



Dell® PowerEdge® 2300 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 *Installation 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***

The Dell® PowerEdge® 2300 systems are high-speed, upgradable, server systems that use the Intel® Pentium® II family of microprocessors with MMX™ technology. PowerEdge 2300 systems incorporate the high-performance PCI local bus as well as the ISA expansion bus.

The systems have been designed for better serviceability and increased reliability. The PowerEdge 2300 systems are freestanding or can be rackmounted for integrating your servers. The microprocessor(s) are mounted in modules on the system board, which allows for greater heat dissipation. Contact Dell for information about Dell-supported microprocessor upgrades.

PowerEdge 2300 systems can have one or two Pentium II microprocessors. The microprocessor contains a built-in clock multiplier circuit, which increases the internal operating frequency to a multiple of the system clock frequency. The microprocessor has an internal operating frequency of 333 MHz and an external operating frequency of 66 MHz, or an internal operating frequency of 350 or 400 MHz and an external operating frequency of 100 MHz.

### ***System Features***

In addition to the standard features found in a traditional personal computer, Dell PowerEdge 2300 systems include the following new and/or advanced features:

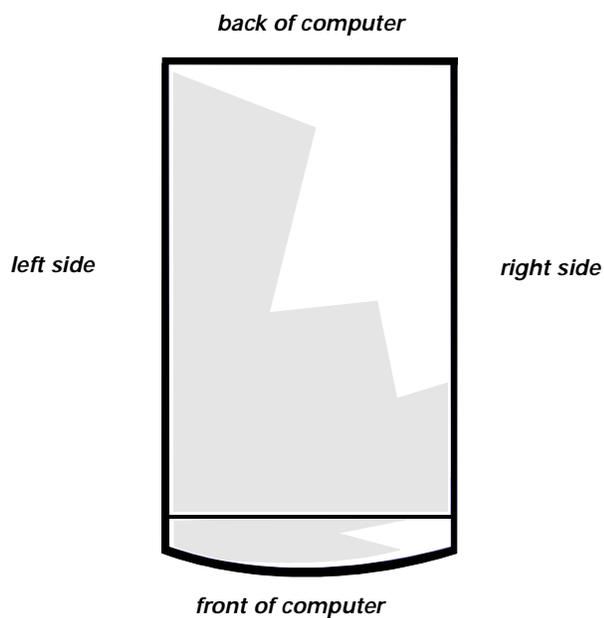
- 512 KB of L2 cache memory internal to each Pentium II microprocessor module
- 64 MB of 72-bit-wide, unbuffered, main memory, upgradable to 512 MB or to 1 GB using 256-MB registered SDRAM DIMMs
- Memory ECC feature built into the memory controller on the system board
- Advanced combination ISA and PCI expansion subsystems
- Four PCI and two combination ISA and PCI expansion-card slots
- Integrated VGA-compatible AGP video subsystem with 2 MB of SGRAM standard
- BIOS in upgradable flash memory attached to the ISA bus
- Integrated super I/O controller, attached to the ISA bus, that controls a bidirectional parallel port, two serial ports, and the diskette drive interface

- Integrated Ultra2/LVD SCSI controller that supports up to six hard-disk drives via a backplane board and special drive carriers
- Hot-pluggable hard-disk drive installation and removal when a PowerEdge Expandable RAID Controller host adapter card and a hot-pluggable backplane board are installed.
- Integrated Ultra/Narrow SCSI controller that supports up to three devices in the external drive bays
- Integrated server management circuitry that monitors operation of the system cooling fan, as well as critical system voltages and temperatures
- Front-panel drive failure and system fault indicators

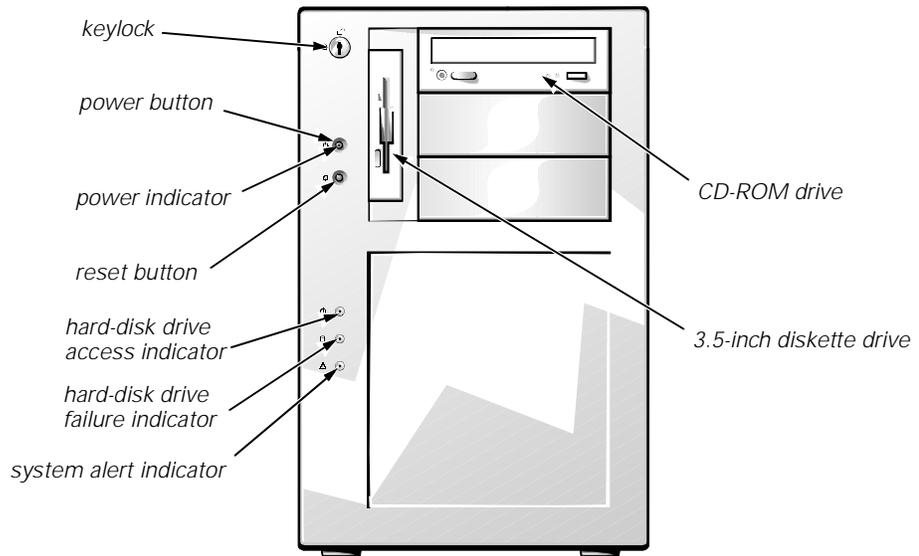
For a complete list of system features, see “Technical Specifications” found later in this chapter.

For information about installing the PowerEdge 2300 systems in a rack, see the *Dell PowerEdge 2300 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 2300 systems.



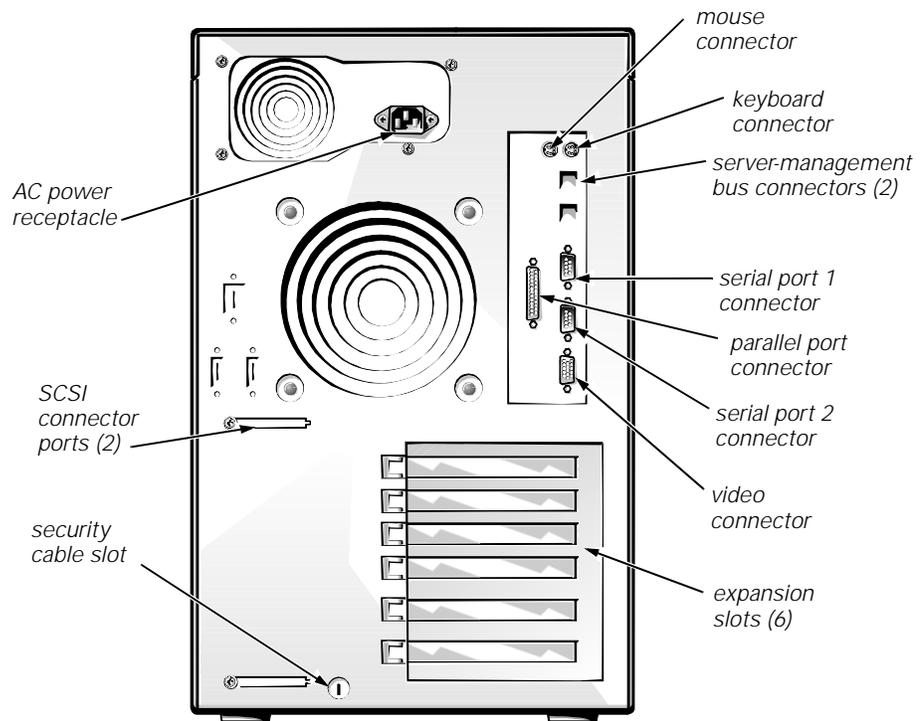
**Figure 1-1. Computer Orientation**



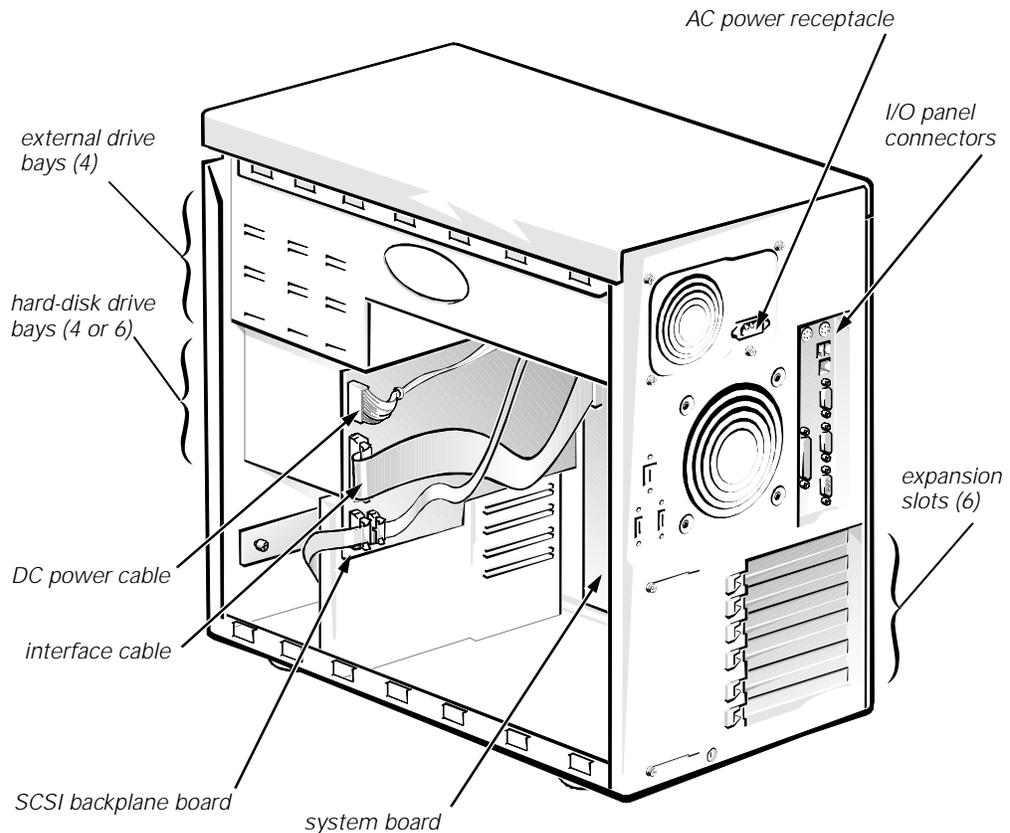
**Figure 1-2. Front-Panel Features**



**CAUTION:** To avoid possible data or file structure corruptions, the reset button should be used only when the system cannot be rebooted by pressing <Ctrl><Alt><Del>. Before you use the reset button to initiate a hardware reset, close any open applications and files if possible.



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



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

## System Memory

System memory has a minimum of 64 MB of 72-bit-wide, unbuffered memory. The system memory capacity can be expanded up to 1 GB by using combinations of 64- and 128-MB unbuffered SDRAM DIMMs or 256-MB registered SDRAM DIMMs.



*NOTE: DIMMs must be rated to run at 100 MHz.*

The system board has four 168-pin DIMM sockets. The DIMMs do not have to be inserted in pairs. The socket population guidelines are as follows:

- Populate the DIMM sockets in order from DIMM\_A (upper) to DIMM\_D (lower).
- The largest-capacity DIMM should be in socket DIMM\_A, with smaller-capacity DIMMs installed in decreasing sizes toward socket DIMM\_D.
- Unbuffered and registered DIMMs *cannot* be mixed. Remove any 64- or 128-MB unbuffered DIMMs before installing 256-MB registered DIMMs.

The 72-bit-wide, unbuffered DIMMs support the ECC feature, which detects memory errors and corrects single-bit memory errors. The ECC feature provides more reliable memory and less downtime. The ECC feature is built into the memory controller on the system board.

For more detailed information about DIMM installation guidelines and samples of DIMM configurations, see “Adding Memory” in Chapter 8 of the *Dell PowerEdge 2300 Systems Installation and Troubleshooting Guide*.

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

## **Advanced Expansion Subsystem**

The computer system offers advanced expansion subsystems that can support a mixture of traditional ISA expansion cards, Plug and Play ISA expansion cards, and PCI expansion cards. The Resource Configuration Utility (RCU) included with the system provides a means of avoiding resource conflicts that might arise from such an arrangement.

After all legacy cards have been configured with the RCU, the system automatically assigns any required memory space, IRQ lines, and DMA channels to any installed Plug and Play ISA expansion cards and PCI expansion cards the next time the system is rebooted. Chapter 5, “Using the Resource Configuration Utility,” in the *Dell PowerEdge 2300 Systems User’s Guide* describes the RCU and provides instructions for using it to configure the system.

The six expansion-card slots include six PCI expansion-card connectors and two ISA expansion-card connectors. Two of the PCI connectors share expansion-card slots with the two ISA connectors. The expansion-card connectors are located on the system board (see Figure 1-10).

## **Integrated Server Management**

Integrated server-management circuitry monitors operation of the system fans as well as critical system voltages and temperatures. The integrated server-management circuitry works in conjunction with the HP OpenView Network Node Manager Special Edition (NNM SE) and the Dell Hardware Instrumentation Package (HIP) software package.

## **Video Controller**

The video subsystem is built into the system board and consists of an AGP 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**

An integrated Adaptec AIC-7890 Ultra2/LVD SCSI host adapter supports up to six 1-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 2300 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.

Three SCSI backplane board options (see Figures 1-11 through 1-13) include a non-hot-pluggable 2 x 2 backplane, non-hot-pluggable 2 x 3 backplane, and hot-pluggable 1 x 6 backplane boards. The hot-pluggable 1 x 6 backplane board supports hot-pluggable SCSI hard-disk drive installation and removal.



*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 on-board 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 2300 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.

## System Power Supply

The 300-W system power supply can operate from an AC power source of 115 VAC at 60 Hz or 230 VAC at 50 Hz. The system power supply provides the DC operating voltages and currents listed in Table 1-1.



