



Dell™ PowerEdge™ 2400 Systems Service Manual

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Preface: Dell™ PowerEdge™ 2400 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 in the *Dell PowerEdge 2400 Systems User's Guide* that came with the system, Dell provides the *Dell PowerEdge 2400 Systems Installation and Troubleshooting Guide* for troubleshooting procedures and instructions on using Dell Diagnostics to test the computer system.

The sections are summarized as follows:

- "[System Overview](#)" — Overview of the system's service features.
 - "[Basic Troubleshooting](#)" — Initial checks and procedures used to solve basic system problems and information on more detailed troubleshooting procedures to solve more complex problems.
 - "[Codes and Error Messages](#)" — POST beep codes, system messages, system codes, warning messages, diagnostics messages, alert log messages, and SCSI hard-disk drive indicator codes.
 - "[Removing and Replacing Parts](#)" — Removal and replacement of all field-replaceable parts, such as DIMMs, microprocessors, expansion cards, and SCSI devices.
 - "[Jumpers, Switches, and Connectors](#)" — Jumper or switch settings to change when troubleshooting and servicing the system.
 - "[Using the System Setup Program](#)" — The System Setup program is used to change the system configuration information stored in NVRAM on the system board.
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Notes, Notices, Cautions, and Warnings

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

 *NOTE: A NOTE indicates important information that helps you make better use of your computer system.*

NOTICE: A NOTICE indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

 **CAUTION: A CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.**

 **WARNING:** A WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious bodily injury.

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System Overview: Dell™ PowerEdge™ 2400 Systems Service Manual

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Overview

The Dell PowerEdge 2400 workgroup server is a high performance system that offers strong availability, serviceability, and manageability features. The PowerEdge 2400 server utilizes Intel® Pentium® III microprocessors and next-generation chipset and memory technology to provide high performance in both file/print and server application environments.

This section describes the hardware features that simplify servicing of PowerEdge 2400 systems. It also describes major hardware and software features of the computer system.

Service Features

The PowerEdge 2400 systems include the following service features to make troubleshooting and repair easy and effective:

- Dell Diagnostics, which checks for hardware problems (if the system can boot).
- Embedded server management hardware, which monitors temperatures and voltages throughout the system and notifies you if the system overheats, if a system cooling fan malfunctions, or if a power supply fails.
- Optional redundant, hot-pluggable power supplies.

The PowerEdge 2400 system chassis simplifies removing and replacing computer components. You can perform replacement of microprocessors or DIMMs without removing the system board. The Dell-designed SCSI backplane board and hard-disk drive carriers eliminate the extensive cabling and drive configuration usually required for a SCSI subsystem.

System Features

The PowerEdge 2400 systems offer the following major features:

- One or two Pentium III microprocessors with an internal operating frequency of at least 500 MHz and an external bus speed of 100 or 133 MHz.

The Pentium III microprocessor includes MMX™ technology designed to handle complex multimedia

and communications software. This microprocessor incorporates new instructions and data types as well as a technique called single instruction, multiple data (SIMD) that allows the microprocessor to process multiple data elements in parallel, thereby improving overall system performance.

A secondary level 2 (L2) cache of 256 KB or 512 KB of SRAM is included within the single-edge contact (SEC) cartridge that contains the microprocessor. Secondary L2 cache is 512 KB only in the 100 MHz FSB processors. Math coprocessor functions are provided by the microprocessor. A separate and external math coprocessor chip is not used or required.

- Support for symmetric multiprocessing (SMP) is available by installing a second Pentium III microprocessor. SMP greatly improves overall system performance by dividing microprocessor operations between the two independent microprocessors. To take advantage of this feature, you must use an operating system that supports SMP, such as Microsoft® Windows NT® Server 4.0 (or later) or Novell® NetWare® 4.2 (or later).



NOTE: If you decide to upgrade the system by installing a second microprocessor, you must order a microprocessor upgrade kit from Dell. Not all versions of the Pentium III microprocessor work properly as a second microprocessor. The upgrade kit from Dell contains the correct version of the microprocessor for use as a second microprocessor as well as instructions for performing the upgrade. Both microprocessors must have the same part number and revision (or stepping) code, internal operating frequency, and cache size.

