




Dell™ OptiPlex™ GX240 Systems

# User's Guide



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## 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](#).”

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Models: DHS, DHP, and DHM

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## **CAUTION: Safety Instructions**

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

### **General**

- Do not attempt to service the computer yourself unless you are a trained service technician. Always follow installation instructions closely.
- To help prevent electric shock, plug the computer and device power cables into properly grounded electrical outlets. These cables are equipped with 3-prong plugs to help ensure proper grounding. Do not use adapter plugs or remove the grounding prong from a cable. If you must use an extension cable, use a 3-wire cable with properly grounded plugs.



- To help avoid the potential hazard of electric shock, do not use your computer during an electrical storm.
- To help avoid the potential hazard of electric shock, do not connect or disconnect any cables or perform maintenance or reconfiguration of this product during an electrical storm.
- If your computer includes a modem, the cable used with the modem should be manufactured with a minimum wire size of 26 American wire gauge (AWG) and an FCC-compliant RJ-11 modular plug.
- Before you clean your computer, disconnect the computer from the electrical outlet. Clean your computer with a soft cloth dampened with water. Do not use liquid or aerosol cleaners, which may contain flammable substances.
- To help avoid possible damage to the system board, wait 5 seconds after turning off the computer before disconnecting a device from the computer.

## **CAUTION: Safety Instructions (*continued*)**

- To avoid shorting out your computer when disconnecting a network cable, first unplug the cable from the network adapter on the back of your computer, and then from the network jack. When reconnecting a network cable to your computer, first plug the cable into the network jack, and then into the network adapter.
- To help protect your computer from sudden, transient increases and decreases in electrical power, use a surge suppressor, line conditioner, or uninterruptible power supply (UPS).
- Ensure that nothing rests on your computer's cables and that the cables are not located where they can be stepped on or tripped over.
- Do not push any objects into the openings of your computer. Doing so can cause fire or electric shock by shorting out interior components.
- Keep your computer away from radiators and heat sources. Also, do not block cooling vents. Avoid placing loose papers underneath your computer; do not place your computer in a closed-in wall unit or on a bed, sofa, or rug.
- Do not spill food or liquids on your computer. If the computer gets wet, consult ["Repairing a Wet Computer."](#)
- Do not use your computer during an electrical storm unless the AC adapter cable has been disconnected from the electrical outlet.
- When you use the AC adapter to run the computer or to charge the battery, place the AC adapter in a ventilated area, such as a desk top or on the floor.
- The AC adapter may become hot during normal operation of your computer. Use care when handling the adapter during or immediately after operation.

## When Using Your Computer

As you use your computer, observe the following safe-handling guidelines.

**⚠ CAUTION:** Do not operate your computer with any cover(s) (including computer covers, bezels, filler brackets, front-panel inserts, and so on) removed.

- Your computer is equipped with one of the following:
  - A fixed-voltage power supply — Computers with a fixed-voltage power supply do not have a voltage selection switch on the back panel and operate at only one voltage (see the regulatory label on the outside of the computer for its operating voltage).
  - An auto-sensing voltage circuit — Computers with an auto-sensing voltage circuit do not have a voltage selection switch on the back panel and automatically detect the correct operating voltage.
  - A manual voltage selection switch — Computers with a voltage selection switch on the back panel must be manually set to operate at the correct operating voltage.





- ➔ **NOTICE:** To help avoid damaging a computer with a manual voltage selection switch, set the switch for the voltage that most closely matches the AC power available in your location. For Japan, the voltage selection switch must be set to the 115-V position even though the AC power available in Japan is 100 V. Also, ensure that your monitor and attached devices are electrically rated to operate with the AC power available in your location.
- Before working inside the computer, unplug the computer to help prevent electric shock or system board damage. Certain system board components continue to receive power any time the computer is connected to AC power.

## When Using Your Computer (*continued*)

### When Working Inside Your Computer

Before you open the computer cover, perform the following steps in the sequence indicated.

 **CAUTION:** Do not attempt to service the computer yourself, except as explained in your online Dell™ documentation or in instructions otherwise provided to you by Dell. Always follow installation and service instructions closely.

 **NOTICE:** To help avoid possible damage to the system board, wait 5 seconds after turning off the computer before removing a component from the system board or disconnecting a device from the computer.

- 1 Perform an orderly computer shutdown using the operating system menu.
- 2 Turn off your computer and any devices connected to the computer.
- 3 Ground yourself by touching an unpainted metal surface on the chassis, such as the metal around the card-slot openings at the back of the computer, before touching anything inside your computer.

While you work, periodically touch an unpainted metal surface on the computer chassis to dissipate any static electricity that might harm internal components.

- 4 Disconnect your computer and devices, including the monitor, from their electrical outlets. Also, disconnect any telephone or telecommunication lines from the computer.


Doing so reduces the potential for personal injury or shock.

In addition, take note of these safety guidelines when appropriate:

- When you disconnect a cable, pull on its connector or on its strain-relief loop, not on the cable itself. Some cables have a connector with locking tabs; if you are disconnecting this type of cable, press in on the locking tabs before disconnecting 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.

## When Using Your Computer (*continued*)

- 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 microprocessor chip by its edges, not by its pins.

 **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. Do not dispose of the battery along with household waste. Contact your local waste disposal agency for the address of the nearest battery deposit site.**

### Protecting Against Electrostatic Discharge

Static electricity can harm delicate components inside your computer. To prevent static damage, discharge static electricity from your body before you touch any of your computer's electronic components, such as the microprocessor. You can do so by touching an unpainted metal surface on the computer chassis.

As you continue to work inside the computer, periodically touch an unpainted metal surface to remove any static charge your body may have accumulated.

You can also take the following steps to prevent damage from electrostatic discharge (ESD):

- Do not remove components from their antistatic packing material until you are ready to install the component in your computer. Just before unwrapping the antistatic packaging, discharge static electricity from your body.
- When transporting an electrostatic sensitive component, first place it in an antistatic container or packaging.
- Handle all electrostatic sensitive components in a static-safe area. If possible, use antistatic floor pads and workbench pads.

### Ergonomic Computing Habits

 **CAUTION: Improper or prolonged keyboard use may result in injury.**

 **CAUTION: Viewing the monitor screen for extended periods of time may result in eye strain.**

For comfort and efficiency, observe the ergonomic guidelines in "[Ergonomic Computing Habits](#)" when setting up and using your computer.

## When Using Your Computer *(continued)*



### Battery Disposal

Your computer uses a lithium battery. The lithium battery is a long-life battery, and it is very possible that you will never need to replace it. However, should you need to replace it, see ["Replacing the Battery."](#)

Do not dispose of the battery along with household waste. Contact your local waste disposal agency for the address of the nearest battery deposit site.



# 1

## SECTION 1

# About Your Computer

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Finding Information and Assistance

Front Panel

Back Panel


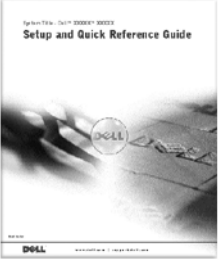
Inside Your Computer

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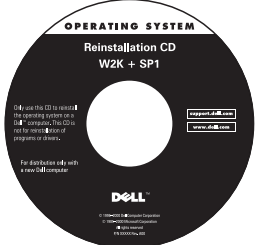

## Finding Information and Assistance

The following table lists the resources that Dell provides as support tools. Additional resources may be shipped with your computer system.


### Resources and Support Tools

Resources	Contents	Using the Resource
 <p>The Dell OptiPlex ResourceCD for Reinstalling Drivers, Diagnostics, Utilities, and Online Documentation. The CD contains the following content:</p> <ul style="list-style-type: none"> <li>• Dell Diagnostics</li> <li>• Drivers</li> <li>• Utilities</li> <li>• Computer and device documentation</li> </ul>	<p><i>Dell OptiPlex ResourceCD</i></p> <ul style="list-style-type: none"> <li>• Dell Diagnostics</li> <li>• Drivers</li> <li>• Utilities</li> <li>• Computer and device documentation</li> </ul>	<p>See the main menu on the <i>ResourceCD</i> that was shipped with your computer. Use the pull-down menu to make selections appropriate for your computer. You can perform the following tasks:</p> <ul style="list-style-type: none"> <li>• Diagnose a problem</li> <li>• Install or reinstall drivers</li> <li>• Obtain information on your computer and devices</li> </ul> <p><b>NOTE:</b> User documentation and drivers are already installed on your computer when shipped from Dell. You can use this CD to access documentation, reinstall drivers, or run diagnostics tools. You must boot your computer from this CD to run the diagnostics, which may require changing your computer's <a href="#">boot sequence</a>.</p> <p>For more information on using the <i>ResourceCD</i>, see <a href="#">“Using the Dell OptiPlex ResourceCD.”</a></p>
 <p>For Non-TX, Dell™ XPS™ Series Setup and Quick Reference Guide</p>	<p><i>Setup and Quick Reference Guide</i></p> <ul style="list-style-type: none"> <li>• Getting started/setup</li> <li>• Support tools</li> <li>• Solving Problems</li> </ul>	<p>See the <i>Setup and Quick Reference Guide</i> for information on the following:</p> <ul style="list-style-type: none"> <li>• Setting up your computer</li> <li>• Finding and using support resources</li> <li>• Diagnosing a problem</li> <li>• Using tools and utilities</li> </ul>

## Resources and Support Tools *(continued)*

Resources	Contents	Using the Resource
 <p>WWW.DELL.COM Service Tag: XXXXX Express Service Code: XX-XXX-XX</p>  <p>Windows OS Professional OEM Move Here</p> <p>XXXXXXXXXX XXXXXXXXXX XXXXXXXXXX Product Key XXXXXXX-XXXXX-XXXXX-XXXXX-XXXXX</p>	<p>Service and Registration Labels—located on the front or side of your Dell™ computer.</p> <ul style="list-style-type: none"> <li>Express Service Code and Service Tag Number</li> <li>Product Key (also called the Product ID or Certificate of Authenticity [COA])</li> </ul>	<p>The Express Service Code and Service Tag Number are unique identifiers for your Dell computer.</p> <p>You may need the Product Key (or Product ID) number to complete the operating system setup.</p>
 <p>OPERATING SYSTEM Reinstallation CD W2K + SP1</p> <p>Use this CD to reinstall the operating system on a Dell computer. This CD is not for removal or use on other computers.</p> <p>For distribution only with your Dell computer.</p> <p>DELL</p>	<p>Operating System CD</p>	<p>To reinstall your operating system, use the <i>Operating System</i> CD that was shipped with your computer.</p> <p><b>NOTE:</b> The operating system CD may not include all the latest drivers for your computer. If you reinstall your operating system, use the <i>ResourceCD</i> to reinstall drivers for the devices shipped with your computer.</p> <p>For more information about reinstalling your operating system, see the operating system installation documentation that was shipped with your computer.</p>
 <p>Operating System Installation Guide</p> <p>DELL</p>	<p>Operating system installation guide</p>	<p>See the operating system installation guide for information on reinstalling and configuring your operating system.</p> <p>Click the <b>Start</b> button and select <b>Help</b> or <b>Help and Support</b>, depending on your operating system, to obtain more information on your operating system.</p>

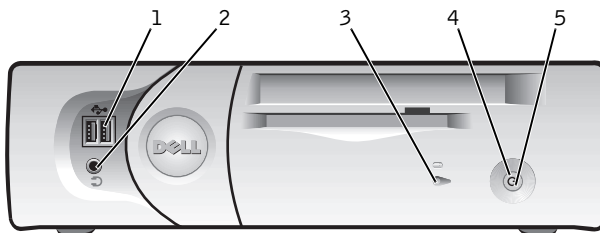
## Resources and Support Tools (continued)

Resources	Contents	Using the Resource
 User's Guides	User's guides for your computer and devices	Depending on your operating system, double-click the <b>User's Guides</b> icon on your desktop or click the <b>Start</b> button and then select <b>Help and Support</b> to access the electronic documentation stored on your hard drive. Obtain information on the following: <ul style="list-style-type: none"> <li>• Using your computer</li> <li>• Configuring system settings</li> <li>• Removing and installing parts</li> <li>• Installing and configuring software</li> <li>• Diagnosing a problem</li> <li>• Technical specifications</li> <li>• Device documentation (on selected operating systems)</li> <li>• Getting technical assistance</li> </ul>
<b>I support.dell.com</b>	Dell Support website <ul style="list-style-type: none"> <li>• Technical support and information</li> <li>• Downloads for your computer</li> <li>• Order or delivery status</li> <li>• Hints and tips, technology papers, service information</li> </ul>	Go to Dell Support website at <b>support.dell.com</b> and complete the one-time registration. <ul style="list-style-type: none"> <li>• Get help with general usage, installation, and troubleshooting questions</li> <li>• Obtain answers to technical service and support questions</li> <li>• Get the latest versions of the drivers for your computer</li> <li>• Access documentation about your computer and devices</li> <li>• Join online discussions with other Dell customers and Dell technical professionals</li> <li>• Explore a list of online links to Dell's primary vendors</li> </ul>
<b>Premier Support.Dell.com</b>	Dell Premier Support website <ul style="list-style-type: none"> <li>• Service call status</li> <li>• Top technical issues by product</li> <li>• Frequently asked questions by product number</li> <li>• Customized service tags</li> <li>• System configuration detail</li> </ul>	Go to <b>premiersupport.dell.com</b> : The Dell Premier Support website is customized for corporate, government, and education customers. This site may not be available in all regions.

## Front Panel

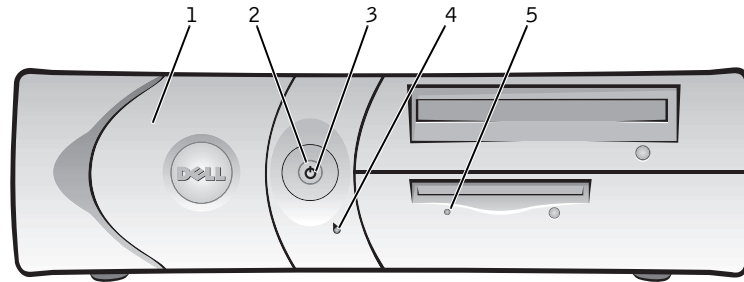
The following figures show the controls, lights, and features located on the front panel of the small form-factor, small desktop, and small mini-tower computers.

### Small Form-Factor Computer



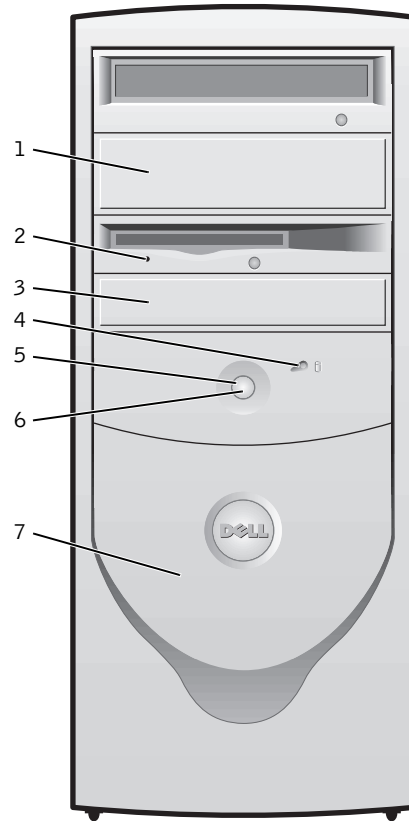
1	USB connectors (2)
2	headphone connector
3	hard drive access lights
4	power button
5	power light

### Small Desktop Computer



- |   |                           |
|---|---------------------------|
| 1 | front panel door          |
| 2 | power button              |
| 3 | power light               |
| 4 | hard drive access light   |
| 5 | floppy drive access light |

## Small Mini-Tower Computer

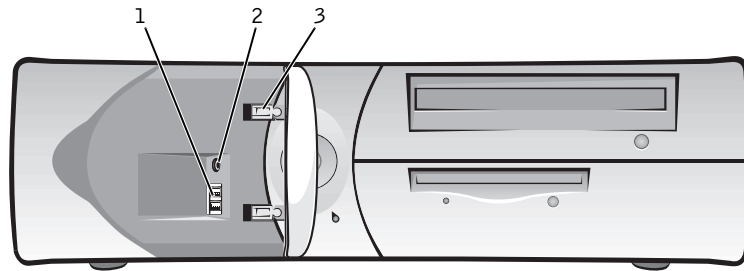


1	removable drive panel
2	floppy drive access light
3	removable drive panel
4	hard drive access light
5	power button
6	power light
7	front panel door

## Front Panel Door

Open the front panel door to access two Universal Serial Bus (USB) connectors and one headphone connector. This door is removable; if you remove it or accidentally knock it off its hinges, it snaps back in place.

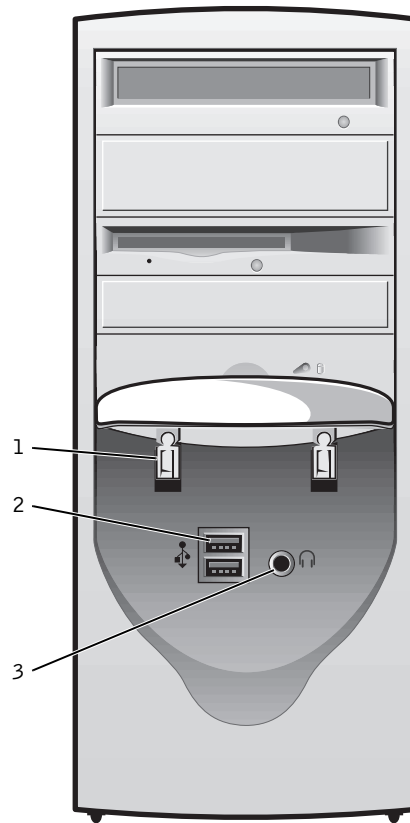
### Small Desktop Computer



1	USB connectors (2)
2	headphone connector
3	breakaway hinges (2)



## Small Mini-Tower Computer



- |   |                      |
|---|----------------------|
| 1 | breakaway hinges (2) |
| 2 | USB connectors (2)   |
| 3 | headphone connector  |


### Speaker/Headphone Connector

Used to connect computer speakers, headphones, or other audio output devices. This connector is amplified to support headphones.

### Power Button

The power button controls the computer's AC input power.

The Microsoft® Windows® 98 Second Edition (SE), Windows 2000, and Windows XP operating systems let you configure the function of the power button through the Advanced Configuration and Power Interface (ACPI) feature, as shown in the following table.

 **NOTICE:** To turn off your computer, perform an orderly computer shutdown using the operating system menu when possible.

#### Power Button Functions for Windows 98 SE, Windows 2000, and Windows XP with ACPI

Action	Results		
	Computer Turned On and ACPI Enabled	Computer in Standby Mode	Computer Turned Off
Press power button	Computer goes into standby mode or turns off (depending on the operating system setup)	Computer turns on	Boots and computer turns on
Hold power button for 6 seconds*	Computer turns off	Computer turns off	Boots and computer turns on

*\*Pressing or holding the power button to shut down the computer may result in data loss. Use the power button to shut down the computer only if the operating system is not responding.*

#### Power Button Functions for Windows 98 SE, Windows 2000, and Windows XP with ACPI Disabled

Action	Results		
	Computer Turned On and ACPI Disabled	Computer in Suspend Mode	Computer Turned Off
Press power button	Computer turns off immediately	Computer turns off immediately	Boots and computer turns on
Hold power button for 6 seconds*	Computer turns off	Computer turns off	Boots and computer turns on

---

*\* Pressing or holding the power button to shut down the computer may result in data loss. Use the power button to shut down the computer only if the operating system is not responding.*

---

### Power Button Functions for Microsoft Windows NT®

Action	Results	
	Computer Turned On	Computer Turned Off
Press power button	Computer shuts down	Boots and computer turns on
Hold power button for 6 seconds*	Computer turns off	Boots and computer turns on

---

*\* Pressing or holding the power button to shut down the computer may result in data loss. Use the power button to shut down the computer only if the operating system is not responding.*

---

If the computer does not turn off when you press the power button, the computer may be hung. Press and hold the power button until the computer turns off completely (this process may take several seconds). If the computer is hung and the power button fails to function properly, unplug the AC power cable from the computer, wait for it to completely stop running, and plug in the AC power cable. If the computer does not restart, press the power button to restart the computer.

### Power Light

The power light illuminates in two colors and blinks or remains solid to indicate different states (normal and nonnormal). The following are normal lights:

- No light — computer is in the off state (S4, S5, or mechanical OFF)
- Steady green — normal operating state
- Blinking green — low-power state (S1 or S3)

**NOTE:** Your computer can resume from the S3 state (suspend to RAM) in several ways. Pressing the power button always works. Remote Wake Up also creates an S3 wake event if enabled in system setup and in your operating system. Personal System/2 (PS/2) wake events also vary depending on your operating system, but PS/2 mice always wake the computer from S3 with both movement and click. Certain USB devices also wake the computer from S3, and the action required varies by device. Check your device documentation for details.

See “[Diagnostic Lights](#)” for a description of nonnormal indications.

### Floppy Drive Access Light

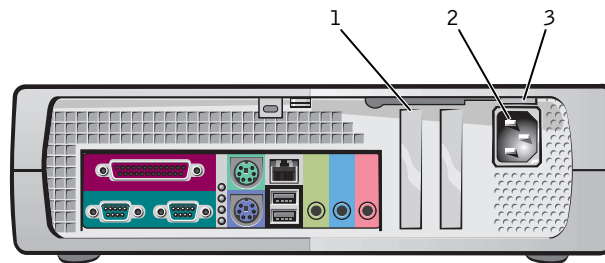
The floppy drive access light lights when the drive is reading data from, or writing data to, a floppy disk. Wait until this light turns off before you remove the floppy from the drive.

### Hard Drive Access Light

The hard drive access light lights when the computer is reading data from, or writing data to, the drive.

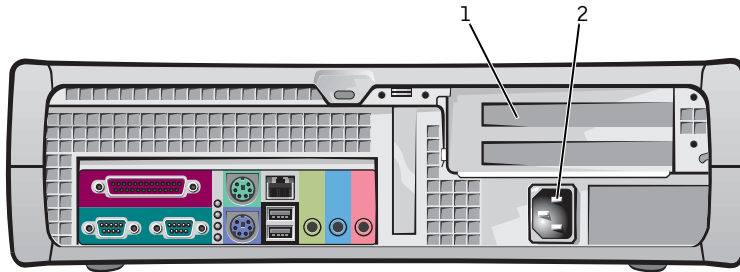
## Back Panel

### Small Form-Factor Computer



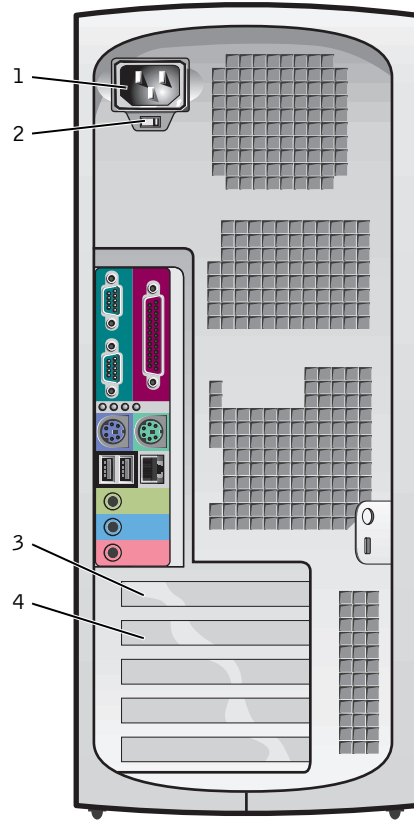
- |   |                                     |
|---|-------------------------------------|
| 1 | half-height PCI expansion-card slot |
| 2 | AC adapter                          |
| 3 | AC voltage switch                   |

## Small Desktop Computer



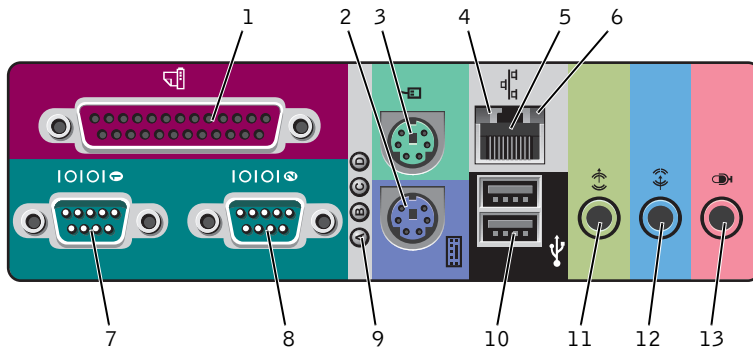
- |   |               |
|---|---------------|
| 1 | PCI slots (2) |
| 2 | AC adapter    |

### Small Mini-Tower Computer



- 1 AC adapter
- 2 AC voltage switch
- 3 AGP slot
- 4 PCI slots (4)

## I/O Panel—Small Form-Factor, Desktop, and Mini-Tower Computers



1	parallel connector	8	serial connector (2)
2	keyboard connector	9	diagnostic lights
3	mouse connector	10	USB connectors (2)
4	link integrity light	11	audio line-out connector
5	network adapter	12	audio line-in connector
6	activity light	13	microphone connector
7	serial connector (1)		


### Connecting Devices


When you connect external devices to your computer's back panel, follow these guidelines:


- Check the documentation that accompanied the device for specific installation and configuration instructions.

For example, you must connect most devices to a particular input/output (I/O) connector to operate properly. Also, external devices like a mouse or printer usually require you to load device drivers into computer memory before they will work.

- Always attach external devices *while your computer is turned off*. Then turn on the computer *before* turning on any external devices, unless the documentation for the device specifies otherwise. (If the computer does not seem to recognize the device, try turning on the device before turning on the computer.)

 **NOTE:** The integrated parallel connector is automatically disabled if the computer detects an installed expansion card containing a parallel connector configured to the same address as specified in “[Additional System Setup Options](#).”

 **NOTE:** USB mice only wakes the computer from the S1 (standby) and S3 (suspend to RAM) states with a click.

 **NOTICE:** When you disconnect external devices from the back of the computer, wait 10 to 20 seconds after turning off the computer before you disconnect any devices to avoid possible damage to the system board.

## Parallel Connector

This is used to connect printers. Default designation is LPT1.

## Mouse Connector

Turn off the computer and any attached devices before connecting a mouse to the computer. If your computer uses Microsoft Windows 2000 or Windows NT 4.0, Dell installed the necessary mouse drivers on your hard drive.

## USB Connectors

These are used to attach USB-compliant devices such as keyboards, mice, printers, and computer speakers to your computer.

## Integrated Network Adapter Connector

The network adapter, which includes a Remote Wake Up feature, has the following lights:

- A yellow network activity light flashes 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.)
- A dual-colored link integrity light, which is green when a good connection exists between a 10-megabit per second (Mbps) network and the computer, or is orange when a good connection exists between a 100-Mbps network and the computer. When the light is off, the computer is not detecting a physical connection to the network.

## Network Cable Requirements

The network adapter connector attaches an unshielded twisted pair (UTP) Ethernet cable to your computer. Press one end of the UTP cable to an RJ45 jack wall plate or to an RJ45 port on a UTP concentrator or hub, depending on your network configuration, and press the other end of the UTP cable into the network adapter connector until the cable snaps securely into place.

Dell recommends the use of Category 5 wiring and connectors for our customers’ networks.



### **Line-In Jack**

This jack is used to attach record/playback devices such as cassette players, CD players, and VCRs. Connect the line-out cable from any of these devices to the line-in jack.

### **Line-Out Jack**

This jack is used to attach computer speakers. This jack is amplified, so speakers with integrated amplifiers are not required. Connect the audio cable from the speakers to this jack.

### **Microphone Jack**

This jack is used to attach a standard personal computer microphone. Connect the audio cable from the microphone to the microphone jack.

### **Video Connector**

This connector is used to attach a video graphics array (VGA)-compatible monitor to your computer.

### **Serial Connectors**

Default port designations: COM1 for port 1 and COM2 for port 2. You can reassign the serial connector's designation if you add an expansion card containing a serial connector using this designation.

If you set the computer's serial connectors to **Auto** in system setup and add an expansion card containing a serial connector configured to a specific designation, the computer automatically maps (assigns) the integrated ports to the appropriate COM setting as necessary.


Before you add a card with a serial connector, check the documentation that accompanied your software to make sure that the software can be mapped to the new COM port designation.

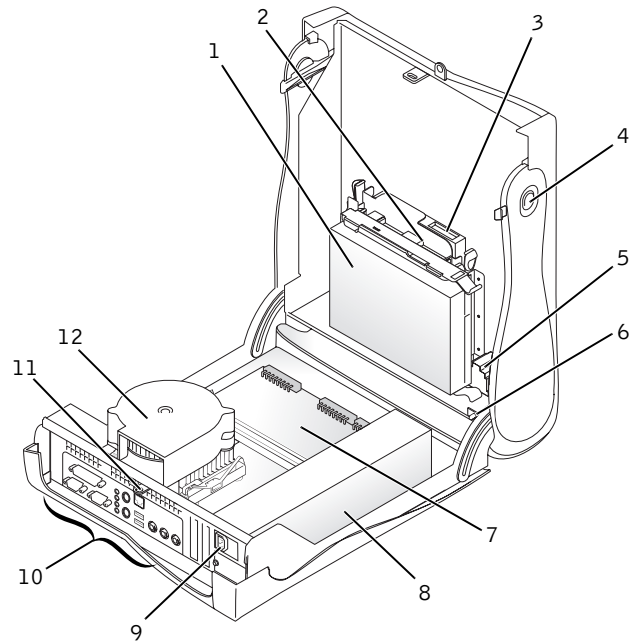
### **Keyboard Connector**

Attach the keyboard cable to the 6-pin connector on the [back panel](#).

# Inside Your Computer

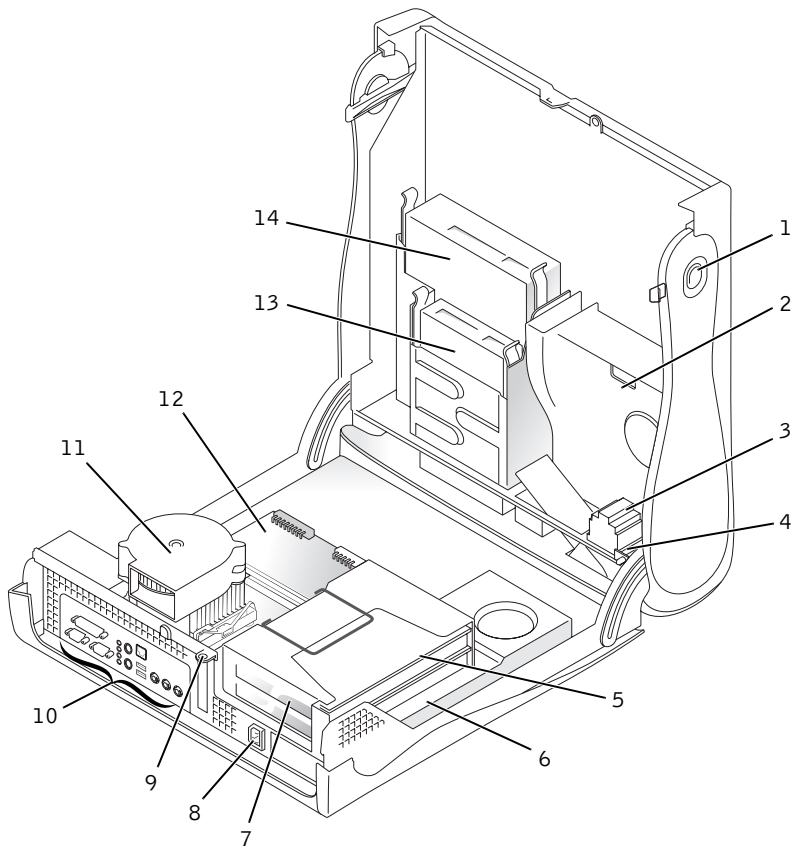
## Small Form-Factor Computer

 **NOTE:** User service access points are colorcoded green.



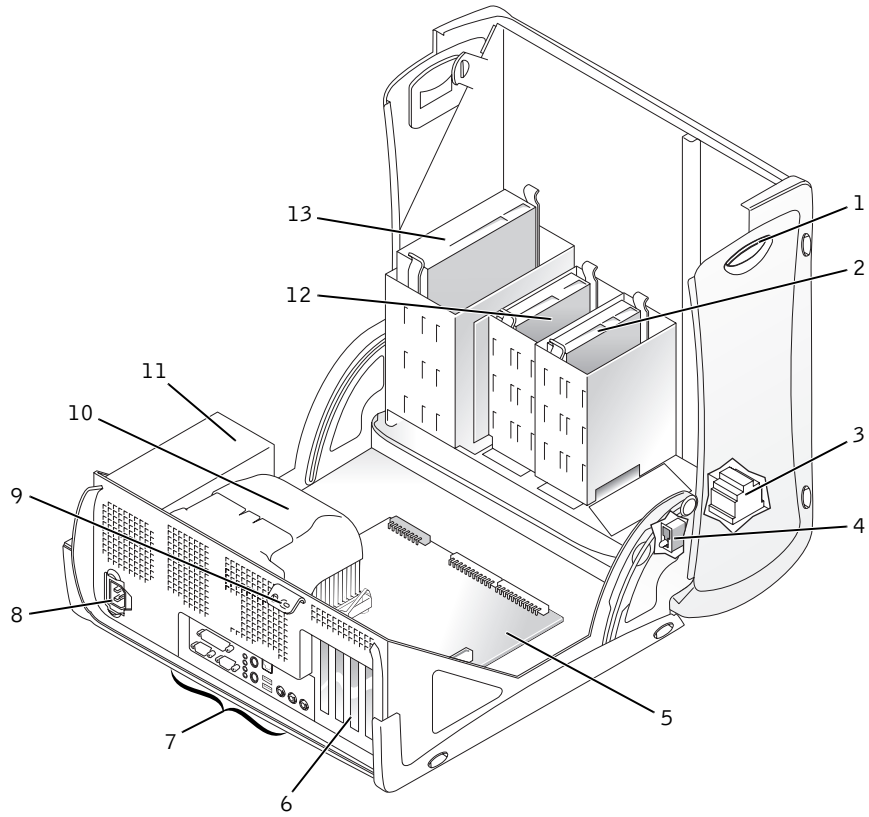
1	hard drive	7	system board
2	3.5-inch floppy drive	8	power supply
3	CD/DVD drive	9	AC power connector
4	cover release buttons (2)	10	I/O ports and connectors
5	internal speaker	11	padlock ring
6	chassis intrusion switch	12	heat sink and blower assembly

## Small Desktop Computer



1	cover release buttons (2)	8	AC power connector
2	hard drive	9	padlock ring
3	internal speaker	10	I/O ports and connectors
4	chassis intrusion switch	11	heat sink and blower assembly
5	expansion-card cage	12	system board
6	power supply	13	3.5-inch floppy drive
7	expansion-card slots	14	CD/DVD drive

### Small Mini-Tower Computer



1	cover release buttons (2)	8	AC power connector
2	hard drive	9	padlock ring
3	internal speaker	10	microprocessor and airflow shroud
4	chassis intrusion switch	11	power supply
5	system board	12	3.5-inch floppy drive
6	expansion-card slots	13	CD/DVD drive
7	I/O ports and connectors		

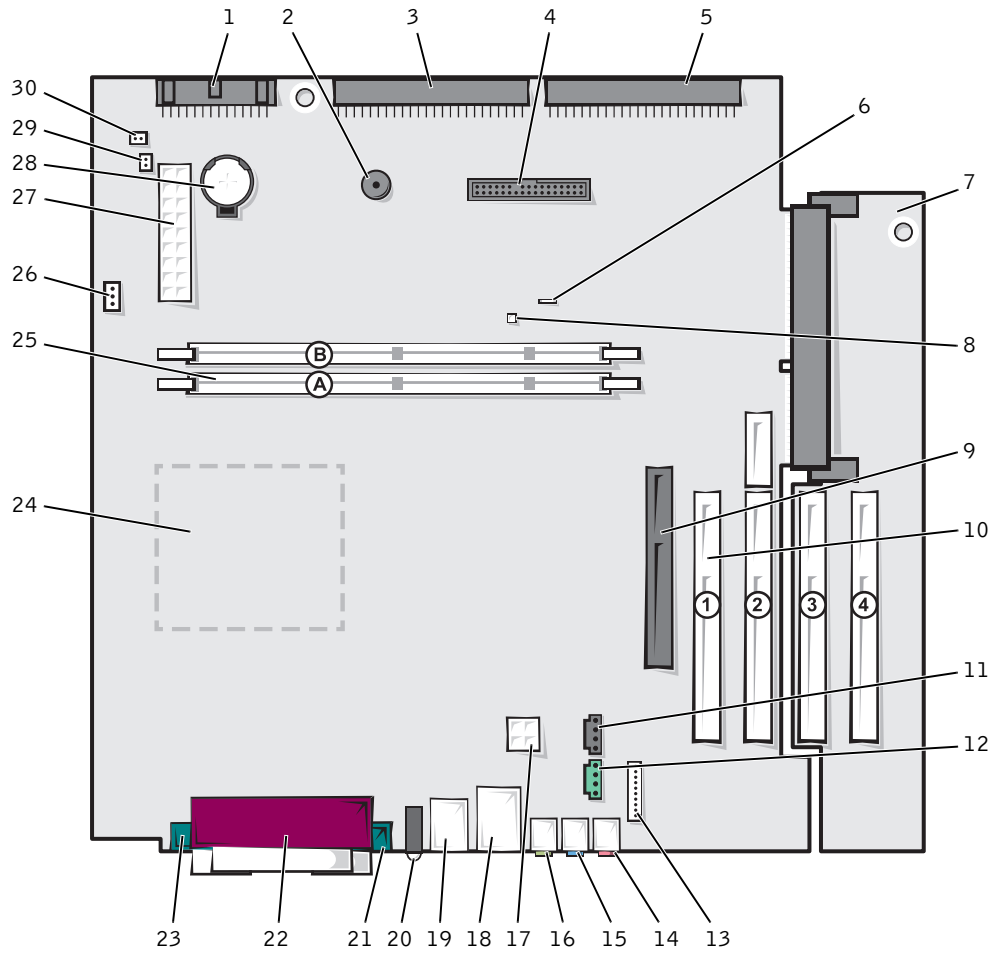
### Cable Colors

Hard drive	Blue
Floppy drive	Black
CD/DVD drive	Orange
USB	Gray
ATA or IDE	Green
Control panel	Yellow
CD audio	Blue
Computer audio	Black



### System Board Components

The following figure shows the principal connectors and components on the system board.



1	floppy drive	16	audio line-out connector
2	internal speaker	17	12-volt microprocessor power connector
3	EIDE2 connector	18	network (upper) and USB connectors (2) (lower)
4	front panel connector	19	keyboard (lower) and mouse (upper) connectors
5	EIDE1 connector	20	diagnostic lights
6	suspend-to-RAM light	21	serial 2 connector
7	PCI riser (small mini-tower computer only)	22	parallel connector
8	standby power light	23	serial 1 connector
9	AGP connector	24	microprocessor and heat sink
10	PCI connectors	25	memory module (DIMM) connectors
11	CD audio connector	26	fan connector
12	telephony connector (TAPI)	27	main power connector
13	front audio connector	28	battery
14	microphone connector	29	RTC reset jumper
15	audio line-in connector	30	password jumper

## System Board Labels

Connector or Socket	Description
AUDIO	Line-in, line-out, and microphone jacks
AUX_PWR	Standby power light
BATTERY	Battery socket
STR	Suspend-to-RAM light
CD_IN	CD drive audio cable connector
DIAG_LED	Diagnostic lights
DIMM A and DIMM B	Dual in-line memory module (DIMM) sockets
DSKT	Floppy drive interface connector
FAN	Microprocessor fan connector
FRONTAUDIO	Front panel audio connector for onboard audio
FRONTPANEL	Front panel cable connector
IDE1	Primary IDE interface connector
IDE2	Secondary IDE interface connector
KYBD_MOUSE	Keyboard and mouse connectors
CPU	Microprocessor connector
MODEM	Telephony connector
NIC_USB	Integrated network adapter connector and USB connectors
PAR_SER1_SER2	Parallel and serial connectors
PCI1, PCI2, PCI3, and PCI4	PCI expansion card connectors
POWER	Main power input connector
12VPOWER	12-volt power connector
PSWD	Password jumper
RTCST	RTC reset jumper
H_RISER	Horizontal riser board connector; vertical PCI cards
V_RISER	Vertical riser board connector; horizontal PCI cards
SPEAKER	Internal speaker



## SECTION 2

# Advanced Features

- LegacySelect Technology Control
- Manageability
- Security
- Password Protection
- Computer Settings
- Additional System Setup Options
- Jumper Settings
- Software Installation and Configuration

## LegacySelect Technology Control

LegacySelect technology control permits the deployment of legacy full, legacy reduced, or legacy free solutions based on a common platform with common hard drive images and common help desk procedures. Control is provided to the administrator through the system setup program, Dell OpenManage™ IT Assistant, or Dell custom factory integration.

LegacySelect allows the administrator to electronically activate or deactivate specific connectors and media devices including: serial and USB connectors, parallel connector, floppy drive, PCI slots, and PS/2 mouse. When the connectors and media devices are deactivated, resources that they might have used are available. Any changes that are made will take place after you reboot the computer.

## Manageability

### Dell OpenManage™ IT Assistant

Dell OpenManage IT Assistant is the premier Dell™ systems management application for configuring, managing, and monitoring computers and other devices on a corporate network. IT Assistant employs the latest remote management technology to provide asset management, configuration management, event (alert) management, and security management for systems equipped with industry-standard management software. Software of this type is called system management *instrumentation*.

IT Assistant supports instrumentation that conforms to the following industry standards:

- Simple Network Management Protocol (SNMP)
- Desktop Management Interface (DMI)
- Common Information Model (CIM)

The instrumentation available for your computer is Dell OpenManage Client instrumentation, which is based on DMI and CIM. For more information on IT Assistant, see the *Dell OpenManage IT Assistant User's Guide* available on the Dell website.

## Dell OpenManage Client Instrumentation

Dell OpenManage Client Instrumentation is software that enables remote management application 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

Dell OpenManage Client Instrumentation can be installed on computers like yours, which, when set up on a network with IT Assistant, are called *managed systems*. For more information about Dell OpenManage Client Instrumentation, see the *Dell OpenManage Client Instrumentation User's Guide* available on the Dell website.

## Security

The computer provides the following methods of physically securing the chassis:

- [Chassis Intrusion Detection](#)
- [Padlock Ring and Security Cable Slot](#)

### Chassis Intrusion Detection

The chassis intrusion monitor can detect when the chassis is opened. The **Chassis Intrusion** option in system setup displays the status of the monitor.

- 1 Enter system setup.
- 2 Press the down-arrow keys to move to the **System Security** option.
- 3 Press <Enter> to access the **System Security** option's pop-up menu.
- 4 Press the down-arrow keys to move to the **Chassis Intrusion** option.
- 5 Press the spacebar to select an option setting.


**Option settings:**

- **Enabled** — When the computer cover is opened with this setting, a DMI event is generated, the setting changes to **Detected**, and the following message appears during the boot routine at the next computer start-up:

Alert! Cover was previously removed.

To reset the **Detected** setting, [enter system setup](#) during the computer's power-on self-test (POST). In the **Chassis Intrusion** option, press the left- or right-arrow key to select **Reset**, and then choose **Enabled**, **Enabled-Silent**, or **Disabled**.

- **Enabled-Silent** (default) — When the computer cover is opened with this setting, a DMI event is generated and the setting changes to **Detected**, but the alert message does not appear during the boot sequence at the next computer start-up.
- **Disabled** — No intrusion monitoring occurs and no messages appear.

 **NOTE:** When the setup password is enabled, you must know the setup password before you can reset the Chassis Intrusion option.

**Padlock Ring and Security Cable Slot**

Use one of the following methods to secure your computer:

- Use a padlock alone or a padlock and looped security cable with the [padlock ring](#).

A padlock alone prevents the computer from being opened.

A security cable looped around a stationary object and used in conjunction with the padlock can help prevent the unauthorized movement of the computer.

- Attach a commercially available antitheft device to the [security cable slot](#) on the back of the computer to prevent the unauthorized movement of the computer.

Antitheft devices usually include a segment of metal-stranded cable with an attached locking device and key. Dell recommends that you use a Kensington lock. For instructions on installing this kind of antitheft device, see the documentation that accompanied the device.

## Password Protection

The computer provides two types of password protection:

- System Password
- Setup Password

### System Password

System passwords allow only those who know the password to have full use of the computer. Your Dell computer does not have the system password feature enabled when you receive it.


- ➔ **NOTE:** Although passwords provide security for the data on your computer, they are not foolproof. If your data requires more security, it is your responsibility to obtain and use additional forms of protection, such as data encryption programs.
- ➔ **NOTE:** If you leave your computer running and unattended without having a system password assigned, or if you leave your computer unlocked so that someone can disable the password by changing a jumper setting, anyone can access the data stored on your hard drive.


System Password settings in system setup:


- **Enabled** — a system password is assigned
- **Disabled** — system password feature is disabled by a jumper setting on the system board
- **Not Enabled** — no system password is assigned and the password jumper on the system board is in the enabled position (its default setting)

### Assigning a System Password

- 1 Verify that **Password Status** is set to **Unlocked**.
- 2 Highlight **System Password** and then press the left- or right-arrow key.  
The option heading changes to **Enter Password**, followed by an empty 32-character field in square brackets.
- 3 Type your new system password.  
You can use up to 32 characters.

 **NOTE:** Before you purchase an antitheft device, make sure it works with the security cable slot on your computer.

 **NOTE:** You cannot change or enter a new system password if either of these options is displayed.

 **NOTE:** You can only assign a system password when **System Password** is set to **Not Enabled**.



**NOTE:** To escape from the field without assigning a system password, press <Tab> or the <Shift><Tab> combination to move to another field, or press <Esc> at any time prior to completing step 5.

As you press each character key (or the spacebar for a blank space), a placeholder appears in the field. The password assignment operation recognizes keys by their location on the keyboard, without distinguishing between lowercase and uppercase characters. For example, if you have an *M* in your password, the computer recognizes either *M* or *m* as correct.

Certain key combinations are not valid. If you enter one of these combinations, the speaker emits a beep.

To erase a character when entering your password, press <Backspace> or the left-arrow key.

**4** Press <Enter>.

If the new system password is less than 32 characters, the whole field fills with placeholders. Then the option heading changes to **Verify Password**, followed by another empty 32-character field in square brackets.

**5** To confirm your password, type it a second time and press <Enter>.

The password setting changes to **Enabled**. Your system password is now set; you can exit system setup and begin using your computer. Password protection takes effect when you reboot the computer by turning the computer off and then on again.

### Using Your System Password

When you turn on your computer, or when you reboot the computer by pressing the <Ctrl><Alt><Del> combination, the following prompt appears on the screen when **Password Status** is set to **Unlocked**:

```
Type in the password and
- press <ENTER> to leave password security enabled.
- press <CTRL><ENTER> to disable password security.
Enter password:
```

If **Password Status** is set to **Locked**, the following prompt appears:

Type the password and press <Enter>.

If you enter a wrong or incomplete system password, the following message appears on the screen:

```
** Incorrect password. **
Enter password:
```



**NOTE:** If you have assigned a setup password, the computer accepts your setup password as an alternate system password.

