

Dell Precision™ WorkStation 530

# SERVICE MANUAL



## 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 potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

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7 May 2001 A00

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SECTION 1

## Before You Begin

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Safety First—For You and Your Computer  
Protecting Against Electrostatic Discharge







# Safety First—For You and Your Computer

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

## When Working Inside Your Computer

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

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

 **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.

### 1 Turn off the computer and any peripherals.

Disconnect your computer and devices from their power sources. Also, disconnect any telephone or network lines from the computer.

Doing so reduces the potential for personal injury or shock.

### 2 Wear a wrist grounding strap, and clip it to an unpainted metal surface, such as the padlock loop on the back of the chassis. If a wrist grounding strap is not available, ground yourself by touching an unpainted metal surface on the chassis, such as the power supply, to discharge any static charge from your body 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. Also avoid touching components or contacts on a card and avoid touching pins on a chip.

### 3 Disconnect your computer and peripherals from their power sources.

Before disconnecting a peripheral 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](#)" or "[Interior Service Label](#)."

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, make sure both connectors are correctly oriented and aligned.
- 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.

Also see "[Protecting Against Electrostatic Discharge](#)." In addition, Dell recommends that you periodically review the safety instructions in your *Setup and Quick Reference Guide*.

## 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):

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



**SECTION 2**

# Removing and Installing Parts

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Computer Cover  
Interior Service Label  
Inside Your Computer  
System Board Components  
Drive Door  
Front Panel  
Front-Panel Inserts  
Front-Panel Button  
Dell Shield  
Power Supply  
Computer Memory  
Disk Drives and Media  
Expansion-Card Airflow Shroud  
Expansion Cards  
Expansion-Card Cooling Fan and Guide  
Control Panel  
I/O Panel  
Chassis Intrusion Switch

Speaker  
Microprocessor  
Airflow Shroud  
Microprocessor  
Microprocessor  
Cooling Fan  
VRM  
Computer Battery  
System Board

# Computer Cover

- [Opening the computer cover](#)
- [Closing the computer cover](#)

## Opening the Computer Cover



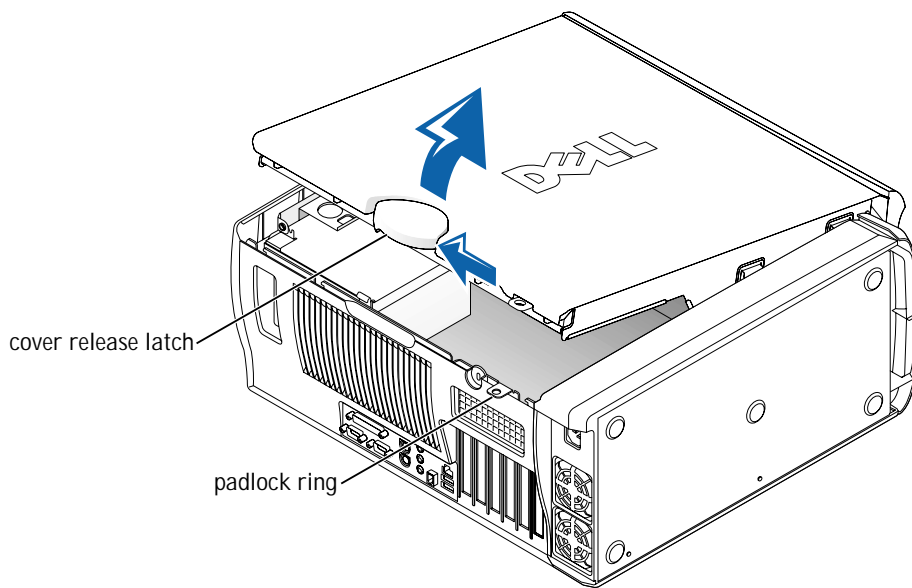
**CAUTION:** Before you perform this procedure, see "[Safety First—For You and Your Computer](#)."



**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 If you have installed a padlock through the padlock ring on the rear panel, remove the padlock.
- 3 Lay the computer on its right side.
- 4 Open the computer cover:
  - a Slide the cover release latch toward the top of the computer (see the following figure).
  - b Raise the back of the cover, and pivot it toward the front of the computer.

## Opening the Computer Cover



## Closing the Computer Cover

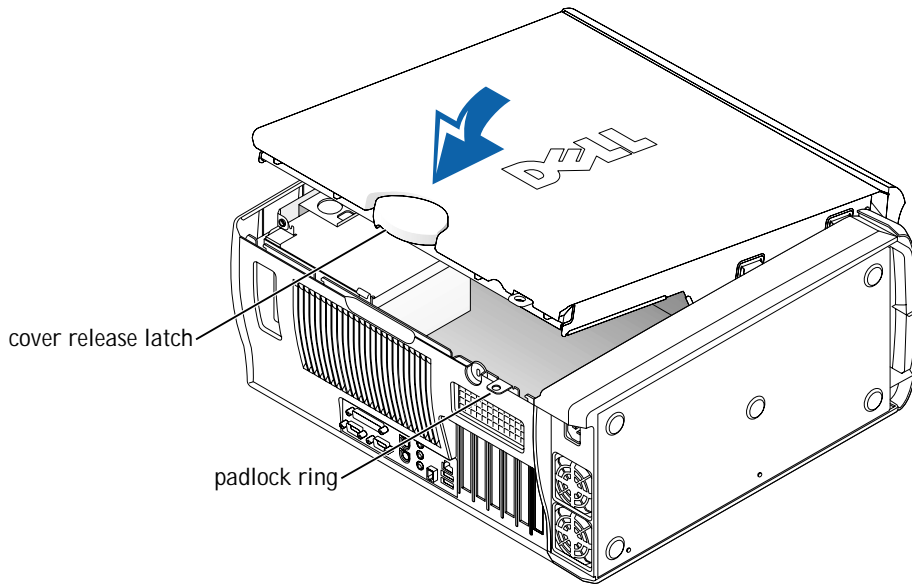
- 1 Check all cable connections, especially those that might have come loose during your work. Fold cables out of the way so that they do not obstruct the computer cover.
- 2 Ensure that no tools or extra parts (including screws) are left inside the computer.
- 3 Close the computer cover by pivoting the cover down toward the back of the chassis and into position (see the following figure).



**NOTE:** As you close the cover, hold the release latch to the left, in its open position, and then slide the release latch to the right to latch the cover to the chassis.



## Closing the Computer Cover



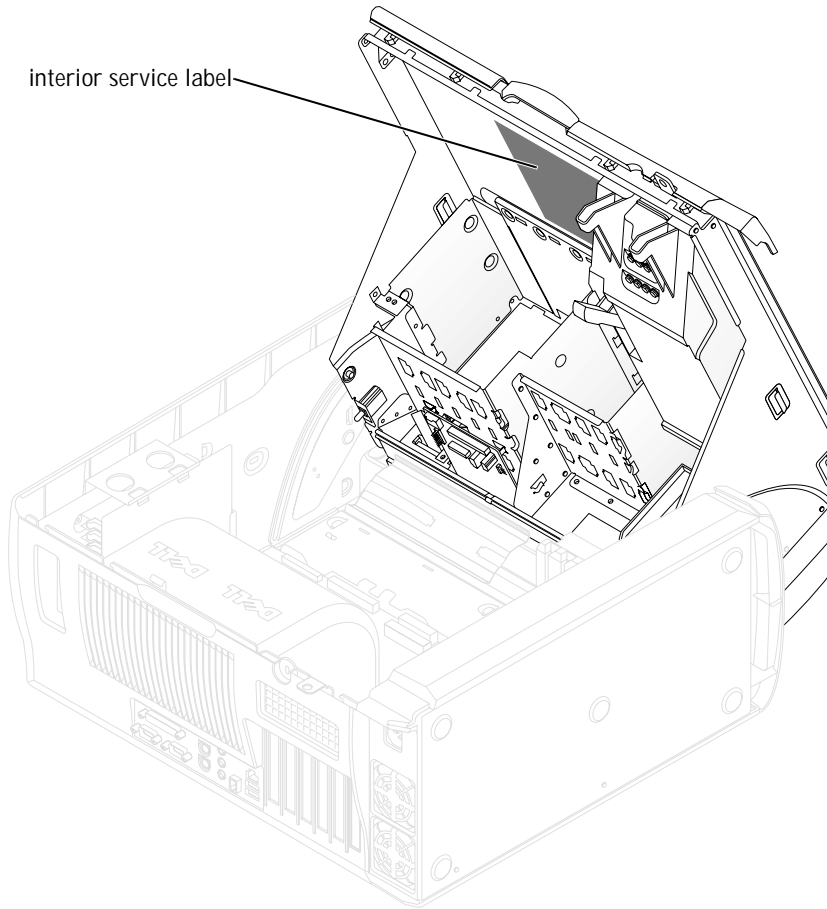
- 4 Stand the computer upright.
- 5 If you are using a padlock to secure your computer, reinstall the padlock.



# Interior Service Label

A service label affixed to the inside of your computer cover provides information about working inside your computer.


Interior Service Label



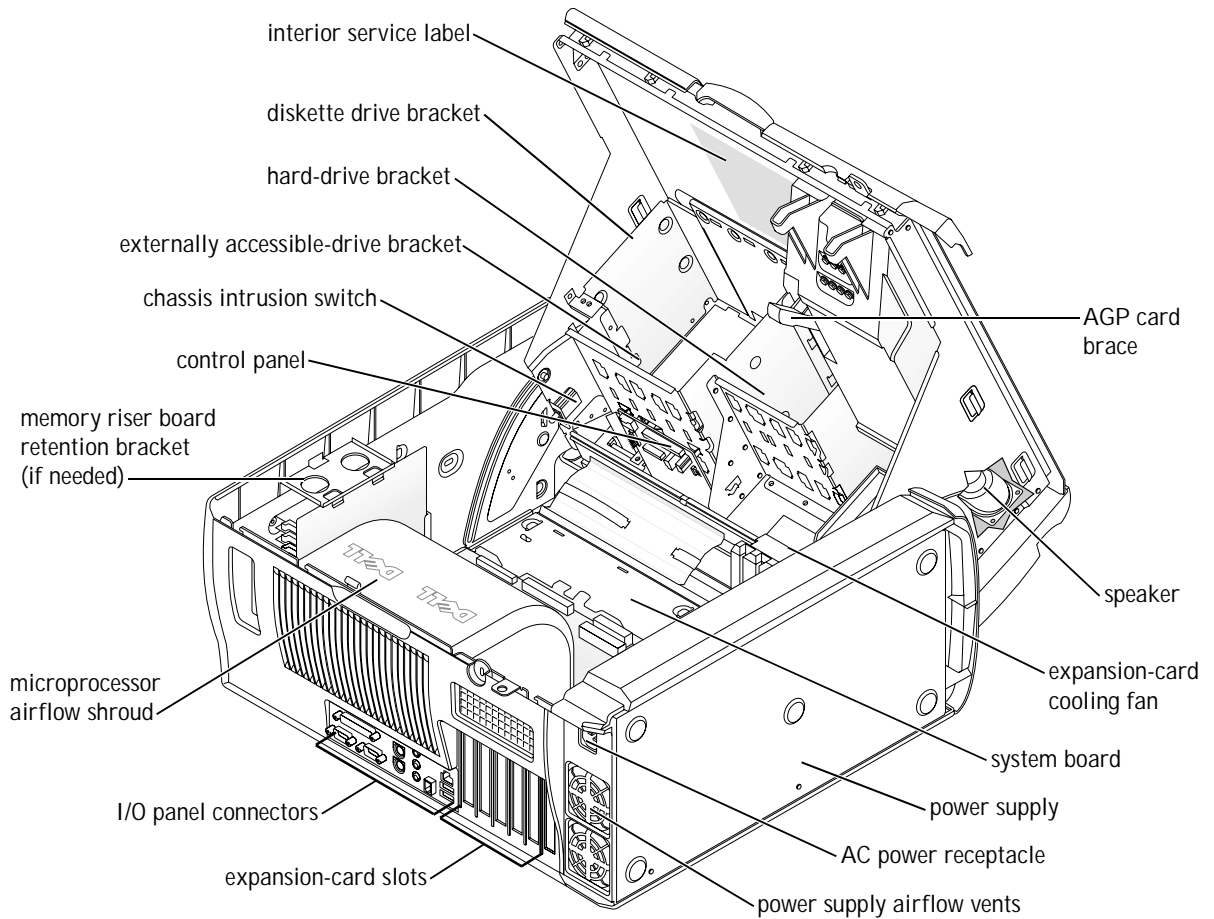


# Inside Your Computer

The following figure shows the computer with the cover open.

 **NOTE:** User service access points are color-coded green.

## Inside the Computer



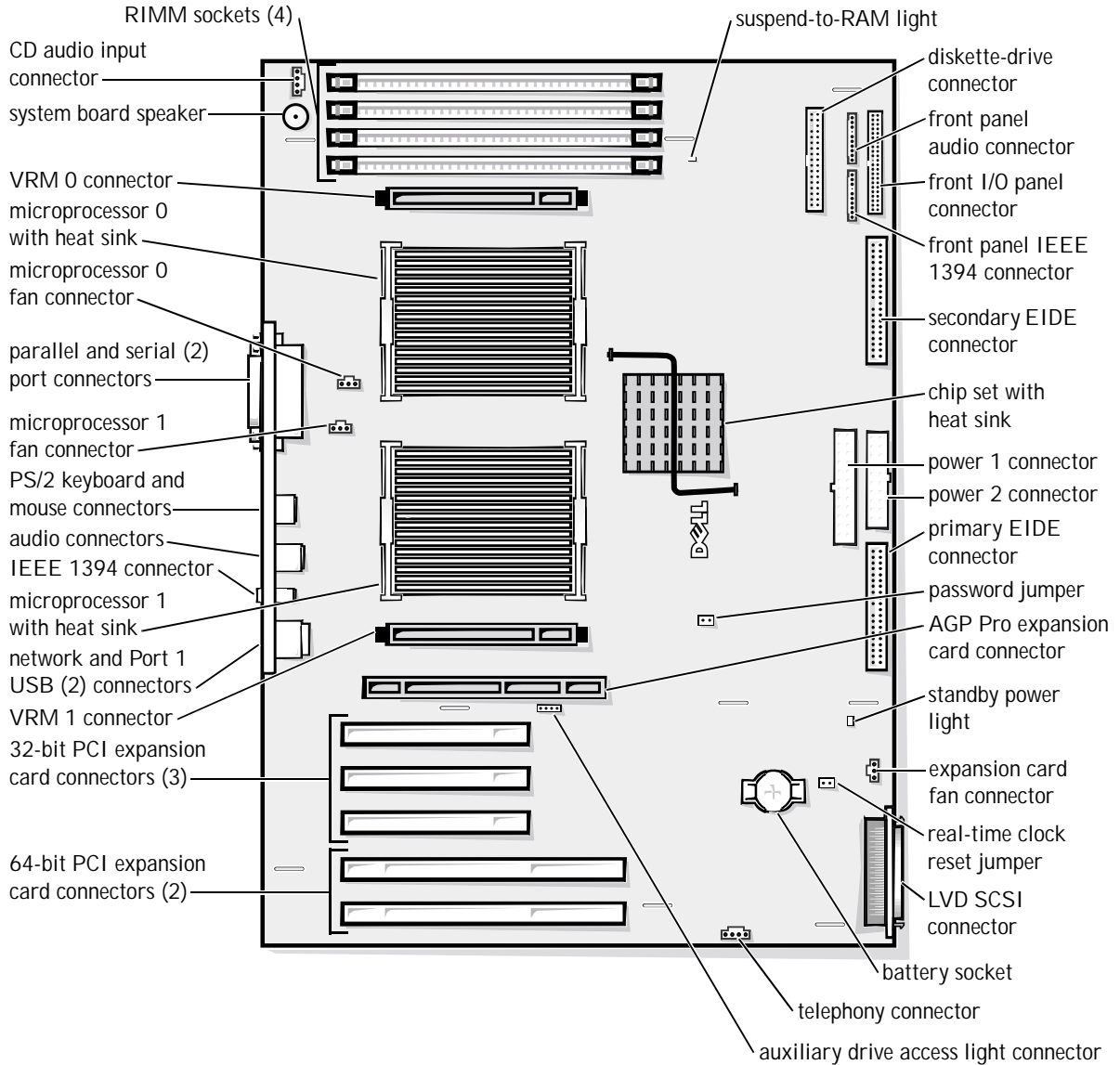


# System Board Components

## Components

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

### System Board Components





## Labels

The following table lists the labels for connectors and components on the system board, and briefly describes the function of each.

### System Board Labels

Connector or Component	Label
1394	IEEE 1394 connector
AGP	AGP Pro card connector
AUDIO	Audio connectors
AUX_LED	Auxiliary drive access light connector
BATTERY	Battery socket
CD_IN	CD audio input connector
CPU_0	Microprocessor 0 with heat sink
CPU_1	Microprocessor 1 with heat sink
DISKETTE	Diskette-drive connector
FAN_CCAG	Expansion card fan connector
FAN_P0	Microprocessor 0 fan connector
FAN_P1	Microprocessor 1 fan connector
FP3AUDIO	Front panel audio connector
FRONT1394	Front panel IEEE 1394 connector
IDE1	Primary EIDE connector
IDE2	Secondary EIDE connector
KYBD_MOUSE	PS/2 keyboard and mouse connectors
PANEL	Front I/O panel connector
PARALLEL_SERIAL	Parallel and serial (2) port connectors
PCI <sub>n</sub>	PCI expansion-card connector
POWER1	Power 1 connector
POWER2	Power 2 connector
PSWD	Password jumper
RIMM_ <i>n</i>	RIMM socket
RTCST	Real-time clock reset jumper

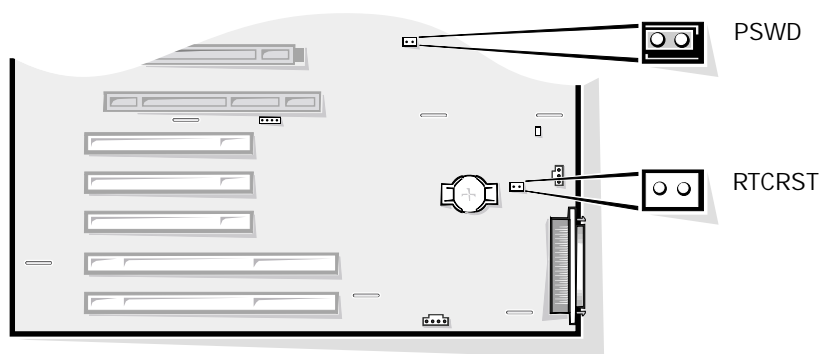
System Board Labels *(continued)*

Connector or Component	Label
SCSI	LVD SCSI connector
SPKR	System board speaker
STANDBY_LED	Standby power light
STR_LED	Suspend-to-RAM light
TAPI/MODEM	Telephony connector
USB_NIC	Network and Port 2 USB (2) connectors
VRM_0	VRM 0 connector
VRM_1	VRM 1 connector

## Jumpers

The following figure shows the location of the jumpers on the system board.

## System Board Jumpers








**NOTICE:** Before changing a jumper setting, verify that the standby power light on the system board has turned off. Otherwise, damage to your computer or unpredictable results may occur. To locate this light, see "[System Board Components](#)."

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

The following table lists the system board jumpers and their settings.

#### System-Board Jumper Settings

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



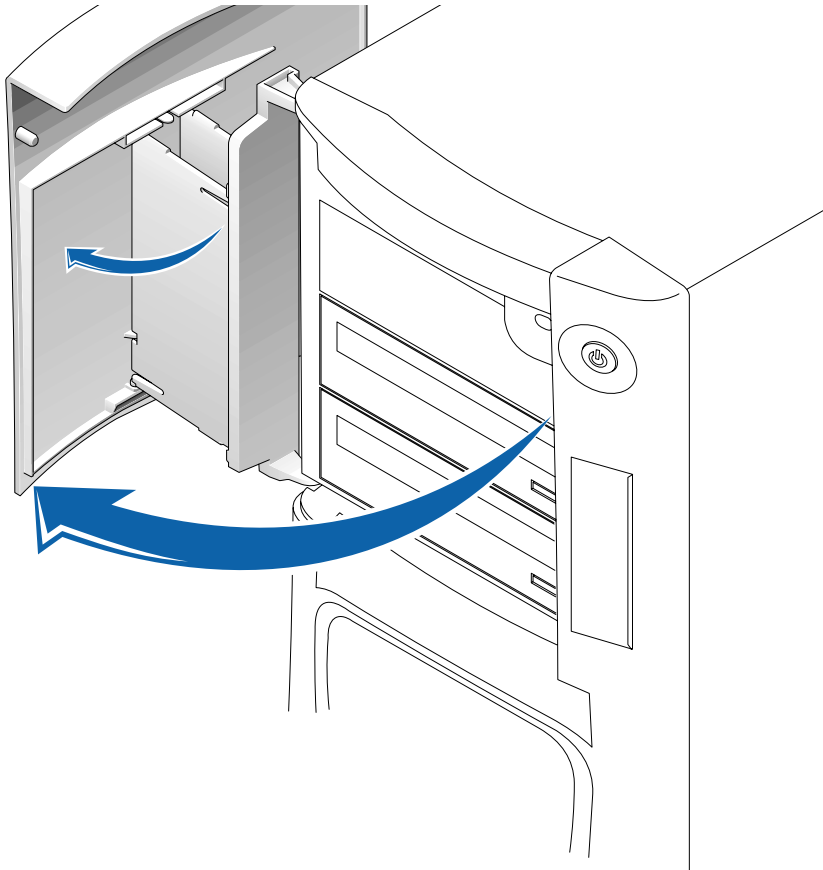
## Drive Door

- Removing the drive door
- Replacing the drive door

### Removing the Drive Door

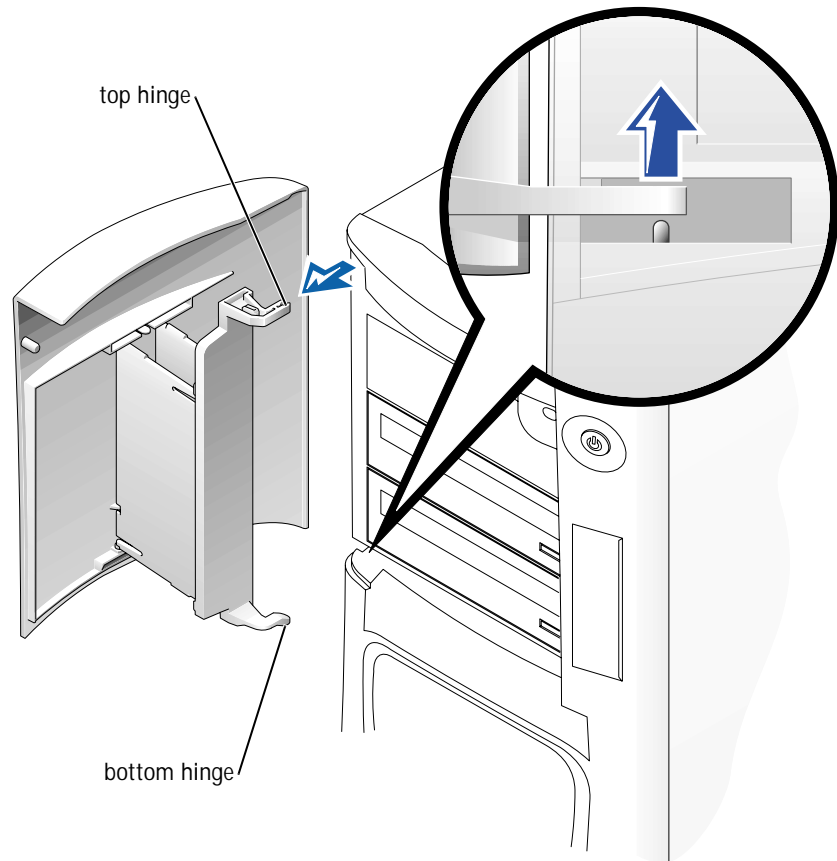
- 1 Open the drive door to a 90-degree angle (see the following figure).

