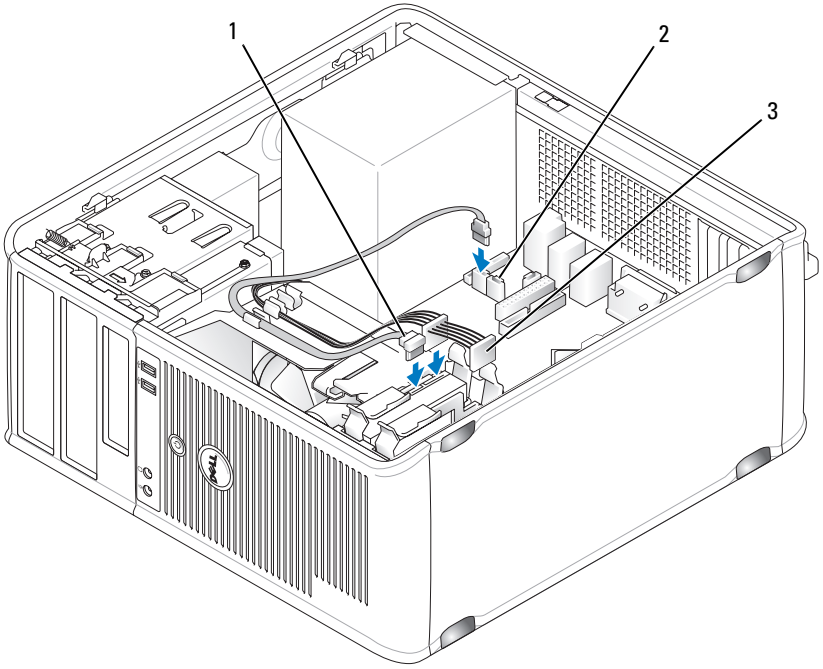
2 hard drive bracket

4 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.
Snap the bracket onto the new drive.

5 Gently slide the hard drive into the drive bay until it clicks into place.



6 Connect the power and data cables to the drive.



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

7 Connect the data cable to the system board.

8 Check all cables to be certain that they are properly connected and firmly seated.

9 Replace the computer cover (see "Replacing the Computer Cover" on page 207).

NOTICE: To connect a network cable, first plug the cable into the network port or device and then plug it into the computer.

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

11 See the documentation that came with the drive for instructions on installing any software required for drive operation.

12 Check the system setup for drive configuration changes (see "Entering System Setup" on page 79).

Installing 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, laceration by moving fan blades, or other unexpected injuries, always unplug your computer from the electrical outlet before removing the 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.

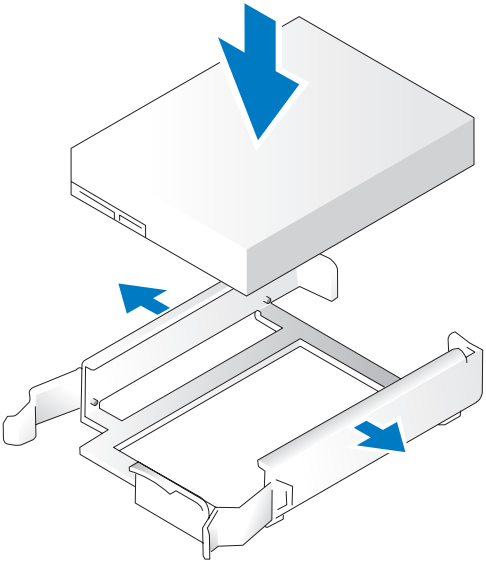
NOTICE: If you are replacing a hard drive that contains data you want to keep, back up your files before you begin this procedure.

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 143.

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 Gently spread the sides of the drive bracket and slide the hard drive into the bracket until the drive clicks into place.



5 Move the first hard drive from the upper bay to the lower bay:

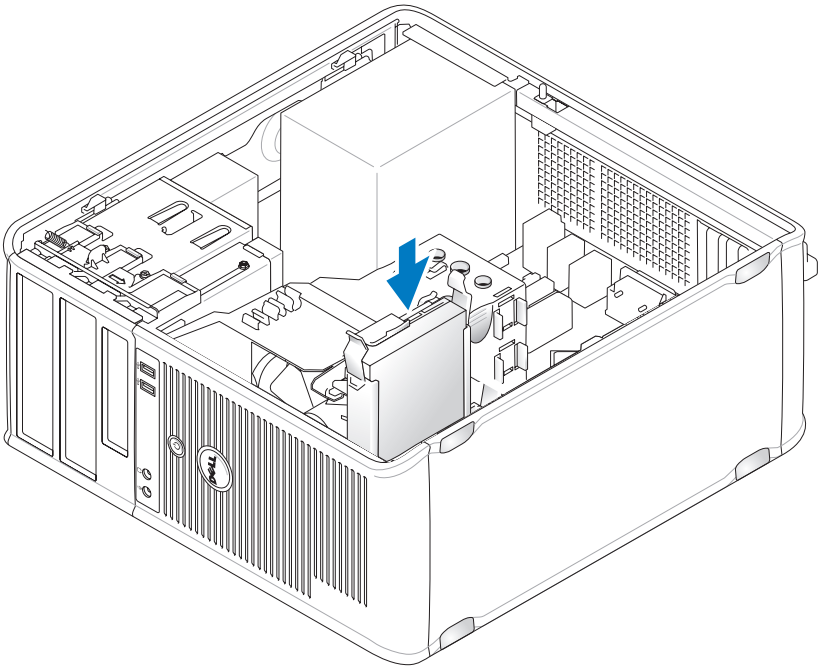
   a Disconnect the power and the data cables from the back of the first hard drive.

   b Press in on the blue release tabs on each side of the drive and slide the first hard drive up and out of the upper bay.

   c Gently slide the first hard drive into the lower bay until it clicks into place.

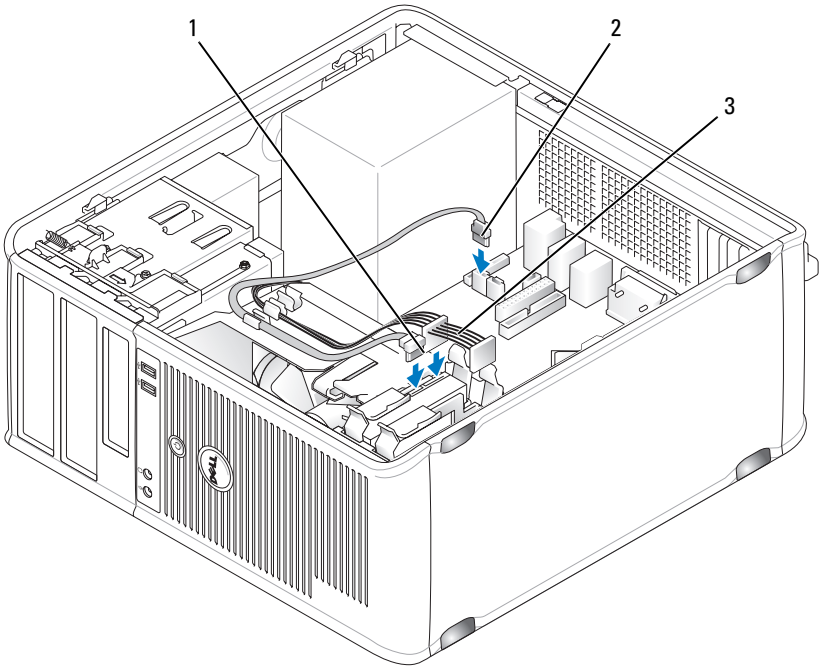
6 Gently slide the new hard drive into the upper bay until it clicks into place.

7 Connect a power cable to each drive.



8 Attach the SATA data cable removed in step 5 to the first hard drive.

9 Locate an unused SATA connector on the system board and attach a drive cable to this connector and to the second hard drive.



1	hard-drive data cable	2	hard-drive data connector on system board (SATA0 or SATA1)
3	power cable		

10 Replace the computer cover (see "Replacing the Computer Cover" on page 207).

NOTICE: To connect a network cable, first plug the cable into the network port or device and then plug it into the computer.

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

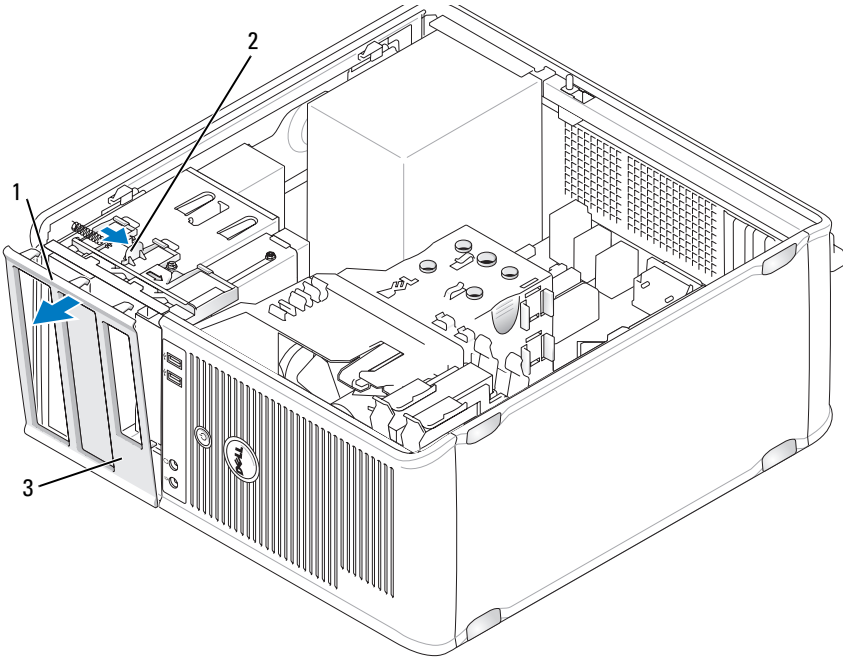
12 See the documentation that came with the drive for instructions on installing any software required for drive operation.

13 Check the system setup for drive configuration changes (see "Entering System Setup" on page 79).

Drive-Panel Inserts

1 Follow the procedures in "Before You Begin" on page 143.

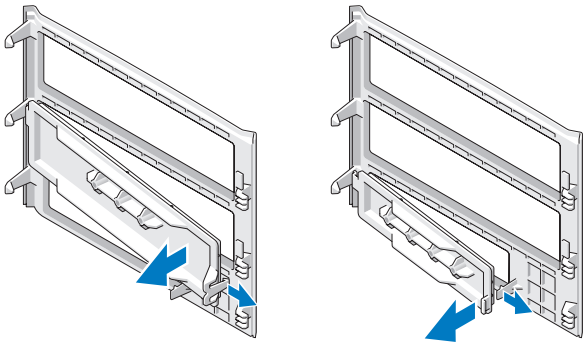
2 Remove the drive panel by sliding the drive release latch downward to open the panel. Then, remove the drive panel from the hinges.



1 drive panel
2 release tab
3 drive-panel insert

3 Find 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.

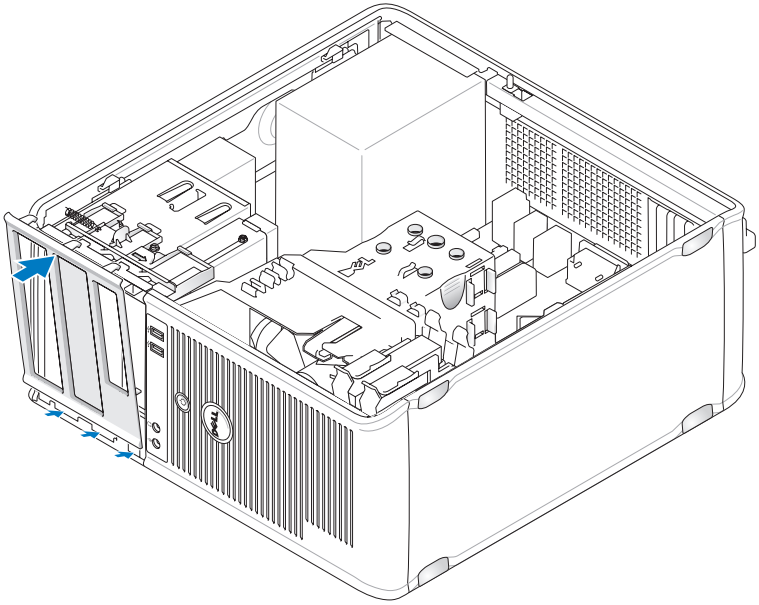


1 optical-drive panel insert

2 floppy-drive panel insert

3 holder for shoulder screws

5 Reattach the drive panel to the front of the computer.
The drive panel only fits when it is correctly oriented.



Floppy Drive

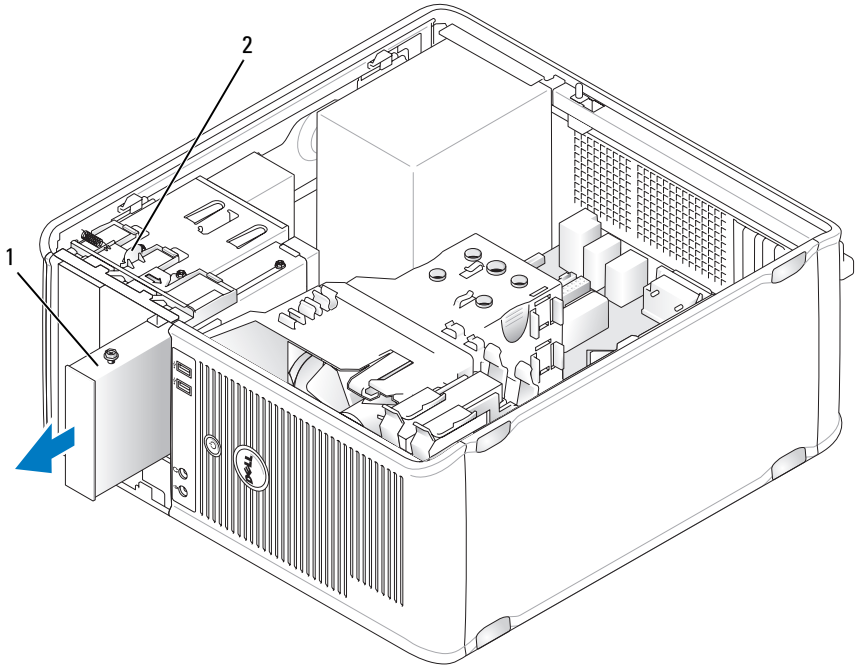
CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

CAUTION: To guard against electrical shock, laceration by moving fan blades, or other unexpected injuries, always unplug your computer from the electrical outlet before removing the cover.

NOTE: If you are adding a floppy drive, see "Installing a Floppy Drive" on page 182.

Removing a Floppy Drive

1. Follow the procedures in "Before You Begin" on page 143.
2. Remove the computer cover (see "Removing the Computer Cover" on page 147).
3. Remove the bezel (see "Removing the Bezel" on page 165).
4. Disconnect the power and data cables from the back of the floppy drive.
5. Disconnect the data cable from the system board.
6. Slide the drive release latch downward and hold it in place. Without releasing the latch, slide the floppy drive out of the computer.



1	floppy drive	2	drive release latch

7 If you are replacing the floppy drive, see "Installing a Floppy Drive" on page 182. Otherwise, replace the drive panel by aligning its hinges and rotating it up until it snaps into place.