If you again enter an incorrect or incomplete system password, the same message appears on the screen. The third and subsequent times you enter an incorrect or incomplete system password, the computer displays the following message:

```
** Incorrect password. **  
Number of unsuccessful password attempts: 3  
System halted! Must power down.
```

Even after your computer is turned off and on, the previous message is displayed each time an incorrect or incomplete system password is entered.

### Deleting or Changing an Existing System Password

To delete or change an existing system password, perform the following steps:

- 1 Enter system setup program, and verify that **Password Status** is set to **Unlocked**.
- 2 Reboot your computer to force it to prompt you for a system password.
- 3 When prompted, type the system password.
- 4 Press <Ctrl><Enter> to disable the existing system password, instead of pressing <Enter> to continue with the normal operation of your computer.
- 5 Confirm that **Not Enabled** is displayed for the **System Password** option.


If **Not Enabled** appears in the **System Password** option, the system password has been deleted. If you want to assign a new password, continue to step 6. If **Not Enabled** is not displayed for the **System Password** option, press <Alt><B> to reboot the computer, and then repeat steps 3 through 5.

- 6 To assign anew password, follow the procedure in “[Assigning a System Password](#).”

### Setup Password

Setup passwords allow only those who know the password to have full use of system setup. Your Dell computer does not have the setup password feature enabled when you receive it.

**Setup Password** options in system setup:



**NOTE:** You can use Password Status in conjunction with System Password and Setup Password to further protect your computer from unauthorized changes.

- **Enabled** — does not allow assignment of setup passwords; users must enter a setup password to make changes to system setup
- **Not Enabled** — allows assignment of setup passwords; password feature is enabled but no password is assigned

### Assigning a Setup Password

- 1 Enter system setup, and verify that **Setup Password** is set to **Not Enabled**.
- 2 **Highlight Setup Password** and press the left- or right-arrow key.  
The computer prompts you to enter and verify the password. If a character is illegal for password use, the computer emits a beep.
- 3 Type in and then verify the password.

After you verify the password, the **Setup Password** setting changes to **Enabled**. The next time you attempt to [enter system setup](#), the computer prompts you for the setup password.



**NOTE:** The setup password can be the same as the system password.



**NOTE:** If the two passwords are different, the setup password can be used as an alternate system password. However, the system password cannot be used in place of the setup password.



**NOTE:** You can use Password Status in conjunction with Setup Password to protect the system password from unauthorized changes.

A change to **Setup Password** becomes effective immediately (rebooting the computer is not required).

### Operating Your Computer With a Setup Password Enabled

When you start system setup, the **Setup Password** option is highlighted, prompting you to type the password.

If you do not enter the correct password, the computer lets you view, but not modify, system setup options.

### Deleting or Changing an Existing Setup Password

To change an existing setup password, you must know the setup password.

- 1 Enter system setup.
- 2 If you have already assigned a setup password, type it at the prompt.
- 3 Highlight **Setup Password** and press the left- or right-arrow key to delete the existing setup password.

The setting changes to **Not Enabled**.



- 4 If you want to assign a new setup password, perform the steps in “Assigning a System Password.”

### Disabling a Forgotten Password



**NOTICE:** This process erases both the system and setup passwords.



**CAUTION:** Before you open the computer cover, see “**CAUTION: Safety Instructions.**”

- 1 Open the computer cover.
- 2 Remove the jumper plug from the PSWD jumper to disable the password feature.  
See “[Jumper Settings](#)” to locate the password jumper (labeled “PSWD”) on the system board.
- 3 Close the computer cover.
- 4 Reconnect your computer and devices to an electrical outlet, and then turn them on.

This erases the existing password(s).

- 5 Enter system setup and verify that the password is disabled. Proceed to step 6 if you want to assign a new password.



**CAUTION:** Before you open the computer cover, see “**CAUTION: Safety Instructions.**”

- 6 [Open the computer cover.](#)
- 7 Replace the PSWD jumper plug.
- 8 Close the computer cover and reconnect the computer and devices to an electrical outlet and turn them on.

Booting your computer with the PSWD jumper installed reenables the password feature. When you enter system setup, both password options appear as **Not Enabled**, meaning that the password feature is enabled but that no password is assigned.

- 9 Assign a new system and/or setup password.



**NOTE:** Before you assign a new system and/or setup password, you must replace the PSWD jumper plug to reenables the password feature.

## Computer Settings

Each time you start your computer, it compares the installed hardware with the computer configuration information stored in nonvolatile random access memory (NVRAM). If the computer detects a discrepancy, it generates an error messages for each incorrect configuration setting.

You can use computer settings as follows:

- To set user-selectable options such as date and time, or system password
- To read the current amount of memory or set the type of hard drive installed

You can view the current settings at any time. Dell recommends that you print the system setup screens (by pressing <Print Screen>) or record the information for future reference.

Before you use system setup, you need to know the kind of floppy drive(s) and hard drive(s) installed in your computer. If you are unsure of this information, see the Manufacturing Test Report that was shipped with your computer and is located in the **Dell Accessories** folder.

### Entering System Setup

- 1 Turn on (or restart) your computer.
- 2 When Press <F2> to Enter Setup appears in the upper-right corner of the screen, press <F2> immediately.

If you wait too long and the Microsoft® Windows® Windows logo appears, continue to wait until you see the Windows desktop. Then shut down your computer and try again.



**NOTE:** To ensure an orderly computer shutdown, consult the documentation that accompanied your operating system.

### System Setup Screens

The system setup screens display the current configuration information for your computer. Information on the screen is organized into four areas:











- Title — the box at the top of all screens lists the computer name.









- Computer data — two boxes below the title box that display your computer processor, level 2 (L2) cache, service tag, and the version number of the basic input/output system (BIOS.)
- Options — a scrollable box listing options that define the configuration of your computer, including installed hardware, power conservation, and security features.

Fields to the right of the option titles contain settings or values. Those you can change appear bright on the screen. Those you cannot change (because they are set by the computer) appear less bright. When <Enter> appears to the right of an option title, press <Enter> to access a popup menu of additional options.

- Key functions — a line of boxes across the bottom of all screens that lists keys and their functions within system setup.
- Help — press <F1> for information in the currently highlighted option.

### System Setup Navigation Keys

Keys	Action
 or 	Moves to the next field.
 or  or 	Moves to the previous field.
 or 	Cycles through the options in a field. In many fields, you can also type the appropriate value.
 or 	Scrolls through help information.
	Enters the selected field's pop-up options menu.

Keys	Action
spacebar or  or 	In the selected field's pop-up options menu, cycles through the options in a field.
	 Exits system setup without rebooting the system and returns the system to the boot routine.
	 Exits system setup and reboots the system, implementing any changes you have made.
	 Resets the selected option to its default setting.


## Changing the Boot Sequence During System Setup

- 1 Turn on your computer.

If your computer is already on, restart it.


- 2 When **F2 = Setup** appears in the upper-right corner of the screen, press <Ctrl><Alt><F8>.

The **Boot Device Menu** appears.

 **NOTE:** This feature changes the boot sequence for one time only. On the next start-up, the computer boots according to the devices specified in [system setup](#). This is helpful when you need to change the boot devices quickly. For example, you can cause the computer to boot from the CD drive to run the [Dell Diagnostics](#), but the computer boots from the hard drive when the diagnostic tests are complete.

Option settings:


- **Normal** — The computer attempts to boot from the sequence of devices specified in [system setup](#).
- **Diskette Drive** — The computer attempts to boot from the floppy drive. If the computer finds a floppy in the drive that is not bootable, an error message will appear. If no floppy is in the drive, an error message appears.
- **Hard Drive** — The computer attempts to boot from the primary hard drive. If the computer does not find an operating system on the drive, an error message appears.
- **IDE CD Drive** — The computer attempts to boot from the IDE CD drive. If the computer does not find a CD in the drive or if there is not an operating system on the CD, an error message appears.

 **NOTE:** 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.

## Changing the Boot Sequence in System Setup

- 1 [Enter system setup](#).

- 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 appear with a check mark).
- 5 Press plus (+) or minus (-) to move a selected device up or down the list.

Option settings:

- **Diskette Drive** — The computer attempts to boot from the floppy drive. If the computer finds a floppy in the drive that is not bootable, an error message appears. If no floppy is in the drive, the computer attempts to boot from the next device in the list.
- **Hard Drive** — The computer attempts to boot from the primary hard drive. If the computer does not find an operating system on the drive, it attempts to boot from the next device in the list.
- **CD Drive** — The computer attempts to boot from the CD drive. If the computer does not find a CD in the drive or if there is not an operating system on the CD, the computer attempts to boot from the next device in the list.
- **MBA** — The system prompts you to press <Ctrl><Alt><b> at the Dell logo screen during boot. A menu appears that allows you to select a method for booting from a network server. If a boot routine is not available from the network server, the system attempts to boot from the next device in the list.

## Additional System Setup Options


- **AC Power Recovery** determines what happens when AC power is restored to the computer.

When **Off** is selected, the computer remains off when AC power is restored. When **On** is selected, the computer starts up when AC power is restored.

When **Last** is selected, the computer returns to the AC power state existing at the time that AC power was lost. If the computer is on

when AC power is lost, the computer starts up when AC power is restored. If the computer is off when AC power is lost, the computer remains off when AC power is restored.

- **Asset Tag** displays the customer-programmable asset tag number for the computer if an asset tag number is assigned. You can use the Asset Tag utility, which is included with your software support utilities, to enter an asset tag number up to ten characters long into nonvolatile random-access memory (NVRAM).
- **Auto Power On** allows you to set the time and days of the week to turn on the computer automatically. You can set **Auto Power On** to turn on the computer either every day or every Monday through Friday.

 **NOTE:** This feature does not work if you turn off your computer using a power strip or surge protector.

Time is kept in a 24-hour format (*hours:minutes*). To change the start-up time, press the right-arrow key to increase the number in the highlighted field or press the left-arrow key to decrease the number. If you prefer, you can type numbers in both the date and time fields.

The default for **Auto Power On** is **Disabled**.

- **CPU ID** provides the manufacturer's identification code for the installed microprocessor.
- **CPU Information**
  - **CPU Speed** indicates the processor speed at which your computer boots.  
Press the left- or right-arrow key to toggle the **CPU Speed** option between the resident microprocessor's rated speed (the default) and a lower compatibility speed, which lets you accommodate speed-sensitive application programs. A change to this option takes effect immediately (rebooting the computer is not required).  
To toggle between the rated processor speed and the compatibility speed while the computer is running in real mode, press <Ctrl><Alt><\>. (For keyboards that do not use American English, press <Ctrl><Alt><#>.)
  - **Bus Speed** indicates the speed of the microprocessor's system bus, or front-side bus (FSB).
  - **Processor ID** provides the manufacturer's identification code(s) for the installed microprocessor.

- **Clock Speed** indicates the core speed at which the microprocessor(s) operates.
- **Cache Size** displays the size of the microprocessor's level 2 (L2) cache.
- **Diskette Drive A** identifies the type of floppy drives installed in your computer. With the standard cabling configuration, **Diskette Drive A** (the boot floppy drive) is the 3.5-inch floppy drive installed in the top externally accessible drive bay.

The **Diskette Drive A** option has the following possible settings:

- **3.5 Inch, 1.44 MB**
- **Not Installed**



**NOTE:** Tape drives are not reflected in the **Diskette Drive A** option. For example, if you have a single floppy drive and a tape drive attached to the floppy drive interface cable, set **Diskette Drive A** to match the characteristics of the floppy drive.

- **Fastboot** allows your computer to boot in 10 seconds or less. The default setting is **On**. If you do not want your computer to skip certain configurations and tests during boot, you may set this option to **Off**.
- **Integrated Devices.** This option configures the following devices integrated with the system board:

Press <Enter> to configure these options as explained in the following subsections.

- **Sound** determines whether the integrated audio controller is **On** or **Off**. The default is **On**.
- **USB Controller** enables or disables the onboard USB controller. The onboard USB controller is always enabled during the BIOS boot process. When set to **On**, the onboard USB controller remains enabled when control is passed to the operating system. When set to **Off**, the USB controller is disabled when control is passed to the operating system.
- **Network Interface Controller** determines whether the integrated network adapter is **On**, **Off**, or **On w/ MBA**. The default is **On**. If you select **On w/ MBA**, you are prompted to press <Ctrl><Alt><b> at the Dell logo screen during computer boot. A menu then appears that allows you to select **PXE**, **RPL**, **BootP**, or **NetWare** as the active boot mode.




- **Mouse Port** enables or disables the computer's integrated Personal System/2 (PS/2)-compatible mouse port. Disabling the mouse allows an expansion card to use interrupt request (IRQ)12. This setting is used to control the use of this legacy device.
- **Serial Port 1 and Serial Port 2** configure the computer's integrated serial connectors. You can set these options to **Auto** (the default) to automatically configure a connector, to a particular designation (**COM1** or **COM3** for **Serial Port 1**; **COM2** or **COM4** for **Serial Port 2**), or to **Off** to control the use of this legacy device or to disable the connector.

If you set a serial connector to **Auto** and add an expansion card containing a connector configured to the same designation, the computer automatically remaps the integrated port to the next available connector designation that shares the same IRQ setting as follows:

**COM1** (input/output [I/O] address 3F8h), which shares IRQ4 with **COM3**, is remapped to **COM3** (I/O address 3E8h).


**COM2** (I/O address 2F8h), which shares IRQ3 with **COM4**, is remapped to **COM4** (I/O address 2E8h).

 **NOTE:** When two COM connectors share an IRQ setting, you can use either connector as necessary, but you may not be able to use them both at the same time. If you are running the Microsoft® Windows® 95 or IBM® OS/2® operating system, you cannot use both serial connectors at the same time. If the second connector (COM3 or COM4) is also in use, the integrated connector is turned off.

- **Parallel Port** configures the computer's integrated parallel connector. Press <Enter> to configure the **Parallel Port** options explained in the following subsections.

**Mode:** You can set this option to **PS/2**, **EPP**, **ECP**, **AT**, or **Off** to control the use of this legacy device or to disable the connector. Set this option according to the type of device connected to the parallel connector. To determine the correct mode to use, see the documentation that came with the device.

**I/O Address:** This option determines the I/O address used by the parallel connector and appears except when **Mode** is set to **Off**. You can set **I/O Address** to 378h (the default), 278h, or 3BCh.

 **NOTE:** You cannot set the parallel connector to 3BCh if **Mode** is set to **EPP**.

**DMA Channel:** This option determines the direct memory access (DMA) channel used by the parallel connector and appears only when **Mode** is set to **ECP**. The available options are **DMA 1**, **DMA 3**, and **Off**.

- **IDE Drive Interface:** enables or disables the computer's integrated device electronics (IDE) hard drive interface. With **Auto** (the default) selected, the computer turns off the IDE interface when necessary to accommodate a controller card installed in an expansion slot. As part of the boot routine, the computer first checks for a primary hard drive controller card installed in an expansion slot. If no card is found, the computer enables the IDE interface to use IRQ14 and IRQ15. If a primary controller is detected on the expansion bus, the IDE interface is disabled. Selecting **Off** disables the IDE interface.
- **Diskette Interface:** controls the operation of the computer's integrated floppy drive controller. With **Auto** (the default) selected, the computer turns off the integrated floppy drive controller when necessary to accommodate a controller card installed in an expansion slot.


With **Read Only** selected, nothing can be written to any floppy drive using the computer's integrated floppy drive controller. (The computer can still read from the drives.) When **Read Only** is selected, **Auto** is also in effect, meaning that the computer turns off the integrated floppy drive controller as necessary.

Selecting **Off** turns off the integrated floppy drive controller; this setting is used to control the use of this legacy device or for troubleshooting purposes.


- **USB Emulation:** determines whether the computer's basic input/output system (BIOS) controls Universal Serial Bus (USB) keyboards and mice. When **On** is selected (the default), the BIOS controls USB keyboards and mice until a USB driver is loaded by the operating system. When **Off** is selected, the BIOS does not control USB keyboards and mice, although they function during the boot routine. Set USB Emulation to **Off** if you are using a PS/2-compatible keyboard and mouse.


 **NOTE:** For Windows NT<sup>®</sup>, **Off** is the default setting.

- **Primary Video Controller:** determines which video controller to use when the computer boots. When **Auto** is selected, the computer searches first for a PCI expansion card and then for an AGP expansion card. If the computer has only an AGP expansion card installed, the computer uses the AGP card; if the computer has only a PCI expansion card installed, the computer uses the PCI card; and if the computer has *both* AGP and PCI expansion cards installed, the computer will use both cards. When **AGP** (the default) is selected, the computer uses the AGP expansion card.
- **Video DAC Snoop:** lets you correct video problems that may occur when you use certain video expansion cards. The default is **Off**. If you are using a video expansion card and problems such as incorrect colors or blank windows occur, set **Video DAC Snoop** to **On**.
- **Keyboard NumLock** determines whether your computer boots with the Num Lock mode activated on 101- or 102-key keyboards (it does not apply to 84-key keyboards). When Num Lock mode is activated, the rightmost bank of keys on your keyboard provides the mathematical and numeric functions shown at the top of each key. When Num Lock mode is turned off, these keys provide cursor-control functions shown by the label on the bottom of each key.
- **Memory Information** indicates the amount of installed memory detected in your computer, the computer memory speed, the amount of video memory, and the size of the display cache. After you add memory, check this option to confirm that the new memory is installed correctly and is recognized by the computer.
- **PCI IRQ Assignment** specifies which IRQ lines are assigned to the Peripheral Component Interconnect (PCI) devices installed in the computer. Press <Enter> to configure these devices. Then select the device whose IRQ line you want to change, and press the plus (+) or minus (–) key to scroll through the available IRQ lines. Normally you do not need to change the IRQ lines assigned to PCI devices unless a particular device, device driver, or operating system requires a specific IRQ line already in use by a PCI device.
- **Primary Drive *n* and Secondary Drive *n***  
**Primary Drive *n*** identifies drives attached to the primary IDE interface connector (labeled “IDE1”) on the system board; **Secondary Drive *n*** identifies drives connected to the secondary IDE interface

 **NOTE:** For Windows NT, if **Primary Video Controller** is set to **Auto** and the computer has *both* AGP and PCI expansion cards installed, the computer will use the PCI expansion card.

connector (labeled “IDE2”). Use the secondary IDE interface connector for IDE CD, DVD, and tape drives.


 **NOTE:** For all devices obtained from Dell that use the integrated IDE controller, set the appropriate Drive option to Auto.

 **NOTE:** You must have an IDE device connected to the primary IDE interface if you have an IDE device connected to the secondary IDE interface.

The following settings identify the type of IDE devices installed in the computer:

- **Auto** (use this setting for all IDE devices from Dell)
- **Off**

To choose a setting for each option, press <Enter> to access the field's pop-up settings menu. Then type characters from the keyboard or press the left- or right-arrow key to cycle through the settings.

 **NOTE:** Operating systems that bypass the computer BIOS may not obtain optimum hard drive performance.

### If You Have a Problem

If the computer generates a drive error message the first time you boot your computer after you install an IDE drive, your drive may not work with the automatic drive-type detect feature. Press <Alt><d> in any hard drive field to set the hard drive autoconfiguration feature.

During POST the computer scans the IDE channels for supported devices and generates a summary message. For example, if it finds that a hard drive is connected to the Primary channel and a CD drive is connected to the Secondary channel, it generates the following message:

```
Performing automatic IDE configuration...
```

```
Primary Master: IDE Disk Drive
```


```
Secondary Master: CD-ROM Reader
```

If it detects a device during the scan, it sets the device to **Auto** in system setup. If no device is listed, it sets the device setting to **Off** in system setup.

If your computer does not reset after you perform these steps, enter system setup and reset the computer to its original Dell settings.

- 1 Restart your computer.
- 2 As the system reboots, press <F2> to enter system setup.

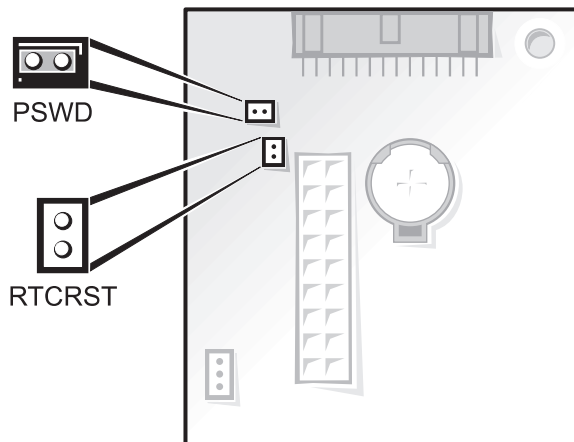
- 3 When the system setup screen appears, press <Alt><F> to load the Dell default settings.  
The computer beeps when the settings are restored.
- 4 Press <Esc> and then press <Enter> to save your changes and exit.  
The computer reboots.


 **NOTE:** Verify that the time, date, and year are correct and that the **Secondary Drive 0** option is set to **Auto**.

## Jumper Settings

The following figure shows the jumpers on the system board.






### System Board Jumpers



 **NOTICE:** Make sure that your computer is turned off and unplugged before you change the jumper settings. Otherwise, damage to your computer or unpredictable results may occur.

To change a jumper setting, pull the plug off its pin(s) and carefully fit it down onto the pin(s) indicated.

### System-Board Jumper Settings

Jumper	Setting	Description
PSWD	 (default)	Password features are enabled.
		Password features are disabled.
RTCST		Real-time clock reset. Can be used for troubleshooting purposes.
	 <i>jumpered</i>	 <i>unjumpered</i>

## Software Installation and Configuration

When you obtain software, check it for viruses with virus-scanning software before installing it on your computer's hard drive. Viruses can quickly use all available computer memory, damage or destroy data stored on the hard drive, and permanently affect the performance of the programs they infect. Several commercial virus-scanning programs are available for purchase, and most bulletin board services (BBSs) on the Internet archive freely distributed virus-scanning programs that you can download with a modem.

Before you install a program, read its documentation to learn how the program works, what hardware it requires, and what its defaults are. A program usually includes installation instructions in its accompanying documentation and a software installation routine on its program floppy disks or CD(s).

The software installation routine assists you in transferring the appropriate program files to your computer's hard drive. Installation instructions may provide details about how to configure your operating system to successfully run the program. Always read the installation instructions before running a program's installation routine. You may be instructed to modify some operating system start-up files, such as **config.sys** and **autoexec.bat**, or the installation routine may modify start-up files automatically.

When you run the installation routine, be prepared to respond to prompts for information about how your computer's operating system is configured, what type of computer you have, and what devices are connected to your computer.









## SECTION 3

# Installing Upgrades



- Computer Cover
- Expansion Cards
- Expansion-Card Cage (Small Desktop Computer Only)
- TAPI
- Memory
- Microprocessor
- Front Panel Inserts
- Internal Drives
- Hard Drives
- Floppy Drives
- CD/DVD Drives
- Battery

 **NOTE:** On the small form-factor and small desktop computers, [remove the stand](#) before you open the computer cover. On the small mini-tower computer, place the computer on its side before you open the cover.

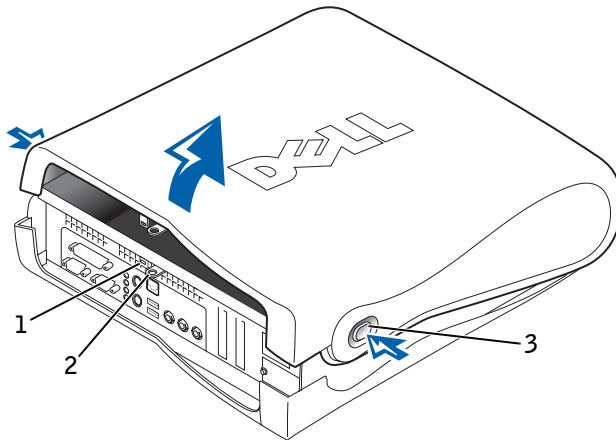
## Computer Cover

 **CAUTION:** Before you open the computer cover, see “**CAUTION: Safety Instructions.**”

### Opening the Computer Cover

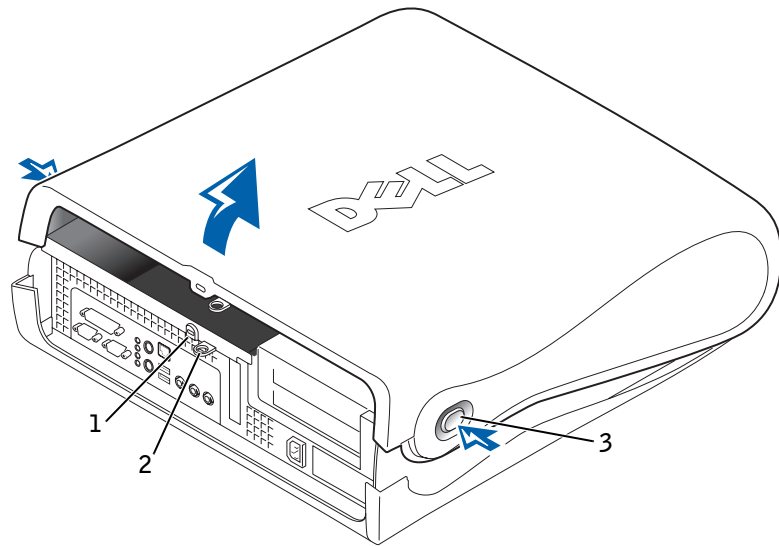
- 1 Turn off your computer and devices, and observe the caution for your personal safety and protection of your equipment described in “**CAUTION: Safety Instructions.**”
  - 2 Remove the padlock from the padlock ring, if present.
-  **NOTICE:** Do not open the cover if the computer is on the edge of a desk or table. Doing so may cause the computer to tip over and fall. Make sure that the computer is situated so that there is at least 12 inches of desk- or table-top for the cover to rest on.
- 3 Press the two release buttons until the cover is free to swing up. On the small mini-tower chassis, press the top part of the buttons to release the cover.
-  **NOTICE:** Open the cover slowly to ensure that you do not damage any cables.
- 4 Raise the back of the cover, and pivot it toward the front of the computer.

### Small Form-Factor Computer



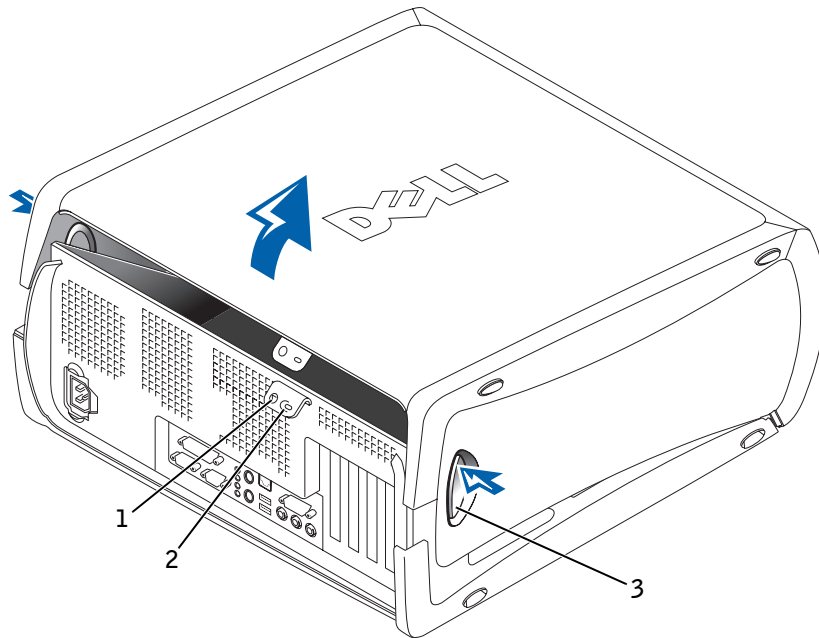
- 1 security cable slot
- 2 padlock ring
- 3 release buttons (one on each side)

### Small Desktop Computer



- 1 security cable slot
- 2 padlock ring
- 3 release buttons (one on each side)

### Small Mini-Tower Computer



- 1 security cable slot
- 2 padlock ring
- 3 release buttons (one on each side)

### Closing the Computer Cover

- 1 Check all cable connections, especially those that might have come loose during your work. Fold cables out of the way so that they do not catch on the computer cover. Make sure cables are not routed over the drive cage—they will prevent the cover from closing properly.
- 2 Check to see that no tools or extra parts are left inside the computer.
- 3 Close the cover by pivoting the cover down toward the back of the computer and into position. Make sure that the release buttons click into place.
- 4 If you are using a padlock to secure your computer, reinstall the padlock.

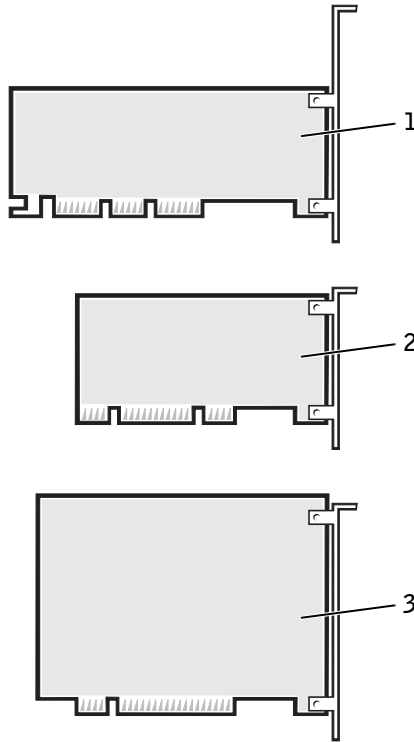
## Expansion Cards

Your computer provides expansion slots for the following cards:

- In the small form-factor computer, one low-profile, 32-bit, 33-megahertz (MHz) Peripheral Component Interconnect (PCI) card.
- In the small desktop computer, up to two 32-bit, 33-MHz PCI cards.
- In the small mini-tower computer, up to four 32-bit, 33-MHz PCI cards.

All computers provide an expansion slot for one 32-bit accelerated graphics port (AGP) 4x card (low-profile in the small form-factor and small desktop computers) operating at 1.5 volts (V).

## Expansion Card Types




- 1 AGP 4x card
- 2 low-profile 32-bit PCI card
- 3 32-bit PCI card

**➔ NOTICE:** Before disconnecting a device from the computer or removing a component from the system board, verify that the standby power light on the [system board](#) has turned off.

### Installing an Expansion Card

**⚠ CAUTION:** Before you perform this procedure, see “**CAUTION: Safety Instructions.**”

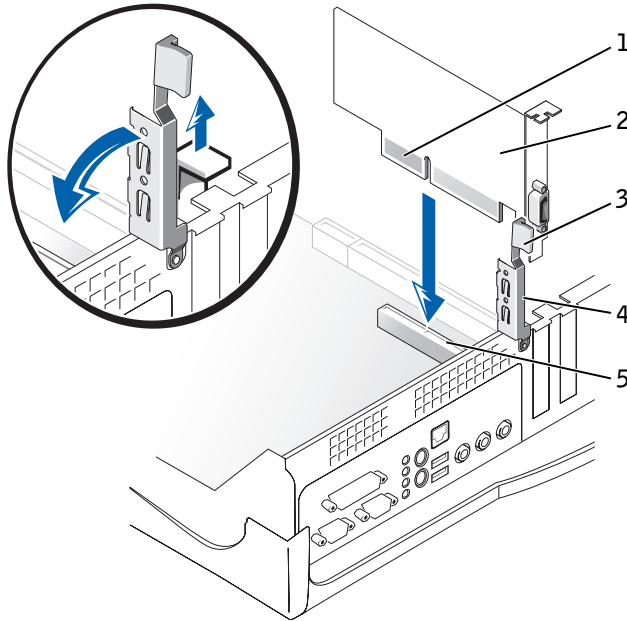
**✍ NOTE:** To meet PC99 requirements, your Dell computer uses only PCI expansion slots. Industry-Standard Architecture (ISA) expansion cards are not supported.

-  **NOTICE:** Before disconnecting a device from the computer, wait 10 to 20 seconds after disconnecting the computer from its electrical outlet. Before removing a component from the system board, verify that the standby power light on the system board has turned off. To locate this light, see “[System Board Components](#).”
- 1 If you are replacing an expansion card, remove the current driver for the expansion card from the operating system.
  - 2 Turn off the computer and devices, disconnect them from their electrical outlets, and wait 10 to 20 seconds.
  - 3 [Open the computer cover](#).
  - 4 If you have a small desktop computer, [remove the expansion-card cage](#).



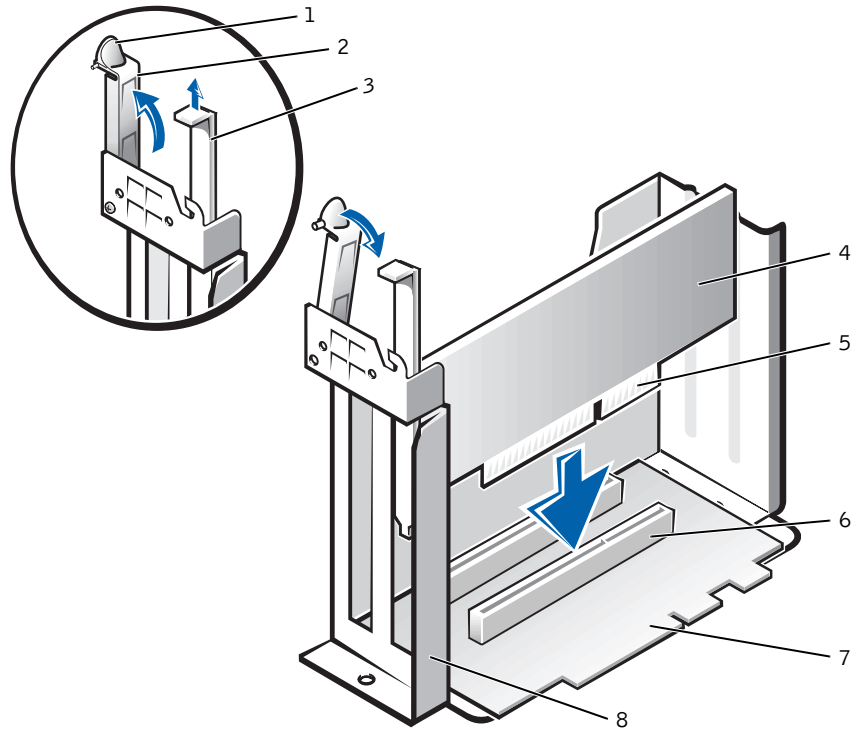
- 5 Press the lever on the expansion card retention arm and raise the retention arm.

### Small Form-Factor Computer



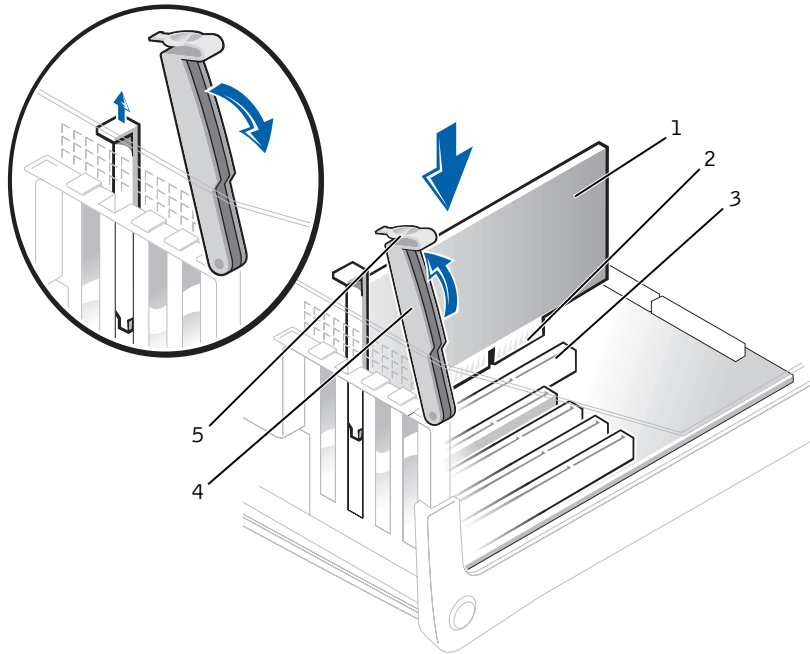
- 1 card-edge connector
- 2 expansion card
- 3 hinged lever
- 4 retention arm
- 5 expansion-card connector

### Small Desktop Computer




- |   |                |   |                          |
|---|----------------|---|--------------------------|
| 1 | lever          | 5 | card-edge connector      |
| 2 | retention arm  | 6 | expansion-card connector |
| 3 | filler bracket | 7 | riser board              |
| 4 | expansion card | 8 | expansion-card cage      |

## Small Mini-Tower Computer




- 1 expansion card
- 2 card-edge connector
- 3 expansion-card connector
- 4 retention arm
- 5 lever

- 6 If you are installing a new expansion card, remove the filler bracket for an empty card-slot opening, and then continue with [step 8](#).
- 7 If you are replacing an expansion card that is already installed in the computer, remove the expansion card.  
If necessary, disconnect any cables connected to the card. Grasp the card by its top corners, and ease it out of its connector.
- 8 Prepare the expansion card for installation.

 **NOTE:** The AGP expansion slot only supports 1.5-V cards.

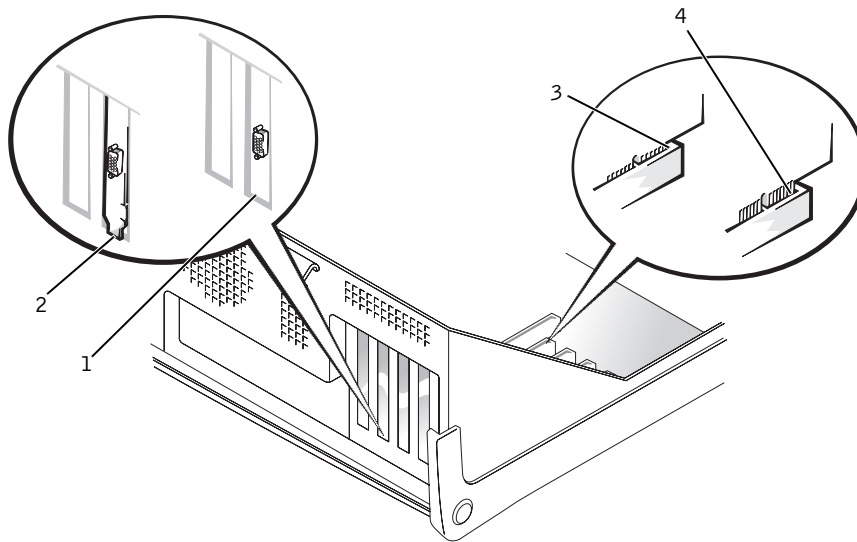
See the documentation that came with the expansion card for information on configuring the card, making internal connections, or otherwise customizing it for your computer.

 **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 expansion cards. Verify that the standby power light on the system board is off. To locate this light, see “[System Board Components](#).”

- 9 Place the expansion card on the connector and press down firmly. Make sure that the card is fully seated in the slot.

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

## Expansion-Card Connection



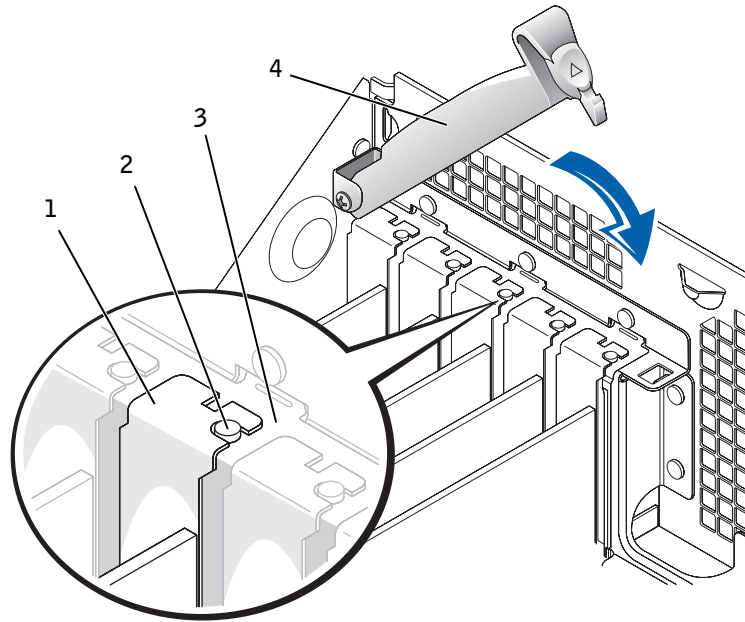
- 1 bracket within slot
- 2 bracket caught outside of slot
- 3 fully seated card
- 4 not fully seated card

**10** Before lowering the retention arm, make sure of the following:

- Tops of all expansion cards and filler brackets are flush with the alignment bar.
- Notch in the top of the card or filler bracket fits around the alignment guide.

Press the arm into place, securing the expansion card(s) in the computer.

## Retention Arm Closure



- 1 filler bracket
- 2 alignment guide
- 3 alignment bar
- 4 retention arm


**11** If you have a small desktop computer, [replace the expansion-card cage](#).

**12** 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 expansion card cables over or behind the expansion cards. Cables routed over the expansion cards can prevent the computer cover from closing properly or cause damage to the equipment.

**13** [Close the computer cover](#), reconnect the computer and devices to their electrical outlets, and turn them on.


 **NOTE:** After you open and close the cover, the chassis intrusion detector causes the following message to appear on the screen at the next computer start-up:

ALERT! Cover was previously removed.

- 14 [Reset the chassis intrusion detector](#) by changing **Chassis Intrusion** to **Enabled** or **Enabled-Silent**.


 **NOTE:** If a setup password has been assigned by someone else, contact your network administrator for information on resetting the chassis intrusion detector.

- 15 If you installed a sound card, perform the following steps:
  - a [Enter system setup](#), select **Integrated Devices**, and change the setting for **Sound** to **Off**.
- 16 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 I/O panel (see "[I/O Panel—Small Form-Factor, Desktop, and Mini-Tower Computers](#)").
- 17 If you installed an add-in network adapter, perform the following steps:
  - a [Enter system setup](#), select **Integrated Devices** and change the setting for **Network Interface Card** 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 I/O panel (see "[I/O Panel—Small Form-Factor, Desktop, and Mini-Tower Computers](#)").

 **NOTE:** Problems may arise if two expansion cards are trying to use the same resources: memory, I/O addresses, and IRQs. To avoid this type of conflict, see "[Interrupt Assignment Conflicts](#)" and the documentation that came with the card for more information.

## Removing an Expansion Card


 **CAUTION:** Before you perform this procedure, see "[CAUTION: Safety Instructions](#)."

 **NOTICE:** Before disconnecting a device from the computer, wait 10 to 20 seconds after disconnecting the computer from its electrical outlet. Before removing a component from the system board, verify that the standby power light on the system board has turned off. To locate this light, see "[System Board Components](#)."


- 1 Turn off the computer and devices, disconnect them from their electrical outlets, and wait 10 to 20 seconds.
- 2 [Open the computer cover](#).
- 3 In the small desktop computer, [remove the expansion-card cage](#).

- 4 Press the lever on the retention arm and raise the retention arm (see the illustration for your computer in “[Installing an Expansion Card](#)”).
- 5 If necessary, disconnect any cables connected to the card.
- 6 Grasp the card by its top corners, and ease it out of its connector.
- 7 If you are removing the card permanently, install a filler bracket in the empty card-slot opening.

If you need a filler bracket, [contact Dell](#).


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

- 8 Lower the retention arm and press it into place, securing the expansion card(s) in the computer.
- 9 If you have a small desktop computer, [replace the expansion-card cage](#).
- 10 [Close the computer cover](#), reconnect the computer and devices to their electrical outlets, and turn them on.

 **NOTE:** After you open and close the cover, the chassis intrusion detector causes the following message to appear on the screen at the next computer start-up:

```
ALERT! Cover was previously removed.
```

- 11 [Reset the chassis intrusion detector](#) by changing **Chassis Intrusion** to **Enabled** or **Enabled-Silent**.

 **NOTE:** If a setup password has been assigned by someone else, contact your network administrator for information on resetting the chassis intrusion detector.

- 12 If you removed a sound card, perform the following steps:
  - a [Enter system setup](#), select **Integrated Devices**, and change the setting for **Sound** to **On**.
  - b Connect external audio devices to the audio connectors on the I/O panel (see “[I/O Panel—Small Form-Factor, Desktop, and Mini-Tower Computers](#)”).
- 13 If you removed an add-in network adapter, perform the following steps:
  - a [Enter system setup](#), select **Integrated Devices** and change the setting for **Network Interface Card** to **On**.



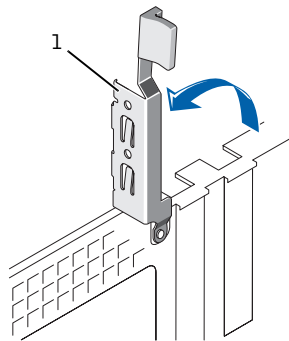
- b Connect the network cable to the integrated connector on the I/O panel (see “I/O Panel—Small Form-Factor, Desktop, and Mini-Tower Computers”).

### Installing an AGP Graphics Card

- 1 Open the computer cover.
- 2 Remove the filler bracket by raising the hinged lever and sliding the bracket up.

On the small desktop computer, press the indented tab with your thumb at an angle toward the system board until you release the tab. Continue holding the lever and pull the lever up.

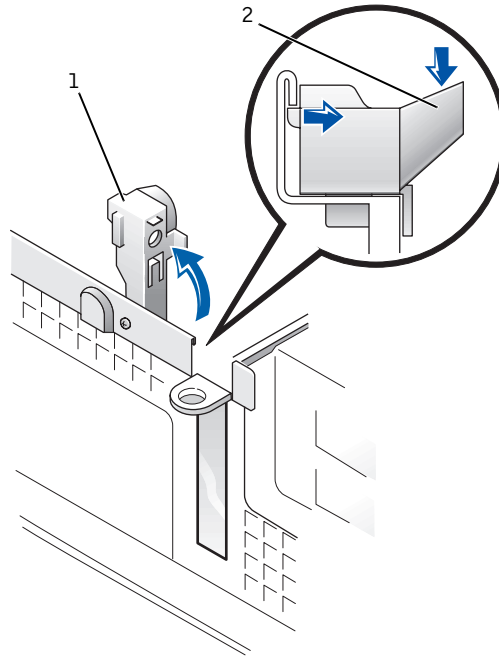
#### AGP Slot Filler Bracket Removal—Small Form-Factor Computer



1 hinged lever

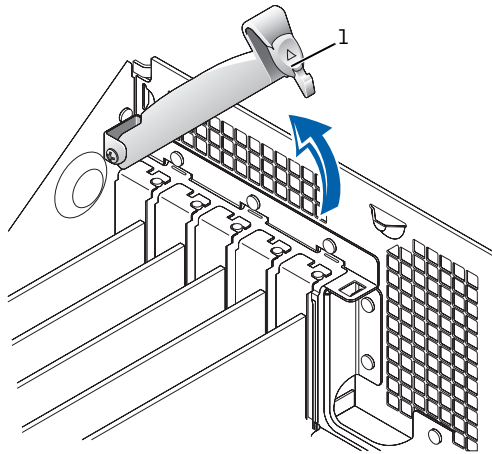
**NOTE:** The small form-factor and small desktop computers support low-profile AGP cards.