#### Opening the Drive Door



- 2 Unsnap the top hinge, and pull the top of the drive door outward, away from the chassis.

## Removing the Drive Door



- 3 Lift the bottom hinge off of the chassis.

## Replacing the Drive Door

To replace the drive door, perform the [removal procedures](#) in reverse.

# Front Panel

- [Removing the front panel](#)
- [Replacing the front panel](#)

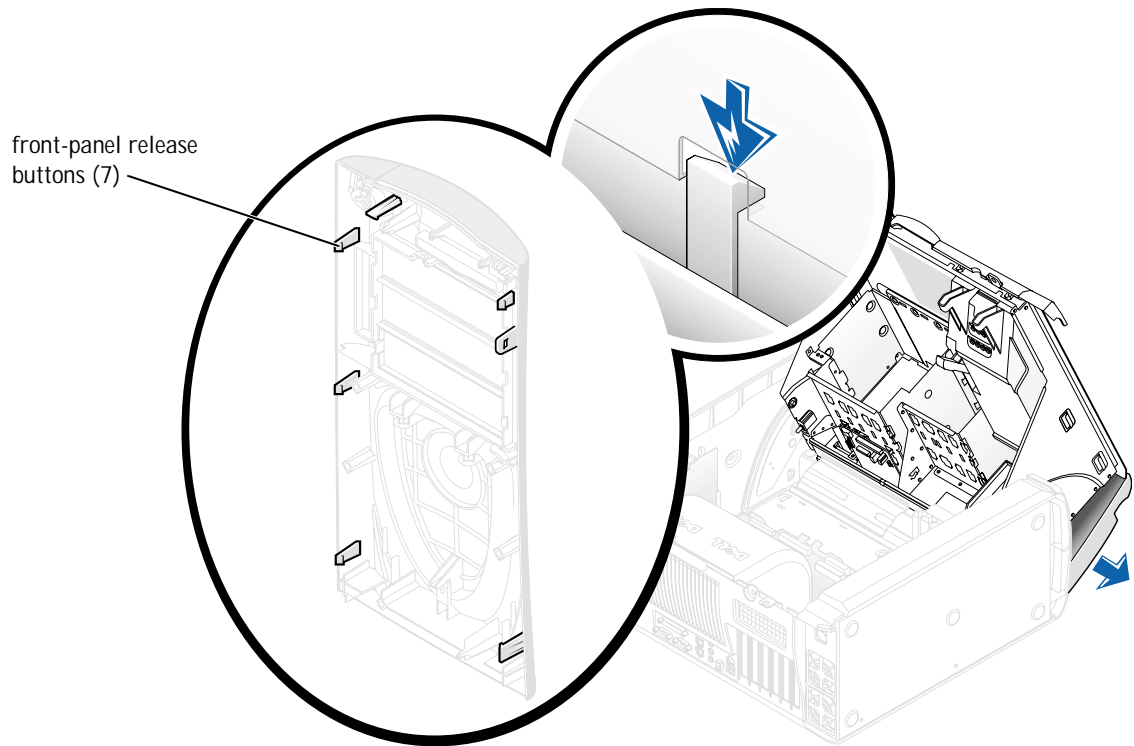
## Removing the Front Panel



**CAUTION:** Before you perform this procedure, see "[Safety First—For You and Your Computer.](#)"

- 1 Turn off the computer and devices, disconnect them from their electrical outlets, wait at least 10 to 20 seconds, lay the computer on its right side, and [open the computer cover](#).
- 2 Disconnect and [remove all disk drives](#) from the chassis drive bay.
- 3 Release the front panel by pressing each of the seven front-panel release buttons (see the following figure).

## Removing the Front Panel



- 4 Close the computer cover halfway and rotate the top of the panel outward, away from the chassis.
- 5 Pull the panel downward, away from the chassis.

## Replacing the Front Panel


Fit the seven front-panel retaining hooks into the recessed slots at the bottom of the chassis. Perform the [removal procedures](#) in reverse.




## Front-Panel Inserts

- [Removing front-panel inserts](#)
- [Replacing front-panel inserts](#)

### Removing Front-Panel Inserts

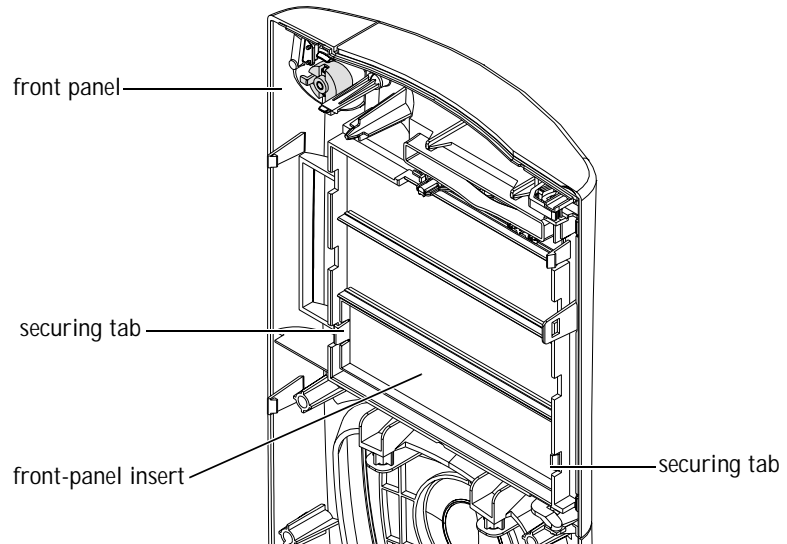
 **CAUTION:** Before you perform this procedure, see "[Safety First—For You and Your Computer.](#)"

- 1 Turn off the computer and devices, disconnect them from their electrical outlets, wait at least 10 to 20 seconds, lay the computer on its right side, and [open the computer cover](#).
- 2 Disconnect and [remove any disk drives](#) from the chassis drive bay that obstruct your access to the front-panel insert you want to use.
- 3 Remove the front-panel insert for the chassis drive bay you want to use.

 **NOTE:** You do *not* need to remove the front panel to remove the inserts.

- a Open the externally accessible drive door.
- b Use your thumb to press the center of the insert until it snaps free through the front of the front panel (see the following figure).

## Removing Front-Panel Inserts



## Replacing Front-Panel Inserts

- 1 Connect and **replace any disk drives** you removed from the chassis drive bay.
- 2 **Close the computer cover** and stand the computer upright.
- 3 Replace the front-panel insert.
  - a Facing the front panel, open the drive door.
  - b Insert the left securing tab into the drive bay.
  - c Press the right securing tab into the drive bay until the panel snaps into place.

## Front-Panel Button

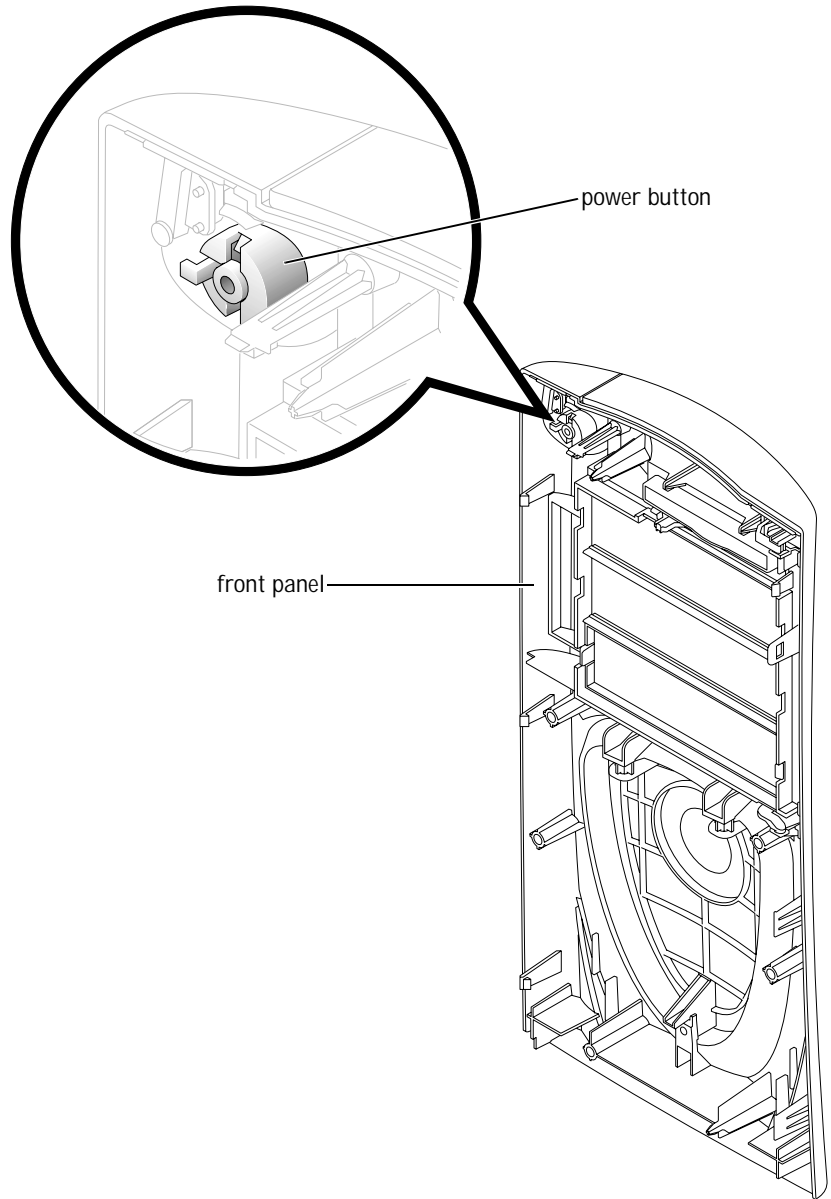
- [Removing the front-panel button](#)
- [Replacing the front-panel button](#)

### Removing the Front-Panel Button

- 1 Turn off the computer and devices, disconnect them from their electrical outlets, wait at least 10 to 20 seconds, lay the computer on its right side, and [open the computer cover](#).
- 2 [Remove the front panel](#).
- 3 Lay the front panel down with the inside of the panel facing up.
- 4 Use a small screwdriver to push in the two plastic clips that secure the power button to the computer cover.

When these clips are released, the button comes free from the front panel.

## Removing the Front-Panel Button



## Replacing the Front-Panel Button

Insert the button into the hole in the front panel of the computer cover so that the button's clips secure it to the cover.



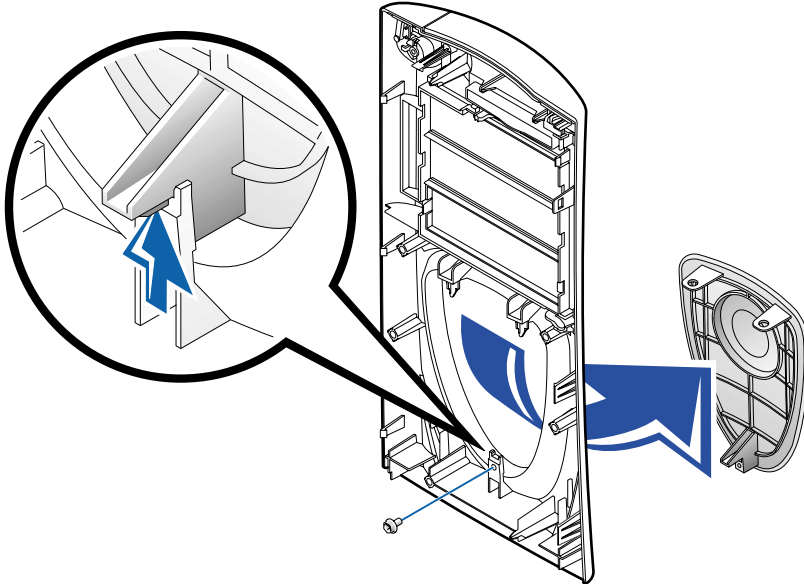
# Dell Shield

- Removing the Dell shield
- Replacing the Dell shield

## Removing the Dell Shield

- 1 Turn off the computer and devices, disconnect them from their electrical outlets, wait at least 10 to 20 seconds, lay the computer on its right side, and [open the computer cover](#).
- 2 [Remove the front panel](#).
- 3 Lay the front panel down with the inside of the panel facing up.
- 4 Use a Phillips screwdriver to unscrew the shield from the inside of the front panel.
- 5 Pull the shield down and push it away from you, through the front of the front panel.

## Removing the Dell Shield



## Replacing the Dell Shield

To replace the Dell shield, perform the [removal procedure](#) in reverse.



# Power Supply

- [Removing the power supply](#)
- [Replacing the power supply](#)

## Removing the Power Supply



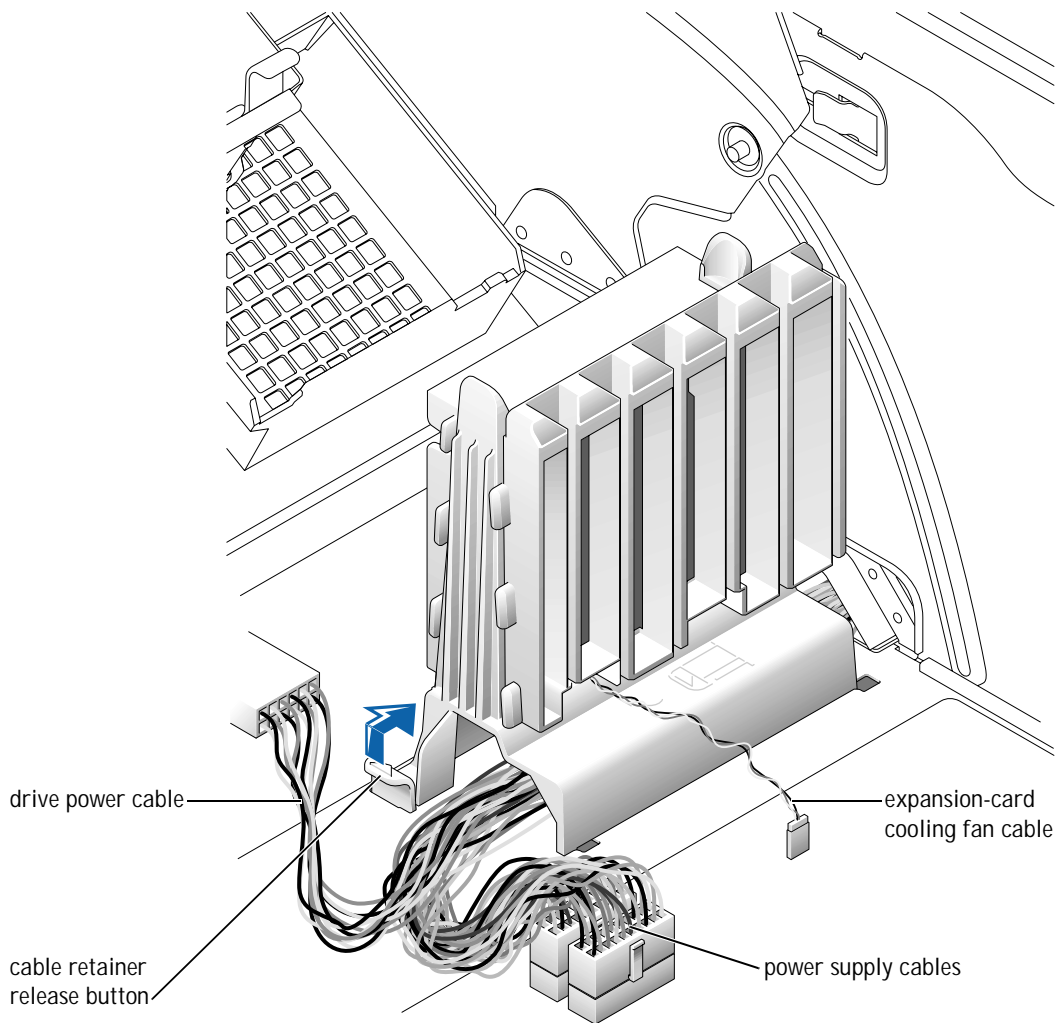
**CAUTION:** Before you perform this procedure, see "[Safety First—For You and Your Computer.](#)"



**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, lay the computer on its right side, and [open the computer cover.](#)**
- 2 [Remove the expansion cards.](#)
- 3 [Remove the expansion-card cooling fan and guide.](#)
- 4 **Disconnect the power supply cables and the expansion-card cooling fan cable from the system board, and disconnect the drive power cable (see the following figure).**

## Removing the Plastic Cable Retainer

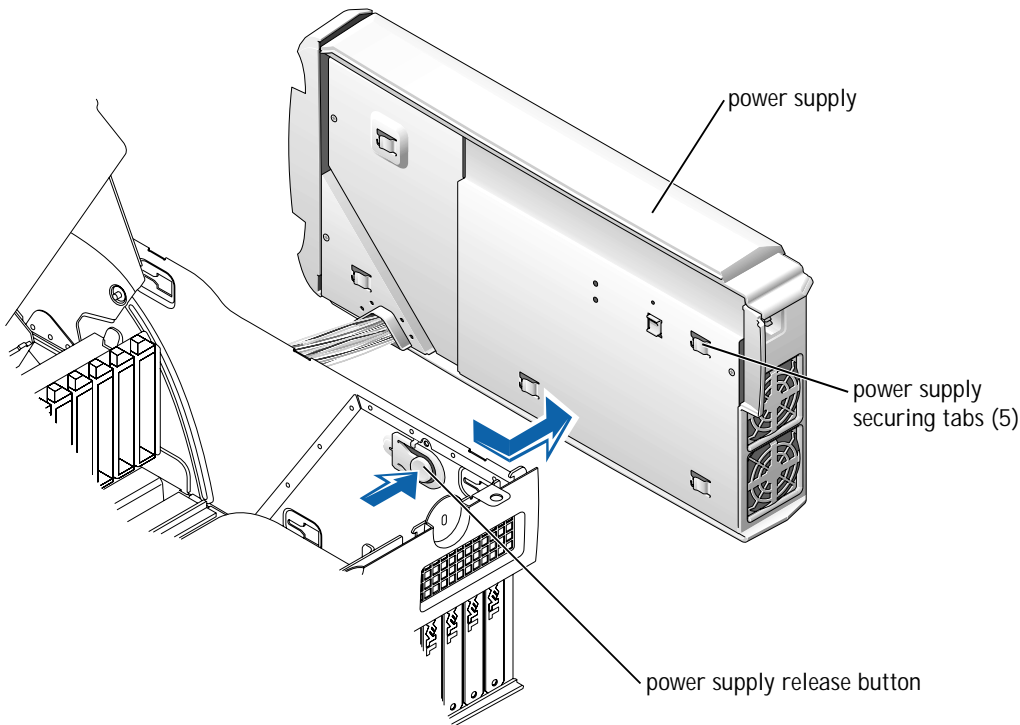


### 5 Remove the cable retainer.

- a Pull up on the cable retainer release button.
- b Slide the cable retainer to the right.
- c Lift the cable retainer out of the four securing slots in the chassis.

- 6 While pressing the power supply release button, slide the power supply toward the back of the computer.
- 7 Lift the power supply away from the chassis (see the following figure).
- 8 Slide the power supply cables out of the chassis through the hole.

### Removing the Power Supply



### Replacing the Power Supply

- 1 Slide the power supply cables through the hole into the chassis.
- 2 Insert the power supply securing tab into the power supply securing slot on the chassis. Ensure that all five securing tabs are connected to their slots on the chassis.
- 3 Slide the power supply toward the front of the computer. See "[Removing the Power Supply](#)."
- 4 Install the cable retainer.

- a Place the cable retainer into the four securing slots in the chassis.
  - b Slide the cable retainer to the left until it locks into place.
- 5 Connect the power supply cables and the expansion-card cooling fan cable to the system board, and connect the drive power cable.
- 6 [Replace the expansion-card cooling fan and guide.](#)
- 7 [Install the expansion cards.](#)
- 8 [Close the computer cover](#) and restart the computer.