8 Replace the bezel (see "Replacing the Bezel" on page 166).

9 Replace the computer cover (see "Replacing the Computer Cover" on page 207).

NOTICE: To connect a network cable, first plug the cable into the network port or device and then plug it into the computer.

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

11 Check the system setup for the appropriate diskette Drive Option changes (see "Entering System Setup" on page 79).

Installing a Floppy Drive

1 Follow the procedures in "Before You Begin" on page 143.

2 Remove the computer cover (see "Removing the Computer Cover" on page 147).

3 Remove the bezel (see "Removing the Bezel" on page 165).

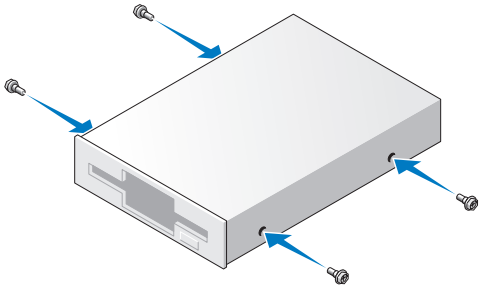
4 If you are replacing a floppy drive, remove the shoulder screws from the existing drive and attach the screws to the replacement drive.

5 If you are installing a new floppy drive:

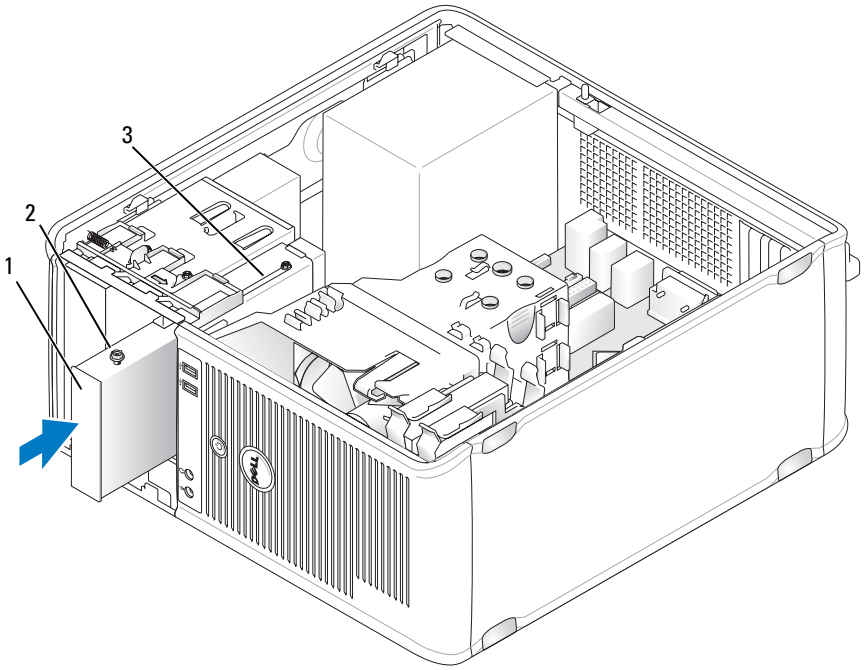
   a Remove the drive-panel insert for your new drive (see "Drive-Panel Inserts" on page 178).

   b Remove the shoulder screws from the inside of the drive-panel insert.

   c Attach the screws to the new drive.



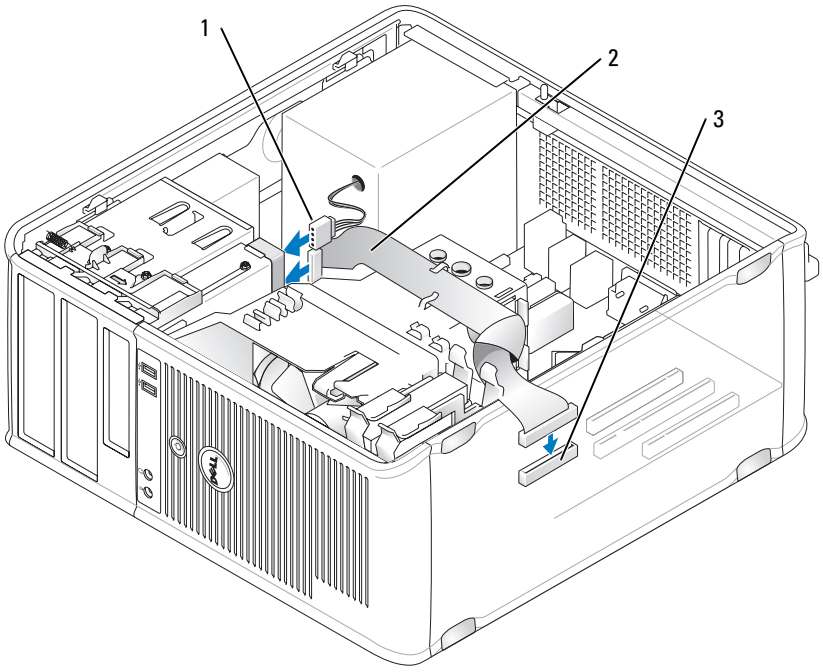
6 Align the shoulder screws on the floppy drive with the shoulder screw slots, and gently slide the drive into the bay until it clicks into place.



1	floppy drive	2	shoulder screws (4)
3	shoulder screw slots (2)		

7 Attach the power and data cables to the floppy drive.

8 Connect the other end of the data cable to the connector labeled "FLOPPY" on the system board (see "System Board Components" on page 150) and route the cable through the clip on the shroud.



1	power cable	2	floppy-drive cable
3	floppy-drive connector (FLOPPY)		

9 Replace the bezel (see "Replacing the Bezel" on page 166).

10 Check all cable connections, and fold cables out of the way to avoid blocking airflow between the fan and cooling vents.

11 Replace the computer cover (see "Replacing the Computer Cover" on page 207).

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

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

13 Enter system setup (see "Entering System Setup" on page 79) and select the appropriate **Diskette Drive** option.

14 Verify that your computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 111).

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, laceration by moving fan blades, or other unexpected injuries, always unplug your computer from the electrical outlet before removing the cover.

Removing an Optical Drive

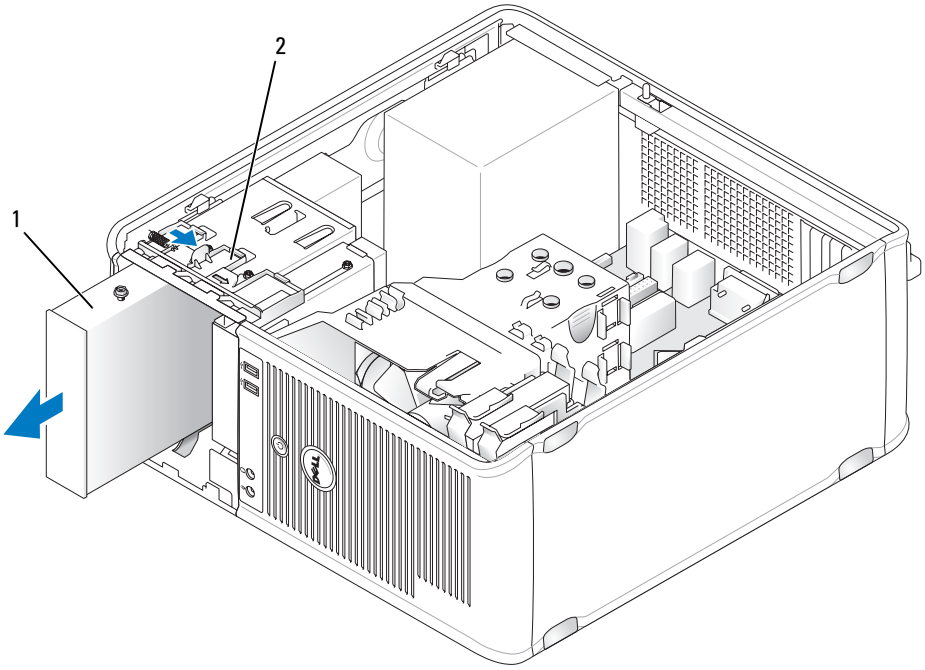
1 Follow the procedures in "Before You Begin" on page 143.

2 Remove the computer cover (see "Removing the Computer Cover" on page 147).

3 Remove the bezel (see "Removing the Bezel" on page 165).

4 Disconnect the optical drive data cable from the system board connector.

5 Slide the drive release latch downward and hold it in place. Without releasing the latch, slide the optical drive out of the computer.



1 optical drive 2 drive release latch

6 If you are replacing the optical drive, see "Installing an Optical Drive" on page 187.

7 Replace the bezel (see "Replacing the Bezel" on page 166).

8 Replace the computer cover (see "Replacing the Computer Cover" on page 207).

NOTICE: To connect a network cable, first plug the cable into the network port or device and then plug it into the computer.

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

10 Configure the drives in system setup (see "Entering System Setup" on page 79).

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.

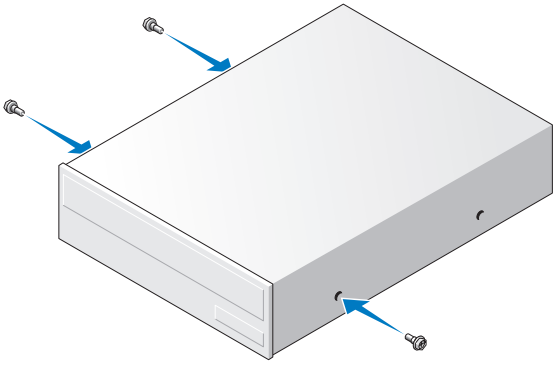
2 Follow the procedures in "Before You Begin" on page 143.

3 If you are replacing an optical drive, remove the shoulder screws from the existing drive and attach the screws to the replacement drive.

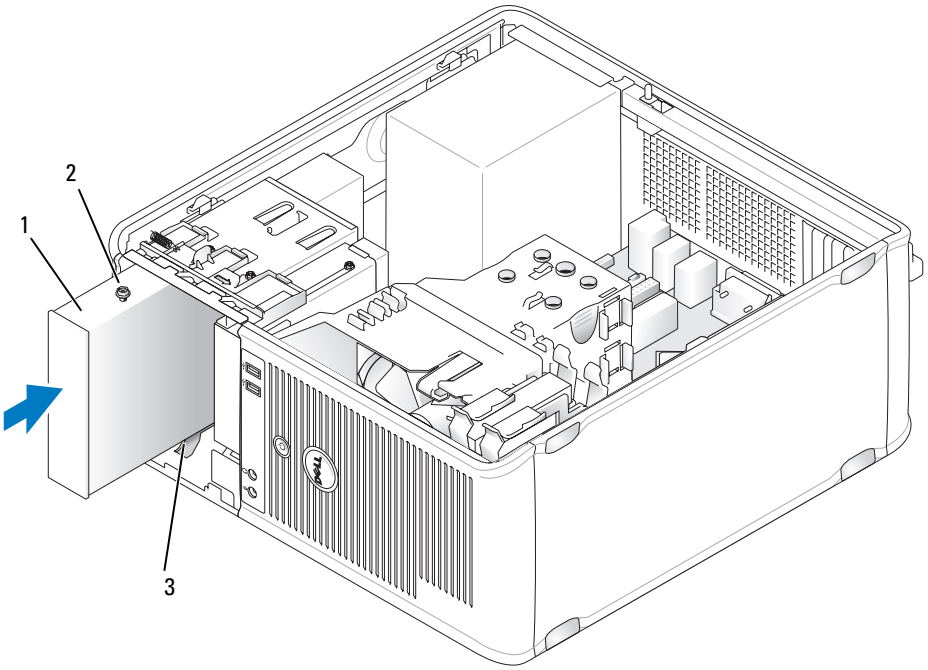
4 If you are installing a new optical drive:

a Remove the shoulder screws from the inside of the drive-panel insert.

b Attach the screws to the new drive.



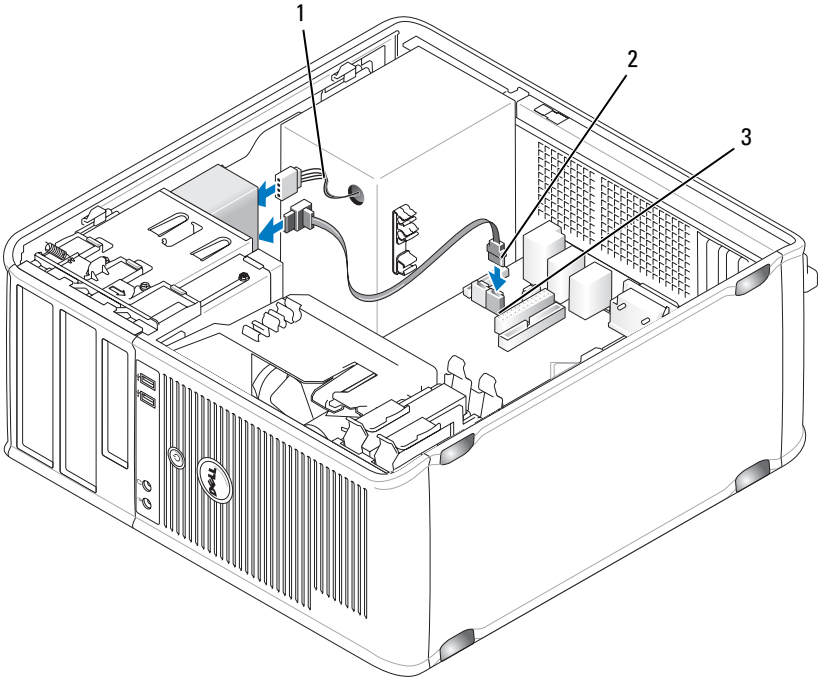
5 Align the shoulder screws on the optical drive with the shoulder screw slots, and slide the drive into the bay until it clicks into place.



1	optical drive	2	shoulder screws (3)
3	shoulder screw slots (2)		

6 Connect the power and data cables to the drive.

7 Connect the data cable to the system board connector on the system board.



1	power cable	2	optical drive data cable
3	optical drive connector		

8 Check all cable connections, and fold cables out of the way to avoid blocking airflow between the fan and cooling vents.

9 Replace the drive panel by aligning its hinges and rotating it up until it snaps into place.

10 Replace the bezel (see "Replacing the Bezel" on page 166).

11 Replace the computer cover (see "Replacing the Computer Cover" on page 207).

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

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

See the documentation that came with the drive for instructions on installing any software required for drive operation.

13 Enter system setup (see "System Setup" on page 79) and select the appropriate **Drive** option.

14 Verify that your computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 111).

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. If you have to repeatedly reset time and date information after turning on the computer, replace the battery.

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 replace the battery:

1 Record all the screens in system setup (see "System Setup" on page 79) so that you can restore the correct settings in step 9.

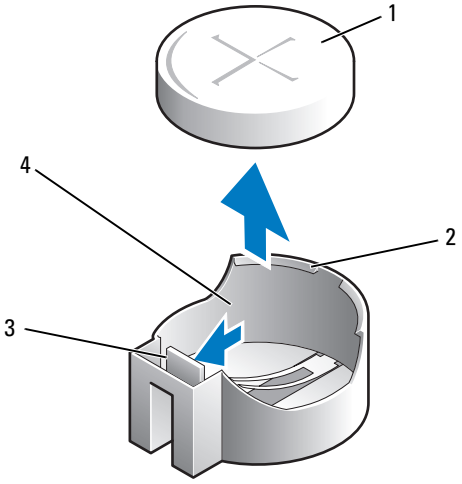
2 Follow the procedures in "Before You Begin" on page 143.