*NOTE: The power supply produces DC voltages only under its loaded condition. Therefore, when you measure these voltages, the DC power connectors must be connected to their corresponding power input connectors on the system board or drives.*

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

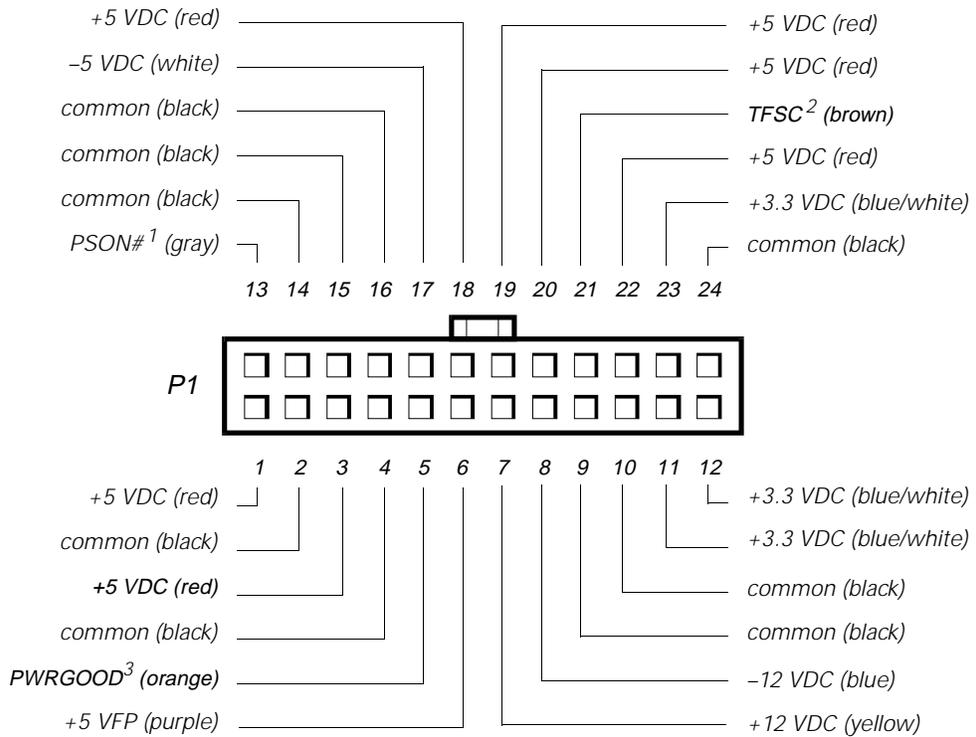
Voltage	Range	Maximum Output Current <sup>1</sup>
+3.3 VDC	+3.15 to +3.45 VDC	18.0 A
+5 VDC	+4.75 to +5.25 VDC	35.0 A
+12 VDC	+11.40 to +12.60 VDC	14.0 A
-12 VDC	-10.80 to -13.20 VDC	0.3 A
-5 VDC	-4.50 to -5.50 VDC	0.3 A
+5 VFP <sup>2</sup>	+4.75 to +5.25 VDC	1.2 A

<sup>1</sup> Maximum continuous DC output power should not exceed 300 W. Maximum combined load on +5 VDC and +3.3 VDC cannot exceed 200 W.

<sup>2</sup> VFP (volts flea power) — sometimes called “standby power.”

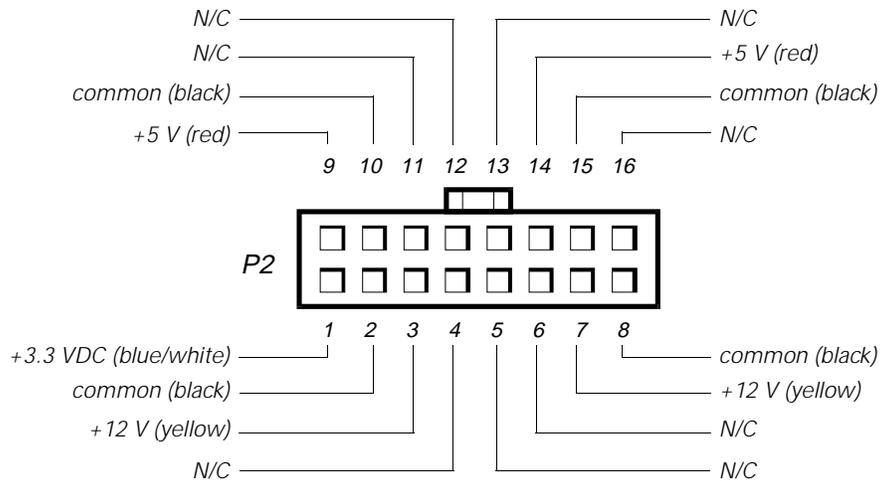
### Pin Assignments for the DC Power Connectors

The power-supply output voltages can be measured at the back (wire side) of the connectors without disconnecting them. Figures 1-5, 1-6, and 1-7 show the wire side of the connectors.

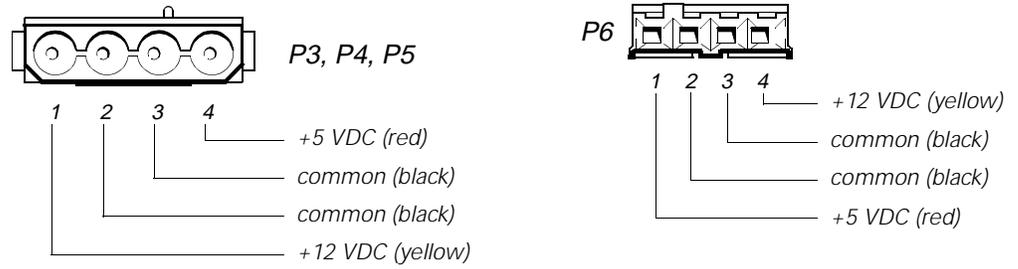


- <sup>1</sup> Pin 13 — PSON# should measure between +4 and +5 VDC except when the power button on the front panel is pressed, taking PSON# to its active-low state.
- <sup>2</sup> Pin 21 — Thermal fan-speed control (TFSC) is a power-supply input signal used to control power-supply fan speed in special applications.
- <sup>3</sup> Pin 5 — PWRGOOD should measure +3.3 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 1-5. DC Power Connector P1**



**Figure 1-6. DC Power Connector P2**

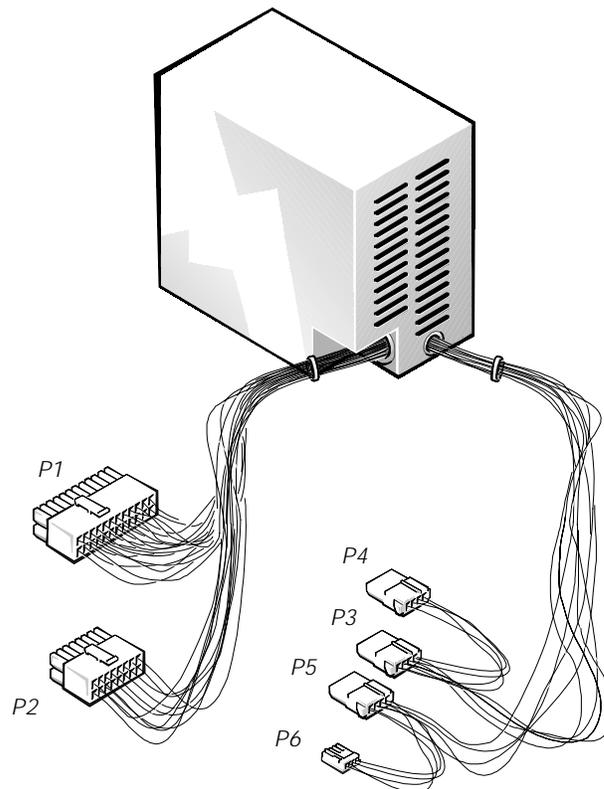


**Figure 1-7. DC Power Connectors P3, P4, P5, and P6**

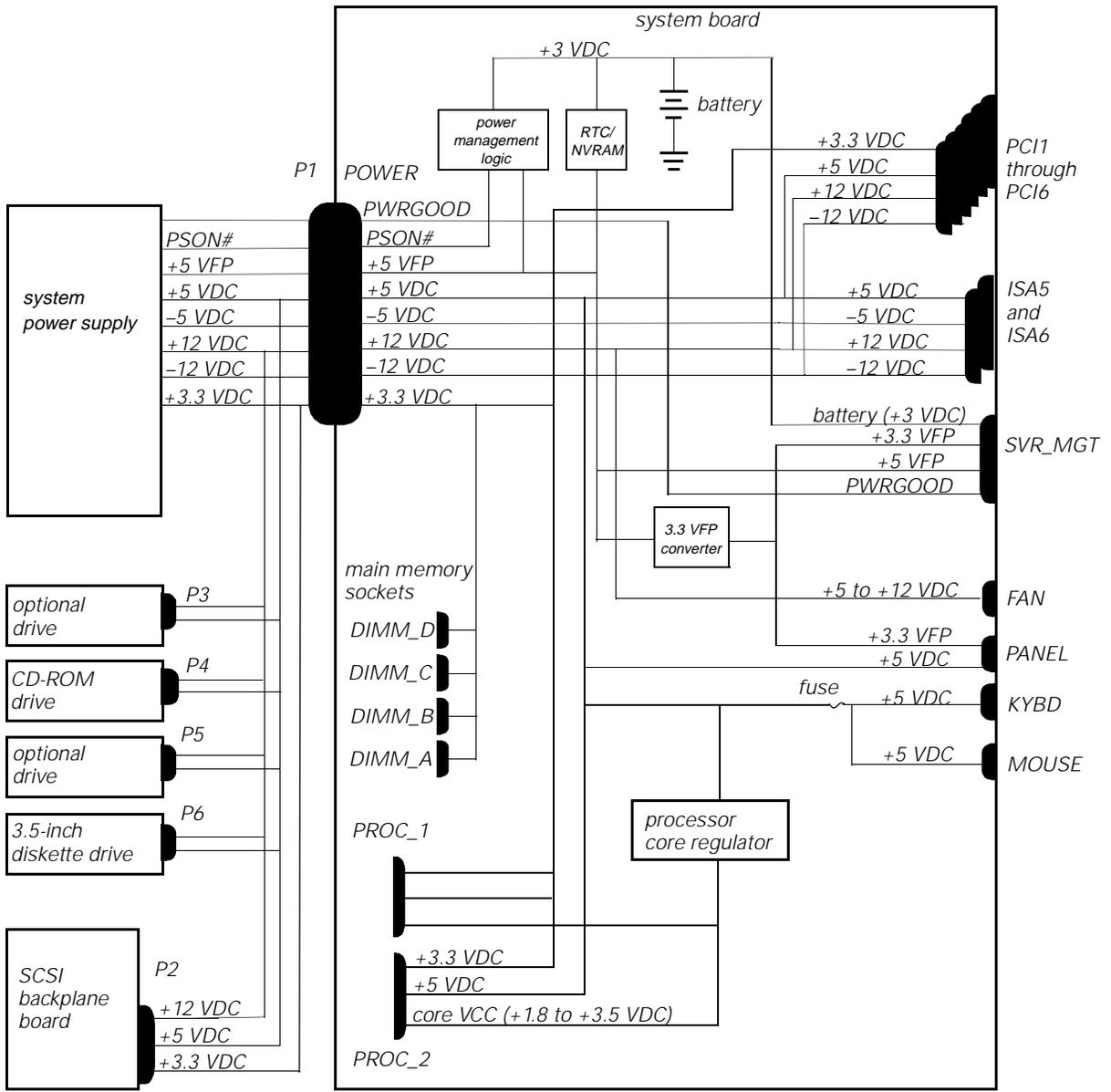
### DC Power Distribution

Figures 1-8 and 1-9 provide the following information about DC power distribution:

- Power-supply connector identification
- Power cable connections for drives and the SCSI backplane board
- Power distribution to sockets and connectors on the system board