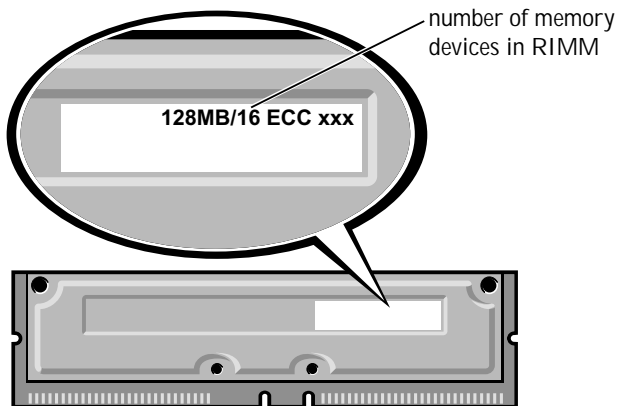
# Computer Memory

- [System memory installation guidelines](#)
- [Removing a memory module](#)
- [Installing a memory module](#)
- [Removing memory riser boards](#)
- [Installing memory riser boards](#)

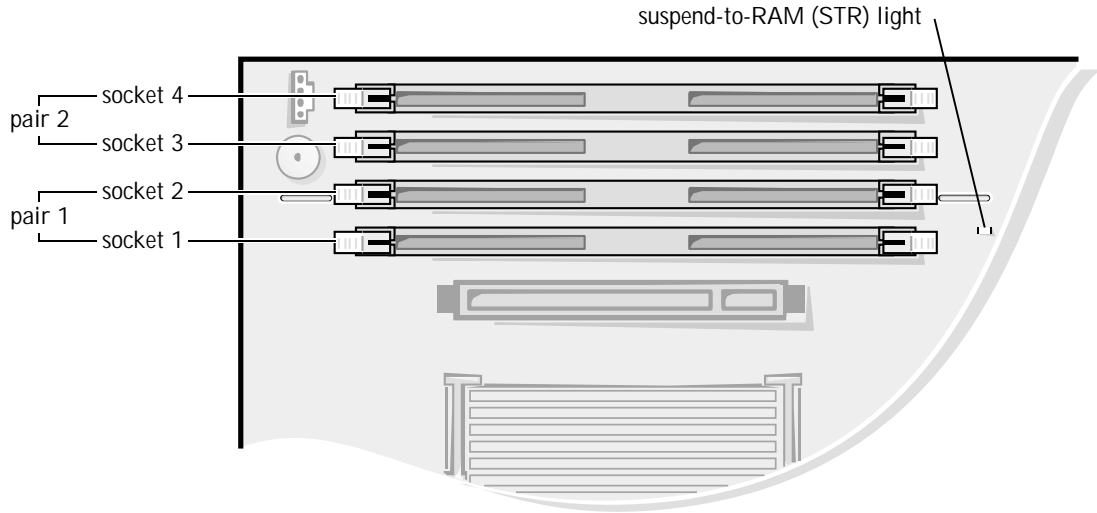
To locate the memory sockets on the system board, see "[System Board Memory Components](#)." To locate the memory sockets on the optional memory riser boards, see "[Memory Riser Board Components](#)."

 **NOTE:** The computer does not support RIMMs with six memory devices.

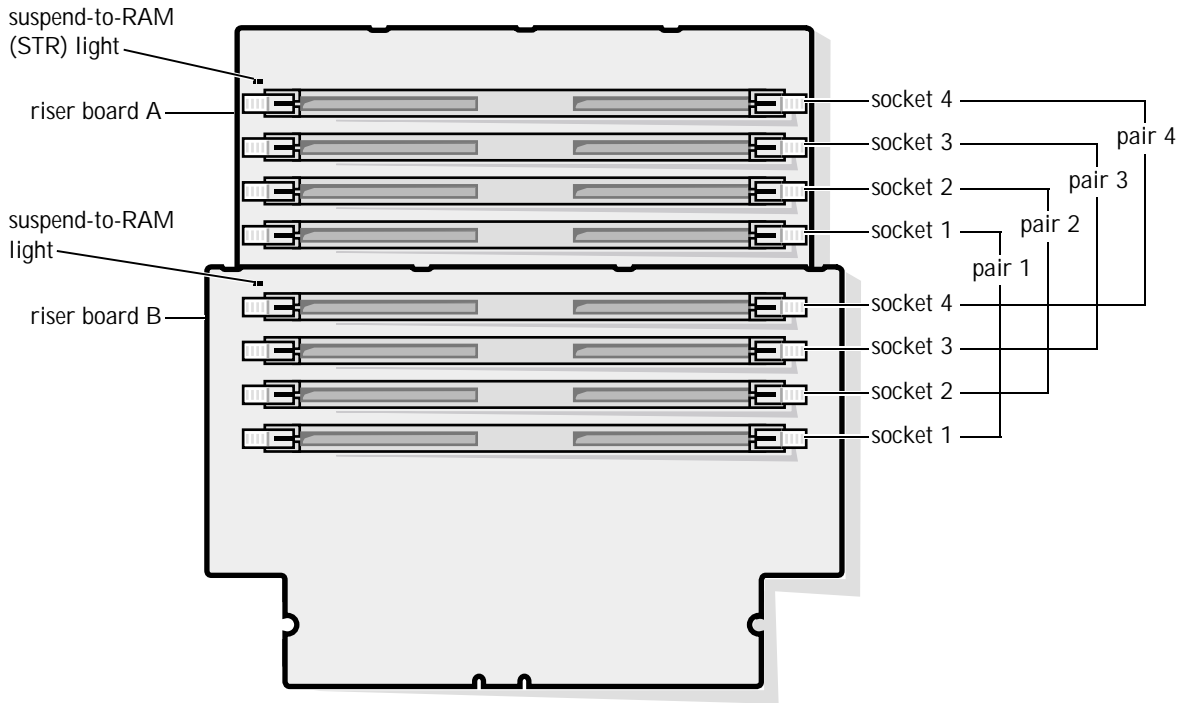
## Memory Module Label



### System Board Memory Components



## Memory Riser Board Components



## System Memory Installation Guidelines

- [System board installation](#)
- [Riser board installation](#)

### System Board Installation

When installing memory modules in the system board sockets and *not* using the optional memory riser boards, observe the following guidelines:

- Each memory socket on the system board must be occupied either by a RIMM or a CRIMM.
- Memory sockets must be upgraded in matched pairs. In other words, two sockets in a pair must contain modules of identical capacity, number of components, and speed. See "[System Board Memory Components](#)" to identify pairs of sockets.

- Mixed pairs of ECC and non-ECC modules all function as non-ECC.
- Be sure to install a RIMM in socket 1 first (closest to the processor) before installing modules in the other sockets.
- The system board supports PC600 and PC800 memory modules.

#### Riser Board Installation

When installing memory modules using the optional memory riser boards, observe the following guidelines:

- The memory riser boards must be installed in system board memory sockets 1 and 2. Memory riser board A must be installed in system board memory socket 1, and riser board B must be installed in system board socket 2. System board memory sockets 3 and 4 can either be empty or contain CRIMMs. Sockets 3 and 4 cannot contain RIMMs with memory riser boards installed in sockets 1 and 2. See "[System Board Memory Components](#)" to identify the system board sockets.
- Memory sockets on the riser boards must be upgraded in matched pairs. In other words, two sockets in a pair must contain modules of identical capacity, number of components, and speed. See "[Memory Riser Board Components](#)" to identify pairs of sockets.
- Not all memory sockets on the memory riser boards need to be populated: if one or more pairs of memory sockets contain RIMMs, then the next pair must contain CRIMMs, and the remaining pair(s) can be empty. For example, if the first and second pairs of memory sockets on the riser boards contain RIMMs, then the third pair must contain CRIMMs, and the fourth pair can remain empty.
- Mixed pairs of ECC and non-ECC modules all function as non-ECC.
- The optional memory riser boards only support PC800 memory modules.

#### Removing a Memory Module

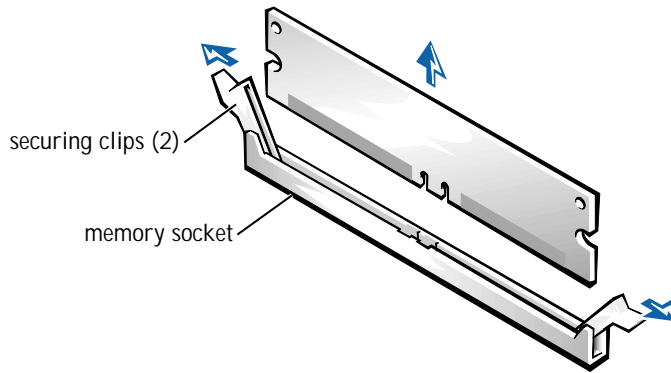


**NOTICE:** Before disconnecting a device from the computer, wait 10 to 20 seconds after disconnecting the computer from its electrical outlet. Before removing a component from the system board, verify that the standby power light on the system board has turned off. To locate this light, see "[System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



- ➔ **NOTICE:** To avoid damage to the memory module, press the securing clips with equal force applied at each end of the memory socket.
- 1 Press the securing clips at each end of the memory socket outward simultaneously until the module pops out slightly from the socket (see the following figure).
- 2 Lift the module away from the socket.

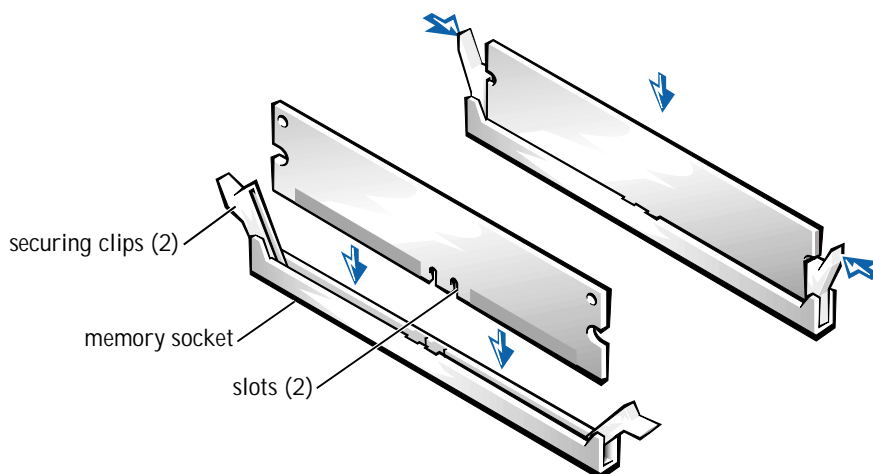
### Removing a Memory Module



### Installing a Memory Module

- 1 Press the securing clips at each end of the socket outward until they snap open (see the following figure).
- 2 Align the slots on the bottom of the 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.
- 3 Press the module straight down into the socket until the securing clips snap into place at the ends of the module.

## Installing a Memory Module



## Removing Memory Riser Boards

➔ **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 [Remove the microprocessor airflow shroud.](#)
- 2 Remove the memory riser board retention bracket (see the following figure).
  - a Lift the retention bracket up to disengage it from the chassis.
  - b Lift the bracket away from the chassis.

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

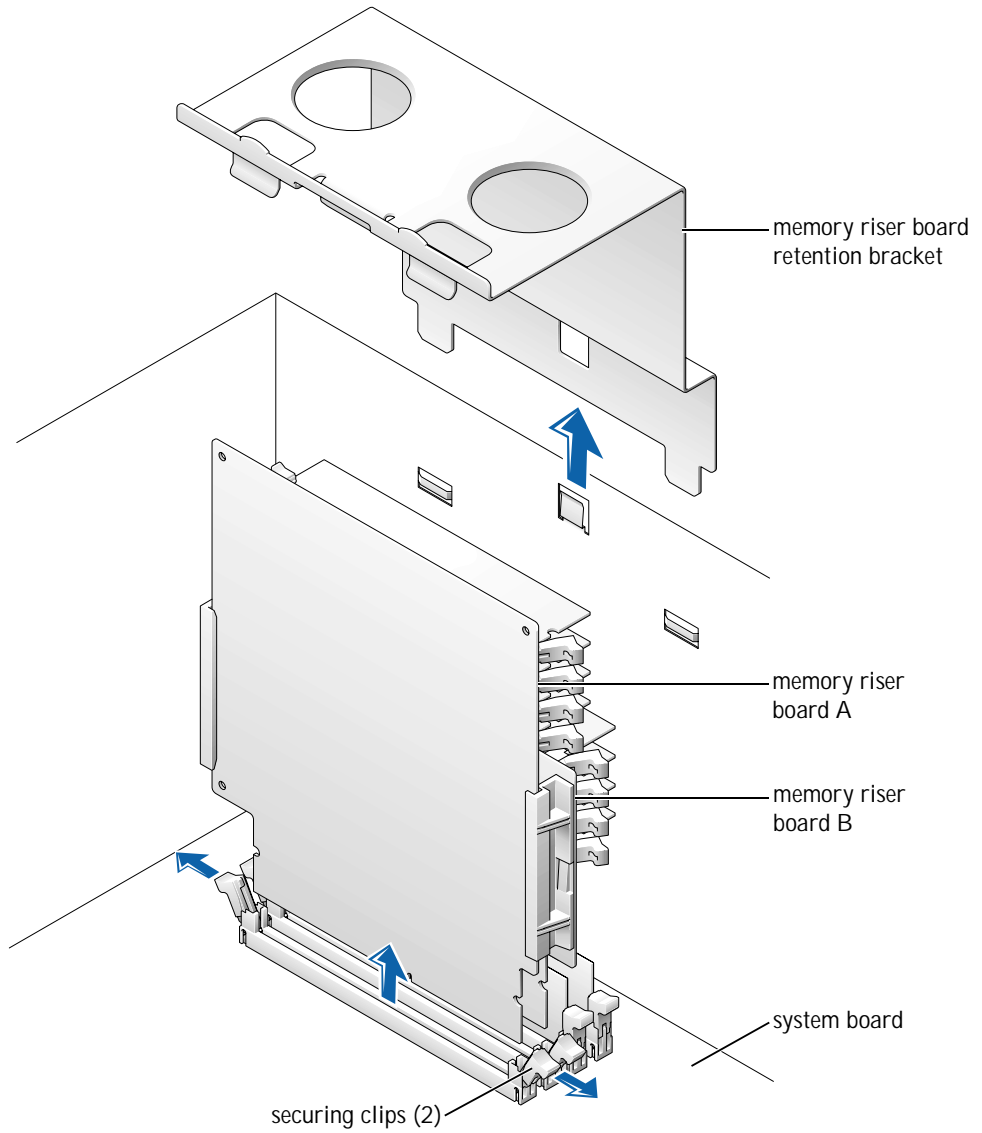
- 3 Remove memory riser board A:

✎ **NOTE:** To access the securing clips on the system board memory sockets, it may be necessary to remove the [fan for microprocessor 0](#).

- a Press the securing clips of system board memory socket 1 outward simultaneously until riser board A pops out slightly from the socket.

- b Lift riser board A away from the retention brackets on riser board B.
- 4 Remove memory riser board B:
- a Press the securing clips of system board memory socket B outward simultaneously until riser board B pops out slightly from the socket.
  - b Lift riser board B away from socket 2.

## Removing Memory Riser Boards



## Installing Memory Riser Boards

➔ **NOTICE:** System board memory sockets 3 and 4 can either be empty or contain CRIMMs. Sockets 3 and 4 cannot contain RIMMs with memory riser boards installed in sockets 1 and 2.

- 1 If any RIMMs occupy memory sockets on the system board, **remove those modules.**

To locate the memory sockets on the system board, see "[System Board Components](#)."

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

- 2 Install memory riser board B (see the following figure):

- a Align the slots on the bottom of riser board B with the ridges inside memory socket 2 on the system board.

The memory sockets on the riser board will face away from the microprocessor(s).

- b Press riser board B straight down into socket 2 until the securing clips snap into place at the ends of the riser board.

- 3 Install memory riser board A:

- a Align the edges of riser board A with the retention brackets on riser board B.

- b Align the slots on the bottom of riser board A with the ridges inside memory socket 1 on the system board.

The memory sockets on the riser board will face away from the microprocessor(s).

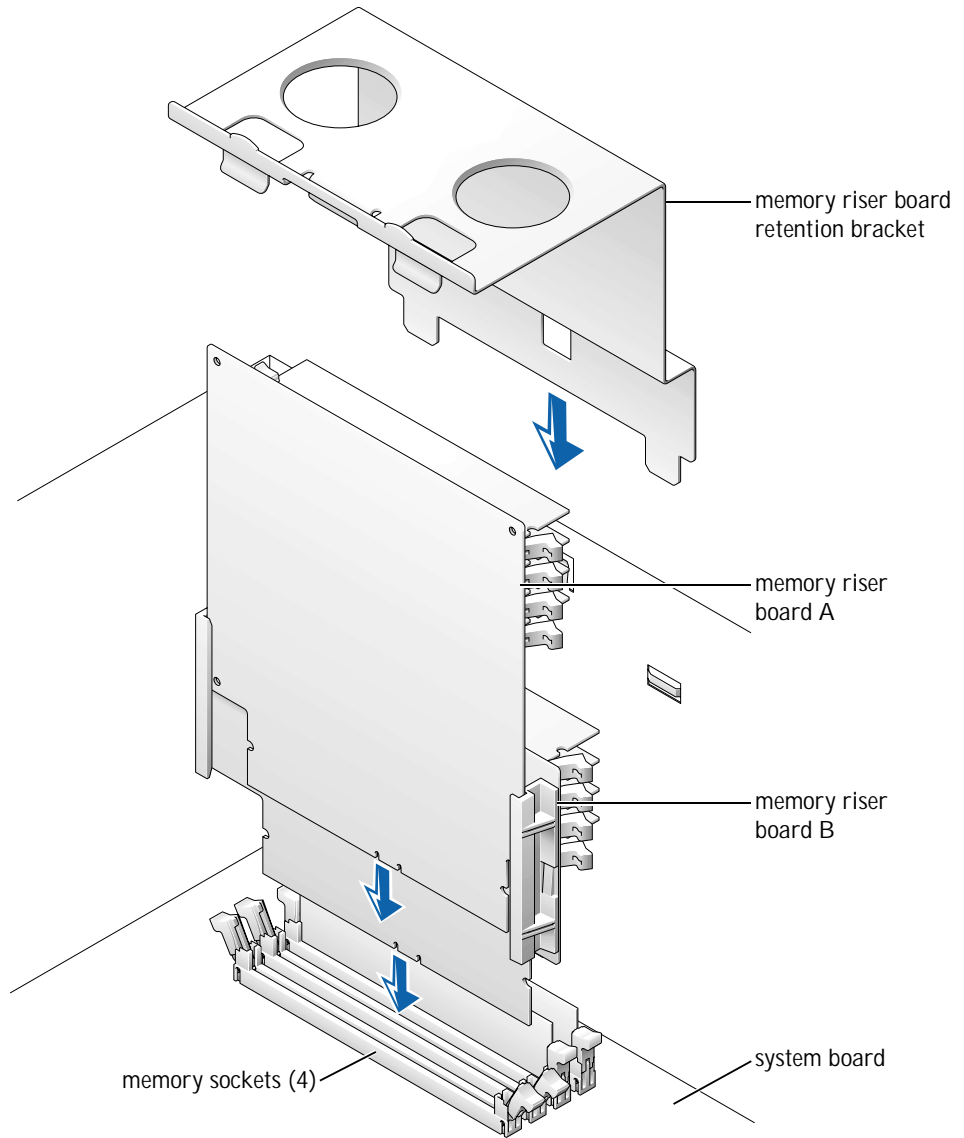
- c Press riser board A straight down into socket 1 until the securing clips snap into place at the ends of the riser board.

- 4 Install the memory riser board retention bracket:

- a Lower the bracket to the chassis so that the two bracket tabs insert into the chassis slots.

- b Press the bracket straight down until it is secured in the chassis.

## Installing Memory Riser Boards



## Disk Drives and Media

- [Installing a CD, zip, or other externally accessible drive](#)
- [Installing a hard drive](#)
- [EIDE device installation guidelines](#)
- [SCSI device installation guidelines](#)

Your computer provides the following drive bays:

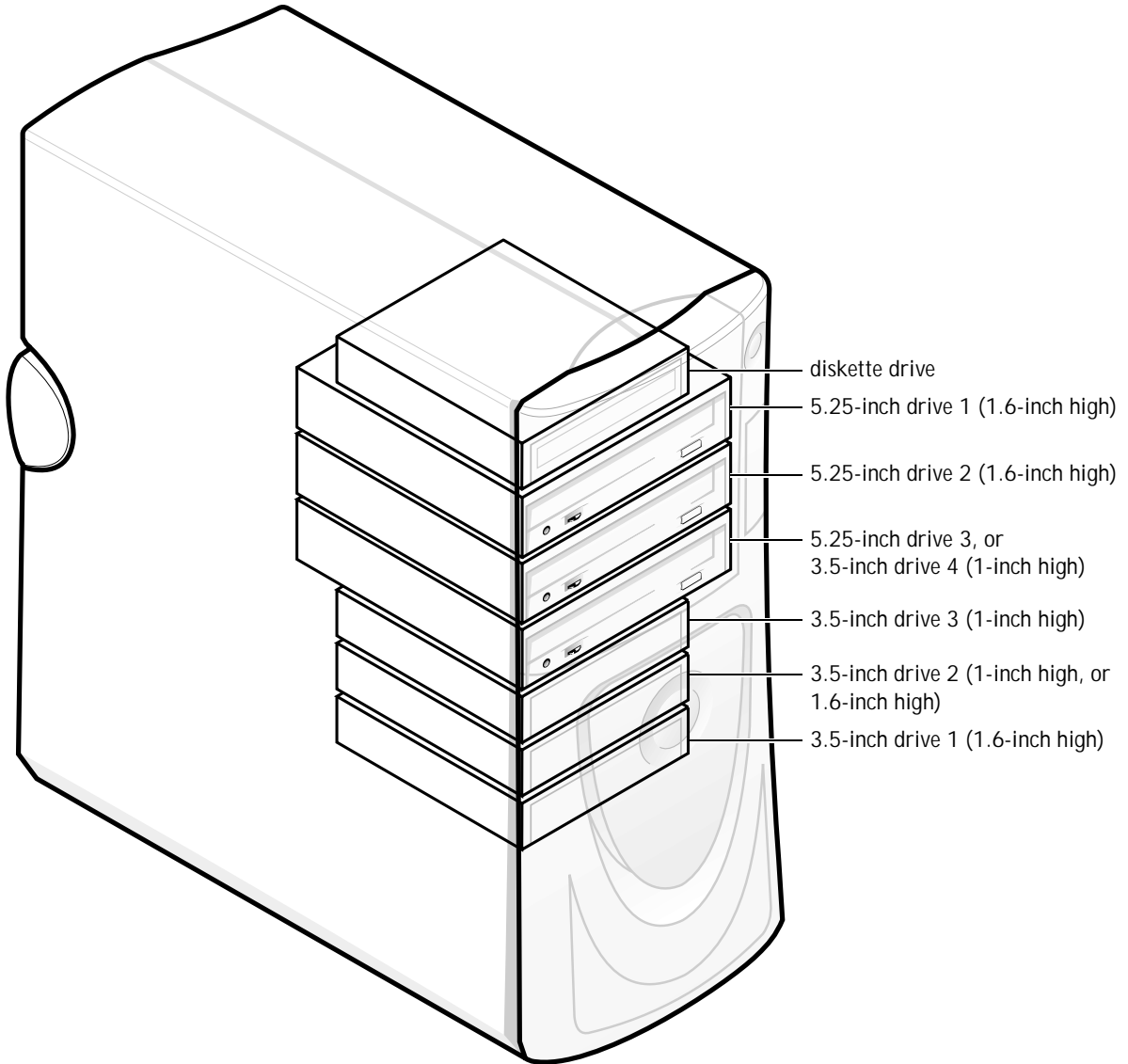
- One 3.5-inch diskette drive.
- Externally accessible drive bay: holds up to three 5.25-inch externally accessible drives or up to two 5.25-inch externally accessible drives and one 3.5-inch hard drive.
- Hard drive bay: holds up to three 3.5-inch hard drives. The bay can hold three 1-inch-high drives, two 1-inch-high drives and one 1.6-inch-high drive, or two 1.6-inch-high drives.