3 Remove the computer cover (see "Removing the Computer Cover" on page 147).

4 Locate the battery socket (see "System Board Components" on page 150).

5 Carefully press the battery release lever away from the battery and the battery will pop out.

6 Insert the new battery into the socket with the side labeled "+" facing up, then snap the battery into place.



1	system battery	2	positive side of battery connector
3	battery socket tab	4	battery socket

7 Replace the computer cover (see "Replacing the Computer Cover" on page 207).

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

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

9 Enter system setup (see "Entering System Setup" on page 79) and restore the settings you recorded in step 1. Then go to the **Maintenance** section and clear the low battery and other errors associated with the battery replacement in the **Event Log**.

10 Properly dispose of the old battery.

See the *Product Information Guide* for battery disposal information.

Power Supply

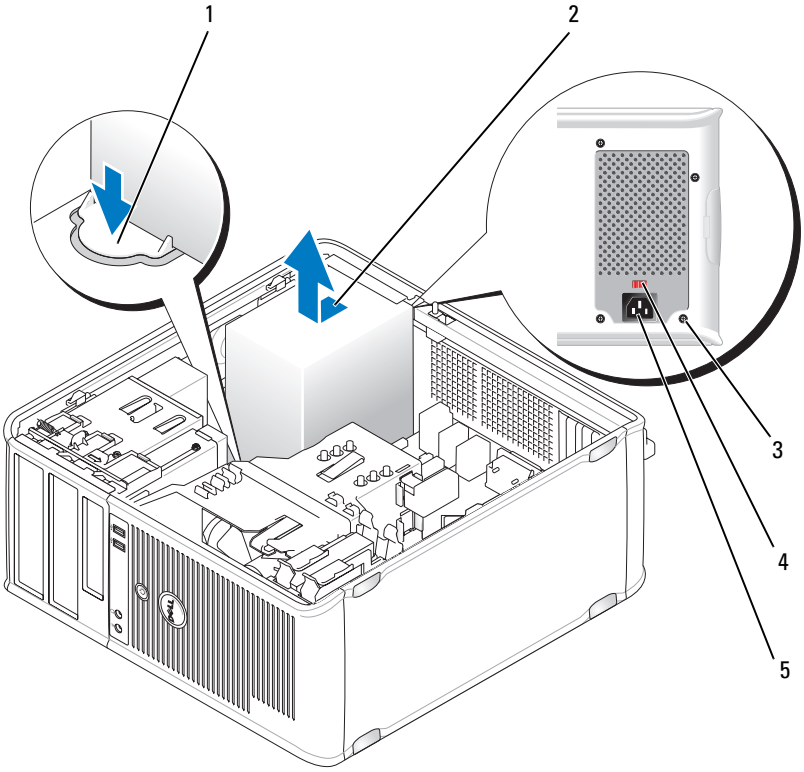
CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

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.

Replacing the Power Supply

1. Follow the procedures in "Before You Begin" on page 143.
2. Remove the computer cover (see "Removing the Computer Cover" on page 147).
3. 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.
4. Remove the hard drive cable, CD or DVD drive data cable, front panel ribbon cable, and any other cables from the securing clip on the side of the power supply.
5. Remove the four screws that attach the power supply to the back of the computer chassis.



1	release button	2	power supply
3	screws (4)	4	voltage selection switch (red)
5	AC power connector		

6 Slide the power supply towards the front of the computer and lift it out.

7 Place and slide the replacement power supply toward the back of the computer.

8 Replace and tighten all screws that secure the power supply to the back of the computer chassis.

CAUTION: Failure to replace and tighten all screws may cause electrical shock as these screws are a key part of the system grounding.

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 Secure the hard drive cable, CD or DVD drive data cable, and the front panel ribbon cable to the securing clip on the side of the power supply.

NOTE: Double-check all cable connections to make sure they are secure.

11 Replace the computer cover (see "Replacing the Computer Cover" on page 207).

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

12 Ensure that the correct power supply voltage (115 V or 230 V) is selected, using the red voltage selection switch at the back of the chassis.

13 Connect your computer and devices to an electrical outlet, and turn them on.

14 Verify that the computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 111).

Speakers

Installing a Speaker

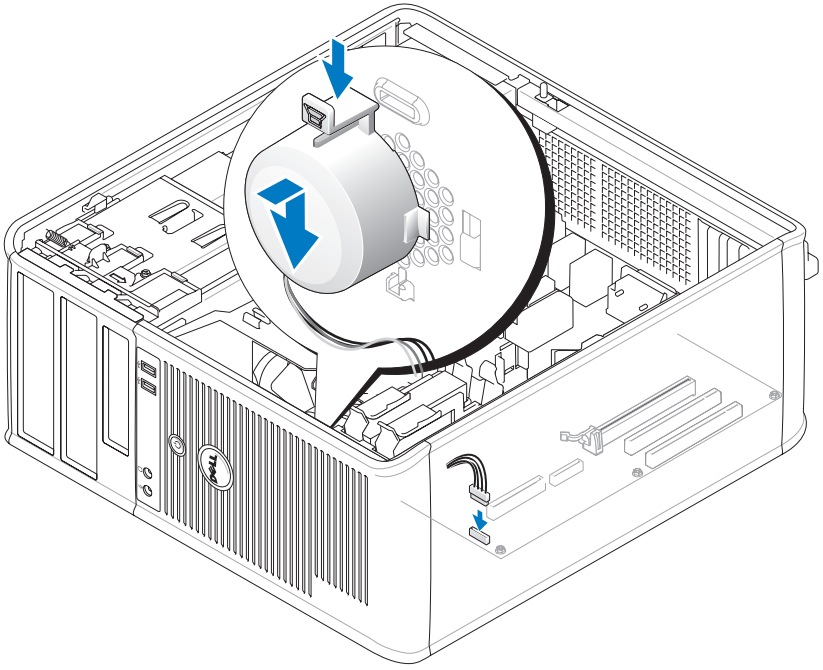
CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

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 143.

2 Remove the cover of your computer (see "Removing the Computer Cover" on page 147).

3 Insert the speaker into the chassis of the computer.



4 Connect the cables to the system board.

5 Replace the computer cover.

6 Turn on power to the computer.

Removing a Speaker

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

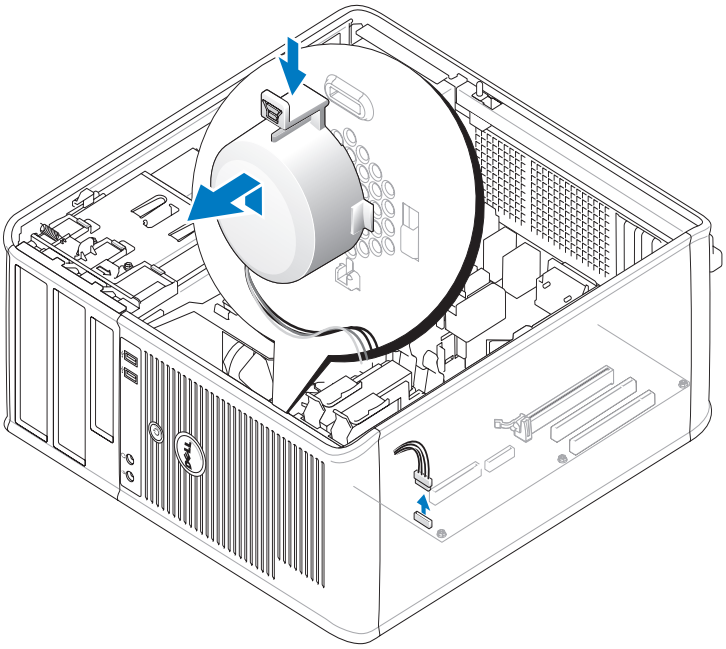
NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1 Follow the procedures in "Before You Begin" on page 143.

2 Remove the cover of your computer (see "Removing the Computer Cover" on page 147).

3 Disconnect the cables from the system board.

4 Remove the speaker from the chassis of the computer.



5 Replace the computer cover.

6 Turn on power to the computer.

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.

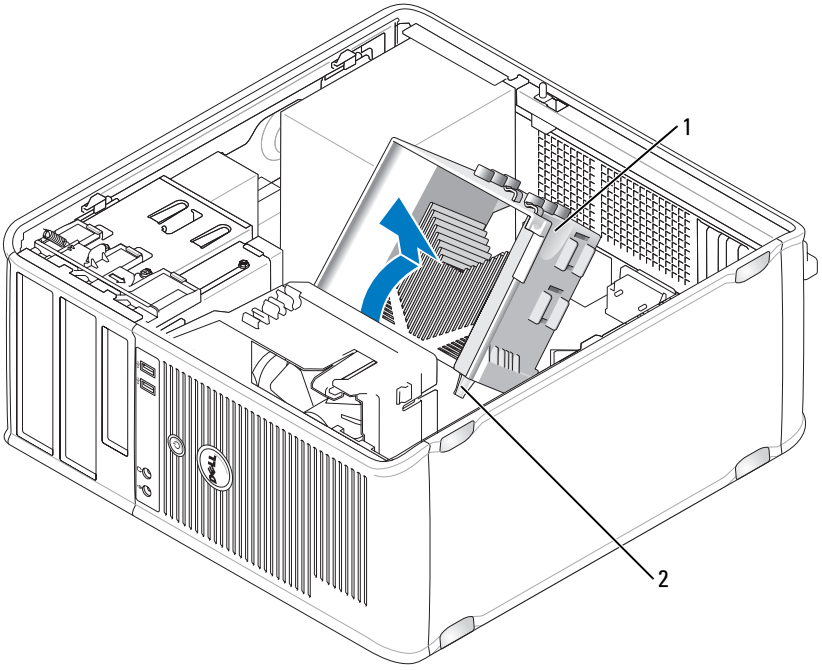
Removing the Processor and Heat Sink

1. Follow the procedures in "Before You Begin" on page 143.
2. Remove the computer cover (see "Removing the Computer Cover" on page 147).
3. Carefully disconnect and move any cables that are routed over the heat sink assembly.
4. Rotate the clamp lever 180 degrees counter-clockwise to release the clamp grip from the bracket projection.
5. Release the clamp grip from the bracket projection on the opposite side.

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

NOTICE: A strong thermal grease bond may exist between the processor and heat sink. Do not use excessive force to separate the heat sink assembly from the processor to avoid damaging the processor.

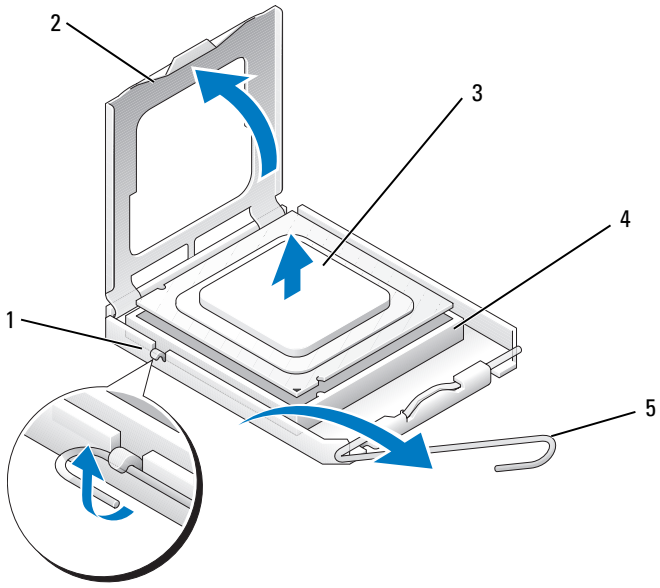
6. Rotate the heat sink assembly upward gently, and remove it from the computer. Lay the heat sink assembly down on its top, with the thermal grease facing upward.



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.

7 Pull the release lever straight up until the processor is released.



1	center cover latch	2	processor cover
3	processor	4	socket
5	release lever		

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

8 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.

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 and Heat Sink

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

1 Follow the procedures in "Before You Begin" on page 143.

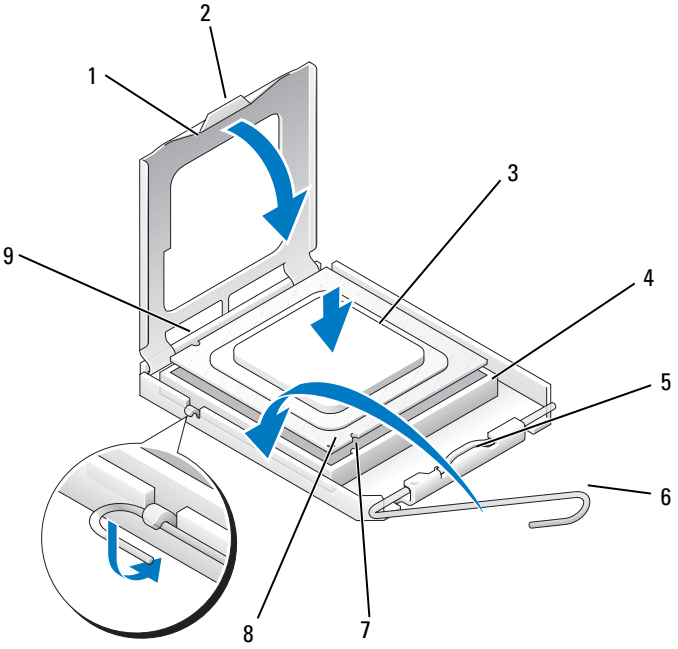
NOTICE: Be careful not to bend any of the pins when you unpack the processor. Bending the pins can permanently damage the processor.

2 Unpack the new processor, being careful not to bend any of the processor pins.

3 If the release lever on the socket is not fully extended, move it to that position.

NOTICE: 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.

4 Align the pin-1 corner of the processor and socket.



1	processor cover	2	tab
3	processor	4	processor socket
5	center cover latch	6	release lever
7	front alignment-notch	8	socket and processor pin-1 indicator
9	rear alignment-notch		

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.

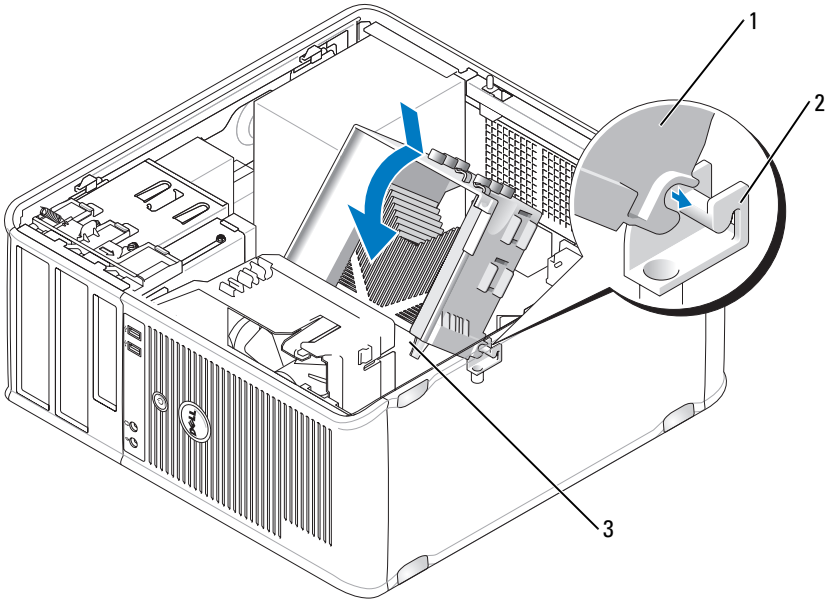
NOTICE: Ensure that you apply new thermal grease. New thermal grease is critical for ensuring adequate thermal bonding, which is a requirement for optimal processor operation.