### AGP Slot Filler Bracket Removal—Small Desktop Computer



- 1 hinged lever
- 2 indented tab

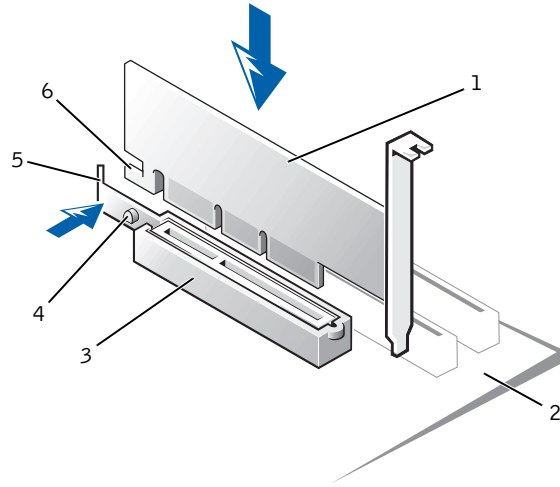
### AGP Slot Filler Bracket Removal—Small Mini-Tower Computer



1 hinged lever

- 3 Press the AGP card clip lever toward PCI slot 1.
- 4 Slide the AGP card into place.

### AGP Card Installation



- 1 AGP card
- 2 system board
- 3 AGP card clip
- 4 AGP card clip tab
- 5 AGP card clip lever
- 6 AGP card notch

- 5 Release the AGP card clip lever, ensuring that the tab on the AGP card clip lever fits into the notch on the front end of the AGP card.
- 6 Secure the AGP card by lowering the hinged lever on the back panel.
- 7 [Close the computer cover.](#)

### Removing an AGP Card

- 1 Raise the hinged lever on the back panel.
- 2 On the AGP card clip, press the lever toward PCI slot 1.
- 3 Pull the AGP card up and out of the AGP card clip.

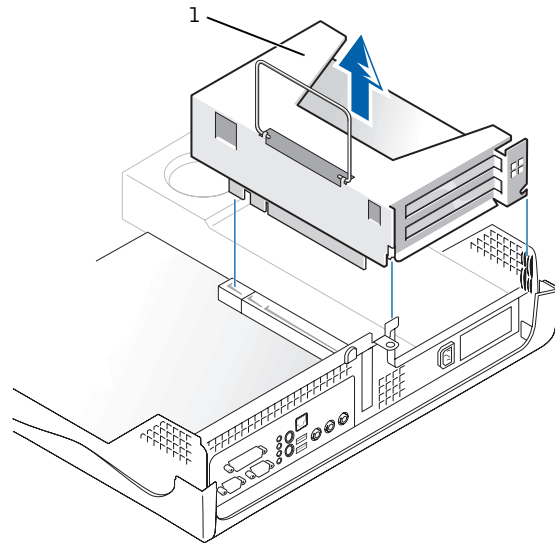
## Expansion-Card Cage (Small Desktop Computer Only)

### Removing the Expansion-Card Cage

 **CAUTION:** Before you perform this procedure, see “**CAUTION: Safety Instructions.**”

- 1 Open the computer cover.
- 2 Check any cables connected to expansion cards through the back-panel openings. Disconnect any cables that do not reach the expansion-card cage once it is removed from the computer.
- 3 Gently pull on the handle and lift the expansion-card cage up and away from the computer.

### Expansion-Card Cage Removal

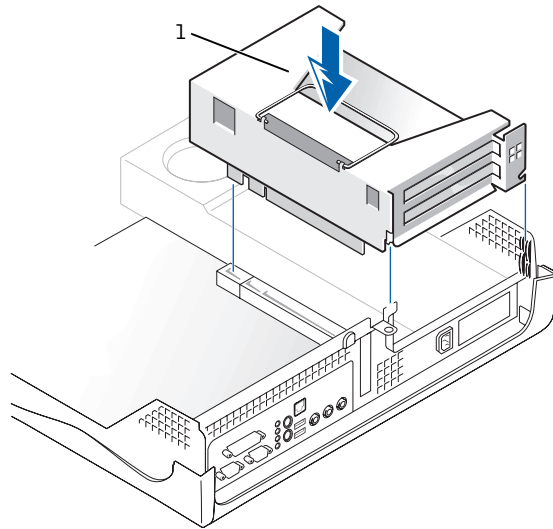


1 expansion-card cage

### Replacing the Expansion-Card Cage

- 1 Align the slots in the side of the expansion-card cage with the tabs on the side of the computer, and slide the expansion-card cage down into place.

## Expansion-Card Cage Replacement




1 expansion-card cage

- 2 Make sure that the riser board is fully seated in the connector on the [system board](#).
- 3 Reconnect any cables that you removed in [step 2](#) of the previous procedure.


## TAPI

The telephony applications programming interface (TAPI) system-board connector uses a 4-pin cable to interface your internal TAPI-compliant expansion card with the audio system in your computer. To locate the TAPI system-board connector, see “[System Board Components](#).” Your computer supports TAPI-compliant cards using the standard TAPI connector (labeled TELE). For example, you can connect your modem to the TAPI connector and then use your audio speakers and microphone as a speakerphone. The microphone carries your voice into the computer and then through the TAPI system board connector to your modem card. The caller’s voice enters through the modem card to the TAPI system board connector and then out to the speakers. You can also use this configuration to record and play sound files over the phone.

 **NOTE:** See the documentation that came with the TAPI-compliant expansion card for more information on using TAPI devices and to verify the card works with your computer.

### Installing a TAPI Device

 **CAUTION:** Before you perform this procedure, see “**CAUTION: Safety Instructions.**”

 **NOTICE:** Before disconnecting a device from the computer, wait 10 to 20 seconds after disconnecting the computer from its electrical outlet. Before removing a component from the system board, verify that the standby power light on the system board has turned off. To locate this light see, “[System Board Components](#).”

- 1 Turn off the computer and devices, disconnect them from their electrical outlets, and wait 10 to 20 seconds.
- 2 [Open the computer cover.](#)
- 3 Install the TAPI-compliant expansion card.  
See the manufacturer’s documentation for more information.
- 4 Connect the 4-pin TAPI cable to the TAPI system-board connector.  
To locate the TAPI connector on the system board, see “[System Board Components](#).”
- 5 Connect the 4-pin TAPI cable to the TAPI expansion-card connector.  
To locate the TAPI connector on the expansion card, see the manufacturer’s documentation.
- 6 [Close the computer cover.](#)




- 7 Reconnect the computer and devices to their electrical outlets, and turn them on.
- 8 Install the appropriate TSP for the TAPI device.  
See the manufacturer's documentation and your Windows documentation for more information.


### Installing a TAPI Sound Card

You can install a TAPI-compliant sound card that has a standard TAPI connector. For example, you can connect your modem to the TAPI sound card connector and then use the audio capabilities as a speakerphone.

 **CAUTION:** Before you perform this procedure, see “**CAUTION: Safety Instructions.**”

 **NOTICE:** Before disconnecting a device from the computer, wait 10 to 20 seconds after disconnecting the computer from its electrical outlet. Before removing a component from the system board, verify that the standby power light on the system board has turned off. To locate this light, see “**System Board Components.**”

- 1 Turn off the computer and devices, disconnect them from their electrical outlets, and wait 10 to 20 seconds.
- 2 [Open the computer cover.](#)
- 3 Install the TAPI-compliant expansion card.  
See the manufacturer's documentation for more information.
- 4 [Enter system setup](#), click **Integrated Devices**, and change the setting for **Sound** to **Off**.
- 5 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 I/O panel (see “[I/O Panel—Small Form-Factor, Desktop, and Mini-Tower Computers](#)”).
- 6 Connect the 4-pin TAPI cable to the TAPI sound-card connector.  
To locate the TAPI connector on the sound card, see the manufacturer's documentation.
- 7 Connect the 4-pin TAPI cable to the TAPI expansion-card connector.  
To locate the TAPI connector on the expansion card, see the manufacturer's documentation.

 **NOTE:** If enabled, the **Chassis Intrusion** option causes the following message to be displayed at the next system start-up: **ALERT! Cover was previously removed.**


- 8 Close the computer cover.
- 9 Reconnect the computer and devices to their electrical outlets, and turn them on.
- 10 Install the appropriate TSP for the TAPI devices.  
See the manufacturer's documentation and your Microsoft® Windows® documentation for more information.

## Memory

You can increase memory up to 1 gigabyte (GB) by using synchronous dynamic random-access memory (SDRAM) dual in-line memory modules (DIMMs). The [system board](#) illustration shows the location of the DIMM sockets on the system board. (DIMMs may either be error checking and correction [ECC] or non-error checking and correction [non-ECC]. However, all DIMMs must be the same type of memory—either ECC or non-ECC.)

When you add memory, you may install DIMMs in either socket. For optimum operation, Dell recommends that you install a DIMM in socket A first (closest to the processor) before installing a DIMM in socket B.

### Installing DIMMs

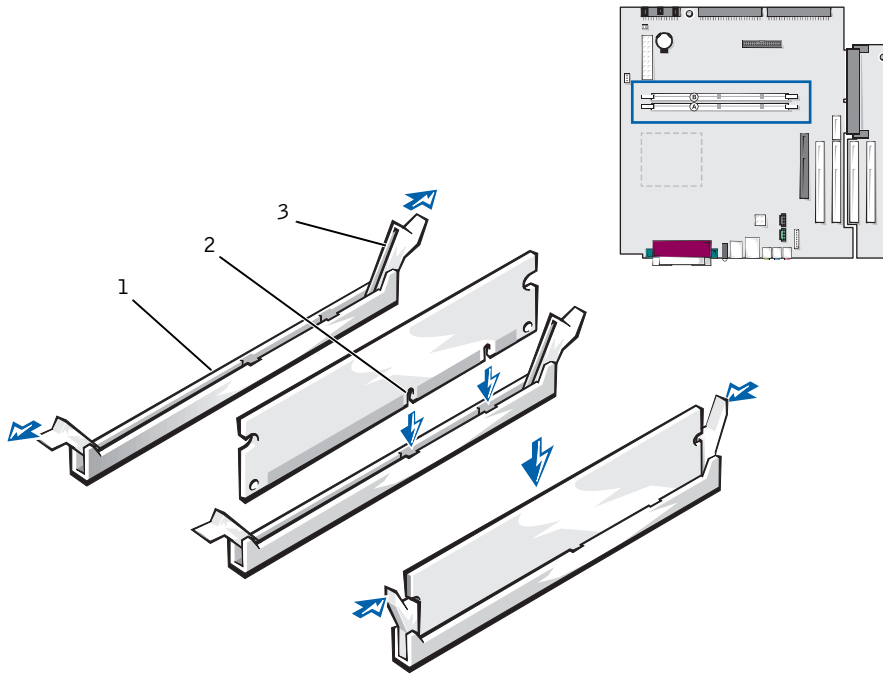
 **CAUTION:** To avoid the possibility of electric shock, turn off the computer and any devices, disconnect them from their electrical outlets, and then wait 10 to 20 seconds before you open the computer cover. Also, before you upgrade memory, see the other precautions in “**CAUTION: Safety Instructions.**”

- 1 Open the computer cover.
- 2 If necessary, remove any DIMMs that occupy sockets in which you plan to install the upgrade memory modules.
- 3 Install the upgrade DIMMs.
  - a Press the securing clips at each end of the socket outward until they snap open.
  - b Align the slots on the bottom of the memory module with the ridges inside the socket.

**NOTICE:** To avoid damage to the memory module, press the module straight down into the socket with equal force applied at each end of the module.

- c Press the DIMM straight down into the socket until the securing clips snap into place at the ends of the DIMM.

### DIMM Installation



- 1 socket
- 2 slot
- 3 securing clip

- 4 Close the computer cover, reconnect your computer and devices to their electrical outlets, and turn them on.

**NOTE:** After you open and close the cover, the chassis intrusion detector causes the following message to appear on the screen at the next computer start-up:

ALERT! Cover was previously removed.

You need to [reset the chassis intrusion detector](#).


The computer detects that the new memory does not match the existing configuration information and generates the following message:

```
The amount of system memory has changed.
Strike the F1 key to continue, F2 to run the setup
utility
```

- 5 Press <F2> to [enter system setup](#), and check the value for **System Memory**.

The computer should have already changed the value of **System Memory** to reflect the newly installed memory. Verify the new total. If it is correct, skip to step 7.


- 6 If the memory total is incorrect, turn off and disconnect your computer and devices from their electrical outlets. [Open the computer cover](#), and check the installed DIMMs to make sure that they are seated properly in their sockets. Then repeat steps 3, 4, and 5.
- 7 [Reset the chassis intrusion detector](#) by changing **Chassis Intrusion** to **Enabled** or **Enabled-Silent**.

 **NOTE:** If a setup password has been assigned by someone else, contact your network administrator for information on resetting the chassis intrusion detector.

- 8 When the **System Memory** total is correct, press <Esc> to exit system setup.
- 9 Run the [Dell Diagnostics](#) to verify that the memory modules are operating properly.

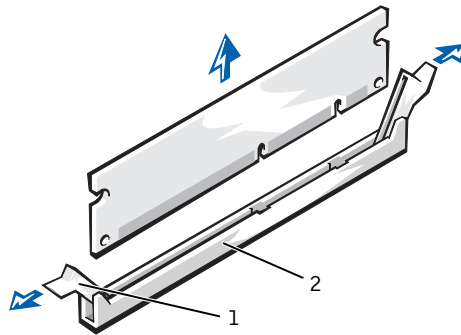
## Removing DIMMs

 **CAUTION:** Before you perform this procedure, see the precautions in **“CAUTION: Safety Instructions.”**

 **NOTICE:** To avoid damage to the memory module, press the securing clips with equal force applied at each end of the socket.

To remove a DIMM, press the securing clips at each end of the socket outward simultaneously until the DIMM pops out slightly from the socket.

## DIMM Removal



- 1 securing clips (2)
- 2 socket

## Microprocessor

**CAUTION:** To avoid the possibility of electric shock, turn off the computer and any devices, disconnect them from their electrical outlets, and then wait 10 to 20 seconds before you open the computer cover. Also, before you upgrade the microprocessor, see the other precautions in “**CAUTION: Safety Instructions.**”

- 1 Turn off the computer and devices, disconnect them from their electrical outlets, wait 10 to 20 seconds, and then [open the computer cover](#).

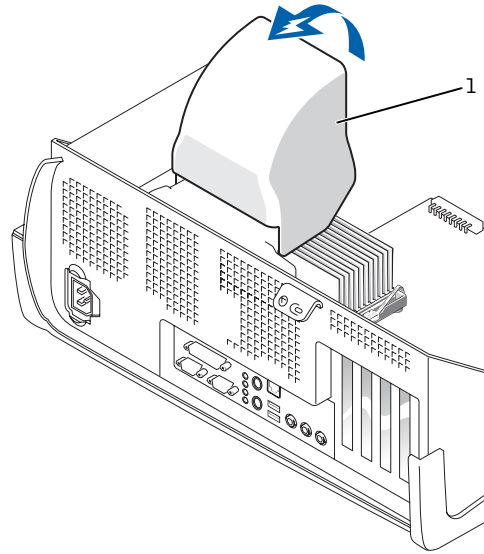
**CAUTION:** The microprocessor cooling fan/heat-sink assembly can get extremely hot. Be sure the assembly has had sufficient time to cool before you touch it.

- 2 Disconnect the fan cable from the [system board](#).
- 3 Disconnect the 12-volt power cable from the [system board](#).

**NOTE:** Dell recommends that only a technically knowledgeable person perform the following procedure.

- 4 On the small mini-tower computer, lift up the airflow shroud.

#### Airflow Shroud Adjustment—Small Mini-Tower Computer



1 airflow shroud

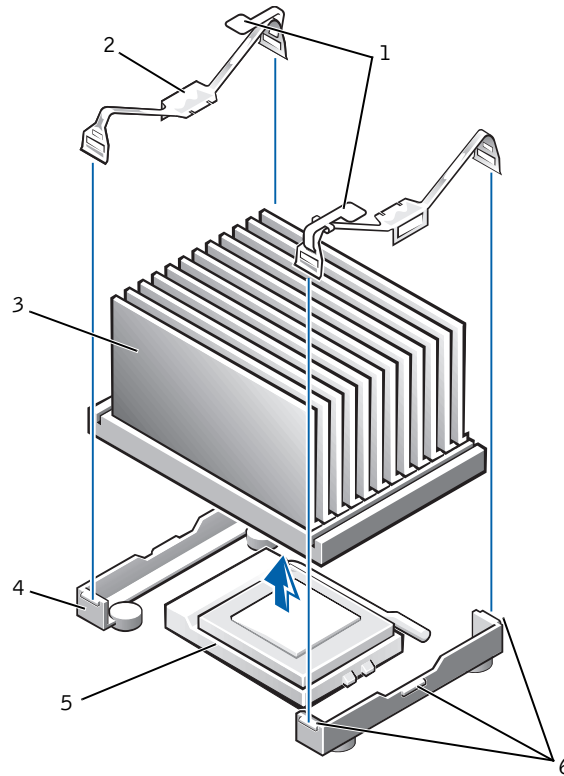
## Removing the Heat Sink or Heat-Sink/Blower Assembly

➡ **NOTICE:** Before you remove the heat sink, gently rock the heat sink and then slightly twist it as you lift it from the system board.

For both securing clips on a small mini-tower computer, press down on the metal securing clip latches to release the clips from the retention base, and then lift the clips out of the tabs on the retention base and away from the heat sink.



### Heat-Sink Removal—Small Mini-Tower Computer



- 1 latches (2)
- 2 securing clips (2)
- 3 heat sink
- 4 retention base
- 5 ZIF socket
- 6 tabs (3)

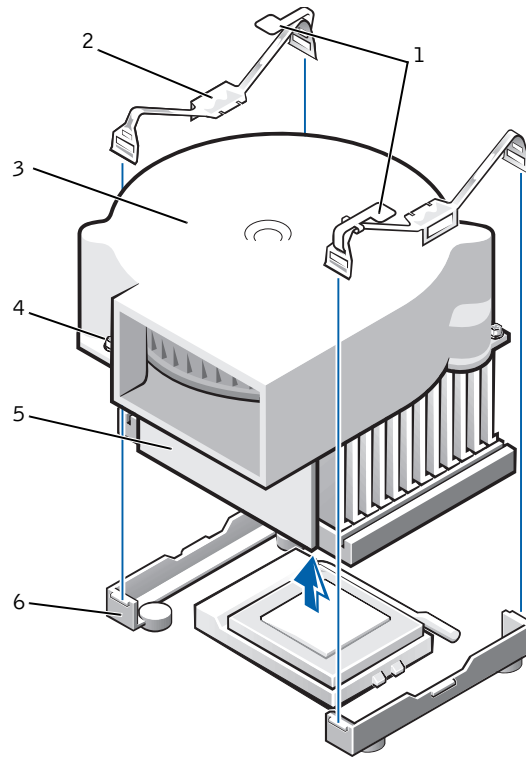


On small form-factor and small desktop computers, the heat sink is attached to the blower. Remove the securing clips to remove the heat-sink/blower assembly.

➔ **NOTICE:** Before you remove the heat sink, gently rock the heat sink and then slightly twist it as you lift it from the system board.



### Heat-Sink/Blower Assembly Removal—Small Form-Factor and Small Desktop Computers




- 1 latches (2)
- 2 securing clips (2)
- 3 blower
- 4 screws (2)
- 5 heat sink
- 6 retention base

**➔ NOTICE:** Lay the heat sink down with the thermal grease facing upward. Do not lay the heat sink down with the thermal grease touching the work surface.


- 5** Lift the heat sink or heat-sink/blower assembly away from the microprocessor.

- 6 On the small form-factor and small desktop computers, remove the two screws on the blower to remove it from the heat sink.

 **NOTICE:** Do not discard the original heat sink and securing clips unless you are installing a microprocessor upgrade kit from Dell. If you are *not* installing a microprocessor upgrade kit from Dell, reuse the original heat sink, blower, and securing clips when installing your new microprocessor.


- 7 Discard the original heat sink and securing clips.

### Removing the Microprocessor

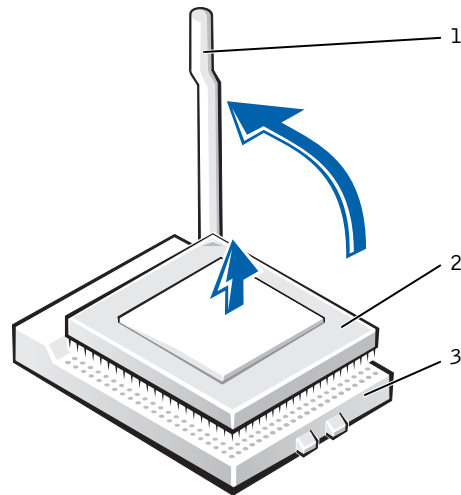
 **NOTICE:** Be careful not to bend any of the pins when you remove the microprocessor from its socket. Bending the pins can permanently damage the microprocessor.

Your microprocessor socket is a zero insertion force (ZIF) socket with a lever-type handle that secures the microprocessor in, or releases it from, the socket.

- 1 Pull the release lever straight up until the microprocessor is released, and then remove the microprocessor from the socket.
- 2 Leave the release lever extended so that the socket is ready for the new microprocessor.

 **NOTE:** Do not discard the blower; reuse the blower. Your microprocessor upgrade kit from Dell includes only a replacement heat sink and two replacement securing clips.

## Microprocessor Removal



- 1 release lever
- 2 microprocessor
- 3 ZIF socket

## Installing the Microprocessor

- ➔ **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 microprocessor. Bending the pins can permanently damage the microprocessor.

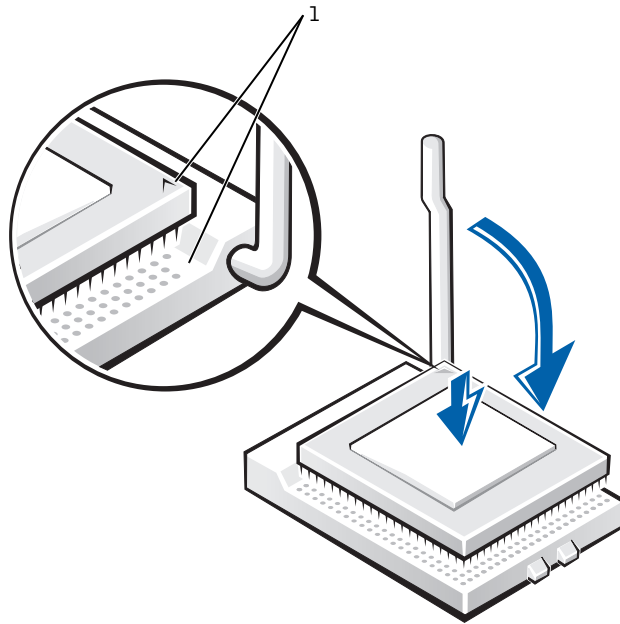
- 1 Unpack the new microprocessor.

If any of the pins on the microprocessor appear to be bent, see [“Getting Help”](#) for instructions on obtaining technical assistance.

- 2 Align the pin-1 corner of the microprocessor with the pin-1 corner of the socket.

✎ **NOTE:** You must identify the pin-1 corner to correctly position the microprocessor.

## Microprocessor Installation



- 1 pin-1 corners of microprocessor and socket aligned

- ➔ **NOTICE:** You must position the microprocessor correctly in the socket to avoid permanent damage to the microprocessor and the computer when you turn on the computer.
- 3 If the release lever on the socket is not fully extended, move it to that position now.
- 4 With the pin-1 corners of the microprocessor and socket aligned, align the pins on the microprocessor with the holes in the socket.
- ➔ **NOTICE:** When you place the microprocessor in the socket, be sure that all of the pins go into the corresponding holes on all sides of the socket. Be careful not to bend the pins.

- 5 Set the microprocessor lightly in the socket and make sure all pins are headed into the correct holes. Because your computer uses a ZIF socket, there is no need to use force (which could bend the pins if the microprocessor is misaligned). When the microprocessor is positioned correctly, press it with minimal pressure to seat it.
- 6 When the microprocessor is fully seated in the socket, pivot the release lever back toward the socket until it snaps into place, securing the microprocessor.

### Replacing the Heat Sink or Heat-Sink/Blower Assembly

- ➔ **NOTICE:** Ground yourself by touching an unpainted metal surface on the back of the computer.
  - ➔ **NOTICE:** If you are installing a microprocessor replacement kit from Dell, return the microprocessor to Dell in the same package in which your replacement kit was sent.
  - ➔ **NOTICE:** If you are *not* installing a microprocessor upgrade kit from Dell, reuse the original blower/heat-sink assembly and securing clips when replacing the microprocessor.
- 1 Remove the film covering the thermal grease on the bottom of the heat sink.
  - 2 On the small form-factor and small desktop computers, reinstall the two screws that attach the blower to the heat sink.
  - 3 Lower the heat sink or blower/heat-sink assembly to the microprocessor so that the heat sink fits in the retention base.
  - 4 For each of the replacement metal clips, fit the end of the clip that does *not* have the latch over its tab on the retention base. Then, fit the middle of the clip over the middle tab on the retention base, and press down on the clip's latch to secure the clip to the retention base (see the illustration for your computer in "[Removing the Heat Sink or Heat-Sink/Blower Assembly](#)").
  - 5 On the small mini-tower computer, lower the airflow shroud over the heat sink.
  - 6 Plug the fan cable into its connector on the [system board](#).
  - 7 Plug the 12-volt power cable into its connector on the [system board](#).
  - 8 [Close the computer cover](#), reconnect your computer and devices to their electrical outlets, and turn them on.

As the computer boots, it detects the presence of the new microprocessor and automatically changes the configuration information in system setup.

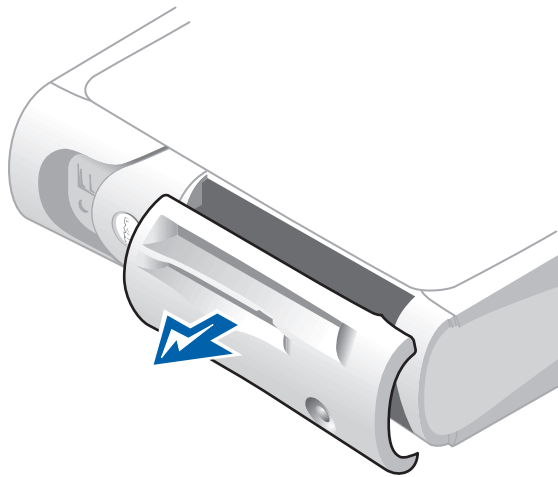
- 9 Enter system setup and confirm that the **Microprocessor** option correctly identifies the installed microprocessor.
- 10 Run the [Dell Diagnostics](#) to verify that the new microprocessor is operating correctly.

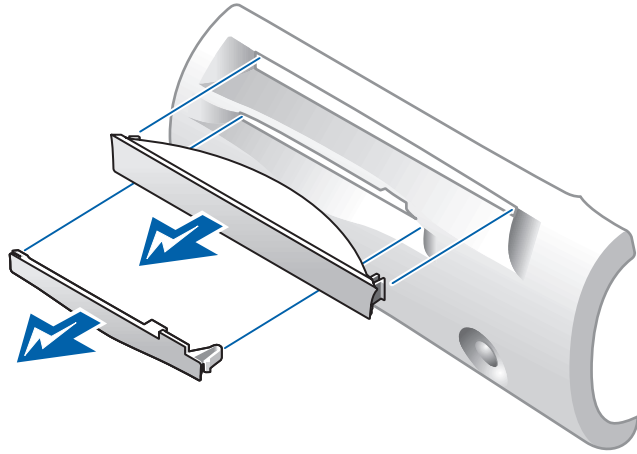
## Front Panel Inserts

### Removing Front Panel Inserts—Small Form-Factor and Small Desktop Computers

- 1 [Open the computer cover.](#)
- 2 Facing the front of the computer, use your fingers to remove the front panel cover.

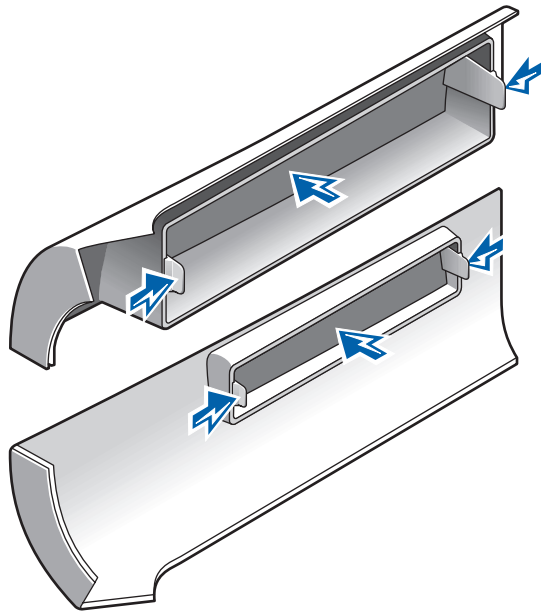
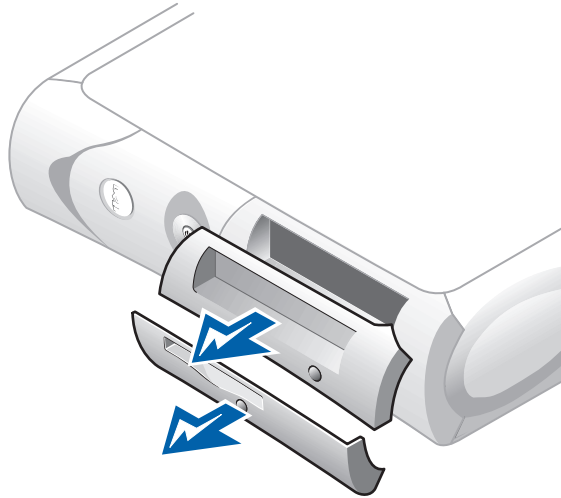
#### Small Form-Factor Computer







### Small Desktop Computer

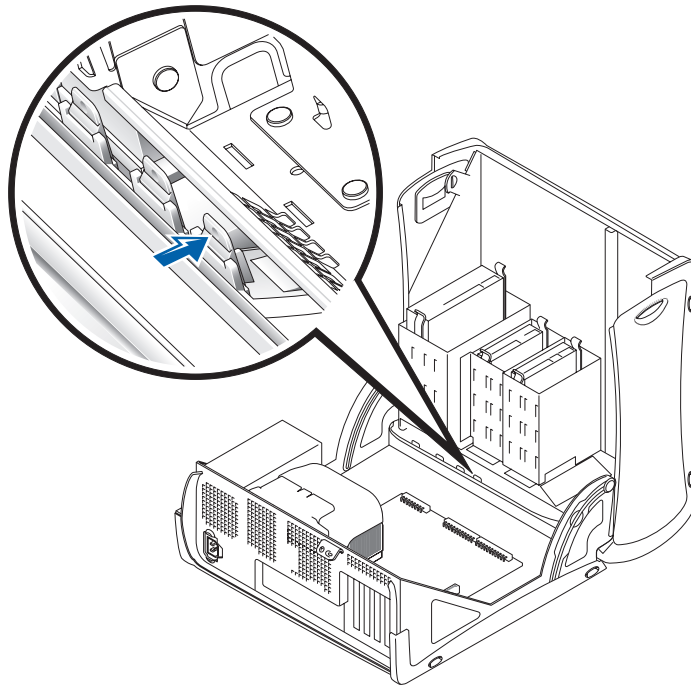


- 3 Press on the insert until it pops free of the front panel cover.

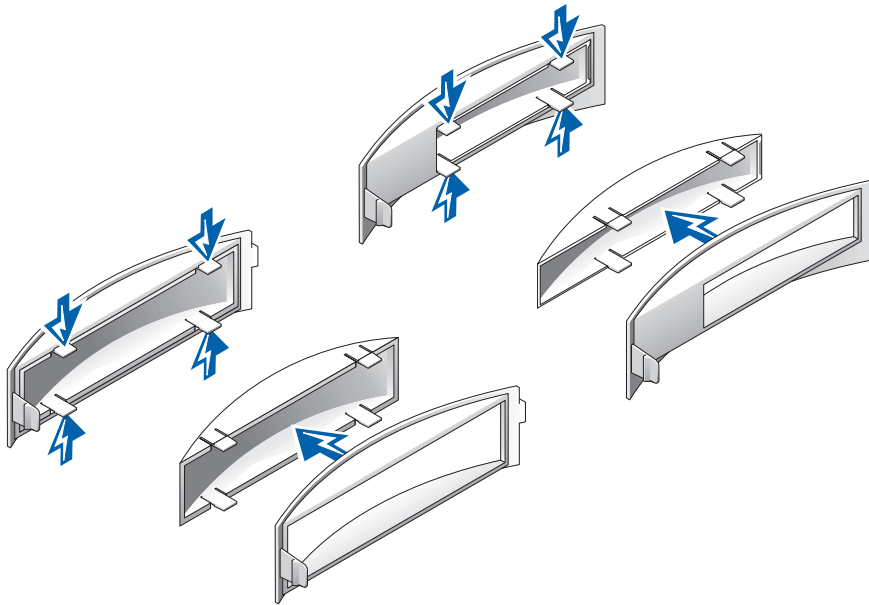
### Removing Front Panel Inserts—Small Mini-Tower Computer

- 1 Open the computer cover to a 45-degree angle and disconnect the CD/DVD drive data cable.
- 2 Open the cover to a 90-degree angle and release the insert tabs from inside the computer.

#### Small Mini-Tower Computer



- 3 Press on the insert until it pops free of the front panel cover.



### Replacing Front Panel Inserts

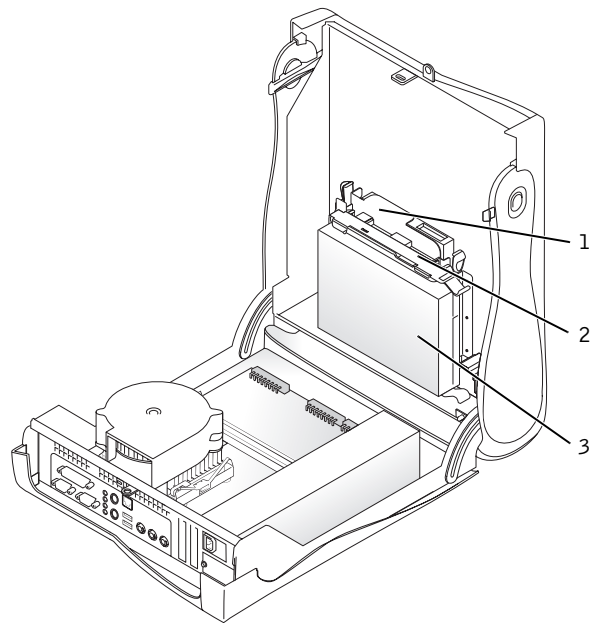
To replace a front panel insert, follow the “Removing Front Panel Inserts” procedures in reverse.

## Internal Drives

This computer may support the following internal drives:

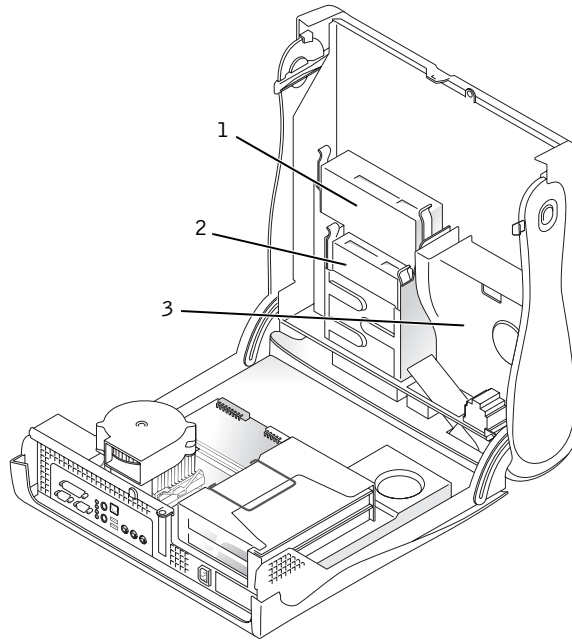
- Small form-factor: one enhanced integrated drive electronics (IDE) hard drive; one floppy or optional Zip drive; and one optional CD, CD-RW, or DVD drive.
- Small desktop: one enhanced IDE hard drive; one floppy or optional Zip drive; and one optional CD, CD-RW, or DVD drive.
- Small mini-tower: two enhanced IDE hard drives; two floppy or optional Zip drives; and two optional CD, CD-RW, or DVD drives.

### Small Form-Factor Computer



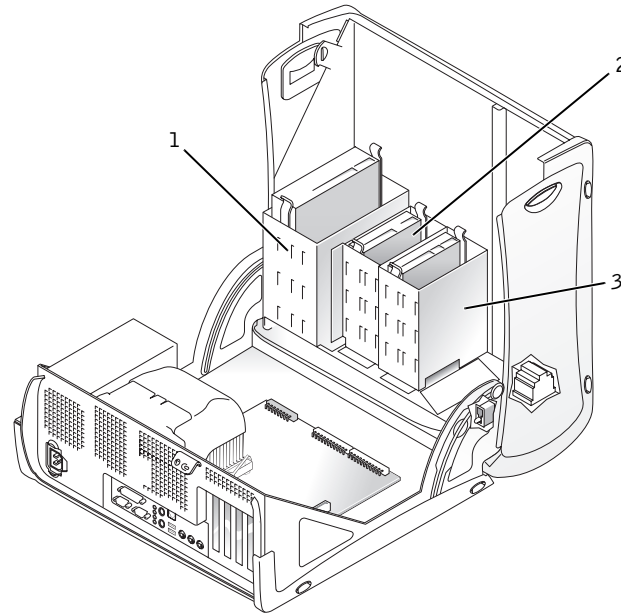
- 1 CD/DVD drive
- 2 floppy drive
- 3 hard drive

## Small Desktop Computer



- 1 CD/DVD drive
- 2 floppy drive
- 3 hard drive

## Small Mini-Tower Computer



- 1 CD/DVD drive(s)
- 2 floppy drive(s)
- 3 hard drive(s)

### IDE Drive Addressing

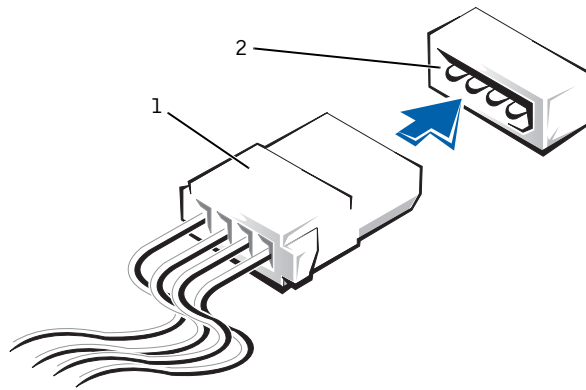
All IDE devices require that you configure the cable select setting, which assigns master and slave status to devices according to their position on the interface cable. You usually configure a drive for cable select by setting a jumper or switch, depending on the drive. Refer to the drive documentation in your upgrade kit for information on configuring devices for the cable select setting. When you connect two IDE devices to a single IDE interface cable and configure them for the cable select setting, the device attached to the last connector on the interface cable is the master or boot device (drive 0), and the device attached to the middle connector on the interface cable is the slave device (drive 1).

With the two IDE interface connectors on the system board, your computer supports up to two IDE devices. IDE hard drives should be connected to the IDE interface connector labeled “IDE1.” (Always connect CD/DVD drives to the IDE interface connector labeled “IDE2.”)

### Connecting Drives

When you install a drive, you connect two cables—a DC power cable and an interface cable—to the back of the drive. Your drive’s power input connector (to which you connect the DC power cable) resembles the following connector.

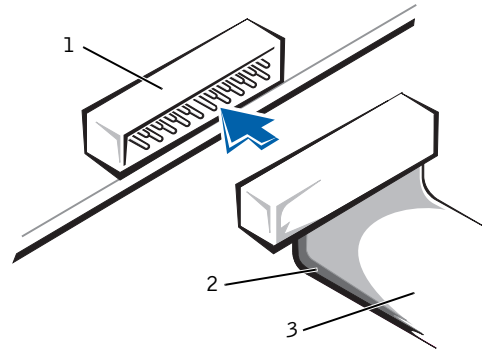
#### Power Cable Connector



- 1 power cable
- 2 power input connector

The drive’s interface connector is a card-edge connector or a header connector, as shown in the following figure.

## Drive Interface Connectors



- 1 header connector
- 2 colored stripe on the cable
- 3 interface cable

When you attach the interface cable to a drive, be sure to match the colored stripe on the cable to pin 1 of the drive's interface connector. For the location of pin 1 on the drive's interface connector, see the documentation that came with the drive.

When you disconnect an interface cable from the system board, be sure to press in on the locking tabs on the cable connector before you disconnect the cable. When you attach an interface cable to the system board, be sure that the locking tabs snap into place so that the cable is firmly attached to the connector on the system board.

Most 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. Keyed connectors ensure that the pin-1 wire in the cable (indicated by the colored stripe along one edge of the cable) goes to the pin-1 end of the connector. The pin-1 end of a connector on a board or a card is usually indicated by a silk-screened "1" printed directly on the board or card.



- ➔ **NOTICE:** When you connect an interface cable, do not reverse the interface cable (do not place the colored stripe away from pin 1 of the connector). Reversing the cable prevents the drive from operating and could damage the controller, the drive, or both.

## Hard Drives


- ⚠ **CAUTION:** To avoid the possibility of electric shock, turn off the computer and any devices, disconnect them from electrical outlets, and then wait 10 to 20 seconds before you open the computer cover. Also, before you install a drive, see the other precautions in “**CAUTION: Safety Instructions.**”

- 1 If you are replacing a hard drive that contains data you want to keep, back up your files before you begin this procedure.
- 2 If you are adding an additional hard drive to a small mini-tower computer, see “[Adding a Second Hard Drive — Small Mini-Tower Computer.](#)”

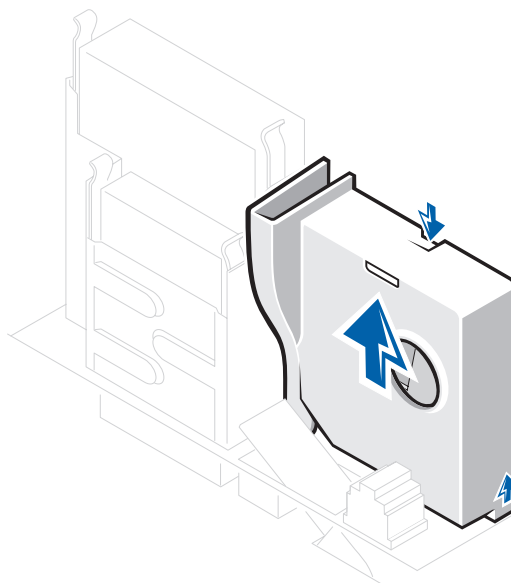
- ➔ **NOTICE:** Ground yourself by touching an unpainted metal surface on the back of the computer.

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

- 3 [Open the computer cover.](#)
- 4 On the small desktop computer, the hard drive may or may not have a plastic shroud cover. (Operating the computer without a hard-drive shroud does not affect its performance.) If your computer's hard drive does not have a shroud, proceed to the next step. If your computer's hard drive does have a shroud, remove it by pressing in on the indented tab at the top of the shroud and lifting the shroud away.

 **NOTE:** Your computer's hard drive may or may not have a plastic shroud cover. Operating the computer without a hard-drive shroud does not affect its performance.

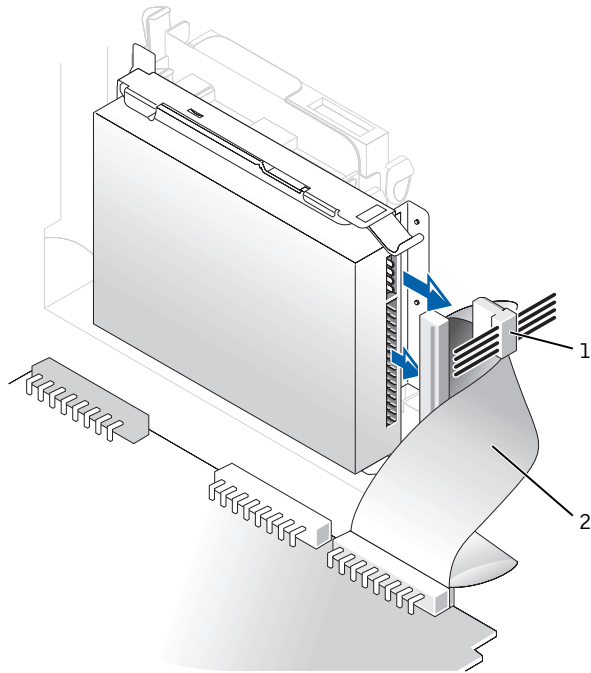
### Hard-Drive Shroud Removal



### Detaching Hard Drive Cables

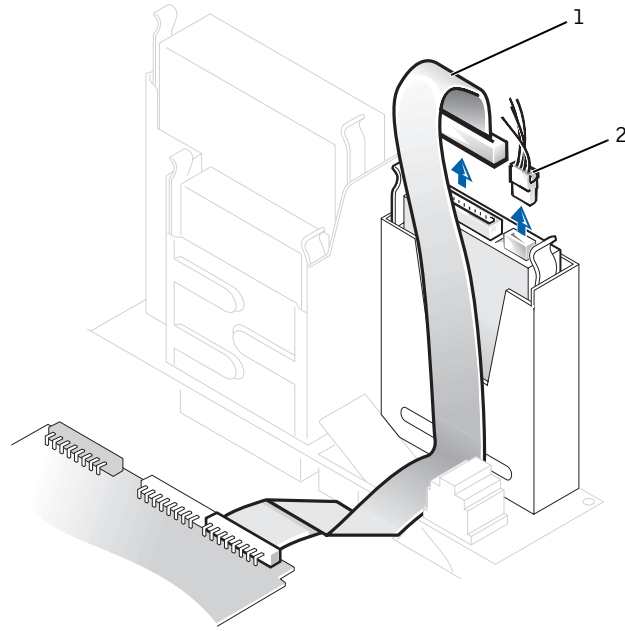
- 1 Disconnect the power cable and hard drive cable from the drive.

## Small Form-Factor Computer



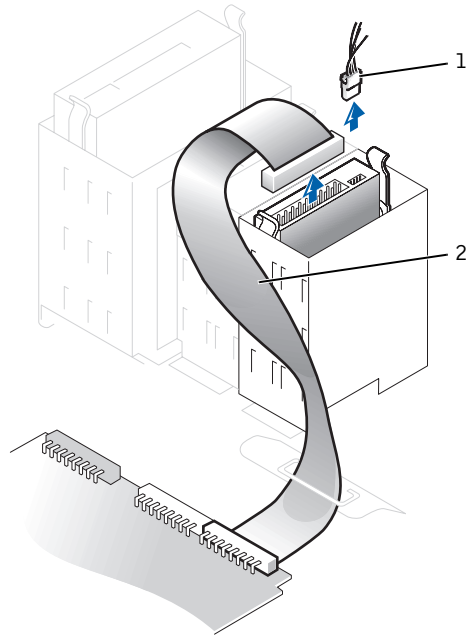
- 1 power cable
- 2 hard drive cable

### Small Desktop Computer



- 1 hard drive cable
- 2 power cable

## Small Mini-Tower Computer



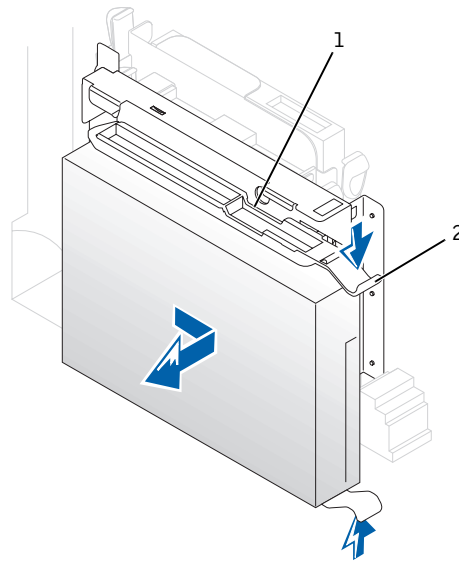
- 1 power cable
- 2 hard drive cable

- 2 On the small form-factor computer, if the computer has the combination data cable, disconnect the combination data cable from the floppy drive and interface (IDE2) connectors on the system board (see the small form-factor computer illustration in “[Detaching Floppy Drive Cables](#)”).