**NOTE:** Cable ends are color coded so that black identifies the diskette drive cable, yellow the front I/O panel cable, orange the secondary EIDE cable, white the LVD SCSI cable, and blue the primary EIDE cable.

See the following figure for examples of these drives.

## Drive Types





## Installing a CD, Zip, or Other Externally Accessible Drive



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



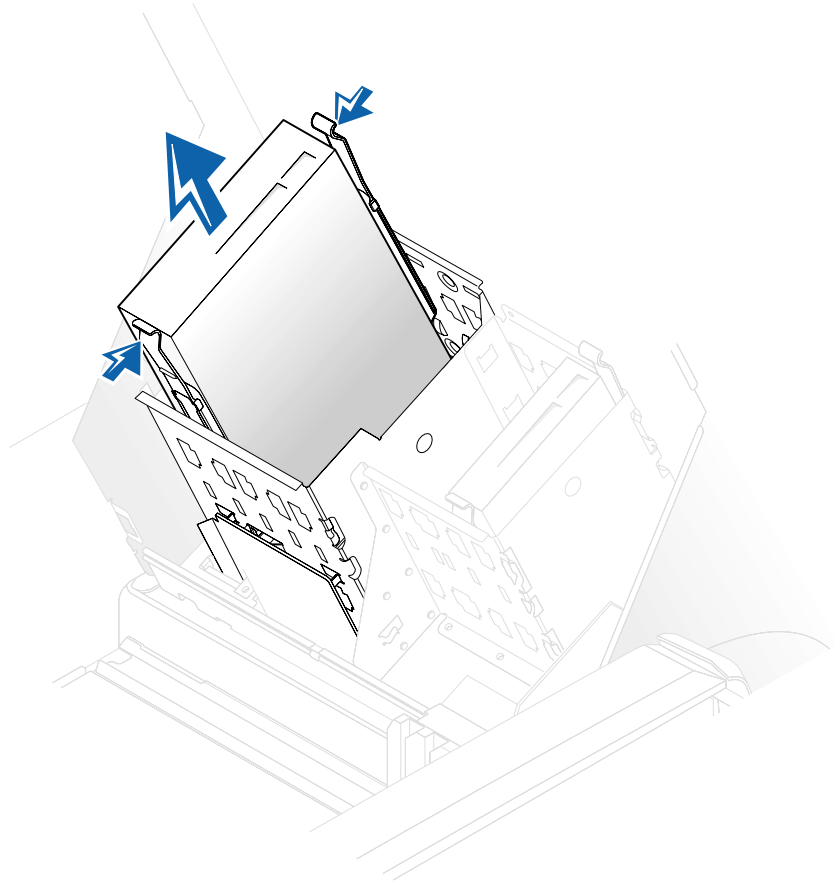
**CAUTION:** Before you perform this procedure, see "[Safety First—For You and Your Computer](#)."



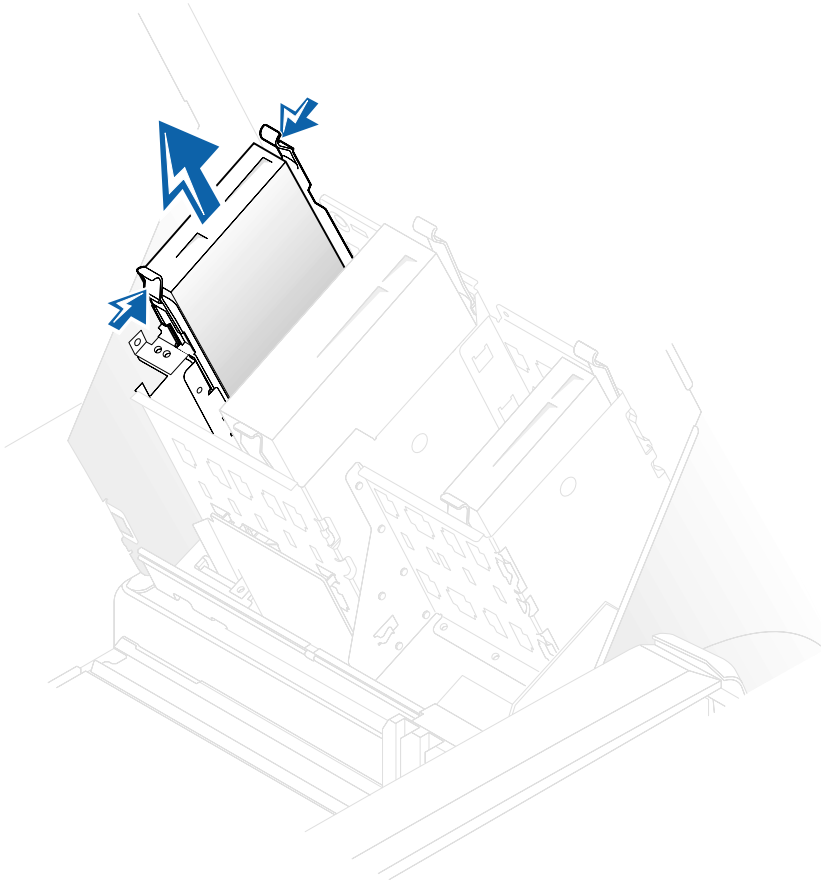
**NOTICE:** Before disconnecting a device from the computer, wait 10 to 20 seconds after disconnecting the computer from its electrical outlet. Before removing a component from the system board, verify that the standby power light on the system board has turned off. To locate this light, see "[System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

- 1 Turn off the computer and devices, disconnect them from their electrical outlets, and wait 10 to 20 seconds, lay the computer on its right side, and [open the computer cover](#).
- 2 If you are replacing a drive that is already installed in the computer, continue with [step 3](#). If you are installing a new drive, go to [step 5](#).
- 3 Disconnect the DC power cable and interface cable from the back of the drive you are replacing.
- 4 Remove the drive from the chassis drive bay.
  - a Squeeze together the tabs at each side of the drive to disengage the drive bracket from the chassis.
  - b Slide the drive bracket upward, and remove it from the chassis (see the following figures).

## Removing an Externally Accessible Drive



## Removing the Diskette Drive




- 5 Unpack the replacement drive and prepare it for installation.

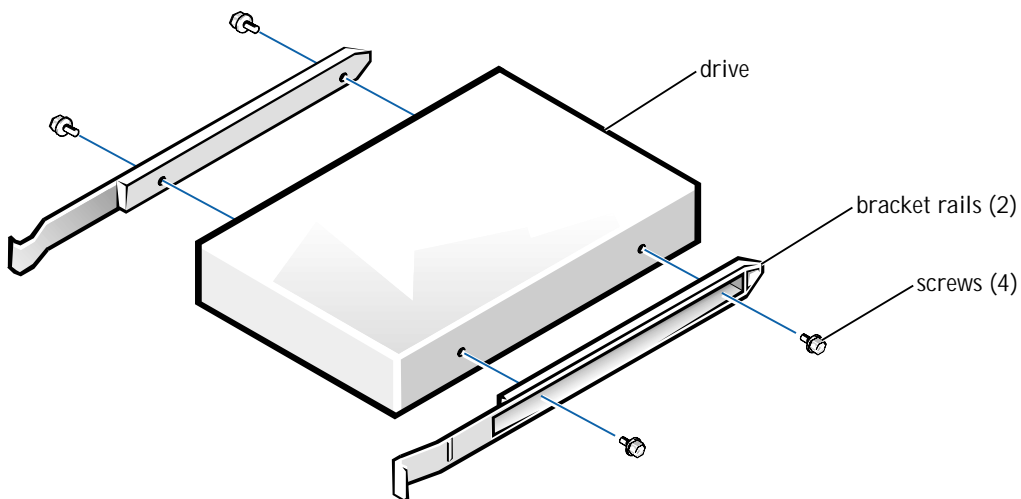
➔ **NOTICE:** Ground yourself by touching an unpainted metal surface on the back of the computer.

See the documentation that accompanied the drive to verify that the drive is configured for your computer. Change any settings necessary for your configuration.

- 6 If the replacement drive does not have bracket rails attached, remove the rails from the old drive by removing the four screws that secure the rails to the drive. Then attach the bracket rails to the replacement drive (see the following figure).

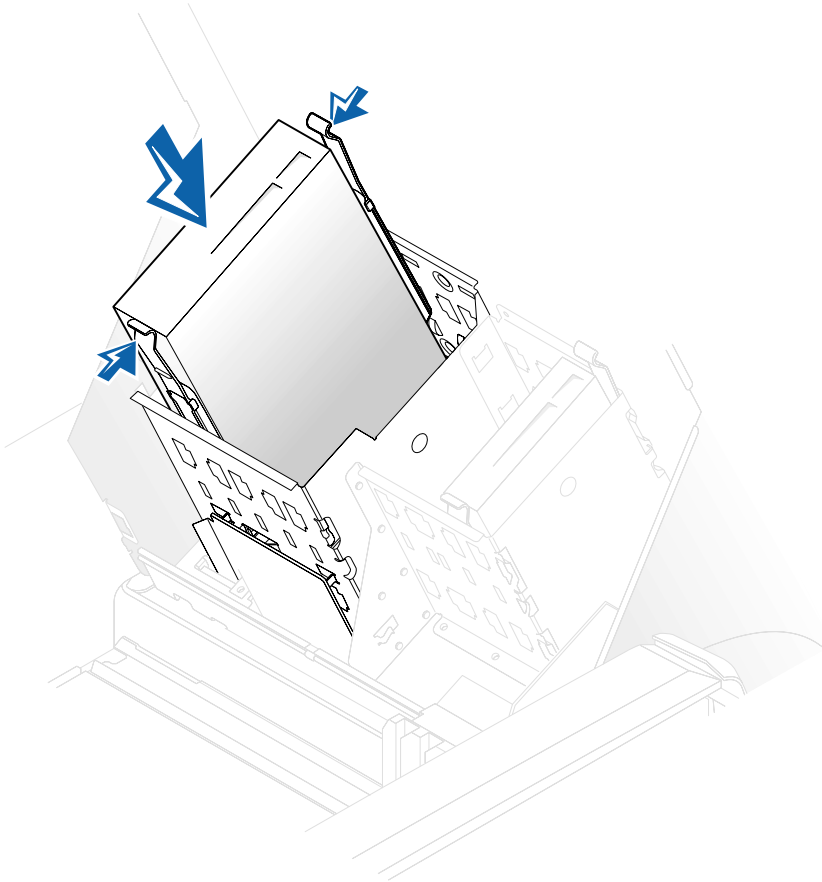
 **NOTE:** If you are not replacing an existing drive and the new drive does not have bracket rails attached, install the extra rail set that is located inside your computer in an empty drive bay.

### Attaching Bracket Rails for an Externally Accessible Drive

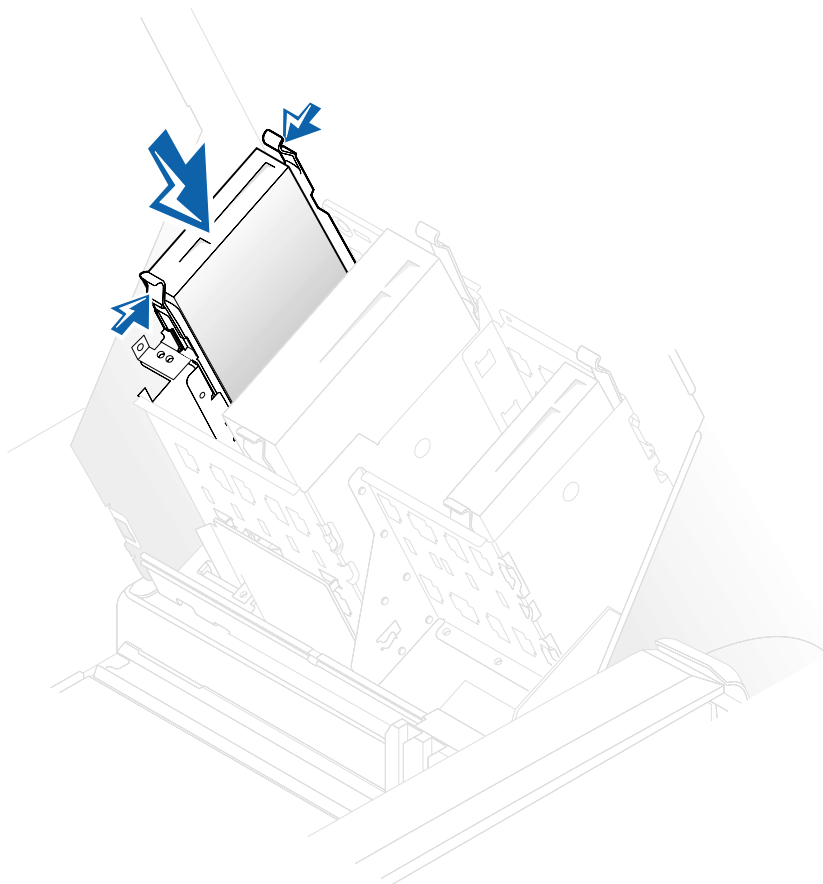


- 7 Slide the drive/bracket assembly into the drive bay until both drive bracket tabs snap securely into place (see the following figure).

## Installing an Externally Accessible Drive



## Installing the Diskette Drive




- 8 If you are installing a drive that has its own controller card, [install the controller card in an expansion slot](#).  
See the documentation that accompanied the drive and controller card to verify that the configuration is correct for your computer. Change any settings necessary for correct configuration.
- 9 Connect the cables to the drive. See "[Attaching Cables for an Externally Accessible Drive](#)."
  - Connect a DC power cable to the power input connector on the back of the drive.


- Connect the appropriate interface cable to the interface connector on the back of the drive.


If you are installing an EIDE or SCSI drive and you have another drive of the same type in the computer, you can use the spare connector on the interface cable for the existing drive. Otherwise, use the interface cable provided with the new drive.

- If the drive has audio output capability, such as a CD drive, connect the audio cable to the audio connector on the back of the drive.

10 Connect the interface cable(s) to the system board or a controller card, depending on the type of drive you are installing. See "[Attaching Cables for an Externally Accessible Drive](#)."

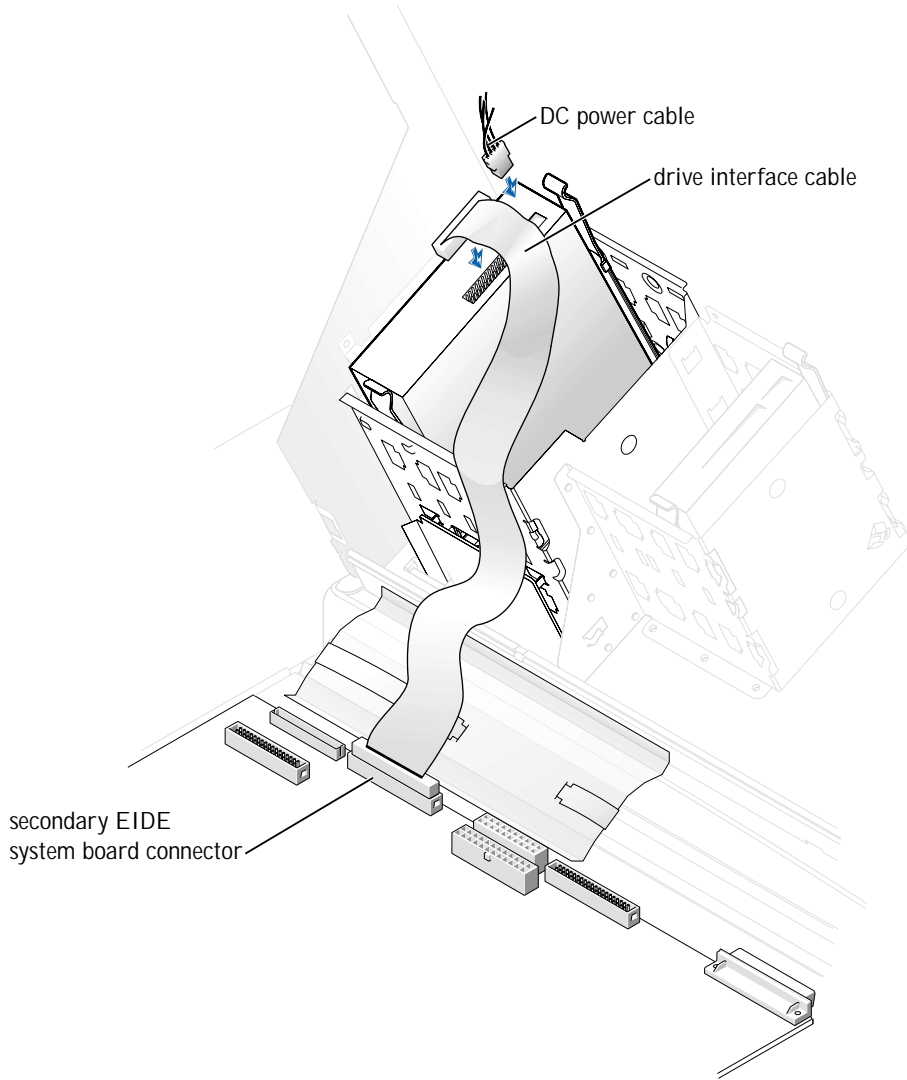
 **NOTE:** To locate system board drive connectors, see "[System Board Components](#)."

 **NOTICE:** To avoid possible damage, you must match the colored strip on the interface cable with pin 1 on both the drive and system board connectors.

 **NOTICE:** To avoid possible damage, ensure that drive cables are secured in the cable retainer and in the drive bay cable clips. See "[Attaching Cables for an Externally Accessible Drive](#)" and "[Attaching Cables for the Diskette Drive](#)."

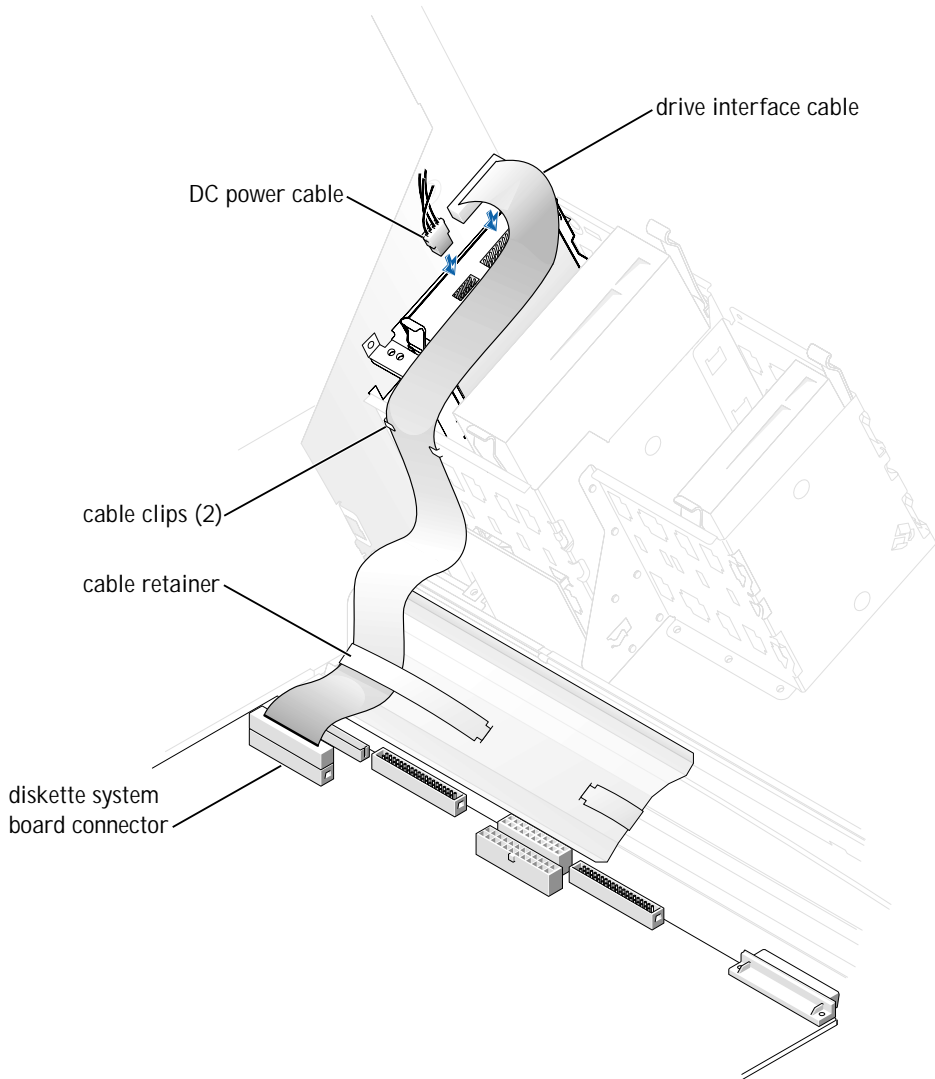
- For a diskette drive or non-EIDE tape drive, connect the drive interface cable to the diskette connector on the system board.
- For an EIDE CD, zip, or tape drive, connect the drive interface cable to the secondary EIDE connector on the system board. For more information, see "[EIDE Device Installation Guidelines](#)."
- For an EIDE hard drive, connect the drive interface cable to the primary EIDE connector on the system board. For more information, see "[EIDE Device Installation Guidelines](#)."
- For a SCSI drive, connect the drive interface cable to the SCSI connector on system board. For more information, see "[SCSI Device Installation Guidelines](#)."
- For a drive that comes with its own controller card, connect the drive interface cable to the controller card.
- For a drive that has audio output capability, such as a CD drive, connect the audio cable to the audio (CD input) connector on the system board.