8. Apply the new thermal grease to the top of the processor.

NOTICE: Ensure that the floppy drive 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 and fan assembly back onto the heat-sink assembly bracket.
   b. Ensure that the two clamp grips are aligned with the two bracket projections.
   c. Hold the heat sink fan assembly in place and rotate the clamp lever 180 degrees clockwise to secure the heat sink and fan assembly.

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 Connect any cables disconnected before removing the heat sink assembly.

11 Replace the computer cover (see "Replacing the Computer Cover" on page 207).

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

12 Connect your computer and devices to an electrical outlet, and turn them on.

13 Verify that the computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 111).

I/O Panel

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, laceration by moving fan blades, or other unexpected injuries, always unplug your computer from the electrical outlet before opening the cover.

CAUTION: The heat sink assembly, power supply, and other components may become very hot during normal operation. Be sure that they have had sufficient time to cool before you touch them.

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.

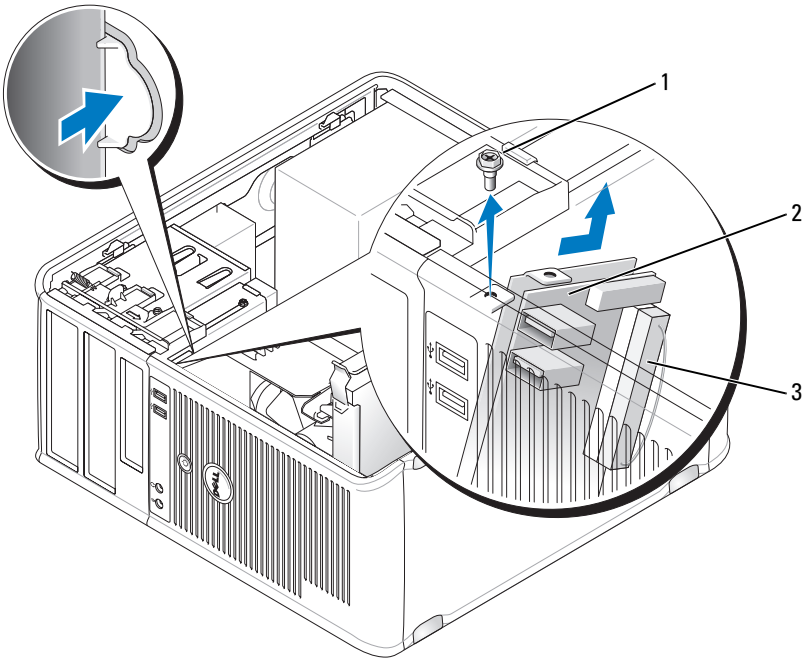
Removing the I/O Panel

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

1. Follow the procedures in "Before You Begin" on page 143.
2. Remove the computer cover (see "Removing the Computer Cover" on page 147).
3. Remove the bezel (see "Removing the Bezel" on page 165).

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

4. Disconnect all the cables that are connected to the I/O panel from the system board.
5. Remove the screw that secures the I/O panel.
6. Slide the I/O panel down to release the I/O panel clamp from the I/O panel clamp slot.
7. Carefully remove the I/O panel from the computer.



1	securing screw	2	I/O panel
3	I/O cable connector		

Installing the I/O Panel

1. Place the I/O panel into the slot.

NOTICE: Take care not to damage the cable connectors and the cable routing clips when sliding the I/O panel into the computer.

2. Align and slide the I/O panel clamp in the I/O panel clamp slot.
3. Replace and tighten the screw that secures the I/O panel.
4. Reconnect the cables to the system board.
5. Replace the bezel (see "Replacing the Bezel" on page 166).

6 Replace the computer cover (see "Replacing the Computer Cover" on page 207).

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

7 Connect your computer and devices to an electrical outlet, and turn them on.

8 Verify that the computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 111).

System Board

Removing the System Board

CAUTION: To guard against electrical shock, laceration by moving fan blades, or other unexpected injuries, always unplug your computer from the electrical outlet before opening the cover.

CAUTION: The heat sink assembly, power supply, and other components may become very hot during normal operation. Be sure that they have had sufficient time to cool before you touch them.

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.

1 Follow the procedures in "Before You Begin" on page 143.

2 Remove the computer cover (see "Removing the Computer Cover" on page 147).

3 Remove any add-in cards on the system board (see "Cards" on page 157).

4 Remove the processor and heat sink assembly (see "Speakers" on page 194).

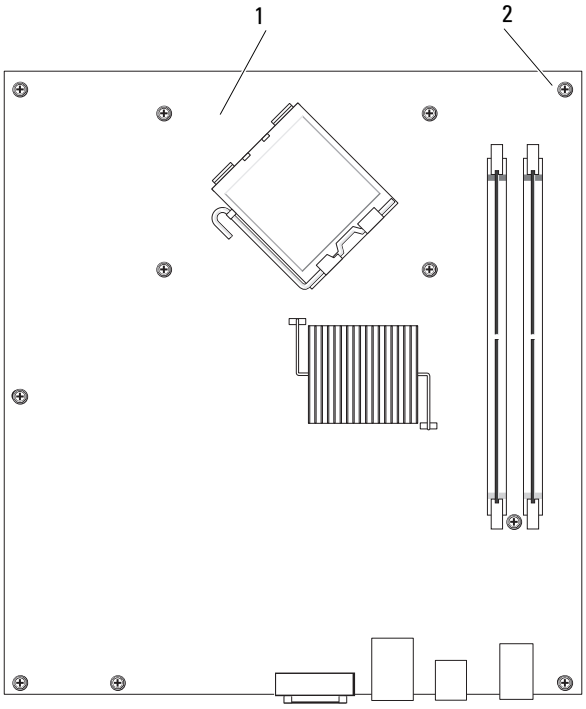
5 Remove the memory modules (see "Removing Memory" on page 157) and document which memory module is removed from each memory socket so that the memory modules can be installed in the same location after the board is replaced.

6 Disconnect all cables from the system board. Note the routing of all cables as you remove them so that you can reroute them correctly after installing the new system board.

7 Remove the remaining seven screws from the system board. (Four other screws were removed with the heat sink assembly.)

8 Slide the system board assembly toward the front of the computer, and then lift the board up and away.

System Board Screws



1 system board 2 screws (7)

9 Place the system board that you just removed next to the replacement system board to compare and ensure they are identical.

Installing the System Board

1. Gently align the board into the chassis and slide it toward the back of the computer.
2. Using the seven screws, secure the system board to the chassis.

CAUTION: Failure to replace and tighten all screws may cause electrical shock as these screws are a key part of the system grounding.

3. Replace the cables that you removed from the system board.
4. Replace the processor and the heat sink assembly (see "Installing the Processor and Heat Sink" on page 199).

NOTICE: Ensure that the heat sink assembly is correctly seated and secure.

5. Replace the memory modules into the memory sockets at the same locations from which you removed them (see "Installing Memory" on page 156).
6. Replace any add-in cards on the system board.
7. Replace the computer cover (see "Replacing the Computer Cover" on page 207).

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

8. Connect your computer and devices to an electrical outlet, and turn them on.
9. Verify that the computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 111).

Replacing the Computer Cover

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

1. Ensure that all cables are connected, and fold cables out of the way.
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 to close it.

c Snap the cover into place by pulling back on the cover release latch and then releasing the latch when the cover is properly seated.

d Ensure that the cover is seated correctly before moving the computer.

4 Move the computer to the upright position.

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

NOTICE: Ensure that none of the air-vents of the system are blocked.

5 Connect your computer and devices to an electrical outlet, and turn them on.

13

Desktop Computer Parts

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, laceration by moving fan blades, or other unexpected injuries, always unplug your computer from the electrical outlet before removing the cover.

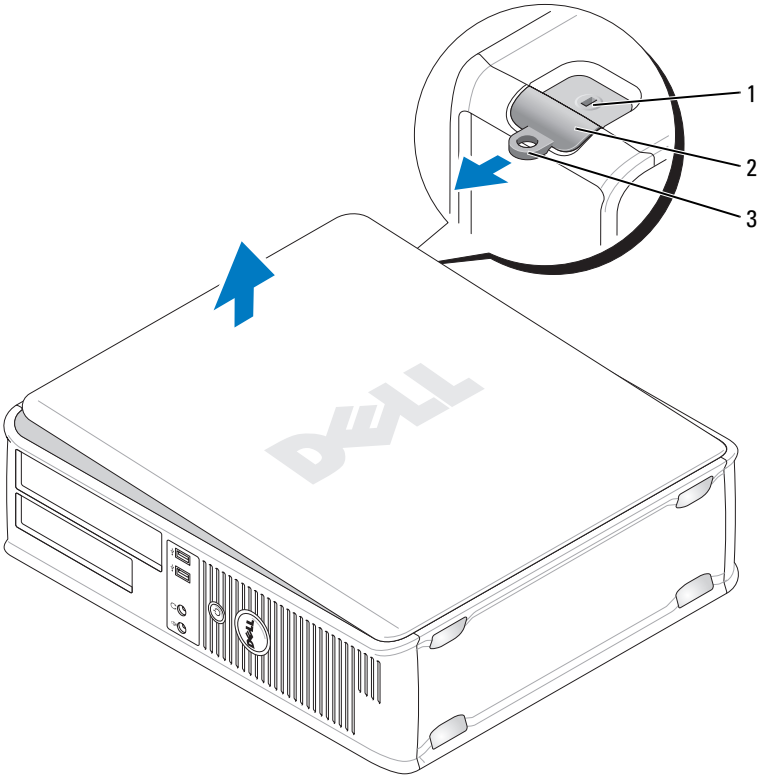
CAUTION: Some of the parts described in this chapter may be replacable by a certified service technician only and are not custom replacable.

1. Follow the procedures in "Before You Begin" on page 143.

NOTE: Ensure that sufficient space exists to support the removed cover.

NOTICE: Ensure that you are working on a level, protected surface to avoid scratching either the computer or the surface on which it is resting.

2. If you have installed a padlock through the padlock ring on the back panel, remove the padlock.
3. Slide the cover release latch back as you lift the cover.



1	security cable slot	2	cover release latch
3	padlock ring		

4 Pivot the cover up using the hinge tabs as leverage points.

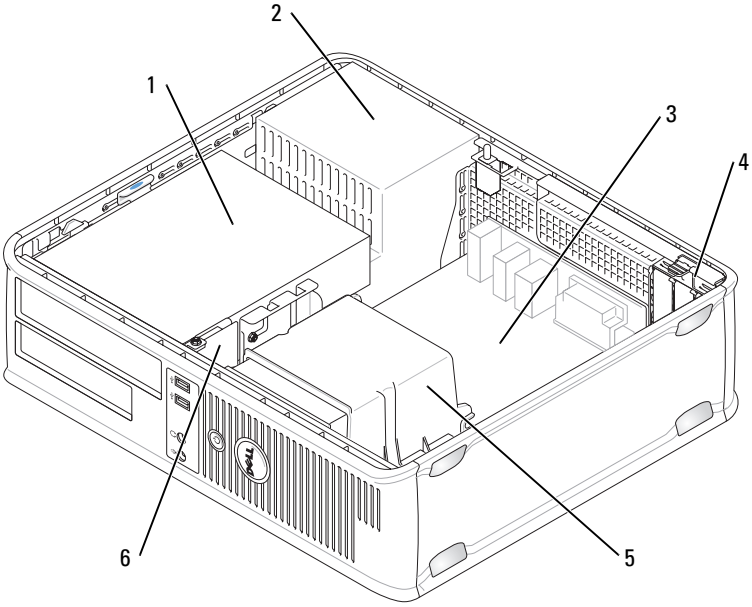
5 Remove the cover from the hinge tabs and set it aside on a soft nonabrasive surface.

Inside View of Your Computer

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

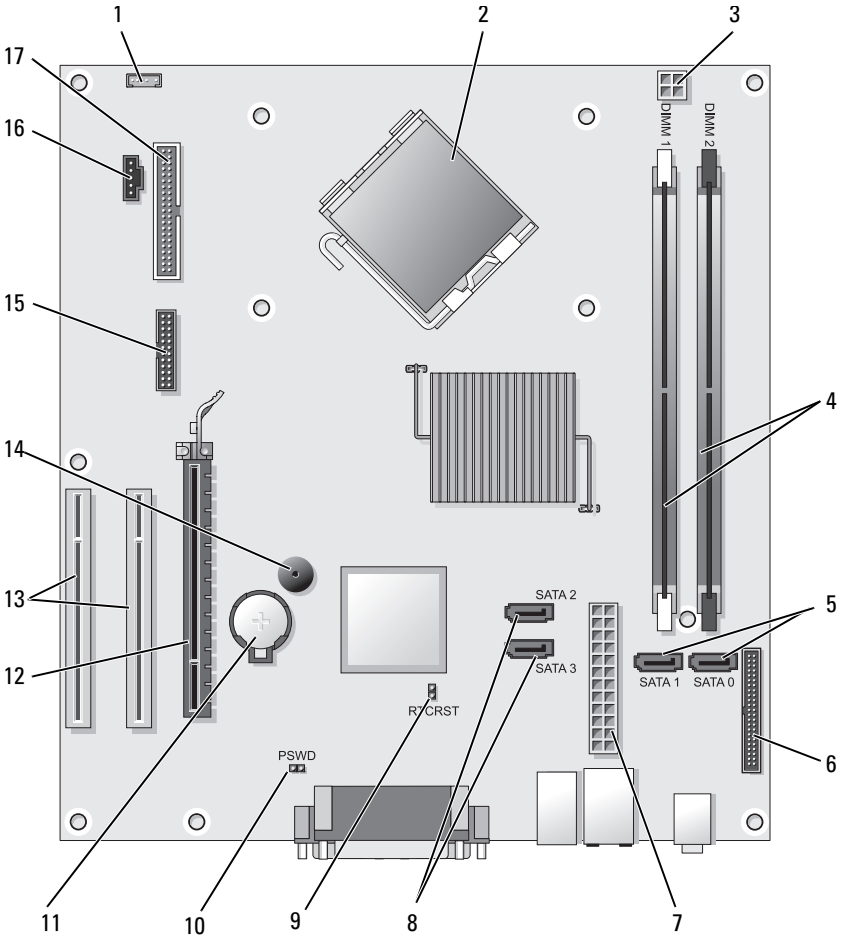
CAUTION: To avoid electrical shock, laceration by moving fan blades, or other unexpected injuries, always unplug your computer from the electrical outlet before removing the computer cover.

