



## **CHAPTER 8**

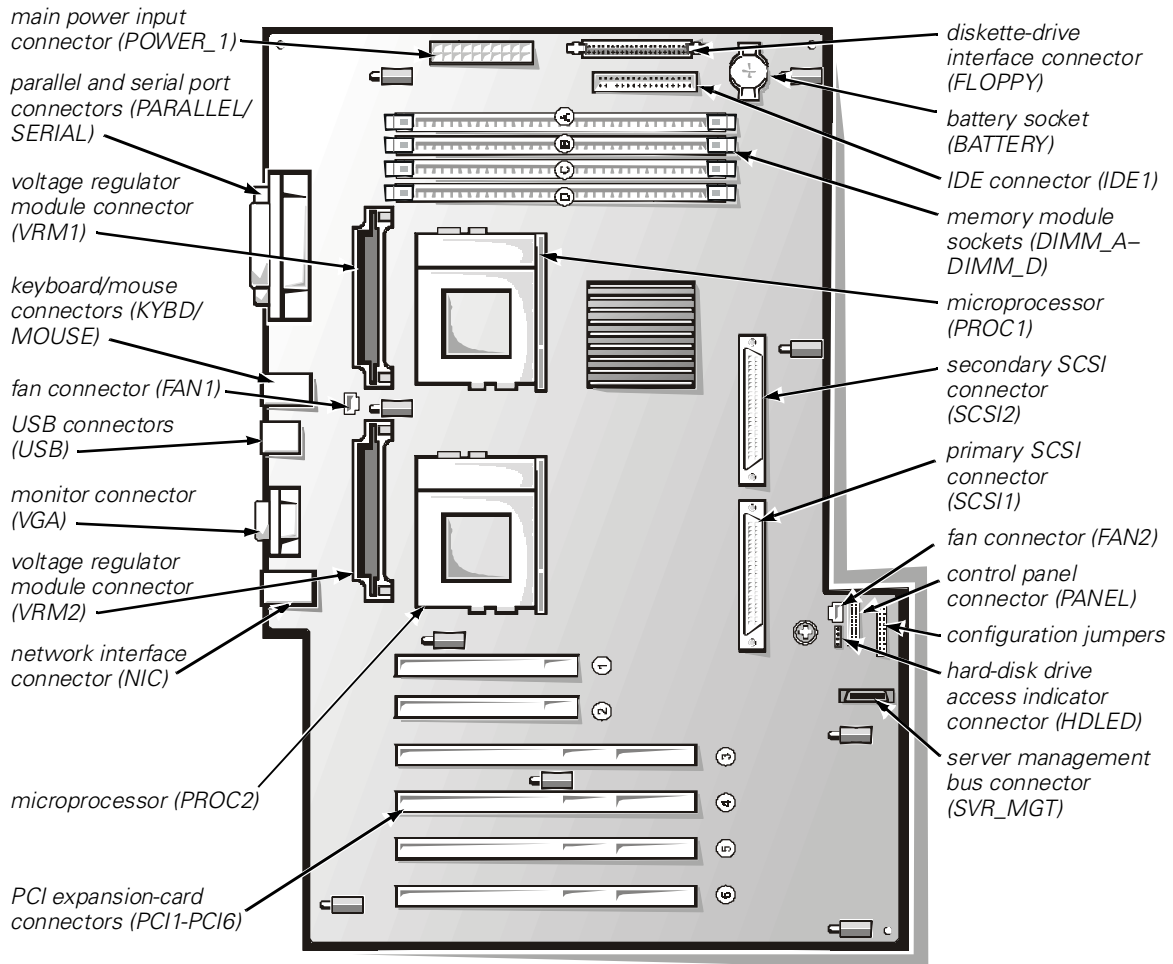
# ***Installing System Board Options***

This chapter describes how to install the following options:

- Peripheral Component Interconnect (PCI) expansion cards
- System memory
- Microprocessors

This chapter also includes instructions for replacing the system battery, if necessary.

Use Figure 8-1 to locate the system board features.



**Figure 8-1. System Board Features**

## Expansion Cards

The system accommodates up to six expansion cards, including two 32-bit/33-MHz and four 64-bit/33MHz PCI expansion cards. PCI1 is limited to a half-length card.

### Expansion Slots

There are six expansion-card connectors on the system board. Expansion-card connectors PCI1 through PCI2 support 32-bit PCI expansion cards; expansion-card connector PCI3 through PCI6 support 64-bit PCI expansion cards.