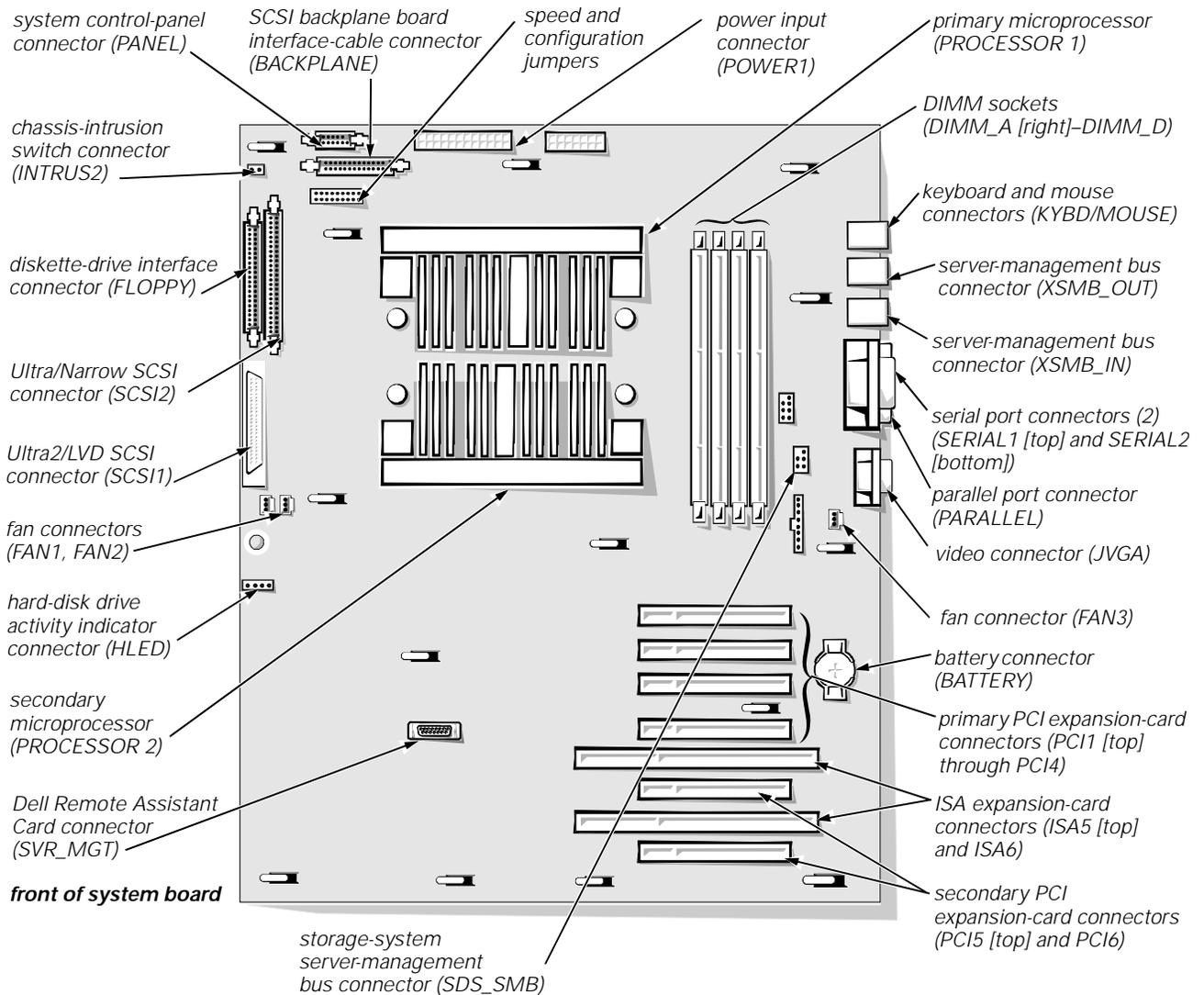
**Figure 1-8. DC Power Cables**



**Figure 1-9. DC Power Distribution**

# System Board Layout

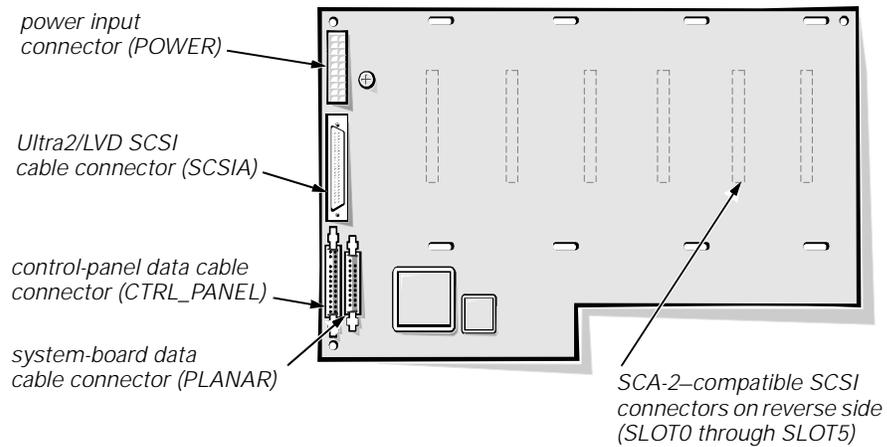
The subsections that follow provide service-related information about the system board components. Figure 1-10 illustrates the location of important system board components



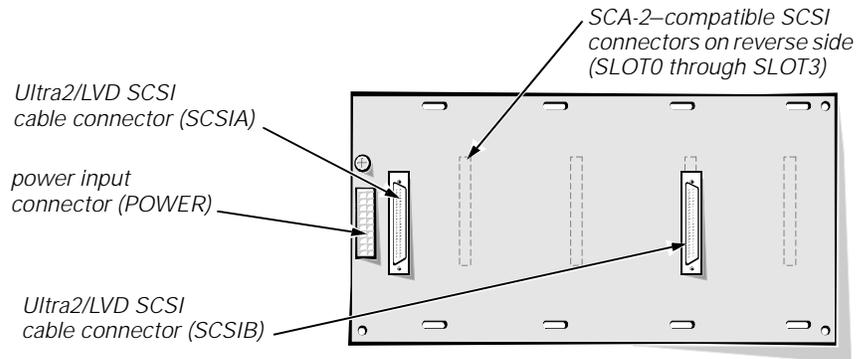
**Figure 1-10. System Board Components**

## SCSI Backplane Board Layouts

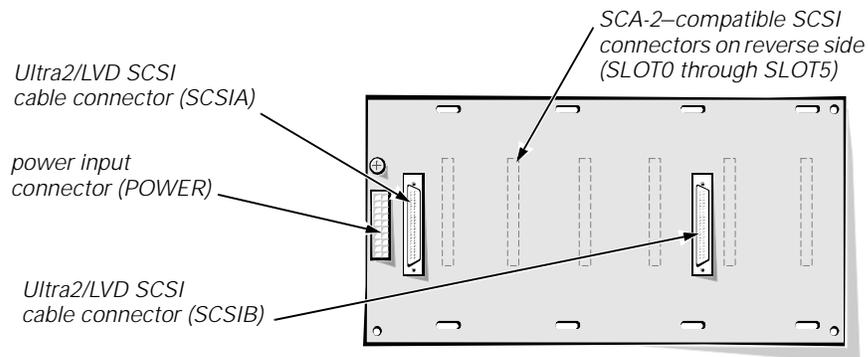
Figure 1-11 shows the location of the connectors on the 1 x 6 hot-pluggable SCSI backplane board. Figures 1-12 and 1-13 show the location of the connectors on the two non-hot-pluggable SCSI backplane boards.



**Figure 1-11. 1 x 6 Hot-Pluggable SCSI Backplane Board**



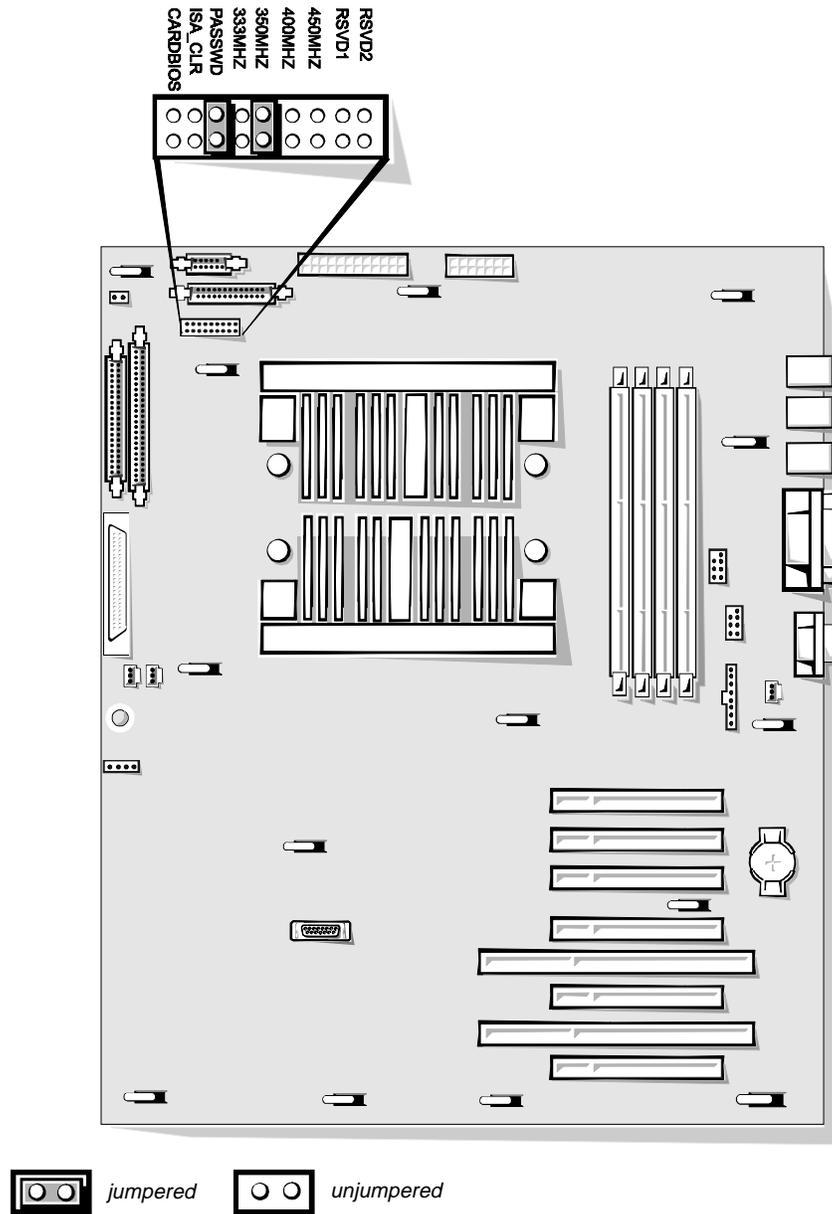
**Figure 1-12. 2 x 2 Non-Hot-Pluggable SCSI Backplane Board**



**Figure 1-13. 2 x 3 Non-Hot-Pluggable SCSI Backplane Board**

## System Board Jumpers

Figure 1-14 illustrates the location of the system board jumpers, and Table 1-2 describes the jumper settings.



**Figure 1-14. System Board Jumpers**

**Table 1-2. Jumper Descriptions**

<b>Jumper</b>	<b>Settings</b>
RSVD2	Do <i>not</i> install. Reserved for future microprocessor speed.
RSVD1	Do <i>not</i> install. Reserved for future microprocessor speed.
450MHZ	Installed only if the microprocessor's internal speed is 450 MHz.
400MHZ	Installed only if the microprocessor's internal speed is 400 MHz.
350MHZ	Installed only if the microprocessor's internal speed is 350 MHz.
333MHZ	Installed only if the microprocessor's internal speed is 333 MHz.
PASSWD	Installed (default) to enable the password features. Remove the jumper and boot the computer to remove an existing password.
ISA_CLR	When <i>not</i> installed (default), the ISA configuration settings are retained at system boot. Install the jumper and boot the computer to clear the ISA configuration settings. Then remove the jumper and use the Resource Configuration Utility to configure the system.
CARDBIOS	<i>Not</i> installed (default) to allow normal boot operation from the system BIOS. Install the jumper only to boot the system from a BIOS expansion card.

## **Interrupt Assignments**

Table 1-3 lists the default IRQ line assignments.

**Table 1-3. Interrupt Assignments**

<b>IRQ Line</b>	<b>Used/Available</b>
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

**Table 1-3. Interrupt Assignments** (continued)

<b>IRQ Line</b>	<b>Used/Available</b>
IRQ9	Used for power management functions
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 1-4 lists the default DMA channel assignments.

**Table 1-4. DREQ Line Assignments**

<b>DREQ Line</b>	<b>Used By/Available</b>
DREQ0	Available
DREQ1	Available
DREQ2	Generated by super I/O controller to initiate DMA cycle for attached diskette drive
DREQ3	Available
DREQ4	Generated by bus controller chip to activate second DMA controller
DREQ5	Available
DREQ6	Available
DREQ7	Available

# Technical Specifications

Table 1-5 lists detailed technical specifications.

**Table 1-5. Technical Specifications**

<b>Microprocessor</b>	
Microprocessor type . . . . .	single- or dual-Pentium II microprocessor
Microprocessor speed . . . . .	333 MHz (66 MHz externally); 350 MHz (100 MHz externally); 400 MHz (100 MHz externally)
Internal cache . . . . .	512-KB L2 cache
Math coprocessor . . . . .	internal to the microprocessor
<b>System Information</b>	
System chip set . . . . .	Intel 443BX controller chip set
Data bus width . . . . .	64 bits
Address bus width . . . . .	32 bits
<b>Expansion Bus</b>	
Bus types . . . . .	ISA, PCI, AGP local bus
Bus speed . . . . .	AGP: 66.67 MHz PCI: 33.33 MHz ISA: 8.33 MHz
PCI expansion-card connectors . . . . .	two full-length and two half-length dedicated, and two full-length, shared expansion-card slots
ISA expansion-card connectors	two shared full-length
<b>System Clocks</b>	
System clock . . . . .	66 MHz or 100 MHz (matches external processor speed)
Diskette/communications ports . . . . .	48 MHz from the system clock
SCSI channel . . . . .	40 MHz

**Table 1-5. Technical Specifications** (continued)

<b>Memory</b>	
Architecture . . . . .	72-bit (64 data bits plus 8 ECC bits), unbuffered SDRAM DIMMs or registered SDRAM DIMMs. DIMMs must be rated for 100-MHz operation.
DIMM sockets . . . . .	four 168-pin sockets
DIMM capacities . . . . .	64 and 128 MB (unbuffered); 256 MB (registered)
Standard RAM . . . . .	64 MB (minimum)
Maximum RAM . . . . .	1 GB
BIOS address . . . . .	F000:0000h–F000:FFFFh
External cache . . . . .	none
<b>Integrated SCSI Controllers</b>	
Types . . . . .	Adaptec AIC-7890 Ultra2/LVD (Fast-40) controller, with integrated 68-pin SCSI connector 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
Internally accessible bays . . . . .	four or 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

**Table 1-5. Technical Specifications** (continued)

<b>Ports</b> (continued)	
Internally accessible:	
Ultra2/LVD SCSI controller	68-pin connector
Ultra/Narrow SCSI controller	50-pin connector
Diskette drive . . . . .	34-pin connector
Storage-system server-management bus connector	6-pin header connector
<b>Controls and Indicators</b>	
Reset control . . . . .	push button
Power control . . . . .	push button
Power indicator . . . . .	green LED
Hard-disk drive access indicator	green LED
Hard-disk drive failure indicator	amber LED
System alert indicator . . . . .	amber LED
<b>Video</b>	
Video type . . . . .	ATI 3D RAGE PRO AGP video controller with integrated VGA connector
Video memory (standard) . . . . .	2 MB (not upgradable)
<b>Power</b>	
DC power supply:	
Wattage . . . . .	300 W
Voltage . . . . .	115 V at 60 Hz; 230 V at 50 Hz
Backup battery . . . . .	3.0-V CR2032 lithium coin cell
<b>Physical</b>	
Height . . . . .	43.9 cm (17.3 inches)
Width . . . . .	26.1 cm (10.3 inches)
Depth . . . . .	59.2 cm (23.3 inches)
Weight (maximum) . . . . .	25.0 kg (55.0 lb)

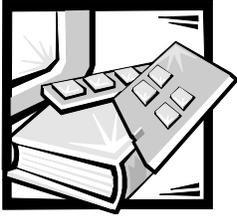
**Table 1-5. Technical Specifications** (continued)

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<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 . . . . .	half-sine wave form: 50 G for 2 ms
Storage . . . . .	half-sine wave form: 110 G for 2 ms; square wave form: 27 G for 15 ms
Altitude:	
Operating . . . . .	-16 to 3048 m (-50 to 10,000 ft)
Storage . . . . .	-16 to 10,600 m (-50 to 35,000 ft)

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## 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 System Diagnostics" found later in this chapter. Dell recommends that you perform the following procedures in the order they are presented in this manual.