## Attaching Cables for an Externally Accessible Drive





## Attaching Cables for the Diskette Drive



- 11 Ensure that all cables are firmly connected. Fold cables out of the way to provide airflow for the fan and cooling vents.
- 12 If the drive bay was previously empty, remove the corresponding insert from the front panel.

From inside the cover, press the ends of the insert outward with your finger until the insert snaps free of the front panel.



**NOTE:** If you are installing a hard drive, do not remove the drive bay insert.

13 **Close the computer cover.**

14 Stand the computer upright.

15 Reconnect the computer and devices to their electrical outlets, and turn them on.



**NOTE:** If enabled, the **Chassis Intrusion** option will cause the following message to be displayed at the next computer start-up:

ALERT! Cover was previously removed.

16 Enter system setup and update your drive configuration information:

- Reset the **Chassis Intrusion** option, as described in your *User's Guide*.
- If you installed a diskette drive, update the **Diskette Drive A** option to enable your new diskette drive.
- If you installed an EIDE CD, zip, or tape drive, set the appropriate **Drive** option (**0** or **1**) under **Secondary Drives** to **Auto**.
- If you installed a hard drive, update the drive settings under **Primary Drives**.

After you update the system settings, exit system setup and reboot the computer.

17 If you installed a hard drive, partition and logically format the drive before proceeding to the next step.

See the operating system's documentation for instructions.

18 Test the drive to verify that it is operating properly.

- If the drive you installed is a hard drive, run the Dell Diagnostics to test the drive.
- For other types of drives, see the drive's documentation for information on testing the drive.



**NOTE:** Tape drives sold by Dell come with their own operating software and documentation. After you install a tape drive, refer to the documentation that came with the drive for instructions on installing and using the tape drive software.

## Installing a Hard Drive



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



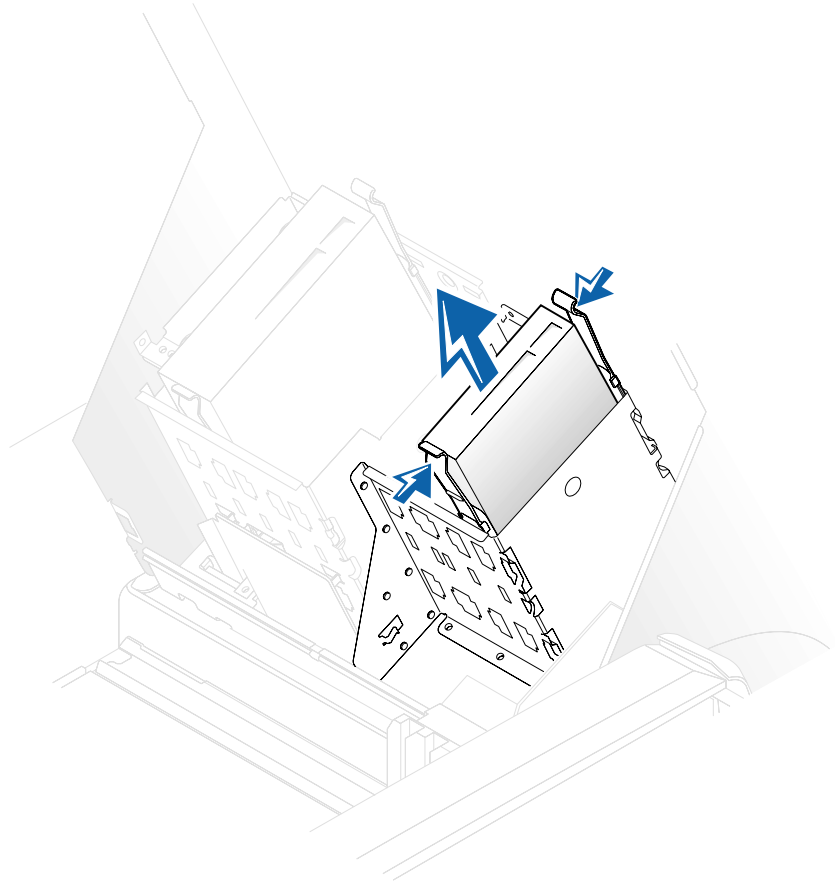
**CAUTION:** Before you perform this procedure, see "[Safety First—For You and Your Computer](#)."



**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, lay the computer on its right side, and [open the computer cover](#).
- 2 If you are replacing a drive that is already installed in the computer, continue with [step 3](#). If you are installing a new drive, go to [step 5](#).
- 3 Disconnect the DC power cable and interface cable from the back of the drive you are replacing.
- 4 Remove the drive from the chassis drive bay.
  - a Squeeze together the tabs at each side of the drive to disengage the drive bracket from the chassis.
  - b Slide the drive bracket upward, and remove it from the chassis (see the following figure).

## Removing a Hard Drive





- 5 Unpack the replacement drive and prepare it for installation.

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

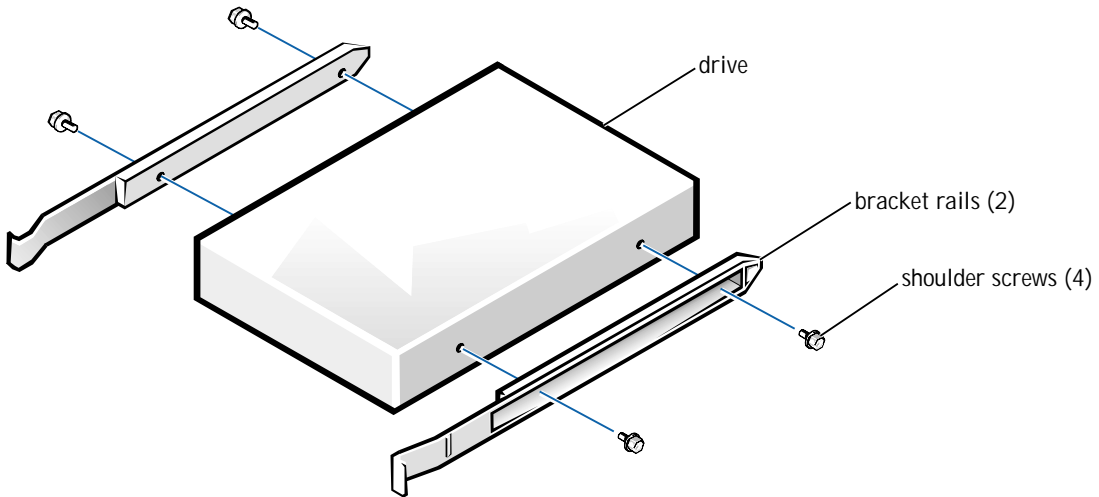
See the documentation that accompanied the drive to verify that the drive is configured for your computer. Change any settings necessary for your configuration.

- 6 If the replacement drive does not have bracket rails attached, remove the rails from the old drive by removing the four screws that secure the rails to the drive. Then attach the bracket rails to the replacement drive (see the following figure).

 **NOTE:** If you are not replacing an existing drive and the new drive does not have bracket rails attached, install the extra rail set that is located inside your computer in an empty drive bay.

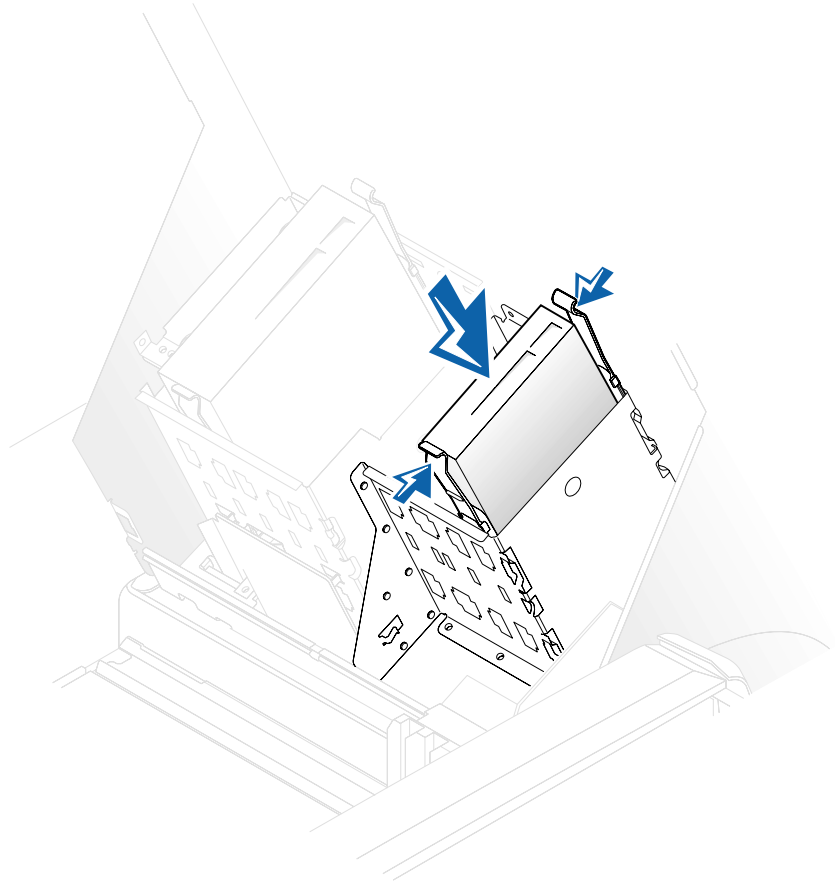
 **NOTE:** You must use the shoulder screws shipped with the spare drive rails.

### Attaching Bracket Rails for a Hard Drive



- 7 Slide the drive/bracket assembly into the drive bay until both drive bracket tabs snap securely into place (see the following figure).

## Installing a Hard Drive



- 8 If you are installing a drive that has its own controller card, [install the controller card in an expansion slot](#).  
See the documentation that accompanied the drive and controller card to verify that the configuration is correct for your computer. Change any settings necessary for correct configuration.
- 9 Connect the cables to the drive. See "[Attaching Cables for a Hard Drive](#)."
  - Connect a DC power cable to the power input connector on the back of the drive.

- Connect the appropriate interface cable to the interface connector on the back of the drive.

If you are installing an EIDE or SCSI drive and you have another drive of the same type in the computer, you can use the spare connector on the interface cable for the existing drive. Otherwise, use the interface cable provided with the new drive.

- 10 Connect the interface cable(s) to the system board or a controller card, depending on the type of drive you are installing. See "[Attaching Cables for a Hard Drive](#)."



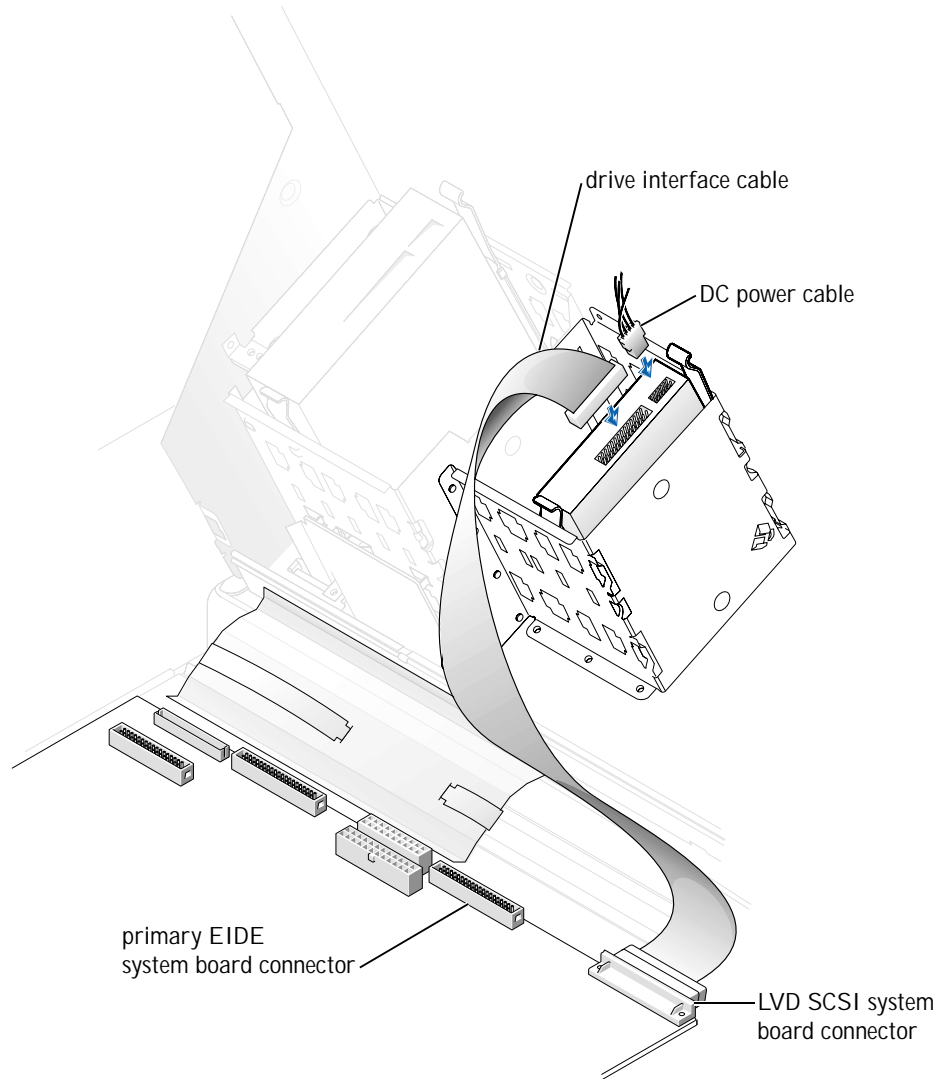
**NOTE:** To locate system board drive connectors, see "[System Board Components](#)."



**NOTICE:** To avoid possible damage, you must match the colored strip on the interface cable with pin 1 on both the drive and system board connectors.

- For an EIDE hard drive, connect the drive interface cable to the primary EIDE connector on the system board. For more information, see "[EIDE Device Installation Guidelines](#)."
- For a SCSI hard drive, connect the drive interface cable to the SCSI connector on system board. For more information, see "[SCSI Device Installation Guidelines](#)."
- For a drive that comes with its own controller card, connect the drive interface cable to the controller card.


## Attaching Cables for a Hard Drive



- 11 Ensure that all cables are firmly connected. Fold cables out of the way to provide airflow for the fan and cooling vents.
- 12 If the drive bay was previously empty, remove the corresponding insert from the front panel.




From inside the cover, press the ends of the insert outward with your finger until the insert snaps free of the front panel.

 **NOTE:** If you are installing a hard drive, do not remove the drive bay insert.

13 [Close the computer cover.](#)

14 Stand the computer upright.

15 Reconnect the computer and devices to their electrical outlets, and turn them on.

 **NOTE:** If enabled, the **Chassis Intrusion** option will cause the following message to be displayed at the next computer start-up:

ALERT! Cover was previously removed.

16 Enter system setup and reset the **Chassis Intrusion** option as described in your *User's Guide*, and update your drive configuration information.

After you update the system settings, exit system setup and reboot the computer.

17 Partition and logically format the drive before proceeding to the next step.

See the operating system's documentation for instructions.

18 Run the Dell Diagnostics to test the drive.

19 If the hard drive you installed is the primary drive, install the operating system on the drive.

See the operating system's documentation for instructions.

## EIDE Device Installation Guidelines

### Jumper Settings

All EIDE drives should be configured for the Cable Select jumper position, which assigns master and slave status to drives by their position on the interface cable. When two EIDE drives are connected to a single EIDE interface cable and are configured for the Cable Select jumper position, the drive 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). Refer to the documentation in your drive upgrade kit for information on setting devices to the Cable Select jumper position.

### General Guidelines

With the two EIDE interface connectors on the system board, your computer can support up to four EIDE drives:


- The primary EIDE system-board connector should be cabled to EIDE hard drives
- The secondary EIDE connector should be cabled to EIDE CD, DVD, tape, DAT, and zip drives

To locate the EIDE interface connectors on the system board, see "[System Board Components](#)" or "[Interior Service Label](#)." Each EIDE interface connector on the system board supports the following:

- Two devices, master and slave
- LBA
- PIO Mode 3 and Mode 4
- Ultra ATA/100 (backward-compatible with ATA/66 and ATA/33)

### EIDE Cables


To transfer data at full speed, Ultra ATA/100 hard drives require an 80-conductor cable like that used with ATA/66 drives. The 80-conductor cable has a 40-pin connector like the ATA/33 cable, but it has twice as many wires within the cable. If you use an ATA/33 cable with Ultra ATA/100 hard drives, the drives will operate properly, but data will transfer at ATA/33 speeds.

 **NOTICE:** Dell recommends that you use only EIDE cables purchased from Dell. Cables purchased elsewhere are not guaranteed to work with Dell computers.

## SCSI Device Installation Guidelines

This section describes how to configure and install SCSI devices in your computer. To install a SCSI device, you can use one or both of the following SCSI controllers:

- The SCSI connector on the system board. To locate the SCSI system board connector, see "[System Board Components](#)" or "[Interior Service Label](#)."

 **NOTE:** The system board SCSI controller will support hard drives only. Do not connect CD or DVD drives, tape drives, DAT drives, and so on. An add-in SCSI controller can be installed in your computer for this purpose.

- A SCSI controller card installed in your computer.

## SCSI ID Numbers

Internal SCSI devices must have a unique SCSI ID number from 0 to 15. If you are using the SCSI connector on the system board and a SCSI controller card installed in your computer, you will have two separate SCSI buses operating. Each SCSI bus will have a set of SCSI ID numbers from 0 to 15.

When SCSI devices are shipped from Dell, the default SCSI ID numbers for are assigned as follows:


## Default SCSI ID Settings

System Board Controller		Optional Controller Card	
Device	ID	Device	ID
Controller	7	Controller	7
Boot hard drive	0	Boot hard drive	0
		CD or DVD drive	5
		tape or DAT drive	6

**NOTE:** There is no requirement that SCSI ID numbers be assigned sequentially or that devices be attached to the cable in order by ID number.

SCSI devices installed by Dell are configured correctly during the manufacturing process. You do not need to set the SCSI ID for these SCSI devices.

If you attach additional optional SCSI devices, refer to the documentation for each device for information about setting the appropriate SCSI ID number.

 **NOTICE:** Dell recommends that you use only SCSI cables purchased from Dell. Cables purchased elsewhere are not guaranteed to work with Dell computers.

#### Device Termination

SCSI logic requires that termination be enabled for the two devices at opposite ends of the SCSI chain and disabled for all devices in between.

Dell recommends that you use terminated cables and that you disable termination on all devices. See the documentation provided with any optional SCSI device you purchase for information on disabling termination on the device.

#### General Guidelines

Follow these general guidelines when installing SCSI devices in your computer:


- Although you install SCSI devices essentially the same way as other devices, their configuration requirements are different. For details on configuring your particular SCSI subsystem, refer to the documentation for your SCSI devices and/or your host adapter card.
- Configure the device for a SCSI ID number and disable termination, if necessary.
- To use an external SCSI device, you must have a SCSI controller card installed in your computer. Connect one end of the external SCSI cable to the connector on the back of the SCSI device. Attach the other end of the external SCSI cable to the connector on the controller card installed in the computer.

- After installing a SCSI hard drive, **Primary Drive 0** and **Primary Drive 1** should be set to **None** in system setup if no EIDE hard drives are installed. If you have any EIDE devices on the second EIDE channel, such as a CD or tape drive, **Secondary Drive 0** and/or **Secondary Drive 1** should be set to **Auto**.
- You may need to use programs other than those provided with the operating system to partition and format SCSI hard drives. Refer to the documentation that came with your SCSI software drivers for information on installing the appropriate drivers and preparing your SCSI hard drive for use.

### SCSI Cables

Ultra 160/m and Ultra2/Wide LVD drives (typically hard drives) both use a 68-pin cable. One end of the cable attaches to the SCSI connector on the system board or the SCSI controller card installed in your computer. The remaining connectors on the cable attach to the various drives.

Narrow SCSI drives (optional SCSI cards such as tape drives, CD drives, and some hard drives) use a 50-pin cable. One end of this cable attaches to the SCSI controller card. The remaining connectors on the cable attach to the various Narrow SCSI devices.

 **NOTICE:** Dell recommends that you use only SCSI cables purchased from Dell. Cables purchased elsewhere are not guaranteed to work with Dell computers.




# Expansion-Card Airflow Shroud

- [Removing the expansion-card airflow shroud](#)
- [Replacing the expansion-card airflow shroud](#)

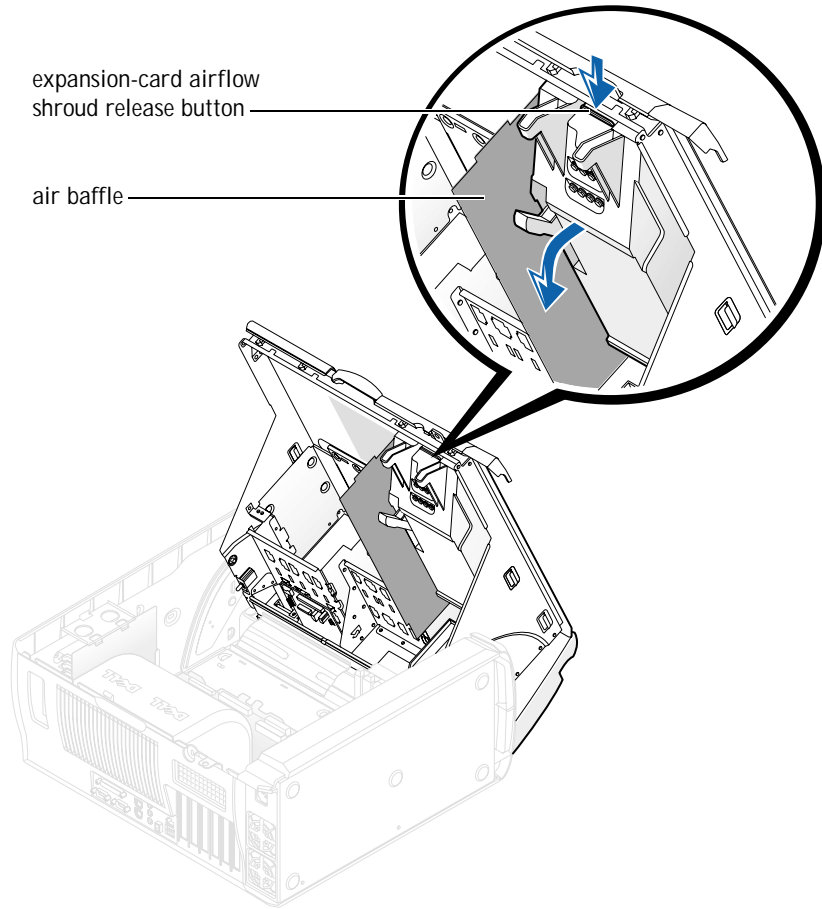
## Removing the Expansion-Card Airflow Shroud

To access some components on the system board, you may need to remove the expansion-card airflow shroud.


