

Dell® PowerEdge® 6300 Systems

## **SERVICE MANUAL**

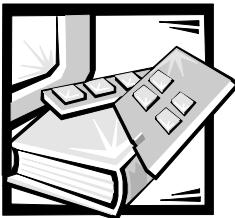
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## **Read This First**

A prerequisite for using this manual to service Dell computer systems is a basic knowledge of IBM®-compatible PCs and prior training in IBM-compatible PC troubleshooting techniques. In addition to information provided in this manual and the *User's Guide* that came with the system, Dell provides the *Diagnostics and Troubleshooting Guide* for troubleshooting procedures and instructions on using the Dell Diagnostics to test the computer system.

## **Warnings, Cautions, and Notes**

Throughout this manual, there may be blocks of text printed in bold type or in italic type. These blocks are warnings, cautions, and notes, and they are used as follows:



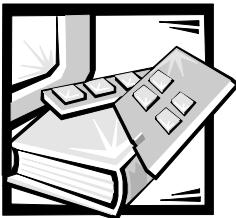
**WARNING:** A **WARNING** indicates the potential for bodily harm and provides instructions for how to avoid the problem.



**CAUTION:** A **CAUTION** indicates either potential damage to hardware or loss of data and provides instructions for how to avoid the problem.



**NOTE:** A **NOTE** provides helpful information about using the computer system.



# CHAPTER 1

## System Overview

Dell® PowerEdge® 6300 systems are feature-rich, enterprise-class server systems that use Intel® Pentium® II Xeon™ microprocessor(s) with MMX™ technology and incorporate a high-performance PCI local bus.

The PowerEdge 6300 systems have been designed for better serviceability and increased reliability. The sliding system board tray allows easy access to the system board for performing processor and memory upgrades. The Dell-designed SCSI backplane board and hard-disk drive carriers eliminate the extensive cabling and drive configuration usually required for a SCSI subsystem. The plastic drive rails attached to devices mounted in the external drive bays allow you to remove these devices without removing a single screw. The systems can be used either freestanding or rack-mounted.

A PowerEdge 6300 system can contain up to four Pentium II Xeon microprocessors. Each processor is housed in a single-edge contact (SEC) cartridge/heat sink assembly mounted in a guide bracket on the system board, allowing for greater heat dissipation. The processor has an internal operating frequency of 400 MHz (or a higher speed when available) and an external operating frequency of 100 MHz. Contact Dell for information about Dell-supported microprocessor upgrades.

## System Features

In addition to the standard features found in a traditional personal computer, Dell PowerEdge 6300 systems include the following new and/or advanced features:

- One to four Intel Pentium II Xeon microprocessors with an internal operating frequency of 400 MHz (and higher speeds when available) and an external bus speed of 100 MHz.
- Support for symmetric multiprocessing (SMP) when two or more microprocessors are installed.



*NOTE: Additional microprocessors must have the same internal operating frequency as the initial microprocessors. Not all versions of the Pentium II microprocessor will work properly as additional microprocessors in this system; the upgrade kit from Dell contains the correct version for this system.*

- A secondary (L2) cache of 512 KB, 1 MB, or 2 MB of SRAM is included within the SEC cartridge that contains the microprocessor.

- A minimum of 128 MB of system memory, upgradable to a maximum of 4 GB by installing combinations of 32-, 128-, and 256-MB buffered EDO DIMMs in the 16 DIMM sockets on the memory board.
- BIOS in upgradable flash memory on the PCI bus.
- Up to six hot-pluggable SCSI hard-disk drives. Two additional 1-inch drives can be installed in the optional removable media bay.
- Three redundant, hot-pluggable power supplies and a power-supply paralleling board (PSPB).
- Five redundant system cooling fans.
- Seven PCI connectors, four 64-bit and three 32-bit.
- Three peer-to-peer PCI expansion subsystems.
- A VGA-compatible video subsystem with an ATI 3D RAGE PRO SVGA video controller. This video subsystem contains 2 MB of SGRAM video memory (nonupgradeable).
- A National Semiconductor PC87309 super I/O controller that controls the bidirectional parallel port, two serial ports, and the diskette drive in the externally accessible front bay.
- Two Adaptec AIC-7890 Ultra2/LVD SCSI host adapters that support up to six 1.6-inch internal SCSI hard-disk drives via a SCSI backplane board and special SCSI hard-disk drive carriers.



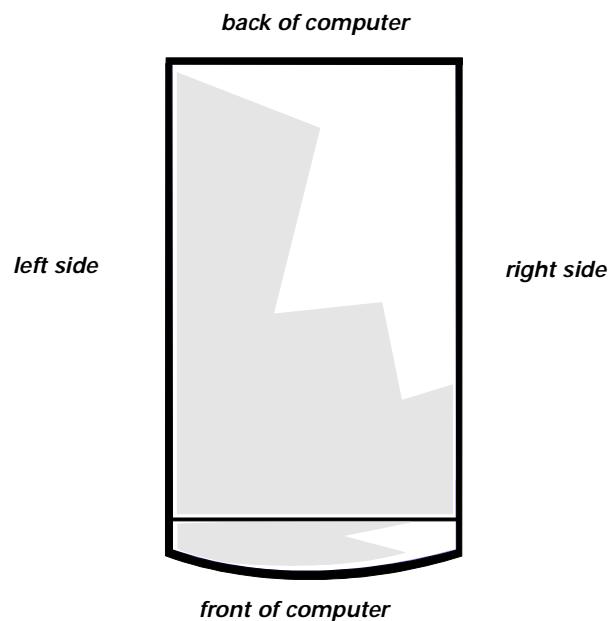
*NOTE: The 1.6-inch drive carriers will accommodate 1-inch drives.*

The SCSI backplane automatically configures SCSI ID numbers and SCSI termination on individual hard-disk drives, greatly simplifying drive installation. The backplane supports hot-pluggable SCSI hard-disk drive installation and removal when used in conjunction with the PowerEdge Expandable RAID controller.

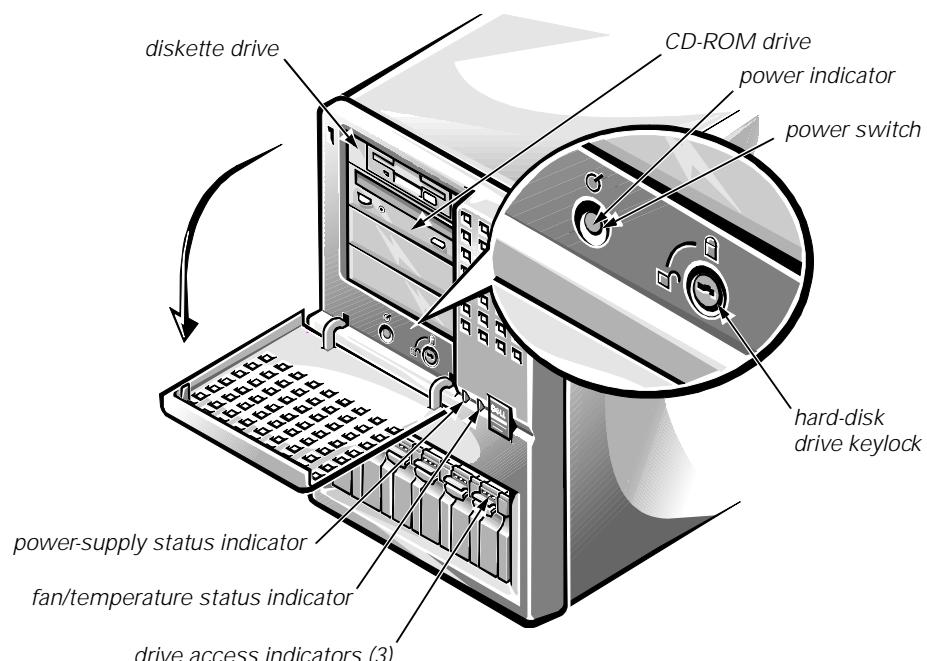
- An Adaptec AIC-7860 Ultra/Narrow SCSI-III host adapter that supports up to three externally accessible SCSI devices in the external hard-disk drive bays.
- Drive failure, online, and activity indicators visible on each hard-disk drive connected to the SCSI backplane.
- Server management circuitry that monitors operation of the system fans as well as critical system voltages and temperatures. The server management circuitry works in conjunction with the HP OpenView Network Node Manager Special Edition (NNM SE) and the Dell OpenManage™ Hardware Instrumentation Package (HIP) software package.
- System board support for the Dell OpenManage Remote Assistant when the optional Dell Remote Assistant Card (DRAC) is installed, which provides additional local and remote server management.

For a complete list of system features, see "Technical Specifications" found later in this chapter. For information about installing the PowerEdge 6300 systems in a rack, see the *Dell PowerEdge 6300 Systems Rack Kit Installation Guide*.

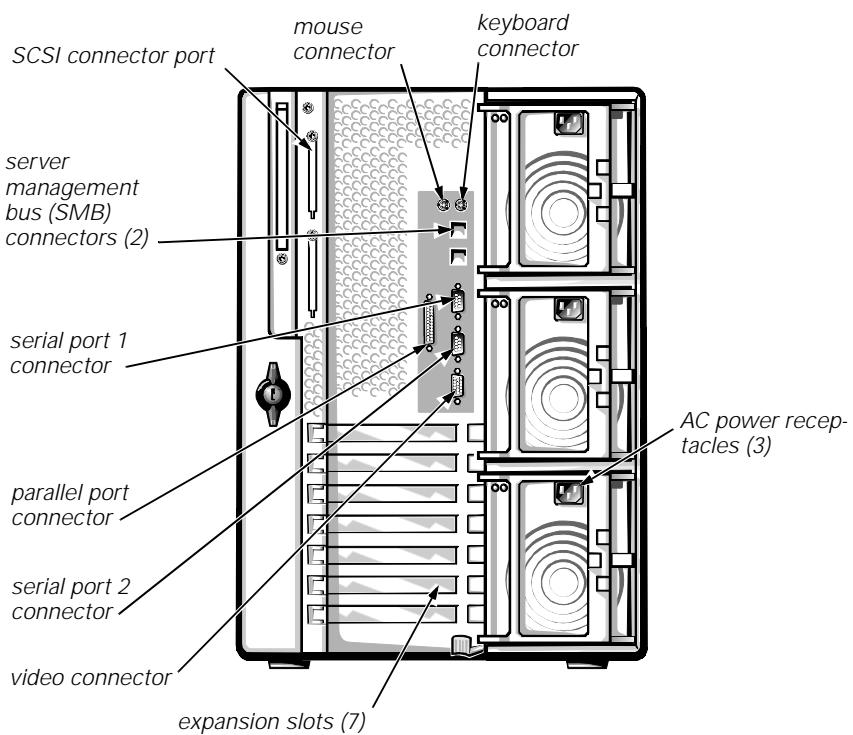
When following the text in this manual, assume that the location or direction relative to the computer is as shown in Figure 1-1. Figures 1-2 through 1-4 illustrate front-panel, back-panel, and interior features of the PowerEdge 6300 systems.



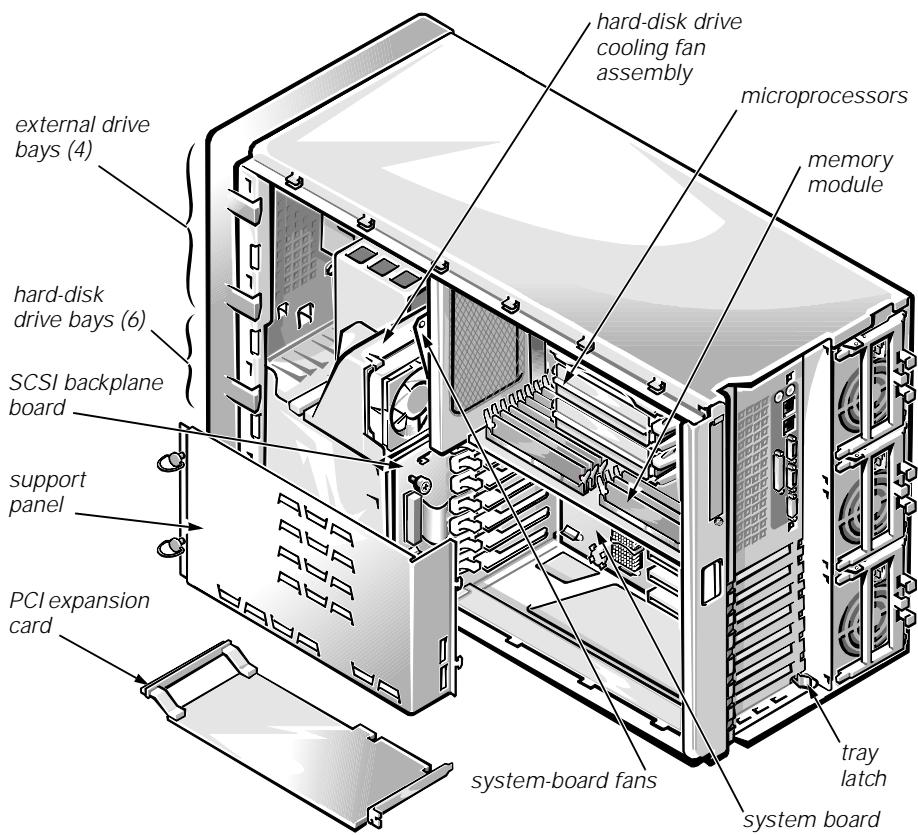
**Figure 1-1. Computer Orientation**



**Figure 1-2. Front-Panel Features**



**Figure 1-3. Back-Panel Features**



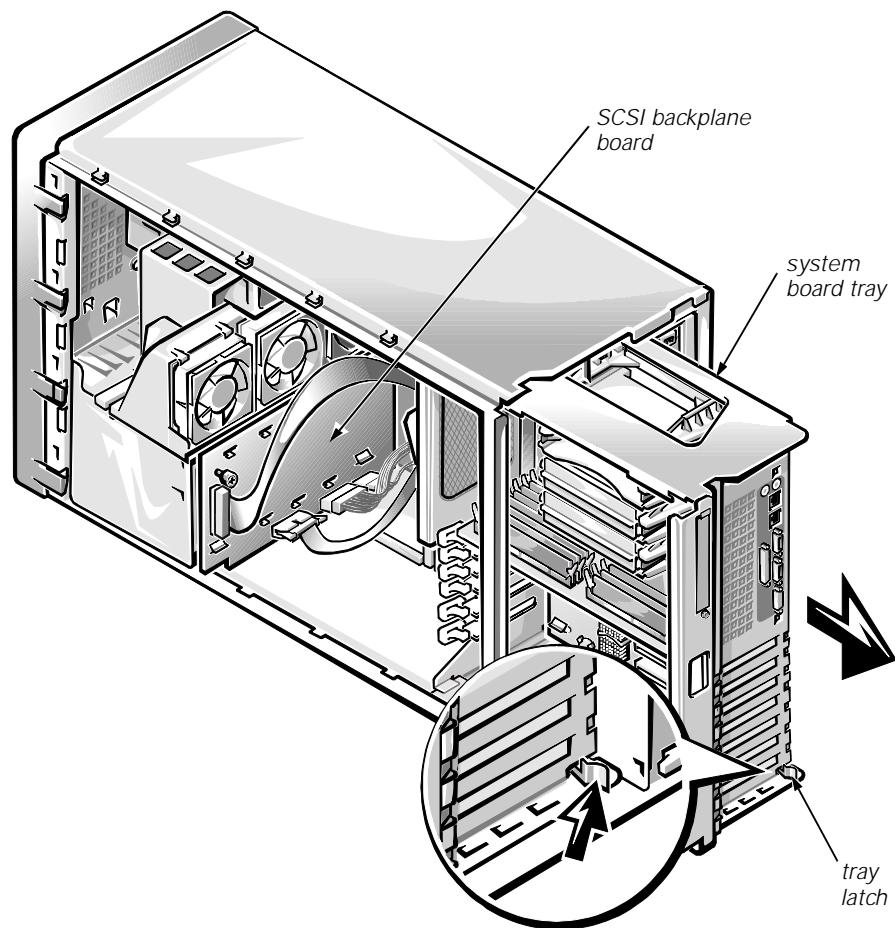
**Figure 1-4. Back/Right Side Internal View**

## **Accessing the Interior of the System**

To access the SCSI backplane board or the PSPB, release the system-board tray latch at the back lower corner of the tray (see Figure 1-5) and pull the tray open to the first stop position, or *service position*.



*NOTE: From the service position, if you depress and release the tray latch and pull the tray out again, you will come to a second stop position that is used by manufacturing. To remove the tray completely from any position, depress the latch, hold it in, and pull the tray out of the chassis.*



**Figure 1-5. Opening the System Board Tray**

## System Memory

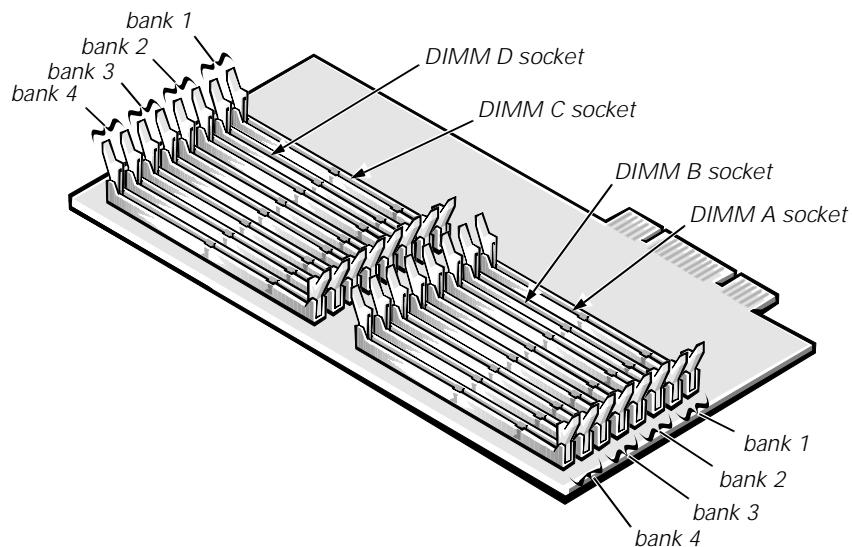
System memory resides on a memory module card and consists of a minimum of 128 MB of 72-bit buffered EDO memory. Memory can be expanded up to 4 GB by installing combinations of 32-, 128-, and 256-MB buffered EDO DIMMs on the memory module.



*NOTE: DIMMs must be rated at 50 or 60 ns. With a mixture of 50- and 60-ns DIMMs, system memory will run at 60 ns.*

The memory module provides 16 168-pin DIMM sockets divided into four banks, each consisting of four sockets labeled "DIMM A" through "DIMM D" (see Figure 1-6). Memory upgrade guidelines are as follows:

- DIMMs must be installed one bank (four DIMMs) at a time, starting with bank 1 and working toward bank 4. There should be no open banks between populated banks.
- Within a bank, install DIMMs in the following order: DIMM A, DIMM B, DIMM C, and DIMM D.
- DIMM sizes cannot be mixed within a memory bank. However, one memory bank can hold different-size DIMMs from another memory bank.
- Of the DIMMs to be installed in the system, install the size you have the most of in the lowest-numbered bank(s), the less numerous size in the next banks, and least numerous size in the highest-numbered banks being used. For example, when installing four 256-MB DIMMs, eight 128-MB DIMMs, and four 32-MB DIMMs, install the 128-MB DIMMs in banks 1 and 2. The 256- and 32-MB DIMMs can be installed in banks 3 and 4; it does not matter which bank holds which size.



**Figure 1-6. Memory Module**

For more detailed information about DIMM installation guidelines and samples of DIMM configurations, see "Adding Memory" in Chapter 8 of the *Dell PowerEdge 6300 Systems Installation and Troubleshooting Guide*.

See "DIMMs" in Chapter 4 of this document for information on removing and replacing DIMMs.

## **PCI Expansion Subsystem**

The Resource Configuration Utility (RCU) included with the system automatically configures installed PCI expansion cards. For more information on the RCU, see Chapter 5, "Using the Resource Configuration Utility," in the *Dell PowerEdge 6300 Systems User's Guide*.

The seven expansion-card slots include four 64-bit and three 32-bit PCI expansion-card connectors located on the system board (see Figure 1-13). The 64-bit slots support both 32- and 64-bit cards.

## **Video Controller**

The video subsystem is built into the system board and consists of a PCI VGA-compatible video subsystem with an ATI 3D RAGE PRO SVGA video controller. The video subsystem contains 2 MB of SGRAM video memory, which is not upgradable. Maximum noninterlaced resolutions are 640 x 480 (16.7 million colors), 800 x 600 (16.7 million colors), and 1024 x 768 (256 colors).

## **Integrated SCSI Controllers**

Two integrated Adaptec AIC-7890 Ultra2/LVD SCSI host adapters support up to six 1- or 1.6-inch internal SCSI hard-disk drives through a 68-pin connector on the system board for a SCSI backplane board. The SCSI backplane board automatically configures SCSI ID numbers and SCSI termination on individual hard-disk drives, greatly simplifying drive installation. The integrated SCSI controller resides on the PCI local bus for optimum performance.

An integrated Adaptec AIC-7860 Ultra/Narrow SCSI host adapter attached to the PCI bus supports up to three SCSI devices in the external drive bays through a 50-pin connector on the system board.