## Installing an Expansion Card

Follow this general procedure to install an expansion card:

**NOTICE:** See “Protecting Against Electrostatic Discharge” in the safety instructions at the front of this guide.

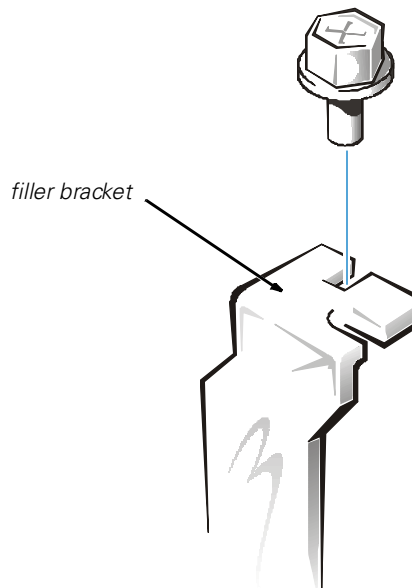
1. Prepare the expansion card for installation, and remove the computer cover according to the instructions in “Removing the Computer Cover” in Chapter 7.

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



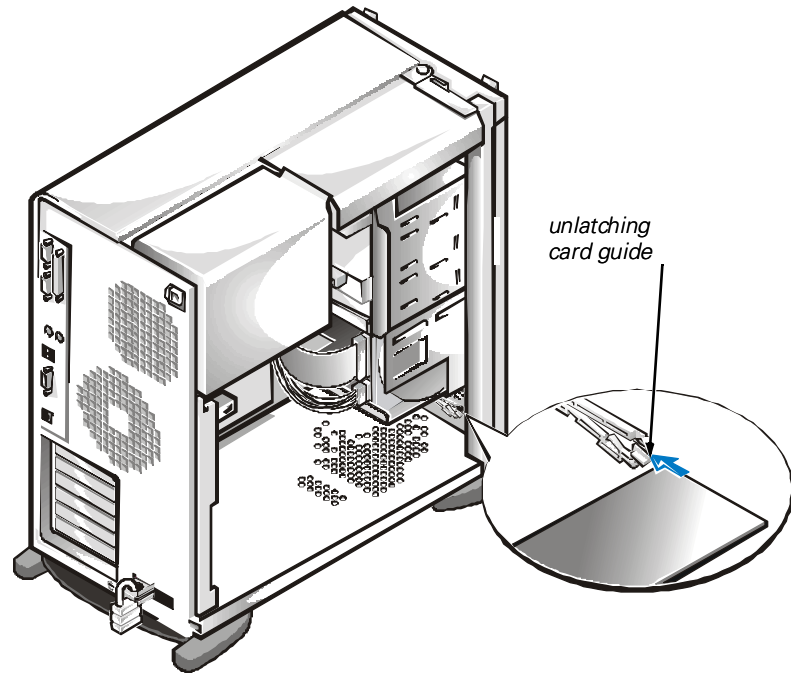
**CAUTION:** Some network cards automatically start up the system when they are connected. To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any expansion cards.

2. Unscrew and remove the metal filler bracket that covers the card-slot opening for the expansion slot you intend to use (see Figure 8-2). Save the screw to use when installing the expansion card later in this procedure.



**Figure 8-2. Removing the Filler Bracket**

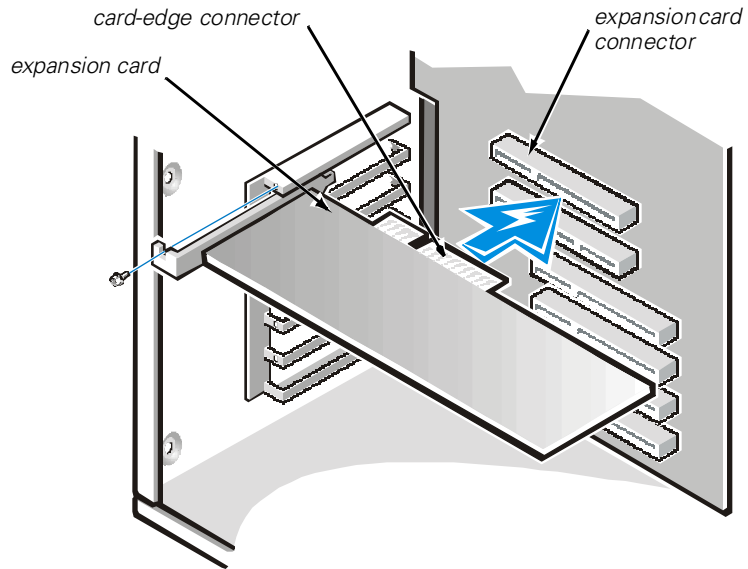
3. Unlatch the card guide as shown in Figure 8-3.