### **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 (JVGA) 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.



*NOTE: 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 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 the 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 supply. If the troubleshooting procedure indicates that the system power supply is 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



**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 Covers" 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.**



**WARNINGS:** 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.

**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 reseal the SEC cartridge and heat sink assembly(ies), remove and re-install it as described in "SEC Cartridge and Heat Sink Assembly" in Chapter 4.

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

If you need to reseal 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 "Creating 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.

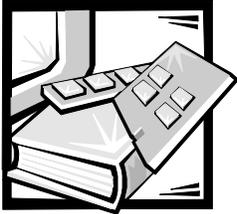
Starting the diagnostics causes the Dell logo screen to appear on the monitor screen, followed by a message indicating that the diagnostics is loading. Before the diagnostics loads, a program tests the portion of main memory (RAM) required for loading the diagnostics. If a RAM error is detected, a message 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, 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 “Running the Dell Diagnostics” in Chapter 2.

### **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. POST 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 replace 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	

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

<b>Code</b>	<b>Cause</b>	<b>Corrective Action</b>
1-3-1	Main-memory refresh verification failure	Remove and reseal the DIMMs. If the problem persists, replace the system board.
1-3-2	No memory installed	Remove and reseal 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 reseal 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	
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.

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

<b>Code</b>	<b>Cause</b>	<b>Corrective Action</b>
3-3-2	System configuration check failure	Replace the system board.
3-3-3	Keyboard controller not detected	
3-3-4	Screen initialization failure	Run the Video Test Group in the Dell Diagnostics.
3-4-1	Screen-retrace test failure	
3-4-2	Search for video ROM failure	
4-2-1	No timer tick	Replace the system board.
4-2-2	Shutdown failure	
4-2-3	Gate A20 failure	
4-2-4	Unexpected interrupt in protected mode	Ensure that all expansion cards are properly seated, and then reboot the system.
4-3-1	Improperly seated or faulty DIMMs	Remove and reseat the DIMMs. If the problem persists, replace the DIMMs.
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	Super I/O controller failure (defective system board)	Replace the system board.
4-4-2	Parallel-port test failure (defective system board)	
4-4-3	Math coprocessor failure (defective microprocessor)	Replace the microprocessor.
4-4-4	Cache test failure (defective 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-drive subsystem or hard-disk drive subsystem (defective system board)	Replace the system board.
Alert! Unbuffered and registered DIMMs cannot be mixed	Combination of unbuffered and registered DIMMs installed	Replace one or more DIMMs so that all DIMMs are the same type.
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-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	One or more DIMMs improperly seated or faulty	Remove and reseat the DIMMs. If the problem persists, replace the DIMMs.

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

<b>Message</b>	<b>Cause</b>	<b>Corrective Action</b>
Diskette drive 0 seek failure	Faulty or improperly inserted diskette, incorrect configuration settings in System Setup program, loose diskette-drive interface cable, or loose power cable	Replace the diskette. Run the System Setup program to correct the diskette drive type. Check the diskette-drive interface cable and power cable connections to the drive.
Diskette drive 1 seek failure	Faulty diskette, faulty or improperly connected diskette-drive interface cable, or loose power cable	Check the diskette-drive interface cable and power cable connections to the drive. Replace the diskette-drive interface cable.
Diskette subsystem reset failed	Faulty diskette-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.
Embedded server management error	Embedded server-management memory may be temporarily corrupted	Shut down the system to clear the memory, and then restart the system.
Embedded server management is not present		
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	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 hard-disk drive configuration settings in the System Setup program. Reinstall the hard-disk drive. Check the interface cable and power cable connections to the backplane board.
Hard disk drive read failure		
Hard disk failure		

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

<b>Message</b>	<b>Cause</b>	<b>Corrective Action</b>
I/O parity interrupt at address	Expansion card improperly installed or faulty	Reinstall the expansion cards. If the problem persists, replace the expansion card.
Invalid configuration - 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 configuration settings in the System Setup program. 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 Resource Configuration Utility	No action is required.
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 failure		
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		

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

<b>Message</b>	<b>Cause</b>	<b>Corrective Action</b>
Memory address line failure at <i>address</i> , read <i>value</i> expecting <i>value</i>	Faulty or improperly seated DIMMs or defective system board	Remove and reseal the DIMMs. If the problem persists, replace the DIMMs. If the problem still persists, replace the system board.
Memory double word logic failure at <i>address</i> , read <i>value</i> expecting <i>value</i>		
Memory odd/even logic failure at <i>address</i> , read <i>value</i> expecting <i>value</i>		
Memory write/read failure at <i>address</i> , read <i>value</i> expecting <i>value</i>		
Memory allocation error	Faulty application	Restart the application.
Memory parity interrupt at <i>address</i>	Improperly seated or faulty DIMMs	Remove and reseal the DIMMs. If the problem persists, replace the DIMMs.
Memory tests terminated by keystroke	POST memory test terminated by pressing the <Spacebar>	No action is required.
No boot device available	Faulty diskette, diskette-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 in System Setup program, or no operating system on hard-disk drive	Check the hard-disk drive configuration settings in the System Setup program.
No timer tick interrupt	Defective system board	Replace the system board.

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

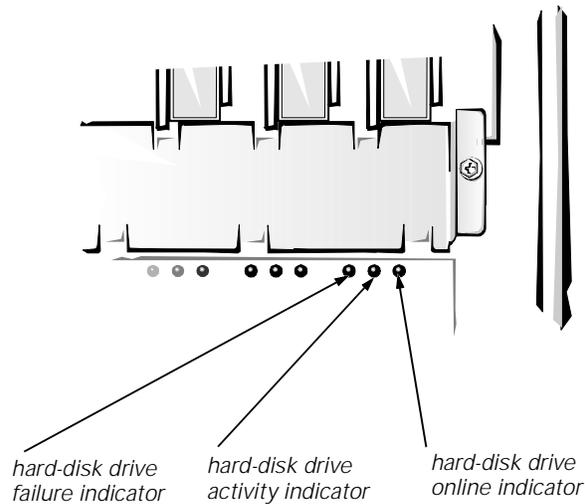
<b>Message</b>	<b>Cause</b>	<b>Corrective Action</b>
Non-system disk or disk error	Faulty diskette, diskette-drive subsystem, or hard-disk drive subsystem	Replace the diskette or hard-disk drive. If the problem persists, replace the system board.
Not a boot diskette	No operating system on diskette	Use a bootable diskette.
Processor or terminator card not installed!	No microprocessor or terminator card installed in secondary microprocessor connector	Install a terminator card or microprocessor in the secondary microprocessor connector.
Read fault Requested sector not found	Faulty diskette, diskette-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.
Reset failed	Improperly connected diskette-drive, hard-disk drive, or power cable	Check the diskette-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 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 system board	Replace the system board.
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 in the System Setup program or defective system battery	Check the Time and Date settings in the System Setup program. If the problem persists, replace the battery.

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

<b>Message</b>	<b>Cause</b>	<b>Corrective Action</b>
Timer chip counter 2 failed	Defective system board	Replace the system board.
Unexpected interrupt in protected mode	Improperly seated DIMMs or faulty keyboard/mouse controller chip (defective system board)	Remove and reseal the DIMMs. If the problem persists, replace the DIMMs. 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.
Write fault  Write fault on selected drive	Faulty diskette or hard-disk drive	Replace the diskette or hard-disk drive.

## SCSI Hard-Disk Drive Indicator Codes

If a 1 x 6 hot-pluggable SCSI backplane board is installed in the computer, three LED indicators adjacent to each of the six SCSI hard-disk drive bays 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 3-3 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 3-3. 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’s front bezel and right side cover.
- You can replace or reinstall a part by performing the removal procedure in reverse order unless additional information is provided.

### ***Recommended Tools***

Most of the procedures in this chapter require the use of one or more of the following tools:

- Small flat-blade screwdriver
- Wide flat-blade screwdriver
- #1 and #2 Phillips screwdrivers
- 1/4-inch nutdriver
- Tweezers or long-nose pliers

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.



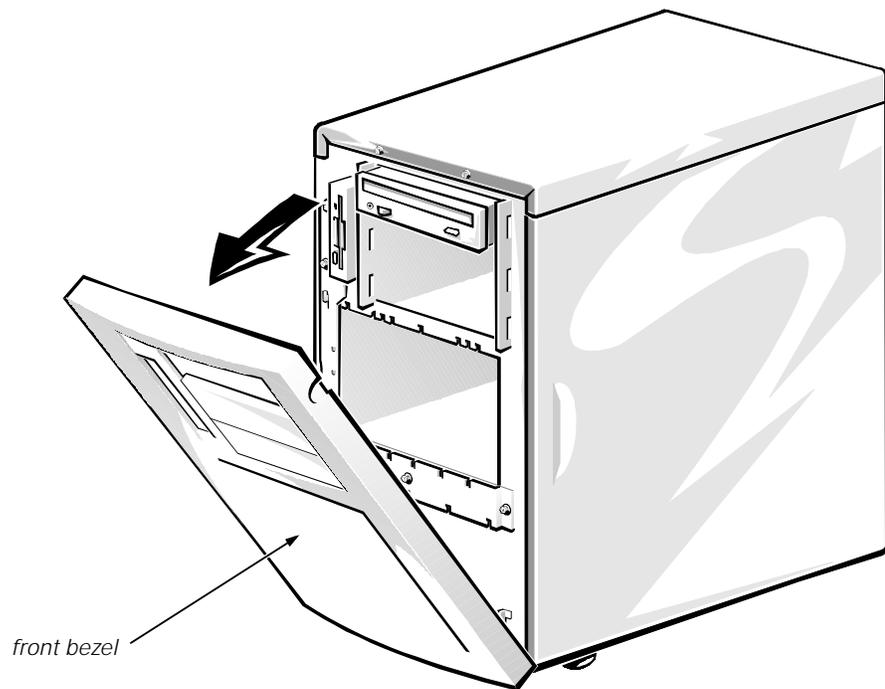
### **WARNING FOR YOUR PERSONAL SAFETY AND PROTECTION OF THE EQUIPMENT**

**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.

## Front Bezel



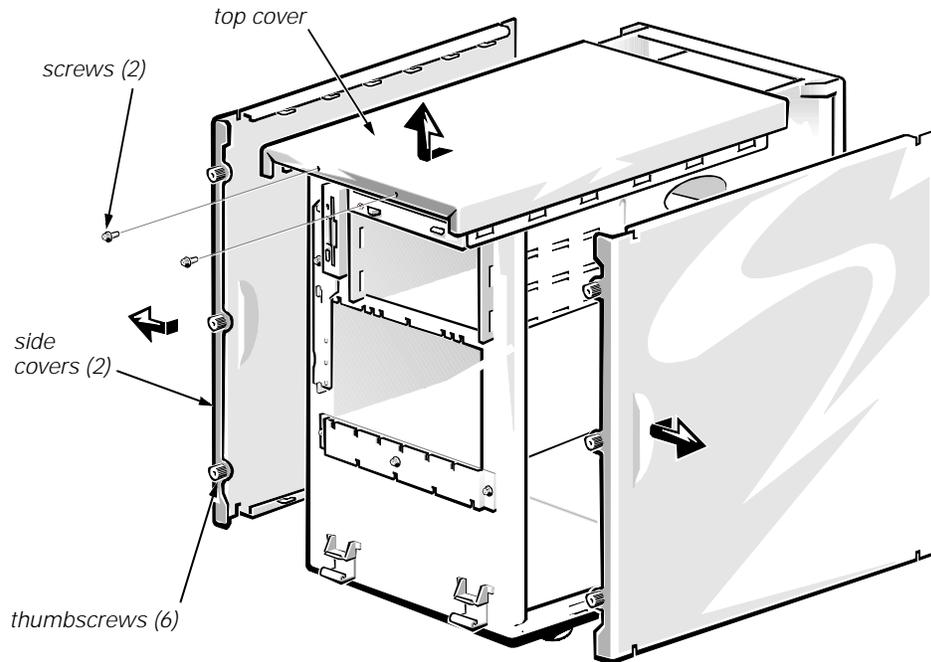
**Figure 4-1. Front-Bezel Removal**

To remove the front bezel, follow these steps:

- 1. Turn the keylock to the unlocked position.**
- 2. Grasp the bezel on either side of the external drive bays and pull it slightly away from the chassis to release the two detents on the back of the bezel.**
- 3. Pivot the bezel downwards (see Figure 4-1) until it is at right angles to the computer chassis.**
- 4. Grasp the bezel along the edge adjacent to the computer chassis, and unsnap the bezel to remove it from the chassis.**

To replace the bezel, make sure that the keylock is in the unlocked position. Then snap the tabs at the inside bottom of the computer bezel into the metal catches on the chassis, and pivot the bezel upward into the closed position.