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



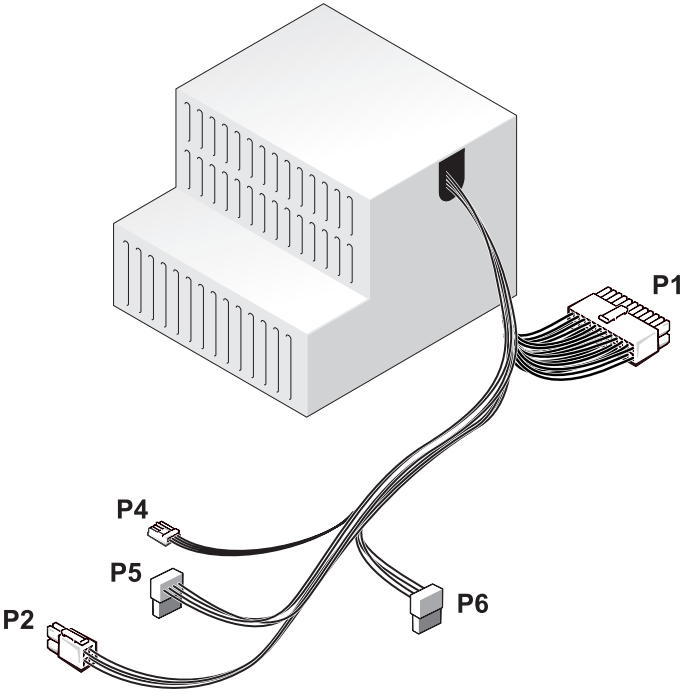
1	drives bay (CD/DVD, floppy, and hard drive)	2	power supply
3	system board	4	card slots
5	heat sink assembly	6	front I/O panel

System Board Components

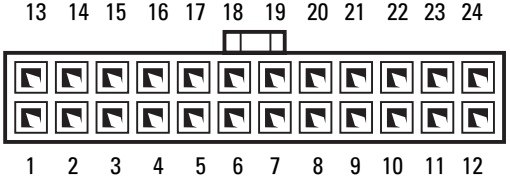


1	internal speaker connector (INT_SPKR)	2	processor connector (CPU)
3	processor power connector (12VPOWER)	4	memory module connectors (DIMM_1, DIMM_2)
5	SATA drive connectors (SATA0, SATA1)	6	front-panel connector (FRONTPANEL)
7	power connector (POWER)	8	SATA drive connectors (SATA2, SATA3)
9	RTC reset jumper (RTCRST)	10	password jumper (PSWD)
11	battery socket (BATTERY)	12	PCI Express x16 card connector (SLOT1)
13	PCI card connectors (SLOT2 and SLOT3)	14	internal buzzer (SPKR)
15	serial/ PS/2 connector (PS2/SER2)	16	fan connector (FAN_CPU)
17	floppy drive connector (FLOPPY)		

Power Supply DC Connector Pin Assignments



DC Power Connector P1



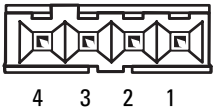
Pin Number	Signal name	Wire Color	Wire Size
1	3.3 V	Orange	20 AWG

Pin Number	Signal name	Wire Color	Wire Size
2	3.3 V	Orange	20 AWG
3	RTN	Black	20 AWG
4	5 V	Red	20 AWG
5	RTN	Black	20 AWG
6	5 V	Red	20 AWG
7	RTN	Black	20 AWG
8	POK	Gray	22 AWG
9	5 V AUX	Purple	20 AWG
10	+12 V	Yellow	20 AWG
11	+12 V	Yellow	20 AWG
12	3.3 V	Orange	20 AWG
13	3.3 V	Orange	20 AWG
14	-12 V	Blue	22 AWG
15	RTN	Black	20 AWG
16	PS_ON	Green	22 AWG
17	RTN	Black	20 AWG
18	RTN	Black	20 AWG
19	RTN	Black	20 AWG
20	OPEN		
21	5 V	Red	20 AWG
22	5 V	Red	20 AWG
23	5 V	Red	20 AWG
24	RTN	Black	20 AWG

DC Power Connector P2

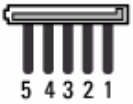
Pin Number	Signal Name	18-AWG Wire
1	GND	Black
2	GND	Black
3	+12 VADC	Yellow
4	+12 VADC	Yellow

DC Power Connector P4



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

DC Power Connectors P5 and P6



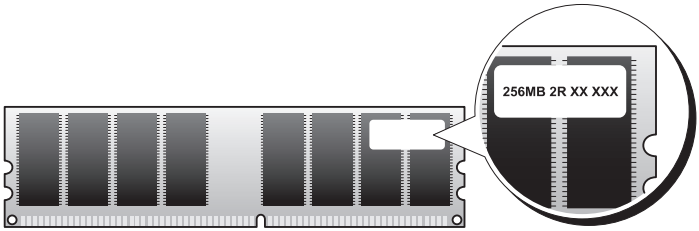
Pin Number	Signal name	18-AWG Wire
1	+3.3 VDC	Orange
2	GND	Black
3	+5 VDC	Red
4	GND	Black
5	+12 VBDC	White

Memory

You can increase your computer memory by installing memory modules on the system board. Your computer supports DDR2 memory. For information on the type of memory supported by your computer, see the "Memory" section of the specifications for your computer:

- Mini Tower — "Mini Tower Specifications" on page 27
- Desktop — "Desktop Computer Specifications" on page 39

NOTICE: Do not install ECC or buffered memory modules. Only unbuffered, non-ECC memory is supported.



Installation Guidelines

- If a single DIMM is installed, you must install it in connector DIMM_1.
- For best performance, memory modules should be installed in *pairs of matched memory size, speed, and technology*. If the memory modules are not installed in matched pairs, the computer will operate, but with a slight reduction in performance (see the label on the module to determine the module's capacity). For example, if you install a mixed pair of DDR2 667-MHz and DDR2 800-MHz memory, the modules function at the slowest speed installed.

Installing Memory

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

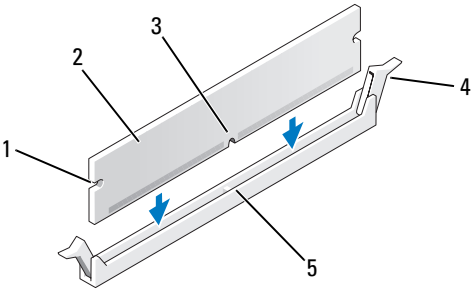
NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1 Follow the procedures in "Before You Begin" on page 143.

2 Remove the computer cover (see "Removing the Computer Cover" on page 209).

NOTICE: Before removing memory, you may need to remove the Optical Drive. See "Optical Drive" on page 237.

3 Press the securing clip at each end of the memory module connector.



1	cutouts (2)	2	memory module
3	notch	4	securing clip (2)
5	crossbar		

4 Align the notch on the bottom of the module with the crossbar in the connector.

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 Replace the Optical Drive, if necessary (see "Optical Drive" on page 237).

7 Replace the computer cover.

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

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

9 Right-click the **My Computer** icon and click **Properties**.

10 Click the **General** tab.

11 To verify that the memory is installed correctly, check the amount of memory (RAM) listed.

Removing Memory

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

NOTICE: Before removing memory, you may need to remove the Optical Drive. See "Optical Drive" on page 237.

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 143.

2 Remove the computer cover (see "Removing the Computer Cover" on page 209).

3 Press out the securing clip at each end of the memory module connector.

4 Grasp the module at the end of the board and lift up.

5 Replace the Optical Drive, if necessary (see "Optical Drive" on page 237).

6 Replace the computer cover.

Cards

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 provides the following slots for PCI and PCI Express cards:

- One PCI Express x16 card slot (SLOT1)
- Two PCI card slots (SLOT2, SLOT3)

See "System Board Components" on page 212 for card slot location.

PCI and PCI Express Cards

Your computer supports two PCI cards and one PCI Express x16 card.

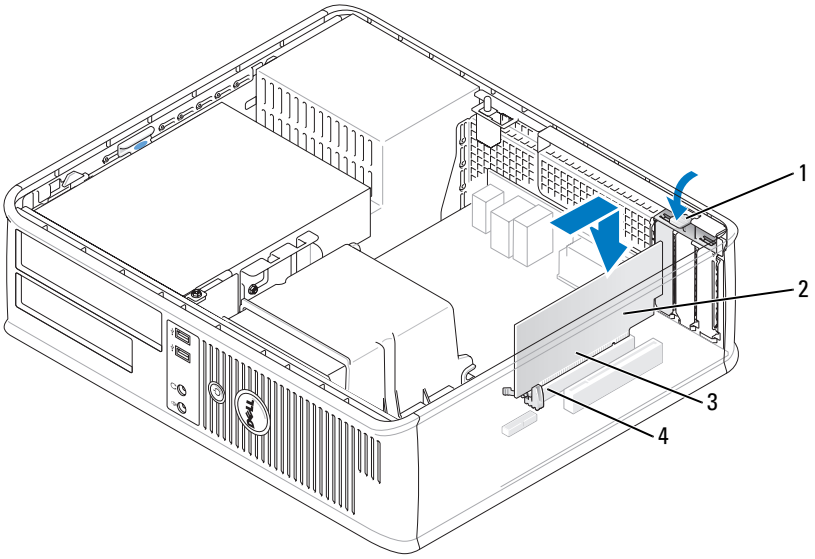
NOTICE: PCI Express graphics cards that run higher than 75 W require an additional cooling fan installed. Otherwise, your card could overheat and damage your computer.

If a card fan is not present in your computer and you are installing a graphics card that runs at 75 W or higher, Contact Dell to purchase a card fan.

- If you are installing or replacing a card, follow the procedures in the next section.
- If you are removing but not replacing a card, see "Removing a PCI or PCI Express x16 Card" on page 224.
- If you are replacing a card, remove the current driver for the card from the operating system.

Installing PCI and PCI Express x16 Cards

1. Follow the procedures in "Before You Begin" on page 143.
2. Remove the computer cover (see "Removing the Computer Cover" on page 209).
3. Rotate the release tab on the card retention latch until it snaps open.
4. If you are installing a new card, remove the filler bracket to create a card-slot opening.
5. 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.
6. Prepare the card for installation.

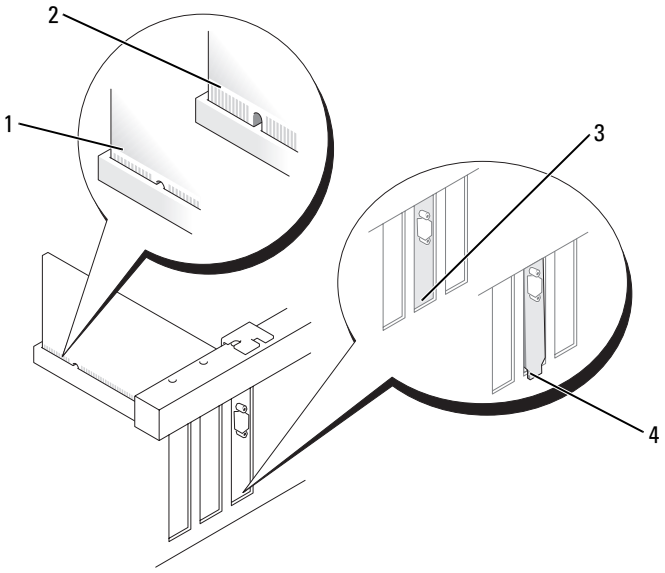


1	release tab	2	card
3	card-edge pins	4	card connector

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

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.

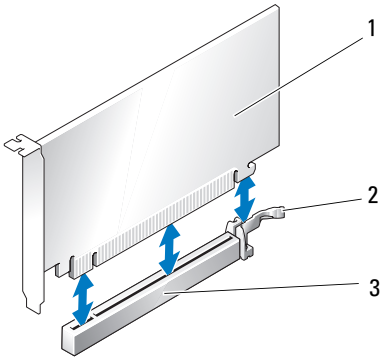
7 Place the card in the connector and press down firmly. Ensure that the card is fully seated in the slot.



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

8 If you are installing the PCI Express card into the x16 card connector, position the card so the securing slot is aligned with the securing tab.

9 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 securing tab
3	PCI Express x16 card slot		

10 Pivot and secure the card retention latch.

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

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

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

12 Replace the computer cover.

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

13 Reconnect your computer and devices to electrical outlets, and then turn them on.

14 If you installed a sound card:

a Enter system setup (see "Entering System Setup" on page 79), go to **Onboard Devices** and select **Integrated Audio**, and then change the setting to **Off**.

b Connect external audio devices to the sound card's connectors. Do not connect external audio devices to the microphone,

speaker/headphone, or line-in connectors on the back panel (see "I/O Panel" on page 253).

15 If you installed an add-in network adapter and want to disable the integrated network adapter:

   a Enter system setup (see "System Setup" on page 79), go to **Onboard Devices** and select **Integrated NIC,** and then change the setting to **Off**.

   b Connect the network cable to the add-in network adapter's connectors. Do not connect the network cable to the integrated connector on the back panel (see "I/O Panel" on page 253).

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

Removing a PCI or PCI Express x16 Card

1 Follow the procedures in "Before You Begin" on page 143.

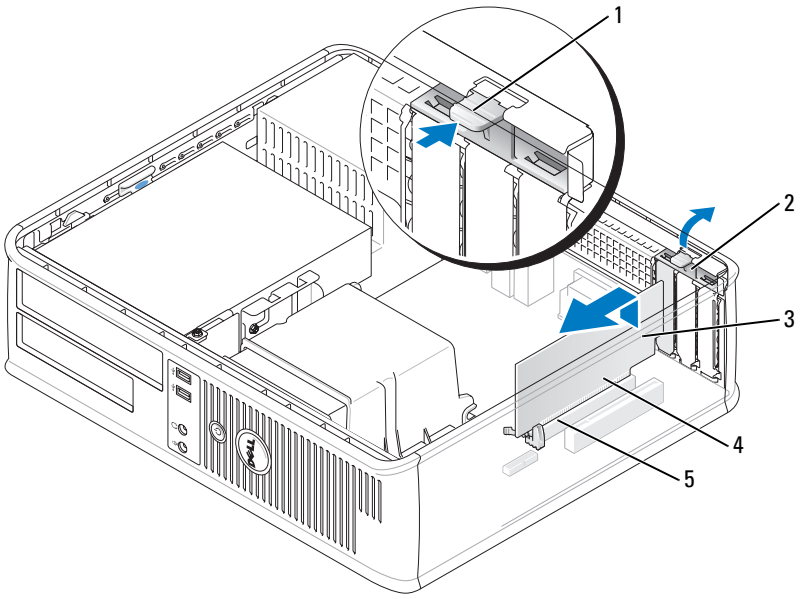
2 Remove the computer cover (see "Removing the Computer Cover" on page 209).

3 Gently push the release tab on the card retention latch and swing it outward.

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.

   - For a PCI card, grasp the card by its top corners, and ease it out of its connector.
   - For a PCI Express x16 card, pull the securing tab, grasp the card by its top corners, and then ease it out of its connector.



1	release tab	2	card retention latch
3	card	4	card-edge pins
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 Snap the card retention latch into place.

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

7 Replace the computer cover (see "Replacing the Computer Cover" on page 257).

8 Reconnect the computer and devices to electrical outlets, and then turn

them on.

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 (see "Entering System Setup" on page 79), go to **Onboard Devices** and select **Integrated Audio**, and then change the setting to **On**.