- A minimum of 64 MB of system memory, upgradable to a maximum of 2 GB by installing combinations of 64-, 128-, 256-, or 512-MB registered SDRAM DIMMs in the four DIMM sockets on the system board.

The registered, 72-bit-wide (168-pin) ECC SDRAM DIMMs installed in PowerEdge 2400 systems support ECC to check for and correct memory errors. ECC is performed by the memory controller in the RCC Server Set LE v3.0 system chip set. DIMMs do not need to be inserted in pairs.

- A BIOS that resides in flash memory on the ISA bus that can be upgraded if required.
- An optional, redundant power supply distribution board to accommodate up to two independent power supplies.
- A single, 1.44-MB 3.5-inch diskette drive.
- A 17/40X SCSI CD-ROM drive.

The system board includes the following features:

- Five PCI slots and one PCI/ISA-shared expansion-card connector, located on the system board. PCI slots 1 through 4 are unshared, 64-bit, 33-MHz PCI slots; PCI slot 5 is a 64-bit, 33-MHz slot that is shared with ISA slot 5. Slot 6 provides a 32-bit, 33-MHz PCI slot for use with the optional Dell Remote Assistant Card (DRAC) or other PCI accessories.
- A VGA-compatible video subsystem with an ATI RAGE IIC video controller. This video subsystem contains 4 MB of SDRAM video memory (nonupgradable). Maximum resolutions are 1024 x 768 x 256 colors (noninterlaced). In 800 x 600 and 640 x 480 resolutions, 16.7 million colors are available for true-color graphics.

- An integrated National Semiconductor PC97317 super I/O controller that controls the bidirectional parallel port, two serial ports, keyboard, mouse, and the diskette drive in the externally accessible front bay. The super I/O controller resides on the ISA bus.

The parallel port can be set to operate in the following modes via the **Parallel Mode** option in the System Setup program: output-only (AT-compatible), bidirectional (PS/2-compatible, or Extended Capabilities Port (ECP).

- An integrated Intel 82559 10/100 NIC, which provides an Ethernet interface.
- An optional integrated PowerEdge Expandable RAID Controller (PERC) 2/Si that supports RAID levels 0, 1, 5, and 10.
- An integrated Adaptec AIC-7890 Ultra2/LVD SCSI host adapter that supports up to six 1-inch or four 1.6-inch internal SCSI hard-disk drives via a SCSI backplane board and special SCSI hard-disk drive carriers. The SCSI backplane automatically configures SCSI ID numbers and SCSI termination on individual hard-disk drives, greatly simplifying drive installation.
- An integrated Adaptec AIC-7880 Ultra/Wide SCSI secondary host adapter (implemented as Ultra/Narrow) provides connections for tape drives and CD-ROM drives via a 50-pin connector.
- SCSI backplane options include a 1 x 4 and 1 x 6 hot-pluggable backplane. The hot-pluggable backplanes support hot-pluggable SCSI hard-disk drive installation and removal. The integrated SCSI controller resides on the PCI local bus for optimum performance.
- Integrated server management circuitry that monitors operation of the system fans as well as critical system voltages and temperatures. The integrated server management circuitry works in conjunction with the optional HP OpenView Network Node Manager Special Edition (NNM SE) and the Dell Hardware Instrumentation Package (HIP) software package.
- A PS/2-style keyboard port, dual USB ports, and a PS/2-compatible mouse port.

The PowerEdge 2400 system is available in a floor-standing or a rack configuration and can be changed from one configuration to the other via customer kits.

The following software is included in the system:

- Video drivers for displaying many popular application programs in high-resolution modes. For more information on these drivers, see "Using the Dell OpenManage Server Assistant CD" in the *User's Guide*.
- SCSI device drivers that allow the operating system to communicate with devices attached to the integrated SCSI subsystem. For more information on these drivers, see "Installing and Configuring SCSI Drivers" in the *User's Guide*.
- The [System Setup program](#) for quickly viewing and changing the system configuration information.
- The Resource Configuration Utility (RCU), which allows users to modify certain PCI configuration settings. RCU must run whenever ISA expansion cards are installed or removed to prevent hardware conflicts.

Enhanced security features, including a user password and a supervisor password, are available through either the System Setup program.