## **SCSI Hard-Disk Drives**

Dell PowerEdge 6300 systems include a SCSI backplane board, which greatly simplifies cabling and configuration for SCSI hard-disk drives. SCSI ID and termination for SCSI hard-disk drives are both configured by the SCSI backplane board, rather than on individual drives. SCSI hard-disk drives are supplied by Dell in special drive carriers that fit in the internal drive bays.



*NOTE: For maximum performance, install Ultra2/LVD drives exclusively. Although you can install a mixture of Ultra2/LVD and Ultra hard-disk drives, they will operate at the slower Ultra transfer rate.*

## **SCSI Configuration Guidelines**

SCSI hard-disk drives must be configured as follows:

- Disable termination on the drive. The SCSI backplane board provides termination for the SCSI bus.
- Set the SCSI ID on all drives to 0. All SCSI ID numbers for the drives are set by the SCSI backplane board.
- Configure the drive so that the drive motor waits for a **start unit** command from the SCSI host adapter before spinning.

SCSI devices in the external drive bays are controlled by the Ultra/Narrow SCSI controller on the system board. Although SCSI devices are installed essentially the same way as other devices, their configuration requirements are different. To configure SCSI devices installed in the external bays, follow the guidelines in the following subsections.

### **SCSI ID Numbers**

Each device attached to the Ultra/Narrow SCSI host adapter must have a unique SCSI ID number from 0 to 7.

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

- The onboard Ultra/Narrow SCSI host adapter is configured through the BIOS as SCSI ID 7.
- A SCSI tape drive is configured as SCSI ID 6 (the default ID number for a tape drive).
- A SCSI CD-ROM drive is usually configured as SCSI ID 5.

*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.*

### **Device Termination**

All Dell PowerEdge 6300 systems have an active terminator installed at the end of the SCSI cable. All of the devices attached to the SCSI cable should have their termination disabled.

## **PSPB and System Power Supplies**

The Dell PowerEdge 6300 includes a PSPB and three 320-W redundant system power supplies.

### **System Power Supplies**

The system power supplies are stacked at the rear of the chassis and can slide in and out of the unit. When fully installed, a power supply automatically mates with a power harness attached to the back plate of the power supply cage. The power harness connects the power supply to the PSPB.

The power supplies can operate from an AC power source of 115 VAC at 60 Hz or 230 VAC at 50 Hz. They provide the DC operating voltages and currents listed in Table 1-1.



*NOTE: The power supplies produce DC voltages only under their loaded condition. Therefore, when you measure these voltages, the DC power connectors must be mated to their PSPB harnesses at the bulkhead, and the harnesses must be connected to their corresponding power input connectors on the PSPB. The PSPB in turn must be connected as appropriate to the system board, SCSI backplane board, or external drive bay.*

**Table 1-1. DC Voltage and Current Ranges**

| Voltage  | Range                | Maximum Output Current <sup>1</sup> |
|----------|----------------------|-------------------------------------|
| +3.3 VDC | +3.23 to +3.45 VDC   | 18.0 A                              |
| +5 VDC   | +4.90 to +5.25 VDC   | 40.0 A                              |
| +12 VDC  | +11.40 to +12.60 VDC | 16.0 A                              |
| -12 VDC  | -10.80 to -13.20 VDC | 0.5 <sup>2</sup> A                  |
| -5 VDC   | -4.50 to -5.50 VDC   | 0.3 A                               |
| +5 VFP   | +4.85 to +5.35 VDC   | 0.4 A                               |

<sup>1</sup> Maximum continuous combined load on +5 VDC and +3.3 VDC outputs cannot exceed 240 W.

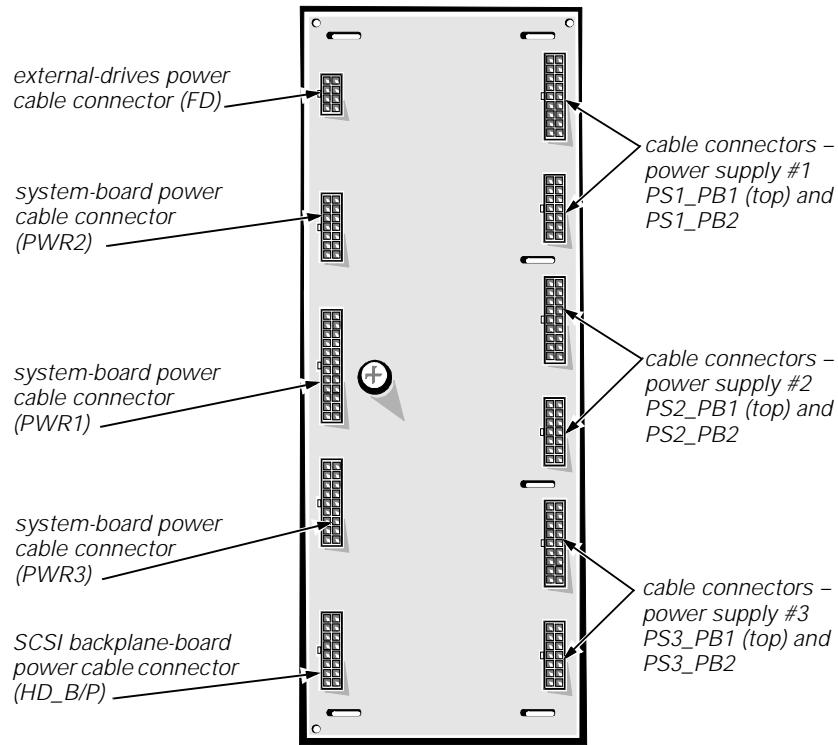
<sup>2</sup> Maximum combined load current on -5 VDC and -12 VDC outputs cannot exceed 0.6 A.

## PSPB

The PSPB multiplexes input from the power supplies to supply redundant power to the system board, SCSI backplane, and external drive bays. Through embedded server management (ESM), the PSPB can also be used to perform such tasks as detecting the presence of one to three power supplies; monitoring voltage and current outputs from the power supplies, voltage going to the system board, and fan RPMs; and supporting the SMB\_ALERT protocol used by the server management bus.

The PSPB connects to the power supplies through short harnesses that attach to the back of the power supply cages. The PSPB is attached to the side wall of the computer behind the external drive cage and is oriented in parallel with the system board. For information on removing and replacing the PSPB, see "Power-Supply Parallelizing Board" in Chapter 4.

Figure 1-7 shows the PSPB power connector layout; Table 1-2 shows the cable connections made from the PSPB.



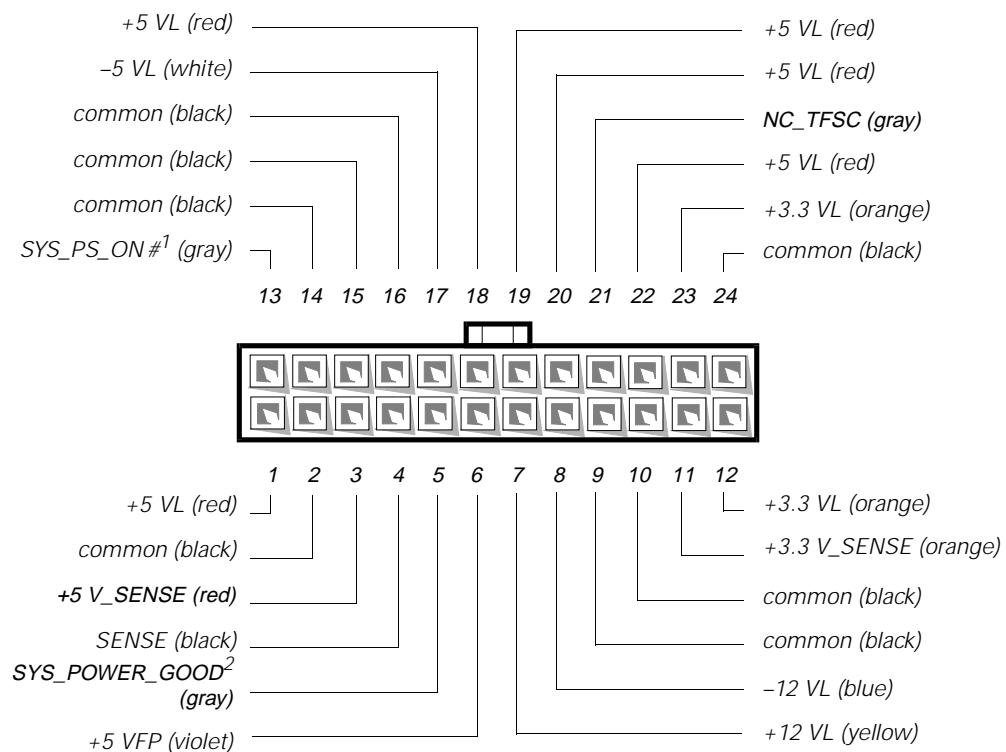
**Figure 1-7. Power-Supply Paralleling Board**

**Table 1-2. Power Cable Connections From the PSPB**

| Connector           | Cable Connection  |
|---------------------|---|
| PS1_PB1 and PS1_PB2 | To the power connector on the first power supply            |
| PS2_PB1 and PS2_PB2 | To the power connector on the second power supply           |
| PS3_PB1 and PS3_PB2 | To the power connector on the third power supply            |
| PWR1                | To POWER1 connector on system board                         |
| PWR2                | To POWER2 connector on system board                         |
| PWR3                | To POWER3 connector on system board                         |
| FD                  | To diskette drives and other devices in external drive bays |
| HD_B/P              | To POWER connector on SCSI backplane board                  |

## Pin Assignments for the PSPB Power Connectors

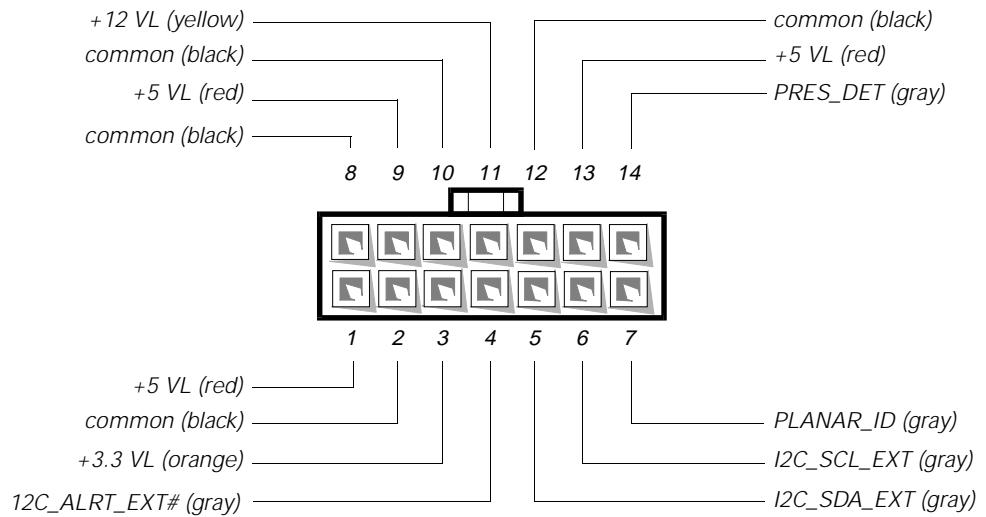
The power-supply output voltages can be measured at the back (wire side) of the connectors without disconnecting them. In the following diagrams, voltages for the PSPB PWRx connectors are shown as measured at the system board; voltages for the PSPB FD connector are shown as measured at the PSPB; voltages for the PSPB HD\_B/P connector are shown as measured at the SCSI backplane.



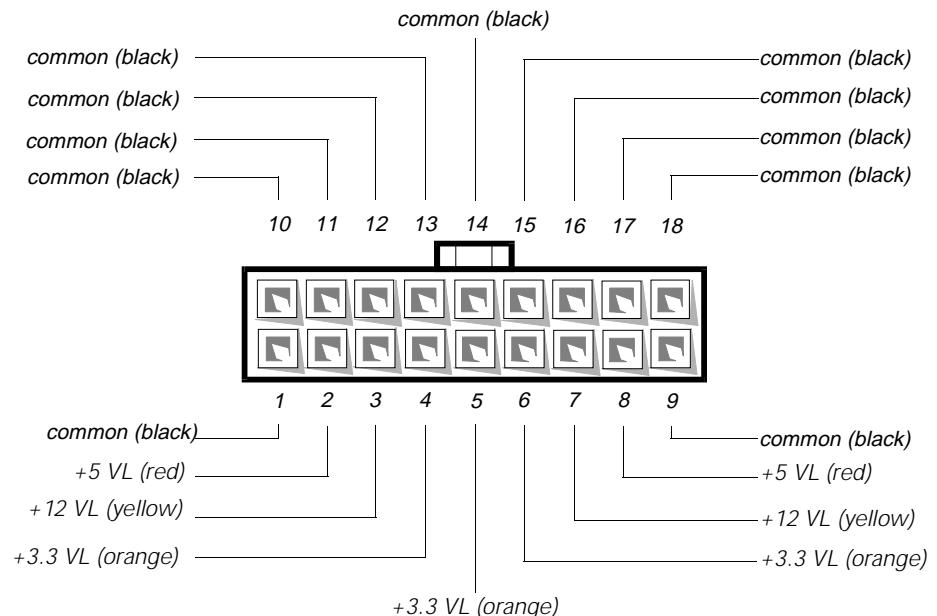
<sup>1</sup> Pin 13 — SYS\_PS\_ON# should measure between +4.75 and +5.25 VDC except when the power button on the front panel is pressed, taking SYS\_PS\_ON# to its active-low state.

<sup>2</sup> Pin 5 — SYS\_PWR\_GOOD should measure between +4.75 and +5.25 VDC when the power supply is operating to indicate that all power-supply output voltages are within the ranges specified in Table 1-1.

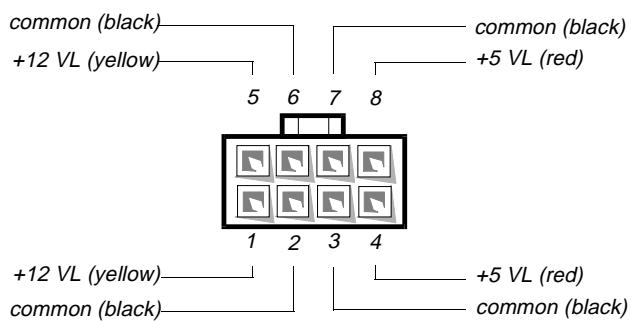
**Figure 1-8. PSPB DC Power Connector PWR1**



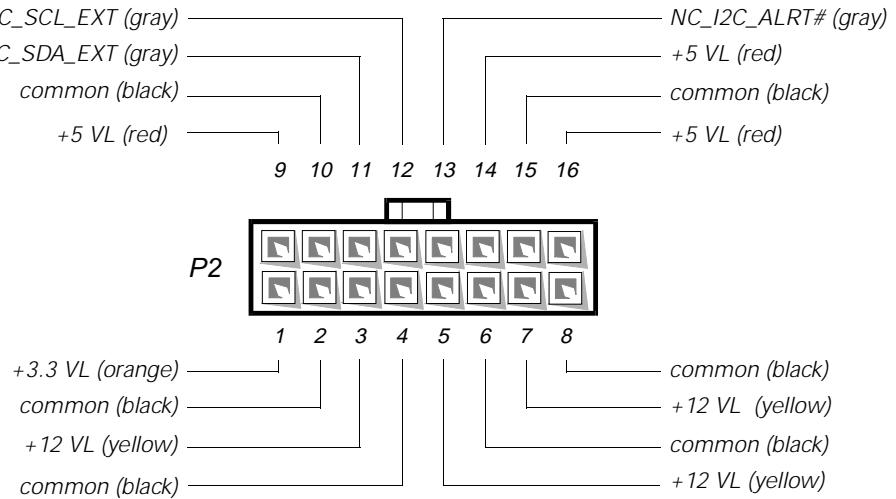
**Figure 1-9. PSPB Power Connector PWR2**



**Figure 1-10. PSPB Power Connector PWR3**



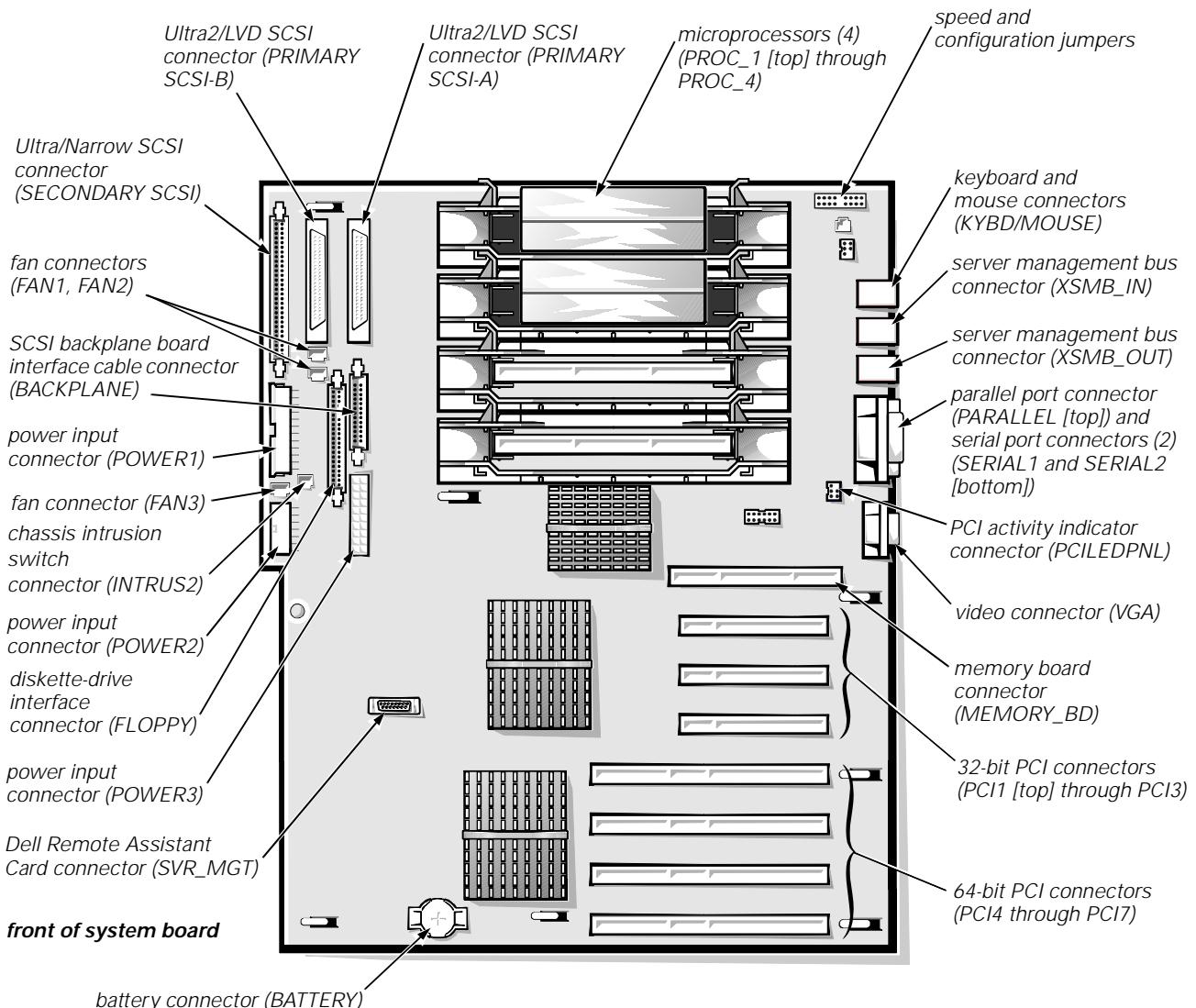
**Figure 1-11. PSPB Power Connector FD**



**Figure 1-12. PSPB Power Connector HD\_B/P**

## System Board Layout

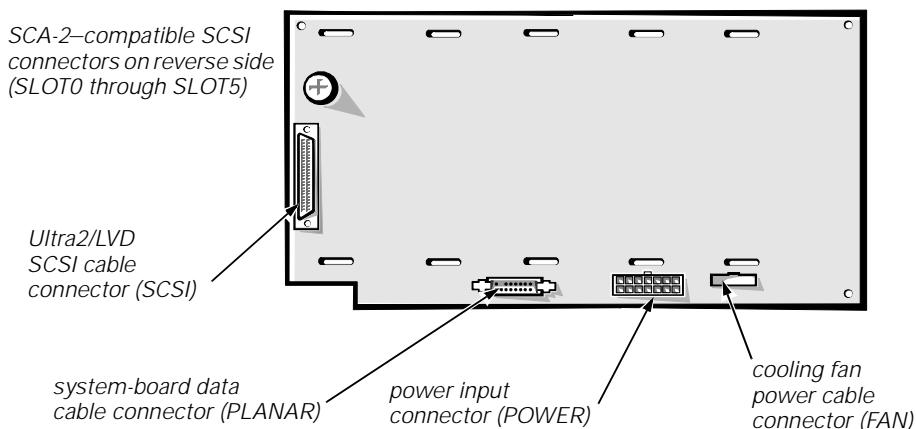
The subsections that follow provide service-related information about the system board components. Figure 1-13 illustrates the location of important system board components.