## Removing a Hard Drive

- 1 For the small form-factor computer, press in on the tabs on each side of the drive, slide the drive toward the I/O panel, and remove the drive from the computer.

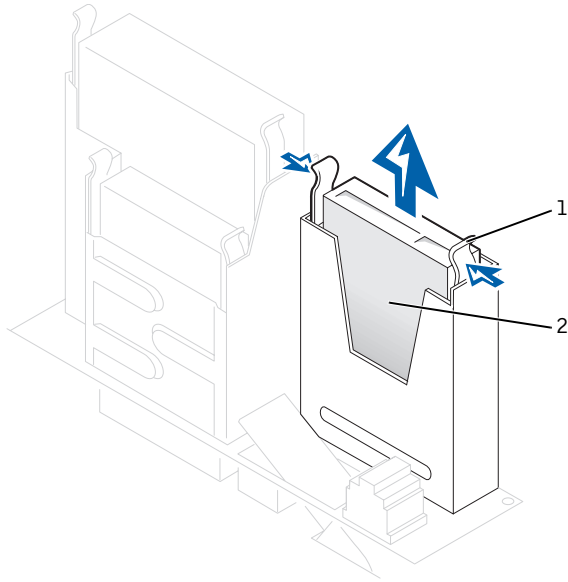
### Small Form-Factor Computer



- 1 notch in drive rail
- 2 tabs (2)

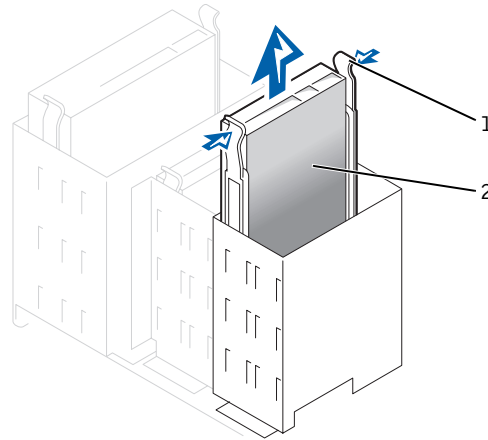
- 2 For the small desktop and small mini-tower computers, press in on the tabs on each side of the drive and slide the drive up and out.

## Small Desktop Computer



- 1 tabs (2)
- 2 hard drive

### Small Mini-Tower Computer



- 1 tabs (2)
- 2 hard drive

### Installing a Hard Drive

**⚠ CAUTION:** To avoid the possibility of electric shock, turn off the computer and any devices, disconnect them from electrical outlets, and then wait 10 to 20 seconds before you open the computer cover. Also, before you install a drive, see the other precautions in “**CAUTION: Safety Instructions.**”

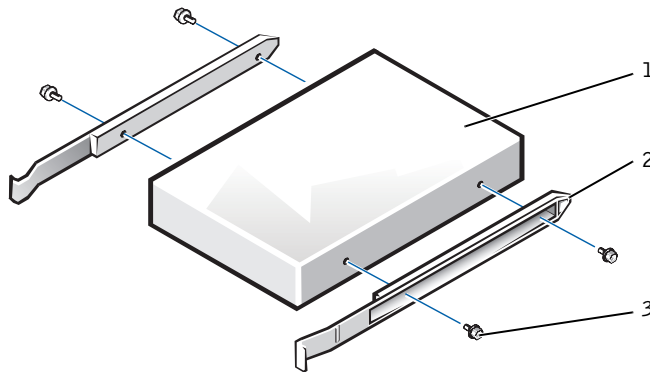
- ➡ **NOTICE:** Ground yourself by touching an unpainted metal surface on the back of the computer.
- ➡ **NOTICE:** When you unpack the drive, do not set it on a hard surface, which may damage the drive. Instead, set the drive on a surface, such as a foam pad, that sufficiently cushions it.

- 1 Unpack the drive, and prepare it for installation.
- 2 Check the documentation for the drive to verify that it is configured for your computer.



- 3 If your replacement hard drive does not have the bracket rails attached, remove the rails from the old drive by removing the two screws that secure each rail to the drive. Attach the bracket rails to the new drive by aligning the four screw holes of the drive and bracket and then inserting and tightening the screws that came with your upgrade kit.

#### Hard Drive Bracket Rails



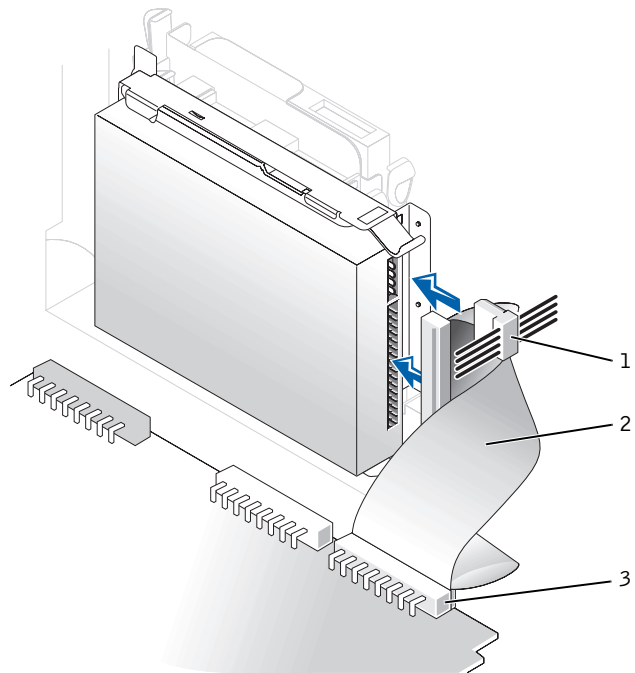
- 1 drive
- 2 bracket rails (2)
- 3 screws (4)

- 4 Install the hard drive into the computer by gently sliding the drive into place until you hear it securely click.

#### Reattaching Hard Drive Cables

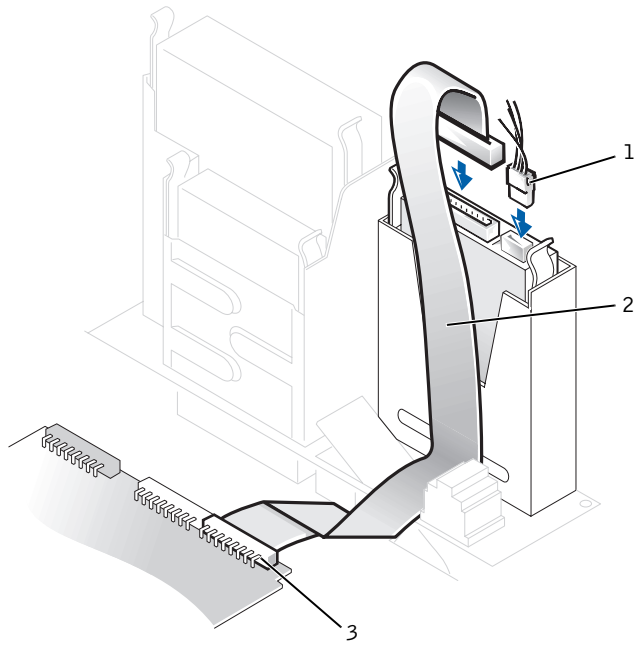
- 1 Connect the power cable and hard-drive data cable to the drive.

### Small Form-Factor Computer



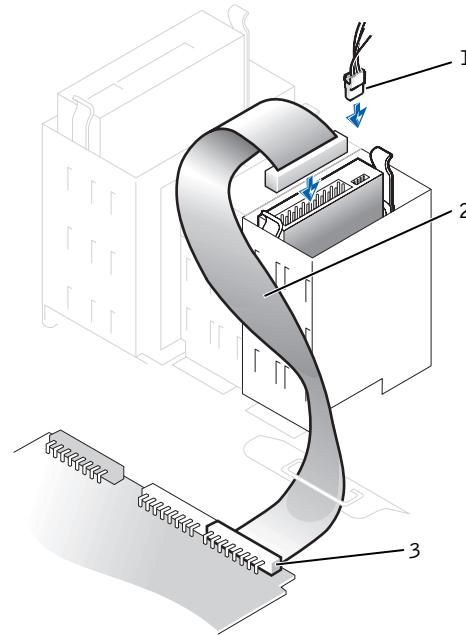
- 1 power cable
- 2 IDE cable
- 3 IDE connector

## Small Desktop Computer



- 1 power cable
- 2 IDE cable
- 3 IDE1 connector

## Small Mini-Tower Computer



- 1 power cable
- 2 IDE cable
- 3 IDE1 connector

- 2 Check all connectors to be certain that they are properly cabled and firmly seated.

**NOTICE:** To avoid possible damage to the computer, you must match the colored stripe on the hard-drive data cable with pin 1 on the hard drive (IDE1) connector and with the system board interface connector (IDE1).

To locate the IDE connector 1 (IDE1) on the system board, see “[System Board Components](#).”

- 3 On the small desktop computer, if your computer has a hard-drive shroud, replace the shroud by inserting the two tabs on the bottom into the holes in the computer and snapping the top into place. (Operating the computer without a hard-drive shroud does not affect its performance.)

- 4 [Close the computer cover](#), reconnect your computer and devices to their electrical outlets, and turn them on.
- 5 If the drive you just installed is the primary drive, insert a bootable floppy into drive A.
- 6 Turn on the computer.
- 7 [Enter system setup](#), and update the appropriate **Primary Drive** option (0 or 1).
- 8 Exit system setup, and reboot the computer.
- 9 Partition and logically format your drive before you proceed to the next step.  
See the documentation for your operating system for instructions.
- 10 Test the hard drive by running the [Dell Diagnostics](#).
- 11 If the drive you just installed is the primary drive, install your operating system on the hard drive.  
For instructions, see the documentation that came with your operating system.

### **Adding a Second Hard Drive — Small Mini-Tower Computer**

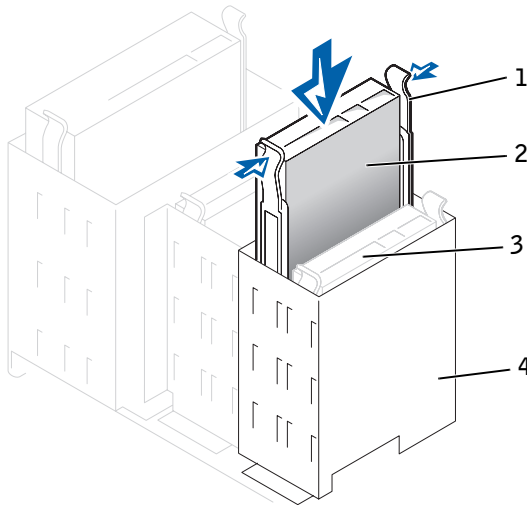
- ➔ **NOTICE:** Ground yourself by touching an unpainted metal surface on the back of the chassis.
  - ➔ **NOTICE:** When you unpack the drive, do not set it on a hard surface, which may damage the drive. Instead, set the drive on a surface, such as a foam pad, that sufficiently cushions it.
- 1 Unpack the drive, and prepare it for installation.
  - 2 Check the documentation for the drive to verify that it is configured for your computer.
  - 3 [Open the computer cover](#).
  - 4 Remove the two green plastic drive rails inside the lower hard-drive bay.  
These rails are not attached to the inside of the hard-drive bay with screws. To remove the rails, gently pull the rails up and out of the bay.
  - 5 Attach the rails to the hard drive using the two screws attached to the rails.

Ensure that the rail tabs are positioned at the back of the hard drive.

➔ **NOTICE:** Do not install a drive into the lower hard-drive bay until you remove the green drive rails from inside the lower hard-drive bay.

- 6 Remove the first hard drive from the upper bay and install it in the lower bay.
  - a Disconnect the power cable and the data cable from the back of the first hard drive.
  - b Press in the two green rail tabs and pull the first hard drive out of the upper bay.
  - c Gently slide the first hard drive into the lower bay until you hear a click.
  - d Reconnect the power cable and the data cable to the back of the hard drive.
- 7 Gently slide the new hard drive into the upper bay until you hear a click.

#### Second Hard Drive Installed



1	rail tabs (2)
2	second hard drive in upper bay
3	first hard drive in lower bay
4	hard drive cage

➔ **NOTICE:** Match the colored strip on the cable with pin 1 on the drive.

Locate the extra connector on the drive cable that is attached to the first hard drive and attach the connector to the second hard drive.

## Floppy Drives

⚠ **CAUTION:** To avoid the possibility of electric shock, turn off the computer and any devices, disconnect them from their electrical outlets, and then wait 10 to 20 seconds before you open the computer cover. Also, before you install a drive, see the other precautions in “**CAUTION: Safety Instructions.**”

➔ **NOTICE:** To avoid possibly damaging the drive by electrostatic discharge (ESD), ground yourself by touching an unpainted metal surface on the back of the computer.

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. Change any settings necessary for your configuration.

2 If you are installing an IDE drive, configure the drive for the cable select setting.

You usually configure a drive for cable select by setting a jumper or switch, depending on the drive. For instructions on configuring the cable select setting, see the documentation that accompanied the drive.

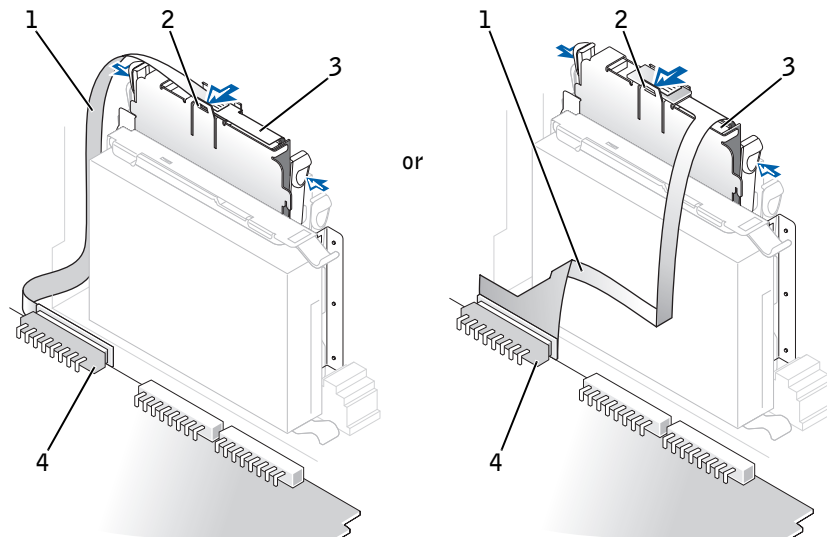
3 [Open the computer cover.](#)

4 If you are replacing a drive, disconnect the power and interface cables from the back of the drive before you remove the drive.

## Detaching Floppy Drive Cables

- 1 Disconnect the cables from the floppy drive and system board.
- 2 Disconnect the CD/DVD drive cable and the power cable from the CD/DVD drive.
- 3 On the small form-factor computer, remove or raise the drive by pressing the green tabs on either side of the drive and lifting the drive up.
  - a Remove the interposer board from the floppy drive by pressing the tab and rotating the interposer board.

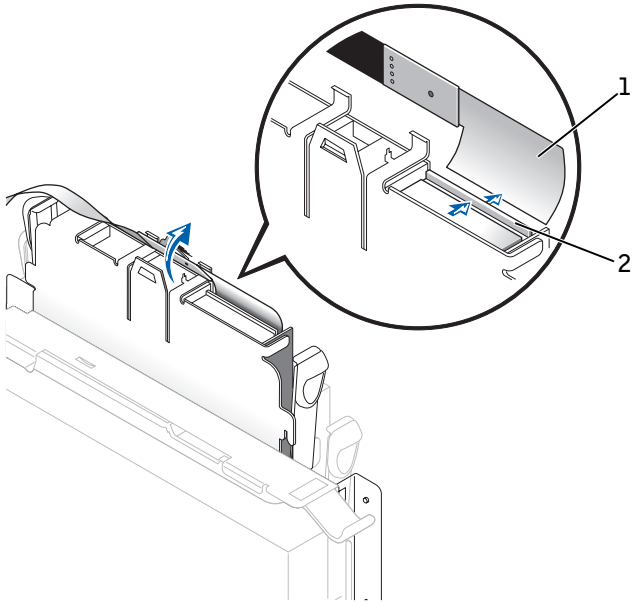
### Small Form-Factor Computer



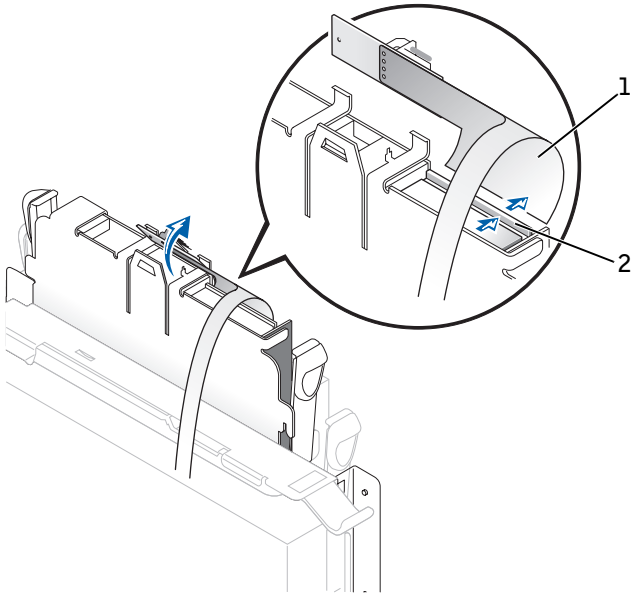
- 1 floppy drive cable
- 2 tab
- 3 interposer board
- 4 system board floppy drive connector (DSKT)

- b To release the cable from the connector, slide the lever until it is fully extended and then lift the cable away.



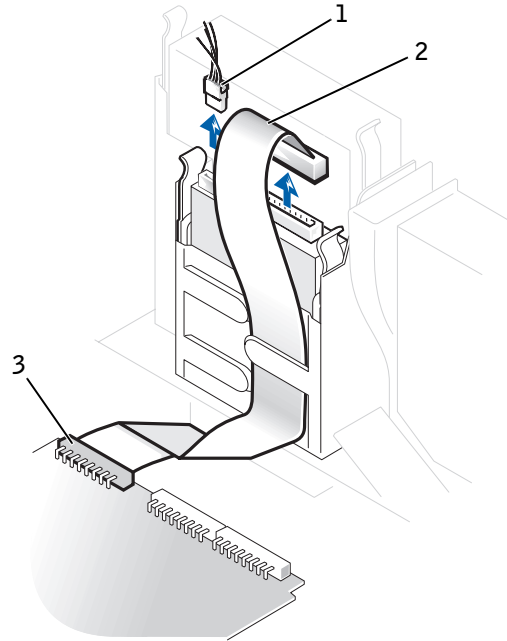


or



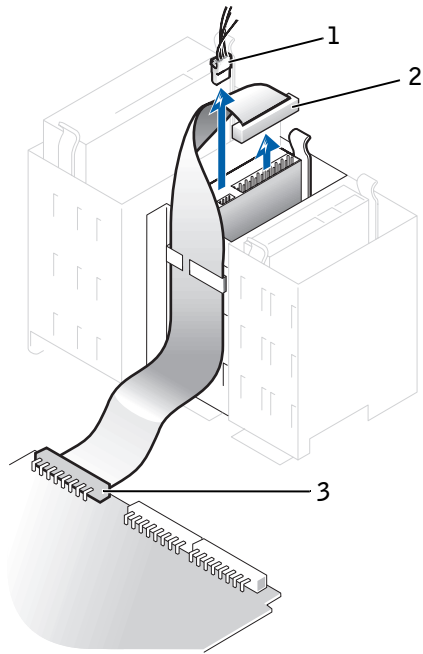
- 1 floppy drive cable
- 2 lever

**Small Desktop Computer**



- 1 power cable
- 2 floppy drive cable
- 3 floppy drive connector

### Small Mini-Tower Computer

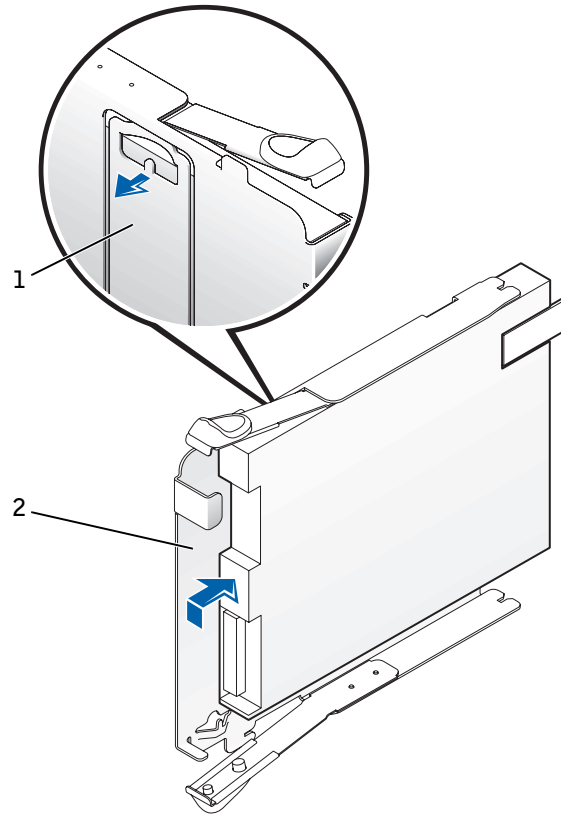


- 1 power cable
- 2 floppy drive cable
- 3 floppy drive connector

### Removing a Floppy Drive

- 1 On the small form-factor computer, remove the floppy drive from its sled by pulling the sled tab out while pushing the drive up and then sliding the drive out of the sled.

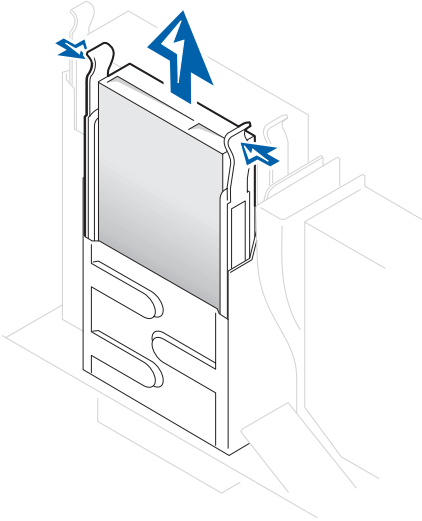
### Small Form-Factor Computer



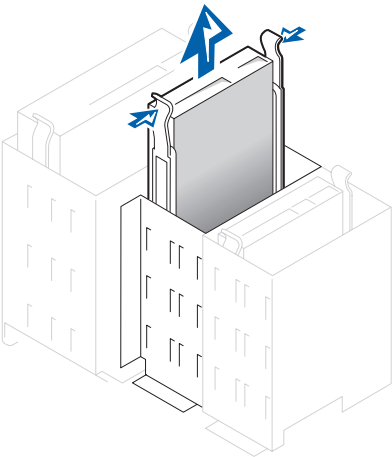
- 1 sled tab
- 2 sled

- 2** On the small desktop and small mini-tower computers, press inward on the two tabs on the sides of the drive bay to disengage the drive from the computer.
- 3** Slide the drive upward and remove it from the computer.

### Small Desktop Computer



### Small Mini-Tower Computer

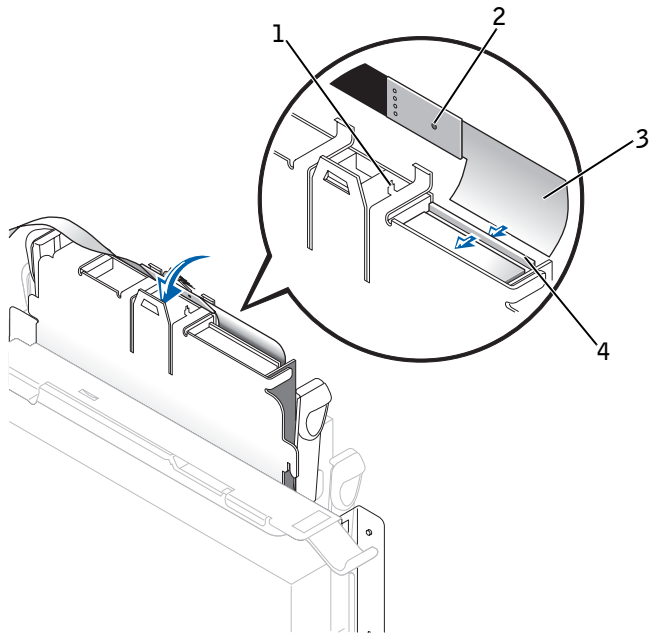


## Installing a Floppy Drive and Reattaching Cables

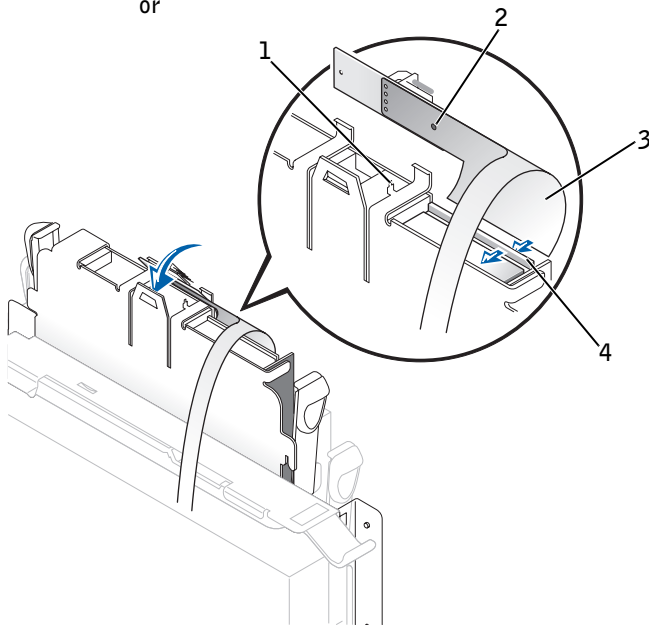
### Small Form-Factor Computer

- 1 Snap the replacement floppy drive into the sled and ensure that it is secure in the sled.
- 2 Gently slide the floppy drive into the computer until the tabs securely click into position.
- 3 Connect the interposer board to the floppy drive.
  - a Slide the drive cable into the connector.
  - b Close the lever so that the cable is secure in the connector.
  - c Line up the hole on the bottom of the interposer board with the notch on the connector, and snap the interposer board onto the drive.
- 4 Attach the power cable to the interposer board on the floppy drive.
- 5 [Attach the CD/DVD drive cable and the power cable to the CD/DVD drive.](#)
- 6 Connect the floppy-drive cable to the DSKT connector on the system board.

## Small Form-Factor Computer



or

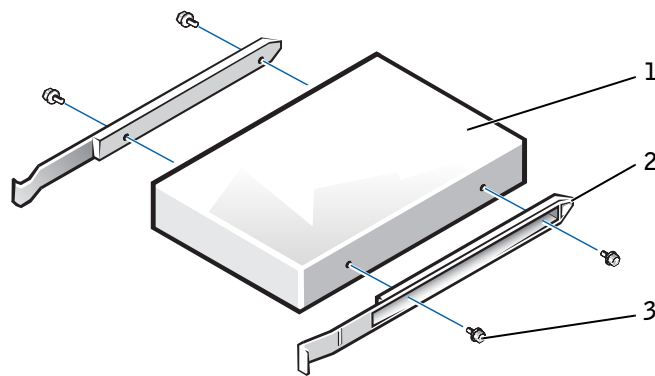


- 1 connector notch
  - 2 interposer board alignment hole
  - 3 floppy-drive cable
  - 4 lever
- 
- 7 Check all cable connections, and fold cables out of the way to provide airflow for the fan and cooling vents.
  - 8 [Close the computer cover](#), reconnect your computer and devices to their electrical outlets, and turn them on.
  - 9 [Enter system setup](#) and update the appropriate **Diskette Drive A** option to reflect the size and capacity of your new floppy drive.
  - 10 Verify that your computer works correctly by running the [Dell Diagnostics](#).

### Small Desktop and Small Mini-Tower Computers

- 1 If the replacement drive does not have the bracket rails attached, remove the rails from the old drive by removing the two screws that secure each rail to the drive. Attach the bracket to the new drive by aligning the screw holes on the drive with the screw holes on the bracket rails and tightening all four screws (two screws on each rail).

#### Floppy Drive Bracket Rails

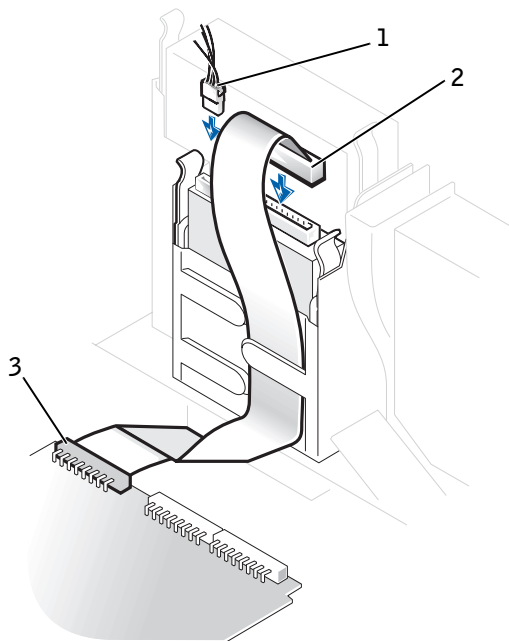




- 1 drive
- 2 bracket rails (2)
- 3 screws (4)

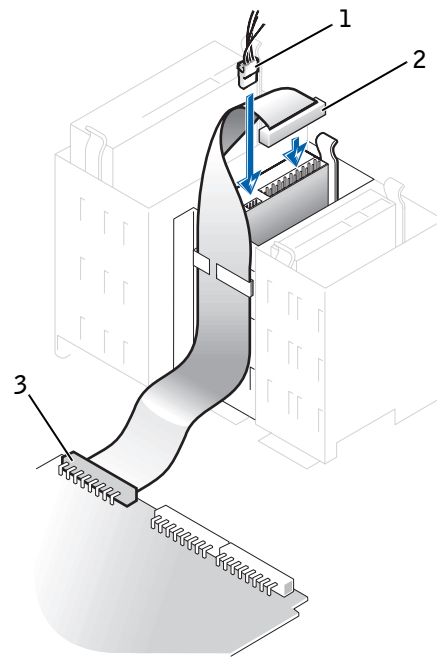
- 2 Gently slide the drive into place until the tabs securely click into position.
- 3 Attach the power and data cables to the floppy drive, and connect the other end of the data cable to the connector labeled “DSKT” on the system board.

### Small Desktop Computer



- 1 power cable
- 2 floppy drive cable
- 3 floppy drive connector


### Small Mini-Tower Computer




- 1 power cable
- 2 floppy drive cable
- 3 floppy drive connector

- 4 Check all cable connections, and fold cables out of the way to provide airflow for the fan and cooling vents.
- 5 [Close the computer cover](#), reconnect your computer and devices to their electrical outlets, and turn them on.
- 6 [Enter system setup](#) and update the appropriate **Diskette Drive A** option to reflect the size and capacity of your new floppy drive.
- 7 Verify that your computer works correctly by running the [Dell Diagnostics](#).

## CD/DVD Drives

 **CAUTION:** To avoid the possibility of electric shock, turn off the computer and any devices, disconnect them from their electrical outlets, and then wait 10 to 20 seconds before you open the computer cover. Also, before you install a drive, see the other precautions in “**CAUTION: Safety Instructions.**”

 **NOTICE:** To avoid possibly damaging the drive by electrostatic discharge (ESD), ground yourself by touching an unpainted metal surface on the back of the computer.

- 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. Change any settings necessary for your configuration.

- 2 If you are installing an IDE drive, configure the drive for the cable select setting.

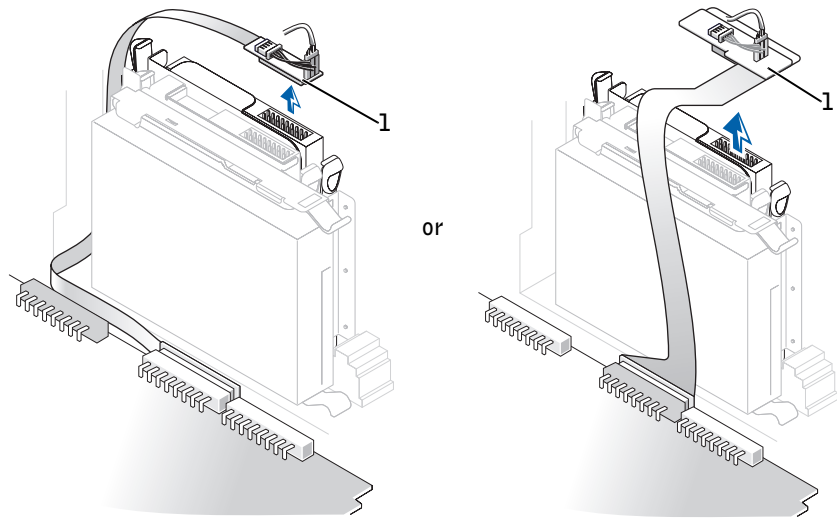
You usually configure a drive for cable select by setting a jumper or switch, depending on the drive. For instructions on configuring the cable select setting, see the documentation that accompanied the drive.

- 3 [Open the computer cover.](#)
- 4 If you are replacing a drive, disconnect the power and interface cables from the back of the drive before you remove the drive.

## Detaching CD, CD-RW, or DVD Drive Cables

- 1 On the small form-factor computer, remove the interposer board from the drive.

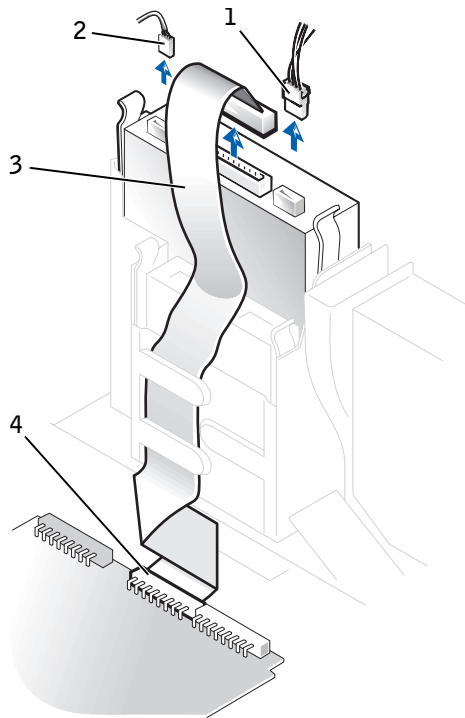
### Interposer Board Removal



1 interposer board

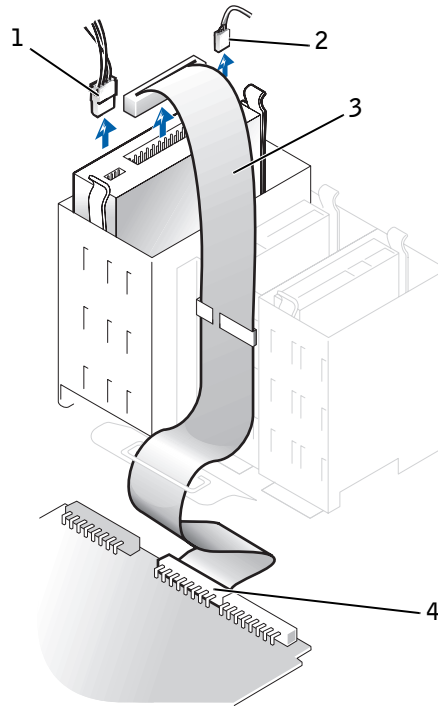
- 2 On the small desktop and small mini-tower computers, remove the data, power, and audio cables from the drive.

### Small Desktop Computer



- 1 power cable
- 2 audio cable
- 3 CD/DVD drive cable
- 4 CD/DVD drive connector

### Small Mini-Tower Computer

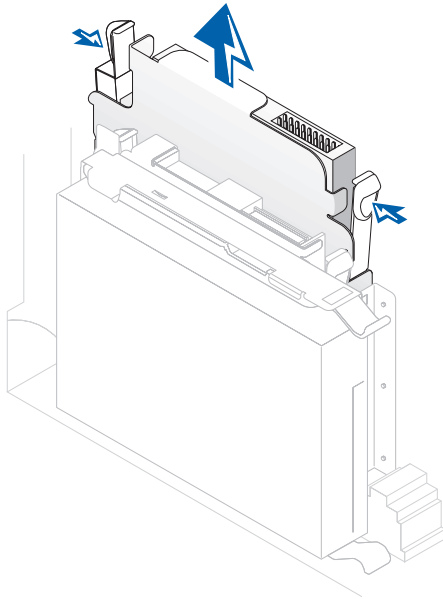


- 1 power cable
- 2 audio cable
- 3 CD/DVD drive cable
- 4 CD/DVD drive connector

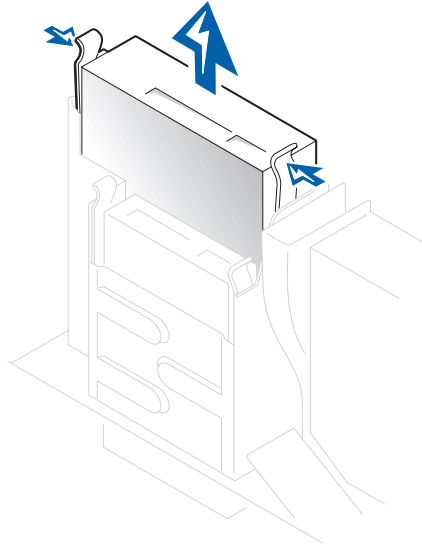
## Removing a CD, CD-RW, or DVD Drive

- 1 Press inward on the two tabs on the sides of the drive to disengage the drive from the computer.
- 2 Slide the drive upward and remove it from the computer.

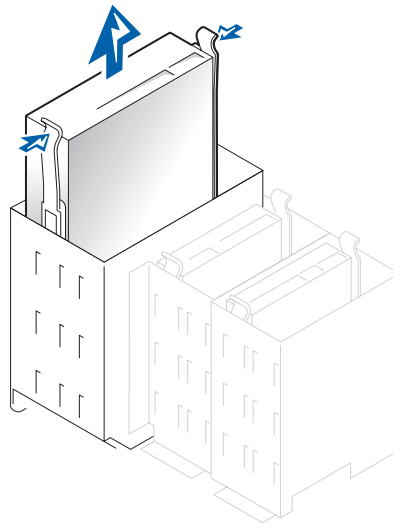
### Small Form-Factor Computer



### Small Desktop Computer



### Small Mini-Tower Computer

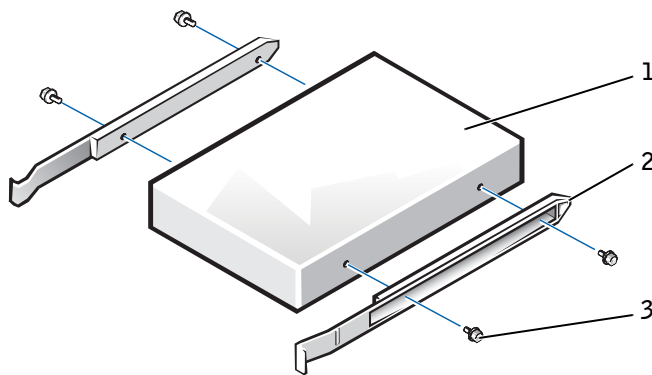




## Installing a CD, CD-RW, or DVD Drive and Reattaching Cables

- 1 If the replacement drive does not have the bracket rails attached, remove the rails from the old drive by removing the two screws that secure each rail to the drive. Attach the bracket to the new drive by aligning the screw holes on the drive with the screw holes on the bracket rails and tightening all four screws (two screws for each rail).

### CD/DVD Drive Bracket Rails



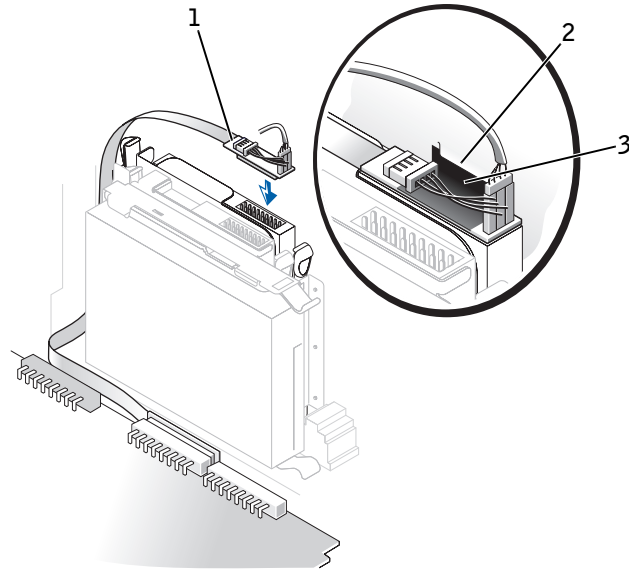
- 1 drive
- 2 bracket rails (2)
- 3 screws (4)

- 2 Gently slide the drive into place until the tabs securely click into position.
- 3 On the small form-factor computer, connect the interposer board to the CD/DVD drive.

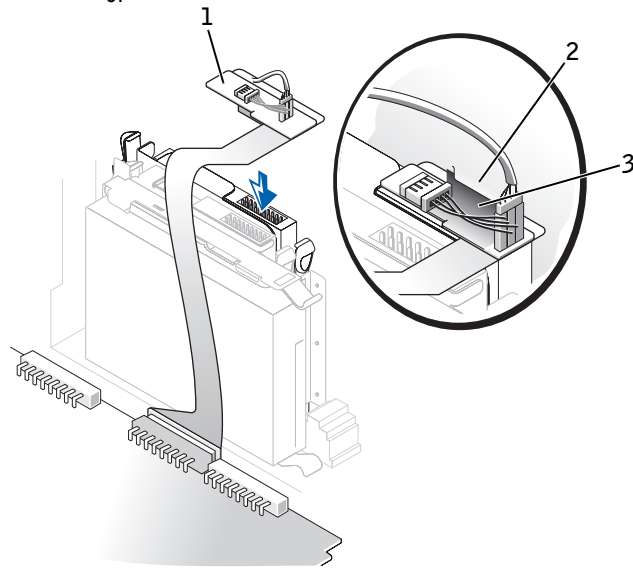
If your computer came with a CD drive, use the spare connector on the existing interface cable. Otherwise, use the IDE interface cable provided in the drive kit.

Ensure that the interposer board tab fits securely under the notch on the inside of the cover.

### Interposer Board Connection—Small Form-Factor Computer



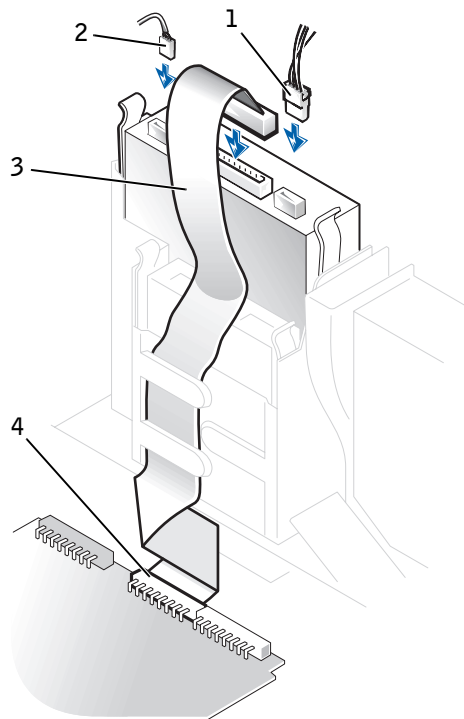
or



1 interposer board

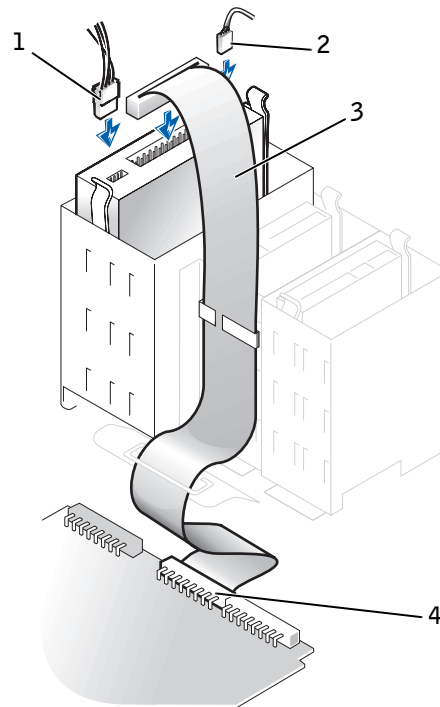
4 Connect the drive, power, and audio cables to the drive.

### Small Desktop Computer



- 1 power cable
- 2 audio cable
- 3 CD/DVD drive cable
- 4 CD/DVD drive connector

### Small Mini-Tower Computer



- 1 power cable
- 2 audio cable
- 3 CD/DVD drive cable
- 4 CD/DVD drive connector

- 5 If you are installing a drive that has its own controller card, install the controller card in an expansion card slot.
- 6 Check all cable connections, and fold cables out of the way to provide airflow for the fan and cooling vents.
- 7 If the CD/DVD drive bay was previously empty, remove the [front panel insert](#).
- 8 [Close the computer cover](#), reconnect your computer and devices to their electrical outlets, and turn them on.

- 9 Update your configuration information by setting the appropriate **Drive** option (0 or 1) under **Drives: Secondary to Auto**. See Primary Drive n and Secondary Drive n for more information.
- 10 Verify that your computer works correctly by running the [Dell Diagnostics](#).

## Battery

A 3.0-V CR2032 lithium coin-cell battery installed on the system board maintains system configuration, date, and time information in a special section of memory.

The operating life of the battery can extend up to 10 years. The battery may need replacing if an incorrect time or date is displayed during the boot routine along with a message such as:

```
Time-of-day not set - please run SETUP program
```

or


```
Invalid configuration information -  
please run SETUP program
```

or

```
Strike the F1 key to continue,  
F2 to run the setup utility
```

To determine whether you need to replace the battery, reenter the time and date through system setup and exit the program properly to save the information. Turn off your computer and disconnect it from the electrical outlet for a few hours, and then reconnect the computer, turn it on, and [enter system setup](#). If the date and time are not correct in system setup, replace your battery.


You can operate your computer without a battery; however, without a battery, the configuration information is erased if the computer is turned off or unplugged from the electrical outlet. In this case, you must enter system setup and reset the configuration options.

 **CAUTION:** There is a danger of the 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.


## Replacing the Battery

- 1 If you have not already done so, make a copy of your configuration information in [system setup](#).

If the settings are lost while you are replacing the battery, see your written or printed copy of the configuration information to restore the correct settings.

 **CAUTION:** Before you open the computer cover, see “**CAUTION: Safety Instructions.**”

- 2 Open the computer cover.