**Figure 8-3. Unlatching the Card Guide**

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

If the expansion card is full-length, insert the front end of the card into the corresponding card guide on the inside front of the chassis as you insert the card into its connector. Insert the card's edge connector firmly into the expansion-card slot. Gently rock the card into the connector until it is fully seated (see Figure 8-4).



**Figure 8-4. Installing an Expansion Card**

5. When the card is firmly seated in the connector, secure the card's mounting bracket to the chassis with the screw you removed in step 2.
6. Close the card guide latch.
7. Connect any cables that should be attached to the card. See the documentation that came with the card for information about the card's cable connections.
8. Replace the computer cover, reconnect your computer and peripherals to their power sources, and turn them on.



*NOTE: After you remove and replace the cover, the chassis intrusion detector will cause the following message to be displayed at the next system start-up:*

`ALERT! Cover was previously removed.`

9. To reset the chassis intrusion detector, enter the System Setup program. See your *User's Guide* for instructions on using the System Setup program.



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

## Removing an Expansion Card

Follow this general procedure to remove an expansion card:

1. Remove the computer cover according to the instructions in “Removing the Computer Cover” in Chapter 7.

**NOTICE: See “Protecting Against Electrostatic Discharge” in the safety instructions at the front of this guide.**

2. If necessary, disconnect any cables connected to the card.
3. Unscrew the mounting bracket of the card you want to remove.
4. Unlatch the card guide.
5. Grasp the card by its outside corners, and ease it out of its connector.
6. If you are removing the card permanently, install a metal filler bracket over the empty card-slot opening.



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

7. Replace the computer cover, and reconnect your computer and peripherals to their power sources and turn them on.



*NOTE: After you remove and replace the cover, the chassis intrusion detector will cause the following message to be displayed at the next system start-up:*

ALERT! Cover was previously removed.

8. To reset the chassis intrusion detector, enter the System Setup program. See your *User's Guide* for instructions.

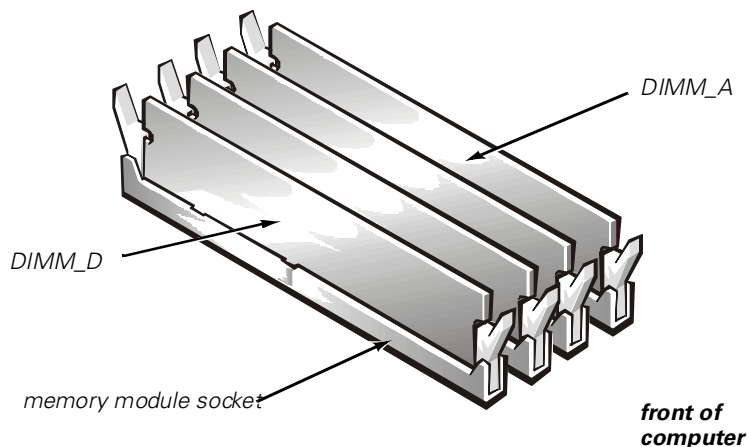


*NOTE: If a setup password has been assigned by someone else, contact your network administrator for information on resetting the chassis intrusion detector.*

## Adding Memory

System memory consists of up to four memory modules installed in sockets on the system board (see Figure 8-5). The system uses registered synchronous dynamic random-access memory (SDRAM) modules that provide error checking and correction (ECC) capabilities.

By installing 128-, 256-, or 512-megabyte (MB) registered SDRAM memory modules, you can increase system memory from its standard total of 128 MB up to 2 gigabytes (GB).



**Figure 8-5. Memory Modules and Sockets**

### Memory Module Installation Guidelines

When adding system memory, you may install memory modules in any order. For optimum operation, Dell recommends installing the memory modules starting with socket A (closest to the top edge of the system board) and working toward socket D, leaving no open sockets between installed memory modules.

Table 8-1 lists sample memory configurations.