**Figure 1-13. System Board Components**

## SCSI Backplane Board Layouts

Figure 1-14 shows the location of the connectors on the SCSI backplane board.



**Figure 1-14. SCSI Backplane Board**



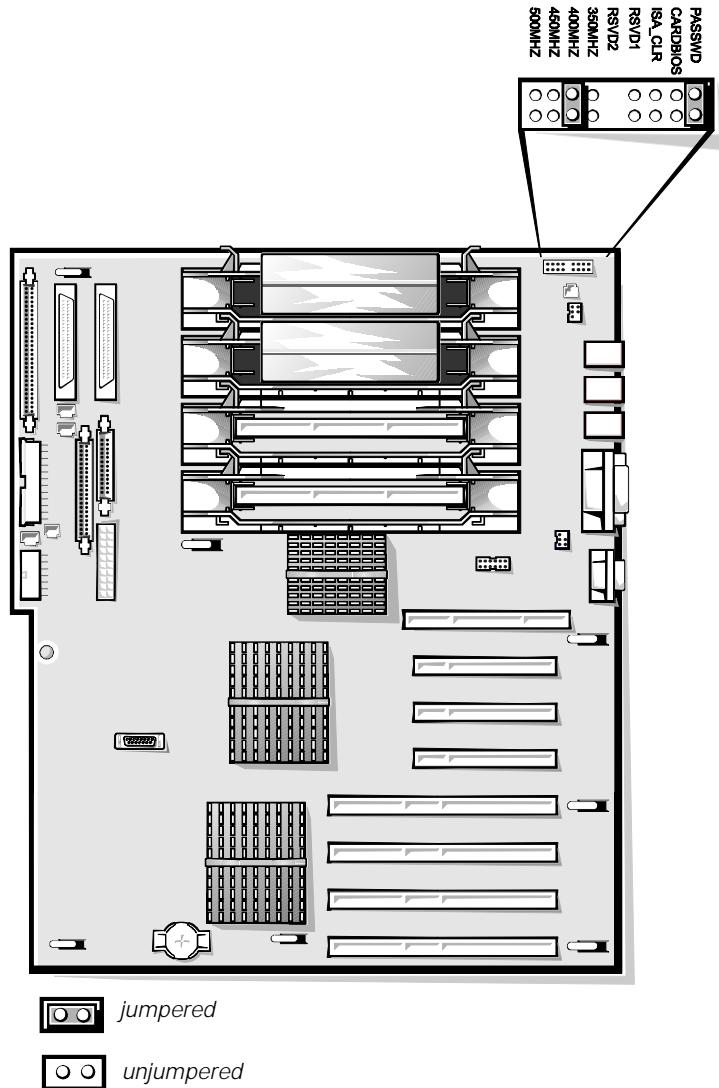
**CAUTION: Should you remove power from the SCSI backplane board (either by removing the power cable or during replacement of the system board battery), you may need to reflash your system's firmware.**

**The original firmware on the SCSI backplane is stored in EEPROM. However, if the SCSI backplane firmware is ever updated, the update is stored in volatile RAM. If power is removed from an updated backplane board, the update will be lost and the board will revert to its original firmware in EEPROM.**

**If at system startup you receive the message** Warning: Firmware is out-of-date, please update..., it is best to reflash all system firmware from your Dell Server Assistant CD.

## System Board Jumpers

Figure 1-15 illustrates the location of the system board jumpers, and Table 1-3 describes the jumper settings.



**Figure 1-15. System Board Jumpers**

**Table 1-3. Jumper Descriptions**

| Jumper   | Settings  |
|----------|---|
| PASSWD   | Installed (default) to enable the password feature. Remove the jumper and boot the computer to remove an existing password.   |
| CARDBIOS | <i>Not</i> installed (default) to allow normal boot operation from the system BIOS.<br>Install the jumper only to boot the system from a BIOS expansion card.   |
| ISA_CLR  | <i>Not</i> installed (default) to retain the ISA configuration settings at system boot. Install the jumper and boot the computer to clear the ISA configuration settings. Remove the jumper before restoring ISA configuration information. |
| RSVD1    | Do <i>not</i> install. Reserved for future microprocessor speed.  |
| RSVD2    | Do <i>not</i> install. Reserved for future microprocessor speed.  |
| 350MHZ   | Do <i>not</i> install.  |
| 400MHZ   | Installed only if the microprocessor's internal speed is 400 MHz.   |
| 450MHZ   | Installed only if the microprocessor's internal speed is 450 MHz (when available).  |
| 500MHZ   | Installed only if the microprocessor's internal speed is 500 MHz (when available).  |

## **Interrupt Assignments**

Table 1-4 lists the default IRQ line assignments.

**Table 1-4. Interrupt Assignments**

| IRQ Line | Used/Available  |
|----------|---|
| IRQ0     | Used by the system timer                                      |
| IRQ1     | Used by the keyboard to signal that the output buffer is full |
| IRQ2     | Used by interrupt controller 1 to enable IRQ8 through IRQ15   |
| IRQ3     | Used by serial port 2 (COM2 and COM4)                         |
| IRQ4     | Used by serial port 1 (COM1 and COM3)                         |
| IRQ5     | Available unless used by a secondary parallel port            |
| IRQ6     | Used by the diskette drive controller                         |
| IRQ7     | Used by the primary parallel port                             |
| IRQ8     | Used by the RTC   |
| IRQ9     | Used for power management functions                           |

**Table 1-4. Interrupt Assignments** (continued)

| IRQ Line | Used/Available   |
|----------|--|
| IRQ10    | Available  |
| IRQ11    | Available  |
| IRQ12    | Used by the PS/2 mouse port unless mouse is disabled in System Setup program |
| IRQ13    | Used by the math coprocessor   |
| IRQ14    | Available  |
| IRQ15    | Used by embedded server-management functions                                 |

## DMA Channel Assignments

Table 1-5 lists the default DMA channel assignments.

**Table 1-5. DREQ Line Assignments**

| DREQ Line | Used By/Available   |
|-----------|---|
| DREQ0     | Not required for PCI-only system  |
| DREQ1     | Not required for PCI-only system  |
| DREQ2     | Generated by super I/O controller to initiate DMA cycle for attached diskette drive |
| DREQ3     | Not required for PCI-only system  |
| DREQ4     | Generated by bus controller chip to activate second DMA controller                  |
| DREQ5     | Not required for PCI-only system  |
| DREQ6     | Not required for PCI-only system  |
| DREQ7     | Not required for PCI-only system  |

# **Technical Specifications**

Table 1-6 lists detailed technical specifications.

**Table 1-6. Technical Specifications**

| <b>Microprocessor</b>                      |   |
|--|---|
| Microprocessor type . . . . .              | 1 to 4 Intel Pentium II Xeon microprocessors  |
| Microprocessor speed . . . . .             | 400 MHz (100 MHz externally);<br>higher internal speeds when available, all<br>with 100-MHz external speeds |
| Internal cache . . . . .                   | 512-KB, 1-MB, or 2-MB L2 cache  |
| Math coprocessor . . . . .                 | internal to the microprocessor  |
| <b>System Information</b>                  |   |
| System chipset . . . . .                   | Intel 450NX controller chipset  |
| Data bus width . . . . .                   | 64 bits   |
| Address bus width. . . . .                 | 32 bits   |
| <b>Expansion Bus</b>                       |   |
| Bus types. . . . .                         | 32- and 64-bit PCI local bus  |
| Bus speed . . . . .                        | 33.33 MHz   |
| PCI expansion-card<br>connectors. . . . .  | three 32-bit and four 64-bit full-length slots  |
| <b>System Clocks</b>                       |   |
| System clock . . . . .                     | 100 MHz   |
| Diskette/<br>communications ports. . . . . | 48 MHz from the system clock  |
| SCSI channels . . . . .                    | three 40-MHz channels   |
| <b>Memory</b>                              |   |
| Architecture . . . . .                     | 4-way interleaved 50- or 60-ns buffered EDO<br>DIMMs  |
| DIMM sockets . . . . .                     | (16) 168-pin sockets  |
| DIMM capacities . . . . .                  | 32-, 128-, and 256-MB buffered EDO  |
| Standard RAM . . . . .                     | 128 MB (minimum)  |
| Maximum RAM . . . . .                      | 4 GB  |
| BIOS address. . . . .                      | F000:0000h–F000:FFFFh   |
| External cache . . . . .                   | none  |

**Table 1-6. Technical Specifications** (continued)

| <b>Integrated SCSI Controllers</b>             |   |
|--|---|
| Types .....                                    | two Adaptec AIC-7890 Ultra2/LVD (Fast-40) controllers, with integrated 68-pin SCSI connectors on the system board; Adaptec AIC-7860 Ultra/Narrow controller, with integrated 50-pin SCSI connector on the system board                              |
| <b>Drives</b>                                  |   |
| Externally accessible bays .....               | one 3.5-inch bay dedicated to a diskette drive; one 5.25-inch bay (upper bay) containing a CD-ROM drive; two 5.25-inch bays for optional devices. Optional cage can be installed in the two option bays to support two additional hard-disk drives. |
| Internally accessible bays .....               | six bays for SCSI hard-disk drives  |
| <b>Ports</b>                                   |   |
| Externally accessible:                         |   |
| Serial (DTE) .....                             | two 9-pin connectors; 16550-compatible  |
| Parallel .....                                 | one 25-hole connector (bidirectional)   |
| Video .....                                    | one 15-hole connector (VGA-compatible)  |
| PS/2-style keyboard .....                      | 6-pin mini-DIN  |
| PS/2-compatible mouse .....                    | 6-pin mini-DIN  |
| Server-management bus daisy-chain connector... | two modular 8-pin connectors  |
| Internally accessible:                         |   |
| Ultra2/LVD SCSI controllers .....              | two 68-pin connectors   |
| Ultra/Narrow SCSI controller .....             | 50-pin connector  |
| Diskette drive .....                           | 34-pin connector  |

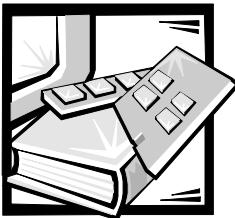
**Table 1-6. Technical Specifications** (continued)

| Controls and Indicators                    |  |
|--|--|
| Power control . . . . .                    | push button behind drive door on front panel   |
| Power indicator . . . . .                  | green LED behind drive door on front panel   |
| Fan/temperature status indicator . . . . . | green LED on front panel (blinks amber for fan failure or out-of-bounds temperature) |
| Power-supply status indicator . . . . .    | green LED on front panel (blinks amber for power supply or system voltage fault)     |
| Drive online indicator . . . . .           | green LED on each SCSI drive carrier   |
| Drive activity indicator . . . . .         | green LED on each SCSI drive carrier   |
| Drive failure indicator . . . . .          | amber LED on each SCSI drive carrier (blinks if drive failure is detected)           |
| Video                                      |  |
| Video type . . . . .                       | ATI 3D RAGE PRO video controller; VGA connector                                      |
| Video memory (standard) . . . . .          | 2 MB (not upgradable)  |
| Power                                      |  |
| DC power supply:                           |  |
| Wattage . . . . .                          | 320 W per supply   |
| Voltage . . . . .                          | 115 V at 60 Hz;<br>230 V at 50 Hz  |
| Backup battery . . . . .                   | 3.0-V CR2032 lithium coin cell   |
| Physical                                   |  |
| Height (with support feet) . . . . .       | 44.5 cm (17.5 inches)  |
| Width . . . . .                            | 30.5 cm (12.0 inches)  |
| Depth . . . . .                            | 71.1 cm (28.0 inches)  |
| Weight (maximum configuration) . . . . .   | 50.0 kg (110.0 lb)   |

**Table 1-6. Technical Specifications** (continued)

| <b>Environmental</b>   |   |
|------------------------|---|
| Temperature:           |   |
| Operating .....        | 10° to 35°C (50° to 95°F)   |
| Storage .....          | -40° to 65°C (-40° to 149°F)  |
| Relative humidity..... | 8% to 80% (noncondensing)   |
| Maximum vibration:     |   |
| Operating .....        | 0.25 G at 3 to 200 Hz for 15 min  |
| Storage .....          | -0.5 G at 3 to 200 Hz for 15 min  |
| Maximum shock:         |   |
| Operating .....        | six shock pulses in the positive and negative x, y, and z axes at 50 G for 2 ms |
| Storage .....          | six shock pulses in the positive and negative x, y, and z axes at 92 G for 2 ms |
| Altitude:              |   |
| Operating .....        | -16 to 3048 m (-50 to 10,000 ft)  |
| Storage .....          | -16 to 10,600 m (-50 to 35,000 ft)  |





## CHAPTER 2

# Basic Troubleshooting

This chapter describes basic troubleshooting procedures that can help you diagnose a computer system problem. These procedures can often reveal the source of a problem or indicate the correct starting point for troubleshooting the system. For a brief explanation of how to load and start the system diagnostics, see "Running the Dell Diagnostics" found later in this chapter. Dell recommends that you perform the following procedures in the order they are presented in this manual.



**WARNING: The power supplies in this computer system produce high voltages and energy hazards, which can cause bodily harm. Only trained service technicians are authorized to remove the computer cover and access any of the components inside the computer.**

### **Initial User Contact**

When you first contact a user who has a problem, ask the user to describe the problem and the conditions under which it occurs. A verbal description can often indicate the cause of a problem or indicate the appropriate troubleshooting procedure to use. After the user describes the problem, follow these steps:

- 1. Ask the user to back up any data on the hard-disk drive if the system's condition permits.**

Appendix C, "Maintaining the System," in the *User's Guide* provides information about backing up data.

- 2. Ask the user to try to duplicate the problem by repeating the operations he or she was performing at the time the problem occurred.**

Can the user duplicate the problem?

**Yes.** Proceed to step 3.

**No.** Proceed to the next section, "External Visual Inspection."

3. **Observe the user to determine if he or she is making an error, such as typing an incorrect key combination or entering a command incorrectly.**

Is the problem a result of user error?

**Yes.** Instruct the user in the proper procedure, or direct him or her to the appropriate user documentation for the correct procedure.

**No.** Proceed to the next section, "External Visual Inspection."

## **External Visual Inspection**

The external visual inspection consists of a quick inspection of the exterior of the computer, the monitor, the keyboard, any peripherals, and cables. While performing the visual inspection, make any necessary corrections. To perform the external visual inspection, follow these steps:

- 1. Turn off the computer, the monitor, and all peripherals.**
- 2. Verify that all power cables are properly connected to the computer, the monitor and peripherals, and their power sources.**
- 3. Verify that the keyboard and mouse interface cables are firmly attached to the proper connectors on the back of the computer.**

For a PS/2-compatible mouse, the keyboard and mouse interface cable connectors are identical except for their labels. If needed, see "System Features" in Chapter 1.

For a serial mouse, the mouse interface cable must be firmly attached to one of the serial port connectors, and its captive screws must be secure enough to ensure a firm connection.

- 4. If any network cables are present, verify that they are attached properly.**
- 5. Verify that any devices attached to the serial and parallel port connectors are properly connected.**

Each of the serial and parallel port interface cables must be firmly attached to an appropriate connector on the back of the computer as well as to the interface connector on the device. The captive screws that secure these connectors at each end of the interface cable must be secure enough to ensure a firm connection.

- 6. Verify that the video interface cable is firmly attached to the video connector on the back panel or to a video expansion card, and also to the connector on the back of the monitor.**

For proper connection of the video monitor, see the documentation for the monitor.

**7. Inspect all external monitor controls for any obvious damage or improper settings.**

For proper settings of the video monitor controls, see the documentation for the monitor.

**8. Inspect the keyboard to ensure that no keys are sticking.**

If one or more keys are sticking, it may be necessary to replace the keyboard.

**9. Inspect the exterior of the computer, including all controls and indicators, and all user-accessible data storage devices for any signs of physical damage.**

Does the inspection reveal any problems?

**Yes.** Proceed to the appropriate procedure in Chapter 4, "Removing and Replacing Parts."

**No.** Proceed to the next section, "Observing the Boot Routine."

## **Observing the Boot Routine**

After you have performed an external visual inspection as described in the previous section, you should boot the system and, while the boot routine is running, observe the system for any indications of problems.



*NOTES: Most of the steps in this procedure require observation of system functions and indications, some of which can occur simultaneously. It may be necessary to reboot the system several times in order to complete all of these steps.*

*To perform the following procedure, you need a Dell Diagnostics Diskette created from the Dell Server Assistant CD. If such a diskette is not available, you can create it as described in "Create Diskettes" in Chapter 2 of the User's Guide.*

To observe problem indications during the boot routine, follow these steps:

**1. If the system is off, turn on all peripherals and the computer. Insert the Dell Diagnostics Diskette into the diskette drive and reboot the system.**

**2. Check each power supply fan.**

Does the fan run normally?

**Yes.** Proceed to step 3.

**No.** Troubleshoot the system power supply.

**3. Watch the Num Lock, Caps Lock, and Scroll Lock indicators on the upper-right corner of the keyboard. After all three indicators flash momentarily, and following a long pause (approximately 30 seconds), the Num Lock indicator should light up and remain on (unless the Num Lock option is set to Off in the System Setup program).**

Do these indicators flash on and off within approximately 10 seconds after the boot routine starts?

**Yes.** Proceed to step 4.

**No.** Troubleshoot the system power supplies. If the troubleshooting procedure indicates that the system power supplies are operational, troubleshoot the memory.

**4. During the boot routine, observe the system for any of the following:**

- *Beep codes:* A beep code is a series of beeps that indicates an error condition. If the system emits a beep code, see Table 3-1 later in this manual.
- *System error messages:* These messages can indicate problems or provide status information. If a system error message is displayed, see Table 3-2 later in this manual.
- *Diskette-drive and hard-disk drive access indicators:* These indicators light up in response to data being transferred to or from the drives. If either of these indicators fails to light up during the boot routine, troubleshoot the diskette drive or hard-disk drive subsystem, as appropriate.

**5. Observe the monitor screen for the Diagnostics Menu.**

Does the Diagnostics Menu appear?

**Yes.** See "Running the Dell Diagnostics" found later in this chapter.

**No.** Proceed to step 6.

**6. Insert another copy of the Dell Diagnostics Diskette into the diskette drive, and reboot the system.**

Does the Diagnostics Menu appear?

**Yes.** See "Running the Dell Diagnostics" found later in this chapter.

**No.** Proceed to the next section, "Internal Visual Inspection."

## **Internal Visual Inspection**



**WARNING:** The power supplies in this computer system produce high voltages and energy hazards, which can cause bodily harm. Only trained service technicians are authorized to remove the computer cover and access any of the components inside the computer.



**CAUTION:** Before you proceed with the internal visual inspection described in this section, ensure that the user has saved all open files and exited all open applications if possible.

A simple visual inspection of a computer's interior hardware can often lead to the source of a problem, such as a loose expansion card, cable connector, or mounting screw. When you perform the visual inspection, refer to "System Features" in Chapter 1 to locate components in the inspection procedure.

To perform the internal visual inspection, follow these steps:

- 1. Turn off the system, including any attached peripherals, and disconnect all the AC power cables from their power sources.**



**WARNING:** Before beginning to work inside the computer, disconnect the power supply from the power source and the power supply cables from the power supply.

- 2. Remove the computer's right side cover as described in "Computer Cover" in Chapter 4.**
- 3. Verify that the chips, DIMMs, expansion cards, and SEC cartridge and heat sink assembly(ies) are fully seated in their sockets or connectors.**



**WARNING:** The SEC cartridge and heat sink assembly can get extremely hot during system operations. Be sure that it has had sufficient time to cool before touching it.



**WARNING:** When handling the SEC cartridge and heat sink assembly, take care to avoid sharp edges on the heat sink.

To ensure that the chips are fully seated in their sockets, press firmly on the top of each chip.

To reseat the SEC cartridge and heat sink assembly(ies), remove and reinstall it as described in "SEC Cartridge and Heat Sink Assembly" in Chapter 4.

To reseat a DIMM, remove it from its socket and reinstall it as described in "DIMMs" in Chapter 4.

If you need to reseat an expansion card, remove the card as described in "Expansion Cards" in Chapter 4, and then reinsert the card in its connector, and carefully push it in until fully seated.

**4. Verify that all jumpers are set correctly.**

For information about these jumpers, see "System Board Jumpers" in Chapter 1.

**5. Check all cable connectors inside the computer to verify that they are firmly attached to their appropriate connectors.**

**6. Reinstall the computer cover.**

**7. Reconnect the computer and any attached peripherals to their power sources, and turn them on.**

Does the problem appear to be resolved?

**Yes.** No further steps are necessary.

**No.** Proceed to the next section, "Eliminating Resource Conflicts," and to "Getting Help" found later in this chapter.

## **Eliminating Resource Conflicts**

Devices within the computer may require dedicated memory spaces, interrupt levels, or DMA channels, all of which must be allocated during installation of the devices. Because devices may be installed at different times, it is possible that the same resource is assigned to two or more devices.

Resource conflicts can result in disorderly or erratic system operation or system failure. If you suspect that resource conflicts might exist, check the system and reassign the resources as necessary.

For additional information, see Chapter 5, "Using the Resource Configuration Utility," in the *User's Guide* or "Interrupt Assignments" and "DMA Channel Assignments" in Chapter 1 of this manual.

## **Running the Dell Diagnostics**

The Dell Diagnostics contains tests that aid in troubleshooting all major components of the computer system. To run the tests, you must first create a diagnostics diskette using the *Dell Server Assistant CD* as described in "Create Diskettes" in Chapter 2 of the *User's Guide*.