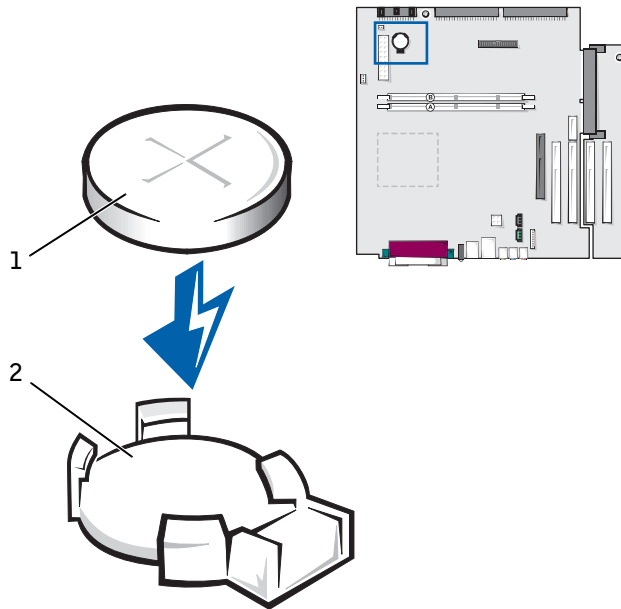
 **NOTICE:** If you pry the battery out of its socket with a blunt object, be careful not to touch the system board with the object. Make certain that the object is inserted between the battery and the socket before you attempt to pry out the battery. Otherwise, you may damage the system board by prying off the socket or by breaking circuit traces on the system board.

- 3 Remove the battery by prying it out of its socket with your fingers or with a blunt, nonconductive object, such as a plastic screwdriver.

See the [system board](#) figure for the location of the battery.

- 4 Install the new battery.
  - a Orient the battery with the side labeled “+” facing up.
  - b Insert the battery into the socket, and snap it into place.

## Computer Battery



- 1 battery
- 2 battery socket

- 5 Close the computer cover, reconnect your computer and devices to their electrical outlets, and turn them on.
- 6 Enter **system setup**, and confirm that the battery is operating properly.
  - a Enter the correct time and date through system setup's **System Time** and **System Date** options.
  - b Use the copy of the configuration information that you made in step 1 to restore the correct settings for other system setup options.
  - c Exit system setup.
- 7 Turn off and unplug your computer, and leave it unplugged for at least 10 minutes.

- 8 After 10 minutes, plug in the computer, turn it on, and enter system setup. If the time and date are still incorrect, see [“Getting Help”](#) for instructions on obtaining technical assistance.



# 4

SECTION 4

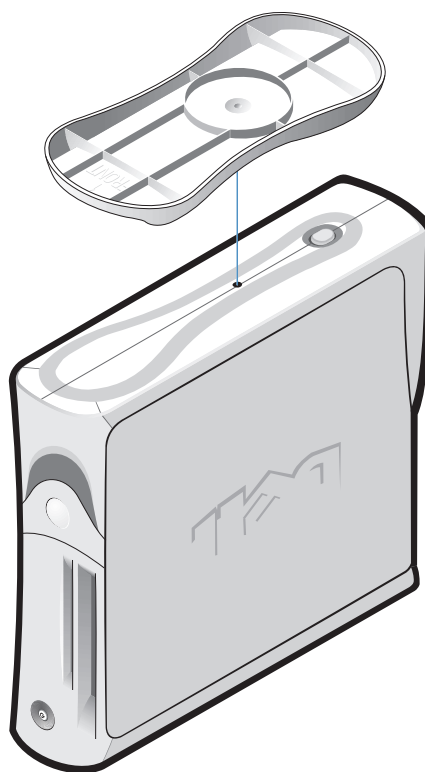
## Stand

Removing the Computer Stand  
Attaching the Computer Stand

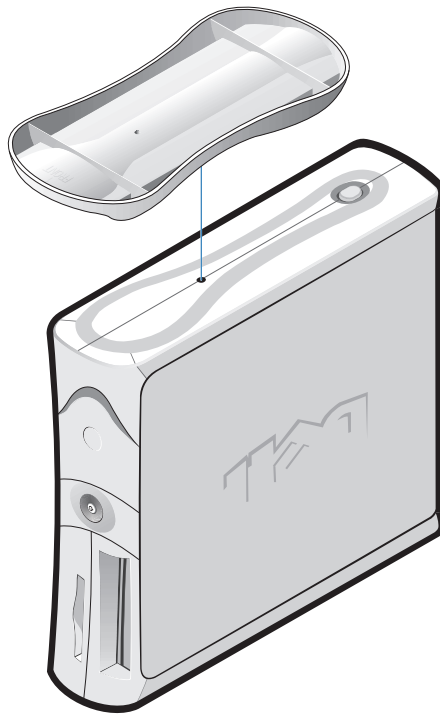
## Removing the Computer Stand

- 1 Turn the computer over so that the stand is at the top.
- 2 Loosen the thumb screw and lift the stand away (see the following figures).
- 3 Place the computer in a horizontal position.

### Small Form-Factor Computer



## Small Desktop Computer



## Attaching the Computer Stand

- 1 Place the computer on its right side so that the drive bays are at the bottom.
- 2 Fit the stand onto what was the left side of the computer.
  - a Position the stand as shown in the figure by aligning the large round hole in the stand with the securing button on the side of the cover and aligning the captive screw in the stand with the screw hole in the cover.
  - b When the stand is in place, tighten the thumbscrew.
- 3 Rotate the computer so that the stand is at the bottom and the drives are at the top.



## SECTION 5

# Technical Specifications

Microprocessor  
Memory  
Computer Information  
Audio  
Expansion Bus  
Drives  
Ports  
Key Combinations  
Controls and Lights  
Power  
Physical  
Environmental

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**Microprocessor**


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Microprocessor type	Intel® Pentium® 4 microprocessor. Design provides for future Dell-supported upgrades. A slower compatibility speed can be set through <a href="#">system setup</a>
Level 1 (L1) cache	8-kilobyte (KB)
Level 2 (L2) cache	1.5–2.0* GHz processors: 256-KB pipelined-burst, eight-way set-associative, write-back static random-access memory (SRAM) 2.2–2.6 GHz processors: 512-KB SRAM
Math coprocessor	internal to microprocessor

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**Memory**


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Architecture	133-megahertz (MHz) synchronous dynamic random-access memory (SDRAM)
Dual in-line memory module (DIMM) sockets	two error-checking and correction (ECC) and non-ECC
DIMM capacities	64-, 128-, 256-, and 512-megabyte (MB)
Minimum random-access memory (RAM)	64 MB (128 MB when running Windows 2000 or Windows XP)
Maximum RAM	1 GB
Basic input/output system (BIOS) address	F8000h

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**Computer Information**


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Computer chip set	Intel 845
Data bus width	64 bits
Address bus width	32 bits
Direct memory access (DMA) channels	four
Interrupts	15
Computer BIOS	Desktop Management Interface (DMI) 2.0s- and system management BIOS 2.3-compliant BIOS in 4-megabit (Mb) flash chip

System bus speed	100 megahertz (MHz) clock, 400 MHz data rate
Network interface controller	integrated 3C920-based 10/100 3Com <sup>®</sup> Ethernet controller

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### Audio

Audio type	AC97, Sound Blaster emulation
Audio controller	Analog Devices AD1885 AC97 Codec
Stereo conversion	16 bit (analog-to-digital and digital-to-analog)
Interfaces:	
Internal	PCI bus/AC97
External	stereo line-in minijack, microphone-in minijack, line-out minijack on the rear input/output (I/O) panel; headphones minijack on the front panel

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### Expansion Bus

Bus types	PCI and AGP
Bus speed	PCI: 33 MHz AGP: 66 MHz
Small form-factor computer expansion-card connector	one PCI expansion slot; low-profile cards are supported (card size = 6.35 cm [2.5 inches] high by 16.76 cm [6.6 inches] long)
Small desktop computer expansion-card connectors:	two PCI expansion slots (card size = 10.67 cm [4.2 inches] high by 17.65 cm [6.95 inches] long)
Small mini-tower computer expansion-card connectors:	four PCI expansion slots (card sizes = three slots support cards up to 27.9 cm high [11 inches, and one slot supports a card up to 22.9 cm high [9 inches])
PCI expansion-card connector size	120 pins
PCI expansion-card connector data width (maximum)	32 bits
AGP expansion-card connectors	one

AGP expansion-card connector data width (maximum)	32 bits
AGP expansion-card connector size	172 pins
AGP bus protocols	4x modes at 1.5 V

### Drives

#### Externally accessible bays:

Small form-factor computer	one 3.5-inch bay for a slimline 3.5-inch floppy drive one 5.25-inch bay for a slimline CD/DVD drive
Small desktop computer	one 3.5-inch bay for a 3.5-inch floppy drive one 5.25-inch bay for a CD/DVD drive
Small mini-tower computer	two 3.5-inch bays for two 3.5-inch floppy drives two 5.25-inch bays for two CD/DVD drives

#### Internally accessible bays:

Small form-factor computer	one bay for a 1-inch-high IDE hard drive
Small desktop computer	one bay for a 1-inch-high IDE hard drive
Small mini-tower computer	two bays for a 1-inch high IDE hard drive

### Ports

#### Externally accessible:

Serial (data terminal equipment [DTE])	two 9-pin connectors; 16550-compatible on the back panel
Parallel	one 25-hole connector (bidirectional) on the back I/O panel
Integrated network adapter	RJ45 connector on the back I/O panel
Personal System/2 (PS/2)-style keyboard	6-pin mini-Deutsche Industrie Norm (DIN) on the back I/O panel
PS/2-compatible mouse	6-pin mini-DIN on the back I/O panel
Universal Serial Bus (USB)	two USB-compliant connectors on the back I/O panel; two on the front panel

#### Internally accessible:



Primary IDE hard drive	40-pin connector on PCI local bus
Secondary IDE hard drive	40-pin connector on PCI local bus
Floppy drive	34-pin connector
CD drive audio interface	4-pin connector
Telephony	4-pin connector
Fan	3-pin connector

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### Key Combinations

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<Ctrl><Alt><Del>	restarts (reboots) the computer
<Ctrl><Alt><\\>	toggles microprocessor speeds on 101-key keyboard (in MS-DOS® real mode only)
<Ctrl><Alt><#>	toggles microprocessor speeds on 102-key keyboard (in MS-DOS real mode only)
<F2> or <Ctrl><Alt><Enter>	starts embedded system setup (during power-on system test [POST] only)
<F3> or <F12>	automatically starts (boots) the computer from the network environment specified by the managed boot agent (MBA) rather than from one of the devices in the system setup <b>Boot Sequence</b> option
<Ctrl><Alt><F10>	launches the utility partition (if installed) during computer start-up
<Ctrl><Alt><F8>	changes boot sequence (during POST only)

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### Controls and Lights

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Power control	push button
Power lights	green light on power button—blinking green in sleep state; solid green for power on state
Hard drive access light	green light
Link integrity light (on integrated network adapter)	green light for 10-Mb operation; orange light for 100-Mb operation
Activity light (on integrated network adapter)	yellow light

Diagnostic lights	four yellow and/or green lights on back of computer (see “I/O Panel—Small Form-Factor, Desktop, and Mini-Tower Computers.”)
Standby power light	AUX_LED on the system board

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### Power

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#### DC power supply:

Wattage	small form-factor computer: 160 W small desktop computer: 180 W small mini-tower computer: 250 W
Heat dissipation	small form-factor computer: 455 BTU/hr (average) small desktop computer: 500 BTU/hr (average) small mini-tower computer: 910 BTU/hr (average)
Voltage	90 to 135 volts (V) at 50/60 Hz; 180 to 265 V at 50/60 Hz

Backup battery	3-V CR2032 lithium coin cell
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### Physical

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#### Small form-factor computer:

Height	9.0 cm (3.57 inches)
Width	31.9 cm (12.54 inches)
Depth	35.4 cm (13.93 inches)
Weight	6.9 kg (15 lbs)

#### Small desktop computer:

Height	10.6 cm (4.2 inches)
Width	38.9 cm (15.3 inches)
Depth	43.2 cm (17 inches)
Weight	9.9 kg (22 lbs)

#### Small mini-tower computer:

Height	42.5 cm (16.7 inches)
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Width	18.1 cm (7.1 inches)
Depth	44.7 cm (17.6 inches)
Weight	12.7 kg (28 lbs)

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### Environmental

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Temperature:

Operating 10° to 35° Celsius (C) (50° to 95° Fahrenheit [F])

Storage -40° to 65°C (-40° to 149°F)

Relative humidity 20% to 80% (noncondensing)

Maximum vibration:

Operating 0.25 gravities (G) at 3 to 200 Hz at 1 octave/min

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

Maximum shock:

Operating bottom half-sine pulse with a change in velocity of 20 inches/sec (50.8 cm/sec)

Storage 27-G faired square wave with a velocity change of 200 inches/sec (508 cm/sec)

Altitude:

Operating -16 to 3048 meters (m) (-50 to 10,000 feet [ft])

Storage -16 to 10,600 m (-50 to 35,000 ft)



# 6

SECTION 6

## Solving Problems

Finding Solutions  
Dell Diagnostics  
Messages and Codes  
Software Problems

[www.dell.com](http://www.dell.com) | [support.dell.com](http://support.dell.com)

## Finding Solutions

This section describes computer and software problems, offers corrective actions, describes the utility, and provides computer messages and codes. Before you call Dell for technical assistance, complete the following tasks to help you resolve computer problems:

Read [“About Your Computer”](#) and [“CAUTION: Safety Instructions.”](#)

Take the problem-solving action listed in the following table for the component or equipment that is malfunctioning.

### Solving Problems

Need a driver for a graphics card, network adapter, sound card, software, or some other device	See <a href="#">“Drivers for Your Computer”</a>
Power light does not light	See <a href="#">“Power Problems”</a>
Monitor power light does not light	See <a href="#">“Video and Monitor Problems”</a>
No sound	See <a href="#">“Sound and Speaker Problems”</a>
Printer not working	See <a href="#">“Printer Problems”</a>
Serial or other parallel devices not working	See <a href="#">“Serial or Parallel Device Problems”</a>
Mouse not working	See <a href="#">“Mouse Problems”</a>
Keyboard not working	See <a href="#">“Keyboard Problems”</a>
Floppy drive or hard drive: lights not lit, scraping or unusual noises, no noise	See <a href="#">“Floppy Drive Problems”</a> or <a href="#">“Hard Drive Problems”</a>
Computer battery not working	See <a href="#">“Battery Problems”</a>
Expansion card errors or malfunction	See <a href="#">“Expansion Card Problems”</a>
A program locks up	See <a href="#">“Recovering From a Program That Is Not Responding”</a>
Computer locks up	See <a href="#">“Restarting a Computer That Is Not Responding”</a>
Computer gets wet	See <a href="#">“Repairing a Wet Computer”</a>
Computer is dropped or damaged	See <a href="#">“Repairing a Dropped or Damaged Computer”</a>

## Solving Problems

Hardware devices conflict	See “ <a href="#">Hardware Conflicts</a> ”
Computer memory amount is not correct	See “ <a href="#">Computer Memory Problems</a> ”
System board malfunctions	See “ <a href="#">System Board Problems</a> ”
System board is damaged	See “ <a href="#">Resetting a Damaged System Board</a> ”
An error message	See “ <a href="#">Messages and Codes</a> ”
A series of beeps on computer startup	See “ <a href="#">Messages and Codes</a> ”

## Using the Dell OptiPlex ResourceCD

To use the *Dell OptiPlex ResourceCD* while you are running the Microsoft® Windows® operating system, perform the following steps:


- 1 Insert the *Dell OptiPlex ResourceCD* into the CD drive.  
If you are using the *Dell OptiPlex ResourceCD* for the first time on this computer, the **ResourceCD Installation** window opens to inform you that the *ResourceCD* is about to begin installation.
- 2 Click **OK** to continue.  
To complete the installation, respond to the prompts offered by the installation program.
- 3 Click **Next** at the **Welcome Dell System Owner** screen.
- 4 Select the appropriate **System Model**, **Operating System**, **Device Type**, and **Topic**.

To access the *Dell OptiPlex ResourceCD Guide*, click **User’s Guides** in the **Topic** pull-down menu and click **Dell OptiPlex ResourceCD**.

## Drivers for Your Computer

To display a list of device drivers for your computer using the *Dell OptiPlex ResourceCD*, perform the following steps:

- 1 Click **My Drivers** in the **Topic** pull-down menu.  
The *ResourceCD* scans your computer’s hardware and operating system, and then a list of device drivers for your system configuration is displayed on the screen.

 **NOTE:** To access device drivers and user documentation, you must use the *ResourceCD* while you are running Windows.

- 2 Click the appropriate driver and follow the instructions to download the driver for your computer.

To view a list of all the available drivers for your computer, click **Drivers** from the **Topic** pull-down menu.

## Power Problems

Basic Checks:

- Test the electrical outlet: ensure that the electrical outlet is working by testing it with another device such as a lamp.
- Connect the computer power cable directly to an electrical outlet: bypass power protection devices, power strips, and extension cords to verify that the computer turns on.
- Check for interference: electrical appliances on the same circuit or operating in close proximity to the computer can cause interference.

If the problem still exists after you complete the basic checks, fill out the [Diagnostics Checklist](#) as you perform the following steps:

- 1 Turn off the computer and devices, and disconnect them from their electrical outlets.
- 2 If you are using a surge protector, remove it.
- 3 Make sure the power cable is firmly connected to the computer, and then verify that the power cable is directly connected to the electrical outlet.
- 4 Turn on the computer.

Does the power light on the front of the computer light up?

**Yes.** The problem is resolved.

**No.** The computer may be defective. [Contact Dell](#) for technical assistance.

## Video and Monitor Problems

Basic Checks:

- If the monitor power light does not light, check the power connection.
- If the external monitor is blank, the computer may be in suspend or hibernate mode. To resume normal operation, press the power button.



- Disconnect the monitor cable from the computer and check the cable connector for bent or broken pins. Check for damaged or frayed cables.
- If the cable is not damaged, make sure that it is firmly connected to the computer.
- Test the electrical outlet. Verify that the device is connected to a working electrical outlet. Verify that the device is turned on.
- Check for interference: electrical appliances on the same circuit or operating in close proximity to the computer can cause interference.
- Adjust brightness and contrast settings on the monitor.
- Reinstall the video driver for your operating system.
- Restart the computer.

If the problem still exists after you complete the basic checks, fill out the [Diagnostics Checklist](#) as you perform the following steps:

- 1 Turn off the computer, wait at least 30 seconds, and then turn the computer back on.
- 2 Allow 1 minute for the computer to initialize its components, and then adjust the monitor's brightness and contrast controls.

Is the monitor readable?

**Yes.** The problem is resolved.

**No.** Go to step 3.

- 3 Turn off nearby fans, lights, lamps, or other electrical devices.

Is the monitor readable?

**Yes.** One or more of those devices was causing interference. The problem is resolved.

**No.** Go to step 4.

- 4 Enter [system setup](#) and make sure that **Primary Video Controller** under the **Integrated Devices** option is set correctly. Then exit system setup properly to save the information, and reboot the computer.

For an AGP expansion card, set **Primary Video Controller** to **AGP**. For a PCI expansion card, set **Primary Video Controller** to **Auto**.

Is the device working properly?

**Yes.** The problem is resolved.

No. Go to step 5.

**5** Run the **VESA/VGA Interface** tests in the [Dell Diagnostics](#).

Did any of the tests fail?

**Yes.** The video controller on the system board may be defective.  
[Contact Dell](#) for technical assistance.

**No.** Go to step 6.

**6** Turn off the computer and the monitor, connect another monitor to the computer, and then turn them on.

If you do not have another monitor, [contact Dell](#) for technical assistance.

**7** Allow 1 minute for the computer to initialize its components, and then adjust the monitor's brightness and contrast controls.

Is the monitor readable?

**Yes.** The original monitor is defective. The problem is resolved.

**No.** [Contact Dell](#) for technical assistance.

## Sound and Speaker Problems

Basic Checks:

- If using external speakers:
  - Make sure that the speaker cables are firmly connected to the computer.
  - Test the electrical outlet: verify that the speakers are connected to a working electrical outlet.
  - Ensure that the speakers are turned on.
- If using a sound card, make sure external audio devices are connected to the sound card's connectors and not to the microphone, line-out, or line-in connectors on the computer's front or back panels.
- Adjust the volume.
- Reinstall the audio driver for your operating system.
- Check for interference: electrical appliances on the same circuit or operating in close proximity to the computer can cause interference.

If the problem still exists after you complete the basic checks, fill out the "[Diagnostics Checklist](#)" as you perform the following steps:

- 1** Turn off nearby fans, lights, lamps, or other electrical devices.  
Are the external speakers functioning properly?  
**Yes.** One or more of those electrical devices was causing interference. The problem is resolved.  
**No.** Go to step 2.
- 2** Enter system setup and make sure that **Sound** under the **Integrated Devices** option is set to **On**, then exit system setup properly to save the information, and reboot the computer.  
Is the device working properly?  
**Yes.** The problem is resolved.  
**No.** Go to step 3.
- 3** Run the **Misc. PCI Devices** tests in the [Dell Diagnostics](#).  
Did the tests complete successfully?  
**Yes.** The controller is functioning properly. If the problem persists, [contact Dell](#) for technical assistance.  
**No.** [Contact Dell](#) for technical assistance.

## Printer Problems

Basic Checks:

- Disconnect the cable from the computer and check the cable connector for bent or broken pins. Check for damaged or frayed cables.
- If the cable is not damaged, make sure that it is firmly connected to the computer.
- Test the electrical outlet: verify that the printer is connected to a working electrical outlet.
- Ensure that the printer is turned on.
- Check for interference: electrical appliances on the same circuit or operating in close proximity to the computer can cause interference.
- See the documentation that came with the printer for the correct parallel port mode. Enter [system setup](#) and verify that the appropriate mode is selected in the **Integrated Device** menu.

If the problem still exists after you complete the basic checks, fill out the [Diagnostics Checklist](#) as you perform the following steps:

- 1 Perform the procedure in “[Serial or Parallel Device Problems.](#)”
 

Is the device working properly?

**Yes.** The problem is resolved.

**No.** Go to step 2.
- 2 Run the printer's self-test.
 

Does the self-test complete successfully?

**Yes.** Go to step 3.

**No.** The printer is probably defective. If you bought the printer from Dell, [contact Dell](#) for technical assistance. If you did not, take it to an authorized service center for repair.
- 3 Try to print again.
 

Does the print operation complete successfully?

**Yes.** The problem is resolved.

**No.** [Contact Dell](#) for technical assistance.



**NOTE:** If you are having a problem with a printer, see “[Printer Problems.](#)”

### Serial or Parallel Device Problems

If a computer error message indicates a port problem or if equipment connected to a port seems to perform incorrectly or not at all, the source of the problem can be any of the following:

- A faulty connection between the I/O port and the device
- Incorrect settings for system setup options
- Incorrect settings in the operating system's configuration files
- A faulty cable between the I/O port and the device
- A faulty device
- Faulty I/O port logic on the system board
- Conflicting COM port settings
- Lack of drivers

Basic Checks:

- Disconnect the cable from the computer and check the cable connector for bent or broken pins. Check for damaged or frayed cables.
- If the cable is not damaged, make sure that it is firmly connected to the computer.
- Test the electrical outlet. Verify that the device is connected to a working electrical outlet.
- Verify that the device is turned on.
- Check for interference: electrical appliances on the same circuit or operating in close proximity to the computer can cause interference.

If the problem still exists after you complete the basic checks, fill out the [Diagnostics Checklist](#) as you perform the following steps:

- 1 [Enter system setup](#) and check the **Integrated Devices** option settings. Then exit system setup properly to save the information, and reboot the computer.

For a serial device, check the **Serial Port** options; for a parallel device, check the **Parallel Port** options. See the device's documentation for additional information on port settings and configuration requirements.

Is the device working properly?

**Yes.** The problem is resolved.

**No.** Go to step 2.

- 2 Run the **Serial Ports** device group and/or the **Parallel Ports** device group in the [Dell Diagnostics](#).

These device groups check the basic functions of the system board's I/O port logic. If a printer is connected to the parallel port, the **Parallel Ports** device group tests the communication link between the system board's I/O port logic and the printer.

Do the tests complete successfully?

**Yes.** Go to step 3.

**No.** [Contact Dell](#) for technical assistance.

- 3 If the problem is confined to a particular application program, see the application program's documentation for specific port configuration requirements.

Is the device working properly?

**Yes.** The problem is resolved.

**No.** Go to step 4.

- 4 Turn off the computer and the device, swap the device's cable with a known working cable, and then turn on the computer and the device.

Is the device working properly?

**Yes.** You need a new device cable. [Contact Dell](#) for technical assistance.

**No.** Go to step 5.

- 5 Turn off the computer and the device, swap the device with a comparable working device, and then turn on the computer and the device.

Is the device working properly?

**Yes.** You need a new device. [Contact Dell](#) for technical assistance.

**No.** [Contact Dell](#) for technical assistance.

## Mouse Problems

Basic Checks:

- Disconnect the cable from the computer and check the cable connector for bent or broken pins. Check for damaged or frayed cables.
- If the cable is not damaged, make sure that it is firmly connected to the computer.
- Reinstall the mouse driver for your operating system.
- Restart the computer.

If the problem still exists after you complete the basic checks, fill out the [Diagnostics Checklist](#) as you perform the following steps:

- 1 If you are using a PS/2 mouse, [enter system setup](#) and make sure that **Mouse Port** under the **Integrated Devices** option is set to **On**. Then exit system setup properly to save the information, and reboot the computer.

Is the device working properly?

**Yes.** The problem is resolved.

**No.** Go to step 2.

- 2 If you are using a PS/2 mouse, run the **Mouse** test in the **Pointing Devices** device group in the [Dell Diagnostics](#).

Did the tests complete successfully?

**Yes.** Go to step 3.

**No.** [Contact Dell](#) for technical assistance.

- 3 Turn off the computer, connect another mouse to the computer, and then turn the computer on.

If you do not have another mouse, [contact Dell](#) for technical assistance.

Is the mouse functioning properly?

**Yes.** The original mouse is defective. The problem is resolved.

**No.** Contact Dell for technical assistance.

## Keyboard Problems

Basic Checks:

- Disconnect the cable from the computer and check the cable connector for bent or broken pins. Check for damaged or frayed cables.
- If the cable is not damaged, make sure that it is firmly connected to the computer.
- Check for interference. Keyboard extension cables can cause problems.
- Restart the computer.

If the problem still exists after you complete the basic checks, fill out the Diagnostic Checklist as you perform the following steps:

- 1 Turn off the computer, and then disconnect the keyboard cable and check it for bent or broken pins.

Do you see bent pins?

**Yes.** If they can be straightened, straighten them and go to step 2. If they cannot be straightened or are broken, you must replace the keyboard.

**No.** Go to step 2.

- 2 Reconnect the keyboard to the computer.

Make sure the keyboard cable is firmly connected to the computer.

- 3** Turn on the computer.
- 4** If you are using a keyboard that can be configured with various switch settings, make sure the switch is set to **PS/2**, **Enhanced XT/AT**, or **PC/AT**.

The switch settings are usually on the bottom of the keyboard, sometimes behind a panel. See the documentation that came with the keyboard for more information.
- 5** Turn off the computer, wait 30 seconds, and turn it on again.

During the boot routine, do the Num Lock, Caps Lock, and Scroll Lock lights on the keyboard blink momentarily?

**Yes.** Go to step 6.  
**No.** Go to step 7.
- 6** Use the keyboard to type some characters.

Do the characters appear on the screen?

**Yes.** The problem is resolved.  
**No.** [Contact Dell](#) for technical assistance.
- 7** Run the **PC-AT Compatible Keyboards** tests in the [Dell Diagnostics](#).

Did any of the diagnostics tests fail?

**Yes.** The original keyboard may be defective. Go to step 8.  
**No.** Go to step 8.
- 8** Turn off the computer, connect another keyboard to the computer, and then turn the computer on.

If you do not have another keyboard, [contact Dell](#) for technical assistance.

Is the keyboard functioning properly?

**Yes.** The original keyboard is defective. The problem is resolved.  
**No.** [Contact Dell](#) for technical assistance.

### Floppy Drive Problems

During the power-on self-test (POST), the computer checks the floppy drive, comparing its characteristics with the computer configuration information. The floppy-drive access light blinks as the computer performs this check.



### Basic Checks:

- If you hear an unfamiliar scraping or grinding sound when a drive is accessed, there could be a hardware malfunction. [Contact Dell](#) for technical assistance.
- When you turn on the computer, you can hear drive activity during the boot routine. If your computer does not boot, [contact Dell](#) for technical assistance.
- If you are trying to copy data to the floppy, make sure that it is not write-protected.
- Try a different floppy in the drive. If the new floppy works, the original one may be defective.
- Test the floppy drive access light by using one of the following methods:
  - Using MS-DOS<sup>®</sup>, insert a floppy into the drive, type `dir a:` at the DOS prompt, and press <Enter>.
  - Using Microsoft<sup>®</sup> Windows<sup>®</sup> or Windows NT<sup>®</sup>, insert a floppy into the drive, open **My Computer** from the desktop, and double-click the floppy drive icon.
- Check the settings in system setup.
- Clean the drive using a commercially available cleaning kit.

➔ **NOTICE:** Do not attempt to clean drive heads with a swab. You may accidentally misalign the heads, rendering the drive inoperable.

If the problem still exists after you complete the basic checks, fill out the [Diagnostics Checklist](#) as you perform the following steps.

 **CAUTION: Before you perform this procedure, see “CAUTION: Safety Instructions.”**

- 1 Run the **Diskette** device group in the [Dell Diagnostics](#).  
Did any of the tests fail?  
**Yes.** [Contact Dell](#) for technical assistance.  
**No.** Go to step 2.
- 2 Turn off the computer and devices, disconnect them from their electrical outlets, wait 10 to 20 seconds, and then open the computer cover.

- 3 Remove and reinstall the floppy drive.
- 4 [Close the computer cover](#), reconnect the computer and devices to their electrical outlets, and turn them on.  
Does the floppy-drive access light blink during the boot routine?  
**Yes.** Go to the next question.  
**No.** [Contact Dell](#) for technical assistance.  
Does the computer display a drive error message?  
**Yes.** See “[Computer Messages](#)” for an explanation of the message, and then go to step 5.  
**No.** The problem is resolved.
- 5 Insert a bootable floppy into the floppy drive and reboot the computer.  
Does the drive boot the operating system?  
**Yes.** The problem is probably resolved. If you continue to experience trouble, [contact Dell](#) for technical assistance.  
**No.** [Contact Dell](#) for technical assistance.

## Hard Drive Problems

Basic Checks:

- If you hear an unfamiliar scraping or grinding sound when a drive is accessed, there could be a hardware malfunction. [Contact Dell](#) for technical assistance.
- When you turn on the computer, you can hear drive activity during the boot routine. If your computer does not boot, [contact Dell](#) for technical assistance.
- Test the hard drive by using one of the following methods:
  - For Windows XP, run the **chkdsk** utility by following these steps:  
Click the **Start** button, select **Shutdown**, and then click **Restart the Computer**.  
At the C: prompt, type: `CD\Windows\Command` and press `<Enter>`.  
Type `chkdsk` and press `<Enter>`.  
This utility creates and displays a status report, and lists and corrects errors on the disk.

- For Windows 2000, run the ScanDisk utility by clicking the **Start** button, pointing to **Run**, typing `scandiskw`, and clicking **OK**.
- For Windows NT, run the error-checking utility by double-clicking **My Computer** and selecting the hard drive that you want to check. Click the right mouse button, select **Properties**, then click **Tools**, and select **Check Now** in in the **Error-checking** section.
- For MS-DOS, type `scandisk x:` at an MS-DOS prompt, where *x* is the hard drive letter, and press <Enter>.

If the problem still exists after you complete the basic checks, fill out the Diagnostic Checklist as you perform the following steps:

 **CAUTION: Before you perform this procedure, see “CAUTION: Safety Instructions.”**

- 1 Enter system setup and make sure the problem drive is configured correctly. Make any necessary changes, and reboot the computer.

Is the drive operating properly?

**Yes.** The problem is resolved.

**No.** Proceed to step 2.

- 2 Test the hard drive by using one of the following methods:

- For Windows XP, run the `chkdsk` utility by following these steps:  
Click the **Start** button, select **Shutdown**, and then click **Restart the Computer**.

At the C: prompt, type: `CD\windows\Command` and press <Enter>.

Type `chkdsk` and press <Enter>.

This utility creates and displays a status report, and lists and corrects errors on the disk.

- For Windows 2000, run the ScanDisk utility by clicking the **Start** button, pointing to **Run**, typing `scandiskw`, and clicking **OK**.
- For Windows NT, run the error-checking utility by double-clicking **My Computer** and selecting the hard drive that you want to check. Click the right mouse button, select **Properties**, then click **Tools**, and select **Check Now** in in the **Error-checking** section.
- For MS-DOS, type `scandisk x:` at an MS-DOS prompt, where *x* is the hard drive letter, and press <Enter>.

Is the drive operating properly?

**Yes.** The problem is resolved.

**No.** Proceed to step 3.

**3** Run the appropriate test group in the [Dell Diagnostics](#):

For an IDE hard drive, run the **IDE Devices** device group.

Did any of the diagnostics tests fail?

**Yes.** Go to the next question.

**No.** Proceed to step 4.

Did any of the diagnostics tests indicate a faulty drive?

**Yes.** The hard drive may be faulty. [Contact Dell](#) for technical assistance.

**No.** Go to the next question.

Did any of the diagnostics tests indicate a faulty drive controller?

**Yes.** The system board may be faulty. [Contact Dell](#) for technical assistance.

**No.** Proceed to step 4.

**4** Turn off the computer and devices, disconnect them from their electrical outlets, wait 10 to 20 seconds, and then open the computer cover.

**5** Make sure the DC power cables from the power supply are firmly connected to the connectors on each drive. Also verify that the interface cable for each drive is firmly connected to the drive and to the system board.

**6** Make sure the control panel cable is firmly connected to the system board. The control panel contains the hard drive activity light. To locate the control panel system board connector, see the [system board](#).

**7** Close the computer cover, reconnect the computer and devices to their electrical outlets, and turn them on.

Does the hard drive activity light blink during the boot routine?

**Yes.** Go to the next question.

**No.** The system board may be faulty. [Contact Dell](#) for technical assistance.

Does the computer display a drive error message?

**Yes.** See “[Computer Messages](#)” for an explanation of the message. If you cannot correct the problem by performing the action described in the table, then [contact Dell](#) for technical assistance.

**No.** Go to the next question.

Is this the primary hard drive that contains the operating system?

**Yes.** Go to the next question.

**No.** [Contact Dell](#) for technical assistance.

Does the drive boot the operating system?

**Yes.** Go to the next question.

**No.** Files in the operating system may be corrupt. See your operating system documentation.


Is the drive operating properly?

**Yes.** The problem is resolved.

**No.** [Contact Dell](#) for technical assistance.

## Battery Problems

If an error message indicates a problem with the battery or if configuration information is lost from system setup when the computer is turned off, the battery may be defective.

 **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 perform this procedure, see “[CAUTION: Safety Instructions.](#)”

- 1 Turn off the computer and devices, disconnect them from their electrical outlets, wait 10 to 20 seconds, and then open the computer cover.
- 2 Reseat the battery in its socket with the side labeled “+” facing up.
- 3 Close the computer cover, reconnect the computer and devices to their electrical outlets, and turn them on.
- 4 Enter system setup and reenter the current time and date, then exit system setup properly to save the information.

- 5 Turn off your computer and disconnect it from its electrical outlet. Leave the computer off for at least 10 minutes.
- 6 Reconnect the computer to its electrical outlet and turn it on.
- 7 Enter system setup, and check the date and time.  
Are the date and time correct?  
**Yes.** The problem is resolved.  
**No.** The battery may be defective. Proceed to step 8.
- 8 Replace the battery.  
Is the battery working properly?  
**Yes.** The problem is resolved.  
**No.** You may have a faulty system board. [Contact Dell](#) for technical assistance.

### Expansion Card Problems

If an error message indicates an expansion card problem or if an expansion card seems to perform incorrectly or not at all, the problem could be a faulty connection, a conflict with software or other hardware, or a faulty expansion card.

Fill out the [Diagnostics Checklist](#) as you perform the following steps.

 **CAUTION:** Before you perform this procedure, see “**CAUTION: Safety Instructions.**”

- 1 Turn off the computer and devices, disconnect them from their electrical outlets, wait 10 to 20 seconds, and then open the computer cover.
- 2 Make sure each expansion card is firmly seated in its connector. If any expansion cards are loose, reseal them.
- 3 Make sure all cables are firmly connected to their corresponding connectors on the expansion cards. If any cables appear loose, reconnect them.

For instructions on which cables should be attached to specific connectors on an expansion card, see the expansion card's documentation.

- 4 Close the computer cover, reconnect the computer and devices to their electrical outlets, and turn them on.


Is the computer working properly?

**Yes.** The problem is resolved.

**No.** You may have a faulty expansion card. Proceed to step 5.

- 5 Turn off the computer and devices, disconnect them from their electrical outlets, wait 10 to 20 seconds, and then open the computer cover.

- 6 Remove all expansion cards except the video card.

 **NOTE:** If your primary hard drive is connected to a drive controller card and not one of the system board IDE connectors, leave the drive controller card installed in the computer.

- 7 Close the computer cover, reconnect the computer and devices to their electrical outlets, and turn them on.

- 8 Run the **RAM** test group in the Dell Diagnostics.

Did any of the diagnostics tests fail?

**Yes.** [Contact Dell](#) for technical assistance.

**No.** Proceed to step 9.

- 9 Turn off the computer and devices, disconnect them from their electrical outlets, wait 10 to 20 seconds, and then open the computer cover.

- 10 Reinstall one of the expansion cards that you removed previously, and repeat steps 7 and 8.

Did any of the diagnostics tests fail?

**Yes.** The expansion card you just reinstalled is faulty and needs to be replaced.

**No.** Repeat steps 7 and 8 with another expansion card. Proceed to step 11.

- 11 If you have replaced all the expansion cards and the problem is not resolved, [contact Dell](#) for technical assistance.

### Recovering From a Program That Is Not Responding

- 1 Press <Ctrl><Alt><Delete>, click **Task Manager**, and select **Applications**.

Did the **Task Manager** window or **Close Program** window appear?

**Yes.** Go to [step 2](#).

**No.** Skip to [step 4](#).

**2** Click the program that no longer responds.

**3** Click **End Task**.

Is the computer operating properly?

**Yes.** The problem is resolved.

**No.** Go to [step 4](#).

**4** Click the **Start** button and select **Shut Down**.

### Restarting a Computer That Is Not Responding

- 1** Press and hold the power button until the computer turns off.
- 2** Press the power button to turn on the computer.

### Repairing a Wet Computer

Spills, splashes, and excessive humidity can cause damage to the computer. If an external device, such as a printer or modem, gets wet, contact the manufacturer of the device for instructions.


 **CAUTION:** Before you perform this procedure, see “**CAUTION: Safety Instructions.**”

Fill out the [Diagnostics Checklist](#) as you perform the following steps:

- 1** Turn off the computer and devices, disconnect them from their electrical outlets, wait 10 to 20 seconds, and then open the computer cover.
- 2** Let the computer dry for at least 24 hours. Make sure that it is thoroughly dry before you proceed.
- 3** Remove all expansion cards installed in the computer except a video expansion card.



- 4 Close the computer cover, reconnect the computer and devices to their electrical outlets, and turn them on.  
Does the computer have power?  
**Yes.** Proceed to step 6.  
**No.** [Contact Dell](#) for technical assistance.
- 5 Turn off the computer and devices, disconnect them from their electrical outlets, wait 10 to 20 seconds, and then open the computer cover.
- 6 Reinstall all expansion cards.
- 7 Close the computer cover, reconnect the computer and devices to their electrical outlets, and turn them on.
- 8 Run the **System Board Devices** test group in the Dell Diagnostics.  
Did any of the diagnostics tests fail?  
**Yes.** Contact Dell for technical assistance.  
**No.** The problem is resolved.

 **NOTE:** If your primary hard drive is connected to a drive controller card and not one of the system board IDE connectors, leave the drive controller card installed in the computer.

### Repairing a Dropped or Damaged Computer

 **CAUTION:** Before you perform this procedure, see “**CAUTION: Safety Instructions.**”

Fill out the Diagnostic Checklist as you perform the following steps:

- 1 Turn off the computer and devices, disconnect them from their electrical outlets, wait 10 to 20 seconds, and then open the computer cover.
- 2 Check all the expansion-card connections in the computer, and reseal any loose expansion cards.
- 3 Make sure that all cables are properly connected and that all components are properly seated in their connectors and sockets.
- 4 Close the computer cover, reconnect the computer and devices to their electrical outlets, and turn them on.
- 5 Run the **System Board Devices** test group in the Dell Diagnostics.  
Did any of the diagnostics tests fail?  
**Yes.** [Contact Dell](#) for technical assistance.

No. The problem is resolved.

### Hardware Conflicts

Hardware conflicts occur when the operating system detects multiple devices that are attempting to operate on the same computer resources when those resources cannot be shared between the devices.

Symptoms:

- Computer hangs or locks up, particularly while using a specific device.
- Memory parity errors occur on parity-enabled computers.
- Noise or other problems from sound cards.
- Unintelligible characters printed on the printer.
- Mouse pointer hangs and does not move or moves in a stuttering fashion.
- Messages stating that the computer is not operating at maximum performance.
- Errors and crashes of applications for no apparent reason.
- Nothing displays on the video monitor.

To resolve hardware conflicts, remove any newly added hardware and contact the hardware manufacturer. Also see your operating system documentation.

### Computer Memory Problems

During POST, the computer checks the computer's memory, determines the amount of installed memory, and then writes to and reads from the number of available bytes to ensure proper operation.

Basic Checks:

- If an insufficient memory message appears, save and close any open files and exit any open application programs not in use.
- Consider installing additional computer memory.
- Run the **System Memory** test in the Dell Diagnostics.
- Reseat the memory modules.

- Restart the computer.

If the problem still exists after you complete the basic checks, fill out the Diagnostic Checklist as you perform the following steps.

 **CAUTION: Before you perform this procedure, see “CAUTION: Safety Instructions.”**

- 1 Reboot the computer.

Does the RAM count displayed correctly match the actual amount of memory installed in the computer?

**Yes.** The computer needed to update the memory count. The problem is resolved.

**No.** Go to step 2.

- 2 Run the **System Memory** test group in the [Dell Diagnostics](#).

Did any of the diagnostics tests fail?

**Yes.** [Contact Dell](#) for technical assistance.

**No.** Go to step 3.

- 3 Turn off the computer and devices, disconnect them from their electrical outlets, wait 10 to 20 seconds, and then open the computer cover.

- 4 Rotate the power supply away from the system board.

- 5 Replace the memory module(s).

- 6 Close the computer cover, reconnect the computer and devices to their electrical outlets, and turn them on.

Does the RAM count displayed correctly match the actual amount of memory installed in the computer?

**Yes.** The memory module(s) were defective. The problem is resolved.

**No.** [Contact Dell](#) for technical assistance.

## System Board Problems

A system board problem can result from a defective system board component, a faulty power supply, or a defective component connected to the system board. If an error message indicates a system board problem, fill out the Diagnostic Checklist as you perform the following steps.



**CAUTION:** Before you perform this procedure, see “**CAUTION: Safety Instructions.**”

- 1 Reboot the computer and run the **System Board Devices** test group in the [Dell Diagnostics](#).

Did any of the tests fail?

**Yes.** [Contact Dell](#) for technical assistance.

**No.** Go to step 2.

- 2 Turn off the computer and devices, disconnect them from their electrical outlets, wait 10 to 20 seconds, and then open the computer cover.

- 3 Make sure the power cables from the power supply are firmly connected to the connectors on the system board.

- 4 Close the computer cover, reconnect the computer and devices to their electrical outlets, and turn them on.

Is the computer working properly?

**Yes.** The problem is resolved.

**No.** Go to step 5.

- 5 Perform the procedure in “[Expansion Card Problems.](#)”

Is the computer working properly?

**Yes.** The problem is resolved.

**No.** Go to step 6.

- 6 Perform the procedure in “[Keyboard Problems.](#)”

Is the computer working properly?

**Yes.** The problem is resolved.

**No.** Go to step 7.

- 7 Perform the procedure in “[Resetting a Damaged System Board.](#)”

Is the computer working properly?

**Yes.** The problem is resolved.

**No.** [Contact Dell](#) for technical assistance.

## Resetting a Damaged System Board

If the computer cannot boot and you have exhausted all other troubleshooting options, perform the following steps.

 **CAUTION:** Before you perform this procedure, see “**CAUTION: Safety Instructions.**”

- 1 Turn off the computer and devices, disconnect them from their electrical outlets, wait 10 to 20 seconds, and then open the computer.
- 2 Remove the battery, wait 5 minutes, and then reinstall the battery.
- 3 Close the computer cover, reconnect the computer and devices to their electrical outlets, and turn them on.

Is the computer working properly?


Yes. The problem is resolved.

No. [Contact Dell](#) for technical assistance.

## Dell Diagnostics

### When to Use the Dell Diagnostics

If you experience a problem with your computer, run the Dell Diagnostics before you call Dell for technical assistance. The Dell Diagnostics tests check your computer's hardware without additional equipment and without the risk of destroying data. When the diagnostics tests complete without indicating any problems, you can have confidence in your computer's operation. If the tests indicate a problem you cannot solve by yourself, the test results provide important information you need when talking to Dell's service and support personnel.

 **NOTICE:** Only use the Dell Diagnostics to test your Dell computer. Using this program with other computers may cause incorrect computer responses or result in error messages.

### Features

The diagnostic test groups features allow you to take the following actions:

- Perform quick checks or extensive tests on one or all devices
- Choose the number of times a test group or subtest is repeated

- Display or print test results or save them in a file
- Suspend testing if an error is detected or terminate testing when an adjustable error limit is reached
- Access online Help screens that describe the tests and tell how to run them
- Read status messages that inform you whether test groups or subtests completed successfully
- Receive error messages that appear if problems are detected

### Before You Start Testing

- Read “**CAUTION: Safety Instructions.**”
- Turn on your printer if one is attached, and make sure it is online.
- Enter system setup, confirm your computer's configuration information, and enable all of its components and devices, such as ports.



**NOTE:** Dell recommends that you print these procedures before you begin.

### Running the Dell Diagnostics

- 1 Shut down and restart the computer.
- 2 Enter system setup.
- 3 Change the **Boot Sequence** to use the CD drive as the first device in the boot sequence.



**NOTE:** Write down your current boot sequence in case you want to restore it after running the Dell Diagnostics.

- 4 Insert the *Dell OptiPlex ResourceCD* into the CD drive.
- 5 Press <Alt><b> to exit system setup and save your changes.

The computer reboots and the Dell logo screen appears followed by a list of the available languages.



**NOTE:** If you are using the *ResourceCD* for the first time on this computer, the **ResourceCD Installation** window opens to inform you that the *ResourceCD* is about to begin installation. Click **OK** to continue. To complete the installation, respond to the prompts offered by the installation program. If the **Welcome Dell System Owner** screen opens, click **Next** to continue.

- 6 Select **Start computer to run Dell Diagnostics.**

- 7 Select the number for the language that you want.