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

11 If you removed a network adapter card:

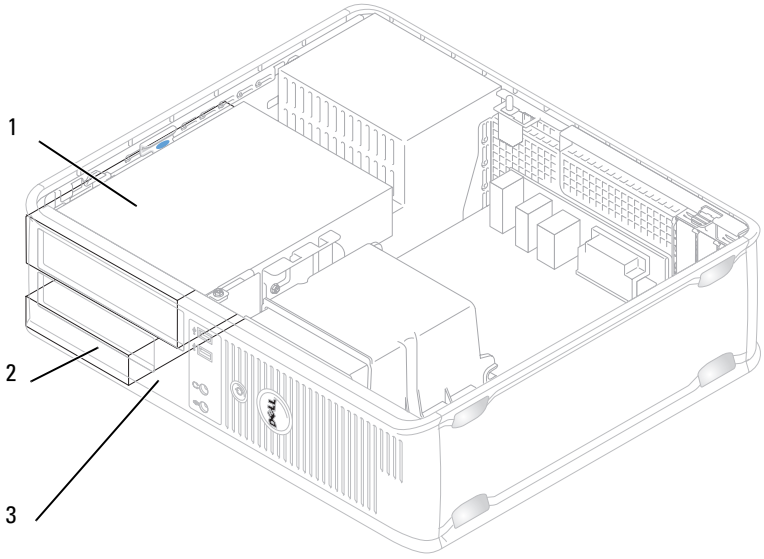
   a Enter system setup, select Audio Controller, and change the setting to On (see "Entering System Setup" on page 25).

   b Connect the network cable to the integrated network connector on the back panel of the computer.

Drives

Your computer supports a combination of these devices:

- One SATA (serial ATA) hard drive
- One optional floppy drive
- One optional optical drive



1 optical drive
2 hard drive
3 floppy drive

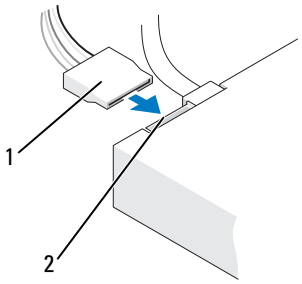
Recommended Drive Cable Connections

- Connect the serial ATA hard drive to connectors labeled "SATA0"on the system board.
- Connect the serial ATA CD or DVD drive to connectors labeled "SATA1".

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.

Power Connector

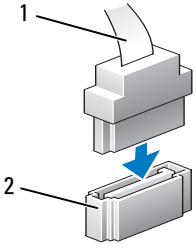


1 power cable 2 power input connector

Drive Interface Connectors

The drive cable connectors are keyed for correct insertion. Properly align the cable connector key on the cable and the drive before connecting.

Serial ATA Connector



1 interface cable 2 interface connector

Connecting and Disconnecting Drive Cables

When connecting and disconnecting a serial ATA data cable, disconnect the cable using the pull-tab.

The serial ATA interface connectors are keyed for correct insertion; that is, a notch or a missing pin on one connector matches a tab or a filled-in hole on the other connector.

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

Hard Drives

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, laceration by moving fan blades, or other unexpected injuries, always unplug your computer from the electrical outlet before removing the 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.

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

Removing a Hard Drive

1. Follow the procedures in "Before You Begin" on page 143.
2. Remove the computer cover (see "Removing the Computer Cover" on page 209).

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

3. Remove the optical drive from the bay and carefully set it aside (see "Optical Drive" on page 237).
4. Remove the floppy drive from the bay and carefully set it aside (see "Floppy Drive" on page 233).
5. Press in on the two plastic securing clips on each side of the hard drive and slide the drive towards the back 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 and disconnect the power and data cables from the drive.
7. If removing this drive changes the drive configuration, then be sure to

reflect these changes in system setup. When you restart your computer, enter system setup (see "Entering System Setup" on page 79), then go to the "Drives" section of the system setup and under **Drive 0 through 3**, set the Drive to the correct configuration.

8 Replace the computer cover (see "Replacing the Computer Cover" on page 257).

NOTICE: To connect a network cable, first plug the cable into the network port or device and then plug it into the computer.

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

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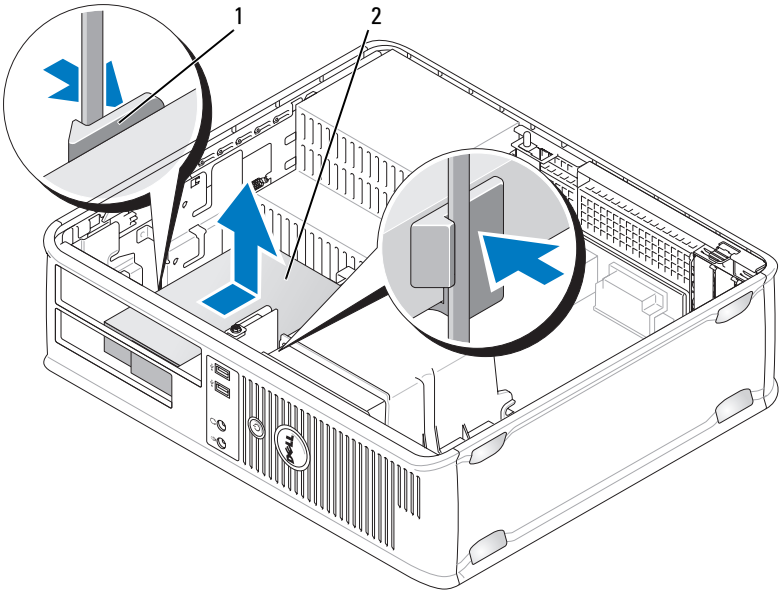


1 securing clips (2) 2 hard drive

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

Installing a Hard Drive

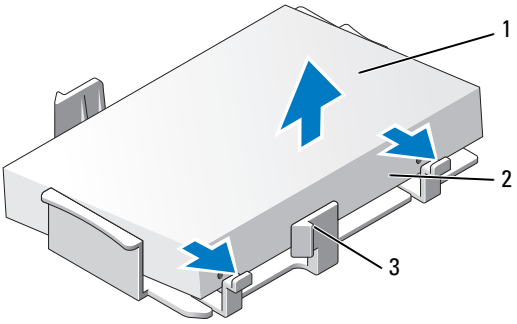
1 Follow the procedures in "Before You Begin" on page 143.

2 Remove the computer cover (see "Removing the Computer Cover" on

page 209).

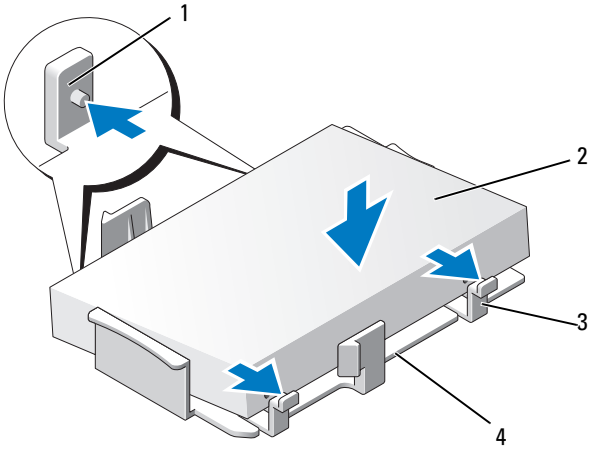
3 Check the documentation for the drive to verify that it is configured for your computer.

4 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, using the two release tabs.



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

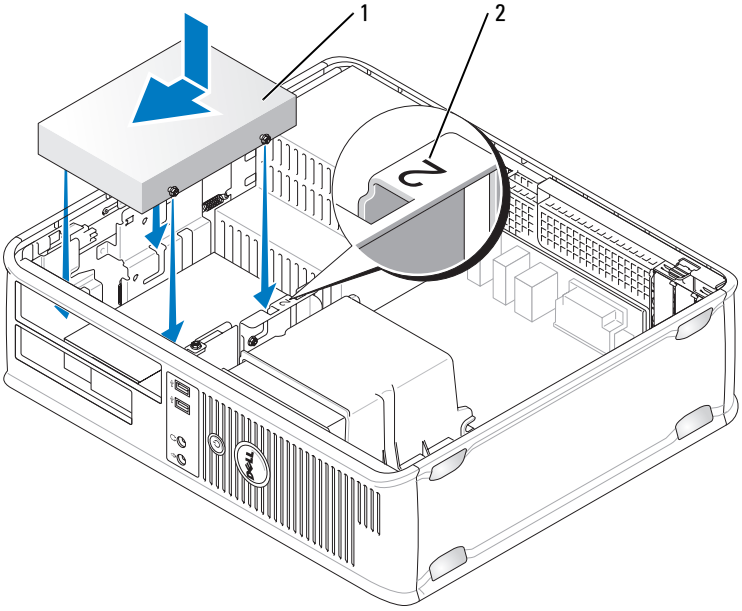
5 Attach the bracket to the new drive by snapping it onto the drive.



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

6 Connect the power and data cables to the drive.

7 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

8 Replace the floppy drive and optical drive.

9 Connect the data cable to the system board.

10 Check all cables to be certain that they are properly connected and firmly seated.

11 Replace the computer cover (see "Replacing the Computer Cover" on

page 257).

NOTICE: To connect a network cable, first plug the cable into the network port or device and then plug it into the computer.

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

13 Partition and logically format your drive before you proceed to the next step.

14 Check the system setup for drive configuration changes (see "Entering System Setup" on page 79).

15 Test the hard drive by running the Dell Diagnostics. (see "Dell Diagnostics" on page 111).

16 Install your operating system on the hard drive. For instructions, see the documentation that came with your operating system.

Floppy Drive

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

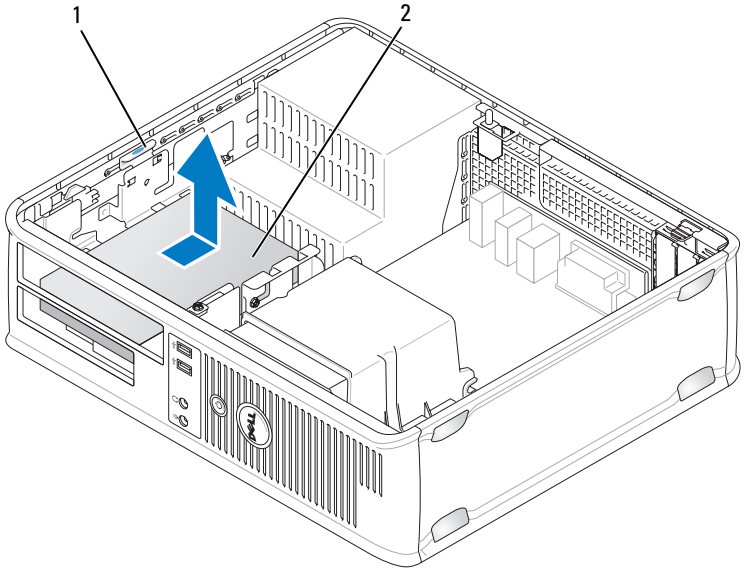
CAUTION: To guard against electrical shock, laceration by moving fan blades, or other unexpected injuries, always unplug your computer from the electrical outlet before removing the cover.

NOTE: If you are adding a floppy drive, see "Installing a Floppy Drive" on page 235.

Removing a Floppy Drive

1 Follow the procedures in "Before You Begin" on page 143.

2 Remove the computer cover (see "Removing the Computer Cover" on page 209).



1 drive release latch (blue) 2 floppy drive

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

3 Remove the optical drive and carefully set it aside (see "Optical Drive" on page 237).

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 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.

5 If you are not replacing the drive, reinstall the drive panel insert.

6 Replace the computer cover (see "Replacing the Computer Cover" on page 257).

NOTICE: To connect a network cable, first plug the cable into the network port or device and then plug it into the computer.

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

8 Check the system setup for the appropriate diskette Drive Option changes (see "Entering System Setup" on page 79).

Installing a Floppy Drive

1 Follow the procedures in "Before You Begin" on page 143.

2 Remove the computer cover (see "Removing the Computer Cover" on page 209).

3 If you are installing a new drive:

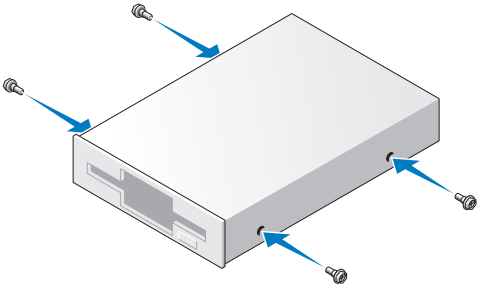
   a Gently slide a small flat-edge screw driver between the front of the computer and the back side of the drive-panel insert to pop off the insert.

   b Remove the four shoulder screws from the back of the drive-panel insert.

4 If you are replacing an existing drive:

   Remove the four shoulder screws from the existing drive.

5 Insert the four shoulder screws into the sides of the new floppy drive and tighten them.

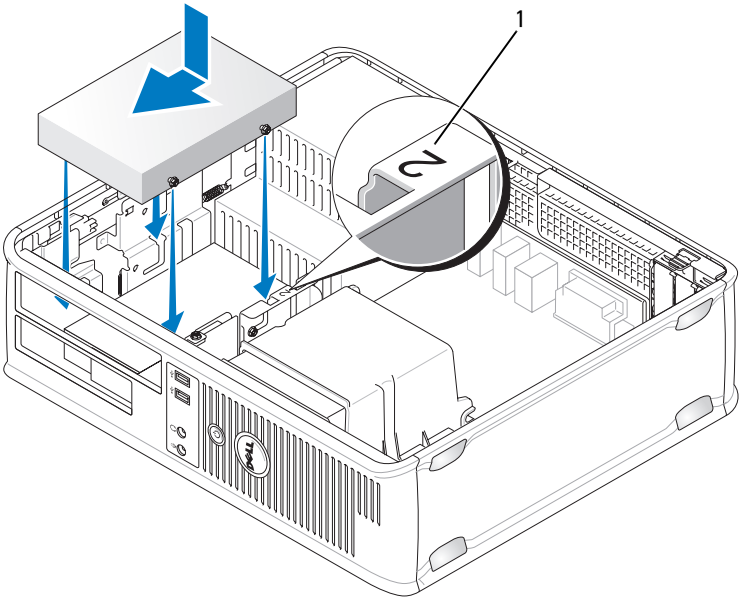


6 Attach the power and data cables to the floppy drive.

7 Gently slide the floppy drive into place into slot 2.

8 Align the shoulder screws with the screw guides, and slide the drive into

the bay until it clicks into place.



1 slot verification number

9 Connect the other end of the data cable to the connector labeled "FLOPPY" on the system board (see "System Board Components" on page 212).

10 Replace the optical drive (see "Optical Drive" on page 237).

11 Replace the computer cover (see "Replacing the Computer Cover" on page 257).

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

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

See the documentation that came with the drive for instructions on installing any software required for drive operation.

13 Enter system setup (see "Entering System Setup" on page 79) and select the appropriate **Diskette Drive** option.

14 Verify that your computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 111).

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, laceration by moving fan blades, or other unexpected injuries, always unplug your computer from the electrical outlet before removing the cover.

Removing an Optical Drive

1 Follow the procedures in "Before You Begin" on page 143.

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.

2 Remove the computer cover (see "Removing the Computer Cover" on page 209).

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.