To start the Dell Diagnostics, turn off the system, insert a diagnostics diskette into drive A, and then turn on the system.

Starting the diagnostics causes the Dell logo screen to appear on the monitor screen, followed by a message indicating that the diagnostics is loading. Before the diagnostics loads, a program tests the portion of main memory (RAM) required for loading the diagnostics. If a RAM error is detected, a message appears on the screen telling you which DIMM has failed.

If no errors are found in RAM, the diagnostics loads and the Diagnostics Menu appears. This menu lets you choose the following options or exit the Dell Diagnostics:

- Run All Tests — Runs all tests for a thorough check of the system
- Run Quick Tests — Runs selected tests from all test groups to quickly locate a failure or to indicate where further testing is needed to isolate a failure
- Run Specific Tests — Tests a particular area or subsystem

## **Getting Help**

If none of the troubleshooting procedures in this chapter or the tests in the Dell Diagnostics reveals the source of the problem or leads to the proper troubleshooting steps for determining the source of the problem, call Dell for technical assistance. For instructions, see the chapter titled, "Getting Help," in the *Installation and Troubleshooting Guide*.





## CHAPTER 3

# Codes and Messages

This chapter describes beep codes, system messages, alert messages from the Dell OpenManage HIP application, and SCSI hard-disk drive indicator codes that can occur during POST or during normal system operation. Tables 3-1 and 3-2 list faults that can cause a beep code or system message to occur and the probable causes of the fault in each case. Table 3-3 explains the hard-disk drive indicator patterns.

If a faulty system does not emit beep codes or display system messages to indicate a failure, you should use the Dell Diagnostics to run the appropriate tests to help isolate the source of the problem. See Chapter 5, "Running the Dell Diagnostics," in the *Installation and Troubleshooting Guide*.

### **POST Beep Codes**

If the monitor cannot display error messages during the POST, the system may emit a series of beeps that identifies the problem or that can help you identify a faulty component or assembly. Table 3-1 lists the beep codes that may be generated during the POST. Most beep codes indicate a fatal error that prevents the system from completing the boot routine until the indicated condition is corrected.

When the system emits a beep code, record the code and then find it in Table 3-1. If the table does not lead to the source of the problem, run the appropriate tests in the Dell Diagnostics to assist in troubleshooting the problem.

**Table 3-1. System Beep Codes**

| <b>Code</b>         | <b>Cause</b>  | <b>Corrective Action</b>   |
|---------------------|---|--|
| 1-1-3               | NVRAM write/read failure                                    | Replace the system board.  |
| 1-1-4               | BIOS checksum failure                                       | This fatal error usually requires that you reflash the BIOS firmware.                              |
| 1-2-1               | Programmable interval-timer failure                         | Replace the system board.  |
| 1-2-2               | DMA initialization failure                                  |  |
| 1-2-3               | DMA page register write/read failure                        |  |
| 1-3-1               | Main-memory refresh verification failure                    | Remove and reseat the DIMMs. If the problem persists, replace the system board.                    |
| 1-3-2               | No memory installed   | Remove and reseat the DIMMs. Reboot the system. If the problem persists, replace the system board. |
| 1-3-3               | Chip or data line failure in the first 64 KB of main memory | Remove and reseat the DIMMs. Reboot the system. If the problem persists, replace the system board. |
| 1-3-4               | Odd/even logic failure in the first 64 KB of main memory    |  |
| 1-4-1               | Address line failure in the first 64 KB of main memory      |  |
| 1-4-2               | Parity failure in the first 64 KB of main memory            |  |
| 2-1-1 through 2-4-4 | Bit failure in the first 64 KB of main memory               |  |

**Table 3-1. System Beep Codes** (continued)

| <b>Code</b> | <b>Cause</b>                           | <b>Corrective Action</b>   |
|-------------|--|--|
| 3-1-1       | Slave DMA-register failure             | Replace the system board.  |
| 3-1-2       | Master DMA-register failure            |  |
| 3-1-3       | Master interrupt-mask register failure |  |
| 3-1-4       | Slave interrupt-mask register failure  |  |
| 3-2-4       | Keyboard-controller test failure       | Check the keyboard cable and connector for proper connection. If the problem persists, run the Keyboard Test Group in the Dell Diagnostics to determine whether the keyboard or keyboard controller is faulty. If the keyboard controller is faulty, replace the system board. |
| 3-3-1       | CMOS failure                           | Run the System Set Test Group in the Dell Diagnostics to isolate the problem.  |
| 3-3-2       | System configuration check failure     | Replace the system board.  |
| 3-3-3       | Keyboard controller not detected       | Replace the system board.  |
| 3-3-4       | Screen initialization failure          | Ensure that the monitor cable is correctly connected. If the problem persists, replace the system board.   |
| 3-4-1       | Screen-retrace test failure            | Run the Video Test Group in the Dell Diagnostics.  |
| 3-4-2       | Search for video ROM failure           | Ensure that the monitor cable is correctly connected. If the problem persists, replace the system board.   |
| 4-2-1       | No timer tick                          | Replace the system board.  |
| 4-2-2       | Shutdown failure                       |  |
| 4-2-3       | Gate A20 failure                       | Replace the system board.  |
| 4-2-4       | Unexpected interrupt in protected mode | Ensure that all expansion cards are properly seated, and then reboot the system.   |

**Table 3-1. System Beep Codes** (continued)

| <b>Code</b> | <b>Cause</b>  | <b>Corrective Action</b>   |
|-------------|---|--|
| 4-3-1       | Faulty or improperly seated DIMM, DIMMs not installed in sets of four, or a faulty or improperly seated memory module | Be sure that the DIMMs are installed in sets of four and in the proper sockets for each memory bank in use. If this does not resolve the problem, remove and reseat the DIMMs or the memory module. If the problem persists, replace the DIMMs or the memory module. |
| 4-3-3       | Defective system board  | Replace the system board.  |
| 4-3-4       | Time-of-day clock stopped   | Replace the battery. If the problem persists, replace the system board.  |
| 4-4-1       | Faulty I/O chip<br><br>Super I/O controller failure   | Replace the system board.  |
| 4-4-2       | Parallel-port test failure (defective system board)   | Replace the system board.  |
| 4-4-3       | Math coprocessor failure (defective microprocessor)   | Replace the microprocessor.  |
| 4-4-4       | Cache test failure (defective microprocessor)   | Replace the microprocessor.  |

## System Messages

Table 3-2 lists (in alphabetical order) system messages that can appear on the monitor screen. These messages can help you find the source of a problem. Some of these messages indicate fatal errors. When a fatal error occurs, the system cannot usually be rebooted until an appropriate hardware change has been made.

**Table 3-2. System Messages**

| Message                                      | Cause   | Corrective Action  |
|--|---|--|
| Address mark not found                       | Faulty diskette/tape drive subsystem or hard-disk drive subsystem (defective system board)                            | Replace the system board.  |
| Attachment failed to respond                 | Diskette drive or hard-disk drive controller cannot send data to associated drive                                     | Replace the drive's interface cable.   |
| Auxiliary device failure                     | Mouse cable connector loose or improperly connected, defective mouse  | Check the mouse cable connection. If the problem persists, replace the mouse.  |
| Bad error-correction code (ECC) on disk read | Faulty diskette/tape drive subsystem or hard-disk drive subsystem (defective system board)                            | Replace the system board.  |
| Controller has failed                        |   |  |
| Data error                                   | Faulty diskette, diskette drive, or hard-disk drive   | Replace the diskette, diskette drive, or hard-disk drive.  |
| Decreasing available memory                  | Faulty or improperly seated DIMM, DIMMs not installed in sets of four, or a faulty or improperly seated memory module | Be sure that the DIMMs are installed in sets of four and in the proper sockets for each memory bank in use. If this does not resolve the problem, remove and reseat the DIMMs or the memory module. If the problem persists, replace the DIMMs or the memory module. |

**Table 3-2. System Messages** (continued)

| Message                                  | Cause   | Corrective Action   |
|--|---|---|
| Diskette drive 0 seek failure            | Faulty or improperly inserted diskette, incorrect configuration settings in System Setup program, loose diskette/tape drive interface cable, or loose power cable | Replace the diskette. Run the System Setup program to correct the diskette drive type. Check the diskette/tape drive interface cable and power cable connections to the drive.  |
| Diskette read failure                    | Faulty diskette, faulty or improperly connected diskette/tape drive interface cable, or loose power cable   | Check the diskette/tape drive interface cable and power cable connections to the drive. Replace the diskette drive interface cable.   |
| Diskette subsystem reset failed          | Faulty diskette/tape drive controller (defective system board)  | Replace the system board.   |
| Diskette write protected                 | Diskette write-protect feature activated  | Move the write-protect tab on the diskette.   |
| Drive not ready                          | Diskette missing from or improperly inserted in diskette drive  | Reinsert or replace the diskette.   |
| ECC host bus parity interrupt at address | Defective system board  | Replace the system board.   |
| ECC memory parity interrupt at address   | Faulty or improperly seated DIMM, DIMMs not installed in sets of four, a faulty or improperly seated memory module, or a defective system board                   | Be sure that the DIMMs are installed in sets of four and in the proper sockets for each memory bank in use. If this does not resolve the problem, remove and reseat the DIMMs and then the memory module. If the problem persists, replace the DIMMs or the memory module. If the problem still persists, replace the system board. |

**Table 3-2. System Messages** (continued)

| Message   | Cause  | Corrective Action  |
|---|--|--|
| Embedded server management error<br><br>Embedded server management is not present         | Embedded server management memory may be temporarily corrupted   | Shut down the system to clear the memory, and then restart the system.   |
| Gate A20 failure  | Faulty keyboard controller (defective system board)  | Replace the system board.  |
| General failure   | Operating system corrupted or not installed properly   | Reinstall the operating system.  |
| Hard disk controller failure<br><br>Hard disk drive read failure<br><br>Hard disk failure | Incorrect configuration settings in System Setup program, improperly connected hard-disk drive, faulty hard-disk drive controller subsystem (defective system board), or loose power cable | Check the primary and secondary SCSI configuration settings in the System Setup program. Reinstall the hard-disk drive. Check the interface cable and power cable connections to the backplane board. If the problem still persists, replace the system board. |
| Invalid configuration information - please run SETUP program                              | Incorrect ISA_CLR jumper configuration, incorrect configuration settings in System Setup program, or faulty battery  | Remove the plug from the ISA_CLR jumper. Check the System Setup configuration settings. Replace the battery.   |
| Invalid CPU speed detected - check jumpers  | Incorrect microprocessor jumper configuration  | Check the microprocessor speed jumper.   |
| Invalid NVRAM configuration, resource reallocated   | System detected and corrected a resource conflict when system resources were allocated using the RCU   | No action is required.   |

**Table 3-2. System Messages** (continued)

| Message                         | Cause   | Corrective Action   |
|---------------------------------|---|---|
| I/O parity interrupt at address | Expansion card improperly installed or faulty   | Reinstall the expansion cards. If the problem persists, replace the expansion card.                           |
| Keyboard clock line failure     | Keyboard cable connector loose or improperly connected, defective keyboard, or defective keyboard/mouse controller (defective system board) | Check the keyboard cable connection. Replace the keyboard. If the problem persists, replace the system board. |
| Keyboard controller failure     | Defective keyboard/mouse controller (defective system board)  | Replace the system board.   |
| Keyboard data line failure      | Keyboard cable connector loose or improperly connected, defective keyboard, or defective keyboard/mouse controller (defective system board) | Check the keyboard cable connection. Replace the keyboard. If the problem persists, replace the system board. |
| Keyboard stuck key failure      | Keyboard cable connector loose or improperly connected, defective keyboard, or defective keyboard/mouse controller (defective system board) | Check the keyboard cable connection. Replace the keyboard. If the problem persists, replace the system board. |

**Table 3-2. System Messages** (continued)

| Message  | Cause   | Corrective Action   |
|--|---|---|
| Memory address line failure at <i>address</i> , read value expecting <i>value</i>      | Faulty or improperly seated DIMM, DIMMs not installed in sets of four, a faulty or improperly seated memory module, or a defective system board | Be sure that the DIMMs are installed in sets of four and in the proper sockets for each memory bank in use. If this does not resolve the problem, remove and reseat the DIMMs and then the memory module. If the problem persists, replace the DIMMs or the memory module. If the problem still persists, replace the system board. |
| Memory double word logic failure at <i>address</i> , read value expecting <i>value</i> |   |   |
| Memory odd/even logic failure at <i>address</i> , read value expecting <i>value</i>    |   |   |
| Memory write/read failure at <i>address</i> , read value expecting <i>value</i>        |   |   |
| Memory allocation error  | Faulty application  | Restart the application.  |
| Memory parity interrupt at <i>address</i>  | Faulty or improperly seated DIMM, DIMMs not installed in sets of four, or a faulty or improperly seated memory module                           | Be sure that the DIMMs are installed in sets of four and in the proper sockets for each memory bank in use. If this does not resolve the problem, remove and reseat the DIMMs or the memory module. If the problem persists, replace the DIMMs or the memory module.  |
| Memory tests terminated by keystroke   | POST memory test terminated by pressing <Spacebar>  | No action is required.  |

**Table 3-2. System Messages** (continued)

| Message                                     | Cause  | Corrective Action   |
|---|--|---|
| No boot device available                    | Faulty diskette, diskette/tape drive subsystem, hard-disk drive, hard-disk drive subsystem, or no boot disk in drive A | Replace the diskette or hard-disk drive. If the problem persists, replace the system board.   |
| No boot sector on hard-disk drive           | Incorrect configuration settings on the drive controller, or no operating system on hard-disk drive                    | Check the configuration settings on the controller using the hot-key combination displayed on the screen during POST. See the controller documentation for more information on using the hot-key combination. |
| No timer tick interrupt                     | Defective system board   | Replace the system board.   |
| Non-system disk or disk error               | Faulty diskette, diskette/tape drive subsystem, or hard-disk drive subsystem   | Replace the diskette or hard-disk drive. If the problem persists, replace the system board.   |
| Not a boot diskette                         | No operating system on diskette  | Use a bootable diskette.  |
| Plug & Play Configuration error             | Plug and Play or PCI resource configuration failure  | Run the RCU to identify the resource conflict and then reallocate system resources accordingly.   |
| Processor or terminator card not installed! | No microprocessor or terminator card installed in one or more of the microprocessor connectors                         | Ensure that each microprocessor connector has either a terminator card or a microprocessor installed.   |
| Read fault<br>Requested sector not found    | Faulty diskette, diskette/tape drive subsystem, or hard-disk drive subsystem (defective system board)                  | Replace the diskette or hard-disk drive. If the problem persists, replace the system board.   |

**Table 3-2. System Messages** (continued)

| Message                     | Cause   | Corrective Action   |
|-----------------------------|---|---|
| Reset failed                | Improperly connected diskette/tape drive, hard-disk drive, or power cable | Check the diskette/tape drive interface cable and power cable connections to the diskette drive. Replace the diskette drive interface cable. Reinstall the hard-disk drive. Check the interface cable and power cable connections to the backplane board. |
| ROM bad checksum = address  | Expansion card improperly installed or faulty                             | Reinstall the expansion cards. If the problem persists, replace the expansion card.   |
| Sector not found            | Defective sectors on diskette or hard-disk drive                          | Replace the diskette or hard-disk drive.  |
| Seek error                  | Defective sectors on diskette or hard-disk drive                          | Replace the diskette or hard-disk drive.  |
| Seek operation failed       | Faulty diskette or hard-disk drive  | Replace the diskette or hard-disk drive.  |
| Shutdown failure            | Defective battery   | Replace the battery.  |
| Time-of-day clock stopped   | Defective battery or faulty chip (defective system board)                 | Replace the battery. If the problem persists, replace the system board.   |
| Time-of-day not set         | Incorrect Time or Date settings or defective system battery               | Check the Time and Date settings. If the problem persists, replace the battery.   |
| Timer chip counter 2 failed | Defective system board  | Replace the system board.   |

**Table 3-2. System Messages** (continued)

| Message   | Cause   | Corrective Action   |
|---|---|---|
| Unexpected interrupt in protected mode                          | Faulty or improperly seated DIMM, DIMMs not installed in sets of four, a faulty or improperly seated memory module, or a defective system board                               | Be sure that the DIMMs are installed in sets of four and in the proper sockets for each memory bank in use. If this does not resolve the problem, remove and reseat the DIMMs and then the memory module. If the problem persists, replace the DIMMs or the memory module. If the problem still persists, replace the system board. |
| Unsupported CPU detected in SLOT <i>n</i>                       | Microprocessor not supported by system  | Install a correct version of the microprocessor in the specified microprocessor connector.  |
| Unsupported CPU speed in CMOS                                   | Microprocessor not supported by BIOS  | Upgrade the BIOS.   |
| Warning:<br>Firmware is<br>out-of-date,<br>please<br>update ... | Some portion of system firmware is out of date, possibly as result of power being removed from the system while servicing the battery, PSPB, system board, or SCSI backplane. | Reflash the system firmware from the <i>Dell Server Assistant CD</i> (if available) or from the Dell website.   |
| Write fault<br><br>Write fault<br>on selected<br>drive          | Faulty diskette or hard-disk drive  | Replace the diskette or hard-disk drive.  |

## **Alert Messages from the Dell OpenManage HIP Application**

The Dell OpenManage Hardware Instrumentation Package (HIP) server management application generates alert messages that appear in the simple network management protocol (SNMP) trap log file. To see the trap log, select any enterprise under the SNMP trap log icon.

Alert log messages consist of information, status, warning, and failure messages for drive, temperature, fan, and power conditions. They can assist you with identifying a problem and may provide you with information to help you resolve the problem.

Table 3-3 lists some of the alert log messages from the Dell OpenManage HIP application.

**Table 3-3. Dell OpenManage HIP Application Alert Log Messages**

| <b>Message</b>                                 | <b>Cause</b>   | <b>Corrective Action</b>  |
|--|--|---|
| Automatic management notification has occurred | The server stopped functioning and called the notification number specified in the DC Console Actions tab.         | The server will reboot if the Reset or Power Cycle option was selected in the Action on Hung Server Notification section of the System Console System tab. If neither option was selected, the system can be reset using the Remote Management feature in the Dell Remote Assistant Card utility. |
| Chassis intrusion detected                     | The chassis of an attached system has been opened.   | Check to make sure the system chassis is closed.  |
| Current sensor detected a failure              | The system is consuming more power than the power supplies are rated to output. The power supply name is provided. | Verify that all of the expansion cards in the system are functioning properly. Verify that the load requirements of the hardware configured in the system does not exceed the capacity of the power supplies.   |

**Table 3-3. Dell OpenManage HIP Application Alert Log Messages** (continued)

| Message                         | Cause   | Corrective Action   |
|---------------------------------|---|---|
| Current sensor warning detected | The system is consuming more power than the power supplies are rated to output. The power supply name is provided.  | Verify that all of the expansion cards in the system are functioning properly. Verify that the load requirements of the hardware configured in the system does not exceed the capacity of the power supplies. |
| Fan sensor detected a failure   | A failure of one or more fans was detected by the thermal-monitoring facility in the specified server. If possible, the chassis number and fan number are provided. | Check for a possible blockage of or inadequate ventilation around the fan. If the fan is not blocked and ventilation is adequate, check fan connections.  |
| Fan sensor warning detected     | A fan sensor reading on the specified server has exceeded the user-settable warning thresholds. If possible, the chassis number and fan number are provided.        | Check for a possible blockage of or inadequate ventilation around the fan. If the fan is not blocked and ventilation is adequate, check fan connections.  |
| ECC memory fault                | An ECC error has occurred in system memory.   | Run the appropriate memory test(s) from the Dell Diagnostics.   |

**Table 3-3. Dell OpenManage HIP Application Alert Log Messages** (continued)

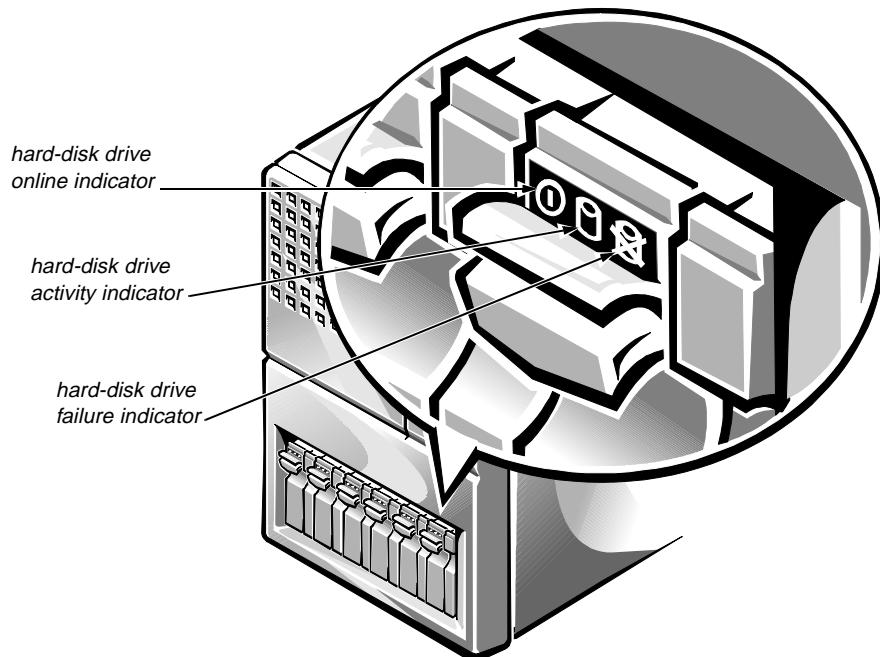
| Message                                   | Cause   | Corrective Action   |
|---|---|---|
| Power supply lost redundancy detected     | The system has detected that one of the three power supplies has failed and thus lost power supply redundancy. If a second power supply fails, the system will be inoperable. | Check the power supply indicators for a power supply failure. Check to make sure the latch switch on each power supply is enabled. Check each connection to the power source. If a power supply failure is confirmed, replace the failed power supply as soon as possible. (The system's default configuration is redundant power. Although it will run with only two functioning power supplies, redundancy will be lost.) |
| Power supply degraded redundancy detected | A power supply may be failing or a power utilization warning threshold has been exceeded. The system will function normally in this configuration and is still redundant.     | Check the power supply indicators for a power supply failure. Check to make sure the latch switch on each power supply is enabled. Check each connection to the power source. Check the power utilization warning thresholds to verify they are valid values.   |
| Power supply detected a failure           | The power supply sensor detected a failure in one of the power supplies. If possible, the power supply number is provided.  | Check the power supply indicators for a power supply failure. Check to make sure the latch switch on each power supply is enabled. Check each connection to the power source.   |

**Table 3-3. Dell OpenManage HIP Application Alert Log Messages** (continued)

| Message                               | Cause   | Corrective Action  |
|---------------------------------------|---|--|
| Temperature sensor detected a failure | A temperature probe on the backplane board, system board, or drive carrier in the specified server has exceeded its temperature failure range. If possible, the chassis number and probe number are provided. | Check for a fan failure. If needed, replace the fan or fan assembly.   |
| Temperature sensor warning detected   | A temperature probe on the backplane board, system board, or drive carrier in the specified server has exceeded its temperature warning range. If possible, the chassis number and probe number are provided. | Make sure the fan thresholds are set in a reasonable range. Check for a fan failure. Make sure the computer cover is properly installed.           |
| Voltage sensor detected a failure     | A failure has occurred with the system power supply or voltage probe(s) on the system board. If possible, the chassis number and probe number are provided.   | Check the power supply and backplane board connections.  |
| Voltage sensor warning detected       | The voltage probe on the backplane board, system board, or power supply for the specified server has exceeded its warning range. If possible, the chassis number and probe number are provided.               | Make sure the user-settable voltage thresholds are set correctly. If the problem persists, check the power supply and backplane board connections. |

## **SCSI Hard-Disk Drive Indicator Codes**

Three indicator lights in each SCSI hard-disk drive carrier provide information on the status of the SCSI hard-disk drives (see Figure 3-1). The SCSI backplane firmware controls the drive online and drive failure indicators.