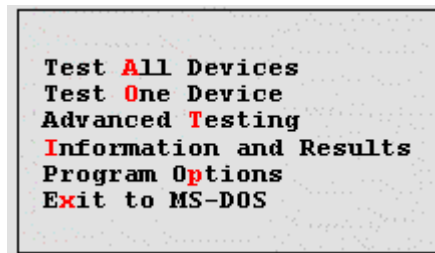
A numbered list displays the following options:

- **Option 1– Dell Diagnostics** — Loads the Dell Diagnostics that run computer tests
- **Option 2– Exit** — Exits the main menu and returns to an MS-DOS prompt

- 8 Select **Option 1– Dell Diagnostics**.

After the diagnostics initialize, the Dell Diagnostics main menu appears:

#### Dell Diagnostics Main Menu



- **Test All Devices:** Performs quick or extensive tests on all devices.
  - **Test One Device:** Performs quick or extensive tests on a single device after you select it from a list of device groups. After you select **Test One Device**, press <F1> for more information about a test.
  - **Advanced Testing:** Allows you to modify the parameters of a test, select a group of tests to perform, and access additional information about Advanced Testing.
  - **Information and Results:** Provides test results, test errors, version numbers of subtests, and additional information on the Dell Diagnostics.
  - **Program Options:** Allows you to change the settings of the Dell Diagnostics.
  - **Exit to MS-DOS:** Exits to the MS-DOS prompt.
- 9 Select the type of tests to perform:

- To perform a quick check of your computer or a specific device, select **Quick Tests** from the **Test All Devices** or **Test One Device** option.

**Quick Tests** runs only the tests that run fast and do not require user interaction. Dell recommends that you choose **Quick Tests** first to increase the odds of tracing the source of the problem quickly.

- For a thorough check of your computer or to check a particular area of your computer, select **Extended Tests** from the **Test All Devices** or **Test One Device** option.
- To customize your test(s), select the **Advanced Testing** option.

- 10** Remove the *ResourceCD* from the CD drive when you have finished running the [Dell Diagnostics](#).
- 11** Enter system setup and change the **Boot Sequence** to your original configuration.

### **Advanced Testing**

When you select **Advanced Testing** from the Diagnostics Menu, the following screen appears:




## Advanced Testing Screen




Information in the Advanced Testing screen is presented as follows:

- **Device Groups** — lists the diagnostic test groups in the order they run if you select **All** from the **Run tests** menu option.

To select a test device group, press the up- or down-arrow key to highlight the group.

 **NOTE:** The diagnostics may not list in the Device Groups area the names of all components or devices that are part of your computer. For example, it may not list a printer even though it is connected to your computer. However, the parallel port to which the printer is connected appears in the Device Groups list. You can test your printer connection in the Parallel Ports tests.

- **Devices for Highlighted Group** — lists the computer's current hardware.

 **NOTE:** The groups and devices listed in your screen can vary somewhat based on the components installed in your computer.



**NOTE:** The options displayed on your screen should reflect the hardware configuration of your computer.

- **Device groups menu bar** — contains the options **Run tests**, **Devices**, **Select**, **Config**, and **Help**.

To select a menu option, press the left- or right-arrow key to highlight the option and press <Enter>, or press the key that corresponds to the highlighted letter in the category title.

## Advanced Testing Help Menu

The **Help** options and a description of their functions are presented in the following table.

### Advanced Testing Help Categories

Help Option	Description
Menu	Describes the <b>Advanced Testing</b> screen, the <b>Device Groups</b> , and the diagnostic menus and commands and gives instructions on how to use them
Keys	Explains the functions of all keystrokes that can be used in the Dell Diagnostics
Device Group	Describes the highlighted group in the <b>Device Groups</b> list on the main menu and provides reasons for using certain tests
Device	Describes the highlighted device in the <b>Device Groups</b> list on the <b>Advanced Testing</b> screen
Test	Describes the test procedure for each highlighted test group subtest
Versions	Lists the version numbers of the subtests

## Messages and Codes


Your application programs, operating system, and the computer itself are capable of identifying problems and alerting you to them. When a problem occurs, a message may appear on your monitor screen or a beep code may sound. See “[Computer Messages](#)” or “[Computer Beep Codes](#)” for information about each message or beep code.

## Computer Messages

If you receive a computer message, see the table below for suggestions on resolving any problems indicated by the message. The computer messages are listed alphabetically.

### Computer Messages

Message	Cause	Action
Address mark not found	The basic input/output system (BIOS) found a faulty disk sector or could not find a particular disk sector.	See “ <a href="#">Floppy Drive Problems</a> ,” or “ <a href="#">Hard Drive Problems</a> .”
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 has failed to complete the boot routine three consecutive times for the same error.	See “ <a href="#">Getting Help</a> ” for instructions on obtaining technical assistance, and report the checkpoint code (nnnn) to the support technician.
Attachment failed to respond	The floppy drive or hard drive controller cannot send data to the associated drive.	See “ <a href="#">Floppy Drive Problems</a> ” or “ <a href="#">Hard Drive Problems</a> .”
Bad command or file name	The command or file name you entered does not exist or is not in the pathname you specified.	Make sure you have spelled the command correctly, placed spaces in the proper location, and used the correct pathname.
Bad error-correction code (ECC) on disk read	The floppy drive or hard drive controller detected an uncorrectable read error.	See “ <a href="#">Floppy Drive Problems</a> ” or “ <a href="#">Hard Drive Problems</a> .”

 **NOTE:** If the computer message you received is not listed in the table, check the documentation for the application program that you were running at the time the message appeared and/or the operating system documentation for an explanation of the message and a recommended action.

## Computer Messages

Message	Cause	Action
Controller has failed	The hard drive or the associated controller is defective.	See <a href="#">“Floppy Drive Problems”</a> or <a href="#">“Hard Drive Problems.”</a>
Data error	The floppy or hard drive cannot read the data.	Run the chkdsk utility in the Microsoft Windows operating system to check the file structure of the floppy or hard drive. See your operating system documentation for more information.  If you are using another operating system, run the appropriate utility to check the file structure of the floppy or hard drive. See your operating system documentation.
Decreasing available memory	One or more dual in-line memory modules (DIMMs) may be faulty or improperly seated.	See <a href="#">“Computer Memory Problems.”</a>
Diskette drive 0 seek failure	A cable may be loose, or the computer configuration information may not match the hardware configuration.	See <a href="#">“Floppy Drive Problems”</a> or <a href="#">“Hard Drive Problems.”</a>
Diskette read failure	A cable may be loose, or the floppy may be faulty.	See <a href="#">“Floppy Drive Problems”</a> or <a href="#">“Hard Drive Problems.”</a>
Diskette subsystem reset failed	The floppy drive controller may be faulty.	Run the <b>Diskette</b> tests in the <a href="#">Dell Diagnostics</a> .
Drive not ready	No floppy is in the drive. The operation requires a floppy in the drive before it can continue.	Put a floppy in the drive or close the drive latch.

## Computer Messages

Message	Cause	Action
Diskette write protected	The floppy write-protect feature is activated.	Remove the floppy from drive A, and move the write-protect tab to the unlocked position.
Gate A20 failure	One or more DIMMs may be loose.	See “ <a href="#">Computer Memory Problems</a> .”
General failure	The operating system is unable to carry out the command.	This message is usually followed by specific information—for example, <code>PRINTER OUT OF PAPER</code> . Respond by taking the appropriate action.
Hard disk configuration error	The hard drive failed initialization.	See “ <a href="#">Floppy Drive Problems</a> ” or “ <a href="#">Hard Drive Problems</a> .”
Hard disk controller failure	The hard drive failed initialization.	See “ <a href="#">Floppy Drive Problems</a> ” or “ <a href="#">Hard Drive Problems</a> .”
Hard disk failure		
Hard-disk drive read failure		
Invalid configuration information - please run SETUP program	The computer configuration information does not match the hardware configuration.	<a href="#">Enter system setup</a> and correct the computer configuration information.
Keyboard failure	A cable or connector may be loose, or the keyboard or keyboard/mouse controller may be faulty.	See “ <a href="#">Keyboard Problems</a> .”
Memory address line failure at address, read value expecting value	One or more DIMMs may be faulty or improperly seated.	See “ <a href="#">Computer Memory Problems</a> .”

## Computer Messages

Message	Cause	Action
Memory allocation error	The software you are attempting to run is conflicting with the operating system or another application program or utility.	Turn off the computer, wait 30 seconds, and then turn it on. Try to run the program again. If the problem persists, contact the software company.
Memory data line failure at <i>address</i> , read <i>value</i> expecting <i>value</i>	One or more DIMMs may be faulty or improperly seated.	See “ <a href="#">Computer Memory Problems</a> .”
Memory double word logic failure at <i>address</i> , read <i>value</i> expecting <i>value</i>		
Memory odd/even logic failure at <i>address</i> , read <i>value</i> expecting <i>value</i>		
Memory write/read failure at <i>address</i> , read <i>value</i> expecting <i>value</i>		
Memory size in CMOS invalid	The amount of memory recorded in the computer configuration information does not match the memory installed in the computer.	Reboot the computer. If the error appears again, see “ <a href="#">Getting Help</a> ” for instructions on obtaining technical assistance.
Memory tests terminated by keystroke	The memory test was not completed.	Rerun the memory test.

## Computer Messages

Message	Cause	Action
No boot device available	The computer cannot find the floppy or hard drive.	<a href="#">Enter system setup</a> , check the computer configuration information for the floppy and hard drive, and, if necessary, correct the information.
No boot sector on hard-disk drive	The computer configuration information in system setup may be incorrect, or the operating system may be corrupted.	<a href="#">Enter system setup</a> , check the computer configuration information for the hard drive, and if necessary, correct the information. If the problem persists, reinstall your operating system. See the documentation that came with your operating system.
No timer tick interrupt	A chip on the system board might be malfunctioning.	Run the <b>System Board Devices</b> tests in the <a href="#">Dell Diagnostics</a>
Non-system disk or disk error	The floppy in drive A or your hard drive does not have a bootable operating system installed on it.	A nonbootable floppy is in drive A. Either replace the floppy with one that has a bootable operating system, or remove the floppy from drive A and restart the computer.
Not a boot diskette	There is no operating system on the floppy.	Boot the computer with a floppy that contains an operating system.

## Computer Messages

Message	Cause	Action
Plug and Play Configuration Error	The computer has encountered a problem in trying to configure one or more expansion cards.	Turn your computer off and unplug it. Remove all but one of the cards. Plug in your computer and reboot it. If the problem persists, the expansion card may be malfunctioning. If the message does not reappear, turn off the power and reinsert one of the other cards. Repeat this process until you identify the malfunctioning card.
Read fault Requested sector not found	The operating system cannot read from the floppy or hard drive.  The computer could not find a particular sector on the disk, or the requested sector is defective.	See <a href="#">“Floppy Drive Problems”</a> or <a href="#">“Hard Drive Problems.”</a>
Reset failed	The disk reset operation failed.	See <a href="#">“Floppy Drive Problems”</a> or <a href="#">“Hard Drive Problems.”</a>
Sector not found	The operating system is unable to locate a sector on the floppy or hard drive.	See <a href="#">“Floppy Drive Problems”</a> or <a href="#">“Hard Drive Problems.”</a>
Seek error	The operating system is unable to find a specific track on the floppy or hard drive.	If the error is on the floppy drive, try another floppy in the drive.
Shutdown failure	A chip on the system board might be malfunctioning.	Run the <b>System Board Devices</b> tests in the <a href="#">Dell Diagnostics</a> .
Time-of-day clock stopped	The battery may be dead.	<a href="#">Enter system setup</a> and correct the date or time.  If the problem persists, see <a href="#">“Battery Problems.”</a>



## Computer Messages

Message	Cause	Action
Time-of-day not set	The time or date displayed in the computer configuration information does not match the computer clock.	<a href="#">Enter system setup</a> and correct the date or time.
Timer chip counter 2 failed	A chip on the system board might be malfunctioning.	Run the <b>System Board Devices</b> tests in the <a href="#">Dell Diagnostics</a> .
Unexpected interrupt in protected mode	The keyboard controller may be malfunctioning, or one or more DIMMs may be loose.	Run the <b>System Memory</b> and the <b>Keyboard</b> tests in the <a href="#">Dell Diagnostics</a> .
WARNING: Dell's Disk Monitoring System has detected that drive [0/1] on the [primary/secondary] EIDE controller is operating outside of normal specifications. It is advisable to immediately back up your data and replace your hard drive by calling your support desk or Dell	Power-on self-test (POST) has queried the enhanced integrated drive electronics (EIDE) drive for status information. The drive has returned a parameter from the call that indicates it has detected possible error conditions for its operating specifications.	Once your computer finishes booting, immediately back up your data and replace your hard drive. Restore the data to the replaced drive.  If a replacement drive is not immediately available and the drive is not the only bootable drive, <a href="#">enter system setup</a> and change the appropriate drive setting to <b>None</b> . Remove the drive from the computer. This should be done only after you have backed up the data.
Write fault Write fault on selected drive	The operating system cannot write to the floppy or hard drive.	See " <a href="#">Floppy Drive Problems</a> " or " <a href="#">Hard Drive Problems</a> ."

## Computer Beep Codes

When errors occur during a boot routine that cannot be reported on the monitor, your computer may emit a series of beeps that identify the problem. The beep code is a pattern of sounds: for example, one beep, followed by a second beep, and then a burst of three beeps (code 1-1-3) means that the computer was unable to read the data in nonvolatile random-access memory (NVRAM). This information is invaluable to the Dell support staff if you need to call for technical assistance.

When a beep code is emitted, write it down on a copy of the [Diagnostics Checklist](#) found in “[Getting Help](#),” and then look it up in “[Computer Beep Codes](#).” If you are unable to resolve the problem by looking up the meaning of the beep code, use the [Dell Diagnostics](#) to identify a more serious cause. If you are still unable to resolve the problem, see “[Getting Help](#)” for instructions on obtaining technical assistance.

### Computer Beep Codes

Code	Cause	Action
1-1-2	Microprocessor register failure	See <a href="#">Getting Help</a> ” for instructions on obtaining technical assistance.
1-1-3	NVRAM	Run the <b>System Board Devices</b> tests in the <a href="#">Dell Diagnostics</a> , if possible.
1-1-4	ROM BIOS checksum failure	Run the <b>System Board Devices</b> tests in the <a href="#">Dell Diagnostics</a> , if possible.
1-2-1	Programmable interval timer	Run the <b>System Board Devices</b> tests in the <a href="#">Dell Diagnostics</a> , if possible.
1-2-2	Direct memory access (DMA) initialization failure	Run the <b>System Board Devices</b> tests in the <a href="#">Dell Diagnostics</a> , if possible.
1-2-3	DMA page register read/write failure	Run the <b>System Board Devices</b> tests in the <a href="#">Dell Diagnostics</a> , if possible.
1-3	Video Memory Test failure	Run the <b>VESA/VGA Interface</b> tests in the <a href="#">Dell Diagnostics</a> .

## Computer Beep Codes

Code	Cause	Action
1-3-1 through 2-4-4	DIMMs not being properly identified or used	See “ <a href="#">Computer Memory Problems.</a> ”
3-1-1	Slave DMA register failure	Run the <b>System Board Devices</b> tests in the <a href="#">Dell Diagnostics</a> , if possible.
3-1-2	Master DMA register failure	Run the <b>System Board Devices</b> tests in the <a href="#">Dell Diagnostics</a> , if possible.
3-1-3	Master interrupt mask register failure	See “ <a href="#">Getting Help</a> ” for instructions on obtaining technical assistance.
3-1-4	Slave interrupt mask register failure	See “ <a href="#">Getting Help</a> ” for instructions on obtaining technical assistance.
3-2-2	Interrupt vector loading failure	See “ <a href="#">Getting Help</a> ” for instructions on obtaining technical assistance.
3-2-4	Keyboard Controller Test failure	Run the <b>Keyboard</b> tests in the <a href="#">Dell Diagnostics</a> . Otherwise, see “ <a href="#">Getting Help</a> ” for instructions on obtaining technical assistance.
3-3-1	NVRAM power loss	Run the <b>System Board Devices</b> tests in the <a href="#">Dell Diagnostics</a> , if possible.
3-3-2	NVRAM configuration	Run the <b>System Board Devices</b> tests in the <a href="#">Dell Diagnostics</a> , if possible.
3-3-4	Video Memory Test failure	Run the <b>VESA/VGA Interface</b> tests in the <a href="#">Dell Diagnostics</a> .
3-4-1	Screen initialization failure	Run the <b>VESA/VGA Interface</b> tests in the <a href="#">Dell Diagnostics</a> .
3-4-2	Screen retrace failure	Run the <b>VESA/VGA Interface</b> tests in the <a href="#">Dell Diagnostics</a> .
3-4-3	Search for video ROM failure	Run the <b>VESA/VGA Interface</b> tests in the <a href="#">Dell Diagnostics</a> .
4-2-1	No time tick	See “ <a href="#">Getting Help</a> ” for instructions on obtaining technical assistance.

### Computer Beep Codes

Code	Cause	Action
4-2-2	Shutdown failure	See “ <a href="#">Getting Help</a> ” for instructions on obtaining technical assistance.
4-2-3	Gate A20 failure	See “ <a href="#">Getting Help</a> ” for instructions on obtaining technical assistance.
4-2-4	Unexpected interrupt in protected mode	See “ <a href="#">Getting Help</a> ” for instructions on obtaining technical assistance.
4-3-1	Memory failure above address 0FFFFh	Run the <b>System Memory</b> tests in the <a href="#">Dell Diagnostics</a> .
4-3-3	Timer-chip counter 2 failure	See “ <a href="#">Getting Help</a> ” for instructions on obtaining technical assistance.
4-3-4	Time-of-day clock stopped	See “ <a href="#">Getting Help</a> ” for instructions on obtaining technical assistance.
4-4-1	Serial or parallel port test failure	Run the <b>Serial Ports</b> and the <b>Parallel Ports</b> tests in the <a href="#">Dell Diagnostics</a> .
4-4-2	Failure to decompress code to shadowed memory	Run the <b>System Board Devices</b> tests in the <a href="#">Dell Diagnostics</a> , if possible.
4-4-3	Math-coprocessor test failure	Run the <b>System Board Devices</b> tests in the <a href="#">Dell Diagnostics</a> , if possible.
4-4-4	Cache test failure	Run the <b>System Board Devices</b> tests in the <a href="#">Dell Diagnostics</a> if possible.

### Warning Messages

A warning message alerts you to a possible problem and asks you to do something before execution continues. For example, before you format a floppy, a message may warn you that you may lose all data on the floppy as a way to protect against inadvertently erasing or writing over the data. These warning messages usually interrupt the procedure and require you to respond by typing y (yes) or n (no).

## Diagnostics Messages

When you run a test group or subtest in the [Dell Diagnostics](#), an error message may result. These particular error messages are not covered in this section. Record the message on a copy of the [Diagnostics Checklist](#) found in “[Getting Help](#).” Also see “[Getting Help](#)” for instructions on obtaining technical assistance.

## Diagnostic Lights


Should your computer fail to operate, lights on the [front panel](#) and [back panel](#) of the computer provide diagnostic codes that can help you troubleshoot a computer problem. The following sections describe the meaning of the diagnostic codes.

 **CAUTION:** Before servicing any components inside your computer, see “[CAUTION: Safety Instructions](#).”

## Front Panel Lights

### Power Switch Diagnostic Light Codes

Power Light Code	Cause	Action
Blinking yellow	The computer power supply may have failed.	Ensure that the voltage switch setting is correct. If the computer still has no power, see “ <a href="#">Getting Help</a> ” for instructions on obtaining technical assistance.
Solid yellow	A device on the system board may be faulty or is incorrectly installed.	Be sure that each microprocessor is properly seated, remove all expansion cards, and then reboot. If the computer does not boot, see “ <a href="#">Getting Help</a> ” for instructions on obtaining technical assistance.
Solid green and a beep code during POST	A problem was detected while the BIOS was executing.	See the previous table for instructions on diagnosing the beep code.

 **NOTE:** Warning messages are generated by either your application programs or your operating system. See “[Software Problems](#)” and the documentation that accompanied your operating system and application programs.

Solid green power light <i>with no beep code and no video</i> during POST	The monitor or the graphics card may be faulty.	See " <a href="#">Video and Monitor Problems</a> " If the monitor is operating properly and is correctly connected, see " <a href="#">Getting Help</a> " for instructions on obtaining technical assistance.
Solid green power light <i>and no beep code but the computer locks up during POST</i>	An integrated system board device may be faulty.	See " <a href="#">Getting Help</a> " for instructions on obtaining technical assistance.

## Back Panel Lights






When you turn on your computer, it performs a power-on self-test (POST), which is a series of self-diagnostic checks. A successful POST ends with a single beep that signifies the start of normal operation. If the computer fails to emit the single beep or appears to stop responding during POST, a series of lights located at the rear of the computer can help you understand which POST test failed or why the computer stopped responding. These lights indicate problems encountered during POST only, not during normal operation.

 **CAUTION:** Before servicing any components inside your computer, see "[CAUTION: Safety Instructions](#)."






The light patterns described in the following table can help you determine what to do to resolve the problem. If a problem resolution requires you to open the computer chassis, see "[Finding Solutions](#)" for procedures you need to complete prior to performing the suggested resolution. If the problem persists after you perform the suggested problem resolution(s), [contact Dell](#) for further help.

The following table lists the codes for the back panel diagnostic lights, gives their probable causes, and offers suggested corrective actions. The light patterns are shown as they appear on the back of the desktop chassis (vertical position).

## Back Panel Light Codes

Light pattern	Problem Description	Suggested Resolution
	<p>off</p> <p>off</p> <p>off</p> <p>off</p>	<p>Normal off condition or possible pre-BIOS failure</p> <p>Verify that the computer is plugged into a working outlet and that you have pressed the power button.</p>
	<p>green</p> <p>yellow</p> <p>yellow</p> <p>yellow</p>	<p>Possible BIOS failure</p> <p><a href="#">Contact Dell</a> for technical assistance.</p>
	<p>yellow</p> <p>green</p> <p>yellow</p> <p>yellow</p>	<p>Possible processor failure</p> <p>Reseat the processor(s) and the terminator card (if present), and restart the computer to retest.</p>
	<p>green</p> <p>green</p> <p>yellow</p> <p>yellow</p>	<p>Possible memory failure</p> <p>Reseat all DIMMs and restart the computer to retest.</p>
	<p>yellow</p> <p>yellow</p> <p>green</p> <p>yellow</p>	<p>Possible expansion card failure</p> <p>Remove each expansion card individually, and restart the computer to retest.</p> <p>Reinstall the expansion card(s) one at a time, and restart the computer to retest.</p> <p>Move each expansion card one at a time to another PCI slot, and restart the computer to retest.</p>

### Back Panel Light Codes

	green yellow green yellow	Possible video card failure or bad on-board video	If you have a video card, reseal it and restart the computer to retest. If you have video integrated, you must replace the system board.
	yellow green green yellow	Possible floppy or hard drive failure	Reseat all power and data cables, and restart the computer to retest.
	green green green yellow	Possible USB failure	Reseat all USB devices and cables, and restart the computer to retest.
	yellow green green green	Other failure	<a href="#">Contact Dell</a> for technical assistance.
	green green green green	Normal operating condition after POST	None.

## Software Problems

This section provides general guidelines for analyzing software problems. For detailed troubleshooting information on a particular program, see the documentation that accompanied the software or consult the support service for the software.

If your computer is behaving erratically, back up your files immediately. If your computer has a tape drive installed, see the documentation that came with the tape backup software for instructions on performing a backup operation. Otherwise, see your operating system documentation for information on backing up data files.



### Basic Checks:

- Ensure that the application program is compatible with the operating system installed in your computer and that your computer meets the minimum hardware requirements needed to run the software.
- Ensure that you properly installed and configured the application program. Reinstall the program if necessary.
- Consult the software documentation or contact the software manufacturer for detailed troubleshooting information on a particular application program.
- Ensure that you have not made an error while entering data.
- Make sure that problems are not caused by a virus — Use a virus-scanning application program to check the floppy disks or CDs.
- Verify that the program's device drivers do not conflict with certain application programs.
- Confirm that a problem is software-related by running the **System Board Devices** tests in the Dell Diagnostics. If all tests run successfully, the error condition may be related to a software problem.
- Ensure that the use of terminate-and-stay-resident (TSR) programs has not resulted in a memory conflict.
- Remove or confirm the possibility of a program conflict by rebooting your computer.
- Make sure that a hardware conflict does not exist between devices.

### Operating System Compatibility

Make sure the computer's operating environment is set up to accommodate the application programs you use. Whenever you change the operating environment parameters, you may also affect the successful operation of the application programs. Sometimes, after modifying the operating environment, you may need to reinstall a program that no longer runs properly.

### **Input Errors**

If a specific key or set of keys is pressed at the wrong time, a program may give you unexpected results. See the documentation that came with your application program to make sure the values or characters you are entering are valid.

### **Error Messages**

Error messages can be produced by an application program, the operating system, or the computer. “[Messages and Codes](#)” discusses the error messages that are generated by the computer. If you receive an error message that is not listed in “[Messages and Codes](#),” check your operating system or application program documentation.

### **Device Drivers**

Programs that use specialized subroutines called *device drivers* can also cause problems with your computer. For example, a variation in the way the data is sent to the monitor may require a special screen driver program that expects a certain kind of video mode or monitor. In such cases, you may have to develop an alternative method of running that particular program—the creation of a boot file made especially for that program, for example. Call the support service for the software you are using to help you with this problem.

### **Memory-Resident Programs**

Many utilities and supplementary programs load either when the computer boots or from an operating system prompt. These programs are designed to stay resident in computer memory and thus always be available for use. Because they remain in the computer's memory, memory conflicts and errors can result when other programs require use of all or part of the memory already occupied by these TSR programs.

Typically, your operating system's start-up files (such as `config.sys` and `autoexec.bat`) contain commands to start TSR programs when you boot your computer. If you suspect that one of these TSR programs is causing a memory conflict, remove the commands that start them from the start-up files. If the problem you were experiencing does not recur, one of the TSR programs probably created the conflict. Add the TSR commands back into the start-up files one at a time until you identify which TSR program is creating the conflict.

### **Program Conflicts**

Some programs may leave portions of their setup information behind, even though you have exited from them. As a result, other programs cannot run. Rebooting your computer can confirm whether or not these programs are the cause of the problem.

### **Memory Address Conflicts**

Memory address conflicts occur when two or more devices try to access the same address in the upper memory blocks (UMB). For example, if a network expansion card and an expanded-memory page frame are assigned an overlapping block of addresses, a memory address conflict arises. As a result, when you try to log in to the network, the operation fails.

To resolve this type of conflict, you can change the address of one of the devices. For example, in the case of the network expansion card and expanded-memory page frame address conflict, you can move the network card to an address block in the range of CC000h through D0000h. To reassign the expansion card's address block, see the documentation for the card.

### **Interrupt Assignment Conflicts**

Problems can arise if two devices attempt to use the same interrupt request (IRQ) line. To avoid this type of conflict, check the documentation for the default IRQ-line setting for each installed expansion card, then consult the following table to configure the card for one of the available IRQ lines.



**NOTE:** The following table lists default IRQ settings. In computers with Plug and Play capabilities, you can modify the default settings. If you install a Plug and Play card in a Plug and Play computer, the computer automatically selects an open IRQ line if any are available.

### Default IRQ Line Assignments

IRQ Line	Used/Available
IRQ0	Used by the computer timer
IRQ1	Used by the keyboard to signal that the output buffer is full
IRQ2	Used by interrupt controller 1 to enable IRQ8 through IRQ15
IRQ3	Used by serial connector 2
IRQ4	Used by serial connector 1
IRQ5	Available
IRQ6	Used by the floppy/tape drive controller
IRQ7	Used by the parallel port
IRQ8	Used by the real-time clock (RTC)
IRQ9	Used by the video graphics array (VGA) interface (optional)
IRQ10	Available
IRQ11	Available
IRQ12	Used by the mouse port
IRQ13	Used by the math coprocessor (if applicable)
IRQ14	Used by the primary integrated drive electronics (IDE) controller
IRQ15	Used by the secondary IDE controller

SECTION 7



# Getting Help

Technical Assistance  
Contacting Dell

## Technical Assistance

If you need help with a technical problem, Dell is ready to assist you.

 **CAUTION:** If you need to remove the computer covers, first disconnect the computer power and modem cables from all electrical outlets.

- 1 Complete the procedures in "[Solving Problems](#)."
- 2 Run the [Dell Diagnostics](#).
- 3 Make a copy of the [Diagnostics Checklist](#) and fill it out.
- 4 Use Dell's extensive suite of online services available at Dell Support ([support.dell.com](#)) for help with installation and troubleshooting procedures.
- 5 If the preceding steps have not resolved the problem, contact Dell.

**NOTE:** Call technical support from a telephone near or at the computer so that technical support 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 technical support service, see "[Technical Support Service](#)."

**NOTE:** Some of the following services are not always available in all locations outside the continental U.S. Call your local Dell representative for information on availability.

### Online Services

You can access Dell Support at [support.dell.com](#). Select your region on the **WELCOME TO DELL SUPPORT** page, and fill in the requested details to access help tools and information.

You can contact Dell electronically using the following addresses:

- World Wide Web  
[www.dell.com/](http://www.dell.com/)  
[www.dell.com/ap/](http://www.dell.com/ap/) (for Asian/Pacific countries only)  
[www.euro.dell.com](http://www.euro.dell.com) (for Europe only)  
[www.dell.com/la/](http://www.dell.com/la/) (for Latin American countries)
- Anonymous file transfer protocol (FTP)  
[ftp.dell.com/](ftp://ftp.dell.com/)  
Log in as user: anonymous, and use your e-mail address as your password.
- Electronic Support Service  
[mobile\\_support@us.dell.com](mailto:mobile_support@us.dell.com)  
[support@us.dell.com](mailto:support@us.dell.com)  
[apsupport@dell.com](mailto:apsupport@dell.com) (for Asian/Pacific countries only)  
[support.euro.dell.com](mailto:support.euro.dell.com) (for Europe only)
- Electronic Quote Service  
[sales@dell.com](mailto:sales@dell.com)  
[apmarketing@dell.com](mailto:apmarketing@dell.com) (for Asian/Pacific countries only)
- Electronic Information Service  
[info@dell.com](mailto:info@dell.com)

### **AutoTech Service**

Dell's automated technical support service—AutoTech—provides recorded answers to the questions most frequently asked by Dell customers about their portable and desktop computers.

When you call AutoTech, use your touch-tone telephone to select the subjects that correspond to your questions.

The AutoTech service is available 24 hours a day, 7 days a week. You can also access this service through the technical support service. For the telephone number to call, see the [contact numbers](#) for your region.

### **Automated Order-Status Service**

To check on the status of any Dell products that you have ordered, you can go to [support.dell.com](http://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, see the [contact numbers](#) for your region.

### **Technical Support Service**

Dell's technical support service is available 24 hours a day, 7 days a week, to answer your questions about Dell hardware. Our technical support staff uses computer-based diagnostics to provide fast, accurate answers.

To contact Dell's technical support service, see "[Technical Assistance](#)" and then call the number for your country as listed in "[Contacting Dell](#)."

## **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, see the [contact numbers](#) for your region.

## **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](http://www.dell.com). For the telephone number to call to speak to a sales specialist, see the [contact numbers](#) for your region.

## **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, see the [contact numbers](#) for your region.

- 2 Include a copy of the invoice and a letter describing the reason for the return.
- 3 Include a copy of the [Diagnostics Checklist](#) indicating the tests you have run and any error messages reported by the Dell Diagnostics.
- 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.

Remember to fill out the [Diagnostics Checklist](#). If possible, turn on your computer before you call Dell for technical 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, read the [safety instructions](#).

---

**Diagnostics Checklist**

---

Name:

---

Date:

---

Address:

---

Phone number:

---

Service tag (bar code on the back 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

To contact Dell electronically, you can access the following websites:

- [www.dell.com](http://www.dell.com)
- [support.dell.com](http://support.dell.com) (technical support)
- [premiersupport.dell.com](http://premiersupport.dell.com) (technical support for educational, government, healthcare, and medium/large business customers, including Premier, Platinum, and Gold customers)

For specific web addresses for your country, find the appropriate country section in the table below.

**NOTE:** Toll-free numbers are for use within the country for which they are listed.

When you need to contact Dell, use the electronic addresses, telephone numbers, and codes provided in the following table. If you need assistance in determining which codes to use, contact a local or an international operator.

<b>Country (City) International Access Code Country Code City Code</b>	<b>Department Name or Service Area, Website and E-Mail Address</b>	<b>Area Codes, Local Numbers, and Toll-Free Numbers</b>
Anguilla	General Support	toll-free: 800-335-0031
Antigua and Barbuda	General Support	1-800-805-5924
Argentina (Buenos Aires)	Website: <a href="http://www.dell.com.ar">www.dell.com.ar</a>	
International Access Code: 00	Tech Support and Customer Care	toll-free: 0-800-444-0733
Country Code: 54	Sales	0-810-444-3355
City Code: 11	Tech Support Fax	11 4515 7139
	Customer Care Fax	11 4515 7138
Aruba	General Support	toll-free: 800-1578

<b>Country (City) International Access Code Country Code City Code</b>	<b>Department Name or Service Area, Website and E-Mail Address</b>	<b>Area Codes, Local Numbers, and Toll-Free Numbers</b>
Australia (Sydney)	E-mail (Australia): <a href="mailto:au_tech_support@dell.com">au_tech_support@dell.com</a>	
International Access Code: 0011	E-mail (New Zealand): <a href="mailto:nz_tech_support@dell.com">nz_tech_support@dell.com</a>	
Country Code: 61	Home and Small Business	1-300-65-55-33
City Code: 2	Government and Business	toll-free: 1-800-633-559
	Preferred Accounts Division (PAD)	toll-free: 1-800-060-889
	Customer Care	toll-free: 1-800-819-339
	Corporate Sales	toll-free: 1-800-808-385
	Transaction Sales	toll-free: 1-800-808-312
	Fax	toll-free: 1-800-818-341
Austria (Vienna)	Website: <a href="http://support.euro.dell.com">support.euro.dell.com</a>	
International Access Code: 900	E-mail: <a href="mailto:tech_support_central_europe@dell.com">tech_support_central_europe@dell.com</a>	
Country Code: 43	Home/Small Business Sales	01 795 67602
City Code: 1	Home/Small Business Fax	01 795 67605
	Home/Small Business Customer Care	01 795 67603
	Preferred Accounts/Corporate Customer Care	0660 8056
	Home/Small Business Technical Support	01 795 67604
	Preferred Accounts/Corporate Technical Support	0660 8779
	Switchboard	01 491 04 0
Bahamas	General Support	toll-free: 1-866-278-6818
Barbados	General Support	1-800-534-3066
Belgium (Brussels)	Website: <a href="http://support.euro.dell.com">support.euro.dell.com</a>	
International Access Code: 00	E-mail: <a href="mailto:tech_be@dell.com">tech_be@dell.com</a>	
Country Code: 32	E-mail for French Speaking Customers: <a href="http://support.euro.dell.com/be/fr/emailldell/">support.euro.dell.com/be/fr/emailldell/</a>	
City Code: 2	Technical Support	02 481 92 88
	Customer Care	02 481 91 19
	Home/Small Business Sales	toll-free: 0800 16884
	Corporate Sales	02 481 91 00
	Fax	02 481 92 99
	Switchboard	02 481 91 00

<b>Country (City) International Access Code Country Code City Code</b>	<b>Department Name or Service Area, Website and E-Mail Address</b>	<b>Area Codes, Local Numbers, and Toll-Free Numbers</b>
Bermuda	General Support	1-800-342-0671
Bolivia	General Support	toll-free: 800-10-0238
<b>Brazil</b>	Website: <a href="http://www.dell.com/br">www.dell.com/br</a>	
International Access Code: 00	Customer Support, Technical Support	0800 90 3355
Country Code: 55	Tech Support Fax	51 481 5470
City Code: 51	Customer Care Fax	51 481 5480
	Sales	0800 90 3390
<b>British Virgin Islands</b>	General Support	toll-free: 1-866-278-6820
<b>Brunei</b>	Customer Technical Support (Penang, Malaysia)	604 633 4966
Country Code: 673	Customer Service (Penang, Malaysia)	604 633 4949
	Transaction Sales (Penang, Malaysia)	604 633 4955
<b>Canada (North York, Ontario)</b>	Automated Order-Status System	toll-free: 1-800-433-9014
International Access Code: 011	AutoTech (automated technical support)	toll-free: 1-800-247-9362
	Customer Care (from outside Toronto)	toll-free: 1-800-326-9463
	Customer Care (from within Toronto)	416 758-2400
	Customer Technical Support	toll-free: 1-800-847-4096
	Sales (direct sales—from outside Toronto)	toll-free: 1-800-387-5752
	Sales (direct sales—from within Toronto)	416 758-2200
	Sales (federal government, education, and medical)	toll-free: 1-800-567-7542
	Sales (major accounts)	toll-free: 1-800-387-5755
	TechFax	toll-free: 1-800-950-1329
<b>Cayman Islands</b>	General Support	1-800-805-7541
<b>Chile (Santiago)</b>	Sales, Customer Support, and Technical Support	toll-free: 1230-020-4823
Country Code: 56		
City Code: 2		

<b>Country (City) International Access Code Country Code City Code</b>	<b>Department Name or Service Area, Website and E-Mail Address</b>	<b>Area Codes, Local Numbers, and Toll-Free Numbers</b>
China (Xiamen) Country Code: 86 City Code: 592	Tech Support website: <a href="http://support.ap.dell.com/china">support.ap.dell.com/china</a>	
	Tech Support E-mail: <a href="mailto:cn_support@dell.com">cn_support@dell.com</a>	
	Tech Support Fax	818 1350
	Home and Small Business Technical Support	toll-free: 800 858 2437
	Corporate Accounts Technical Support	toll-free: 800 858 2333
	Customer Experience	toll-free: 800 858 2060
	Home and Small Business	toll-free: 800 858 2222
	Preferred Accounts Division	toll-free: 800 858 2062
	Large Corporate Accounts GCP	toll-free: 800 858 2055
	Large Corporate Accounts Key Accounts	toll-free: 800 858 2628
	Large Corporate Accounts North	toll-free: 800 858 2999
	Large Corporate Accounts North Government and Education	toll-free: 800 858 2955
	Large Corporate Accounts East	toll-free: 800 858 2020
	Large Corporate Accounts East Government and Education	toll-free: 800 858 2669
	Large Corporate Accounts Queue Team	toll-free: 800 858 2572
	Large Corporate Accounts South	toll-free: 800 858 2355
Large Corporate Accounts West	toll-free: 800 858 2811	
Large Corporate Accounts Spare Parts	toll-free: 800 858 2621	
Colombia	General Support	980-9-15-3978
Costa Rica	General Support	0800-012-0435
Czech Republic (Prague) International Access Code: 00 Country Code: 420 City Code: 2	Website: <a href="http://support.euro.dell.com">support.euro.dell.com</a>	
	E-mail: <a href="mailto:czech_dell@dell.com">czech_dell@dell.com</a>	
	Technical Support	02 22 83 27 27
	Customer Care	02 22 83 27 11
	Fax	02 22 83 27 14
	TechFax	02 22 83 27 28
Switchboard	02 22 83 27 11	

<b>Country (City) International Access Code Country Code City Code</b>	<b>Department Name or Service Area, Website and E-Mail Address</b>	<b>Area Codes, Local Numbers, and Toll-Free Numbers</b>
Denmark (Copenhagen) International Access Code: 00 Country Code: 45	Website: <a href="http://support.euro.dell.com">support.euro.dell.com</a> E-mail Support (portable computers): <a href="mailto:den_nbk_support@dell.com">den_nbk_support@dell.com</a> E-mail Support (desktop computers): <a href="mailto:den_support@dell.com">den_support@dell.com</a> E-mail Support (servers): <a href="mailto:Nordic_server_support@dell.com">Nordic_server_support@dell.com</a>	
	Technical Support	7023 0182
	Customer Care (Relational)	7023 0184
	Home/Small Business Customer Care	3287 5505
	Switchboard (Relational)	3287 1200
	Fax Switchboard (Relational)	3287 1201
	Switchboard (Home/Small Business)	3287 5000
	Fax Switchboard (Home/Small Business)	3287 5001
<b>Dominica</b>	General Support	toll-free: 1-866-278-6821
<b>Dominican Republic</b>	General Support	1-800-148-0530
<b>Ecuador</b>	General Support	toll-free: 999-119
<b>El Salvador</b>	General Support	01-899-753-0777
Finland (Helsinki) International Access Code: 990 Country Code: 358 City Code: 9	Website: <a href="http://support.euro.dell.com">support.euro.dell.com</a> E-mail: <a href="mailto:fin_support@dell.com">fin_support@dell.com</a> E-mail Support (servers): <a href="mailto:Nordic_support@dell.com">Nordic_support@dell.com</a>	
	Technical Support	09 253 313 60
	Technical Support Fax	09 253 313 81
	Relational Customer Care	09 253 313 38
	Home/Small Business Customer Care	09 693 791 94
	Fax	09 253 313 99
	Switchboard	09 253 313 00

<b>Country (City) International Access Code Country Code City Code</b>	<b>Department Name or Service Area, Website and E-Mail Address</b>	<b>Area Codes, Local Numbers, and Toll-Free Numbers</b>
France (Paris) (Montpellier) International Access Code: 00 Country Code: 33 City Codes: (1) (4)	Website: <a href="http://support.euro.dell.com">support.euro.dell.com</a>	
	E-mail: <a href="mailto:support.euro.dell.com/fr/fr/emaildell/">support.euro.dell.com/fr/fr/emaildell/</a>	
	<b>Home and Small Business</b>	
	Technical Support	0825 387 270
	Customer Care	0825 823 833
	Switchboard	0825 004 700
	Switchboard (calls from outside of France)	04 99 75 40 00
	Sales	0825 004 700
	Fax	0825 004 701
	Fax (calls from outside of France)	04 99 75 40 01
	<b>Corporate</b>	
	Technical Support	0825 004 719
	Customer Care	0825 338 339
	Switchboard	01 55 94 71 00
	Sales	01 55 94 71 00
Fax	01 55 94 71 01	
<b>Germany (Langen)</b>	Website: <a href="http://support.euro.dell.com">support.euro.dell.com</a>	
International Access Code: 00	E-mail: <a href="mailto:tech_support_central_europe@dell.com">tech_support_central_europe@dell.com</a>	
Country Code: 49	Technical Support	06103 766-7200
City Code: 6103	Home/Small Business Customer Care	0180-5-224400
	Global Segment Customer Care	06103 766-9570
	Preferred Accounts Customer Care	06103 766-9420
	Large Accounts Customer Care	06103 766-9560
	Public Accounts Customer Care	06103 766-9555
	Switchboard	06103 766-7000
<b>Grenada</b>	General Support	toll-free: 1-866-540-3355
<b>Guatemala</b>	General Support	1-800-999-0136
<b>Guyana</b>	General Support	toll-free: 1-877-270-4609



<b>Country (City) International Access Code Country Code City Code</b>	<b>Department Name or Service Area, Website and E-Mail Address</b>	<b>Area Codes, Local Numbers, and Toll-Free Numbers</b>
<b>Hong Kong</b>	Technical Support (Dimension™ and Inspiron™)	296 93188
International Access Code: 001 Country Code: 852	Technical Support (OptiPlex™, Latitude™, and Dell Precision™)	296 93191
	Customer Service (non-technical, post-sales issues)	800 93 8291
	Transaction Sales	toll-free: 800 96 4109
	Large Corporate Accounts HK	toll-free: 800 96 4108
	Large Corporate Accounts GCP HK	toll-free: 800 90 3708
<b>India</b>	Technical Support	1600 33 8045
	Sales	1600 33 8044
<b>Ireland (Cherrywood)</b>	Website: <a href="http://support.euro.dell.com">support.euro.dell.com</a>	
International Access Code: 16 Country Code: 353 City Code: 1	E-mail: <a href="mailto:dell_direct_support@dell.com">dell_direct_support@dell.com</a>	
	Ireland Technical Support	1850 543 543
	U.K. Technical Support (dial within U.K. only)	0870 908 0800
	Home User Customer Care	01 204 4095
	Small Business Customer Care	01 204 4444
	U.K. Customer Care (dial within U.K. only)	0870 906 0010
	Corporate Customer Care	01 204 4003
	Ireland Sales	01 204 4444
	U.K. Sales (dial within U.K. only)	0870 907 4000
	SalesFax	01 204 0144
	Fax	01 204 5960
	Switchboard	01 204 4444

<b>Country (City) International Access Code Country Code City Code</b>	<b>Department Name or Service Area, Website and E-Mail Address</b>	<b>Area Codes, Local Numbers, and Toll-Free Numbers</b>
Italy (Milan)	Website: support.euro.dell.com	
International Access Code: 00	E-mail: support.euro.dell.com/it/it/emaildell/	
Country Code: 39	<b>Home and Small Business</b>	
City Code: 02	Technical Support	02 577 826 90
	Customer Care	02 696 821 14
	Fax	02 696 821 13
	Switchboard	02 696 821 12
	<b>Corporate</b>	
	Technical Support	02 577 826 90
	Customer Care	02 577 825 55
	Fax	02 575 035 30
	Switchboard	02 577 821
<b>Jamaica</b>	General Support (dial from within Jamaica only)	1-800-682-3639

<b>Country (City) International Access Code Country Code City Code</b>	<b>Department Name or Service Area, Website and E-Mail Address</b>	<b>Area Codes, Local Numbers, and Toll-Free Numbers</b>
Japan (Kawasaki) International Access Code: 001 Country Code: 81 City Code: 44	Website: <a href="http://support.jp.dell.com">support.jp.dell.com</a>	
	Technical Support (servers)	toll-free: 0120-1984-98
	Technical Support outside of Japan (servers)	81-44-556-4162
	Technical Support (Dimension™ and Inspiron™)	toll-free: 0120-1982-26
	Technical Support outside of Japan (Dimension and Inspiron)	81-44-520-1435
	Technical Support (Dell Precision™, OptiPlex™, and Latitude™)	toll-free: 0120-1984-33
	Technical Support outside of Japan (Dell Precision, OptiPlex, and Latitude)	81-44-556-3894
	24-Hour Automated Order Service	044-556-3801
	Customer Care	044-556-4240
	Business Sales Division (up to 400 employees)	044-556-1465
	Preferred Accounts Division Sales (over 400 employees)	044-556-3433
	Large Corporate Accounts Sales (over 3500 employees)	044-556-3430
	Public Sales (government agencies, educational institutions, and medical institutions)	044-556-1469
	Global Segment Japan	044-556-3469
Individual User	044-556-1760	
Faxbox Service	044-556-3490	
Switchboard	044-556-4300	
Korea (Seoul) International Access Code: 001 Country Code: 82 City Code: 2	Technical Support	toll-free: 080-200-3800
	Sales	toll-free: 080-200-3600
	Customer Service (Seoul, Korea)	toll-free: 080-200-3800
	Customer Service (Penang, Malaysia)	604 633 4949
	Fax	2194-6202
Switchboard	2194-6000	