# Computer Covers



**Figure 4-2. Computer Cover Removal**

To remove a side cover, follow these steps:

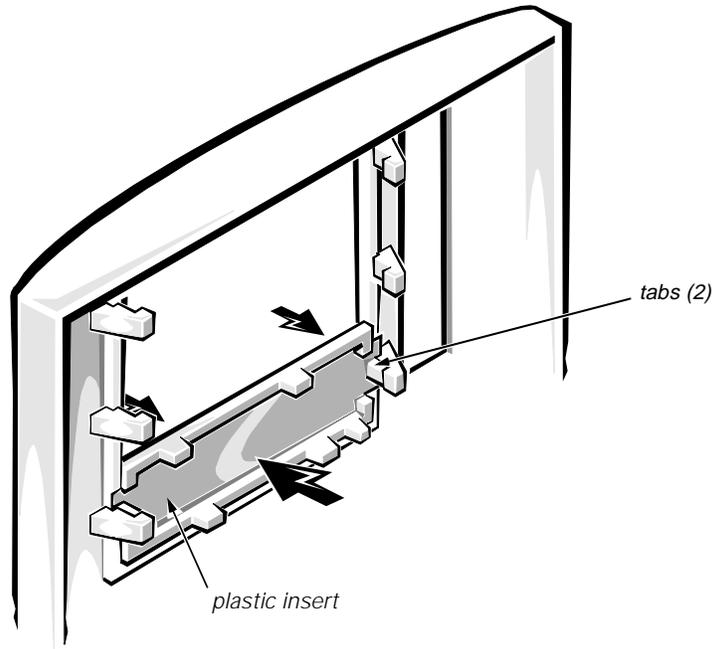
- 1. Remove the front bezel.**
- 2. Loosen the three thumbscrews along the front edge of one of the side covers (see Figure 4-2).**
- 3. Slide one cover a half-inch (about a centimeter) or so toward the front of the computer, grasping the top of the cover at both ends. Rotate the top edge of the cover away from the chassis, and lift it away from the chassis.**

To replace a side cover, fit the cover over the side rail at the bottom of the chassis and slide it closed.

To remove the top cover, follow these steps:

- 1. Remove both side covers.**
- 2. Remove the two screws at the front edge of the top cover (see Figure 4-2).**
- 3. Slide the top cover about a half inch toward the front of the computer and lift it away.**

## Front-Bezel Inserts



**Figure 4-3. Plastic Insert Removal**

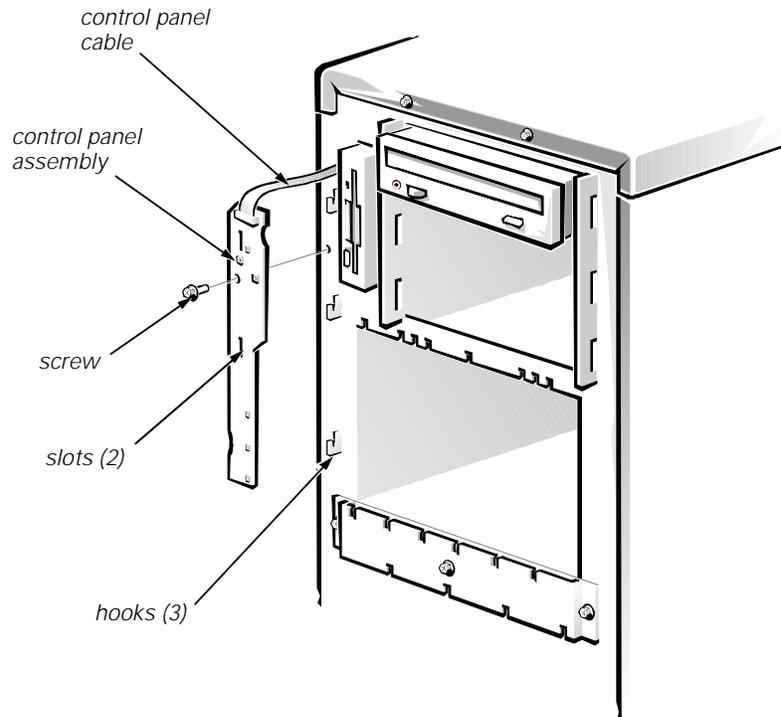
To remove a plastic insert, follow these steps:

- 1. Remove the front bezel.**
- 2. From the back of the front bezel, press against the center of the insert with your thumbs until the insert bows sufficiently to loosen the tabs on the sides of the insert (see Figure 4-3).**
- 3. Pull the insert out of the bezel.**

To replace a plastic insert, position the insert over the bay opening from the inside of the bezel and carefully press the insert into place.

If you need to remove a metal lower drive bay insert from the chassis, press the tab on the right side of the insert and pivot the insert away from the chassis.

# Control Panel Assembly



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

To remove the control panel assembly, follow these steps:

- 1. Disconnect the control-panel assembly cable from the PANEL connector on the system board (see Figure 4-14).**

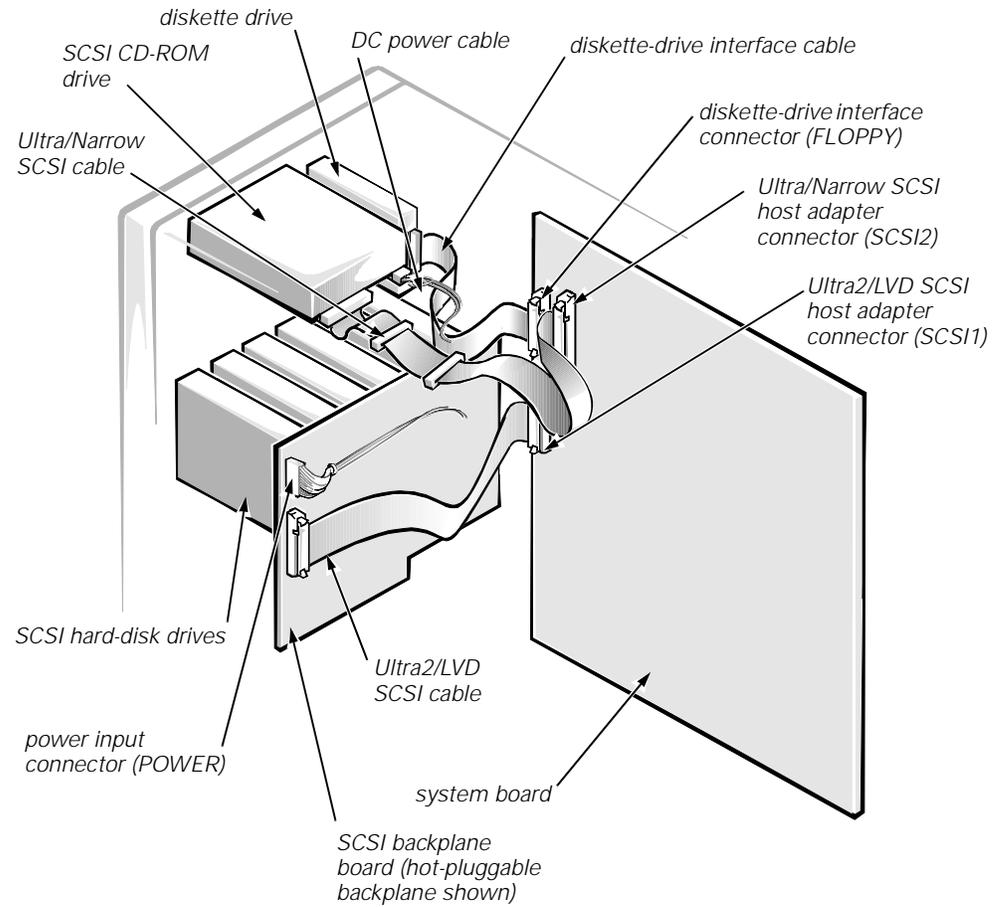
The PANEL connector is near the top of the system board toward the front of the computer chassis.

- 2. Remove the screw holding the control panel assembly to the front of the computer chassis (see Figure 4-4).**
- 3. Lift the control panel assembly out of the chassis hooks.**
- 4. Remove the control-panel assembly cable from the hole in the chassis.**

To replace the control panel assembly, slide the slots in the assembly over the upper chassis hooks (see Figure 4-4), then slide the assembly down until its bottom edge engages the lower chassis hook.

# Drives

Figure 4-5 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.

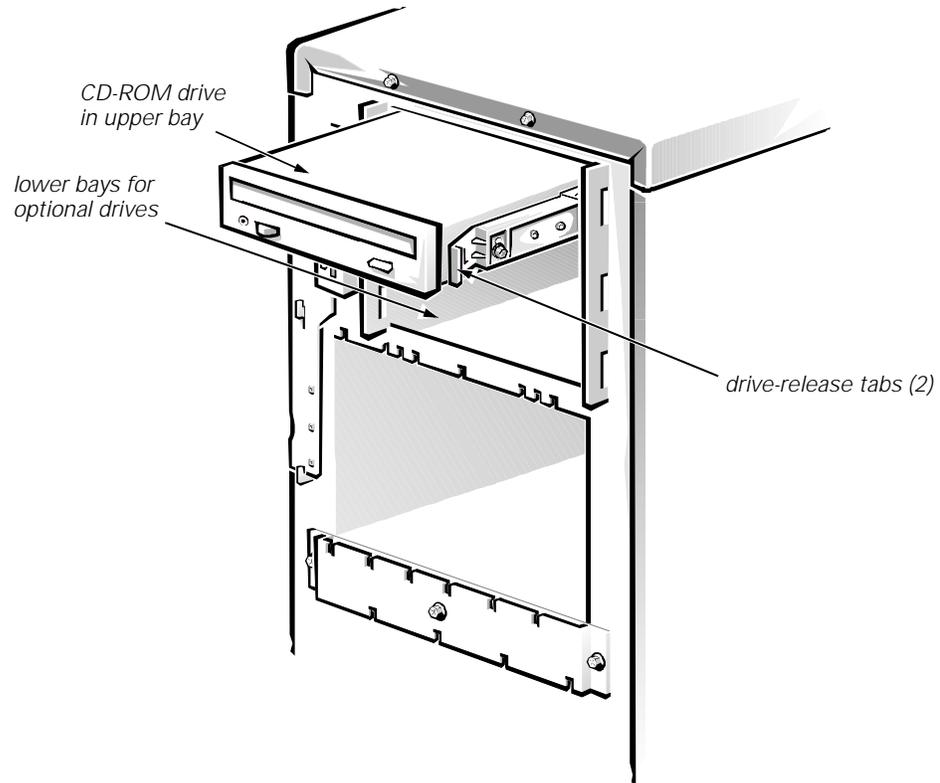


**Figure 4-5. Drive Hardware**

## 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.

### 5.25-Inch Drives



**Figure 4-6. Externally Accessible 5.25-Inch Drive Removal**

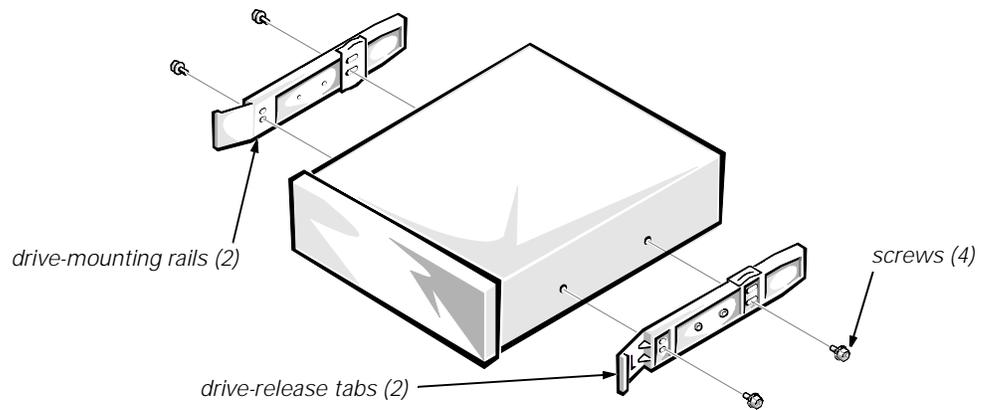
To remove a 5.25-inch drive assembly from one of the externally accessible drive bays, follow these steps:

- 1. 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.