**Table 8-1. Sample DIMM Configurations**

Total Desired Memory	DIMM Sockets			
	DIMM_A	DIMM_B	DIMM_C	DIMM_D
128 MB	128 MB	None	None	None
512 MB	256 MB	256 MB	None	None
1 GB	256 MB	256 MB	256 MB	256 MB
2 GB	512 MB	512 MB	512 MB	512 MB

Follow this procedure to perform a memory upgrade:

1. Remove the computer cover according to the instructions in "Removing the Computer Cover" in Chapter 7.

**NOTICE: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.**

2. To access the memory module sockets on the system board, rotate the power supply as described in “Rotating the Power Supply Away From the System Board” in Chapter 7.
3. Determine the memory module sockets in which you will install memory modules or replace existing memory modules.
4. Install or replace memory modules as necessary to reach the desired memory total.

Follow the instructions in “Installing a Memory Module” or “Removing a Memory Module,” later in this chapter as appropriate.

5. Rotate the power supply back into position, making sure that the securing tab snaps into place.
6. Replace the computer cover, and reconnect your computer and peripherals to their power sources and turn them on.



*NOTE: After you remove and replace the cover, the chassis intrusion detector will cause the following message to be displayed at the next system start-up:*

ALERT! Cover was previously removed.

The system detects that the new memory does not match the existing system 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

7. Press <F2> to enter the System Setup program, and check the value for system memory.

The system should have already updated the value of system memory to reflect the newly installed memory. Verify the new total.



*NOTE: If the memory total is incorrect, turn off and disconnect your computer and peripherals from their power sources. Remove the computer cover, rotate the power supply, and check the installed memory modules to make sure that they are seated properly in their sockets. Then repeat steps 5, 6, and 7.*

8. While in the System Setup program, reset the chassis intrusion detector. See your *User's Guide* for instructions on using the System Setup program.



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

9. When the system memory total is correct, press the <Esc> key to exit the System Setup program.
10. Run the Dell Diagnostics to verify that the memory modules are operating properly.

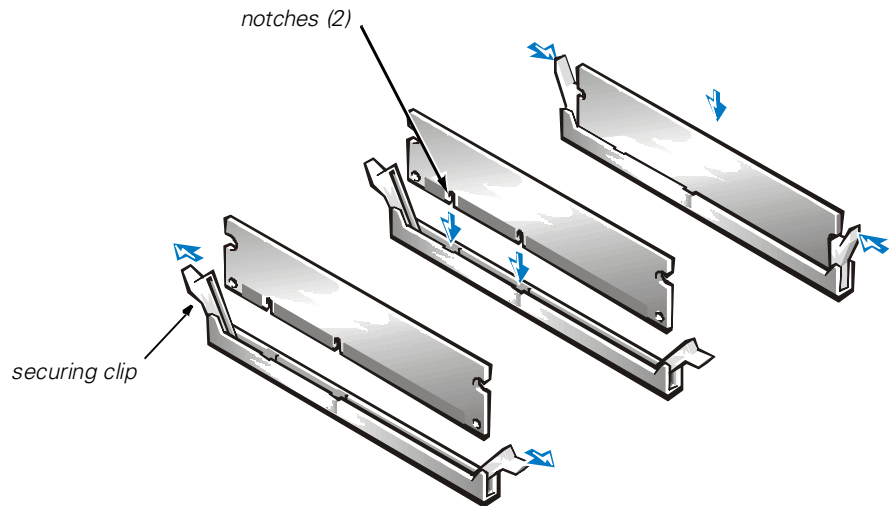


## **Installing a Memory Module**

If a memory module is already installed in the socket you want to use, you must remove it. To do so, follow the instructions in “Removing a Memory Module.”

Use the following procedure to install a memory module (see Figure 8-6):

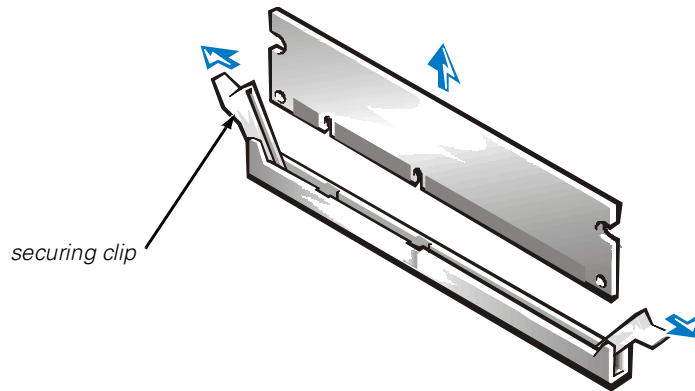
1. Locate the plastic securing clips at each end of the socket. Press the clips outward until they snap open.
2. Orient the memory modules so that the cutouts on the bottom edge match the crossbars in the memory module socket slot, and press the memory module straight into the slot until the securing tabs snap into place around the ends of the memory module.