<b>Country (City) International Access Code Country Code City Code</b>	<b>Department Name or Service Area, Website and E-Mail Address</b>	<b>Area Codes, Local Numbers, and Toll-Free Numbers</b>
<b>Latin America</b>	Customer Technical Support (Austin, Texas, U.S.A.)	512 728-4093
	Customer Service (Austin, Texas, U.S.A.)	512 728-3619
	Fax (Technical Support and Customer Service) (Austin, Texas, U.S.A.)	512 728-3883
	Sales (Austin, Texas, U.S.A.)	512 728-4397
	SalesFax (Austin, Texas, U.S.A.)	512 728-4600 or 512 728-3772
<b>Luxembourg</b>	Website: <a href="http://support.euro.dell.com">support.euro.dell.com</a>	
International Access Code: 00	E-mail: <a href="mailto:tech_be@dell.com">tech_be@dell.com</a>	
Country Code: 352	Technical Support (Brussels, Belgium)	02 481 92 88
	Home/Small Business Sales (Brussels, Belgium)	toll-free: 080016884
	Corporate Sales (Brussels, Belgium)	02 481 91 00
	Customer Care (Brussels, Belgium)	02 481 91 19
	Fax (Brussels, Belgium)	02 481 92 99
	Switchboard (Brussels, Belgium)	02 481 91 00
<b>Macao</b>	Technical Support	toll-free: 0800 582
Country Code: 853	Customer Service (Penang, Malaysia)	604 633 4949
	Transaction Sales	toll-free: 0800 581
<b>Malaysia (Penang)</b>	Technical Support	toll-free: 1 800 888 298
International Access Code: 00	Customer Service	04 633 4949
Country Code: 60	Transaction Sales	toll-free: 1 800 888 202
City Code: 4	Corporate Sales	toll-free: 1 800 888 213

<b>Country (City) International Access Code Country Code City Code</b>	<b>Department Name or Service Area, Website and E-Mail Address</b>	<b>Area Codes, Local Numbers, and Toll-Free Numbers</b>
<b>Mexico</b> International Access Code: 00 Country Code: 52	Customer Technical Support  Sales  Customer Service  Main	001-877-384-8979 or 001-877-269-3383 50-81-8800 or 01-800-888-3355 001-877-384-8979 or 001-877-269-3383 50-81-8800 or 01-800-888-3355
<b>Montserrat</b>	General Support	toll-free: 1-866-278-6822
<b>Netherlands Antilles</b>	General Support	001-800-882-1519
<b>Netherlands (Amsterdam)</b> International Access Code: 00 Country Code: 31 City Code: 20	Website: <a href="http://support.euro.dell.com">support.euro.dell.com</a> E-mail: <a href="mailto:support.euro.dell.com/nl/nl/emaildell/">support.euro.dell.com/nl/nl/emaildell/</a> Technical Support <b>Home/Small and Medium Business</b> Home/Small and Medium Business Fax Home/Small and Medium Business Customer Care <b>Corporate</b> Corporate Fax Corporate Customer Care	020 674 45 00 020 674 55 00 020 674 47 75 020 674 42 00 020 674 50 00 020 674 47 79 020 674 43 25
<b>New Zealand</b> International Access Code: 00 Country Code: 64	E-mail (New Zealand): <a href="mailto:nz_tech_support@dell.com">nz_tech_support@dell.com</a> E-mail (Australia): <a href="mailto:au_tech_support@dell.com">au_tech_support@dell.com</a> Home and Small Business Government and Business Sales Fax	0800 446 255 0800 444 617 0800 441 567 0800 441 566
<b>Nicaragua</b>	General Support	001-800-220-1006

<b>Country (City) International Access Code Country Code City Code</b>	<b>Department Name or Service Area, Website and E-Mail Address</b>	<b>Area Codes, Local Numbers, and Toll-Free Numbers</b>
Norway (Lysaker)	Website: <a href="http://support.euro.dell.com">support.euro.dell.com</a>	
International Access Code: 00	E-mail Support (portable computers):	
Country Code: 47	<a href="mailto:nor_nbk_support@dell.com">nor_nbk_support@dell.com</a>	
	E-mail Support (desktop computers):	
	<a href="mailto:nor_support@dell.com">nor_support@dell.com</a>	
	E-mail Support (servers):	
	<a href="mailto:nordic_server_support@dell.com">nordic_server_support@dell.com</a>	
	Technical Support	671 16882
	Relational Customer Care	671 17514
	Home/Small Business Customer Care	23162298
	Switchboard	671 16800
	Fax Switchboard	671 16865
<b>Panama</b>	General Support	001-800-507-0962
<b>Peru</b>	General Support	0800-50-669
Poland (Warsaw)	Website: <a href="http://support.euro.dell.com">support.euro.dell.com</a>	
International Access Code: 011	E-mail: <a href="mailto:pl_support@dell.com">pl_support@dell.com</a>	
Country Code: 48	Customer Service Phone	57 95 700
City Code: 22	Customer Care	57 95 999
	Sales	57 95 999
	Customer Service Fax	57 95 806
	Reception Desk Fax	57 95 998
	Switchboard	57 95 999
<b>Portugal</b>	E-mail: <a href="mailto:support.euro.dell.com/es/es/emaildell/">support.euro.dell.com/es/es/emaildell/</a>	
International Access Code: 00	Technical Support	800 834 077
Country Code: 35	Customer Care	800 300 415 or 800 834 075
	Sales	800 300 410 or 800 300 411 or 800 300 412 or
		121 422 07 10
	Fax	121 424 01 12

<b>Country (City) International Access Code Country Code City Code</b>	<b>Department Name or Service Area, Website and E-Mail Address</b>	<b>Area Codes, Local Numbers, and Toll-Free Numbers</b>
Puerto Rico	General Support	1-800-805-7545
St. Kitts and Nevis	General Support	toll-free: 1-877-441-4731
St. Lucia	General Support	1-800-882-1521
St. Vincent and the Grenadines	General Support	toll-free: 1-877-270-4609
Singapore (Singapore)	Technical Support	toll-free: 800 6011 051
International Access Code: 005	Customer Service (Penang, Malaysia)	604 633 4949
Country Code: 65	Transaction Sales	toll-free: 800 6011 054
	Corporate Sales	toll-free: 800 6011 053
<b>South Africa (Johannesburg)</b>	Website: <a href="http://support.euro.dell.com">support.euro.dell.com</a>	
International Access Code: 09/091	E-mail: <a href="mailto:dell_za_support@dell.com">dell_za_support@dell.com</a>	
Country Code: 27	Technical Support	011 709 7710
City Code: 11	Customer Care	011 709 7707
	Sales	011 709 7700
	Fax	011 706 0495
	Switchboard	011 709 7700
<b>Southeast Asian and Pacific Countries</b>	Customer Technical Support, Customer Service, and Sales (Penang, Malaysia)	604 633 4810
<b>Spain (Madrid)</b>	Website: <a href="http://support.euro.dell.com">support.euro.dell.com</a>	
International Access Code: 00	E-mail: <a href="mailto:support.euro.dell.com/es/es/emaildell/">support.euro.dell.com/es/es/emaildell/</a>	
Country Code: 34	<b>Home and Small Business</b>	
City Code: 91	Technical Support	902 100 130
	Customer Care	902 118 540
	Sales	902 118 541
	Switchboard	902 118 541
	Fax	902 118 539
	<b>Corporate</b>	
	Technical Support	902 100 130
	Customer Care	902 118 546
	Switchboard	91 722 92 00
	Fax	91 722 95 83

<b>Country (City) International Access Code Country Code City Code</b>	<b>Department Name or Service Area, Website and E-Mail Address</b>	<b>Area Codes, Local Numbers, and Toll-Free Numbers</b>
Sweden (Upplands Vasby) International Access Code: 00 Country Code: 46 City Code: 8	Website: <a href="http://support.euro.dell.com">support.euro.dell.com</a> E-mail: <a href="mailto:swe_support@dell.com">swe_support@dell.com</a> E-mail Support for Latitude and Inspiron: <a href="mailto:Swe-nbk_kats@dell.com">Swe-nbk_kats@dell.com</a> E-mail Support for OptiPlex: <a href="mailto:Swe_kats@dell.com">Swe_kats@dell.com</a> E-mail Support for Servers: <a href="mailto:Nordic_server_support@dell.com">Nordic_server_support@dell.com</a> Technical Support Relational Customer Care Home/Small Business Customer Care Employee Purchase Program (EPP) Support Fax Technical Support Sales	08 590 05 199 08 590 05 642 08 587 70 527 20 140 14 44 08 590 05 594 08 590 05 185
Switzerland (Geneva) International Access Code: 00 Country Code: 41 City Code: 22	Website: <a href="http://support.euro.dell.com">support.euro.dell.com</a> E-mail: <a href="mailto:swisstech@dell.com">swisstech@dell.com</a> E-mail for French-speaking HSB and Corporate Customers: <a href="http://support.euro.dell.com/ch/fr/emaildell/">support.euro.dell.com/ch/fr/emaildell/</a> Technical Support (Home and Small Business) Technical Support (Corporate) Customer Care (Home and Small Business) Customer Care (Corporate) Fax Switchboard	0844 811 411 0844 822 844 0848 802 202 0848 821 721 022 799 01 90 022 799 01 01
Taiwan International Access Code: 002 Country Code: 886	Technical Support (portable and desktop computers) Technical Support (servers) Transaction Sales  Corporate Sales	toll-free: 00801 86 1011  toll-free: 0080 60 1256 toll-free: 0080 651 228 or 0800 33 556 toll-free: 0080 651 227 or 0800 33 555



<b>Country (City) International Access Code Country Code City Code</b>	<b>Department Name or Service Area, Website and E-Mail Address</b>	<b>Area Codes, Local Numbers, and Toll-Free Numbers</b>
Thailand	Technical Support	toll-free: 0880 060 07
International Access Code: 001	Customer Service (Penang, Malaysia)	604 633 4949
Country Code: 66	Sales	toll-free: 0880 060 09
Trinidad/Tobago	General Support	1-800-805-8035
Turks and Caicos Islands	General Support	toll-free: 1-866-540-3355
U.K. (Bracknell)	Website: <a href="http://support.euro.dell.com">support.euro.dell.com</a>	
International Access Code: 00	Customer Care website:	
Country Code: 44	<a href="http://dell.co.uk/lca/customerservices">dell.co.uk/lca/customerservices</a>	
City Code: 1344	E-mail: <a href="mailto:dell_direct_support@dell.com">dell_direct_support@dell.com</a>	
	Technical Support (Corporate/Preferred Accounts/PAD [1000+ employees])	0870 908 0500
	Technical Support (direct/PAD and general)	0870 908 0800
	Global Accounts Customer Care	01344 373 185 or 01344 373 186
	Home and Small Business Customer Care	0870 906 0010
	Corporate Customer Care	0870 908 0500
	Preferred Accounts (500–5000 employees) Customer Care	01344 373 196
	Central Government Customer Care	01344 373 193
	Local Government & Education Customer Care	01344 373 199
	Health Customer Care	01344 373 194
	Home and Small Business Sales	0870 907 4000
	Corporate/Public Sector Sales	01344 860 456
Uruguay	General Support	toll-free: 000-413-598-2521

<b>Country (City) International Access Code Country Code City Code</b>	<b>Department Name or Service Area, Website and E-Mail Address</b>	<b>Area Codes, Local Numbers, and Toll-Free Numbers</b>
U.S.A. (Austin, Texas)	Automated Order-Status Service	toll-free: 1-800-433-9014
International Access Code: 011 Country Code: 1	AutoTech (portable and desktop computers)	toll-free: 1-800-247-9362
	<b>Consumer</b> (Home and Home Office)	
	Customer Technical Support	toll-free: 1-800-624-9896
	Customer Service	toll-free: 1-800-624-9897
	DellNet™ Service and Support	toll-free: 1-877-Dellnet (1-877-335-5638)
	Software Application Support	toll-free: 1-800-433-9005
	Employee Purchase Program (EPP) (Customer Service and Technical Support)	toll-free: 1-800-695-8133
	Financial Services website: <a href="http://www.dellfinancialservices.com">www.dellfinancialservices.com</a>	
	Financial Services (lease/loans)	toll-free: 1-877-577-3355
	Financial Services (Dell Preferred Accounts [DPA])	toll-free: 1-800-283-2210
	<b>Business</b>	
	Service and Technical Support	toll-free: 1-800-822-8965
	Employee Purchase Program (EPP) (Customer Service and Technical Support)	toll-free: 1-800-695-8133
	<b>Public</b> (government, education, and healthcare)	
	Service and Technical Support	toll-free: 1-800-456-3355
	Employee Purchase Program (EPP) (Customer Service and Technical Support)	toll-free: 1-800-234-1490
	Dell Sales	toll-free: 1-800-289-3355 or toll-free: 1-800-879-3355
	Dell Outlet Store (Dell refurbished computers)	toll-free: 1-888-798-7561
	Software and Peripherals Sales	toll-free: 1-800-671-3355
	Spare Parts Sales	toll-free: 1-800-357-3355
	Extended Service and Warranty Sales	toll-free: 1-800-247-4618
	Fax	toll-free: 1-800-727-8320
	Dell Services for the Deaf, Hard-of-Hearing, or Speech-Impaired	toll-free: 1-877-DELLTY (1-877-335-5889)

<b>Country (City) International Access Code Country Code City Code</b>	<b>Department Name or Service Area, Website and E-Mail Address</b>	<b>Area Codes, Local Numbers, and Toll-Free Numbers</b>
U.S. Virgin Islands	General Support	1-877-673-3355
Venezuela	General Support	8001-3605





SECTION 8



# **Additional Information**

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[Regulatory Notices](#)  
[Warranty and Return Policy](#)

8

[www.dell.com](http://www.dell.com) | [support.dell.com](http://support.dell.com)

## Regulatory Notices

Electromagnetic Interference (EMI) is any signal or emission, radiated in free space or conducted along power or signal leads, that endangers the functioning of a radio navigation or other safety service or seriously degrades, obstructs, or repeatedly interrupts a licensed radio communications service. Radio communications services include but are not limited to AM/FM commercial broadcast, television, cellular services, radar, air-traffic control, pager, and Personal Communication Services (PCS). These licensed services, along with unintentional radiators such as digital devices, including computer systems, contribute to the electromagnetic environment.

Electromagnetic Compatibility (EMC) is the ability of items of electronic equipment to function properly together in the electronic environment. While this computer system has been designed and determined to be compliant with regulatory agency limits for EMI, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference with radio communications services, 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 computer with respect to the receiver.
- Move the computer away from the receiver.
- Plug the computer into a different outlet so that the computer and the receiver are on different branch circuits.

If necessary, consult a Dell Technical Support representative or an experienced radio/television technician for additional suggestions.

Dell computer systems are designed, tested, and classified for their intended electromagnetic environment. These electromagnetic environment classifications generally refer to the following harmonized definitions:

- Class A is typically for business or industrial environments.
- Class B is typically for residential environments.

Information Technology Equipment (ITE), including peripherals, expansion cards, printers, input/output (I/O) devices, monitors, and so on, that are integrated into or connected to the system should match the electromagnetic environment classification of the computer system.

**A Notice About Shielded Signal Cables:** Use only shielded cables for connecting peripherals to any Dell device to reduce the possibility of interference with radio communications services. Using shielded cables ensures that you maintain the appropriate EMC classification for the intended environment. For parallel printers, a cable is available from Dell. If you prefer, you can order a cable from Dell on the World Wide Web at [accessories.us.dell.com/sna/category.asp?category\\_id=4117](http://accessories.us.dell.com/sna/category.asp?category_id=4117).

Most Dell computer systems are classified for Class B environments. However, the inclusion of certain options can change the rating of some configurations to Class A. To determine the electromagnetic classification for your system or device, refer to the following sections specific for each regulatory agency. Each section provides country-specific EMC/EMI or product safety information.

### **FCC Notices (U.S. Only)**

Most Dell computer systems are classified by the Federal Communications Commission (FCC) as Class B digital devices. To determine which classification applies to your computer system, examine all FCC registration labels located on the bottom, side, or back panel of your computer, on card-mounting brackets, and on the cards themselves. If any one of the labels carries a Class A rating, your entire system is considered to be a Class A digital device. If *all* labels carry an FCC Class B rating as distinguished by either an FCC ID number or the FCC logo, (FCC), your system is considered to be a Class B digital device.

Once you have determined your system's FCC classification, read the appropriate FCC notice. Note that FCC regulations provide that changes or modifications not expressly approved by Dell could void your authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.

- This device must accept any interference received, including interference that may cause undesired operation.

**Class A**

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. 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 harmful interference with radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case you will be required to correct the interference at your own expense.

**Class B**

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. These limits are designed to provide reasonable protection against harmful interference in a residential installation. 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 communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to 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 or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.

The following information is provided on the device or devices covered in this document in compliance with FCC regulations:

- Model number: DHS, DHP, and DHM



- Company name:

Dell Computer Corporation  
One Dell Way  
Round Rock, Texas 78682 USA  
512-338-4400

### **IC Notice (Canada Only)**

Most Dell computer systems (and other Dell digital apparatus) are classified by the Industry Canada (IC) Interference-Causing Equipment Standard #3 (ICES-003) as Class B digital devices. To determine which classification (Class A or B) applies to your computer system (or other Dell digital apparatus), examine all registration labels located on the bottom, side, or the back panel of your computer (or other digital apparatus). A statement in the form of "IC Class A ICES-003" or "IC Class B ICES-003" will be located on one of these labels. Note that Industry Canada regulations provide that changes or modifications not expressly approved by Dell could void your authority to operate this equipment.

This Class B (or Class A, if so indicated on the registration label) digital apparatus meets the requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la Classe B (ou Classe A, si ainsi indiqué sur l'étiquette d'enregistrement) respecte toutes les exigences du Règlement sur le Matériel Brouilleur du Canada.

### **CE Notice (European Union)**

Marking by the symbol **CE** indicates compliance of this Dell computer to the EMC Directive and the Low Voltage Directive of the European Union. Such marking is indicative that this Dell system meets the following technical standards:

- EN 55022 — "Information Technology Equipment — Radio Disturbance Characteristics — Limits and Methods of Measurement."
- EN 55024 — "Information Technology Equipment - Immunity Characteristics - Limits and Methods of Measurement."

- EN 61000-3-2 — "Electromagnetic Compatibility (EMC) - Part 3: Limits - Section 2: Limits for Harmonic Current Emissions (Equipment Input Current Up to and Including 16 A Per Phase)."
- EN 61000-3-3 — "Electromagnetic Compatibility (EMC) - Part 3: Limits - Section 3: Limitation of Voltage Fluctuations and Flicker in Low-Voltage Supply Systems for Equipment With Rated Current Up to and Including 16 A."
- EN 60950 — "Safety of Information Technology Equipment."

**NOTE:** EN 55022 emissions requirements provide for two classifications:

- Class A is for typical commercial areas.
- Class B is for typical domestic areas.

To determine which classification applies to your computer, examine the system information/regulatory label located on the back, side, or bottom panel of the computer. If the label indicates a Class A rating, the following Class A warning applies to your computer:

**RF INTERFERENCE WARNING: This is a Class A product. In a domestic environment this product may cause radio frequency (RF) interference, in which case the user may be required to take adequate measures.**

If the label indicates a Class B rating, the following Class B statement applies to your computer:

This Dell device is classified for use in a typical Class B domestic environment.

A "Declaration of Conformity" in accordance with the preceding directives and standards has been made and is on file at Dell Computer Corporation Products Europe BV, Limerick, Ireland.

### **ENERGY STAR® Compliance**

Certain configurations of Dell™ computers comply with the requirements set forth by the Environmental Protection Agency (EPA) for energy-efficient computers. If the front panel of your computer bears the ENERGY STAR® Emblem, your original configuration complies with these requirements and all ENERGY STAR® power management features of the computer are enabled.

**NOTE:** Any Dell computer bearing the ENERGY STAR® Emblem is certified to comply with EPA ENERGY STAR® requirements as configured when shipped by Dell. Any changes you make to this configuration (such as installing additional expansion cards or drives) may increase the computer's power consumption beyond the limits set by the EPA's ENERGY STAR® Computers program.

**ENERGY STAR® Emblem**



The EPA's ENERGY STAR® Computers program is a joint effort between the EPA and computer manufacturers to reduce air pollution by promoting energy-efficient computer products. The EPA estimates that use of ENERGY STAR® computer products can save computer users up to two billion dollars annually in electricity costs. In turn, this reduction in electricity usage can reduce emissions of carbon dioxide, the gas primarily responsible for the greenhouse effect, and sulfur dioxide and nitrogen oxides, the primary causes of acid rain.

You can also help reduce electricity usage and its side effects by turning off your computer when it is not in use for extended periods of time, particularly at night and on weekends.

**Simplified Chinese Class A Warning Notice (China Only)**

On Class A systems, the following warning will appear near the regulatory label:

**Warning:** This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

**声明**

此为 A 级产品，在生活环境中，该产品可能会造成无线电干扰。在这种情况下，可能需要用户对其干扰采取切实可行的措施。

## EN 55022 Compliance (Czech Republic Only)

This device belongs to Class B devices as described in EN 55022, unless it is specifically stated that it is a Class A device on the specification label. The following applies to devices in Class A of EN 55022 (radius of protection up to 30 meters). The user of the device is obliged to take all steps necessary to remove sources of interference to telecommunication or other devices.

Pokud není na typovém štítku počítače uvedeno, že spadá do třídy A podle EN 55022, spadá automaticky do třídy B podle EN 55022. Pro zařízení zařazená do třídy A (ochranné pásmo 30m) podle EN 55022 platí následující. Dojde-li k rušení telekomunikačních nebo jiných zařízení, je uživatel povinen provést taková opatření, aby rušení odstranil.

## VCCI Notice (Japan Only)

Most Dell computer systems are classified by the Voluntary Control Council for Interference (VCCI) as Class B information technology equipment (ITE). However, the inclusion of certain options can change the rating of some configurations to Class A. ITE, including peripherals, expansion cards, printers, input/output (I/O) devices, monitors, and so on, integrated into or connected to the system should match the electromagnetic environment classification (Class A or B) of the computer system.

To determine which classification applies to your computer system, examine the regulatory labels/markings (see "VCCI Class A ITE Regulatory Mark" and "VCCI Class B ITE Regulatory Mark") located on the bottom, side, or back panel of your computer. Once you have determined your system's VCCI classification, read the appropriate VCCI notice.

## Class A ITE

この装置は、情報処理装置等電波障害自主規制協議会 (VCCI) の基準に基づくクラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

This is a Class A product based on the standard of the Voluntary Control Council for Interference (VCCI) for information technology equipment. If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

### ***VCCI Class A ITE Regulatory Mark***

If the regulatory label includes the following marking, your computer is a Class A product:

**VCCI**

## Class B ITE

この装置は、情報処理装置等電波障害自主規制協議会 (VCCI) の基準に基づくクラス B 情報技術装置です。この装置は家庭環境で使用することを目的としていますが、ラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。取扱説明書に従って正しい取り扱いをしてください。

This is a Class B product based on the standard of the Voluntary Control Council for Interference (VCCI) for information technology equipment. If this equipment is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction manual.

### ***VCCI Class B ITE Regulatory Mark***

If the regulatory label includes the following marking, your computer is a Class B product:



### MIC Notice (Republic of Korea Only)

To determine which classification (Class A or B) applies to your computer (or other Dell digital device), examine the Republic of Korean Ministry of Information and Communications (MIC) registration labels located on your computer (or other Dell digital device). The MIC label may be located separately from the other regulatory marking applied to your product. Line two of the label identifies the emissions class for the product—"A" for Class A products or "B" for Class B products.

**NOTE:** MIC emissions requirements provide for two classifications:

- Class A devices are for business purposes.
- Class B devices are for nonbusiness purposes.

#### Class A Device

기종별	사용자안내문
A급 기기 (업무용 정보통신기기)	이 기기는 업무용으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며 만약 잘못 판매 또는 구입하였을 때에는 가정용으로 교환하시기 바랍니다.

Please note that this device has been approved for business purposes with regard to electromagnetic interference. If you find that this device is not suitable for your use, you may exchange it for a nonbusiness-purpose device.

### ***MIC Class A Regulatory Label***

If the regulatory label includes the following marking, your computer is a Class A product:



1. 기기의 명칭(모델명):
2. 인증번호:(A)
3. 인증받은 자의 상호:
4. 제조년월일:
5. 제조자/제조국가:

### **Class B Device**

기종별	사용자 안내문
B급 기기 (가정용 정보통신기기)	이 기기는 가정용으로 전자파적합등록을 한 기기로서 주거지역에서는 물론 모든 지역에서 사용할 수 있습니다.

Please note that this device has been approved for nonbusiness purposes and may be used in any environment, including residential areas.

### ***MIC Class B Regulatory Label***

If the regulatory label includes the following marking, your computer is a Class B product.



1. 기기의 명칭(모델명):
2. 인증번호:(B)
3. 인증받은 자의 상호:
4. 제조년월일:
5. 제조자/제조국가:

### **Polish Center for Testing and Certification Notice**

The equipment should draw power from a socket with an attached protection circuit (a 3-prong socket). All equipment that works together (computer, monitor, printer, and so on) should have the same power supply source.

The phasing conductor of the room's electrical installation should have a reserve short-circuit protection device in the form of a fuse with a nominal value no larger than 16 amperes (A).

To completely switch off the equipment, the power supply cable must be removed from the power supply socket, which should be located near the equipment and easily accessible.

A protection mark "B" confirms that the equipment is in compliance with the protection usage requirements of standards PN-93/T-42107 and PN-EN 55022: 1996.

### **Wymagania Polskiego Centrum Badań i Certyfikacji**

Urządzenie powinno być zasilane z gniazda z przyłączonym obwodem ochronnym (gniazdo z kołkiem). Współpracujące ze sobą urządzenia (komputer, monitor, drukarka) powinny być zasilane z tego samego źródła.

Instalacja elektryczna pomieszczenia powinna zawierać w przewodzie fazowym rezerwową ochronę przed zwarciami, w postaci bezpiecznika o wartości znamionowej nie większej niż 16A (amperów).

W celu całkowitego wyłączenia urządzenia z sieci zasilania, należy wyjąć wtyczkę kabla zasilającego z gniazdka, które powinno znajdować się w pobliżu urządzenia i być łatwo dostępne. Znak bezpieczeństwa "B" potwierdza zgodność urządzenia z wymaganiami bezpieczeństwa użytkownika zawartymi w PN-93/T-42107 i PN-EN 55022:1996.

Jeżeli na tabliczce znamionowej umieszczono informację, że urządzenie jest klasy A, to oznacza to, że urządzenie w środowisku mieszkalnym może powodować zakłócenia radioelektryczne. W takich przypadkach można żądać od jego użytkownika zastosowania odpowiednich środków zaradczych.



### Pozostałe instrukcje bezpieczeństwa

- Nie należy używać wtyczek adapterowych lub usuwać kołka obwodu ochronnego z wtyczki. Jeżeli konieczne jest użycie przedłużacza to należy użyć przedłużacza 3-żyłowego z prawidłowo połączonym przewodem ochronnym. □
- System komputerowy należy zabezpieczyć przed nagłymi, chwilowymi wzrostami lub spadkami napięcia, używając eliminatora przepięć, urządzenia dopasowującego lub bezzakłócenowego źródła zasilania.
- Należy upewnić się, aby nic nie leżało na kablach systemu komputerowego, oraz aby kable nie były umieszczone w miejscu, gdzie można byłoby na nie nadeptywać lub potykać się o nie.
- Nie należy rozlewać napojów ani innych płynów na system komputerowy.
- Nie należy wpychać żadnych przedmiotów do otworów systemu komputerowego, gdyż może to spowodować pożar lub porażenie prądem, poprzez zwarcie elementów wewnętrznych.
- System komputerowy powinien znajdować się z dala od grzejników i źródeł ciepła. Ponadto, nie należy blokować otworów wentylacyjnych. Należy unikać kładzenia luźnych papierów pod komputer oraz umieszczania komputera w ciasnym miejscu bez możliwości cyrkulacji powietrza wokół niego.

## BSMI Notice (Taiwan Only)

### BSMI 通告 (僅限於台灣)

大多數的 Dell 電腦系統被 BSMI (經濟部標準檢驗局) 劃分為乙類數位裝置。但是，使用某些選件會使有些組態的等級變成甲類。若要確定您的電腦系統適用等級，請檢查所有位於電腦底部或背面板、擴充卡安裝托架，以及擴充卡上的 BSMI 註冊標籤。如果其中有一甲類標籤，即表示您的系統為甲類數位裝置。如果只有 BSMI 的檢磁號碼標籤，則表示您的系統為乙類數位裝置。

一旦確定了系統的 BSMI 等級，請閱讀相關的 BSMI 通告。請注意，BSMI 通告規定凡是未經 Dell Computer Corporation 明確批准的擅自變更或修改，將導致您失去此設備的使用權。

此裝置符合 BSMI (經濟部標準檢驗局) 的規定，使用時須符合以下兩項條件：

- 此裝置不會產生有害干擾。
- 此裝置必須能接受所接收到的干擾，包括可能導致無法正常作業的干擾。

### 甲類

此設備經測試證明符合 BSMI (經濟部標準檢驗局) 之甲類數位裝置的限制規定。這些限制的目的是為了在商業環境中使用此設備時，能提供合理的保護以防止有害的干擾。此設備會產生、使用並散發射頻能量；如果未遵照製造廠商的指導手冊來安裝和使用，可能會干擾無線電通訊。請勿在住宅區使用此設備。

#### 警告使用者：

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

## 乙類

此設備經測試證明符合 BSMI (經濟部標準檢驗局) 之乙類數位裝置的限制規定。這些限制的目的是為了在住宅區安裝時，能防止有害的干擾，提供合理的保護。此設備會產生、使用並散發射頻能量；如果未遵照製造廠商的指導手冊來安裝和使用，可能會干擾無線電通訊。但是，這並不保證在個別的安裝中不會產生干擾。您可以透過關閉和開啓此設備來判斷它是否會對廣播和電視收訊造成干擾；如果確實如此，我們建議您嘗試以下列一種或多種方法來排除干擾：

- 重新調整天線的接收方向或重新放置接收天線。
- 增加設備與接收器的距離。
- 將設備連接至不同的插座，使設備與接收器連接在不同的電路上。
- 請向經銷商或有經驗的無線電/電視技術人員查詢，以獲得幫助。

### **NOM Information (Mexico Only)**

The following information is provided on the device(s) described in this document in compliance with the requirements of the official Mexican standards (NOM):

Exporter:	Dell Computer Corporation One Dell Way Round Rock, TX 78682
Importer:	Dell Computer de México, S.A. de C.V. Paseo de la Reforma 2620 - 11° Piso Col. Lomas Altas 11950 México, D.F.
Ship to:	Dell Computer de México, S.A. de C.V. al Cuidado de Kuehne & Nagel de México S. de R.L. Avenida Soles No. 55 Col. Peñon de los Baños 15520 México, D.F.
Model number:	DHS, DHP, and DHM
Supply voltage:	115–230 VAC
Frequency:	60–50 Hz
Input current rating:	DHS: 2.0/1.0 A DHP: 1.5/0.75A DHM: 3.0/1.5A

## Warranty and Return Policy

Dell Computer Corporation (“Dell”) manufactures its hardware products from parts and components that are new or equivalent to new in accordance with industry-standard practices. For information about the Dell warranty for your computer, see the *Setup and Quick Reference Guide*.

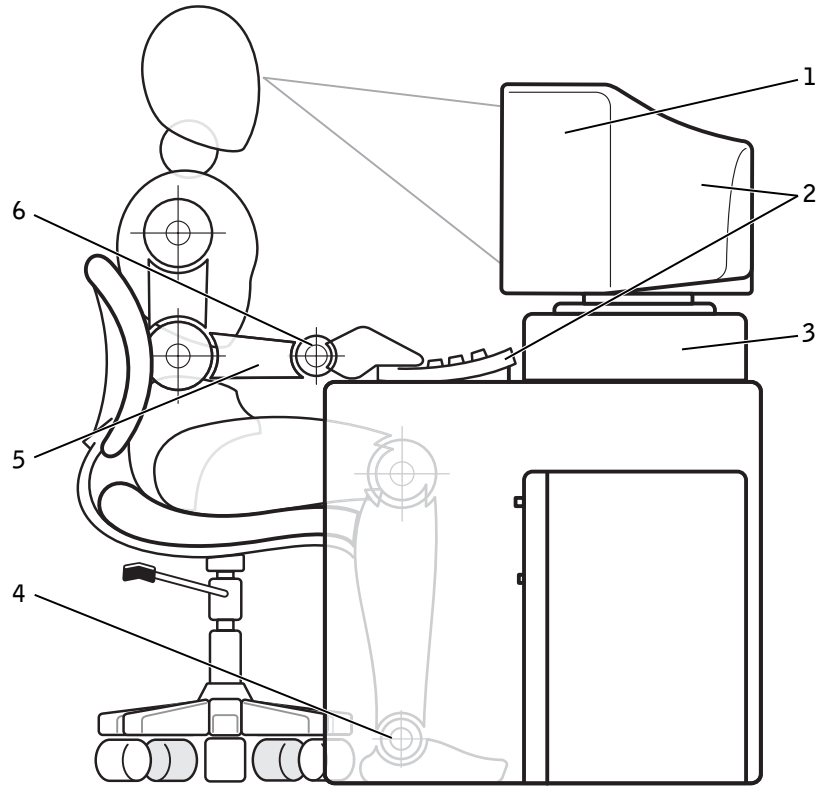
## Ergonomic Computing Habits

 **CAUTION: Improper or prolonged keyboard use may result in injury.**

 **CAUTION: Viewing the monitor screen for extended periods of time may result in eye strain.**

For comfort and efficiency, observe the following ergonomic guidelines when setting up and using your computer:

- Position your computer so that the monitor and keyboard are directly in front of you as you work. Special shelves are available (from Dell and other sources) to help you correctly position your keyboard.
- Set the monitor at a comfortable viewing distance (usually 510 to 610 millimeters [20 to 24 inches] from your eyes).
- Make sure the monitor screen is at eye level or slightly lower when you are sitting in front of the monitor.
- Adjust the tilt of the monitor, its contrast and brightness settings, and the lighting around you (such as overhead lights, desk lamps, and the curtains or blinds on nearby windows) to minimize reflections and glare on the monitor screen.
- Use a chair that provides good lower back support.
- Keep your forearms horizontal with your wrists in a neutral, comfortable position while using the keyboard or mouse.
- Always leave space to rest your hands while using the keyboard or mouse.
- Let your upper arms hang naturally at your sides.
- Sit erect, with your feet resting on the floor and your thighs level.
- When sitting, make sure the weight of your legs is on your feet and not on the front of your chair seat. Adjust your chair's height or use a footrest, if necessary, to maintain proper posture.
- Vary your work activities. Try to organize your work so that you do not have to type for extended periods of time. When you stop typing, try to do things that use both hands.



1	monitor screen at or below eye level	4	feet flat on the floor
2	monitor and keyboard positioned directly in front of the user	5	arms at desk level
3	monitor stand	6	wrists relaxed and flat

SECTION 1

# Microsoft<sup>®</sup> Windows<sup>®</sup> XP Features

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Overview

New User Interface

Files and Settings Transfer Wizard

Application and Device Compatibility

System Restore

User Accounts and Fast User Switching

Home and Small Office Networking

Internet Connection Firewall

## Overview

Based on an enhanced version of the Windows 2000 operating system, Windows XP is available in consumer and business editions: Windows XP Home Edition and Windows XP Professional. The features discussed are available in both editions, but the Professional version, designed for business environments, includes additional productivity, security, networking, and management features important in business environments.

For home users, Windows XP brings the significantly increased stability and security inherent in the Windows 2000/Windows NT<sup>®</sup> operating systems. It also provides better support for portable computers. Key new Windows XP features include:

- An improved desktop and user interface
- Files and Settings Transfer Wizard
- Application program compatibility enhancements
- System Restore
- Fast User Switching\*
- Expanded home and small office networking functions\*
- A personal firewall for always-on Internet connections\*

\*Home and small office features

## Help and Support Center

The Help and Support Center, introduced with Microsoft Windows Millennium Edition (Me), replaces Windows Help from earlier operating systems. The Help and Support Center provides an integrated resource center for information and assistance in using, configuring, and troubleshooting your computer and installed hardware devices and software. For Windows XP, the Help and Support Center features expanded search capabilities, including full-text search and the capability to search across multiple remote sites in addition to files resident on the hard drive. You can use a single print command to print an entire chapter of help content.



To open Help and Support Center, click the **Start** button, and then click **Help and Support**. From the home page, you can conduct a search or select categories of information, leading to task and information topics covering the use of your computer. Click **User and System Guides** for information on using your Dell™ computer, including installed hardware devices and software.

## New User Interface

Windows XP features a redesigned user interface with a new visual style, a less cluttered desktop, and built-in desktop cleanup features. Window layout has also been changed for Windows XP and, as in the Control Panel, emphasizes task presentation. The **Start** menu has been redesigned. The left half of the new **Start** menu includes the most frequently used icons. As you use your computer, the icons in this area are changed and rearranged depending on your computer usage patterns. If you wish to keep one of the icons permanently in its location, right-click the icon and click **Pin to Start menu**.

To access all the programs installed on the computer, click **All Programs** at the bottom of the **Start** menu. The right half of the new **Start** menu contains useful icons for accessing your files, configuring the computer, and finding information and assistance. The **Dell Solution Center** icon opens a portal to services and application programs installed on your Dell computer.

### Switching to Classic View

If you wish, you may change the appearance of the **Start** menu, desktop and windows, or **Control Panel** layout to that of earlier Windows operating systems. These *classic view* options are independent of each other.

You can easily switch back and forth between the new Control Panel category view and the classic icon view by clicking **Switch to Classic View** or **Switch to Category View** in the upper left area of the **Control Panel** window. This can be handy if you would like to take advantage of the new, task-oriented features of the Windows XP Control Panel, but you are accustomed to performing a particular task with the icon-oriented classic Control Panel.

To change the appearance of the **Start** menu to the classic view:

- 1 Right-click the empty area on the task bar.
- 2 Click **Properties**.
- 3 Click the **Start Menu** tab.
- 4 Select **Classic Start Menu** and click **OK**.

If you prefer the classic window and button appearance, perform the following steps:

- 1 Right-click anywhere on the main desktop screen and click **Properties**.
- 2 Click the **Appearance** tab.
- 3 From the **Windows and buttons** dropdown box, select **Windows Classic style**.
- 4 To customize color, font, and other classic desktop options, click **Advanced**.
- 5 When you have completed your appearance selections, click **OK**.

### **Clean Desktop Wizard**

Another feature of Windows XP is the Desktop Cleanup Wizard. The wizard runs 7 days after you first start your computer and every 60 days after that. The Desktop Cleanup Wizard first opens a dialog box informing you that there are unused icons on the desktop and asking whether you want to run the wizard. If you elect to run the wizard, it places unused desktop icons in the folder **C:\Desktop Icons**.

The default for the Desktop Cleanup Wizard is on. To turn the wizard off:

- 1 Right-click anywhere on the main desktop screen and click **Properties**.
- 2 Select the **Desktop** tab and click **Customize Desktop**.
- 3 In the **Desktop cleanup** options make sure that the **Run Desktop Cleanup Wizard every 60 days** box is not checked.

You can run the Desktop Cleanup Wizard anytime by following these steps:

- 1 Right-click anywhere on the main desktop screen and select **Properties**.
- 2 Click the **Desktop** tab and click **Customize Desktop**.
- 3 Click **Clean Desktop Now**.

- 4 When the **Desktop Cleanup Wizard** welcome screen appears, click **Next>**.
- 5 In the **Shortcuts** list, deselect any shortcuts you want to leave on the desktop, and then click **Next>**.
- 6 Click **Finish** to remove the shortcuts and close the wizard.

The shortcuts are moved to the folder **C:\Desktop Icons**.

To access desktop icons removed by Windows XP, click the **Start** button, and then click **Dell Solution Center**.

### **Taskbar Grouping**

The Windows taskbar is a row of buttons that typically displays across the bottom of the screen. The taskbar includes the **Start** menu button and a button for each open application. (The taskbar also includes the **Quick Launch** icons and the notification area.) Windows XP groups multiple instances of the same application on the taskbar. For example, if six instances of Internet Explorer are open, each displaying a button on the taskbar, Windows XP groups the buttons next to one another on the taskbar. If space becomes an issue on the taskbar, Windows XP consolidates all the Internet Explorer buttons into a single button. When clicked, that button expands to a menu of the six Internet Explorer active sessions.

### **Notification Area Cleanup**

Over time, software icons tend to proliferate in the notification area, the area in the bottom right corner of the Windows desktop. Windows XP detects when icons in the notification area are not being accessed and hides them. A caret, or chevron, button indicates that there are hidden icons that can be viewed by selecting the button. You can also configure the notification area manually by right-clicking the taskbar, selecting **Properties**, and then clicking **Customize...** in the **Taskbar and Start Menu Properties** window. For example, you may choose to hide the antivirus program icon because it is rarely accessed, but display the audio volume icon because it is used frequently. The notification area cleanup feature is automatically enabled when the operating system is installed, but you may disable it by unchecking **Hide inactive icons** in the **Taskbar and Start Menu Properties** window.

## Files and Settings Transfer Wizard


The Files and Settings Transfer Wizard is used to migrate personal files and settings from one computer to another (for instance, when upgrading to a new computer). Personal files include the documents, images, spreadsheets, presentations, and e-mail messages on your computer. User settings include display properties, window sizes, toolbar settings, dial-up connections, Internet bookmarks, and so forth on your computer. The Files and Settings Transfer Wizard is run on a source (old) computer to collect the data and is run again on the destination (new) computer to import the data. If the old computer is using an earlier operating system, the wizard can be launched either from the Windows XP CD or from a diskette created on the new Windows XP computer. You transfer the data to the new computer over a network or direct serial connection, or store it on a removable medium such as a floppy disk, Zip disk, or writable CD.

To use the Files and Settings Transfer Wizard:

- 1 On the new Windows XP computer, click the **Start** button, point to **All Programs**—> **Accessories**—> **System Tools**, and click **Files and Settings Transfer Wizard**.
- 2 On the **Files and Settings Transfer Wizard** welcome screen, click **Next**>.
- 3 On the **Which computer is this?** screen, select **New Computer**, and then click **Next**>.

The **Do you have a Windows XP CD?** screen appears.


The Files and Settings Transfer Wizard guides you through the steps necessary to transfer user settings, personal files, or both to the new computer. If a CD drive is not available, the wizard allows you to create a wizard diskette to run on your old computer.

 **NOTE:** The time required to collect and transfer data depends on the amount of data collected. Times can vary from just a few minutes to several hours.

## Application and Device Compatibility

Although Windows XP is designed to be compatible with a wide range of application programs and hardware devices, some older programs and devices may not be usable. Check the Microsoft Web site at [www.microsoft.com](http://www.microsoft.com) for application programs and hardware devices known to be compatible. When buying new software and devices, look for those that are labeled as ready for Windows XP. If you encounter problems using an application program designed for an earlier Windows operating system, Windows XP provides a compatibility mode feature (see “[Program Compatibility Wizard](#)”). If you are unsuccessful at installing application programs or hardware devices designed to operate on earlier Windows operating systems, contact the manufacturer of the product for information or updates for Windows XP.

Windows XP also includes a new technology that addresses the problems sometimes encountered on previous operating systems with Windows application programs that, when installed, replace current versions of certain Windows files with older versions. This situation can cause problems with the newer application programs, which rely on the replaced files. To eliminate this problem and improve operating system stability, Windows XP manages multiple versions of files and invokes the correct version required by a program.

 **NOTE:** If you experience problems with your operating system or other applications after performing an installation, you can use [System Restore](#) to return your computer to a previous stable condition.

### Program Compatibility Wizard

A program compatibility feature is provided in Windows XP that solves some issues that may be encountered when attempting to run older application programs. Using the Program Compatibility Wizard, you can configure a program to run in an environment closer to Windows 95, Windows 98/Me, Windows NT 4.0 with Service Pack 5, or Windows 2000.

To use the Program Compatibility Wizard:

- 1 Click the **Start** button, point to **All Programs**—> **Accessories**, and click **Program Compatibility Wizard**.
- 2 When the welcome screen appears, click **Next**>.

- 3 Select how you want to locate the program to run with compatibility settings: from a list, available on a CD, or manually located. Then click **Next>**.
- 4 Select the type of operating system for which the program was designed or on which it ran successfully, and then click **Next>**.
- 5 If necessary, as for some games, select display settings for the program.
- 6 Click **Next>**.
- 7 To test the compatibility settings for the program, click **Next>**.  
After you have determined whether the program is running correctly, return to the **Program Compatibility Wizard** window.
- 8 Select **Yes** if the program ran correctly, **No, try different compatibility settings**, or **No, I am finished trying compatibility settings** and click **Next>**.
- 9 Select either **Yes** to send information about the settings you used and whether they fixed the problem, or select **No**, and then click **Next>**.
- 10 Click **Finish** to close the wizard.

## System Restore


The System Restore feature of Windows XP provides the capability to restore the operating system, in the event of a problem, to a previous state without losing personal data files (such as Word documents, drawings, or e-mail).

System Restore actively monitors system file changes and some application file changes to record or store previous versions before the changes occurred. System Restore maintains a rolling record of restore points; to limit the amount of space used, older restore points are purged to make room for newer ones.

In the event of a serious operating system problem, System Restore can be used from Safe Mode or Normal Mode to go back to a previous system state, restoring optimal system functionality.



**NOTE:** System Restore does not revert user data or document files, so restoring does not cause loss of work, mail, or browsing history and favorites.

 **NOTE:** Dell recommends that you make regular backups of your data files. System Restore does not monitor changes to or recover your data files. In the event the original data on the hard drive is accidentally erased or overwritten or becomes inaccessible because of a hard-drive malfunction, backup files are required to recover lost or damaged data.

## Using System Restore

System Restore monitors a core set of system and application program files, recording and sometimes copying states of these files before changes are made. System Restore automatically creates restore points; no user intervention is required. In addition, you can create restore points manually, if desired.

Restore points are created to allow you to choose previous system states. Each restore point gathers the necessary information needed to restore to a precisely chosen system state. There are three types of restore points:

- System (automatically created) restore points (scheduled by your computer)
- Installation (event-triggered) restore points (when a program is installed)
- Manual restore points (created by you as needed)

### Scheduled Automatic Restore Points

By default, System Restore creates a restore point every day that the computer is running. If your computer is off for more than a day, a new restore point is created the next time you turn the computer on.

### Event-Triggered Restore Points

Event-triggered restore points are created before key changes are made to the system. System Restore automatically creates a restore point before the following events:

- *Application installations* — System Restore creates a restore point before you install an application program designed for Windows XP. You may wish to create a manual restore point before attempting to install an older program.

- *AutoUpdate installation* — When you choose to install the update, System Restore creates a restore point before the actual installation of the update begins.
- *Restore operation* — The restore operation itself also creates a restore point for undo purposes.
- *Microsoft Backup Utility recovery* — Before Microsoft Backup Utility (only available in Windows XP Professional) performs a backup recovery, System Restore creates a restore point.
- *Unsigned driver installation* — The INF installer of Windows detects unsigned device-driver installations. Drivers that are signed (electronically certified by the device manufacturer) do not generate a restore point.

### Manual Restore Points

If you are logged on to the computer as computer administrator or as a user with administrator rights, you may create and name an on-demand restore point. (For information on types of user accounts, see “[How to Add Users.](#)”) This is useful to create a checkpoint to return to before making a particularly risky change, before leaving a shared system to other users, or at a particular state you believe is optimal.

To create a restore point, perform the following steps:

- 1 Click the **Start** button, point to **All Programs—> Accessories—> System Tools**, and then click **System Restore**.
- 2 Select **Create a restore point** and click **Next>**.
- 3 Type a description of the restore point and click **Create**.

The date and time are automatically added to the description of the new restore point.

### Restore Process

As the computer is used over time, restore points are collected in the archive without any management or intervention. If you encounter operating system problems, you can use the System Restore feature to select any of the restore points presented through the System Restore Wizard.

If problems occur after installing a device driver, you should first attempt to use [Driver Rollback](#). If that is unsuccessful, then use System Restore.