- 2. Press inward (toward the center of drive) on the two drive-release tabs, and slide the drive out of the bay (see Figure 4-6).**

- 3. Remove the drive-mounting rails from the drive (see Figure 4-7).**



**Figure 4-7. Drive-Mounting Rail Removal**

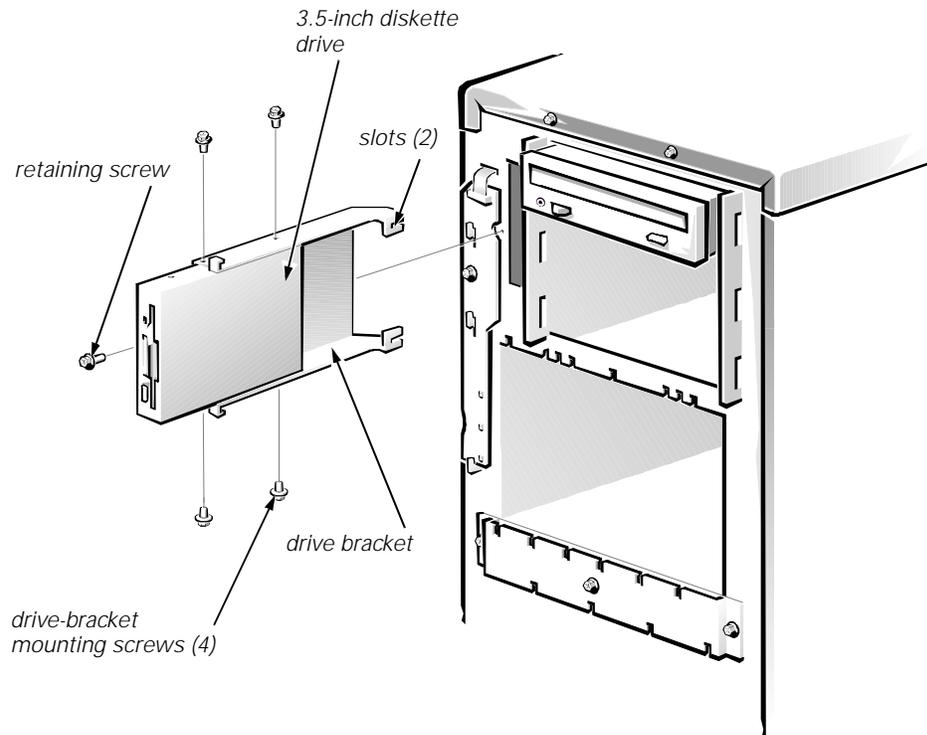
- 4. If the drive is a SCSI drive, record the setting of the SCSI address jumpers and SCSI bus termination jumper.**
- 5. If present, remove the 50-pin to 68-pin adapter from the SCSI connector on the back of the drive.**

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.



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

## 3.5-Inch Diskette Drive



**Figure 4-8. 3.5-Inch Diskette Drive Removal**

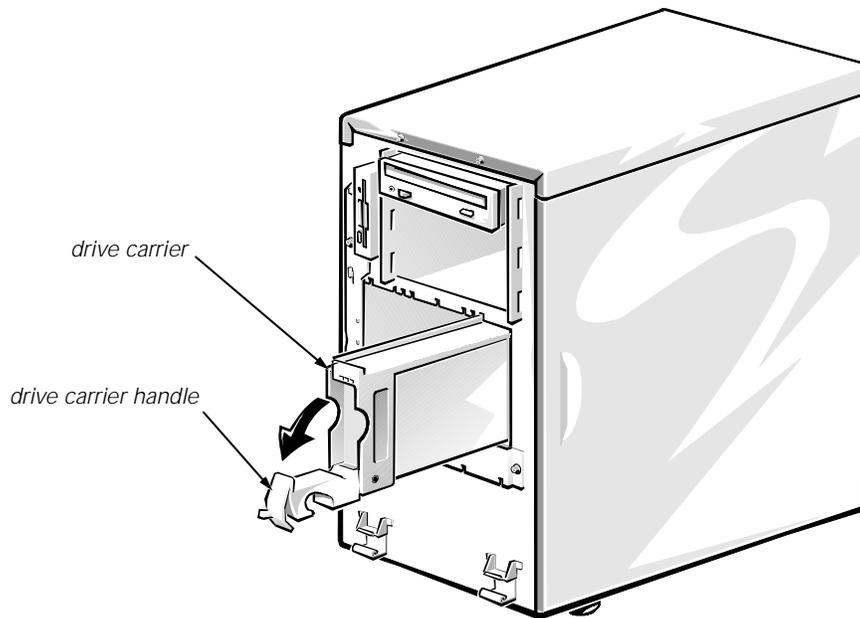
To remove the 3.5-inch diskette drive, follow these steps:

- 1. Remove the left side cover.**
- 2. Disconnect the DC power cable and the interface cable from the back of the diskette drive.**
- 3. Remove the retaining screw from the front of the chassis at the left side of the drive (see Figure 4-8).**
- 4. Slide the drive assembly out of the bay.**

Rotate the assembly to the right so the slots at the back of the drive bracket clear the drive bay opening.
- 5. Remove the four mounting screws securing the drive to the drive bracket (see Figure 4-8), and remove the drive.**

When installing the 3.5-inch drive assembly, make sure that the slots at the back of the drive bracket engage the tabs at the back of the bay. The back of the bay is visible through the open left side of the computer.

## Hard-Disk Drives



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

The hard-disk drives are mounted inside a hard-disk drive carrier. Only the front bezel must be removed to remove a drive carrier.

To remove a hard-disk drive carrier, follow these steps:

- 1. If a non-hot-pluggable SCSI backplane board is installed in the computer, remove the locking bar in front of the hard-disk drive carriers.**



**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 in this situation will result in a loss of data.**

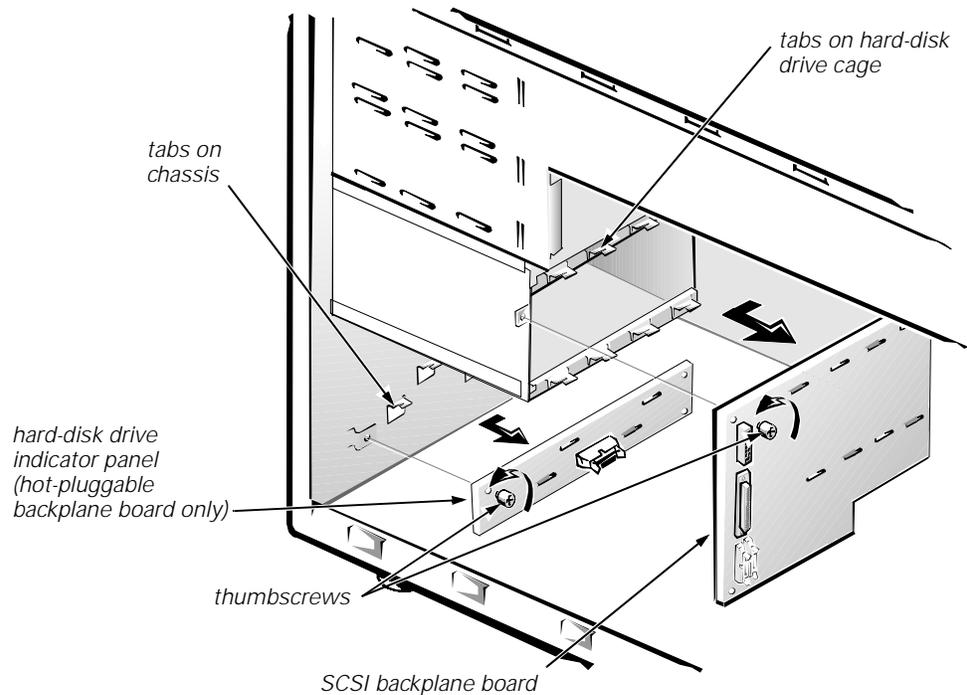
- 2. For hot-pluggable SCSI hard-disk drives, wait until the drive status indicators adjacent to the drive bay signal that the drive may be removed safely.**

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

- 3. Open the drive carrier handle to release the carrier (see Figure 4-9).**
- 4. Slide the carrier toward you until it is free of the drive bay.**

When installing a drive carrier, raise the handle until it latches to ensure that the drive is fully seated in the backplane board.

## SCSI Backplane Boards



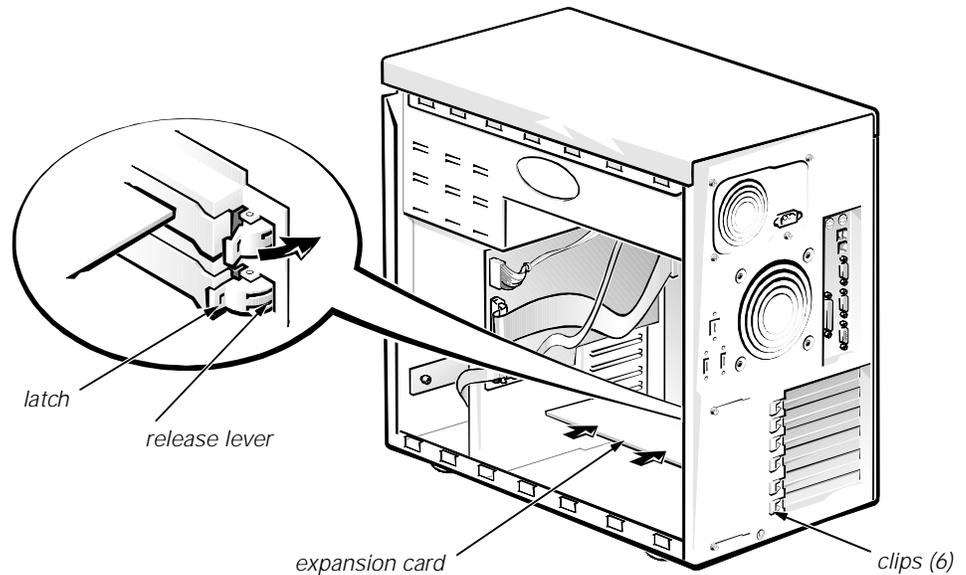
**Figure 4-10. Removing a SCSI Backplane Board and Hot-Pluggable Hard-Disk Drive Indicator Panel**

To remove a SCSI backplane board, follow these steps:

- 1. Remove the hard-disk drives.**
- 2. Disconnect all cables from the SCSI backplane board.**

DC power connector P2 is connected to the power input connector on the backplane board. The interface cable connectors vary with the type of backplane board installed. See Figures 1-11 through 1-13 for layouts of the available SCSI backplane boards.
- 3. Loosen the thumbscrew on the backplane board.**
- 4. Slide the backplane board away from the system board about a quarter inch, and lift it off the L-shaped mounting tabs on the hard-disk drive cage.**
- 5. To remove the hard-disk drive indicator panel (hot-pluggable backplane board only), loosen the thumbscrew. Then slide the panel about a quarter inch away from the system board and lift it off the L-shaped mounting tabs on the chassis.**

# Expansion Cards



**Figure 4-11. Expansion Card Removal**

To remove an expansion card, follow these steps:

- 1. 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.

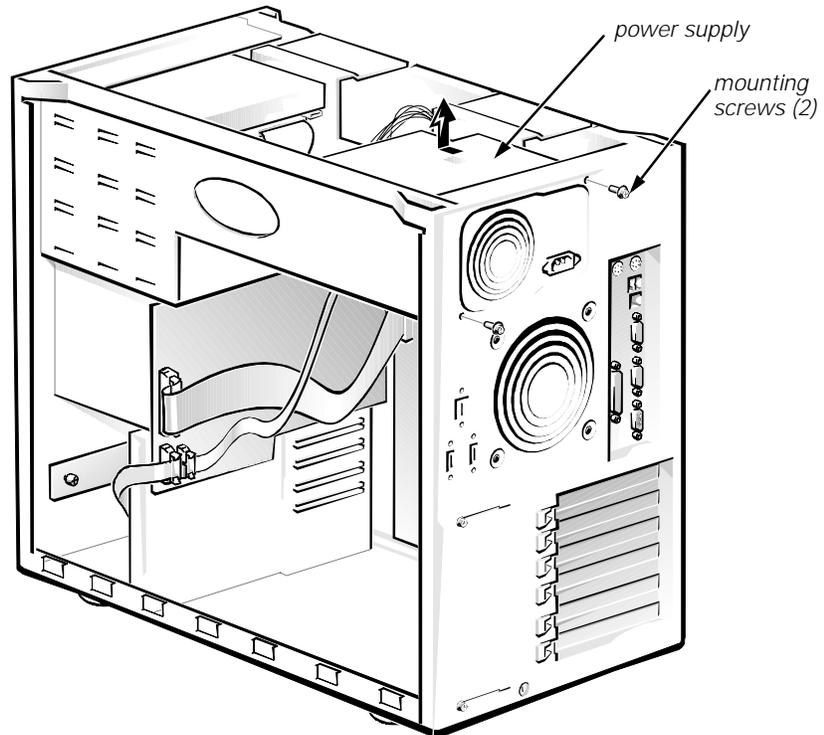
- 2. Press toward the chassis and hold the clip on the back of the computer while pressing the release lever on the clip inside the computer (see Figure 4-11); then rotate the latch away from the expansion-card bracket.**



**CAUTION:** Do not attempt to free the expansion-card bracket by using a tool to force the latch to the side.

- 3. Grasp the expansion card by its corners, and carefully remove it from the expansion-card connector.**

# System Power Supply



**Figure 4-12. Power Supply Removal**

To remove the system power supply, follow these steps:

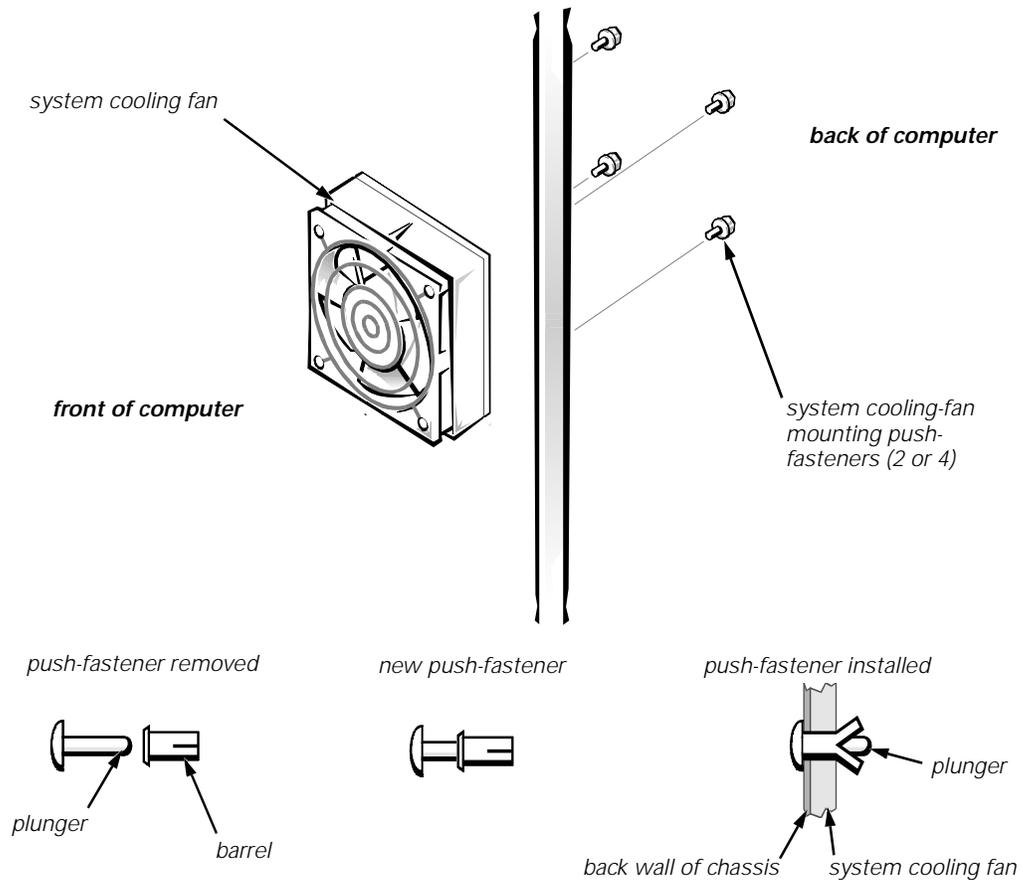
- 1. Remove the computer top cover.**
- 2. Disconnect the AC power cable from the AC power receptacle on the back of the power supply.**
- 3. Disconnect the DC power cables from system board connector POWER1 (see Figure 4-14), the externally accessible drives, and the SCSI backplane board (see Figure 4-5).**

Be sure to record the connector number and plug location for each power cable.