4 Disconnect the optical drive data cable from the system board connector.

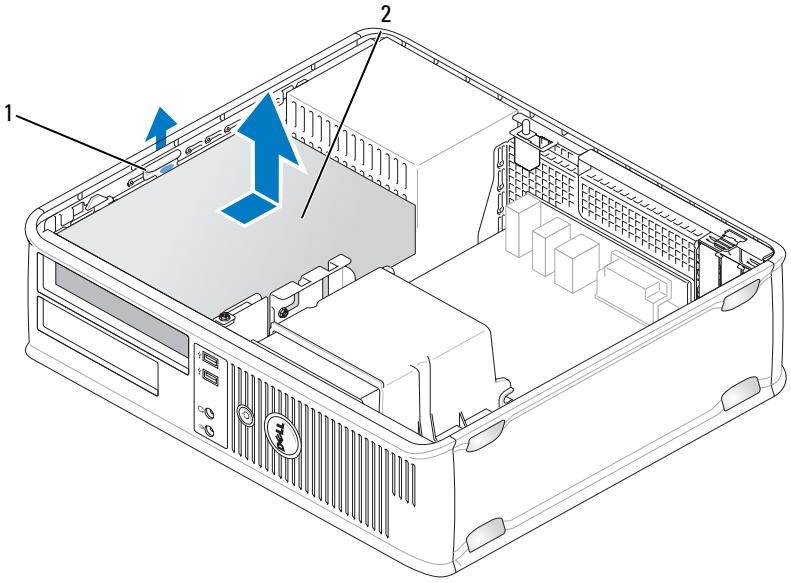
5 Disconnect the power cable and the optical drive data cable from the back of the drive.

6 If you are replacing the optical drive, see "Optical Drive" on page 237.

7 If you are not replacing the drive, replace the drive panel insert.

8 Replace the computer cover (see "Replacing the Computer Cover" on page 257).

NOTICE: To connect a network cable, first plug the cable into the network port or device and then plug it into the computer.



1 drive release latch 2 optical drive

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

10 Configure the drives in system setup (see "Entering System Setup" on page 79).

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 Follow the procedures in "Before You Begin" on page 143.

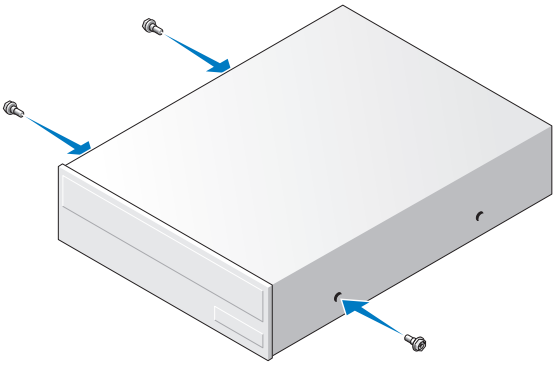
3 If you are replacing an optical drive, remove the shoulder screws from the existing drive and attach the screws to the replacement drive.

4 If you are installing a new drive:

   a Press the two snaps on the top of the drive-panel insert and rotate the insert toward the front of the computer.

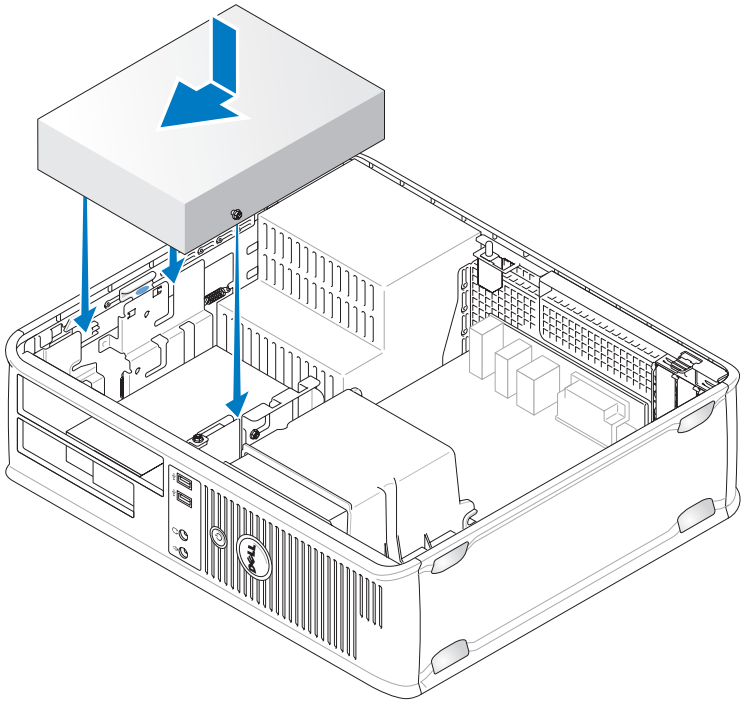
   b Remove the three shoulder screws from the drive-panel insert.

   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 257).

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

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

See the documentation that came with the drive for instructions on installing any software required for drive operation.

10 Enter system setup (see "Entering System Setup" on page 79) and select the appropriate **Drive** option.

11 Verify that your computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 111).

Replacing the Optical Panel Insert

1 Align the optical panel. Insert along the edges of the empty slot for the optical drive.

2 Push the panel. The optical panel insert is locked in place.

NOTE: To comply with FCC regulations, it is recommended that you replace the optical panel insert whenever the optical disc is removed from the computer.

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. If you have to repeatedly reset time and date information after turning on the computer, replace the battery.

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 replace the battery:

1 Record all the screens in system setup (see "System Setup" on page 79) so that you can restore the correct settings in step 9.

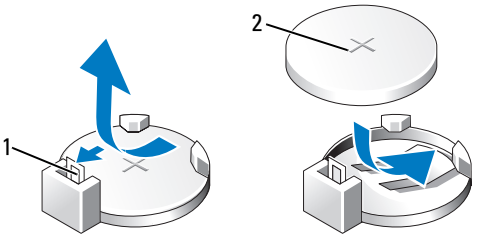
2 Follow the procedures in "Before You Begin" on page 143.

3 Remove the computer cover (see "Removing the Computer Cover" on page 209).

4 Locate the battery socket (see "System Board Components" on page 212).

5 Carefully press the battery release lever away from the battery and the battery will pop out.

6 Insert the new battery into the socket with the side labeled "+" facing up, then snap the battery into place.



1 battery release lever 2 battery (positive side)

7 Replace the computer cover (see "Replacing the Computer Cover" on page 257).

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

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

9 Enter system setup (see "System Setup" on page 79) and restore the settings you recorded in step 1. Then go to the **Maintenance** section and clear the low battery and other errors associated with the battery replacement in the **Event Log**.

10 Properly dispose of the old battery.

See the *Product Information Guide* for battery disposal information.

Power Supply

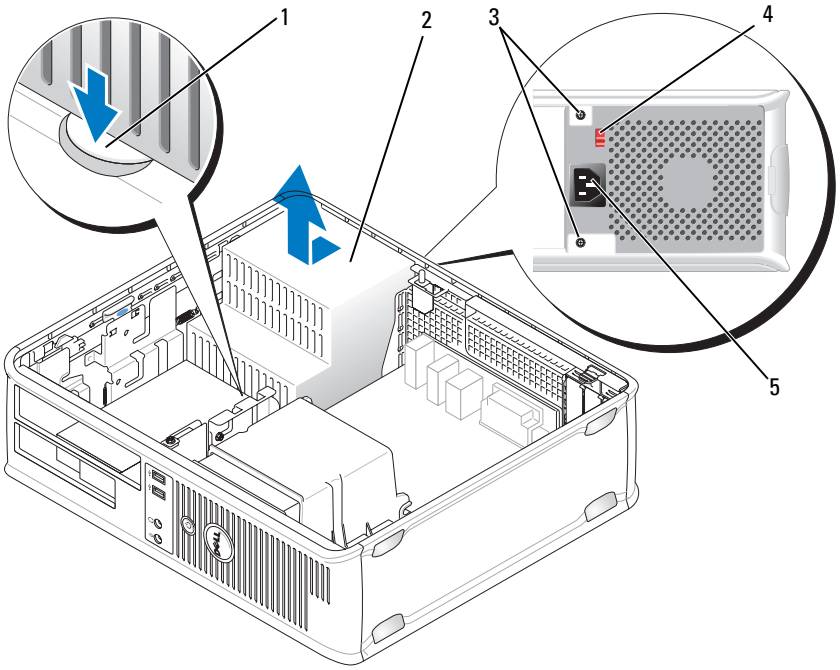
CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

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.

Replacing the Power Supply

1. Follow the procedures in "Before You Begin" on page 143.
2. Remove the computer cover (see "Removing the Computer Cover" on page 209).
3. 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.
4. Remove the hard drive cable, CD or DVD drive data cable, front panel ribbon cable, and any other cables from the securing clip on the side of the power supply.
5. Remove the two screws that attach the power supply to the back of the computer chassis.



1	release button	2	power supply
3	screws (2)	4	voltage selection switch (red)
5	AC power connector		

6 Press the release button located on the floor of the computer chassis.

7 Remove the optical drive and carefully set it aside (see "Optical Drive" on page 237).

8 Slide the power supply toward the front of the computer by approximately 1 inch.

9 Lift the power supply up and out of the computer.

10 Slide the replacement power supply into place.

11 Replace the screws that secure the power supply to the back of the computer chassis.

CAUTION: Failure to replace and tighten all screws may cause electrical shock as these screws are a key part of the system grounding.

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

12 Reconnect the DC power cables to the system board and drives.

13 Secure the hard drive cable, CD or DVD drive data cable, and the front panel ribbon cable to the securing clip on the side of the power supply.

NOTE: Double-check all cable connections to make sure they are secure.

14 Replace the computer cover (see "Replacing the Computer Cover" on page 257).

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

15 Ensure that the correct power supply voltage (115 V or 230 V) is selected, using the red voltage selection switch at the back of the chassis.

16 Connect your computer and devices to an electrical outlet, and turn them on.

17 Verify that the computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 111).

Speakers

Installing a Speaker

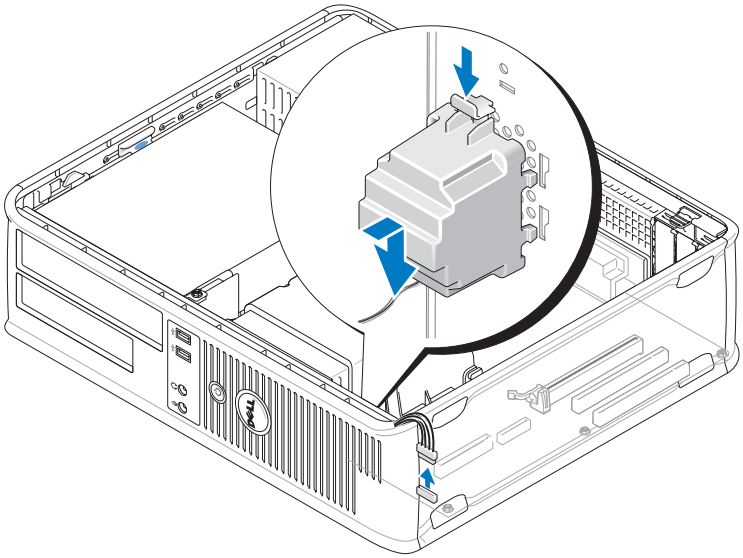
CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide.*

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 143.

2 Remove the cover of your computer (see "Removing the Computer Cover" on page 209).

3 Insert the speaker into the chassis of the computer.



4 Connect the cables to the system board.

5 Replace the computer cover.

6 Turn on power to the computer.

Removing a Speaker

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

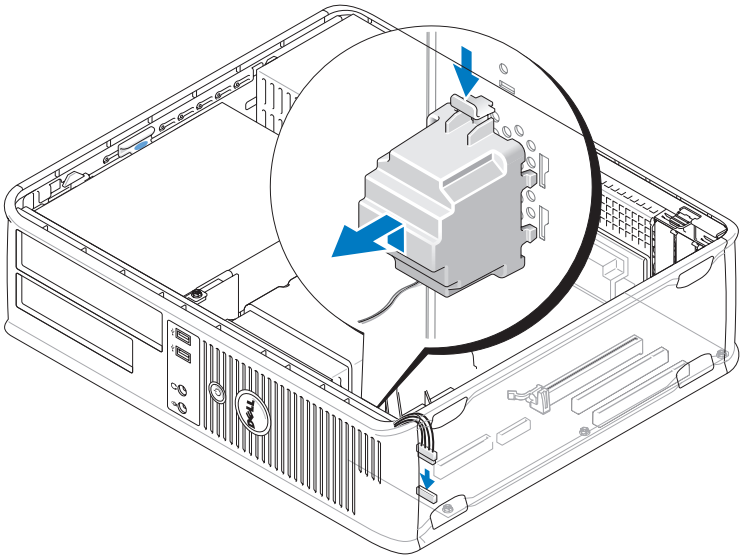
NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1 Follow the procedures in "Before You Begin" on page 143.

2 Remove the cover of your computer (see "Removing the Computer Cover" on page 209).

3 Disconnect the cables from the system board.

4 Remove the speaker from the chassis of the computer.



5 Replace the computer cover.

6 Turn on power to the computer.

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 and Heat Sink

1 Follow the procedures in "Before You Begin" on page 143.

2 Remove the computer cover (see "Removing the Computer Cover" on page 209).

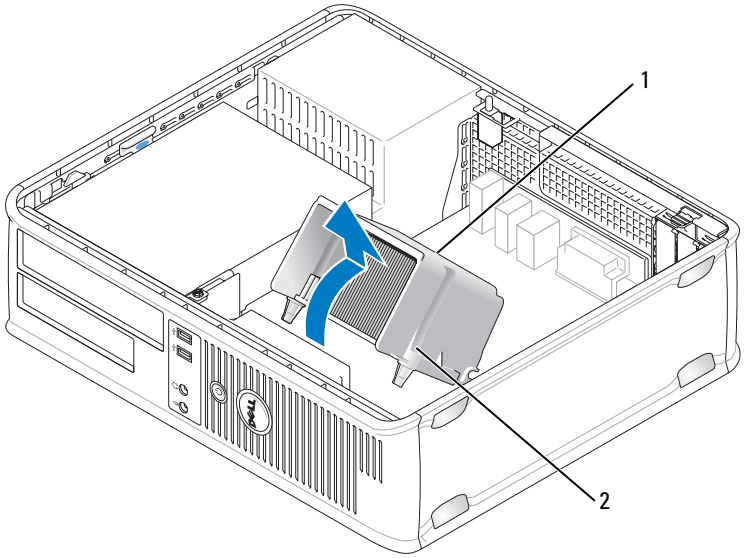
3 Carefully disconnect and move any cables that are routed over the heat sink assembly.

4 Loosen the captive screw on each side of the heat sink assembly.

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

NOTICE: A strong thermal grease bond may exist between the processor and heat sink. Do not use excessive force to separate the heat sink assembly from the processor to avoid damaging the processor.

5 Rotate the heat sink assembly upward, and remove the assembly from the computer.



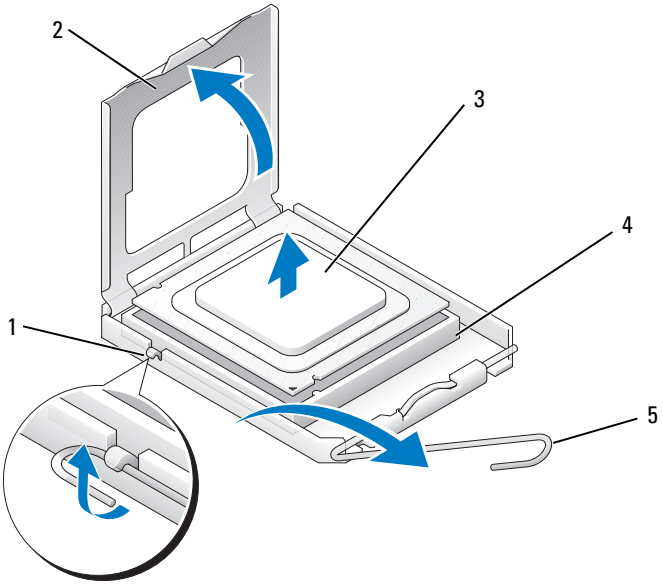
1 heat sink assembly

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.