**Figure 3-1. Hard-Disk Drive Indicators**

Table 3-4 lists the drive indicator patterns established by the SCSI backplane firmware. Different patterns are displayed as drive events occur in the system. For example, in the event of a hard-disk drive failure, the *drive failed* pattern appears. After the drive is selected for removal, the *drive being prepared for removal* pattern appears, followed by the *drive ready for insertion or removal* pattern. After the replacement drive is installed, the *drive being prepared for operation* pattern appears, followed by the *drive online* pattern.



*NOTE: If you do not have a Dell PowerEdge Expandable RAID Controller host adapter card installed, you will see only the drive online and drive bay empty indicator patterns.*

**Table 3-4. SCSI Hard-Disk Drive Indicator Patterns**

| <b>Condition</b>                     | <b>Indicator Pattern</b>  |
|--------------------------------------|---|
| Identify drive                       | All three drive status indicators blink simultaneously.   |
| Drive being prepared for removal     | The three drive status indicators flash sequentially.   |
| Drive ready for insertion or removal | All three drive status indicators are off.  |
| Drive being prepared for operation   | The drive online indicator is on. The drive activity light may flash briefly.                     |
| Drive bay empty                      | All three drive status indicators are off.  |
| Drive predicted failure              | The drive online indicator is on. The drive failure indicator blinks on briefly each second.      |
| Drive failed                         | The drive online indicator turns off. The drive failure indicator blinks off briefly each second. |
| Drive rebuilding                     | The drive online indicator blinks rapidly.  |
| Drive online                         | The drive online indicator is on.   |



## CHAPTER 4

# **Removing and Replacing Parts**

This chapter provides procedures for removing the components, assemblies, and subassemblies in the computer. Unless otherwise noted, each procedure assumes the following:

- You have performed the steps in "Precautionary Measures" found later in this chapter.
- You have removed the computer cover and/or front bezel as necessary.
- You can replace or reinstall a part by performing the removal procedure in reverse order unless additional information is provided.



**WARNING: The power supplies in this computer system produce high voltages and energy hazards, which can cause bodily harm. Only trained service technicians are authorized to remove the computer cover and access any of the components inside the computer.**

## **Recommended Tools**

The PowerEdge 6300 has been designed for greater manual serviceability; most of the procedures in this chapter do not require the use of tools. Exceptions are the following:

- Removing/replacing the processor guide bracket assemblies requires a T25 Torx driver.
- Removing/replacing hard-disk drives in the external drive bay insert requires a small flat-blade screwdriver.

Also, use a wrist grounding strap as explained in the next section, "Precautionary Measures."

## **Precautionary Measures**

Before you perform any of the procedures in this chapter, take a few moments to read the following warning for your personal safety and to prevent damage to the computer system from ESD.



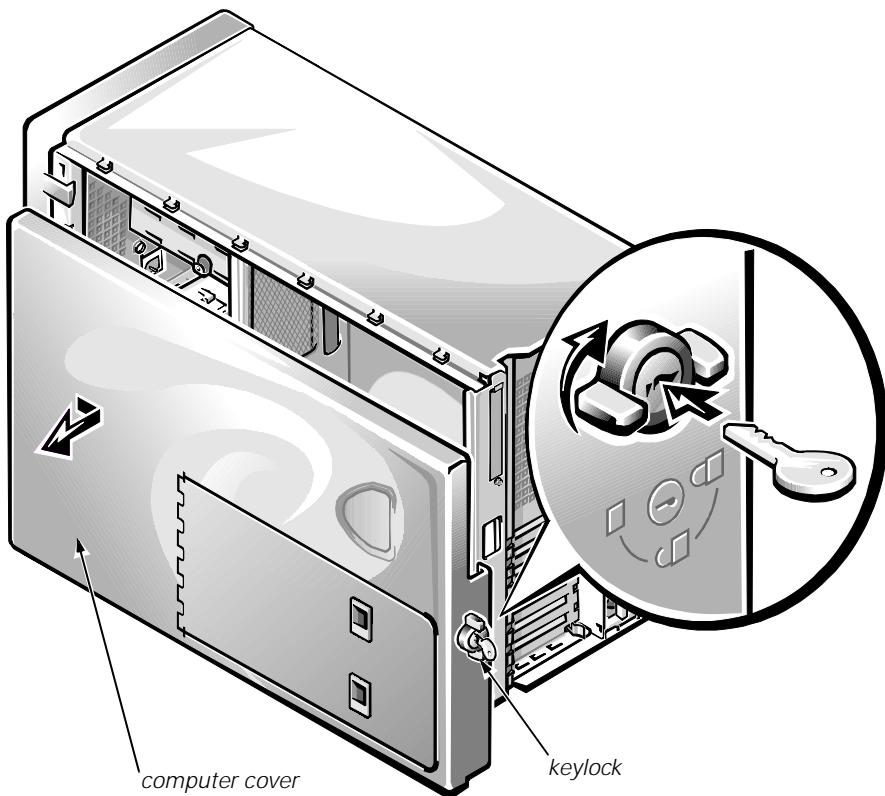
### **WARNING FOR YOUR PERSONAL SAFETY AND PROTECTION OF THE EQUIPMENT**

**Before you start to work on the computer, perform the following steps in the sequence listed:**

- 1. Turn off the computer and any attached peripherals.**
- 2. Disconnect the computer and any attached peripherals from their power sources to reduce the potential for personal injury.**
- 3. Disconnect any communications cables.**
- 4. Wear a wrist grounding strap, and clip it to any unpainted metal surface on the computer chassis.**

If a wrist grounding strap is not available, touch any unpainted metal surface on the back of the computer chassis to discharge any static charge from your body.

## Computer Cover



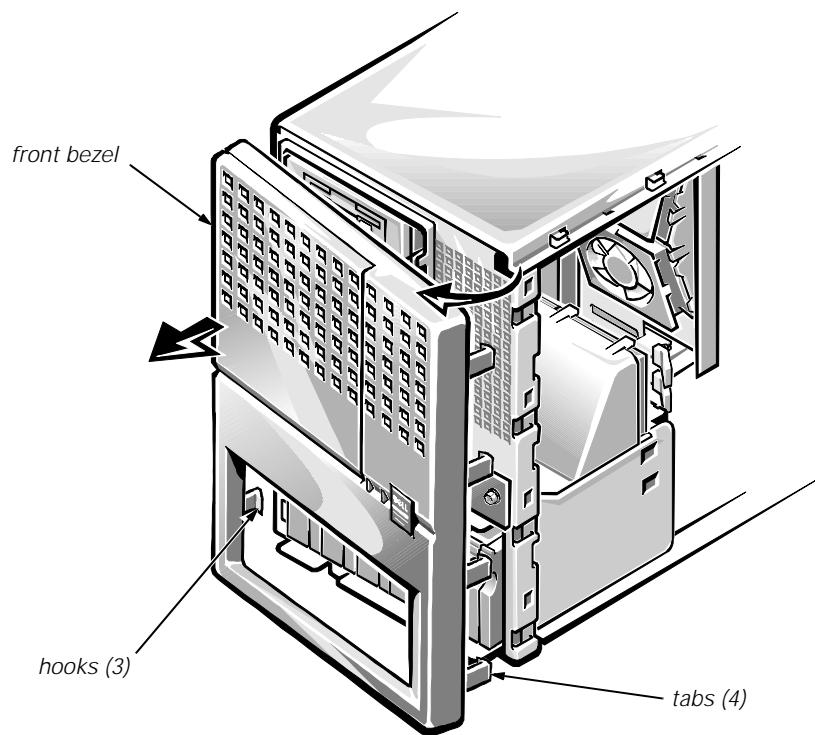
**Figure 4-1. Computer Cover Removal**

To remove the computer cover, follow these steps:

- 1. Turn the keylock on the back edge of the cover clockwise to the unlocked position (see Figure 4-1).**
- 2. Slide the cover a half-inch (about a centimeter) or so toward the back of the computer.**
- 3. Grasping the top of the cover at both ends, lift it away from the chassis.**

To replace the cover, make sure the keylock is in the unlocked position. Fit the cover over the side rail at the bottom of the chassis and slide it closed.

## **Front Bezel**



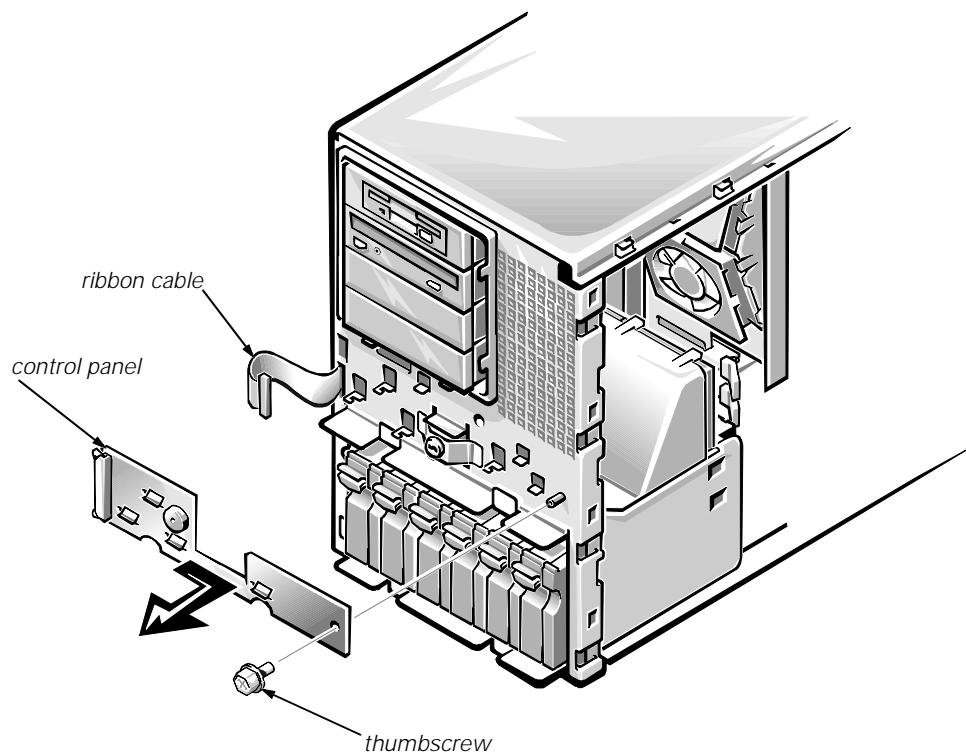
**Figure 4-2. Front Bezel Removal**

To remove the front bezel, follow these steps:

- 1. Remove the computer cover.**
- 2. Gently pry the four tabs along the right edge of the bezel loose, and then disengage the three hooks on the opposite edge from the chassis (see Figure 4-2).**
- 3. Rotate the bezel to the left to disengage it.**

To replace the bezel, align the three hooks on the edge of the bezel and press the bezel into place until the tabs on the opposite edge of the bezel snap into place.

## Control Panel Assembly



**Figure 4-3. Control-Panel Assembly Removal**

To remove the control panel assembly, follow these steps:

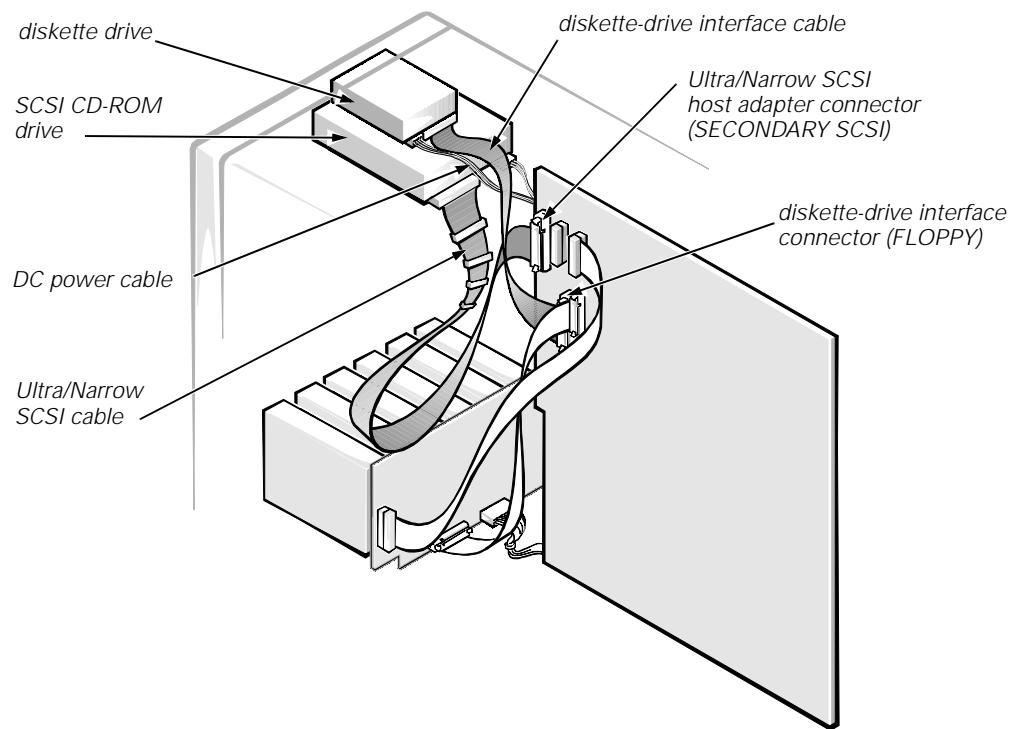
- 1. Disconnect the ribbon cable from its connector on the left side of the control panel assembly (see Figure 4-3).**
- 2. Loosen the thumbscrew securing the control panel assembly to the front of the chassis.**
- 3. Slide the control panel assembly to the right (or up if system is in rack-mount position) to disengage the card from the chassis hooks.**



*NOTE: The ribbon cable that attaches to the control panel assembly connects to the PLANAR connector on the SCSI backplane and then continues on to the BACKPLANE connector on the system board.*

## Drives

Figure 4-4 shows an example of drive hardware that can be installed in the computer. Refer to this figure when you perform any of the procedures in the following subsections.

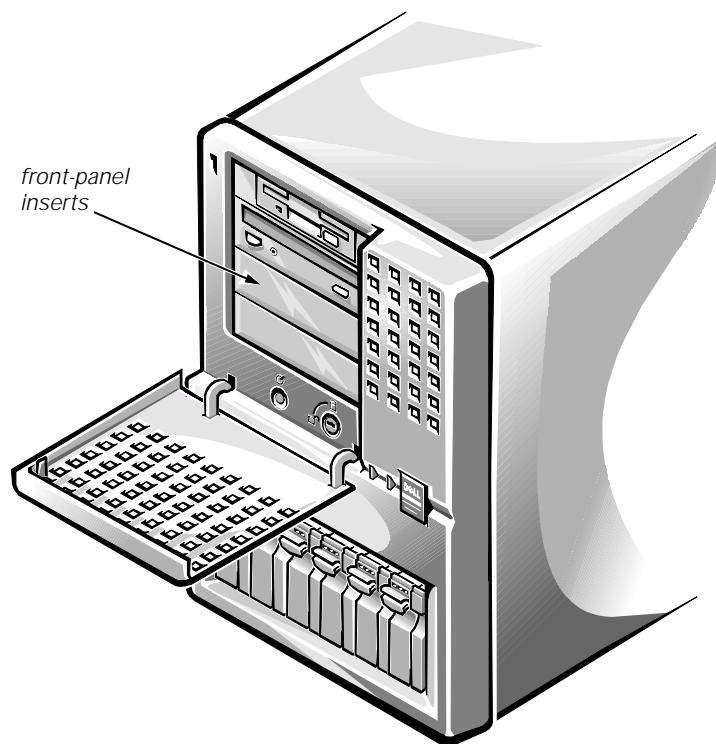


**Figure 4-4. Drive Hardware**

## **Externally Accessible Drives**

The chassis provides three bays for 5.25-inch externally accessible drives and a bay dedicated to a 3.5-inch diskette drive.

### *Front-Panel Inserts*



**Figure 4-5. Front-Panel Inserts**

To remove the front-panel insert that covers an unused bay (see Figure 4-5), first remove the front bezel. Then, facing the inside of the front bezel, press one of the securing tabs (located at each end of the bezel) while pressing against the center of the insert until it springs free from the bezel.

To replace a front-panel insert, from inside the chassis place the insert into the bay opening and press it into place until the tabs on each end of the insert snap into the latches on the inside of the bezel.

### **Close-Out Panels**

Metal close-out panels that fit into the drive-bay openings in the chassis provide extra EMI shielding under the plastic front-panel inserts. The close-out panel for a 1.6-inch bay has a raised lip at the bottom that overlaps the top of a panel beneath it, if any. Because of the overlap, if two or more 1.6-inch close-out panels are installed, you must remove them from the top down. The close-out panel for the 1-inch diskette-drive bay (the top bay in either chassis orientation) is narrower and has no overlap lip.

To remove a close-out panel, pry the bottom of the panel outward at the center until you can unhook a securing tab at one end and work out the other end.

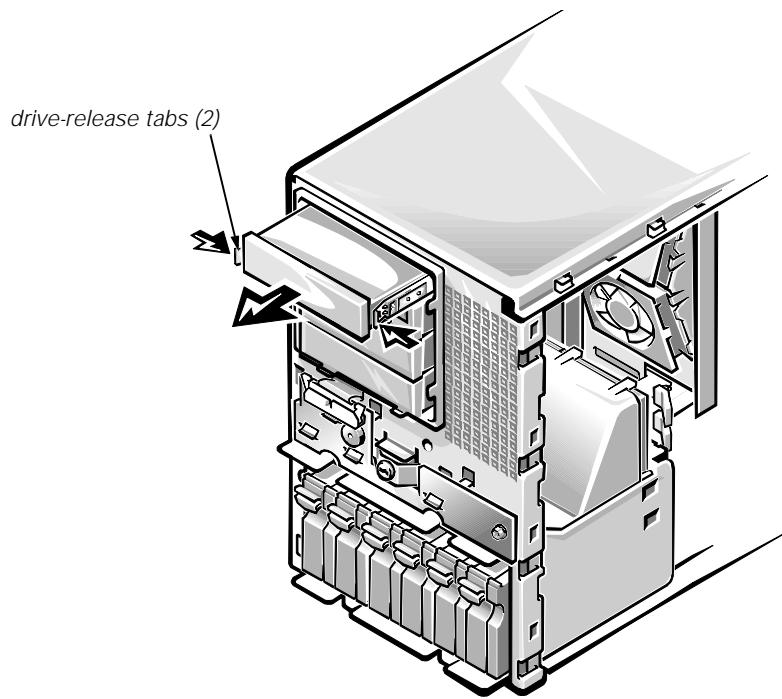
When installing close-out panels, install 1.6-inch panels from the bottom up. Make sure the overlap lip is at the bottom and projecting toward you. Insert the tab on one side of the panel into the appropriate slot in the drive cage, bow the panel slightly, and fit the second tab into the slot in the other side of the cage. Make sure the sides of the panel fit flush against the sides of the drive cage.