**Figure 8-6. Installing a Memory Module**

## **Removing a Memory Module**

To remove a memory module, simultaneously press both securing clips outward until the module disengages from the socket (see Figure 8-7). It should pop out slightly.



**Figure 8-7. Removing a Memory Module**

## **Microprocessor Upgrades**

To take advantage of future options in speed and functionality, you can add a second processor or replace either the primary or secondary processor.

**NOTICE: The second processor must be of the same type and speed as the first processor.**

Each processor and its associated L2 cache memory are contained in a Flip Chip Pin Grid Array (FC-PGA) package that is installed in a zero insertion force (ZIF) socket on the system board. The following subsection describes how to install or replace the microprocessor in either the primary or secondary processor connector.

### **Adding or Replacing a Microprocessor**

In addition to the ZIF socket for the primary microprocessor on the system board, there is a second ZIF socket to accommodate a secondary microprocessor. The secondary microprocessor must have the same operating frequency as the primary microprocessor.

The following items are included in the microprocessor upgrade kit:

- A microprocessor chip
- A heat sink
- A securing clip
- A voltage regulator module (VRM), if adding a second processor

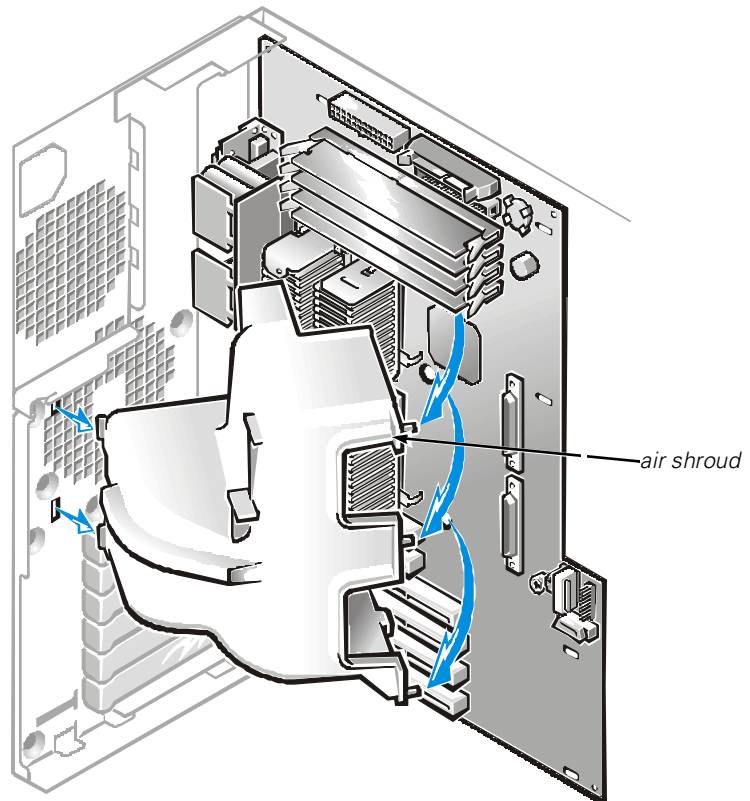


*NOTE: Dell recommends that only a technically knowledgeable person perform this procedure.*

1. Remove the computer cover according to the instructions in "Removing the Computer Cover," in Chapter 7

**NOTICE: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.**

2. Rotate the power supply as described in "Rotating the Power Supply Away From the System Board," in Chapter 7
3. Remove the air shroud by rotating the shroud away from the system board and lifting it away from the back of the chassis (see Figure 8-8).



**Figure 8-8. Removing Air Shroud**

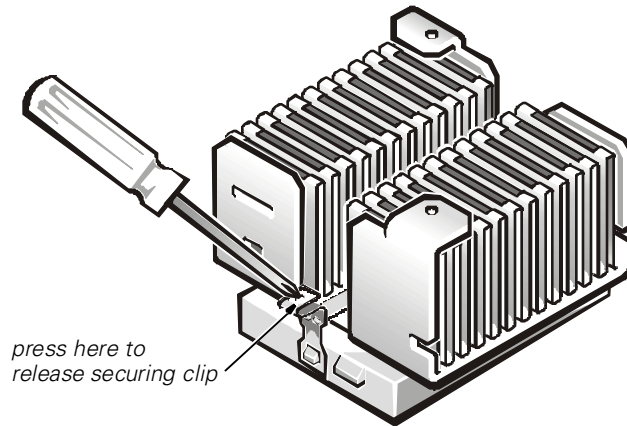
4. Remove the metal clip that secures the heat sink to the microprocessor socket.  
Press down on the folded part of the securing clip with a small screwdriver to release the clip (see Figure 8-9).