 **CAUTION:** Before you perform this procedure, see "[Safety First—For You and Your Computer](#)."

- 1 Turn off the computer and devices, disconnect them from their electrical outlets, wait at least 10 to 20 seconds, lay the computer on its right side, and then [open the computer cover](#).
- 2 Press the expansion-card airflow shroud release button.
- 3 Lift the expansion-card airflow shroud up and away from the computer cover (see the following figure).

## Removing the Expansion-Card Airflow Shroud



## Replacing the Expansion-Card Airflow Shroud

 **NOTE:** You must install the expansion-card airflow shroud with the air baffle connected to the shroud to keep the computer from overheating.

To replace the expansion-card airflow shroud, perform the [removal procedure](#) in reverse.



# Expansion Cards

- [Installing an expansion card](#)
- [Removing an expansion card](#)

Your computer provides expansion slots for the following cards:

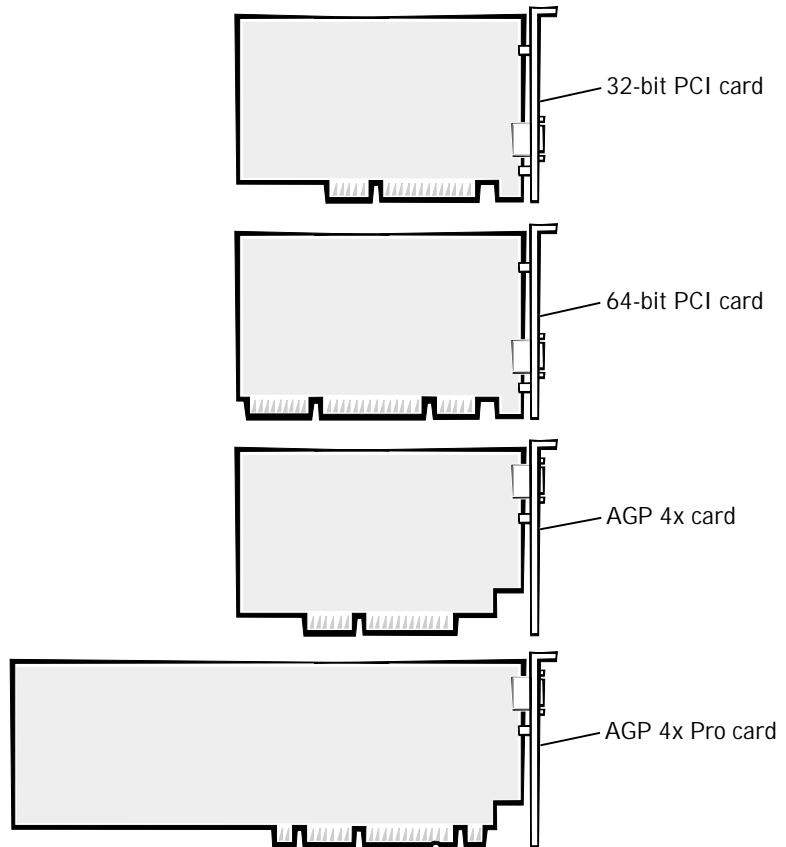
- Up to three 32-bit, 33-MHz PCI cards.
- Up to two 64-bit, 66-MHz PCI expansion cards.
- One 32-bit AGP card. The expansion slot supports AGP 4x or 2x Pro110 modes operating at 1.5 V.


See "[Expansion Card Types](#)" for examples of these cards.



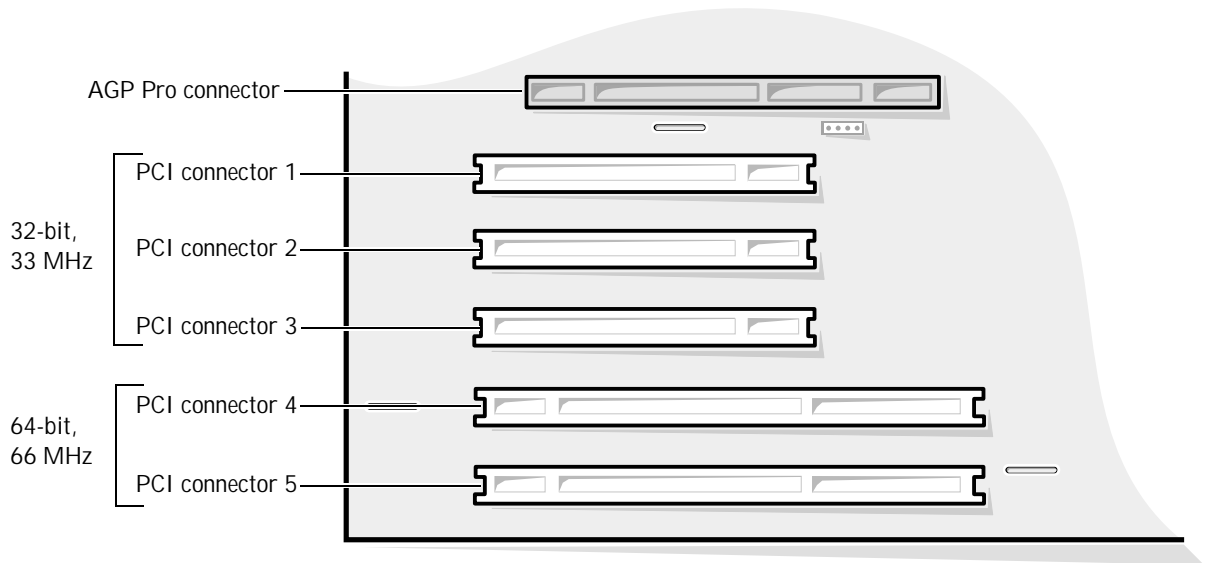
**NOTE:** To meet PC99 Workstation requirements, your Dell™ computer does not support ISA expansion cards. This is an industry standard for ease-of-use.


## Expansion Card Types




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


## System Board Expansion Card Components



 **NOTE:** Install only 66-MHz expansion cards in the 66-MHz slots. You can install 33-MHz cards in the 66-MHz slots. However, the entire bus, including the integrated SCSI controller, will operate at only 33 MHz.

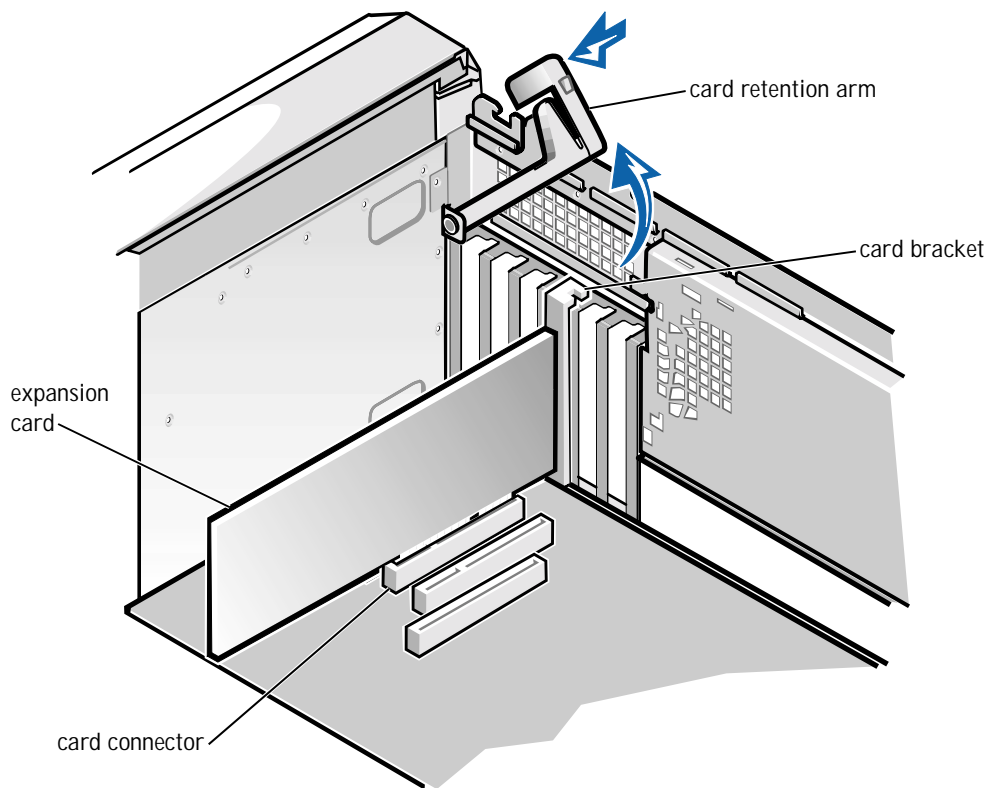
### Installing an Expansion Card

 **CAUTION:** Before you perform this procedure, see "[Safety First—For You and Your Computer](#)."

 **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, lay the computer on its right side, and [open the computer cover](#).
- 2 Press the lever on the expansion card retention arm and raise the retention arm (see the following figure).

## Raising the Expansion Card Retention Arm



3 If you are installing a new expansion card, remove the filler bracket for an empty card-slot opening. Then continue with [step 5](#).

4 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.

5 Prepare the new expansion card for installation.

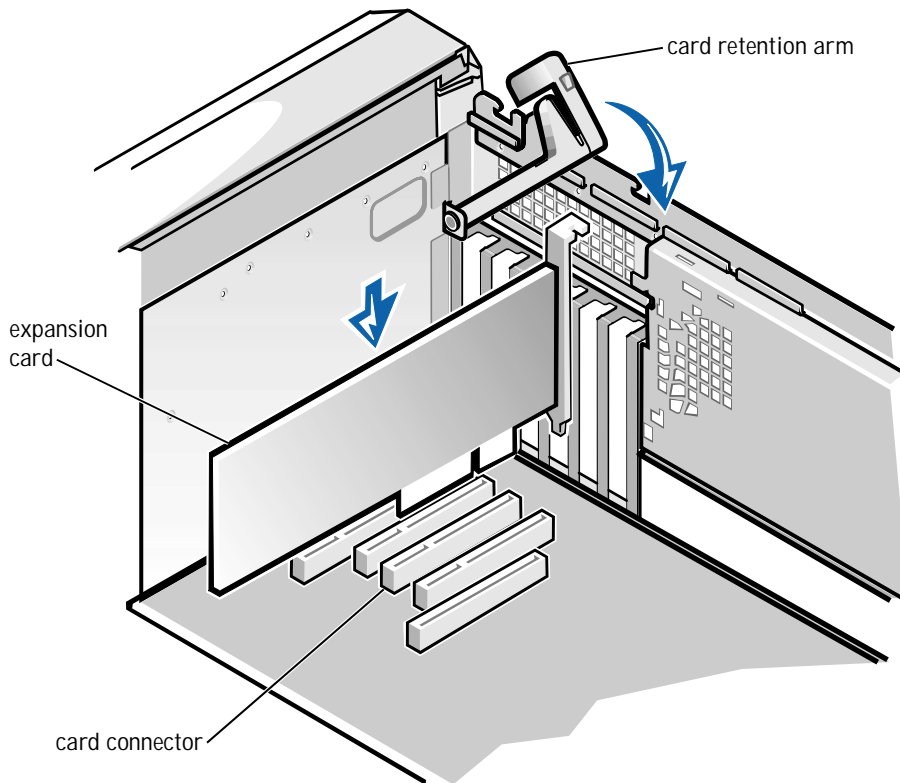
See the documentation that came with the expansion card for information on configuring the card, making internal connections, or otherwise customizing it for your computer.

**⚠ 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 and verify that the standby power light on the system board has turned off. To locate this light, see "[System Board Components](#)."

6 Insert the expansion card into the expansion-card connector.

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 (see the following figure).


### Installing an Expansion Card



7 Lower the expansion card retention arm and press it into place, securing the expansion card(s) in the chassis.

8 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. Cables routed toward the rear of the expansion cards can prevent proper airflow from the expansion-card cooling fan.

9 Close the computer cover.

10 Stand the computer upright.

11 Reconnect the computer and devices to their electrical outlets, and turn them on.

 **NOTE:** If enabled, the **Chassis Intrusion** option will cause the following message to be displayed at the next computer start-up:

ALERT! Cover was previously removed.

Enter system setup and reset the **Chassis Intrusion** option as described in your *User's Guide*.


12 If you installed a sound card, perform the following steps:


- a Enter system setup, clear the security field, select **Integrated Devices** and change the setting for **Sound** to **Off**.
- b Connect external audio devices to the sound card's connectors. Do not connect external audio devices to the microphone, speaker/headphone, or line-in connectors on the computer back panel (see "Back-Panel Features").

13 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 computer back panel (see "Back-Panel Features").


## Removing an Expansion Card

 **CAUTION:** Before you perform this procedure, see "[Safety First—For You and Your Computer.](#)"


 **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, lay the computer on its right side, and [open the computer cover.](#)
- 2 Press the lever on the expansion card retention arm and raise the retention arm (see "[Raising the Expansion Card Retention Arm.](#)").
- 3 If necessary, disconnect any cables connected to the card.
- 4 Grasp the card by its top corners, and ease it out of its connector.
- 5 If you are removing the card permanently, install a filler bracket in the empty card-slot opening.

If you need a filler bracket, contact Dell and order part number 81808.

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

- 6 Lower the expansion card retention arm and press it into place, securing the expansion card(s) in the chassis.
- 7 [Close the computer cover.](#)
- 8 Stand the computer upright.
- 9 Reconnect the computer and devices to their electrical outlets, and turn them on.

 **NOTE:** If enabled, the **Chassis Intrusion** option will cause the following message to be displayed at the next computer start-up:

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

Enter system setup and reset the **Chassis Intrusion** option as described in your *User's Guide*.


- 10 If you removed a sound card, perform the following steps:

- a Enter system setup, clear the security field, select **Integrated Devices** and change the setting for **Sound** to **On**.
  - b Connect external audio devices to the audio connectors on the computer back panel (see "Back-Panel Features").
- 11 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 computer back panel (see "Back-Panel Features").





# Expansion-Card Cooling Fan and Guide

- [Removing an expansion-card cooling fan and guide](#)
- [Replacing an expansion-card cooling fan and guide](#)


 **NOTE:** The expansion-card cooling fan is mounted on the expansion-card guide.

## Removing an Expansion-Card Cooling Fan and Guide

 **CAUTION:** Before you perform this procedure, see "[Safety First—For You and Your Computer.](#)"

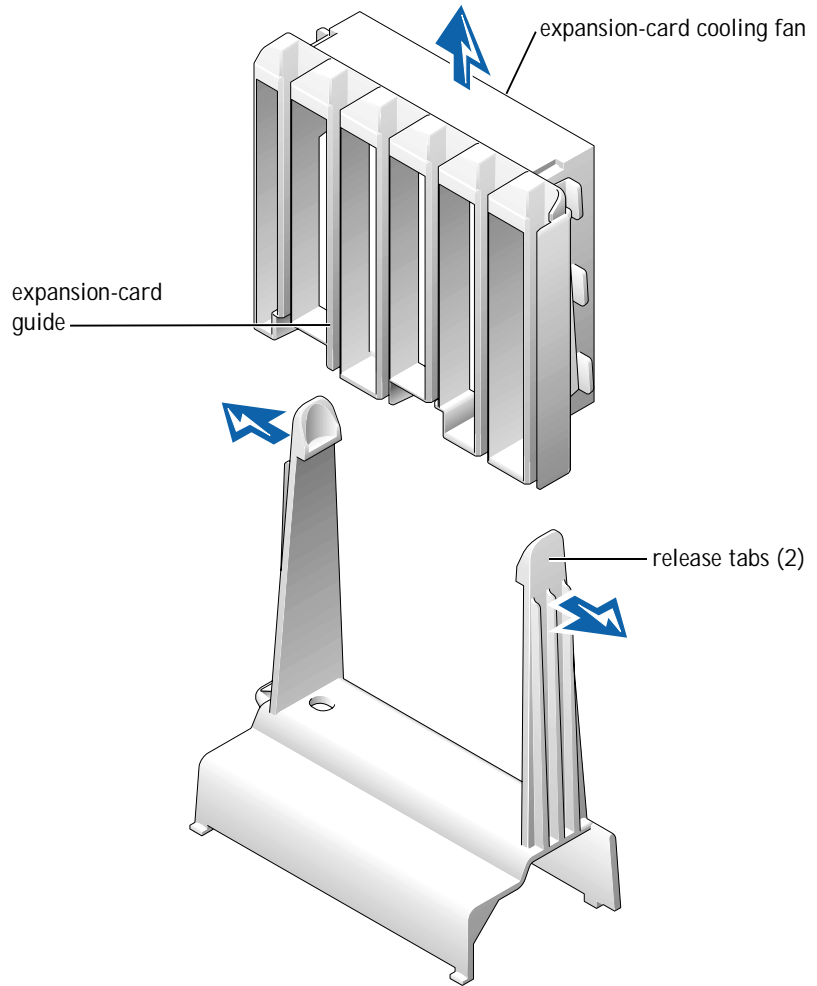
 **NOTICE:** Before disconnecting a device from the computer or removing a component from the system board, verify that the standby power light on the system board has turned off. To locate this light, see "[System Board Components.](#)"

- 1 Turn off the computer and devices, disconnect them from their electrical outlets, wait at least 10 to 20 seconds, lay the computer on its right side, and [open the computer cover](#).
- 2 [Remove any full-length expansion cards.](#)

 **NOTE:** There may not be any full-length expansion cards in the computer.

- 3 Disconnect the fan power cable from its connector on the system board (FAN\_CCAG). To locate this connector, see "[System Board Components.](#)"
- 4 Press the release tabs outward from the expansion-card fan and guide, and lift the fan/guide up and out of the guide bracket (see the following figure).

## Removing an Expansion-Card Cooling Fan and Guide



## Replacing an Expansion-Card Cooling Fan and Guide

- ➡ **NOTICE:** Ensure that the fan is properly installed on the guide bracket. When the fan is properly installed, the fan manufacturer label faces the expansion-card guide, and the fan power cable extends toward the system board. Airflow for the fan enters the chassis through the front panel and is moved by the fan to the chassis interior.

Insert the bottom of the cooling fan into the clips on the card guide. Then press the top of the fan toward the card guide until the tabs on the card guide grasp the fan. See "[Removing an Expansion-Card Cooling Fan and Guide.](#)"



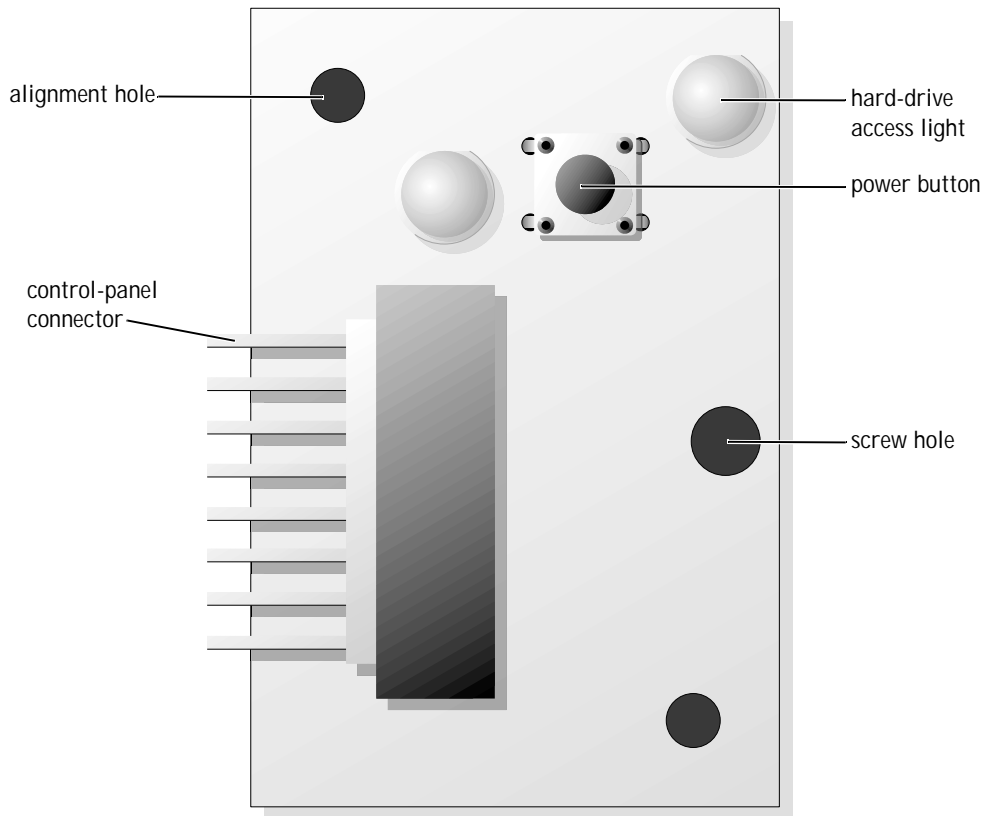
# Control Panel

- Components
- Removing the control panel
- Replacing the control panel


## Components


The following figure shows the control panel and the location of its principal connectors and components.