### *Reorienting the External Drive Cage*

To accommodate a change in computer orientation (for example, from an upright to a rack configuration), you can reconfigure the external drive bays to remain horizontal as follows:

- 1. Remove the front-panel inserts from the front bezel.**
- 2. Reposition the plastic frame surrounding the drive opening in the front bezel:**
  - a. Facing the inside of the front bezel, press against the center of the frame with your thumbs until the frame bows sufficiently to loosen the tabs on the sides of the insert. Pull the frame out of the bezel.
  - b. Rotate the frame 90 degrees to match the new orientation of the drives.
  - c. Replace the frame in the front bezel and carefully press it into place.
- 3. Reinstall the front-panel inserts to match the new drive orientation.**
- 4. Remove the computer cover and slide the system board tray out to the service position.**
- 5. Remove the external drives from the drive bays (noting all cable connections); remove any metal inserts covering empty drive bays.**
- 6. Reinstall the external drives to match the new system orientation, and reconnect cables as appropriate.**
- 7. Close the system board tray.**
- 8. Replace the front bezel and computer cover.**

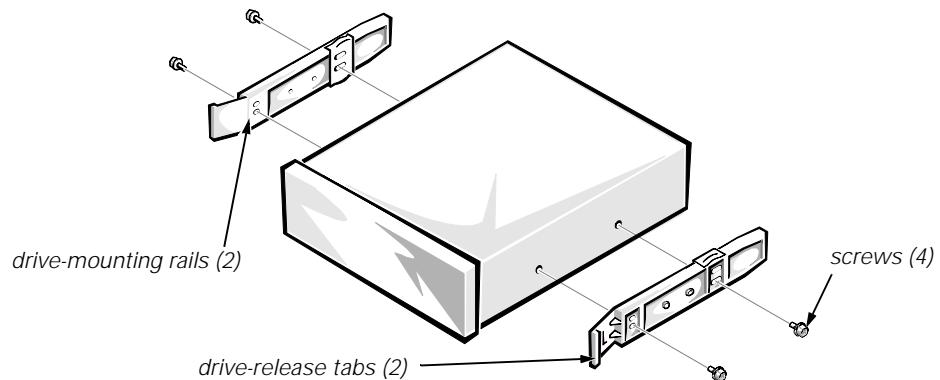
## 5.25- and 3.5-Inch Drives



**Figure 4-6. Externally Accessible Drive Removal**

To remove a 5.25-inch drive assembly from one of the externally accessible drive bays, follow these steps:

- 1. Press the two drive-release tabs toward the center of the drive, and slide the drive out the front of the bay (see Figure 4-6).**
- 2. Disconnect the DC power cable and the interface cable from the back of the drive.**  
Be sure to record the power connector number and the location of the interface cable connector.
- 3. Remove the drive-mounting rails from the drive (see Figure 4-7).**



**Figure 4-7. Drive-Mounting Rail Removal (Example)**

- 4. If the drive is a SCSI drive, record the setting of the SCSI address jumpers and SCSI bus termination jumper.**
- 5. If the drive is a SCSI drive, remove the 50-pin-to-68-pin adapter from the SCSI connector on the back of the drive (if present).**

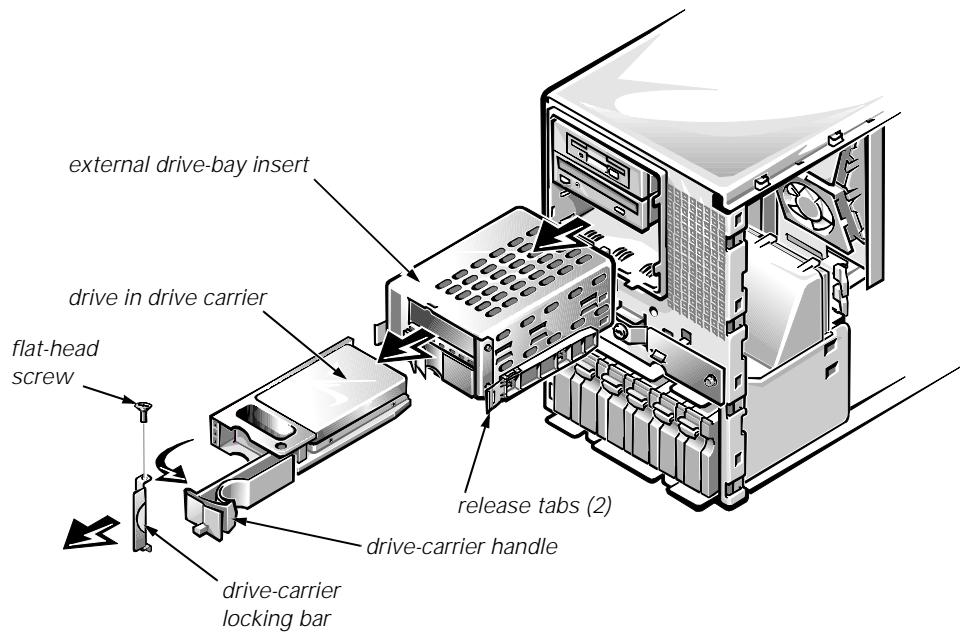
Some drives use a 50-pin-to-68-pin adapter between the SCSI cable and the drive connector. Check the back of the drive for an adapter, if present; remove it and retain it for use on the new drive.



*NOTES: When you install a 5.25-inch drive, install drive rails and slide the drive into its bay until the rails snap securely into place.*

*When you reinstall a SCSI drive, set the SCSI address jumpers and the SCSI bus termination jumpers to the settings you recorded.*

## Hard-Disk Drives in External Bay



**Figure 4-8. Hard-Disk Drives in External Bay**

Two SCSI hard-disk drives can be installed in the external bay using the hard-disk drive carrier insert (see Figure 4-8). Drives mate to a small backplane board on the back of the insert; from there, they can be connected via a two-device ribbon cable either to a redundant arrays of independent disks (RAID) controller or to one of the Ultra2/LVD SCSI connectors on the system board.



**CAUTION: Hot-pluggable drive installation and removal is not supported for hard-disk drives installed in the external drive bay. Removing a drive while the system is turned on will result in a loss of data.**

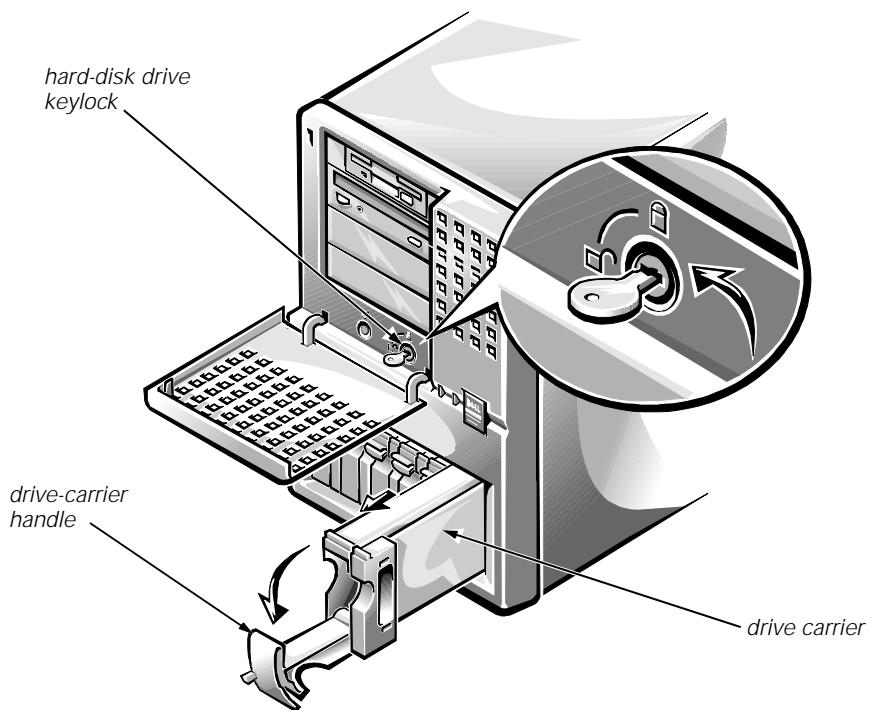
Remove a SCSI hard-disk drive from the external drive bay as follows:

- 1. Press inward on the two release tabs on the drive bay insert, and pull the insert about one inch out of the external bay.**
- 2. Use a flat-blade screwdriver to remove the screw that secures the locking bar on the front of the insert, and remove the locking bar.**
- 3. Open the drive-carrier handle to release the carrier, and slide the carrier toward you out of the insert.**

When installing a drive in the insert, slide the drive in with the handle open until it stops, and then push the handle closed and slide the drive in the rest of the way. Replace the locking bar before installing the insert into the chassis.

If you are not replacing the drive, install a metal close-out panel on the front of the external bay and a front-panel insert on the front bezel.

## Hard-Disk Drives



**Figure 4-9. Hard-Disk Drive Removal**

Remove a SCSI hard-disk drive from an internal drive bay as follows:

- 1. If the system does not have a PowerEdge Expandable RAID Controller installed, shut down the system and go to step 3.**



**CAUTION: Hot-pluggable drive installation and removal is *not* supported for systems *without* a Dell PowerEdge Expandable RAID Controller host adapter card. Removing a drive without turning the system off in this situation will result in a loss of data.**

- 2. For systems with PowerEdge Expandable RAID Controllers, refer to your RAID controller documentation for information on preparing the drive for removal. When the drive has been powered down, wait until the drive status indicators adjacent to the drive bay signal that the drive may be removed safely.**

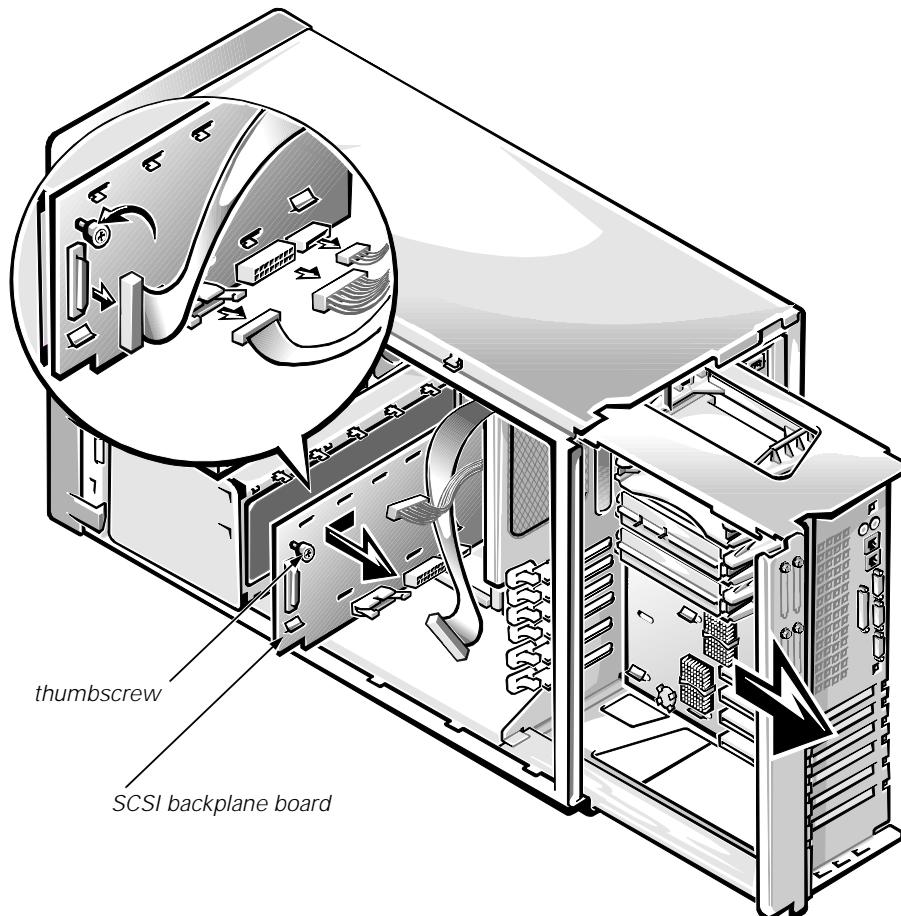
If the drive has been online, the drive status indicators flash sequentially as the drive is powered down. When all indicators are turned off, the drive is ready for removal.

- 3. Unlock the hard-disk drive keylock (see Figure 4-9).**
- 4. Squeeze the open side of the drive-carrier handle to release it, open the handle, and slide the carrier toward you until it is free of the drive bay.**

**5. Remove the drive from its carrier by removing the four screws (two on each side) that secure it in the carrier.**

Before installing a new drive, set all jumpers and remove termination from the drive. When installing the drive, raise the carrier handle until it latches to ensure that the drive is fully seated in the backplane board.

## **SCSI Backplane Board**



**Figure 4-10. Removing a SCSI Backplane Board**

To remove a SCSI backplane board, follow these steps:

**1. Slide the system board tray out to the service position.**

See "Accessing the Interior of the System" in Chapter 1 for instructions.

**2. Remove the hard-disk drives.**

**3. Disconnect all cables from the SCSI backplane board, noting where cables connected.**

**4. Loosen the thumbscrew on the backplane board (see Figure 4-10).**

**5. Slide the backplane board away from the power-supply paralleling board (PSPB) about a quarter inch, and lift it off the L-shaped mounting tabs on the hard-disk drive cage.**

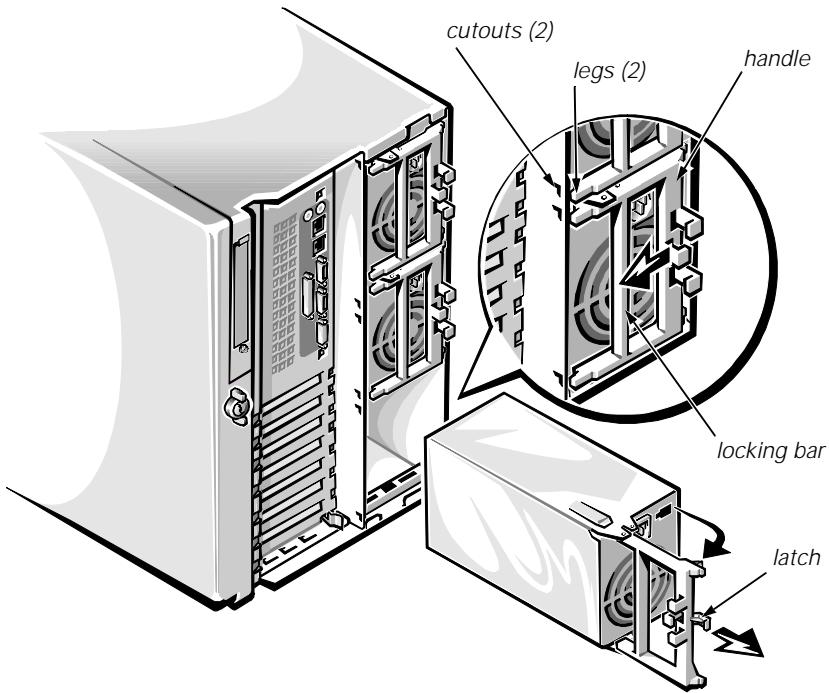


**CAUTION: Should you remove power from the SCSI backplane board (either by removing the power cable or during replacement of the system board battery), you may need to reflash your system's firmware.**

**The original firmware on the SCSI backplane is stored in EEPROM. However, if the SCSI backplane firmware is ever updated, the update is stored in volatile RAM. If power is removed from an updated backplane board, the update will be lost and the board will revert to its original firmware in EEPROM.**

**If at system startup you receive the message Warning: Firmware is out-of-date, please update... , it is best to reflash *all* system firmware from your Dell Server Assistant CD.**

## System Power Supply



**Figure 4-11. Power Supply Removal**

To remove a power supply, follow these steps:

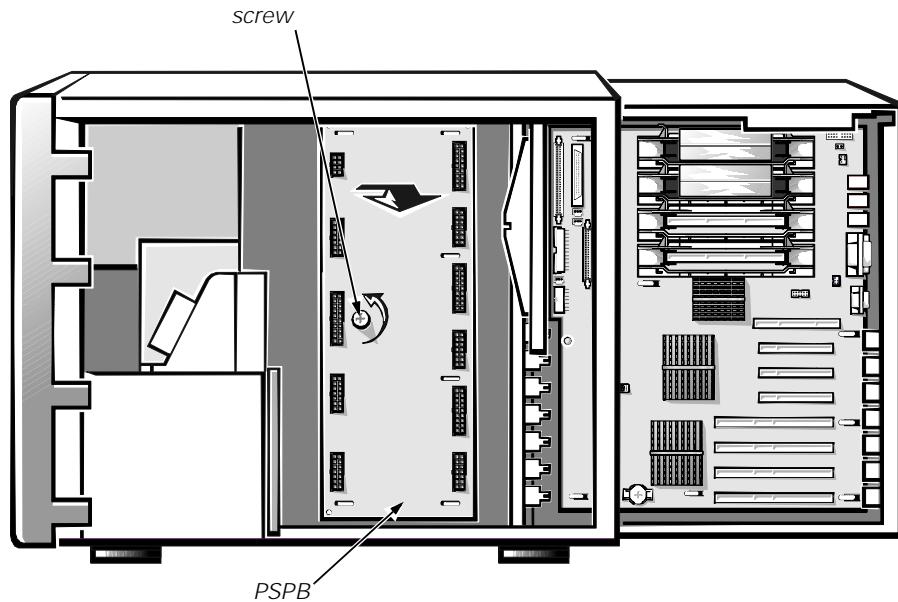
- 1. Disconnect the AC power cable from the electrical outlet, and then disconnect the other end of the cable from the power supply.**
- 2. Press the locking bar in the power supply handle to the left (or up if the system is in rack-mount position) until the latch disengages from the chassis (see Figure 4-11).**
- 3. Rotate the handle outward (forcing the power supply partially out of its bay) and pull the power supply the rest of the way out by the handle.**

When installing a power supply, make sure the handle is all the way out (at a right angle to the back of the power supply). Slide the power supply *almost* all the way into its bay, letting it extend out about a quarter-inch. Rotate the handle back toward the power supply while fitting the two legs of the handle into the cutouts in the chassis wall, at the same time pressing the power supply the rest of the way into the bay. Then push the locking bar to the right (or down if the system is in rack-mount position) until the latch snaps into place, securing the power supply.



**CAUTION: The power supply will not operate unless the handle is snapped all the way into the securing position.**

## **Power-Supply Paralleling Board**



**Figure 4-12. Power-Supply Paralleling Board**

Remove the PSPB as follows:

**1. Slide the system board tray out to the service position.**

See "Accessing the Interior of the System" in Chapter 1 for instructions.

**2. Disconnect all power harnesses and cables from the PSPB.**

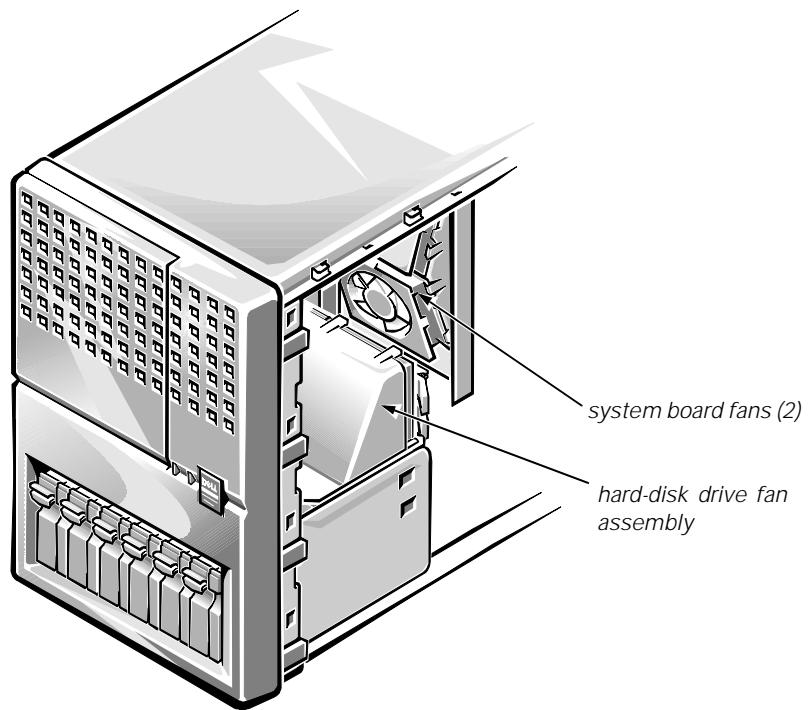
**3. Loosen the captive screw securing the PSPB to the chassis wall (see Figure 4-12).**

**4. Slide the PSPB toward the power supplies about a quarter of an inch until it disengages from the hooked tabs in the chassis wall, and lift it out.**

When installing a replacement PSPB, position the PSPB against the chassis wall so that the tabs on the chassis wall fit through the corresponding slots in the PSPB, slide the PSPB toward the front of the chassis until it is firmly engaged in the tabs, and tighten the screw.