**CAUTION:** Never remove the heat sink from a microprocessor unless you intend to remove the microprocessor. The heat sink is necessary to maintain proper thermal conditions.



**WARNING:** The microprocessor chip and heat sink can become extremely hot. Be sure the microprocessor has had sufficient time to cool before handling.



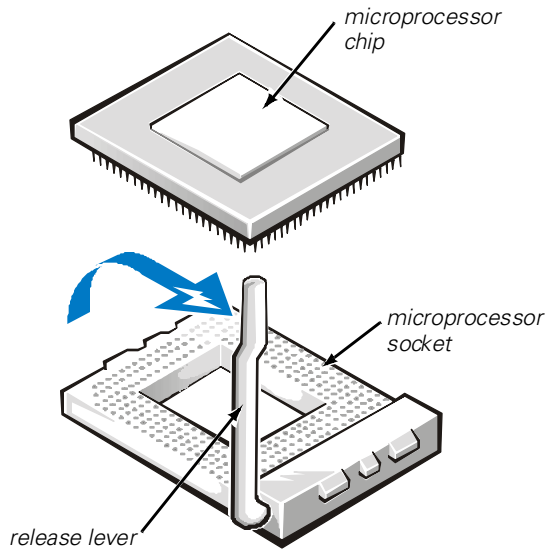
#### **Figure 8-9. Securing Clip**

5. Remove the heat sink.
6. Remove the microprocessor chip from the socket.

To remove the microprocessor chip, pull the socket release lever straight up until the chip is released (see Figure 8-10), and then lift the chip out of the socket. Leave the release lever up so that the socket is ready for the new microprocessor.



**CAUTION:** Be careful not to bend any of the pins when removing the microprocessor chip. Bending the pins can permanently damage the microprocessor chip.



**Figure 8-10. Removing the Microprocessor**

7. Unpack the new microprocessor.

If any of the pins on the microprocessor appear bent, see Chapter 10, "Getting Help," for instructions on obtaining technical assistance from Dell.



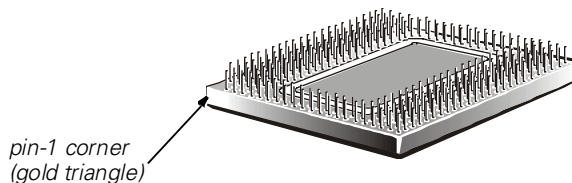
**CAUTION: Be careful not to bend any of the pins when unpacking the microprocessor chip from its socket. Bending the pins can permanently damage the microprocessor chip.**

8. Align the pin-1 corner of the microprocessor chip (see Figure 8-11) with the pin-1 corner of the microprocessor socket.



*NOTE: Identifying the pin-1 corners is critical to positioning the chip correctly.*

Identify the pin-1 corner of the microprocessor by turning the chip over and locating the tiny gold triangle that extends from one corner of the large central rectangular area. The gold triangle points toward pin 1, which is also uniquely identified by a square pad.



**Figure 8-11. Pin-1 Identification**

9. Install the microprocessor chip in the socket (see Figure 8-12).



**CAUTION: Positioning the microprocessor incorrectly can permanently damage the chip and the computer when you turn on the system.**

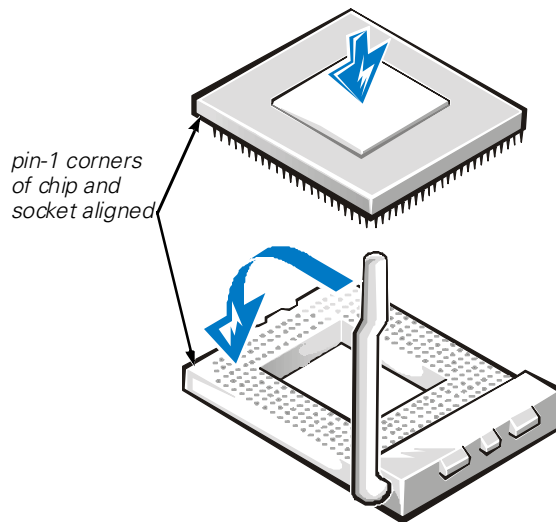
If the release lever on the microprocessor socket is not all the way up, move it to that position now.