- 4. Remove the two power-supply mounting screws (see Figure 4-12).**
- 5. Slide the power supply forward about an inch to clear the top edge of the chassis; then lift it out of the computer.**

When you reinstall the power supply, slide it toward the back of the computer to engage the retaining tabs on the computer chassis.

# System Cooling Fans



**Figure 4-13. System Cooling-Fan Removal**

There are two removable system fans: a front fan behind the drive bays and a back fan on the chassis back panel.

To remove a system cooling fan, follow these steps:

- 1. Disconnect the cooling-fan cable from the FAN1 (front fan) or FAN3 (back fan) connector on the system board (see Figure 4-14).**
- 2. Loosen the system cooling fan from the chassis as follows:**
  - a. Push the plunger of each of the push-fasteners toward the back of the chassis, using a small flat-blade screwdriver (or another small flat object).
  - b. Pull the plungers completely out of the push-fasteners on the back wall of the chassis.

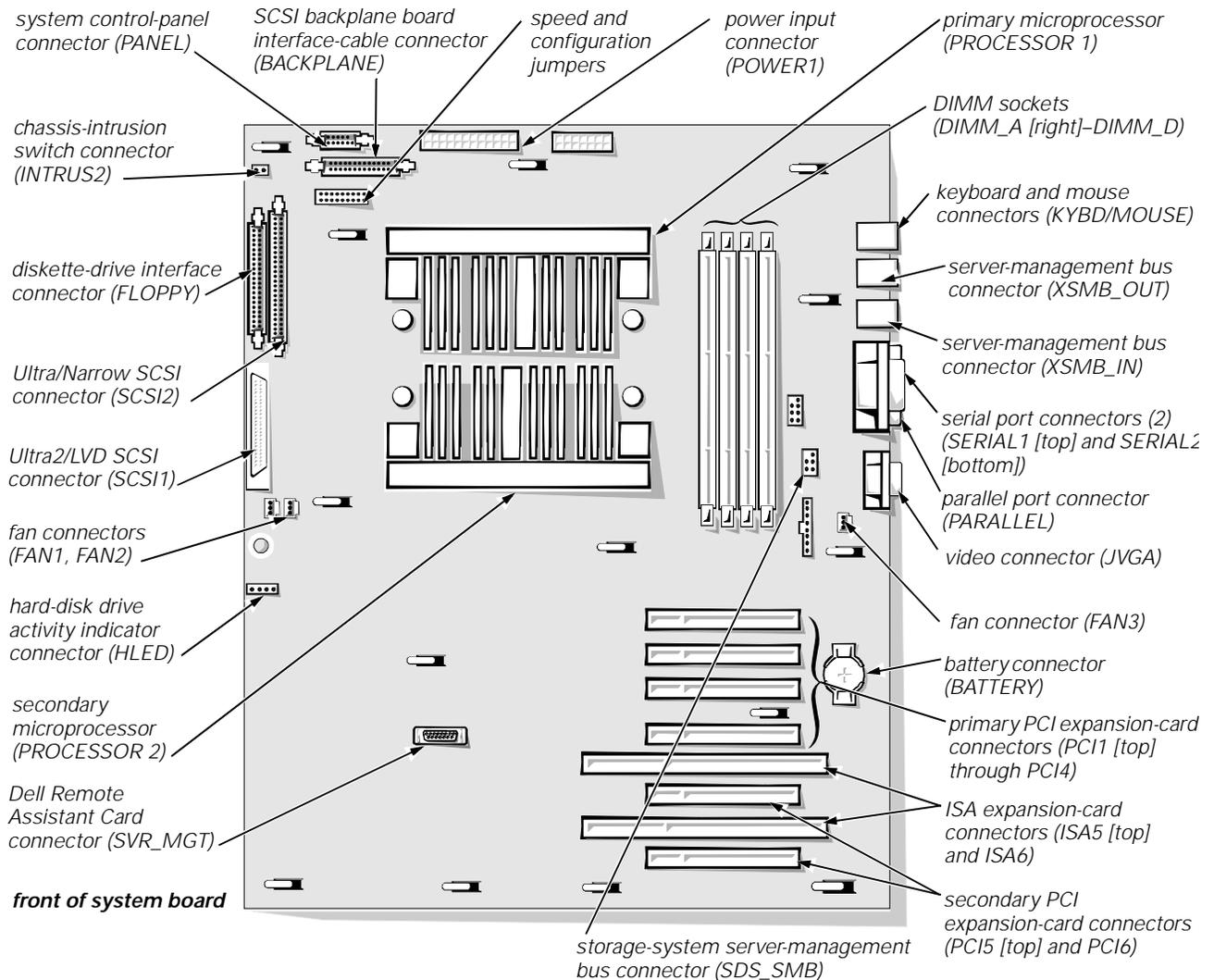
The back fan is mounted using four fasteners. The front fan is held in place by two tabs on its left side and two push-fasteners on the right.

### **3. Remove the system cooling fan and the push-fastener barrels from the chassis.**

To replace the fan, use new push-fasteners. (New push-fasteners have the plunger inserted part-way into the barrel.) To install the back fan, align the mounting holes in the fan with the holes in the chassis wall. To install the front fan, slide the left side under the two chassis tabs and align the mounting holes on the right. Insert each push-fastener completely; then push in the plunger to lock the fastener.

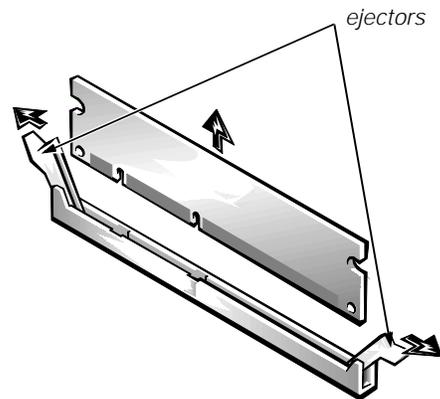
# System Board Components

The subsections that follow contain procedures for removing system board components. Refer to Figure 4-14 for the location of components.



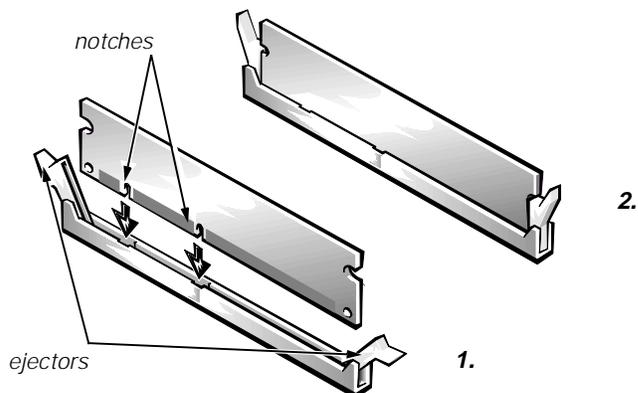
**Figure 4-14. System Board Components**

## DIMMs



**Figure 4-15. DIMM Removal**

To remove a DIMM, push outward on the DIMM socket's securing clips, as shown in Figure 4-15, until the DIMM is released from its socket. Then lift the DIMM away from the socket.



**Figure 4-16. DIMM Installation**

To replace a DIMM, press outward on the securing clips at each end of the socket until they snap open (step 1 in Figure 4-16). Orient the DIMM to the socket, and press down on the outer edges of the DIMM with your thumbs while pulling up on the securing clips until they lock around the ends of the DIMM (step 2 in Figure 4-16).

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

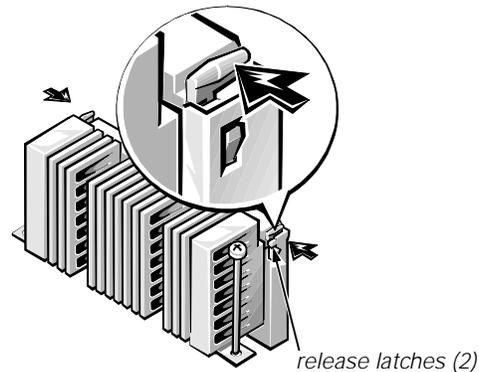
To remove an SEC cartridge and heat sink assembly, follow these steps.



**WARNINGS:** 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.

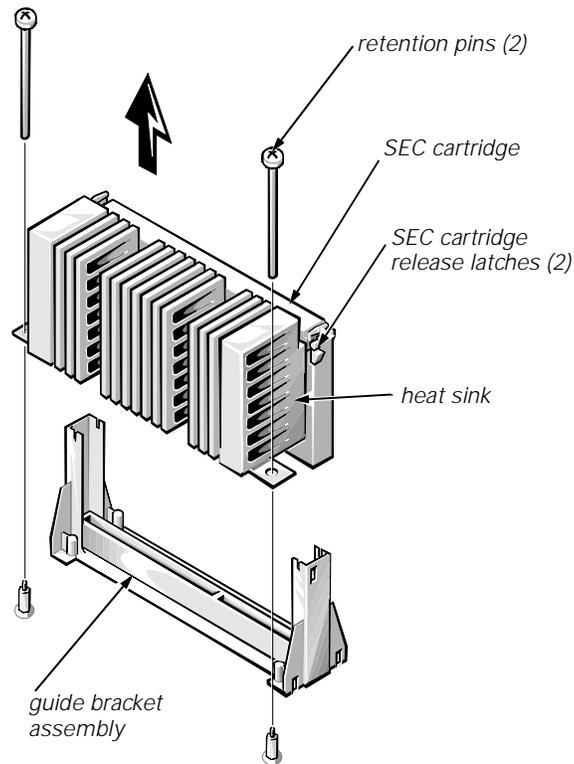
When handling the SEC cartridge and heat sink assembly, take care to avoid sharp edges on the heat sink.

1. Press the SEC cartridge release latches toward the cartridge until they snap into position, as shown in Figure 4-17.



**Figure 4-17. SEC Cartridge Release Latches**

2. Remove the two retention pins from the SEC cartridge and heat sink assembly (see Figure 4-18).



**Figure 4-18. Removing an SEC Cartridge and Heat Sink**

**3. Grasp the SEC cartridge firmly, and pull straight up on the cartridge to remove it from the guide bracket assembly.**

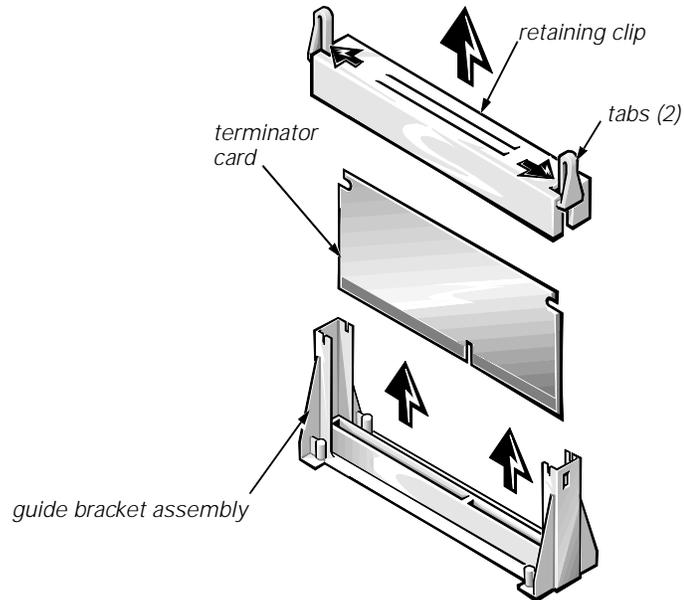
Moderate force may be required to disengage the SEC cartridge from the guide-bracket assembly connector.

**4. Pull out the cartridge release latches until they snap into place.**

To install an SEC cartridge and heat sink assembly, make sure that the cartridge release latches have been pulled out. Slide the cartridge into the guide bracket assembly and firmly seat the assembly.

If installing a second SEC cartridge and heat sink assembly, remove the terminator card as described in the next subsection, "Terminator Card."