When replacing the power harnesses and cables, refer to "PSPB and System Power Supplies" in Chapter 1 for cable routing information.

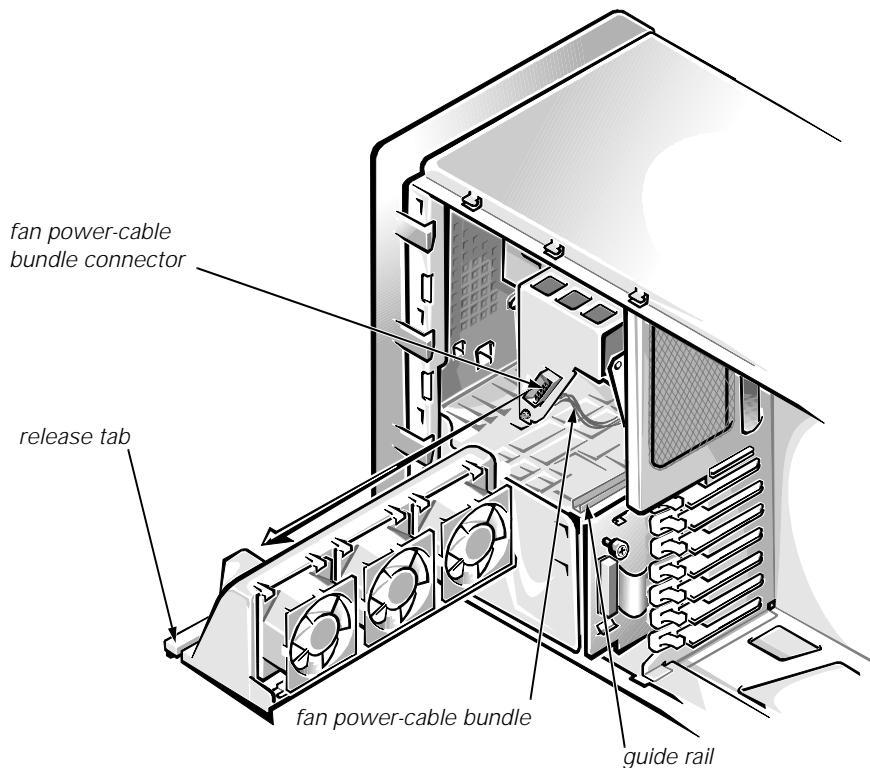
## **System Cooling Fans**



**Figure 4-13. System Cooling Fans**

Five cooling fans are installed in the Dell PowerEdge 6300 chassis. The drive fan assembly consists of three fans mounted in a carrier above the hard-disk drive enclosure; the system-board fan assembly consists of two fans mounted in a carrier on the inner wall of the system board tray (see Figure 4-13). The drive fan assembly is hot-pluggable and must be replaced as a unit. The system board fans are individually hot-pluggable.

## Hard-Disk Drive Fan Assembly



**Figure 4-14. Hard-Disk Drive Fan Assembly**

The drive fan assembly is hot-pluggable and can be quickly replaced while the system is running.

**WARNING: If replacing this assembly while the system is running, make sure you have the new assembly handy, and perform the procedure quickly to avoid overheating the drives.**



Follow these steps to remove a drive fan assembly:

- 1. If replacing the drive fan assembly while the system is running, have the new fan assembly ready.**
- 2. Press the release tab on the fan carrier (see Figure 4-14) up away from the hard-disk drive bay, and slide the fan assembly out of the chassis.**
- 3. To install the replacement drive fan assembly, fit the fan assembly over the guide rail and slide it into place, seating it firmly.**

When the fan assembly is correctly installed, the power cable connection is made automatically through the bottom of the assembly.

## Fan Power-Cable Bundle

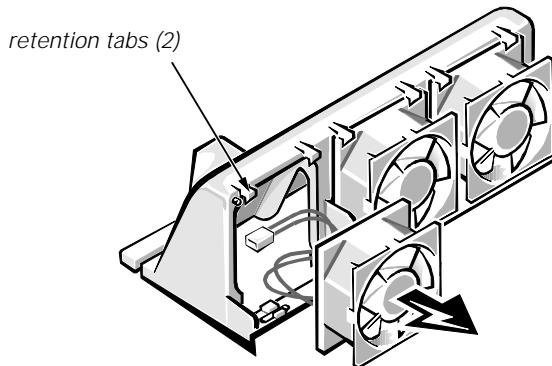


*NOTE: This is **not** a hot-pluggable procedure.*

To remove the power cable bundle that mates to the bottom of the drive fan assembly, follow these steps:

- 1. Remove the drive fan assembly.**
- 2. Squeeze the ends of the power-cable bundle connector (see Figure 4-14) while pulling the cable from it from under the metal support bracket.**
- 3. Disconnect the other end of the cable from the FAN connector on the SCSI backplane.**

## Drive Fan



**Figure 4-15. Drive Fan Removal**

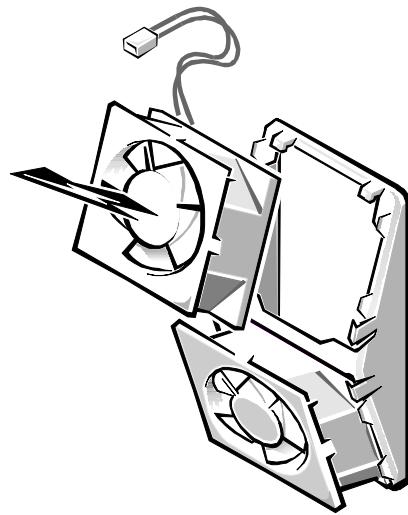


*NOTE: This is **not** a hot-pluggable procedure.*

To replace a faulty fan in a drive fan assembly before storing the assembly for future use, follow these steps:

- 1. Remove the faulty fan from the fan carrier by releasing the two retention tabs that secure the fan in the carrier (see Figure 4-15), and working the fan out of the carrier.**
- 2. Remove the fan's power cable from the carrier's power harness bundle.**
- 3. Use the push fasteners that came with the new fan to install the metal finger guard on the fan. Install the guard so that the fan's airflow arrow points toward the guard.**
- 4. Connect the new fan's cable to the carrier's power harness bundle.**
- 5. Insert the new fan into the carrier under the two retention tabs.**

## **System Board Fans**



**Figure 4-16. System Board Fans**

The system board fans are hot-pluggable and can be quickly replaced (see Figure 4-16) while the system is running.



**WARNING: If replacing this assembly while the system is running, make sure you have the new fan assembled and handy, and perform the procedure quickly to avoid overheating the microprocessor(s).**

**1. Assemble the new fan.**

Use the push fasteners that came with the new fan to install the finger guard on the fan. Install the guard so that the fan's airflow arrow points away from the guard.

**2. Slide the system board tray out to the service position.**

See "Accessing the Interior of the System" in Chapter 1 for instructions.

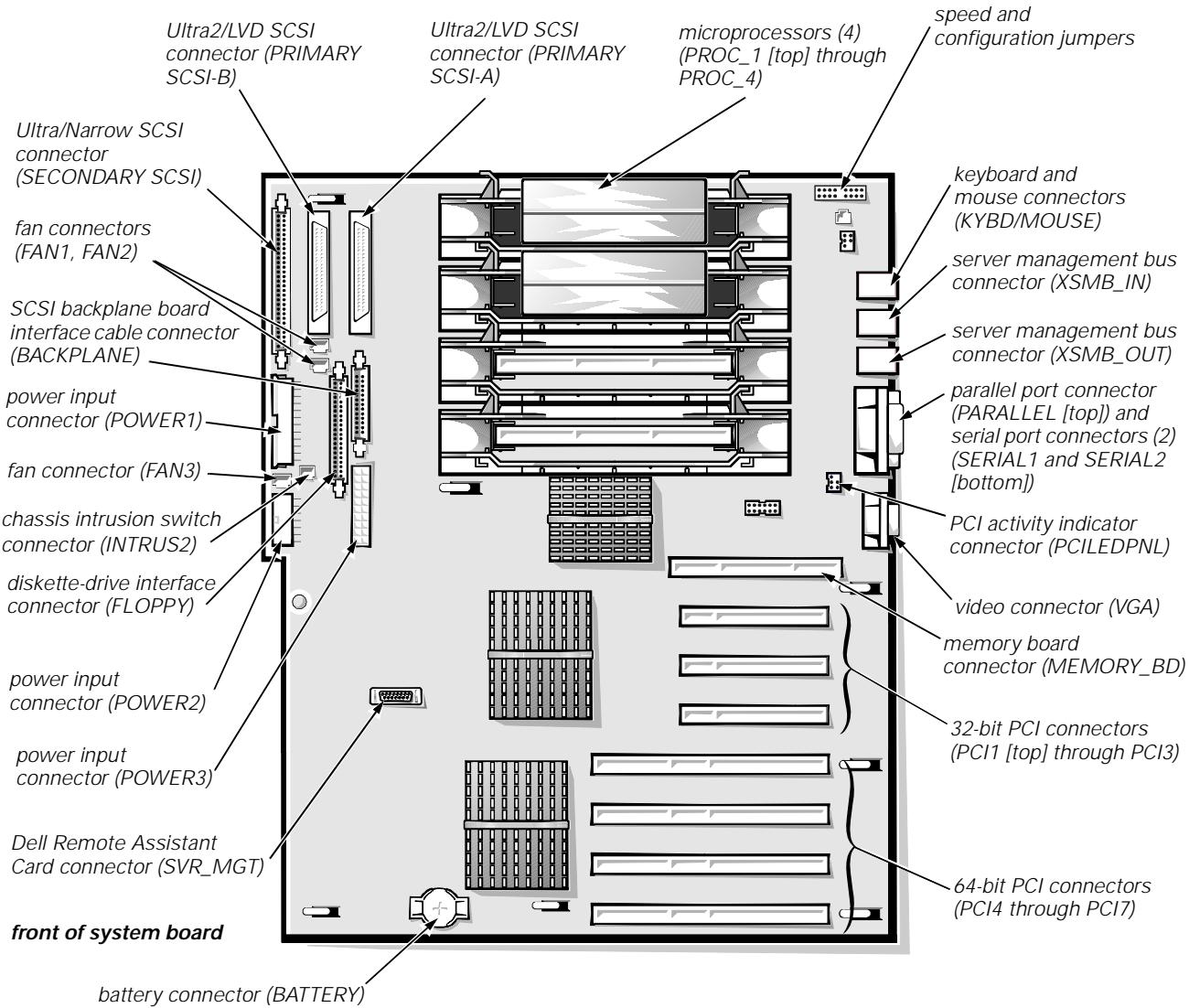
**3. For the fan to be replaced, disconnect its cable from the extension cable attached to the appropriate fan connector (FAN1 or FAN2) on the system board.**

**4. Pull outward on the fan-retention tabs to disengage the fan.**

To install the new fan, slide the fan into the fan housing, align the holes in the corners of the fan with the studs in the housing, and snap the fan into place. Connect the fan to the appropriate extension cable.

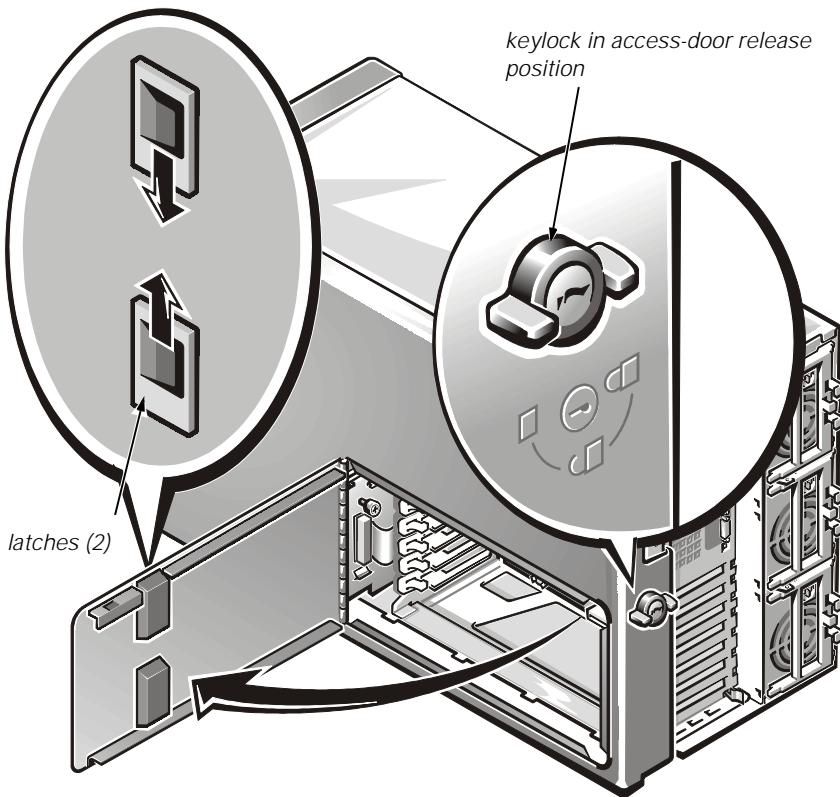
# System Board Components

The subsections that follow contain procedures for removing system board components. Refer to Figure 4-17 for the location of components.



**Figure 4-17. System Board Components**

## Expansion Cards



**Figure 4-18. Expansion-Card Access Door**



*NOTE: PCI cards are **not** hot-pluggable under Microsoft® Windows® 95 or Windows NT® 4.x operating systems. They will become hot-pluggable under Windows NT 5.0, when available.*

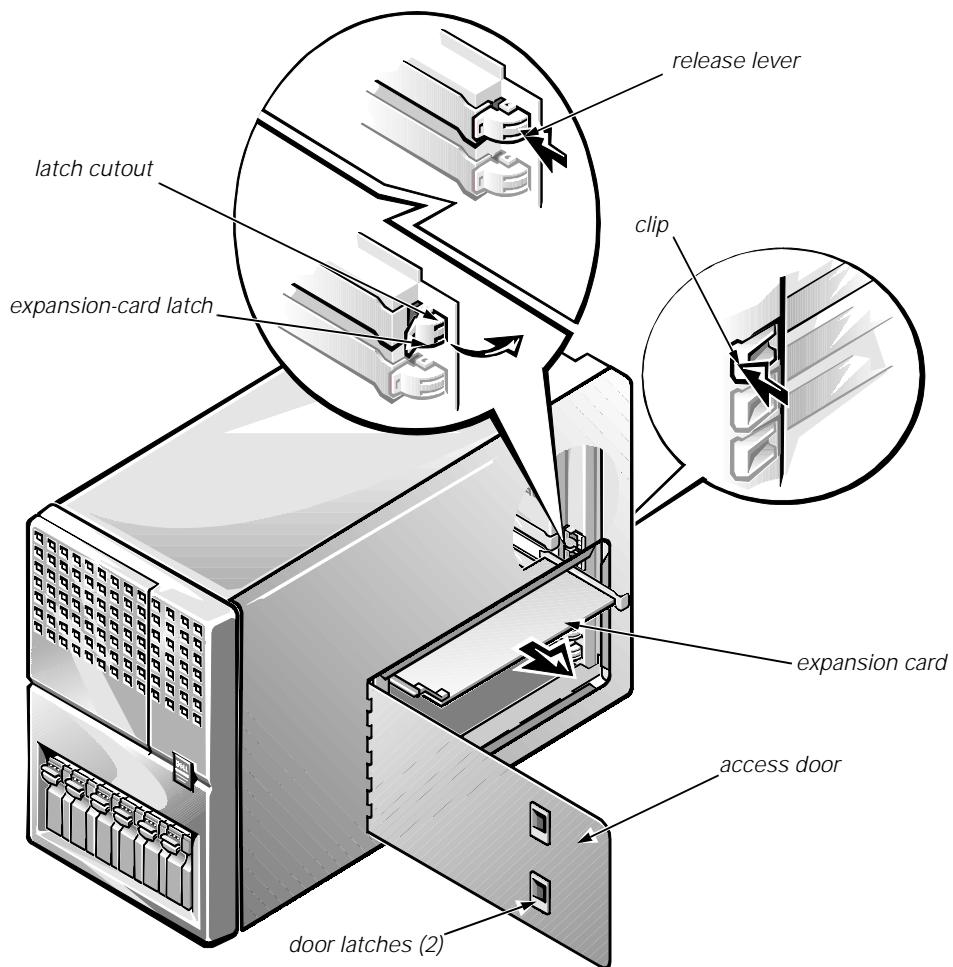
To remove an expansion card, follow these steps:

- 1. Unlock the keylock, remove the key, and then turn the keylock to the access door release position (see Figure 4-18).**
- 2. Squeeze the dual latches on the access door to open the door, exposing the expansion-card compartment.**
- 3. Disconnect any cables attached to the expansion card you want to remove.**

Be sure to record the location of each cable before you disconnect it.

4. For the card you want to remove, press in and hold the clip on the back of the computer. At the same time, from inside the computer, press the curved release lever in the middle of the expansion-card latch toward the bottom of the card. After the release lever clicks into the latch cutout, rotate the latch away from the expansion-card bracket (see Figure 4-19).

**CAUTION: Do not use a tool to force the latch open.**

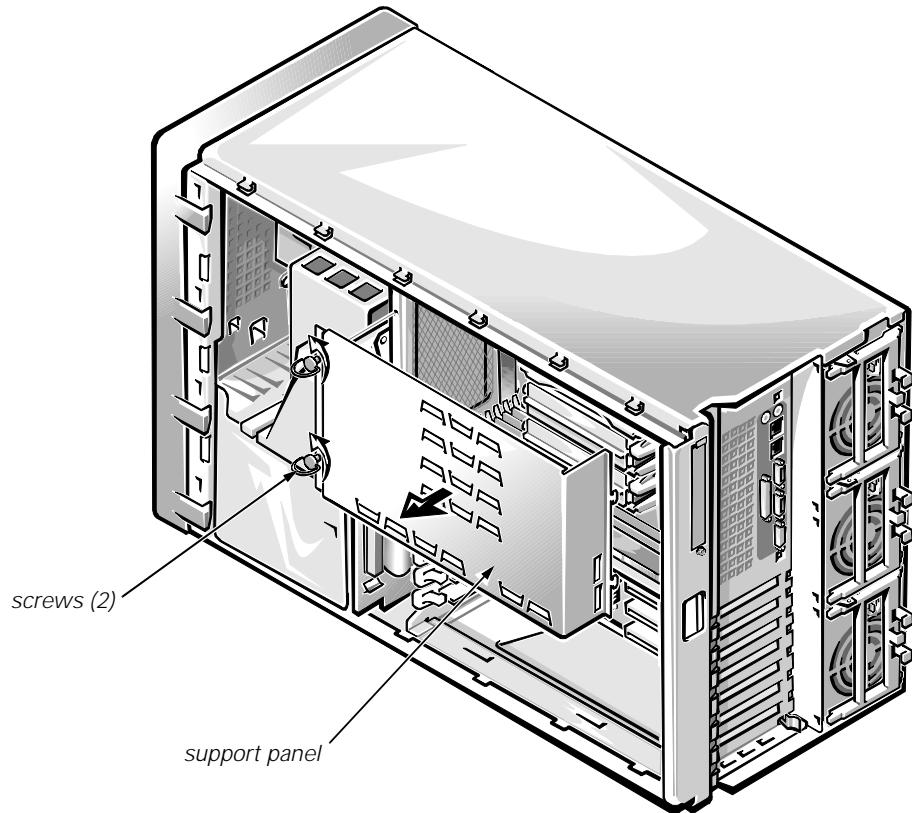


**Figure 4-19. Expansion Card Removal**

5. Release the inner end of the expansion card by pressing outward on the latch at the inner corner of the card.
6. Grasp the expansion card by its corners, and carefully remove it from the expansion-card connector.

To install an expansion card, insert the card firmly into its connector and make sure the securing clips on both ends of the card are in place. Secure the clip on the back of the computer by pressing firmly inward until the release lever on the inside clicks into place.