With the pin-1 corners of the chip and socket aligned, set the chip lightly in the socket and make sure all pins are matched with the correct holes in the socket. Because the system uses a ZIF microprocessor socket, *there is no need to use force* (which could bend the pins if the chip is misaligned). When the chip is positioned correctly, it should drop down into the socket with minimal pressure.



**CAUTION: When placing the microprocessor chip in the socket, be sure that all of the pins on the chip go into the corresponding holes of the socket. Be careful not to bend the pins.**

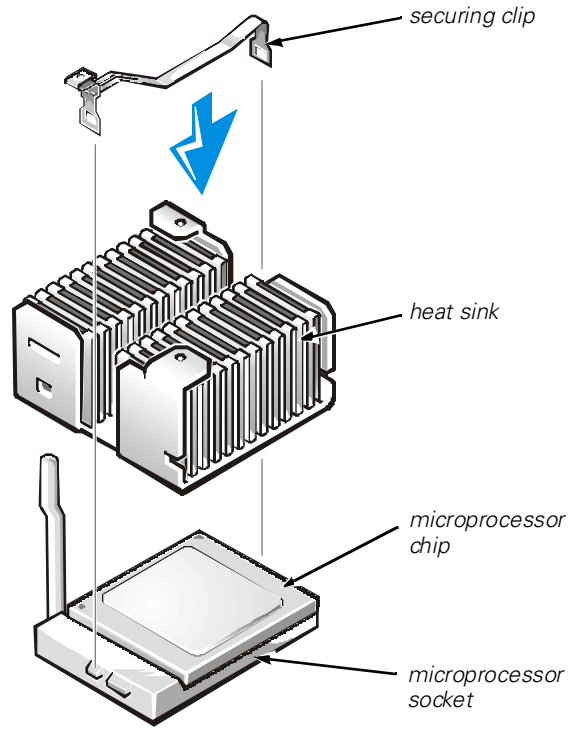
When the chip is fully seated in the socket, rotate the socket release lever back down until it snaps into place, securing the chip.



**Figure 8-12. Installing the Microprocessor Chip**

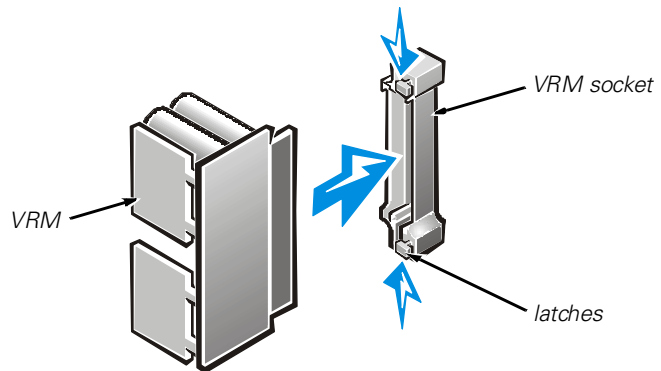
10. Place the new heat sink on top of the microprocessor chip (see Figure 8-12).
11. Replace the securing clip.

Orient the clip as shown in Figure 8-13. Hook the unfolded end of the clip over the tab on the edge of the socket facing the bottom of the computer. Then press down on the folded end of the clip to snap the clip over the tab on the back of the socket.



**Figure 8-13. Installing the Heat Sink**

12. If you are adding a second microprocessor, disconnect the FAN1 connector and place the VRM in the socket (see Figure 8-14). Make sure that the latches engage.



**Figure 8-14. Installing the VRM**

13. Connect the FAN1 connector.
14. Replace the air shroud.
15. Replace the computer cover making sure that the shroud support holds the shroud in place.
16. Reconnect your computer and peripherals to their power sources, and turn them on.
17. Press <F2> to enter the System Setup program, and check that the **PROCESSOR 1** and **PROCESSOR 2** categories match the new system configuration.

See the system *User's Guide* for instructions.