Control Panel Components



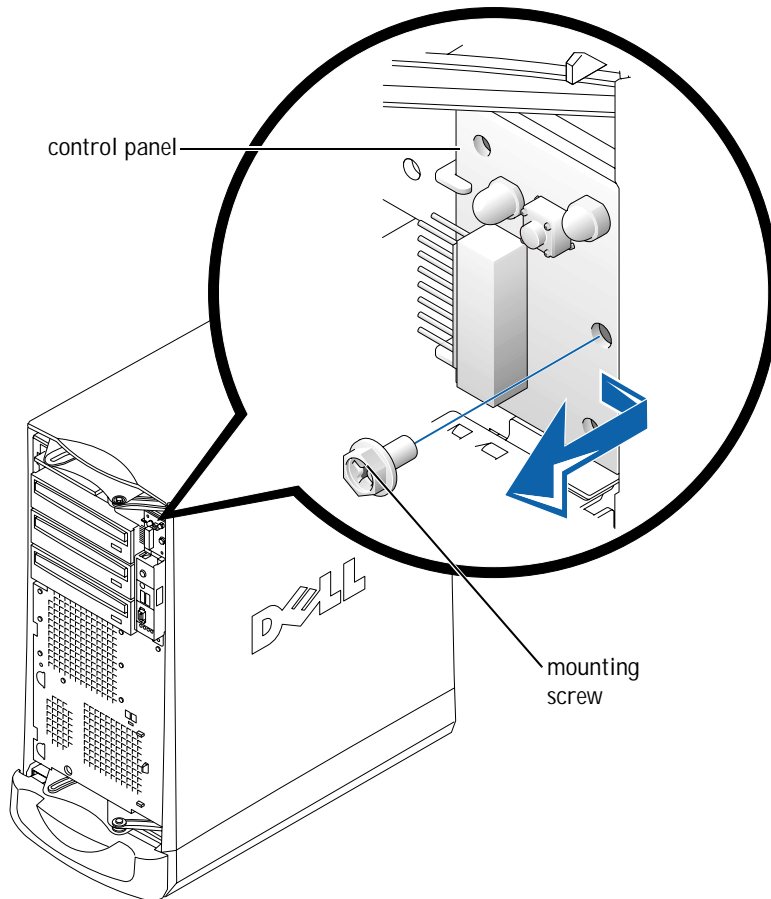
## Removing the Control Panel

 **CAUTION:** Before you perform this procedure, see "[Safety First—For You and Your Computer](#)."


 **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. To locate this light, see "[System Board Components](#)."

- 1 Turn off the computer and devices, disconnect them from their electrical outlets, wait at least 10 to 20 seconds, lay the computer on its right side, and [open the computer cover](#).
- 2 [Remove the front panel](#).
- 3 Disconnect the control-panel cable from the I/O panel connector.
- 4 Disconnect the I/O panel cable from the connector on the system board. To locate the system board connector, see "[System Board Components](#)."
- 5 Remove the mounting screw from the control panel.
- 6 Lift the control panel away from the chassis.

## Removing the Control Panel



## Replacing the Control Panel

 **NOTE:** When mounting the control panel on the drive door, ensure that the control-panel alignment hole is positioned over the guide pin. See "Removing the Control Panel."

To replace the control panel, perform the [removal procedure](#) in reverse.





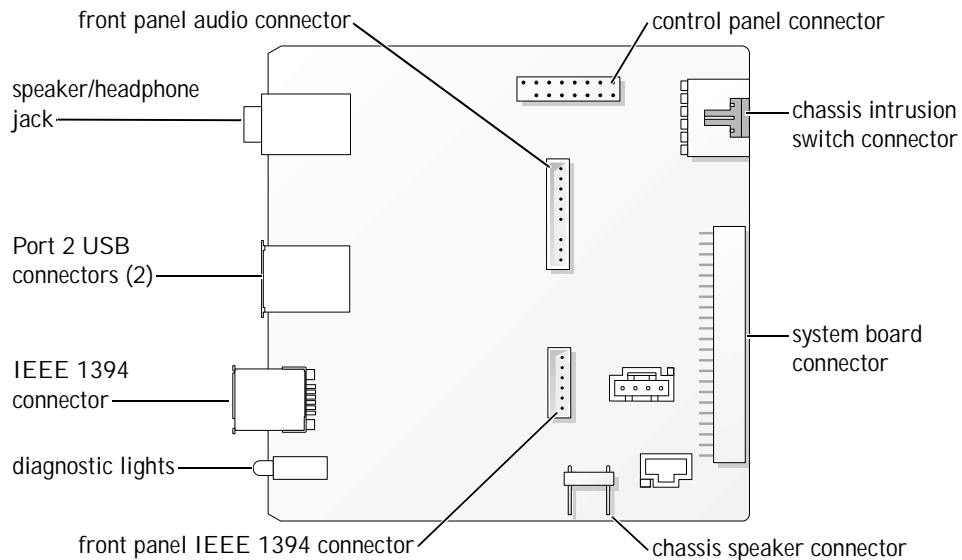
# I/O Panel

- Components
- Removing the I/O panel
- Replacing the I/O panel

## Components

The following figure shows the I/O panel and the location of its principal connectors and components.

### I/O Panel Components

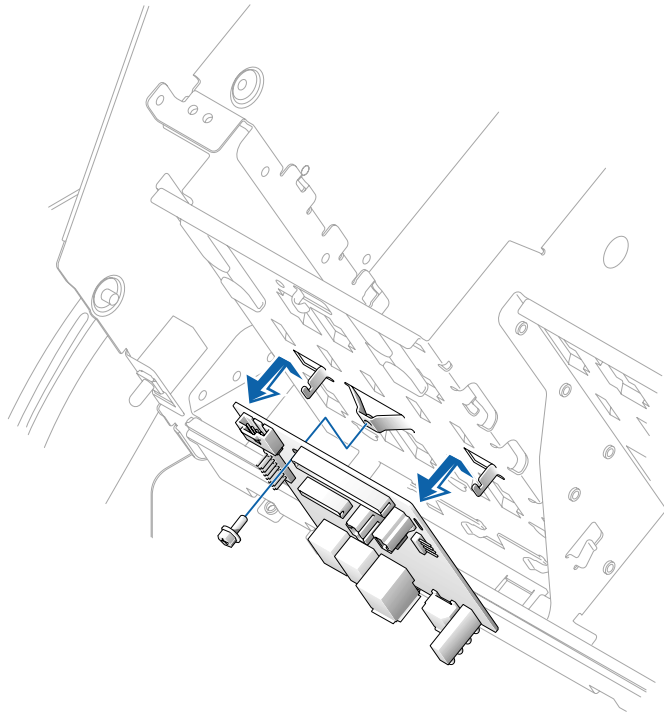


## Removing the I/O Panel

- 1 Turn off the computer and devices, disconnect them from their electrical outlets, wait at least 10 to 20 seconds, lay the computer on its right side, and **remove the computer cover**.
- 2 **Remove the front panel.**

- 3 Disconnect the control panel cable from the control panel connector. Disconnect the front-panel cable from the connector on the system board.
- 4 Remove all cables that are connected to the front I/O panel.
- 5 From inside the chassis cover, remove the mounting screw that secures the front I/O panel to the chassis.
- 6 Remove the front I/O panel from the chassis.

#### Removing the I/O Panel



#### Replacing the I/O Panel

To replace the front I/O panel, perform the [removal procedures](#) in reverse, ensuring that the upright, notched tab on the chassis fits through the hole at the end of the control panel.

# Chassis Intrusion Switch

- [Removing the chassis intrusion switch](#)
- [Replacing the chassis intrusion switch](#)


## Removing the Chassis Intrusion Switch



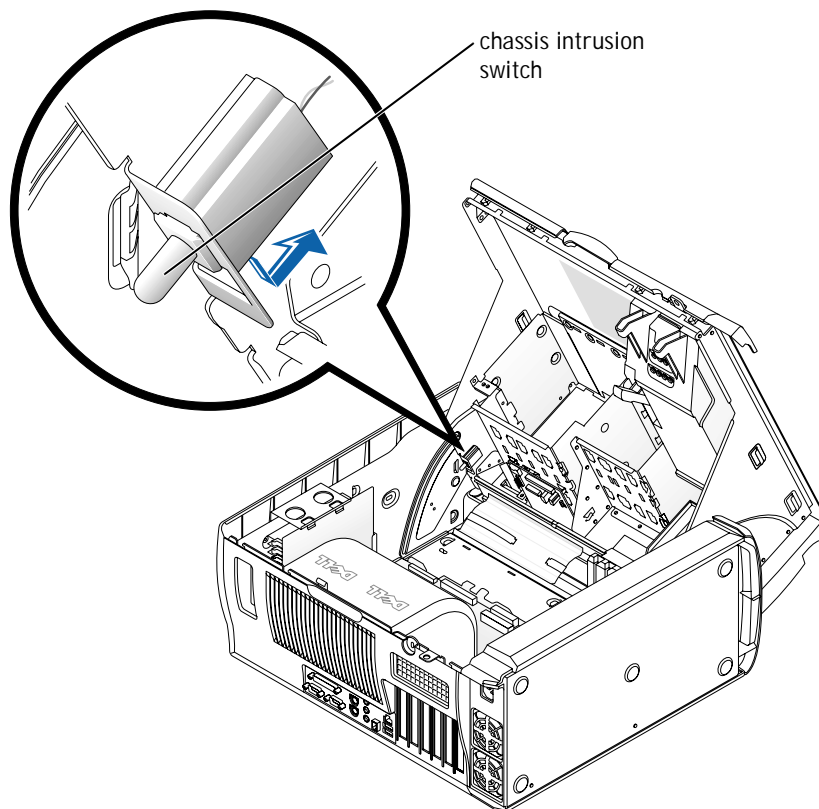
**CAUTION:** Before you perform this procedure, see "[Safety First—For You and Your Computer.](#)"



**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. To locate this light, see "[System Board Components.](#)"

- 1 Turn off the computer and devices, disconnect them from their electrical outlets, wait at least 10 to 20 seconds, lay the computer on its right side, and [open the computer cover](#).
- 2 [Remove the front panel](#).
- 3 Disconnect the chassis intrusion switch cable from the [I/O Panel](#) connector.
- 4 Feed the chassis intrusion switch cable through the routing holes in the drive door and the front wall of the chassis (see the following figure).
  -  **NOTE:** You must [open the drive door](#) to feed the chassis intrusion switch cable through the cable routing holes. The switch cable routes through an enlarged hole in the front chassis wall and through a hole in the drive door.
- 5 Slide the chassis intrusion switch up out of its slot on the left side of the chassis.
- 6 Lift the chassis intrusion switch and switch cable away from the chassis.

## Removing the Chassis Intrusion Switch




## Replacing the Chassis Intrusion Switch


To replace the chassis intrusion switch, perform the [removal procedure](#) in reverse.

# Speaker

- [Removing the speaker](#)
- [Replacing the speaker](#)

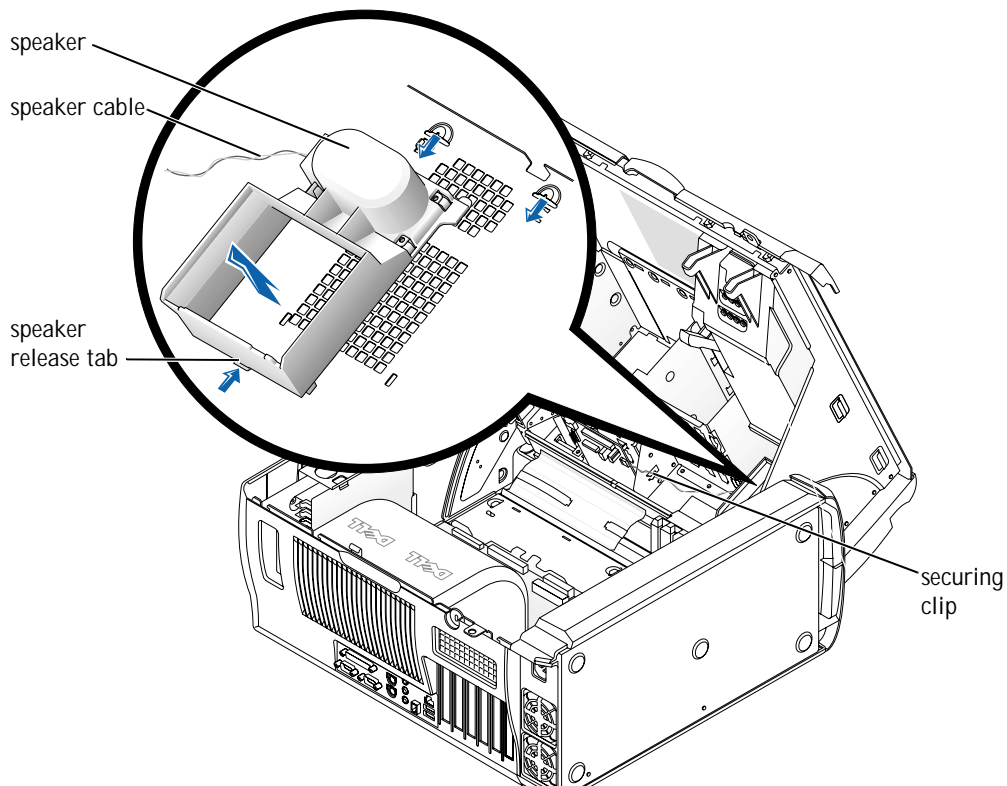
## Removing the Speaker

 **CAUTION:** Before you perform this procedure, see "[Safety First—For You and Your Computer](#)."

 **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. To locate this light, see "[System Board Components](#)."


- 1 Turn off the computer and devices, disconnect them from their electrical outlets, wait at least 10 to 20 seconds, lay the computer on its right side, and [open the computer cover](#).
- 2 Disconnect the speaker cable from the [I/O connector](#).
- 3 Disconnect the speaker cable from the securing clip in the chassis (see the following figure).

## Removing the Speaker



- 4 From inside the chassis, press the speaker release tab and slide the speaker upward to remove it from the retention tabs on the front chassis wall.
- 5 Lift the speaker and cable away from the chassis.

## Replacing the Speaker


 **NOTE:** When mounting the speaker in the retention tabs in the front chassis wall, ensure that the speaker cable is oriented toward the right side of the chassis.


To replace the speaker, perform the [removal procedure](#) in reverse.

# Microprocessor Airflow Shroud

- [Removing the microprocessor airflow shroud](#)
- [Installing the microprocessor airflow shroud](#)

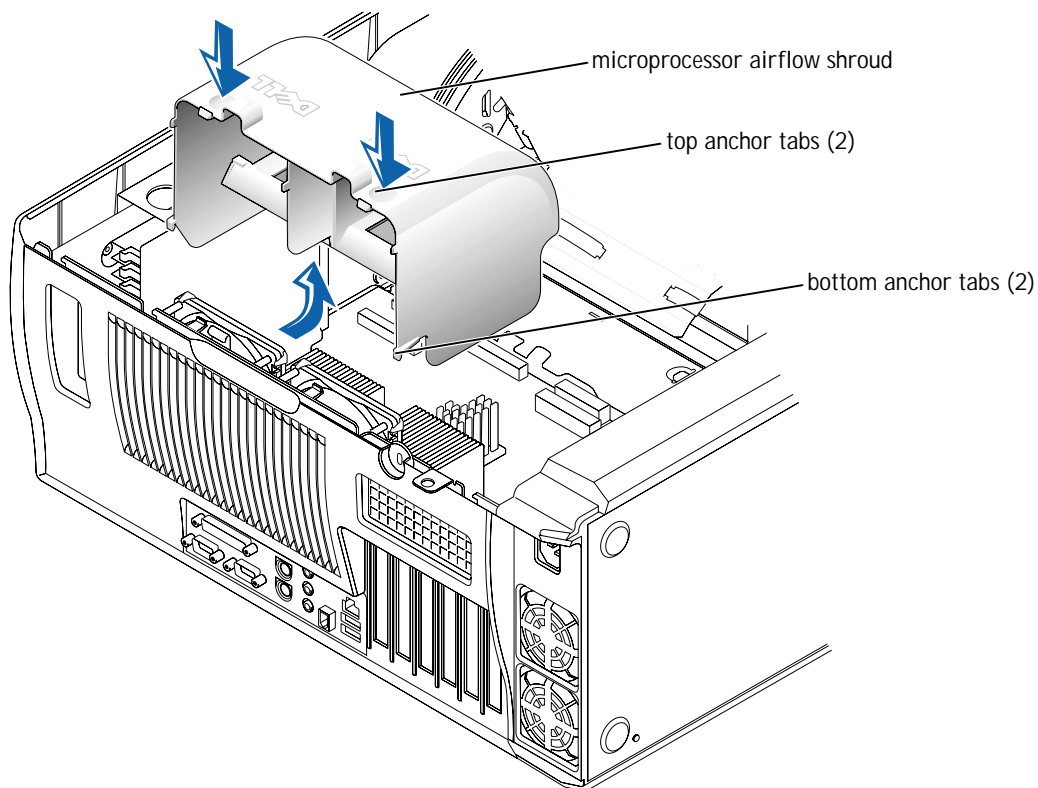
## Removing the Microprocessor Airflow Shroud

 **CAUTION:** Before you perform this procedure, see "[Safety First—For You and Your Computer.](#)"

 **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, lay the computer on its right side, and [open the computer cover.](#)
- 2 Remove the airflow shroud:
  - Press down and back on the indentations at the top corners of the shroud.  
The top anchor tabs will disengage from the chassis anchor slots. See the following figure.
  - Lift the airflow shroud out of the chassis.

## Removing the Microprocessor Airflow Shroud




## Installing the Microprocessor Airflow Shroud

- 1 Install the airflow shroud:
  - Insert the bottom anchor tabs of the shroud into the chassis anchor slots.
  - Press the shroud toward the chassis until the top anchor tabs on the shroud snap securely into place. See "[Removing the Microprocessor Airflow Shroud.](#)"
- 2 [Close the computer cover.](#)
- 3 Stand the computer upright.



- 4 Reconnect the computer and devices to their electrical outlets, and turn them on.

 **NOTE:** If enabled, the **Chassis Intrusion** option will cause the following message to be displayed at the next computer start-up:

ALERT! Cover was previously removed.

Enter system setup and reset the **Chassis Intrusion** option as described in your *User's Guide*.




# Microprocessor


- [Installation guidelines](#)
- [Upgrading the microprocessor\(s\)](#)


## Installation Guidelines

- A VRM must be installed for each microprocessor installed. To locate the VRM and microprocessor sockets, see "[System Board Components](#)."
- For single-processor operations, the processor must be installed in socket 0 and the VRM must be installed in connector 0. Processor socket 1 and VRM connector 1 must be empty. To locate these components, see "[System Board Components](#)."
- For dual-processor operations, both processor sockets and both VRM connectors must be populated.
- For dual-processor operations, the two processors and the two VRMs must be identical. If the processors do not match, you receive a computer message, the diagnostic lights indicate an error, and the computer does not start. If the VRMs do not match, the diagnostic lights indicate an error.
- If installing a Dell processor upgrade kit for either single or dual processors, remove and discard the original VRM(s). Then install the VRM(s) from the upgrade kit. If you are not installing a processor upgrade kit from Dell, reuse the original VRM(s).
- If you are upgrading your microprocessor, keep your original microprocessor heat sink and securing clips for future trouble shooting.

 **NOTICE:** Dell recommends that you use only microprocessors purchased from Dell. Microprocessors purchased elsewhere are not guaranteed to work with Dell computers.

## Upgrading the Microprocessor(s)

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

 **CAUTION:** The processor can get very hot during normal operation. Be sure that the processor has had sufficient time to cool before you touch it.



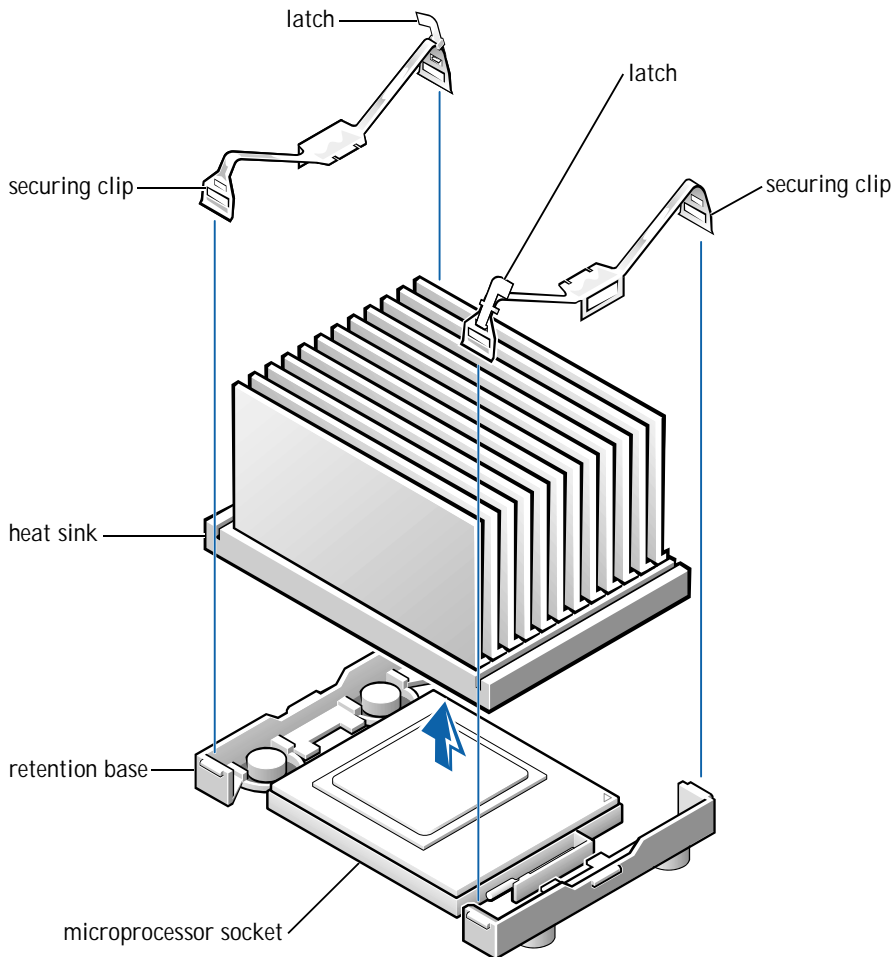
**CAUTION:** Before you perform this procedure, see "[Safety First—For You and Your Computer](#)."





**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, lay the computer on its right side, and [open the computer cover](#).
- 2 [Remove the microprocessor airflow shroud](#).
- 3 Remove the microprocessor heat sink:
  - a For each of the metal clips that secure the heat sink to the microprocessor, press down on the clip's latch to release it from the heat-sink retention base. Then lift the clip away from the heat sink (see the following figure).
  - b Lift the heat sink away from the microprocessor.