## **Interior Support Panel**

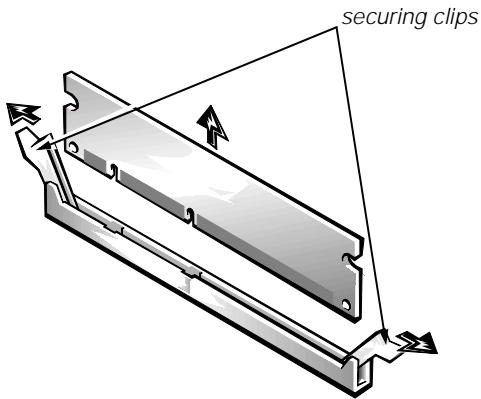


**Figure 4-20. Interior Support Panel Removal**

To access the microprocessors or the memory module, you must remove the interior support panel as follows:

- 1. Loosen the thumbscrews on the left side of the panel (see Figure 4-20).**
- 2. Rotate the panel outward slightly, and lift the hinge side of the panel to clear the tabs from the hinge slot.**

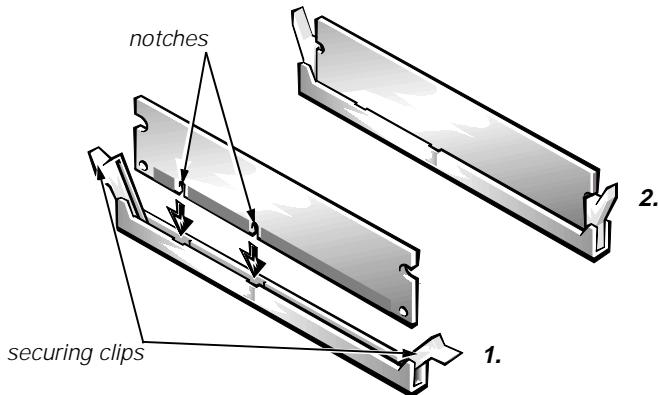
## DIMMs



**Figure 4-21. DIMM Removal**

To remove a DIMM, follow these steps:

- 1. Remove the interior support panel.**
- 2. Remove the memory module by grasping it by the corners and pulling it from its connector.**
- 3. Press outward on the socket's securing clips until the DIMM pops free of the socket (see Figure 4-21).**



**Figure 4-22. DIMM Installation**

To replace a DIMM, press outward on the securing clips until they snap open (step 1 in Figure 4-22). Align the notches in the DIMM to the crossbars in the socket, and press down on the outer edges of the DIMM while pulling up on the securing clips until the clips lock around the ends of the DIMM (step 2 in Figure 4-22).

## **SEC Cartridge and Heat Sink Assembly**

To remove an SEC cartridge and heat sink assembly, follow these steps:

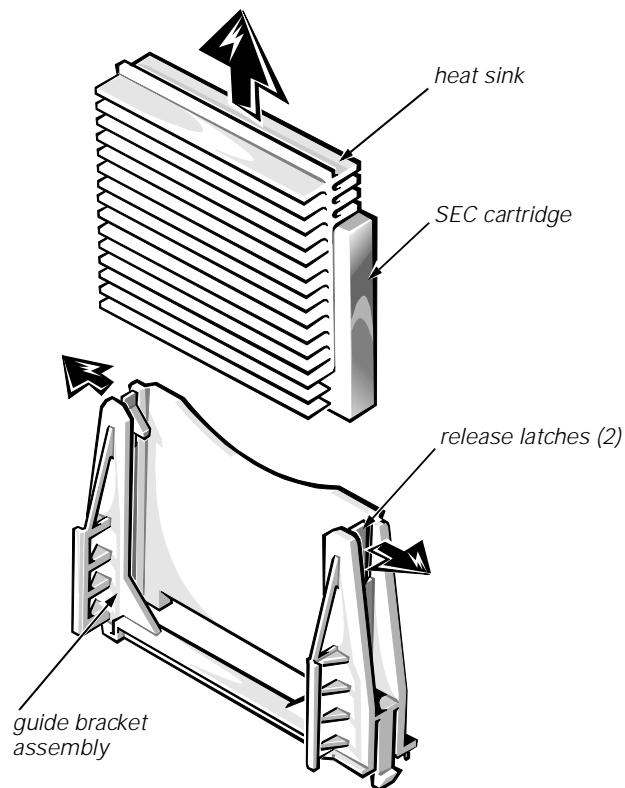


**WARNING: The SEC cartridge and heat sink assembly can get extremely hot during system operations. Be sure that it has had sufficient time to cool before touching it.**



**WARNING: When handling the SEC cartridge and heat sink assembly, take care to avoid sharp edges on the heat sink.**

- 1. For the unit to be removed, press outward on the two SEC cartridge release latches until they snap into the open position (see Figure 4-23).**



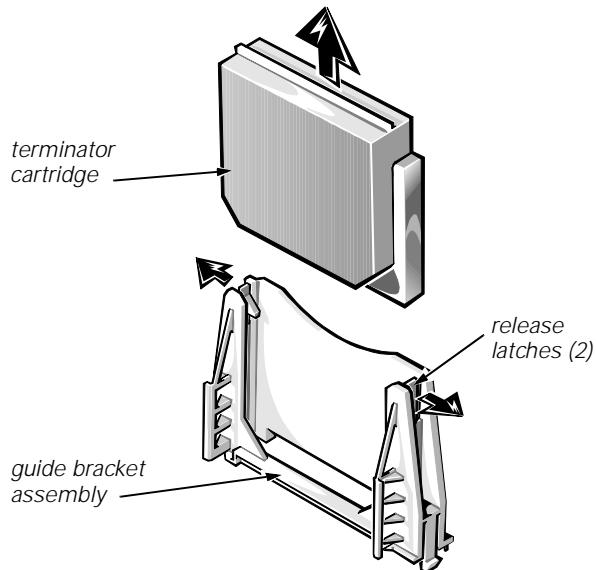
**Figure 4-23. SEC Cartridge Release Latches**

- 2. Pull the SEC cartridge straight up out of the connector and guide bracket assembly (some force may be required).**

To replace an SEC cartridge, make sure the cartridge release latches are in the open position, orient the new SEC cartridge in the guide bracket assembly as shown in Figure 4-23, seat it firmly, and then snap the release latches back into place.

To install an SEC cartridge where there was none before, you will need to remove the installed terminator cartridge (see the next subsection, "Terminator Cartridge").

## **Terminator Cartridge**



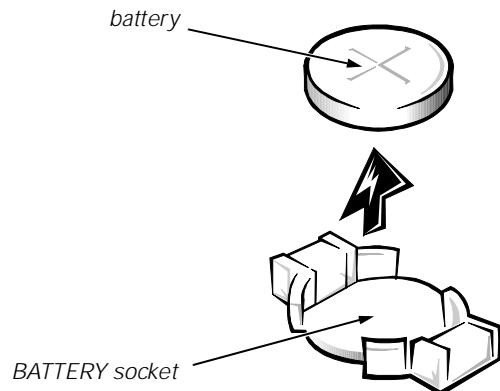
**Figure 4-24. Terminator Cartridge Removal**

To remove a terminator cartridge, follow these steps:

- 1. Remove the interior support panel.**
- 2. Press outward on the two SEC cartridge release latches until they snap into the open position (see Figure 4-24).**
- 3. Pull the terminator cartridge straight up out of the connector and guide bracket assembly (some force may be required).**

To install a terminator cartridge, make sure the cartridge release latches are in the open position, orient the terminator cartridge in the guide bracket assembly as shown in Figure 4-24, seat it firmly, and then snap the release latches back into place.

## System Battery



**Figure 4-25. System Battery Removal**

**WARNING**

**There is a danger of the new battery exploding if incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.**

To remove the system battery, follow these steps:

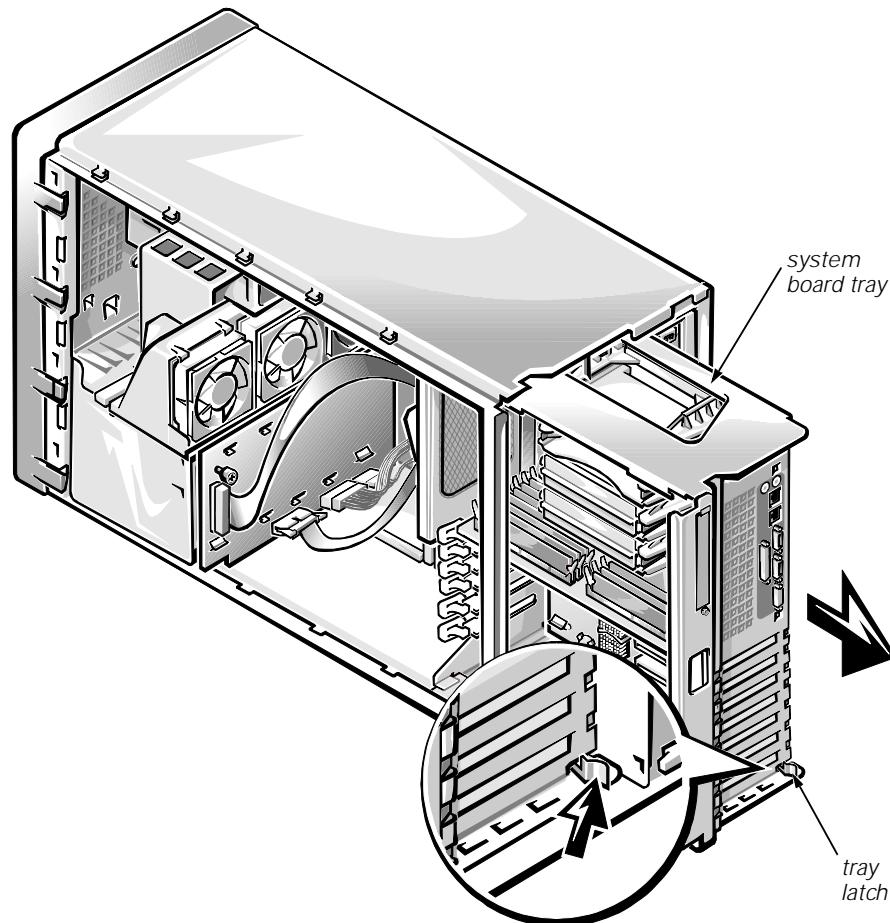
- 1. Before turning off the system, if possible enter the System Setup program and make a printed copy of the System Setup screens (see Appendix A).**
- 2. Remove any expansion cards that block access to the battery.**
- 3. Remove the battery (see Figure 4-25) by prying it out of its socket with your fingers or with a blunt, nonconducting object, such as a plastic screwdriver.**

To replace the system battery, orient the new battery with the "+" facing up. Insert the battery into its socket and snap it into place. After system boot, compare the system configuration information with the copy of the system configuration settings you made in step 1. Restore any system configuration information that was lost while the battery was replaced.



*NOTE: As a result of the power loss while replacing the battery, you may lose portions of the current system firmware. If, after replacing the system battery, you receive the message Warning: Firmware is out-of-date, please update..., reflash the system firmware from the Dell Server Assistant CD (if available) or download it from the Dell website.*

## **System Board Assembly**



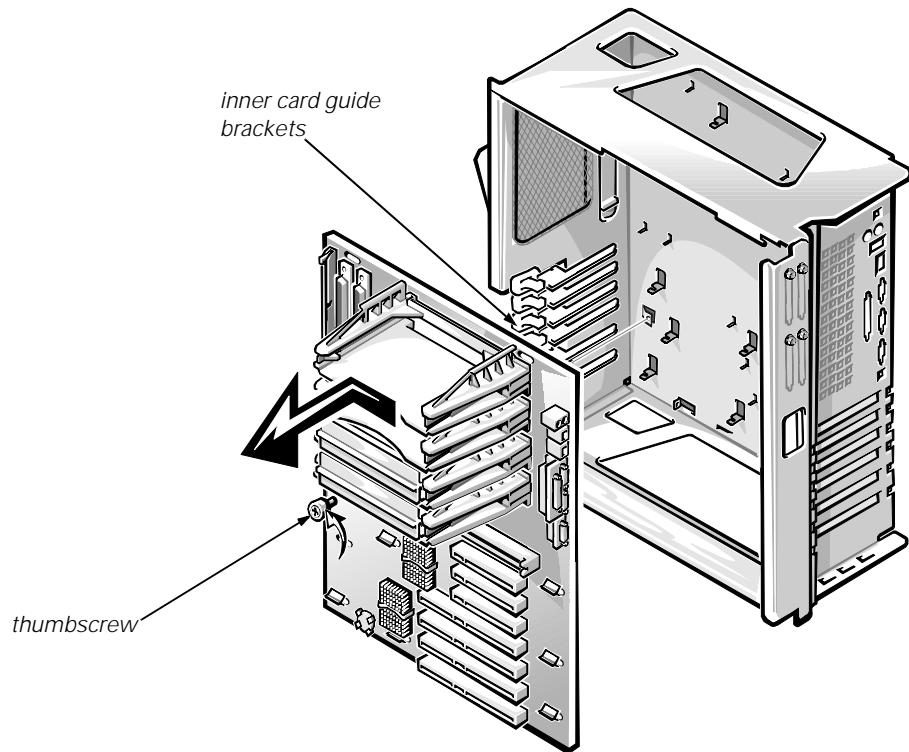
**Figure 4-26. System-Board Assembly Removal**

The system board assembly consists of the system board and a mounting plate. The system board is held to the mounting plate with screws and mounting clips.

To remove the system board assembly follow these steps:

- 1. Disconnect all cables from the system board.**  
Be sure to record where each cable is attached.
- 2. To remove the system board tray, first release the tray latch at the back lower corner of the tray (see Figure 4-26) and pull the tray open to the service position. Then depress the latch again and pull the tray out of the chassis.**

## System Board



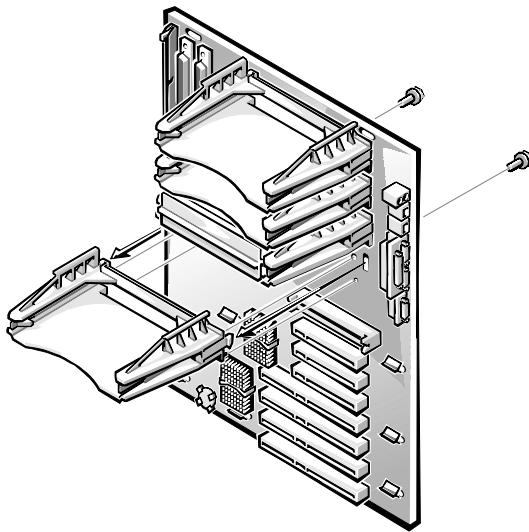
**Figure 4-27. System Board Removal**

To remove the system board from the system board tray, perform the following steps. (If you are replacing the system board, you may want to remove the expansion cards, memory, processors, and processor guides and install them on the replacement system board.)

- 1. Remove the system board assembly (optional).**
- 2. Note the slot numbers of any PCI cards you are migrating to the new system board so that you can install them in the same slots on the new board.**
- 3. Remove the system board components you are migrating to the new system board.**
- 4. Loosen the thumbscrew securing the system board to the tray (see Figure 4-27).**
- 5. Slide the system board to the left as shown in Figure 4-27 (toward the *inner expansion-card guide brackets*) about a half inch to clear the chassis hooks, and remove the board.**

If you are replacing the system board, install any components you removed from the old system board onto the replacement board. To retain the same system configuration and appropriate resource sharing, install PCI expansion cards in the same slots they were in on the old system board. Verify that the jumper settings on the new system board are correct.

## **Guide Bracket Assembly**



**Figure 4-28. Guide-Bracket Assembly Removal**

To remove the guide bracket assembly, follow these steps:

- 1. Remove the system board assembly.**
- 2. Remove the system board from the system board tray.**
- 3. Remove terminator card and SEC cartridge heat sink assemblies if necessary.**
- 4. From the underside of the system board, use a T25 Torx driver to remove the screws at each end of the bracket(s) (see Figure 4-28).**
- 5. For each guide bracket, squeeze the bracket retaining tabs on the underside of the system board to release the bracket, and pull the bracket away from the system board.**



*NOTE: Because of the way the guide brackets overlap each other, the guide bracket assembly must be removed in the following order: PROC\_4 (the bottom bracket when system is standing upright), PROC\_3, PROC\_2, PROC\_1. Reinstall them in reverse order.*



## APPENDIX A

# System Setup Program

This appendix describes the System Setup program, which is used to change the system configuration information stored in NVRAM on the system board. For in-depth information, refer to Chapter 4, "Using the System Setup Program" in the *Dell PowerEdge 6300 Systems User's Guide*.

To enter the System Setup program, follow these steps:

- 1. Turn on (or reboot) the system.**
- 2. Press <F2> immediately after you see the message** Press <F2> for System Setup.

If you wait too long, the operating system begins to load into memory, the message disappears, and you cannot enter the System Setup program. *Let the system complete the load operation*, then shut down the system and try again.



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

## **System Setup Screens**

Figure A-1 illustrates the System Setup program screens, and Table A-1 briefly describes each setup option.

| Dell Computer Corporation (www.dell.com)<br>Page 1 of 2      System PowerEdge 6300/400 Setup      BIOS Version: XXX  |   |
|--|---|
| Time: <input type="text" value="13:17:02"/> Date:Wed Apr 8, 1998<br><br>Diskette Drive A: 3.5 inch, 1.44 MB<br>Diskette Drive B: Not Installed<br><br>Cache: On<br>Num Lock: On<br>Speaker: On<br><br>Processor 1: Revision B0<br>Processor 2: Not Installed<br>Processor 3: Not Installed<br>Processor 4: Not Installed | This category sets the time in 24-hour format (hours:minutes:seconds) for the internal clock/calendar.<br><br>To change the value in a field, enter a number or use the left- or right-arrow key.<br><br>Changes take effect immediately. |
| <p>Pentium® II Processor 400 MHz<br/>Level 2 Cache: 512 KB Integrated<br/>System Memory: 128 MB ECC DRAM<br/>Video Memory: 2 MB SGRAM<br/>Service Tag: XXXXX<br/>Asset Tag: XXXXXXXXXX</p>   |   |
| Tab,Shift-Tab change fields <input type="button" value="←"/> <input type="button" value="→"/> change values Alt-P next Esc exit Alt-B reboot   |   |

| Dell Computer Corporation (www.dell.com)<br>Page 2 of 2      System PowerEdge 6300/400 Setup      BIOS Version: XXX  |  |
|--|--|
| Keyboard Errors: <input type="button" value="Report"/><br>Boot Sequence: Diskette First<br>Scan Sequence: Slots first (H/L)<br>System Password: Not Enabled<br>Password Status: Unlocked<br>Setup Password: Not Enabled<br><br>—— Integrated Devices ——<br>Mouse: On<br>Serial Port 1: Auto<br>Serial Port 2: Auto<br>Parallel Port: 378h<br>Parallel Mode: PS/2<br>Diskette: Auto<br><br>Primary SCSI A: On<br>Primary SCSI B: On<br>Secondary SCSI: On | This category sets whether keyboard-related error messages are reported at system startup. |
| <p>Pentium® II Processor 400 MHz<br/>Level 2 Cache: 512 KB Integrated<br/>System Memory: 128 MB ECC DRAM<br/>Video Memory: 2 MB SGRAM<br/>Service Tag: XXXXX<br/>Asset Tag: XXXXXXXXXX</p>   |  |
| Tab,Shift-Tab change fields <input type="button" value="←"/> <input type="button" value="→"/> change values Alt-P next Esc exit Alt-B reboot   |  |

**Figure A-1. System Setup Screens**

**Table A-1. System Setup Options**

| Option   | Function   |
|--|--|
| Time   | Resets time on computer's internal clock.  |
| Date   | Resets date on computer's internal calendar.   |
| Diskette Drive A<br>Diskette Drive B                     | Identifies type of diskette drives installed.<br>Tape drives are <i>not</i> reflected in these categories.   |
| Cache  | Sets the state of the processor cache to On (default) or Off.  |
| Num Lock   | On 101- and 102-key keyboards, determines whether system boots with Num Lock activated (does not apply to 84-key keyboards).   |
| Speaker  | Determines whether the built-in speaker is On (default) or Off.  |
| Processor 1<br>Processor 2<br>Processor 3<br>Processor 4 | Displays version or stepping number of the microprocessor in each processor slot on the system board.  |
| Keyboard Errors  | Enables or disables reporting of keyboard errors during POST.  |
| Boot Sequence  | Determines whether system boots from diskette (if present) or hard-disk drive.   |
| Scan Sequence  | Determines the order in which the PCI devices are scanned by the system.   |
| System Password  | Displays current status of system's password security feature. Also used to assign and verify a new password.  |
| Password Status  | If set to Locked, prevents the system password from being changed or disabled.<br>Requires that Setup Password category be Enabled.  |
| Setup Password   | Restricts access to System Setup program.  |
| Mouse  | Enables or disables the built-in PS/2-compatible mouse port.   |
| Serial Port 1<br>Serial Port 2                           | Configures system's built-in serial ports. These categories may be set to Auto (default) to automatically configure a port, to a specific designation (COM1 [3F8h] or COM3 [3E8h] for Serial Port 1; COM2 [2F8h] or COM4 [2E8h] for Serial Port 2), or to Off. |
| Parallel Port  | Configures system's built-in parallel port. The port's I/O address may be set to 378h (default), 278h, 3BCh, or to Off to disable the port.  |

**Table A-1. System Setup Options** (continued)

| Option   | Function   |
|--|--|
| Parallel Mode                                      | Controls whether system's built-in parallel port acts as an AT-compatible (unidirectional) or PS/2-compatible (bidirectional) port.  |
| Diskette   | Controls operation of the system's built-in diskette controller.   |
| Primary SCSI A<br>Primary SCSI B<br>Secondary SCSI | Turns the respective SCSI controllers on (default) or off. Selecting On enables a controller and allows scanning of the devices connected to it, allowing the device with the lowest SCSI ID to function as a boot device (unless a boot device has already been detected connected to an enabled controller higher in the scan sequence). Selecting OFF causes the BIOS to mask the presence of a controller. |
| Processor field                                    | Displays microprocessor type and speed.  |
| Level 2 Cache                                      | Displays size of integrated cache.   |
| System Memory                                      | Displays entire amount of installed memory detected in system, except for memory on EMS expansion cards.   |
| Video Memory                                       | Displays amount of video memory detected.  |
| Service Tag  | Displays system's five-character service tag number.   |
| Asset Tag  | Displays the asset tag number up to ten characters if one is assigned.   |



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P/N 33697