18. As the system boots, it detects the presence of the new processor and automatically changes the system configuration information in the System Setup program. If you installed a second microprocessor, the following message is displayed:

```
Two 800 MHz Processors, Processor Bus: 133 MHz, L2 cache
256 KB Advanced
```

If only one processor is installed, the following message is displayed:

```
One 800 MHz Processor, Processor Bus: 133 MHz, L2 cache
256 KB Advanced
```



*NOTE: After you remove and replace the cover, the chassis intrusion detector will cause the following message to be displayed at the next system start-up:*

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

19. Enter the System Setup program, and confirm that the top line in the system data area correctly identifies the installed processor(s). See "Using the System Setup Program" in your *User's Guide*.
20. While in the System Setup program, reset the chassis intrusion detector.



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

21. Run the Dell Diagnostics to verify that the new microprocessor is operating correctly. See Chapter 5, "Running the Dell Diagnostics," for information on running the diagnostics and troubleshooting any problems that may occur.

## Replacing the System Battery

A 3.0-V CR2032 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 the battery needs replacing, reenter the time and date through the System Setup program and exit the program properly to save the information. Turn off and unplug your system for a few hours, and then plug in and turn on your system. Enter the System Setup program. If the date and time are not correct in the System Setup program, replace your battery.

You can operate your system without a battery; however, without a battery, the system configuration information maintained by the battery is erased if the system is unplugged or AC power is lost. In this case, you must enter the System Setup program and reset the configuration options.



**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.**

Use the following procedure to replace the system battery with another CR2032 coin-cell battery:

1. If you have not already done so, make a copy of your system configuration information in the System Setup program. If the settings are lost while you are replacing the battery, you can refer to your written or printed copy of the system configuration information to restore the correct settings. See your *User's Guide* for instructions.
2. Remove the computer cover according to the instructions in "Removing the Computer Cover" in Chapter 7.

**NOTICE: See "Protecting Against Electrostatic Discharge," in the safety instructions at the front of this guide.**

3. To access the battery on the system board, rotate the power supply as described "Rotating the Power Supply Away From the System Board" in Chapter 7.

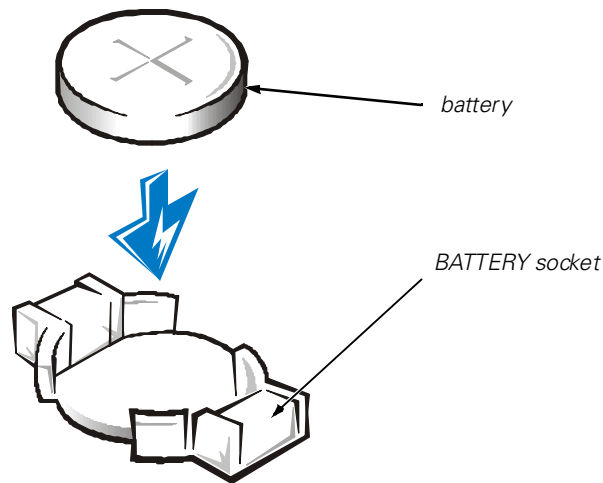


*NOTE: If an expansion card obstructs your access to the battery, you may find it helpful to remove the card temporarily while you work. See "Expansion Cards," for information on removing and installing expansion cards.*

4. Locate the battery and remove it. The battery is mounted in a socket labeled "BATTERY" (see Figure 8-1).

**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 attempting 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.**

Pry the battery out of its socket with your fingers or with a blunt, nonconductive object, such as a plastic screwdriver (see Figure 8-15).



**Figure 8-15. System Battery and Battery Socket**

5. Install the new battery. Orient the battery with the side labeled "+" facing up. Then insert the battery into the socket, and snap it into place.
6. Rotate the power supply back into position, making sure that the securing tab snaps into place.
7. Replace the computer cover, and reconnect your computer and peripherals to their power sources and turn them on.



*NOTE: After you remove and replace the cover, the chassis intrusion detector will cause the following message to be displayed at the next system start-up:*

**ALERT! Cover was previously removed.**

8. Enter the System Setup program, and confirm that the battery is operating properly. See your *User's Guide* for information on running the System Setup program. Enter the correct time and date through the System Setup program's **Time** and **Date** options. Also, restore the correct settings for the system configuration information using the copy made in step 1.



9. While in the System Setup program, reset the chassis intrusion detector, and then exit the System Setup program.

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

10. Turn off your computer, and unplug it for at least 10 minutes.
11. After 10 minutes, plug in the computer, turn it on, and enter the System Setup program. If the time and date are still incorrect, see Chapter 10, "Getting Help," for instructions on obtaining technical assistance.



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