6 Open the processor cover by sliding the release lever from under the center

cover latch on the socket. Then pull the lever back to release the processor.



1	center cover latch	2	processor cover
3	processor	4	socket
5	release lever		

NOTICE: Be careful not to bend any of the pins when you remove the processor. 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.

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

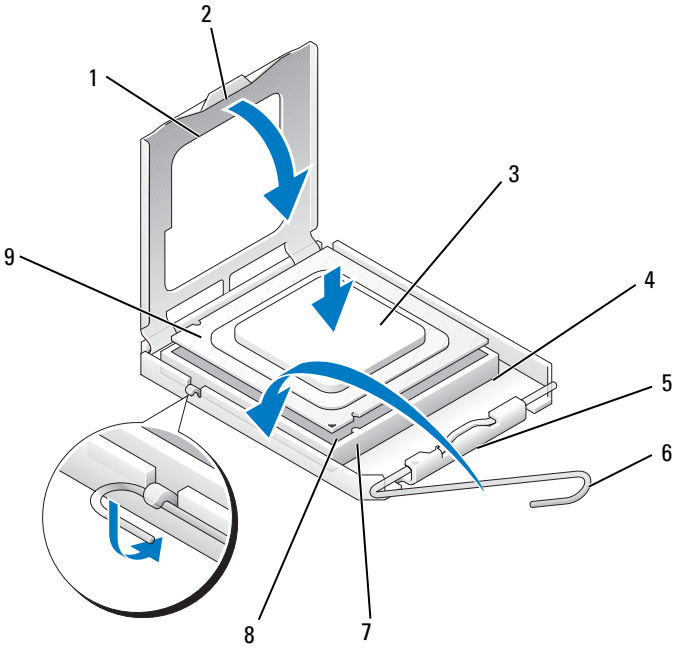
NOTICE: Ground yourself by touching an unpainted metal surface on the back of the computer.

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

1. Follow the procedures in "Before You Begin" on page 143.
2. Unpack the new processor, being careful not to bend any of the processor pins.
3. If the release lever on the socket is not fully extended, move it to that position.

NOTICE: 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.

4. Orient the front and rear alignment-notches on the processor with the front and rear alignment-notches on the socket.
5. Align the pin-1 corner of the processor and socket.



1	processor cover	2	tab
3	processor	4	processor socket
5	center cover latch	6	release lever
7	front alignment-notch	8	socket and processor pin-1 indicator
9	rear alignment-notch		

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

6 Set the processor lightly in the socket and ensure that the processor is positioned correctly.

7 When the processor is fully seated in the socket, close the processor cover.

Ensure that the tab on the processor cover is positioned underneath the center cover latch on the socket.

8 Pivot the socket release lever back toward the socket, and snap it into place to secure the processor.

9 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.

10 Apply the new thermal grease to the top of the processor.

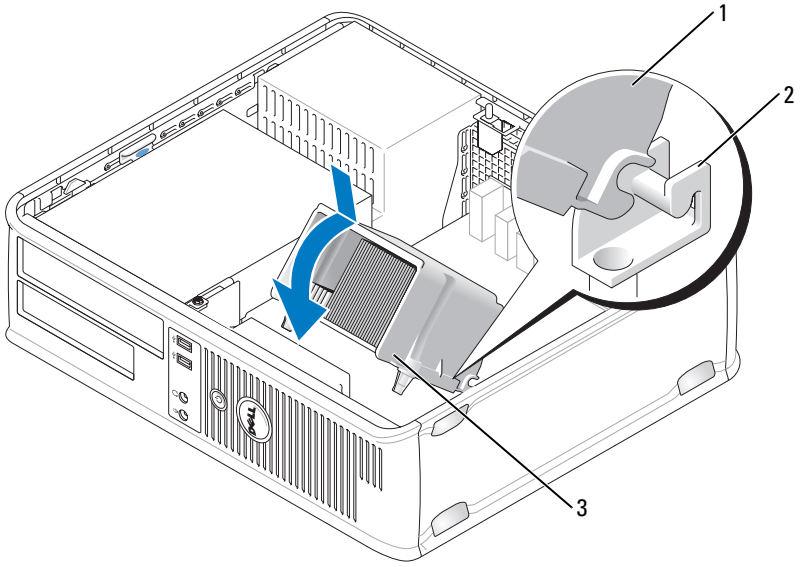
NOTICE: Ensure that the floppy drive and audio cables are not routed so that they are pinched when the heat sink assembly is installed.

11 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 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)		

12 Connect any cables disconnected before removing the heat sink assembly.

13 Replace the computer cover (see "Replacing the Computer Cover" on page 257).

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

14 Connect your computer and devices to an electrical outlet, and turn them on.

15 Verify that the computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 111).

I/O Panel

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, laceration by moving fan blades, or other unexpected injuries, always unplug your computer from the electrical outlet before opening the cover.

CAUTION: The heat sink assembly, power supply, and other components may become very hot during normal operation. Be sure that they have had sufficient time to cool before you touch them.

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.

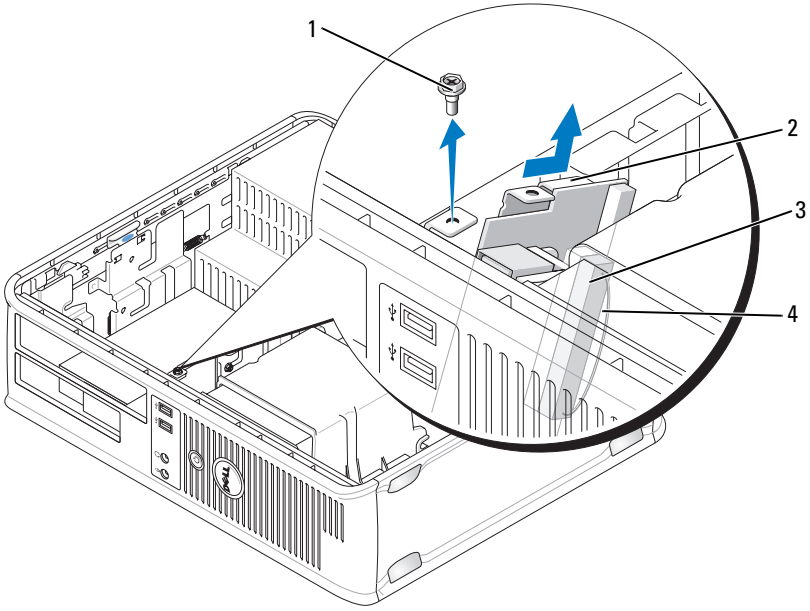
Removing the I/O Panel

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

1. Follow the procedures in "Before You Begin" on page 143.
2. Remove the computer cover (see "Removing the Computer Cover" on page 209).
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 to prevent damage to the cable connectors and the cable routing clips.

4. Gently rotate and slide the I/O panel away from the computer.
5. Remove the cable from the I/O panel by pulling on the pull-loop.



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

Installing the I/O Panel

1. Attach the I/O cable to the I/O panel.
1. Place the I/O panel into the slot.

NOTICE: Take care not to damage the cable connectors and the cable routing clips when sliding the I/O panel into the computer.

2. Align and slide the I/O panel clamp in the I/O panel clamp slot.
3. Check the front panel to ensure that the USB and audio jacks are centered on the holes.
4. Replace and tighten the screw that secures the I/O panel.

5 Reconnect the cables to the system board.

6 Replace the computer cover (see "Replacing the Computer Cover" on page 257).

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

7 Connect your computer and devices to an electrical outlet, and turn them on.

8 Verify that the computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 111).

System Board

Removing the System Board

CAUTION: To guard against electrical shock, laceration by moving fan blades, or other unexpected injuries, always unplug your computer from the electrical outlet before opening the cover.

CAUTION: The heat sink assembly, power supply, and other components may become very hot during normal operation. Be sure that they have had sufficient time to cool before you touch them.

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.

1 Follow the procedures in "Before You Begin" on page 143.

2 Remove the computer cover (see "Removing the Computer Cover" on page 209).

3 Remove any add-in cards on the system board (see "Cards" on page 219).

4 Remove the processor and heat sink assembly (see "Speakers" on page 245).

5 Remove the memory modules (see "Removing Memory" on page 219) and document which memory module is removed from each memory socket so that the memory modules can be installed in the same location after the board is replaced.

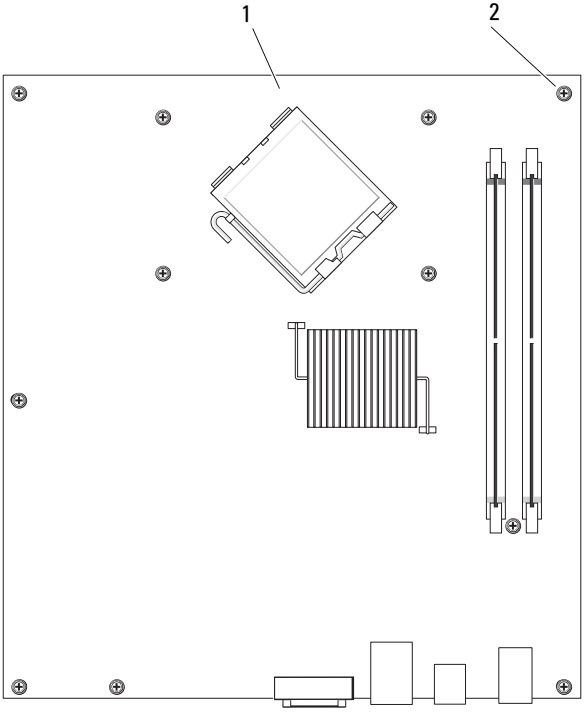
6 Disconnect all cables from the system board. Note the routing of all cables

as you remove them so that you can reroute them correctly after installing the new system board.

7 Remove the remaining seven screws from the system board. (Four other screws were removed with the heat sink assembly.)

8 Slide the system board assembly toward the front of the computer, and then lift the board up and away.

System Board Screws



1 system board 2 screws (7)

9 Place the system board that you just removed next to the replacement system board to compare and ensure they are identical.

Installing the System Board

1. Gently align the board into the chassis and slide it toward the back of the computer.
2. Using the seven screws, secure the system board to the chassis.

CAUTION: Failure to replace and tighten all screws may cause electrical shock as these screws are a key part of the system grounding.

3. Replace the cables that you removed from the system board.
4. Replace the processor and the heat sink assembly (see "Installing the Processor" on page 249).

NOTICE: Ensure that the heat sink assembly is correctly seated and secure.

5. Replace the memory modules into the memory sockets at the same locations from which you removed them (see "Installing Memory" on page 217).
6. Replace any add-in cards on the system board.
7. Replace the computer cover (see "Replacing the Computer Cover" on page 257).

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

8. Connect your computer and devices to an electrical outlet, and turn them on.
9. Verify that the computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 111).

Replacing the Computer Cover

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

1. Ensure that all cables are connected, and fold cables out of the way.
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 to close it.

c Snap the cover into place by pulling back on the cover release latch and then releasing the latch when the cover is properly seated.

d Ensure that the cover is seated correctly before moving the computer.

4 Move the computer to the upright position.

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

NOTICE: Ensure that none of the air-vents of the system are blocked.

5 Connect your computer and devices to an electrical outlet, and turn them on.

14

Getting Help

Obtaining Assistance

CAUTION: If you need to remove the computer cover, first disconnect the computer power and modem cables from all electrical outlets.

If you experience a problem with your computer, you can complete the following steps to diagnose and troubleshoot the problem:

1. See "Troubleshooting" on page 115 for information and procedures that pertain to the problem your computer is experiencing.
2. See "Dell Diagnostics" on page 111 for procedures on how to run Dell Diagnostics.
3. Fill out the "Diagnostics Checklist" on page 266.
4. Use Dell's extensive suite of online services available at Dell Support (**support.dell.com**) for help with installation and troubleshooting procedures. See "Online Services" on page 262 for a more extensive list of Dell Support online.
5. If the preceding steps have not resolved the problem, see "Contacting Dell" on page 267.

NOTE: Call Dell Support 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 Dell Support, see "Technical Support and Customer Service" on page 262.

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.

Technical Support and Customer Service

Dell's support service is available 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 "Before You Call" on page 264, and then see the contact information for your region or go to **support.dell.com**.

DellConnect

DellConnect is a simple online access tool that allows a Dell service and support associate to access your computer through a broadband connection, diagnose your problem and repair it all under your supervision. For more information, go to **support.dell.com** and click DellConnect.

Online Services

You can learn about Dell products and services on the following websites:

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)

You can access Dell Support through the following websites and e-mail addresses:

- Dell Support websites

  support.dell.com

  support.jp.dell.com (Japan only)

  support.euro.dell.com (Europe only)

- Dell Support e-mail addresses

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)

- Dell Marketing and Sales e-mail addresses
  apmarketing@dell.com (Asian/Pacific countries only)

  sales_canada@dell.com (Canada only)
- Anonymous file transfer protocol (FTP)
  ftp.dell.com

  Log in as user: `anonymous`, and use your e-mail address as your password.

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. For the telephone number to call for your region, see "Contacting Dell" on page 267.

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 267.

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 267.

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 267.

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 267.

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 266), indicating the tests that you have run and any error messages reported by the Dell Diagnostics (see "Dell Diagnostics" on page 111).
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 266). 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:

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

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.

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Appendix

FCC Notice (U.S. Only)

FCC Class B

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the manufacturer's instruction manual, may cause interference with radio and television reception. This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of the FCC Rules.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

NOTICE: The FCC regulations provide that changes or modifications not expressly approved by Dell Inc. could void your authority to operate this equipment.

These limits are designed to provide reasonable protection against harmful interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference with radio or television reception, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Relocate the system with respect to the receiver.
- Move the system away from the receiver.
- Plug the system into a different outlet so that the system and the receiver are on different branch circuits.

If necessary, consult a representative of Dell Inc. or an experienced radio/television technician for additional suggestions.

The following information is provided on the device or devices covered in this document in compliance with the FCC regulations:

- Product name: OptiPlex 330
- Model number: DCSM and DCNE
- Company name:
  Dell Inc.
  Worldwide Regulatory Compliance & Environmental Affairs
  One Dell Way
  Round Rock, TX 78682 USA
  512-338-4400

NOTE: For further regulatory information, see your *Product Information Guide*.

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.

Blu-ray Disc™ (BD)— An optical storage technology offering storage capacity of up to 50 GB, full 1080p video resolution (HDTV required), and as many as 7.1 channels of native, uncompressed surround sound.

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 CD, DVD, or floppy 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 CD, DVD, or floppy disk available. Your *Drivers and Utilities* media is an example of bootable 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.

carnet — 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.

CMOS — A type of electronic circuit. Computers use a small amount of battery-powered CMOS memory to hold date, time, and system setup options.

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 — provides port replication, cable management, and security features to adapt your notebook to a desktop workspace.

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.

Hyper-Threading — Hyper-Threading is an Intel technology that can enhance overall computer performance by allowing one physical processor to function as two logical processors, capable of performing certain tasks simultaneously.

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 Mps to 4 Gbps. 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.

RTCRST — 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

UAC — user account control— Microsoft Windows Vista™ security feature that, when enabled, provides an added layer of security between user accounts and access to operating system settings.

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.