## Removing the Microprocessor Heat Sink



 **NOTE:** If you are upgrading your microprocessor, keep your original microprocessor heat sink and securing clips for future trouble shooting.

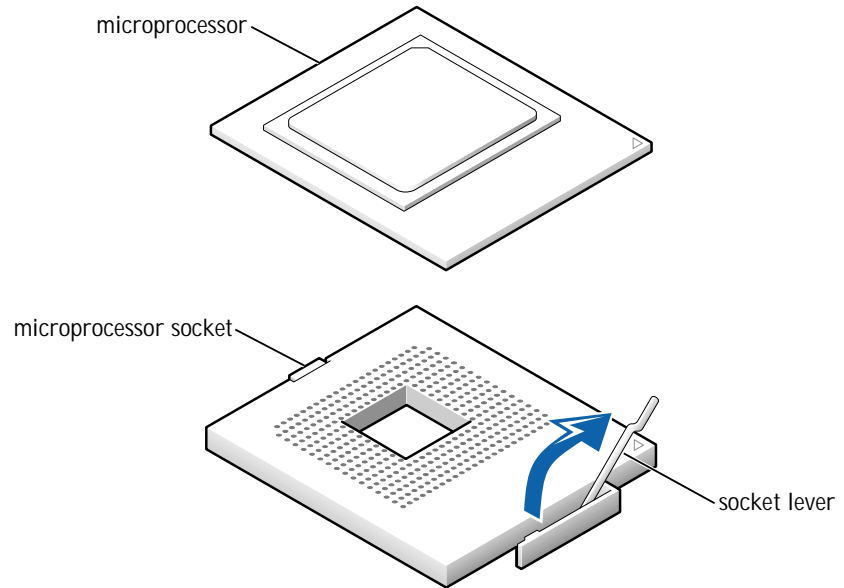
 **NOTE:** Your microprocessor upgrade kit includes a replacement microprocessor heat sink and two replacement securing clips.

### 4 Remove the microprocessor from its connector.

Your microprocessor uses a ZIF socket with a lever-type handle that secures or releases the microprocessor.

To remove the microprocessor, pull the socket lever up until the microprocessor is released. Then remove the microprocessor from the socket (see the following figure).

#### Removing the Microprocessor



#### 5 Install the new microprocessor in the socket:

- a Ensure that the lever on the microprocessor socket is fully extended to the release position.

➡ **NOTICE:** When you place the microprocessor in the socket, ensure that the microprocessor aligns properly with the socket. To avoid damage, you must position the microprocessor correctly in the socket.

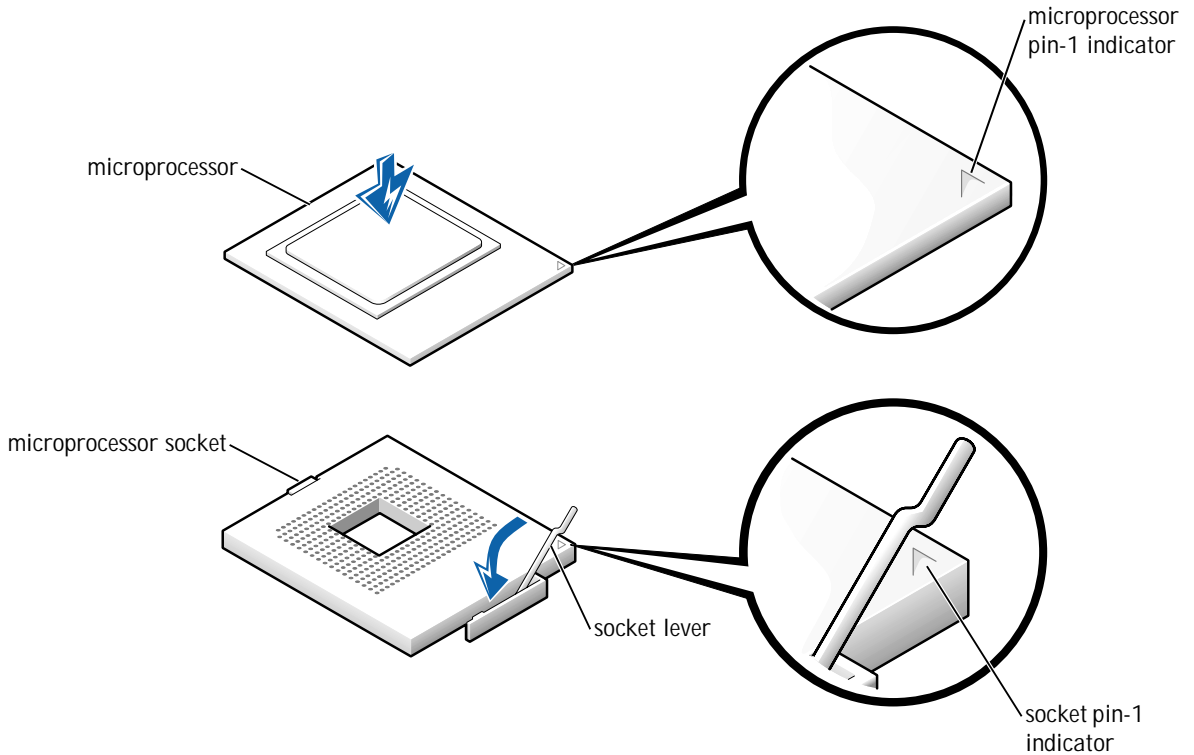
- b Align pin 1 of the new microprocessor with pin 1 of the socket.

✎ **NOTE:** Pin 1 of the microprocessor is indicated by a small triangle in one corner of the microprocessor. Pin 1 of the socket is indicated by a small triangle in one corner of the socket. See "[Installing the Microprocessor](#)."

➡ **NOTICE:** The microprocessor pins are delicate. To avoid damage, ensure that the microprocessor aligns properly with the socket, and do not use excessive force when installing the processor.

- c Carefully set the microprocessor in the socket and press it down lightly to seat it.
- d Rotate the socket lever back toward the socket until it snaps into place, securing the microprocessor.


### Installing the Microprocessor



### 6 Install the replacement microprocessor heat sink:

**➔ NOTICE:** Remove the film covering only when you are ready to replace the heat sink. Once the film covering has been removed, 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.

- a Remove the film covering the thermal grease on the bottom of the heat sink.

 **NOTICE:** Carefully align the heat sink with the retention base before making contact with the base to help avoid spreading the thermal grease to other components.


- b Lower the heat sink to the microprocessor so that the heat sink fits in the heat sink retention base.
- c For each of the replacement metal clips that secure the heat sink to the microprocessor, fit the end of the clip that does not have the latch to the heat sink retention base. Then, press down on the clip's latch to secure the clip to the heat sink retention base (see "[Removing the Microprocessor Heat Sink](#)").

7 Install the airflow shroud.

8 Close the computer cover.

9 Stand the computer upright.

10 Reconnect the computer to the electrical outlet, and turn it on.

 **NOTE:** If enabled, the **Chassis Intrusion** option will cause the following message to be displayed at the next computer start-up:

ALERT! Cover was previously removed.

Enter system setup and reset the **Chassis Intrusion** option as described in your *User's Guide*.

11 Enter system setup and confirm that in the top left corner the correct microprocessor speed appears. Also, confirm that the top line in the **System Data** area correctly identifies the new microprocessor.

12 Exit system setup, turn off the computer, and attach the devices to the computer and electrical outlets.

 **NOTE:** For more information about system setup, see your *User's Guide*.



# Microprocessor Cooling Fan

- Removing the microprocessor cooling fan
- Replacing the microprocessor cooling fan

## Removing the Microprocessor Cooling Fan



**CAUTION:** Before you perform this procedure, see "[Safety First—For You and Your Computer](#)."



**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. To locate this light, see "[System Board Components](#)."

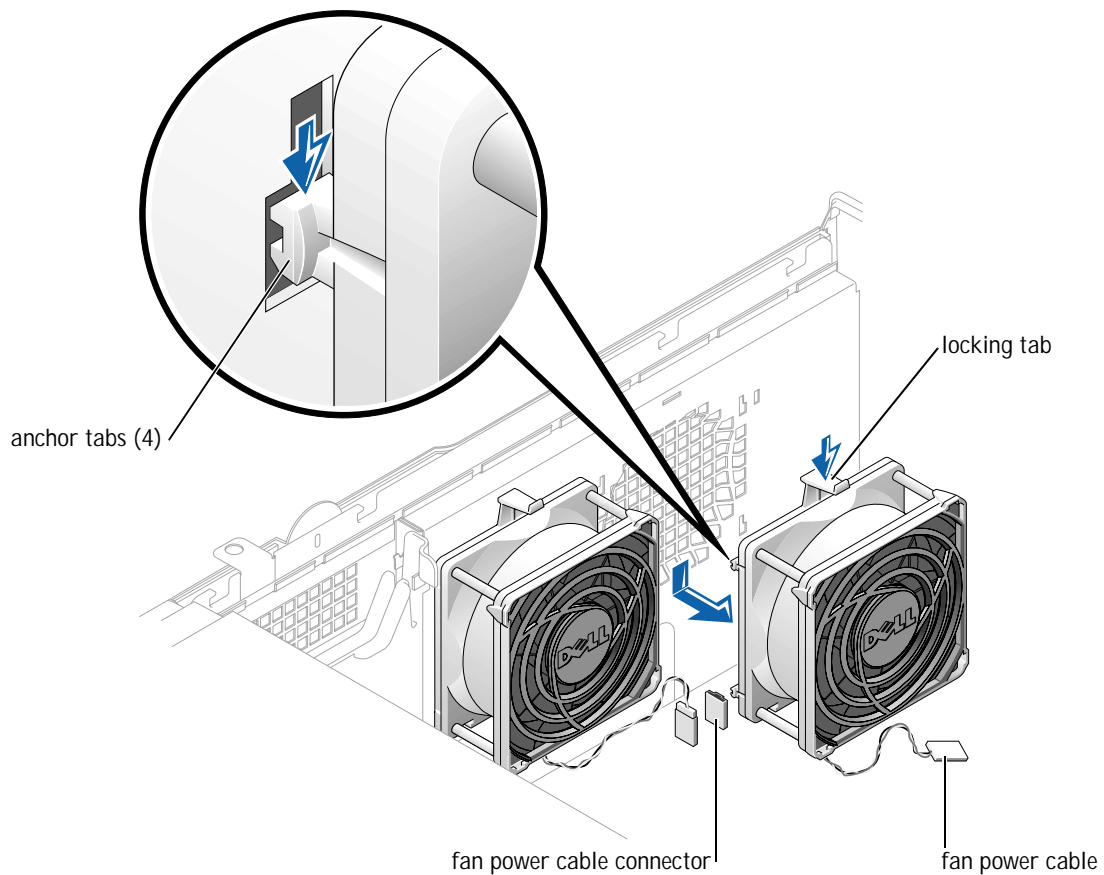
- 1 Turn off the computer and devices, disconnect them from their electrical outlets, wait at least 10 to 20 seconds, lay the computer on its right side, and [open the computer cover](#).
- 2 [Remove the microprocessor airflow shroud](#).
- 3 Disconnect the fan power cable from its connector on the system board. To locate this connector, see "[System Board Components](#)."



**NOTE:** There are two microprocessor cooling fans (FAN\_P0 and FAN\_P1).

- 4 Gently push the plastic locking tab down, and slide the fan down to disengage the four anchor tabs that hold the fan to the chassis wall. Pull the fan away from the chassis wall (see the following figure).

## Removing the Microprocessor Cooling Fan




## Replacing the Microprocessor Cooling Fan


To replace the microprocessor cooling fan, follow the [removal procedures](#) in reverse.


# VRM

- [Removing a VRM](#)
- [Installing a VRM](#)

 **NOTICE:** A VRM must be installed for each microprocessor installed. To locate the VRM and microprocessor sockets, see "[System Board Components](#)."

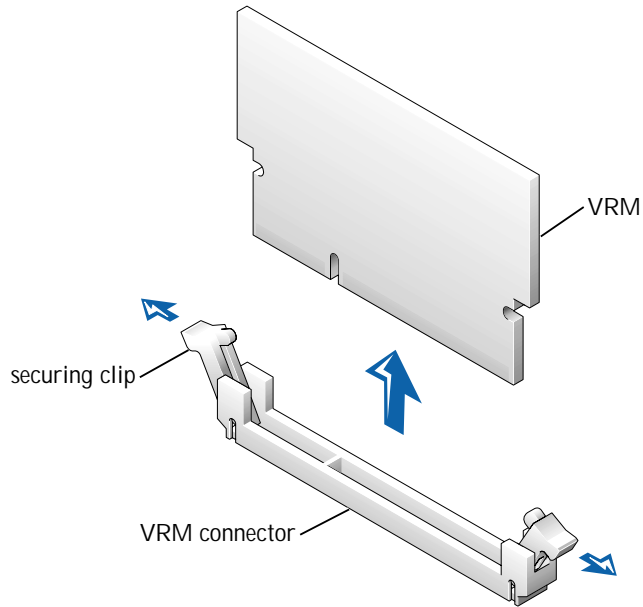
## Removing a VRM

 **CAUTION:** Before you perform this procedure, see "[Safety First—For You and Your Computer](#)."

 **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, wait at least 10 to 20 seconds, lay the computer on its right side, and [open the computer cover](#).
- 2 [Remove the airflow shroud](#).
- 3 Press the securing clips at each end of the socket outward simultaneously until the module pops out slightly from the socket (see the following figure).
- 4 Lift the module away from the socket.

## Removing a VRM




- 5 Grasp the VRM by its top corners, and ease it out of its connector.

## Installing a VRM

 **NOTE:** The VRMs must be installed in the correct configuration, depending on the number of [microprocessors installed](#).

- 1 Press the securing clips at each end of the socket outward until they snap open (see "[Removing a VRM](#)").
- 2 Align the slots on the bottom of the module with the ridges inside the socket.
- 3 Press the module straight down into the socket until the securing clips snap into place at the ends of the module.
- 4 [Install the airflow shroud](#).
- 5 [Close the computer cover](#).
- 6 Stand the computer upright.

- 7 Reconnect the computer and devices to their electrical outlets, and turn them on.

 **NOTE:** If enabled, the **Chassis Intrusion** option will cause the following message to be displayed at the next computer start-up:

ALERT! Cover was previously removed.

Enter system setup and reset the **Chassis Intrusion** option as described in your *User's Guide*.




# Computer Battery


The 3.0-V CR2032 coin-cell battery installed on the system board provides power to retain the configuration, date, and time information when the computer is turned off. The computer battery is designed to provide years of service without being replaced. However, you may need to replace the battery if configuration or clock-related inconsistencies occur or if one of the following messages is displayed during the boot routine:


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

or

Invalid configuration information -  
please run SETUP program

 **CAUTION:** There is a danger of the new battery exploding if it is installed incorrectly. 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 "[Safety First—For You and Your Computer.](#)"

 **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 have not already done so, make a copy of your computer configuration information in system setup.
- 2 If the settings are lost while you are replacing the battery, you can refer to your copy of the computer configuration information to restore the correct settings.
- 3 Turn off the computer and devices, disconnect them from their electrical outlets, and wait 10 to 20 seconds, lay the computer on its right side, and [open the computer cover.](#)
- 4 Remove the battery.

To locate the battery on the system board, see "[System Board Components.](#)"

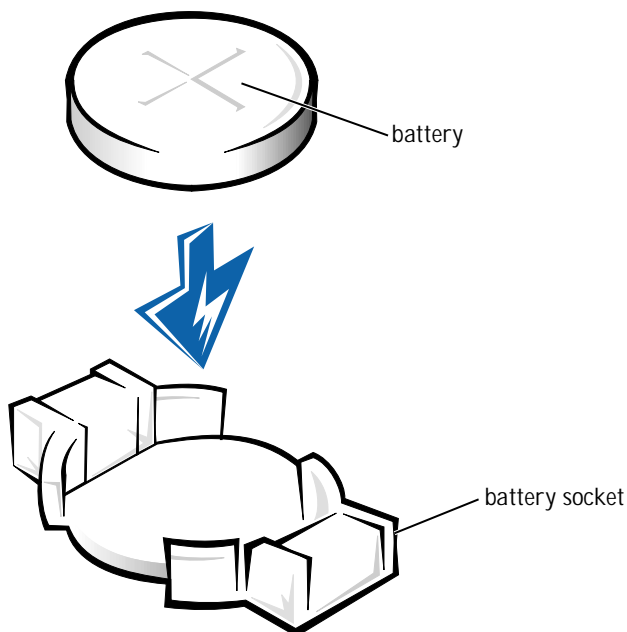
- ➡ **NOTICE:** If you use a blunt, nonconductive object to pry the battery out of its socket, be careful not to touch the system board with the object. Be sure that the object is inserted between the battery and the socket before you attempt to pry out the battery. Otherwise, you may damage the system board.

Pry the battery out of its socket with your fingers or with a blunt, nonconductive object, such as a plastic screwdriver.

- 5 Install the new battery.


Orient the battery with the side labeled "+" facing up (see the following figure). Then insert the battery into the socket, and snap it into place.

#### Installing the Computer Battery



- 6 Close the computer cover.
- 7 Stand the computer upright.
- 8 Reconnect the computer and devices to their electrical outlets, and turn them on.



 **NOTE:** If enabled, the **Chassis Intrusion** option will cause the following message to be displayed at the next computer start-up:

ALERT! Cover was previously removed.


- 9 Enter system setup, reset the **Chassis Intrusion** option as described in your *User's Guide*, and enter the current time and date. Then exit system setup and save the information.
- 10 Turn off your computer and disconnect it from its electrical outlet. Leave the computer off for at least 10 minutes.
- 11 Reconnect the computer to its electrical outlet and turn it on.
- 12 Enter system setup, and check the date and time.
- 13 If the time and date are still incorrect, contact Dell for technical assistance.




# System Board

- [Removing the System Board](#)
- [Replacing the System Board](#)

## Removing the System Board

 **CAUTION:** Before you perform this procedure, see "[Safety First—For You and Your Computer](#)."

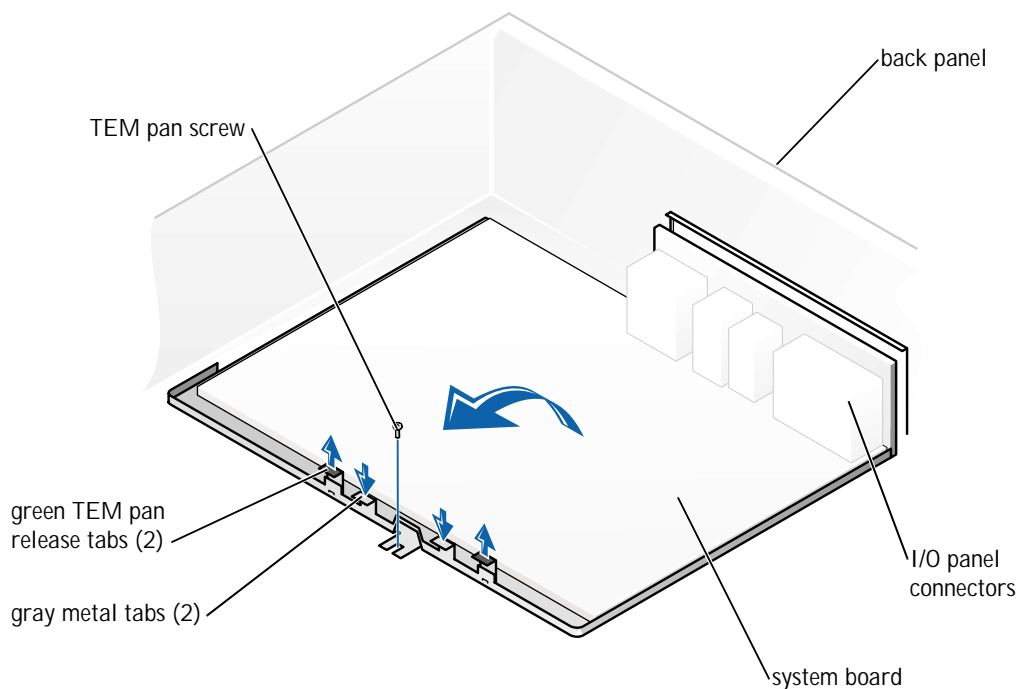
 **NOTICE:** Before disconnecting a device from the computer or removing a component from the system board, verify that the standby power light on the system board has turned off. To locate this light, see "[System Board Components](#)."

- 1 Write down your BIOS settings before you turn off your computer.

See the *User's Guide* that came with your computer for instructions to find your BIOS settings.

- 2 Turn off the computer and devices, disconnect them from their electrical outlets, wait at least 10 to 20 seconds, lay the computer on its right side, and [open the computer cover](#).
- 3 [Remove all expansion cards](#).
- 4 [Remove all memory modules](#).
- 5 [Remove the microprocessor airflow shroud](#).
- 6 [Remove the microprocessor](#).
- 7 [Remove the microprocessor cooling fans](#).
- 8 Disconnect all cables from the system board.
- 9 Remove the TEM pan screw (see the following figure).

## Removing the System Board



- 10 Press down on the two gray metal chassis tabs, lift the two green TEM pan release tabs, and slide the TEM pan toward the front of the computer.

The TEM pan and system board are removed as one unit.

- 11 Reach under the TEM pan near the release tabs, and carefully lift the TEM pan out of the chassis at an angle.

## Replacing the System Board

The TEM pan and system board are replaced as one unit.

- ➡ **NOTICE:** Do not twist the TEM pan or system board as you position it in the chassis.

- 1 Lower the TEM pan into the chassis at an angle, with the I/O panel connectors lowered into the chassis first.

- 2 Slide the TEM pan toward the back of the computer and press the two green TEM pan release tabs into their securing slots.

This locks the TEM pan into position.

NOTICE:

- 3 Replace the TEM pan screw.



**NOTE:** Replacing the TEM pan screw is optional. To avoid damage to the system board, Dell strongly recommends that you replace the TEM pan screw before traveling with or shipping the computer.

- 4 Replace all components on the system board by performing [step 3](#) through [step 8](#) of "[Removing the System Board](#)" in reverse.
- 5 Set the [jumpers](#) on the new system board so that they are identical to those on the original board.
- 6 [Close the computer cover](#) and restart the computer.
- 7 Run system setup to ensure that your settings are correct and that all system board components are correctly identified.
- 8 Run the Dell Diagnostics to verify that the computer is operating properly.