## Terminator Card



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

To remove a terminator card, follow these steps:

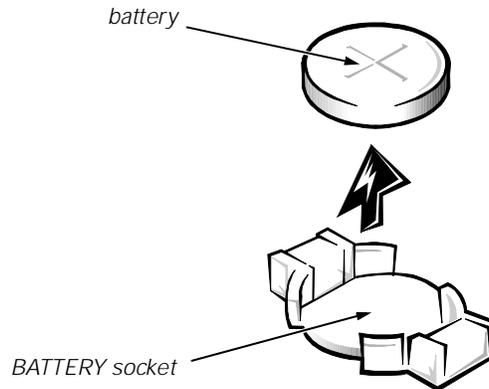
**1. Remove the retaining clip from the guide bracket assembly.**

Using the thumb and forefinger of each hand, pinch the tabs at each end of the cover (see Figure 4-19), and then lift the clip straight up.

**2. Remove the terminator card.**

Hold the card by its edges, and lift the card straight up from the guide bracket assembly.

## System Battery



**Figure 4-20. System Battery Removal**

### WARNING

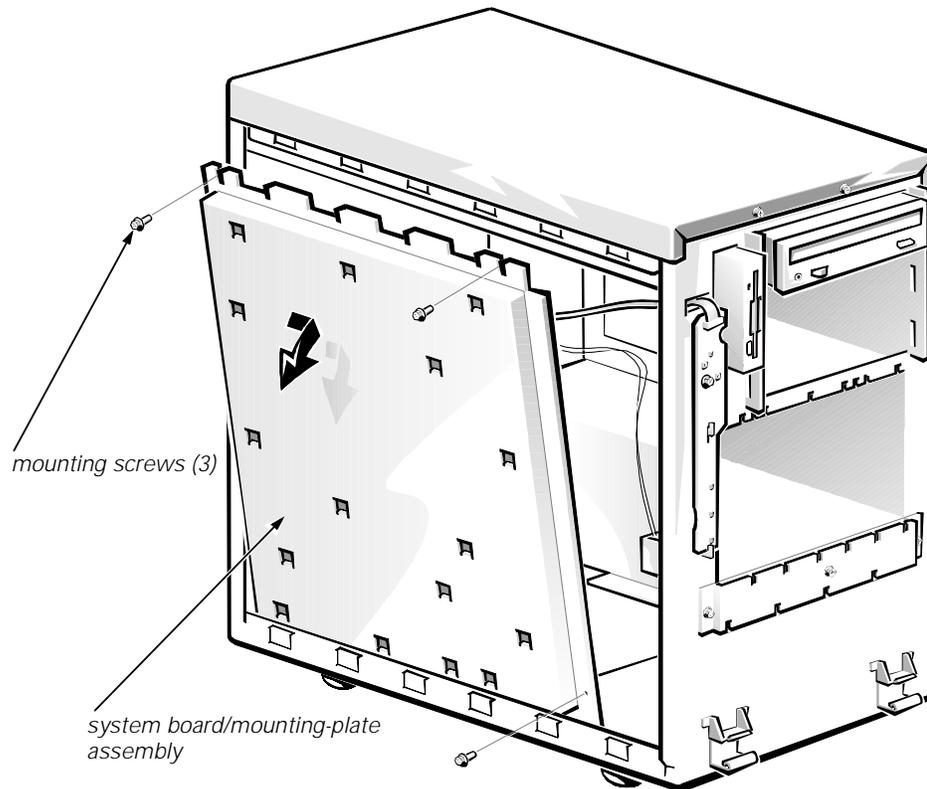
**There is a danger of the new battery exploding if incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.**

To remove the system battery, follow these steps:

- 1. 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 installed in the PCI expansion-card slots obstructing access to the battery.**
- 3. Remove the battery 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. 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.

# System Board Assembly



**Figure 4-21. 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.

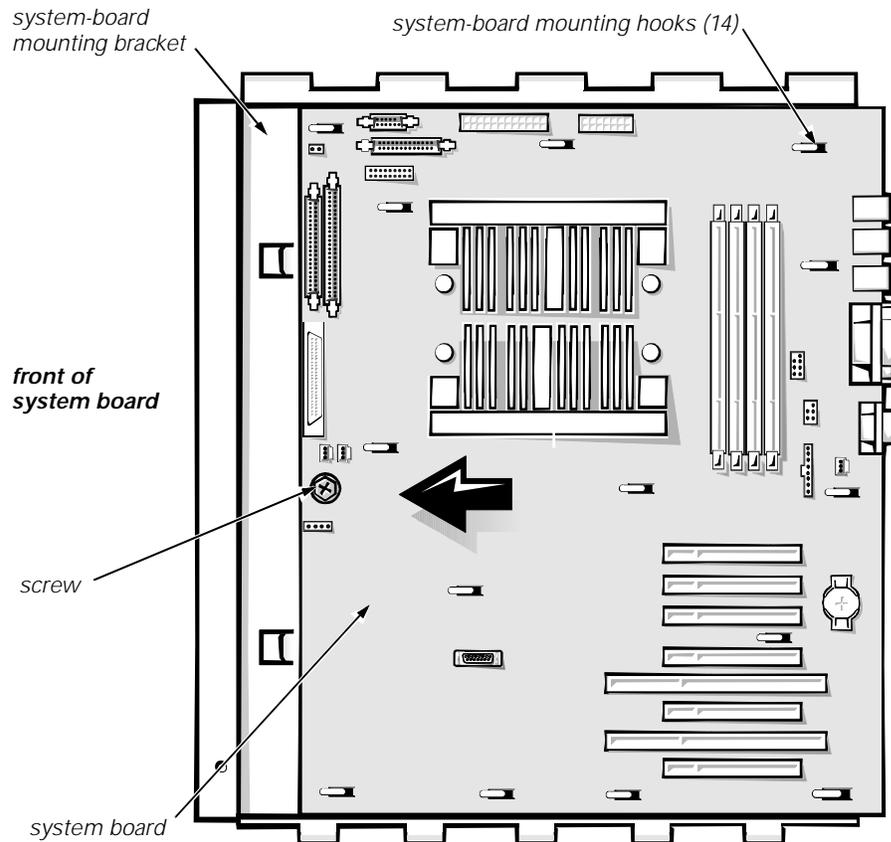
To remove the system board assembly follow these steps:

- 1. Disconnect all cables from their connectors at the back of the computer.**

Be sure to record where each cable is attached.

- 2. Remove any expansion cards.**
- 3. Disconnect all cables from the system board.**
- 4. Remove the left-side computer cover.**
- 5. Remove the three screws from the system board/mounting-plate assembly (see Figure 4-21).**
- 6. Slide the system board assembly forward about a half inch, rotate it away from the top of the chassis, and remove it.**

## System Board



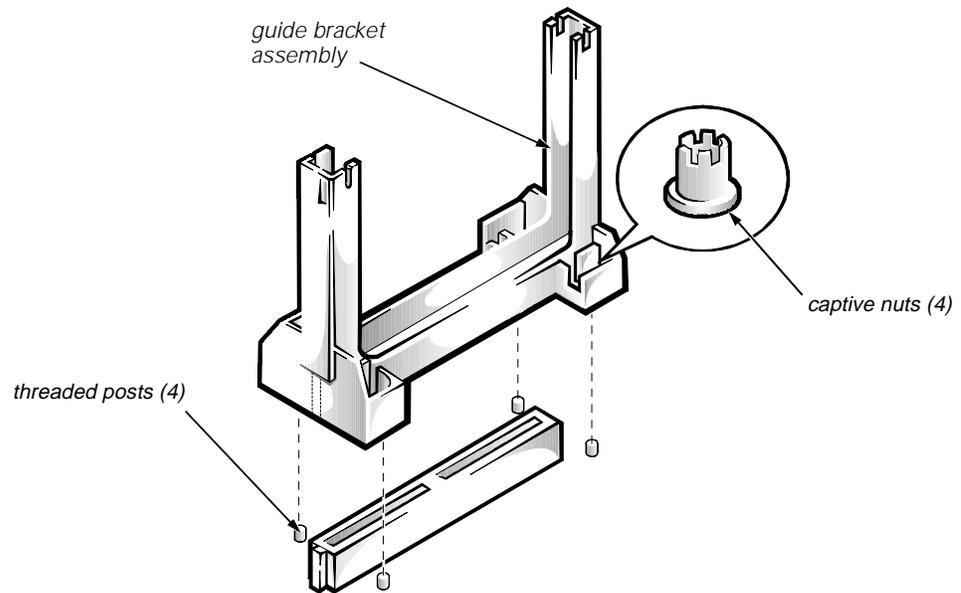
**Figure 4-22. System Board Removal**

To remove the system board, follow these steps:

- 1. Remove the system board assembly.**
- 2. Lay the system board assembly on a flat work surface.**
- 3. Remove the screw from the front edge of the system board.**
- 4. Slide the system board toward the front of the computer (as shown in Figure 4-22) to disengage the system-board mounting hooks.**
- 5. Lift the system board out of the system-board mounting bracket.**

If you are replacing the system board, remove the DIMMs, SEC cartridge and heat sink assembly, terminator card, and guide bracket assemblies, and install them on the replacement board. Verify that the jumper settings on the new system board are correct.

## Guide Bracket Assembly

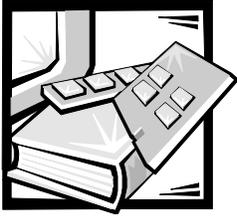


**Figure 4-23. Guide-Bracket Assembly Removal**

To remove the guide bracket assembly, follow these steps:

- 1. Remove the system board assembly.**
- 2. Remove any terminator card, if necessary.**
- 3. Remove any SEC cartridge and heat sink assembly, if necessary.**
- 4. Loosen the four captive nuts that secure the guide bracket assembly to the system board (see Figure 4-23).**
- 5. Lift up the assembly to remove it from the four threaded posts.**





# 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 2300 Systems User's Guide*.

To enter the System Setup program, follow these steps:

- 1. Turn on (or reboot) the system.**
- 2. Press <Ctrl><Alt><Enter> immediately after the monitor displays the message** Press <CTRL><ALT><ENTER> 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 category.

Dell Computer Corporation (www.dell.com)				
Page 1 of 2	System PowerEdge 2300/333 Setup			BIOS Version: XXX
Time: 13:17:02	Date: Wed Apr 8, 1998			
Diskette Drive A: 3.5 inch, 1.44 MB	This category sets the time in 24-hour format (hours:minutes:seconds) for the internal clock/calendar.			
Diskette Drive B: Not Installed	To change the value in a field, enter a number or use the left- or right-arrow key.			
Reserved Memory: None	Changes take effect immediately.			
CPU Speed: 333 MHz				
Num Lock: On				
Reset Button: Enabled				
Processor 1: A0				
Processor 2: Not Installed				
Fan Speed: Full Speed	Pentium® II Processor 333 MHz			
System Alert: Fault	Level 2 Cache: 512 KB Integrated			
	System Memory: 128 MB ECC SDRAM			
	Video Memory: 2 MB SGRAM			
	Service Tag: XXXXX			
	Asset Tag: XXXXXXXXXXXX			
Tab, Shift-Tab change fields	←, → change values	Alt-P next	Esc exit	Alt-B reboot

Dell Computer Corporation (www.dell.com)				
Page 2 of 2	System PowerEdge 2300/333 Setup			BIOS Version: XXX
Keyboard Errors: Report	This category sets whether keyboard-related error messages are reported at system startup.			
Boot Sequence: Diskette First				
Scan Sequence: Slots first (H/L)				
System Password: Not Enabled				
Password Status: Unlocked				
Setup Password: Not Enabled				
----- Integrated Devices -----				
Mouse: On	Pentium® II Processor 333 MHz			
Serial Port 1: Auto	Level 2 Cache: 512 KB Integrated			
Serial Port 2: Auto	System Memory: 128 MB ECC SDRAM			
Parallel Port: 378h	Video Memory: 2 MB SGRAM			
Parallel Mode: PS/2	Service Tag: XXXXX			
Diskette: Auto	Asset Tag: XXXXXXXXXXXX			
Speaker: On				
Primary SCSI: On				
Secondary SCSI: On				
Tab, Shift-Tab change fields	←, → change values	Alt-P next	Esc exit	Alt-B reboot

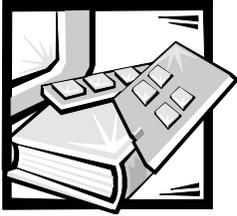
**Figure A-1. System Setup Screens**

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

<b>Category</b>	<b>Function</b>
Time	Resets time on computer's internal clock.
Date	Resets date on computer's internal calendar.
Diskette Drive A Diskette Drive B	Identifies type of diskette drives installed. Tape drives are <i>not</i> reflected in these categories.
Reserved Memory	Designates a region of system board memory that can be supplied by an expansion card.  This feature should not be enabled unless an expansion card that requires special addressing is installed.
CPU Speed	Indicates microprocessor speed at which system boots—the microprocessor's rated speed or a slower compatibility speed.
Num Lock	Determines whether keyboard's Num Lock mode is activated at boot.
Reset Button	Enables or disables the Reset button on the front bezel.
Processor 1 Processor 2	Displays status of each microprocessor slot in the computer.
Fan Speed	Sets the fan to full speed or a lower, noise-reduction speed.
System Alert	Sets the system alert to indicate fault (default) or warning conditions.
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 Enabled, prevents the system password from being changed or disabled. 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.

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

<b>Category</b>	<b>Function</b>
Serial Port 1 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 278h, 3BCh, or 378h (default). Off disables the port.
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.
Speaker	Enables or disables the built-in speaker.
Primary SCSI Secondary SCSI	Turns on (default) or off the built-in PCI SCSI controller and determines if it is scanned as a boot drive.
Processor	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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