To return your computer to a previous, stable condition, perform the following steps:

- 1 Click the **Start** button, point to **All Programs—> Accessories—> System Tools**, and then click **System Restore**.

- 2 Select **Restore my computer to an earlier time** and click **Next>**.

The **Select a Restore Point** screen appears. The calendar on the left indicates in bold the dates on which restore points were created.

- 3 Click a date, click a restore point for that date, and click **Next>**.

- 4 Click **Next>** to confirm the restore point selection and complete the restore process.

After System Restore finishes collecting data, the computer automatically restarts and the **Restoration Complete** screen appears.

- 5 Click **OK**.

If you are not satisfied with the results of the restoration, you can repeat the preceding steps, using a different restore point, or you can undo the restoration.

To undo a restoration, perform the following steps:

- 1 Click the **Start** button, point to **All Programs—> Accessories—> System Tools**, and then click **System Restore**.

- 2 Select **Undo my last restoration** and click **Next>**.

- 3 Click **Next>** to confirm the restoration undo.

After System Restore finishes collecting data, the computer automatically restarts and the **Undo Complete** screen appears.

- 4 Click **OK**.


## Driver Rollback

Windows XP device Driver Rollback can replace a device driver with the previously installed version. When you install a new device driver that causes system instability, use Driver Rollback to reinstall the previous drivers. In the event that Driver Rollback cannot reinstall your previous driver, you can use System Restore to return your operating system to its state before the new device driver installation.

To use Driver Rollback, perform the following steps:

- 1 Click the **Start** button, and then right-click **My Computer**.
- 2 Click **Properties**.
- 3 Click the **Hardware** tab, and then click **Device Manager**.
- 4 In the **Device Manager** window, right-click the device for which the new driver was installed, and then click **Properties**.
- 5 Click the **Drivers** tab, and then click **Roll Back Driver**.

## User Accounts and Fast User Switching

 **NOTE:** Fast User Switching is the default user screen for both Home and Professional editions, but is disabled in Windows XP Professional when the computer is a member of a computer domain.

Microsoft Windows XP includes a new feature that provides multiuser access to a single computer. Fast User Switching, which is available in both the Home and Professional editions, allows users to access the computer with their specific settings, including the desktop and various applications, without requiring the previous user to log off. New users log on and switch from the original user's session to their own. New users can run their desktop and applications without interfering with the original user. When the original user returns, that user can switch back to the desktop and applications with the original settings. All of this is accomplished without the delay of each individual user logging off the computer.

During setup, the computer administrator creates all the accounts that will be used on the computer. (For information on types of accounts and adding new accounts, see “[How to Add Users](#).”) When the computer starts, the main user **Welcome** screen appears with all of the user names. From this screen you select an account and log in to that session.

### How to Use Fast User Switching

To access Fast User Switching, perform the following steps:

- 1 Click the **Start** button and click **Log Off**.
- 2 When the **Log Off Windows** screen appears, click either **Switch User** or **Log Off**.

When you select **Switch User**, the main user **Welcome** screen appears. You can then select your account name and log in. Your personal desktop appears.

### **What Happens When a Fast User Switch Occurs?**

When a fast user switch occurs, the original user is not logged off the computer as previously happened on other Microsoft operating systems. On Windows XP, the user's logon remains active, but is replaced by the new user. Users can switch between login IDs as often as they want.

However, user applications active during a user switch remain active and running in the background while the new user is working; this can result in a slower computer until the process finishes. For example, if one user is downloading a large file from the Internet and another user logs on to the computer, the file download continues in the background until it is complete.

While most applications continue to run in the background during a fast user switch, multimedia applications do not. Because multimedia applications use resources that cannot easily be shared between different users on a single computer, those applications terminate during the user switch, allowing the new user to take full advantage of the multimedia capabilities.

### **Special Considerations With Fast User Switching**

Considerations when using Fast User Switching include:

- Some older Windows games may not operate with a fast user switch.
- Multimedia games may shut down on a fast user switch.
- DVD software shuts down and requires a restart when the user comes back.
- Computers with low memory configurations can experience problems. The computer uses memory to keep the first user's programs running in the background while the second user is logged on. On computers with limited memory, this can cause the entire computer to run slowly. Fast User Switching is off by default on computers with less than 128 megabytes (MB) of random-access memory (RAM).

Fast User Switching is unavailable if the computer has Windows XP Professional installed and is a member of a computer domain.

### How to Turn Off Fast User Switching

You must have a computer administrator account on the computer to turn off Fast User Switching. (For information on types of accounts, see [“How to Add Users.”](#))

To disable Fast User Switching, perform the following steps:

- 1 Click the **Start** button, and click **Control Panel**.
- 2 In the **Control Panel** window, click **User Accounts**.
- 3 Under **Pick a task**, click **Change the way users log on or off** and do one of the following:
  - Select the **Use Fast User Switching to log off** check box to enable Fast User Switching.
  - Deselect the **Use Fast User Switching to log off** check box to disable Fast User Switching.
- 4 Click **Apply Options**.

### How to Add Users

Only a computer administrator or a user with administrator rights can create multiple user accounts. The individual who performs the initial operating system setup creates a computer administrator account and can add any number of users during the initial setup. All user accounts created during setup have administrator rights.

After initial operating system setup, the computer administrator or a user with administrator rights can create additional user accounts.

To add users, perform the following steps:

- 1 Click the **Start** button, and click **Control Panel**.
- 2 In the **Control Panel** window, click **User Accounts**.
- 3 In the **User Accounts** window under **Pick a Task**, click **Create a new account**.
- 4 In the box under **Name the new account**, type the name of the new user. Click **Next>**.

**5** Under **Pick an account type**, click the bullet next to the type of account you are going to create — **Computer administrator**, **Standard**, or **Limited**.

- Computer administrators can change all computer settings.
- Standard account users (Windows XP Professional only) can install some programs and hardware.
- Limited account users can change only a few settings such as their own passwords.

**6** Click **Create Account**.

After the accounts are created, each shows up on the Fast User Switching Welcome screen.

## Home and Small Office Networking

The Network Setup Wizard includes a checklist and steps to guide you through the process of sharing resources, such as files, printers, or an Internet connection, between computers in a home or small office. In Windows XP, Microsoft has improved the online documentation and usability of operating-system tools for setting up a home or small office network. New features in the operating system include support for the Point-to-Point Protocol over Ethernet (PPPoE) and a built-in firewall.

### Network Setup Wizard

The Home Network Wizard first appeared in Windows Me. To make setting up a home or small office network easier, Microsoft developed an enhanced Network Setup Wizard for Windows XP. This version provides more complete online documentation and support for setting up a home or small office network. The new wizard automatically enables the personal firewall discussed later in this section (see “[Internet Connection Firewall](#)”).

To use the wizard, perform the following steps:

- 1** Click the **Start** button, point to **All Programs**—> **Accessories**—> **Communications**, and click **Network Setup Wizard**.
- 2** When the welcome screen appears, click **Next**>.
- 3** Click **checklist for creating a network**.

The checklist leads you through the steps necessary to set up a home or small office network and provides extensive references for each step. When you have completed the necessary connections and preparations, return to the **Network Setup Wizard**.

- 4 Select the Internet connection method and click **Next>**.
- 5 Select the Internet connection and click **Next>**.
- 6 Type a description of the computer and a computer name, and then click **Next>**.
- 7 Review the network settings and click **Next>** to finish the setup.
- 8 When the setup process is complete, click **Finish** to close the wizard.

## Internet Connection Firewall

Today's always-on cable modem and DSL Internet access connections offer unprecedented bandwidth to the home, but also leave the connected computer or home network vulnerable to hacker attacks. The nature of these attacks varies, but the goal is to gain access to individual computers attached to the Internet. With this access, a hacker can browse the hard drive and add or delete files, discover passwords and credit card numbers, and set the system up to launch attacks on other systems or websites. As a result, firewall protection from these attacks is increasingly required on computers. Recognizing this need, Microsoft provides an integrated firewall in Windows XP to provide immediate protection from outside access attempts. When enabled, the Internet Connection Firewall provides basic protection suitable for most home and small office users.



**NOTE:** Enabling the Internet Connection Firewall does not reduce the need for virus-checking software.

The firewall is automatically enabled when you run the Network Setup Wizard. When the firewall is enabled for a network connection, its icon appears with a red background in the **Network Connections** portion of the Control Panel. The Internet Connection Firewall can be applied to each Internet connection on the computer. The firewall also provides basic logging capabilities. Not all events that appear in the log are hacker attacks. Many different types of harmless events can appear in the log, such as routine checks by an Internet Service Provider to verify the presence of your computer (pings).

The firewall is configured using the **Properties** dialog box associated with each Internet connection in the Control Panel. The firewall can be enabled or disabled. Additional configuration options are available for more advanced users. These advanced options include the ability to open or close specific Transmission Control Protocol (TCP) or User Datagram Protocol (UDP) ports or to enable port redirection. Port redirection allows access requests to a specific port on the firewall (such as port 80, the Web server port) to be automatically redirected to another computer on the local network. This capability allows a Web server on a home network to be protected by an edge firewall.







# Glossary

## A

*Ampere.* A measurement of current in an electrical conductor.

## AC

*Alternating current.* Electricity that reverses its direction at a rate of 60 times per second (50 times per second in some countries). See [DC](#).

## Accelerator

A computer component that enhances the processing speed of a particular [device](#), usually by taking over some of the tasks originally assigned by that device. For example, a video accelerator card will take over some of the graphic functions originally assigned to the [microprocessor](#).

## ACPI

*Advanced Configuration and Power Interface.* An industry standard developed by Intel<sup>®</sup>, Microsoft<sup>®</sup>, and Toshiba for computer power management. The key element of the standard is that the [OS](#) controls power management. In previous standards, most of the power management tasks were run by the [BIOS](#), with limited intervention by the OS. In ACPI, the BIOS communicates with hardware components in the computer, but the OS controls power management operations.

## AGP

*Accelerated graphics port.* A high-speed graphics port that produces fast communication between the graphics controller and computer. It allows the video controller to directly access the computer's main memory and bypass the [PCI](#) bus. A video [expansion card](#) installed in this port can run almost twice as fast as that in a PCI slot. This also helps to reduce the traffic on the PCI bus.

## ANSI

*American National Standards Institute.* An organization that publishes standards for data alphabets, codes, and signaling schemes. See [ISO](#).

**API**

*Application Program Interface.* The interface through which an application program accesses the [OS](#) and other services.

**APIC**

*Advanced programmable interrupt controller.* Prioritizes and manages [IRQs](#) for the various devices in a [PC](#). Without an APIC, the microprocessor must control [IRQs](#).

**ASCII**

*American Standard Code for Information Interchange.* The basis of character sets used in many present-day computers. ASCII can be used to convey some [control codes](#), the space character, numbers, most basic punctuation, and unaccented lower- and upper-case letters.

**AT**

*Advanced Technology.* An IBM® [PC](#) introduced in 1984 that has an Intel 80286 [microprocessor](#), 16-bit [bus](#), and 1.2 [MB](#) floppy drive.

**ATA**

*Advanced Technology Attachment.* A specification for drive interface. See [IDE](#).

**ATAPI**

*Advanced Technology Attachment Packet Interface.* An interface used to connect [CD](#), tape, and other drives with a computer.

**Binary**

A system of numbers having 2 as its base and using 0 and 1 for its notation. Binary code is used by computers because it works well with digital electronics and logic.

**BIOS**

*Basic input/output system.* Composed of software and data stored on a [ROM](#) chip. The BIOS initializes communication between the [microprocessor](#) and [devices](#) such as the keyboard and video adapter. The BIOS also controls system functions such as error messages and beep codes. The BIOS can be updated, or “flashed,” which can correct errors, support new hardware, and so on. [System setup](#) allows you to configure certain options in the BIOS.

**Bit**

A shortened reference to *binary digit*. A bit is the smallest unit of storage and represents a quantity that can have only one of two possible values, such as true or false, or 0 or 1.

**Boot Sequence**

Allows you to specify the order of the devices from which the system attempts to boot.

**bps**

*Bits per second*. A measurement of data transmission speed.

**Bps**

*Bytes per second*. A measurement of data transmission speed.

**BTU**

*British Thermal Unit*. A measurement of thermal energy that equals approximately 1055 joules (or 1055 watt-seconds), or the amount of thermal energy necessary to raise the temperature of one pound of pure liquid water by one degree **F** at the temperature at which water has its greatest density (39 °F).

**Bus**

An electronic pathway that links computer components such as the **microprocessor**, **RAM**, **expansion cards**, and so on. The “width” of a bus indicates the amount of data that can move along the bus and is determined by the number of parallel conductors in the bus. For example, a 32-bit bus has 32 conductors and can move 32 **bits** of data at once.

**Bus Speed**

The speed, given in **MHz**, that indicates how fast a **bus** can transfer information. For example, **PCI** bus speeds are 33 or 66 MHz, and the **AGP** bus speed is 66 MHz. Intel Pentium® **microprocessors** have bus speeds of 66 or 100 MHz. The microprocessor operating speed is determined by a combination of the bus speed and multiplier; for example, 100 MHz bus speed x 4.5 multiplier = 450 MHz microprocessor speed.

**Byte**

A measurement of data storage that equals eight contiguous **bits** of information.

**C**

*Celsius*. A measurement of temperature that equals the conversion formula  $(T_f - 32) * (5 / 9)$ , where  $T_f$  equals temperature in **F**.

**Cache**

An area of high-speed **RAM** set aside to store frequently accessed data. When data is accessed, a copy is stored in cache memory. The next time the **microprocessor** looks for information, it first checks the cache. If the data is

there, the microprocessor retrieves it from the much-faster cache memory. Drive caching and RAM caching significantly improve the overall speed of the computer. See also [L1 Cache](#) and [L2 Cache](#).

**CD**

*Compact disc.* An optical form of storage media, typically used for audio and application programs.

**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, then erased and written over (rewritten).

**Chip**

See [IC](#).

**CIM**

*Common Information Model.* CIM allows remote management application programs to access system management information on a client computer running any Microsoft Windows<sup>®</sup> OS that includes the [WBEM](#) core components.

**Clock Speed**

The speed, given in [MHz](#), that indicates how fast computer components operate that are connected to the system [bus](#). The speed is generated by a quartz crystal on the system board that acts as a kind of metronome. Components that are synchronized with the clock speed can run faster or slower, but their speed is determined by multiplying or dividing a factor by the clock speed.

**cm**

*Centimeter(s).* A measurement of length equal to 0.39 inch.

**CMOS**

*Complementary metal-oxide semiconductor.* Memory [chips](#) that are often used for [NVRAM](#) storage.

**COA**

*Certificate of Authenticity.* The Microsoft Windows COA is a 25-digit alphanumeric code located on a sticker on your computer. You need the COA to

complete the [OS](#) setup or reinstallation. Also referred to as the [Product Key](#) or [Product ID](#). For more information, see <http://support.dell.com>.

### **COM Port**

A shortened reference to *communications* port. The typical designation for a [serial](#) connection to a modem or other serial [device](#). Most computers support one or two serial connectors designated as COM1 and COM2.

### **Control Code**

An [I/O](#) character that causes an action rather than appears as part of the data. You can input most control codes by simultaneously pressing the <Ctrl> key and a letter or character on the keyboard. Some control codes usually have their own assigned keys, such as <Escape>, <Tab>, <Delete>, <Backspace>, and <Enter>. Different [OSs](#) and programs have their own conventions for what effect certain control codes will have, such as interrupting the current process or suspending output. Control codes can also be used to affect an output [device](#), such as causing a printer to start a new line of text.

### **Controller**

Part of a computer, typically a separate circuit board or [chip](#), that allows the computer to use certain kinds of [devices](#). Types of controllers include [hard-drive](#), network, keyboard, interrupt, and graphics controllers.

### **COO**

*Cost of ownership*. Business asset data that helps an organization collect and track information about its assets. COO data is contained in a file on a computer, defining the fiscal aspects of the computer, such as ownership status, warranty information, lease configuration, acquisition information, and so on. The computer is a technology investment, and COO business asset data provides organizations with information they can use to target the reduction of maintenance and support costs, as well as to assist system integrators track the cost of computers they provide for their customers.

### **CPU**

*Central processing unit*. A computer [chip](#) that interprets and executes program instructions. Also referred to as the [microprocessor](#).

### **CRIMM**

*Continuity [Rambus](#) in-line memory module (RIMM)*. Module that provides electrical continuity through the [Rambus](#) channel when the channel is not fully populated. All [Rambus](#) slots in a system must be filled with either a RIMM or a CRIMM.

**D-Sub**

See [Subminiature-D](#).

**DAT**

*Digital audio tape.* A type of magnetic tape originally designed for audio format, now also used in computers to back up data. DAT cassettes are about the physical size of audio cassettes and can store numerous [GB](#) of data.

**Data Striping**

The segmentation of logically sequential data, such as a single file, so that segments can be written to multiple [devices](#), usually hard drives, in a round-robin manner. This method is useful if the [microprocessor](#) is capable of transferring data faster than a single drive can supply or accept it. While data is being transferred from the first drive, the second drive can locate the next segment.

**dB**

*Decibel(s).* A measurement of relative loudness of a sound or, in electronics, for the relative difference between two power levels.

**DC**

*Direct current.* An electric current flowing in one direction only. See [AC](#).

**DCE**

*Data communication equipment.* In computer data transmission, DCE is the [RS-232](#) interface that a modem or other [serial](#) device uses to exchange data with the computer. See also [DTE](#).

**Device**

Any piece of equipment that is not part of the essential computer (such as the [microprocessor](#), [RAM](#), and data [buses](#)) but is connected to or installed in the computer. Some devices are installed inside the main part of the computer, such as the hard drive, [CD](#) drive, and [network adapter](#). Other devices are outside the computer, such as the printer, but are attached by a cable or wireless connection.

**DIMM**

*Dual in-line memory module.* A slim circuit board containing [RAM](#) chips, as does a [SIMM](#). DIMMs normally have 168 pins. See also [RIMM](#).

**DIN**

*Deutsche Industrie Normenausschuss*. A German standards organization and member of [ISO](#).

DIN is also a form of connector on your computer that is round, has 5 pins, and is typically used to connect [AT](#) keyboard cable connectors. See also [Mini-DIN](#).

**DMA**

*Direct memory access*. An electronic pathway or direct channel on which a [device](#) can bypass the [microprocessor](#) and transfer data directly to [RAM](#). A DMA channel is often one of the resources assigned when configuring an [expansion card](#) or [EIDE](#) drive. DMA is a recent alternative to [PIO](#).

**DMI**

*Desktop Management Interface*. A standard of [WfM](#) that provides a method to determine various management attributes of a computer through the use of a standard software interface.

**DMTF**

*Distributed Management Task Force*. An industry organization leading the development, adoption, and unification of management standards and initiatives for desktop, enterprise, and Internet environments. Working with key technology vendors and affiliated standards groups, the DMTF is enabling a more integrated and efficient approach to management.

**DRAM**

*Dynamic random-access memory (RAM)*. Referred to as “dynamic” because it must be regularly refreshed, unlike [SRAM](#), which retains a value as long as power is supplied. See also [RDRAM](#) and [SDRAM](#).

**DRDRAM**

*Direct Rambus dynamic random-access memory (RDRAM)*. Provides a 16-bit [bus](#), rather than the 8-bit [DRAM](#) bus. At a speed of 800 [MHz](#), the peak data transfer rate is 1.6 billion [Bps](#). DRDRAM uses [pipelining](#) to accelerate processing, allowing up to eight operations to be performed simultaneously.

**DTE**

*Data terminal equipment*. In computer data transmission, DTE is the [RS-232](#) interface that a computer uses to exchange data with a modem or other [serial](#) device. See also [DCE](#).

**DVD**

*Digital versatile disc.* An optical form of storage media, typically used for movies. DVD has improved capacity and bandwidth compared with the [CD](#). Most DVD drives support CD media as well.

**ECC**

*Error checking and correction.* A type of [RAM](#) that checks data that is being read or transmitted for errors and, when necessary, corrects the errors. See also [EDO](#).

**ECP**

*Extended Capabilities Port.* A [parallel port](#) design that provides improved bidirectional data transmission. Like [EPP](#), it uses [DMA](#) to transfer data and often improves performance. [Devices](#) such as printers that connect to the computer's parallel port are designed to take advantage of the ECP standard.

**EDO**

*Extended-data out.* A type of [RAM](#) that improves the time to read from memory on faster [microprocessors](#) such as the Intel Pentium. For faster computers, different types of [DRAM](#) are considered. See also [ECC](#).

**EIDE**

*Enhanced integrated device electronics.* An improved version of the [IDE](#) interface for hard drives and [CD](#) drives. EIDE uses Logical Block Addressing, which allows for hard-drive storage capacities greater than 528 [MB](#). It makes use of [DMA](#) channels and can address up to four drives. Also called fast [ATA](#).

**EMI**

*Electromagnetic interference.* Electrical interference caused by electromagnetic radiation.

**Energy Star**

A series of [EPA](#) requirements to decrease the overall consumption of electricity.

**EPA**

*Environmental Protection Agency.*

**EPP**

*Enhanced Parallel Port.* A [parallel port](#) design that provides improved bidirectional data transmission. Like [ECP](#), it uses [DMA](#) to transfer data and often improves performance. Many [devices](#) that connect to the computer's parallel port are designed to take advantage of the EPP standard.



**EPP/ECP**

*Enhanced Parallel Port (EPP)/Extended Capabilities Port (ECP)*. A [parallel port](#) design that provides improved bidirectional data transmission, using [DMA](#). EPP is for nonprinter [devices](#). ECP is for printers and scanners.

**EPRM**

*Erasable programmable read-only memory (ROM)*. A [chip](#) that can be erased and then reprogrammed.

**ESD**

*Electrostatic discharge*. A rapid discharge of static electricity that can damage computer [chips](#) and devices.

**Ethernet**

A network communications protocol. See also [Network Adapter](#).

**Expansion Card**

An electronic circuit board that installs in an [expansion slot](#) on the computer's system board, expanding the capabilities of the computer. Examples of expansion cards include, video, modem, and sound cards.

**Expansion Slot**

A connector or "slot" on the computer's system board that allows for the insertion of an [expansion card](#), connecting it to the computer's [bus](#).

**Express Service Code**

A numeric code located on a sticker on your Dell™ computer. This code is a mathematical conversion of the computer's [Service Tag Number](#) into a purely numeric format allowing for easy entry into Dell's automated call-routing system. Enter the Express Service Code, using a touch-tone telephone, when contacting Dell for assistance. For more information, see <http://support.dell.com>.

**F**

*Fahrenheit*. A measurement of temperature that equals the conversion formula  $(9 / 5) * T_c + 32$ , where  $T_c$  equals temperature in [C](#).

**FCC**

*Federal Communications Commission*. A U.S. agency responsible for enforcing communications-related regulations on how much radiation computers and other electronic equipment can emit.

**FSB**

*Front side bus.* The data path and physical interface between the [microprocessor](#) and [RAM](#).

**ft**

*Foot (feet).* A measurement of length that equals 12 inches.

**FTP**

*File Transfer Protocol.* A standard Internet protocol to exchange files between computers on the Internet. Like [http](#), which transfers [HTML](#) pages and related files, FTP is a protocol that uses the Internet's [TCP/IP](#) protocols.

**G**

*Gravities.* A measurement of weight and force.

**g**

*Gram.* A measurement of mass and weight.

**GB**

*Gigabyte.* A measurement of data or drive storage capacity that equals 1024 [MB](#) (1,073,741,824 [bytes](#)).

**GHz**

*Gigahertz.* A measurement of frequency that equals one thousand million [Hz](#), or one thousand [MHz](#).

**GUI**

*Graphical user interface.* Software that interacts with the user by means of menus, windows, and icons. Most applications that operate on the Microsoft Windows [OS](#) are GUIs.

**Hard-Drive Controller**

A computer component that provides an interface with an individual hard drive. With the introduction of [IDE](#), the controller was produced as a [chip](#) integrated into the hard-drive housing, whereas it was previously a dedicated [expansion card](#). See also [Controller](#).

**Heat Sink**

A piece of heat-conductive metal that can be attached to the top of a [chip](#), such as the [microprocessor](#), to draw heat away and allow the chip to operate at a cooler temperature.

**Hot-Swappable**

Indicates that a [device](#) can be connected to or disconnected from a computer while the computer is running. After the hot-swappable device is connected to the computer, the [OS](#) can immediately recognize and use the device.

**hr**

*Hour(s)*. A measurement of time that equals 60 [min](#).

**HTML**

*Hypertext Markup Language*. A set of codes inserted into an Internet web page intended for display on an Internet browser. The codes tell the browser how to display the contents of the web page.

**http**

*Hypertext Transfer Protocol*. A protocol for exchanging files between computers on the Internet. Each [URL](#) begins with [http://](#).

**Hz**

*Hertz*. A measurement of frequency that equals 1 cycle per second. Computers and electronic devices are often measured in kilohertz ([kHz](#)), megahertz ([MHz](#)), gigahertz ([GHz](#)), or terahertz ([THz](#)).

**I/O**

*Input/output*. An operation or [device](#) that enters and/or extracts data from the computer. For example, a keyboard is an input device, and a printer is an output device.

**I/O Address**

An address in [RAM](#) that is associated with a specific [device](#) (such as a [serial port](#), [parallel port](#), or [expansion slot](#)) and allows the [microprocessor](#) to communicate with that device.

**IC**

*Industry Canada*. The Canadian regulatory body responsible for regulating emissions from electronic equipment, much as the [FCC](#) does in the United States. IC polices the Canadian marketplace to ensure that equipment manufactured in or imported into Canada meet the proper emissions limits.

**IC**

*Integrated circuit*. A microelectronic semiconductor component consisting of many interconnected transistors and other devices. Also called a [chip](#). Examples include the [microprocessor](#), [hard-drive controller](#), and [RAM](#) chips.

**IDE**

*Integrated Device Electronics.* An [ATA](#) specification for drive interface. This is a common interface used primarily for hard drives and [CD](#) drives. This interface is commonly integrated directly into the computer's system board, and it allows up to four drives to communicate simultaneously with the computer. See also [EIDE](#).

**IP**

*Internet Protocol.* The protocol governing how data is sent from one computer to another on the Internet. See also [IP Address](#) and [TCP/IP](#).

**IP Address**

Each computer on the Internet has at least one [IP](#) address that uniquely identifies it from all other computers on the Internet. When you send or receive data on the Internet, it contains both the sender's and receiver's addresses. See also [TCP/IP](#).

**IPX**

*Internetwork packet eXchange.* A networking protocol from Novell® that interconnects networks that use Novell NetWare® clients and servers. See also [SPX](#) and [IPX/SPX](#).

**IPX/SPX**

*Internetwork Packet eXchange (IPX)/Sequenced Packet eXchange (SPX).* A Novell network communications protocol that functions similarly to [TCP/IP](#).

**IRQ**

*Interrupt request.* An electronic pathway assigned to a specific [device](#) so that the device can communicate with the [microprocessor](#). Each device connection must be assigned an [IRQ](#). For example, the first [serial port](#) in your computer is typically assigned to [IRQ4](#). Although two devices can share the same [IRQ](#) assignment, you cannot operate both devices simultaneously.

**ISA**

*Industry-Standard Architecture.* A standard for IBM-compatible [PCs](#) that extends the [bus](#) architecture to 16 [bits](#). It also allows for bus mastering, although only the first 16 [MB](#) of [RAM](#) are available for direct access. ISA is sometimes referred to as [AT bus architecture](#).

**ISO**

*International Organization for Standardization.* A voluntary organization founded in 1946, comprised of the national standards organizations of many countries. ISO determines international standards in many areas, including computers and communications. [ANSI](#) is the American member of ISO.

**Kb**

*Kilobit(s)*. A measurement of data that equals 1024 bits. A measurement of the capacity of memory integrated circuits. See also [KB](#).

**KB**

*Kilobyte(s)*. A measurement of data that equals 1,024 [bytes](#). 1024 KB equals 1 [MB](#).

**kg**

*Kilogram(s)*. A measurement of mass that equals 1,000 grams.

**kHz**

*Kilohertz*. A measurement of frequency that equals 1,000 [Hz](#).

**L1 Cache**

*Level 1 cache*. A small, very fast primary [cache](#) that is stored inside the [microprocessor](#). It is faster than the [L2 cache](#).

**L2 Cache**

*Level 2*. A larger, slower secondary [cache](#) used with the [L1 cache](#). In older [microprocessors](#), the L2 cache was usually external to the processor, contained on [chip\(s\)](#) or an [expansion card](#). On more recent processors the L2 cache is typically integrated into the processor.

**lb**

*Pound(s)*. A measurement of weight that equals 16 [oz](#) or 0.453592 [kg](#).

**LBA**

*Logical block addressing*. A defining feature of [EIDE](#) that allows a computer to address a hard drive larger than 528 [MB](#), up to 8.4 [GB](#) in data storage capacity. A logical block address is a 28-bit value that maps to a specific cylinder-head-sector address on the drive.

**LED**

*Light-emitting diode*. An electronic component that lights up when a current is passed through it.

**LIF**

*Low insertion force*. A type of socket or connector that allows a computer [chip](#) to be installed or removed with minimal stress applied to either the chip or its socket. See [ZIF](#).

**Local Bus**

A [bus](#) that allows [chips](#) and other components in the computer to access the [microprocessor](#) at a speed synchronized with the microprocessor [bus speed](#).

**LPT Port**

*Line print terminal.* The typical designation for a [parallel port](#) connection to a printer or other parallel device. Most computers support one or two parallel ports designated as LPT1 and LPT2.

**LVD**

*Low voltage differential.* A form of [SCSI](#) interface that will be formalized in the SCSI-3 specification. LVD uses less power than the present differential drive, is less expensive, and supports the higher speeds of Ultra-2 SCSI drives. LVD requires 3.3 [VDC](#) instead of 5 VDC, the previous standard.

**m**

*Meter.* A measurement of length that equals 39.37 inches.

**mA**

*milliAmpere.* A measurement of current that equals one thousandth of an [A](#).

**Mb**

*Megabit.* A measurement of memory [chip](#) capacity that equals 1024 [Kb](#).

**Mbps**

*Megabits per second.* A measurement of network and modem transmission speeds that equals one million bits per second.

**MB**

*Megabyte.* A measurement of data storage that equals 1,048,576 [bytes](#). 1 MB equals 1024 [KB](#). When referring to hard drive storage, the term is often rounded to mean 1 million bytes.

**MBA**

*Managed boot agent.* Provides multiple [PXE](#)s and allows a computer to boot from a network server.

**MBps**

*MB(s) per second.* A measurement of data transmission speed.

**Memory Address**

Addresses assigned to physical memory locations by the computer at start-up. These addresses allow [devices](#) and software applications to identify

information that the [microprocessor](#) can access. This process is referred to as [Memory Mapping](#).

### **Memory Mapping**

The process by which the computer assigns [memory addresses](#) to physical memory locations at start-up. [Devices](#) and software applications can then identify information that the [microprocessor](#) can access.

### **MHz**

*Megahertz*. A measurement of frequency that equals one million [Hz](#).

### **Microprocessor**

A computer [chip](#) that interprets and executes program instructions. Also referred to as the [CPU](#). See also [Bus Speed](#).

### **MIF**

*Management Information Format*. A syntax for describing information for manageable hardware and software components that can be installed on a computer. See also [COO](#), [WBEM](#), and [WfM](#).

### **min**

*Minute(s)*. A measurement of time that equals 60 [sec](#).

### **Mini-DIN**

A form of [DIN](#) connector that is round, has 6 pins, and is typically used to connect [PS/2](#) keyboard or mouse cable connectors.

### **mm**

*Millimeter*. A measurement of length that equals one thousandth of a meter or 1/25 inch.

### **Modem**

A shortened reference to *modulator/demodulator*. Modems convert analog data into digital data and vice-versa so that computers can communicate over telephone lines.

### **Monitor**

The high-resolution TV-like [device](#) that displays your computer's output.

### **ms**

*Millisecond*. A measurement of storage device access time that equals one thousandth of a second.

**MTBF**

*Mean time between failures.* A measurement of estimated equipment reliability. The higher the MTBF, the longer the equipment should last. For example, if the MTBF is 10,000 hours, the equipment should run, on the average, at least 10,000 hours before failing.

**Network Adapter**

An [expansion card](#) that connects a computer to other computers on a network. The network adapter works with the network [OS](#) to transfer information over the network. See [NIC](#).

**NIC**

*Network Interface Controller.* Also referred to as a [network adapter](#).

**NiCad**

*Nickel cadmium.* A chemical composition used in certain rechargeable batteries.

**NiMH**

*Nickel-metal hydride.* A chemical composition used in certain rechargeable batteries.

**Node**

In networking and communications, a node is any computer or [device](#) attached to a network.

**NVRAM**

*Non-volatile random-access memory (RAM).* Memory that does not lose its contents when you turn off your computer. NVRAM is used for maintaining the computer configuration information such as date, time, and other user-settable system setup options.

**On-Board**

Usually refers to components that are physically located on a circuit board. For example, the system boards of many present-day computers have integrated video, sound, and/or network [controllers](#).

**OS**

*Operating system.* The program that, after being loaded initially into the computer at start-up, manages all the other application programs in a computer. The application programs use the OS by making requests for services through an [API](#). Often the OS also allows direct interaction by the user.



**oz**

*Ounce.* A measurement of weight that equals 1/16 of a [lb](#).

**Parallel Port**

An [I/O](#) port on your computer that transfers data eight [bits](#) at a time. It uses a 25-pin, female [subminiature-D](#) connector, typically to connect a printer. Also referred to as an [LPT port](#).

**PBX**

*Private branch exchange.* A telephone system owned and operated by a private organization rather than the telephone company. This telephone system switches calls between users in the organization on internal lines while allowing users to share a certain number of external phone lines. The main purpose of a PBX is to save the cost of requiring a separate telephone line for each user.

**PC**

*Personal computer.* Commonly used to describe an IBM-compatible computer, as opposed to an Apple Macintosh computer.

**PCI**

*Peripheral Component Interconnect.* A standard for [expansion cards](#) developed by Intel Corporation. PCI is a [local bus](#) that supports 32- and 64-bit data paths, providing a high-speed data path between the [microprocessor](#) and [devices](#) such as video, drives, network, and so on. PCI devices are [PnP](#)-compliant.

**PET**

*Platform event trap.* A platform event is an alarm or specified condition that originates directly from a computer's [BIOS](#) or hardware components such as the [microprocessor](#) or a [chip](#). The event occurs independently of the [OS](#) or system management software and hardware. The platform event trap is a format used for communicating a platform event in an [SNMP](#) environment.

**PGA**

*Pin grid array.* A type of socket for a computer [chip](#). The PGA socket has all its pins lined up in even rows, as opposed to the [SPGA](#) socket, which has its rows staggered.

**Pipeline Processing**

A method of processing in which a task is performed in stages: the output of one stage is input to the next stage. This method speeds up processing by allowing several parts of multiple tasks to be run simultaneously.

**PIO**

Programmed input/output. A method of moving data between devices in a computer in which all data passes through the [microprocessor](#). The most recent [ATA/IDE](#) standard specifies higher data transfer rates, mode 3 at 11.1 [MBps](#) and mode 4 at 16.6 [MBps](#). A recent alternative to PIO is [DMA](#).

**Plug and Play**

Often referred to as *Plug-n-Play* or *PnP*. A technology that can automatically configure [devices](#) at start-up to use or share certain [IRQs](#). For this to work properly the computer's [BIOS](#) and [OS](#) must both support PnP, and all devices being configured must also be PnP-compliant. [PCI](#) devices are PnP-compliant.

**PME**

*Power management event*. An event that causes a computer to be remotely started, such as [Remote Wake Up \(WOL\)](#) or [WOR](#).

**PnP**

See [Plug and Play](#).

**Port**

A socket or plug on your computer that allows you to attach an external [device](#) by connecting its cable. See also [Parallel Port](#) and [Serial Port](#).

**POST**

*Power-on self-test*. Diagnostic programs, loaded automatically by the [BIOS](#) during start-up, that perform basic tests on the major computer components, such as [RAM](#), the hard drives, the keyboard, video, and so on. If there are no problems during the POST, the computer continues the start-up and loads the [OS](#).

**Product ID**

Also referred to as [Product Key](#). See [COA](#).

**Product Key**

Also referred to as [Product ID](#). See [COA](#).

**PS/2**

*Personal System/2*. A [mini-DIN](#) connector on your computer that is typically used to connect keyboard or mouse cable connectors.

## PXE

*Pre-boot eXecution Environment.* A standard of [WfM](#) that allows networked computers that do not have an [OS](#) to be configured and started remotely. PXE benefits include:

- The client computer does not necessarily need its own OS or even a hard drive.
- The client computer can be remotely shut down and restarted.
- Since PXE is an industry standard, new computers can easily be added to the network.

## RAID

*Redundant Array of Independent Disks.* A system of two or more drives working together for performance and fault tolerance. RAID drives are typically used on servers and high-end [PCs](#).

There are a number of different RAID levels. The three most common are 0, 3, and 5:

- **Level 0:** Provides [data striping](#) but no redundancy. This improves performance but does not provide fault tolerance.
- **Level 3:** Same as Level 0, but also reserves one dedicated drive for error correction data, providing good performance and some level of fault tolerance.
- **Level 5:** Provides data striping at the [byte](#) level and also stripe error correction information. This results in excellent performance and good fault tolerance.

## RAM

*Random-access memory.* The primary temporary storage area for program instructions and data. RAM is stored in [chips](#) on small circuit boards called [SIMMs](#), [DIMMs](#), or [RIMMs](#), that attach to the system board. RAM, unlike [ROM](#), is volatile, which means that, when you turn off your computer, any information stored in RAM is lost.

## Rambus

Rambus is a memory technology that is designed to work with existing system board standards as an alternative to [DRAM](#). See also [RIMM](#), [RDRAM](#), and [DRDRAM](#).

## RDRAM

*Rambus dynamic random-access memory (DRAM).* A memory subsystem that can optimally transfer up to 1.6 billion [bytes](#) of data per second. The subsystem consists of [RAM](#), the RAM controller, and the [bus](#) connecting RAM to the [microprocessor](#) and other devices in the computer. See also [DRDRAM](#).

**Remote Wake Up**

A standard of [WfM](#) that provides the ability either to remotely wake a computer from a low-power sleep state or to remotely start a computer that is turned off but connected to a power source. Remote Wake Up, typically used to conserve power in large network organizations and to remotely perform maintenance/configuration operations, must be supported by an [ACPI-compatible](#) computer. Additionally, to start by a network connection, the [network adapter](#) must support [WOL](#). To start by a telephone connection, the [modem](#) must support [WOR](#).

**RIMM**

*Rambus in-line memory module.* A slim circuit board containing [RDRAM chips](#). RIMMs are plugged into sockets on the computer's system board to add memory to the computer. They typically must be installed in matched pairs, meaning two sockets forming a pair must contain RIMMs of identical capacity, number of RDRAM chips, and speed. See also [SIMM](#) and [DIMM](#).

**RJ45**

A form of connector resembling a standard telephone jack that is typically used to connect [Ethernet](#) and [Token Ring network adapters](#) and cables. Unlike a telephone jack, an RJ45 connector has eight wires instead of two, four, or six.

**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 even after you turn off your computer. Some programs essential to the operation of your computer reside in ROM.

**RS-232**

A long-established standard describing the interface for [serial](#) data communication between computers and related devices. See also [DCE](#) and [DTE](#).

**RTC**

*Real-time clock.* Battery-powered clock circuitry on the system board that keeps the date and time after you turn off the computer.

**RTCST**

*Real-time clock reset.* A jumper on the system board that can often be used for troubleshooting problems.

**SCSI**

*Small computer system interface.* A high-speed interface that can be used to connect [devices](#) to a computer, such as hard drives, [CD drives](#), printers, and scanners. The SCSI can connect up to seven devices using a single controller. Each device is accessed by an individual ID number on the SCSI controller's [bus](#). See also [LVD](#).

**SDRAM**

*Synchronous dynamic random-access memory (DRAM).* A type of DRAM used on [DIMMs](#). SDRAM is synchronized with the computer [clock speed](#), operating at the same speed as the system [bus](#).

**sec**

*Second(s).* A measurement of time.

**Serial Port**

An [I/O](#) port on your computer that transfers data sequentially, one [bit](#) at a time. It uses either a 9-pin or a 25-pin, male [subminiature-D](#) connector, typically to connect a [device](#) such as a modem or mouse. Also referred to as a [COM port](#). See also [DCE](#) and [DTE](#).

**Service Tag Number**

A five to seven-digit alpha-numeric code located on a sticker on your Dell computer. This code is programmed into your computer's [system setup](#) by Dell during the manufacturing process. Dell customer support applications use the Service Tag to display all of the configuration and support history information for your specific computer. See also [Express Service Code](#). For more information, see <http://support.dell.com>.

**SIMM**

*Single in-line memory module.* A slim circuit board containing [RAM](#) chips. SIMMs can be plugged into sockets on the computer's system board to add memory to the computer. Depending on the computer, SIMMs may need to be installed in multiples of two or four. See also [DIMM](#) and [RIMM](#).

**SMART**

*Self-Monitoring And Reporting Tool.* A standard for developing hard drives and software systems that automatically monitors a hard drive's health and reports potential problems. Ideally, this should allow you to take proactive actions to prevent impending hard-drive failures.

**SMBIOS**

*System management BIOS.* A standard method by which the BIOS data of a [WfM](#)-compliant computer can be accessed remotely.

**SNMP**

*Simple Network Management Protocol.* The protocol governing network management and the monitoring of network equipment.

**SPGA**

*Staggered pin grid array.* A type of socket for a computer [chip](#). The SPGA socket has all its pins in staggered rows, as opposed to the [PGA](#) socket, which has its pins lined up in even rows.

**SPX**

*Sequenced packet exchange.* A transport layer protocol that works with [IPX](#) to ensure reliable data transmissions. See also [IPX/SPX](#).

**SRAM**

*Static random-access memory (RAM).* Referred to as “static” because it retains a value as long as power is supplied, unlike [DRAM](#), which must be refreshed regularly.

**Stepping**

A term used to indicate a manufacturing “version number” or “revision level” of an Intel [microprocessor](#). The initial version of a new processor is the A0 step. As revisions are made for functional fixes or manufacturing improvements, the stepping is increased. Intel recommends using identical steppings of processors in dual-processor systems.

**STP**

*Shielded twisted pair.* A common type of copper wiring used for [Ethernet](#) networks. STP wiring is constructed just like [UTP](#), having two insulated copper wires wound around each other to form a “twisted pair.” However, for some business locations, twisted pairs are also enclosed in a shield that functions as a ground.

**Subminiature-D**

D-shaped connectors on your computer that typically have 9, 15, or 25 pins and can be male or female. Also referred to as [D-Sub](#) connectors.

**System Setup**

A utility that allows you to configure user-selectable options in the [BIOS](#) such as date and time, or system password, as well as to set the current configuration information, including the amount of memory or type of hard drive installed.

**TAPI**

*Telephony Applications Programming Interface (API)*. Enables Microsoft Windows program applications to operate with a wide variety of telephony devices, including voice, data, fax, video, and so on.

**TCP/IP**

*Transmission Control Protocol (TCP)/Internet Protocol (IP)*. The basic communication protocol of the Internet. It can also be used in a private network. TCP/IP is a two-layer system. The higher layer, TCP, manages the assembling of a file into smaller packets that are transmitted by one computer over the Internet and received by the TCP layer on another computer. The receiving computer's TCP layer reassembles the packets into the original message. The lower layer, IP, addresses each packet so that it gets to the right destination. See [IP](#) and [IP Address](#).

**Token Ring**

A network communications protocol. See also [Network Adapter](#).

**TSR**

*Terminate-and-stay-resident*. A program application that is loaded, stays in [RAM](#) after it is terminated, and can be reactivated by pressing a designated "hotkey" or a combination of keys. Examples of TSRs are calculators and calendars. [OSs](#) like Windows have the ability to constantly switch back and forth between applications and thereby do not require TSRs.

**UDMA**

*Ultra DMA*. A hard drive protocol that allows the computer to take advantage of fast Ultra [ATA](#) drives.

**UL**

*Underwriters Laboratories, Inc.* U.S. Federal law mandates that all equipment used in a place of business be certified as safe by a nationally recognized test laboratory. In addition, many local electrical and building codes and ordinances require that products be certified by a nationally recognized test laboratory. Because UL is one of the most widely recognized test laboratories in the United States, many customers of large manufacturers make UL approval a mandatory requirement.

**UPS**

Uninterruptible power supply. A device that allows your computer to keep running for a limited amount of time after the primary power source is lost. Typically, a UPS can also provide protection against power surges.

**URL**

*Uniform Resource Locator.* A standard way of specifying the location of an object, such as an [HTML](#) document, on the Internet. Examples of URLs include the following:

- <http://www.dell.com>
- <http://support.dell.com>
- <ftp.dell.com>
- <mailto:info@dell.com>

The part before the first colon specifies the access scheme or protocol. Commonly implemented schemes include [FTP](#) and [http](#). The part after the colon is interpreted according to the access scheme and can introduce an [IP address](#), indicate a path or file on a server, or locate a particular position within a specified document.

**USB**

*Universal Serial Bus.* An interface for [devices](#) such as keyboards, joysticks, scanners, speakers, or printers, that provides a maximum transfer speed of 12 [Mb/second](#). Devices plug directly into a four-pin connector on your computer or into a multiport hub that connects to your computer. USB is [hot-swappable](#), and up to 127 devices can be connected in daisy-chain manner.

**UTP**

*Unshielded twisted pair.* A common type of copper wiring used for telephone systems and [Ethernet](#) networks. To reduce electromagnetic induction between pairs of wires, sometimes called “crosstalk,” two insulated copper wires are wound around each other to form a “twisted pair.” See also [STP](#).

**V**

*Volt.* A measurement of electric potential and electromotive force. If one volt is applied to a resistance of one ohm, a current of one ampere will flow across the resistance.

**VAC**

*Volt(s) alternating current (AC).*

**VDC**

*Volt(s) direct current (DC).*

**VRM**

*Voltage regulator module.* A component installed on the system board that senses the voltage requirements for a [microprocessor](#) and ensures that the correct voltage is maintained.



**W**

*Watt.* A measurement of electrical power that equals 1 ampere of current flowing at 1 volt.

**WBEM**

*Web-Based Enterprise Management.* A set of systems management and Internet standard technologies developed to unify the management of computing environments. The core set of WBEM standards, developed by [DMTF](#), include a data model, the [CIM](#) standard, a coding specification, and an [http](#) transport mechanism.

**WfM**

*Wired for management.* A specification developed by Intel to improve the manageability of desktop, mobile, and server computers. WfM defines software, hardware, and other capabilities that enhance computer network operations and reduce support costs by allowing remote management application programs to access client computers over a network. WfM technology is used in a client computer, in such components as circuitry, power supply, [network adapter](#), and so on. Remote management application programs can use WfM technology to access a client computer and gather information about it, monitor its status, or change its operational state. WfM standards include [DMI](#), [PXE](#), and [Remote Wake Up](#). WfM is also compatible with current and emerging industry specifications, such as [ACPI](#), [CIM](#), [SMBIOS](#), [SNMP](#), and [WBEM](#).

**WOL**

*Wake-on LAN.* Technology that allows a computer on a network to be remotely turned on or awakened from sleep mode. WOL is a facet of [WfM](#) technology. See also [WOR](#), [PME](#), and [Remote Wake Up](#).

**WOR**

*Wake-on Ring.* Technology that allows a computer to be remotely turned on or awakened from sleep mode through a modem. See also [WOL](#) and [PME](#).

**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. See [LIF](#).