- Diagnostics for evaluating the computer's components and devices. For information on using the system diagnostics, see "Using the Dell OpenManage Server Assistant CD" in the *User's Guide* or see "Running the Dell Diagnostics" in the *Installation and Troubleshooting Guide*.

Technical Specifications

Processor

Microprocessor type	one or two Intel Pentium III microprocessors with an internal operating frequency of at least 500 MHz and an external operating frequency of 100 or 133 MHz
Internal cache	32-KB L1 cache; 256- or 512-KB L2 cache (512 KB L2 cache only in 100 MHz FSB processors)
Math coprocessor	internal to microprocessor

Expansion Bus

Bus types	PCI bus (operating at 33-MHz) and ISA bus (operating at 8.33 MHz)
Expansion slots	five full-length 64-bit, PCI slots: PCI1 through PCI4; PCI5 is a shared, full-length 32-bit PCI or 8- or 16-bit ISA slot. PCI6 is a 32-bit, 33-MHz PCI for use with the optional DRAC 2 card

Memory

DIMM sockets	four 168-pin sockets
DIMM capacities	64-, 128-, 256-, or 512-MB registered SDRAM DIMMs; must be certified for 133-MHz operation
Minimum RAM	64 MB
Maximum RAM	2 GB (using 512-MB DIMMs)
External cache	none

Drives

Diskette drive	3.5-inch, 1.44-MB diskette drive included with standard system
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SCSI hard-disk drives	formatted capacities from 9 GB to 36 GB
SCSI devices	integrated Adaptec AIC-7890 Ultra2/LVD SCSI host adapter supporting four 1.6-inch SCSI hard-disk drives or six 1-inch SCSI hard-disk drives in internal bays; integrated Adaptec AIC-7880 Ultra/Wide SCSI host adapter, implemented as Ultra/Narrow, supporting up to three SCSI devices in externally accessible front bays; an internal SCSI backplane, provides a physical connection, hot-plug capability, termination, and automatic configuration for the internal SCSI hard-disk drives
CD-ROM drive	SCSI CD-ROM drive included with standard system

External Ports and Connectors

Serial	two 9-pin connectors
Parallel	25-pin connector (bidirectional)
Video	15-pin connector
PS/2-style keyboard	six-pin mini-DIN connector
PS/2-compatible mouse	six-pin mini-DIN connector
USB	two USB-compliant 4-pin connectors
Ethernet	RJ45 connector for connection to internal embedded NIC (Intel 82559 10/100 Ethernet controller)

Internal Ports and Connectors

Diskette drive	34-pin connector for internal 3.5-inch, 1.44-MB diskette drive
Ultra/Narrow SCSI controller	50-pin connector for internal SCSI CD-ROM drive or optional tape backup units
Ultra2/LVD SCSI controller	68-pin connector for internal SCSI drives
XSMB connector (8-pin header connector)	reserved
Embedded 10/100 Ethernet controller	connected to external RJ45 connector
Embedded PowerEdge RAID controller (optional)	Intel i960® RM on system board providing PCI-to-PCI bridge; two integrated SCSI channels residing on the secondary PCI bus;

optional software and unbuffered 64-MB SDRAM DIMM;
support for RAID levels 0, 1, 5, and 10

Video

Video type	ATI RAGE IIC PCI video controller; VGA connector
Video memory	4-MB SDRAM standard (not upgradable)

Power

Standard (nonredundant) DC power supply:

Wattage	330 W
Heat dissipation	600 BTU/hr (nominal)
Input voltage	90 to 135 V at 47-63 Hz 180 to 265 V at 47-63 Hz autoranging
Output voltages and maximum current	+5 VDC at 35 A +3.3 VDC at 18 A +12 VDC at 14 A -12 VDC at 0.3 A -5 VDC at 0.3 A +5 Vfp at 1.2 A

Optional hot-pluggable DC power supply (ratings are for each supply):

Wattage	330 W
Heat dissipation	600 BTU/hr (nominal)
Input voltage	90 to 265 V at 47-63 Hz autoranging
Output voltages and maximum current	+5 VDC at 35 A +3.3 VDC at 10 A +12 VDC at 18 A -12 VDC at 0.8 A -5 VDC at 0.3 A +5 Vfp at 1.2 A

Backup battery	3-V CR2032 lithium coin cell
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Physical

Rack mount (6U):

Height	26 cm (10.25 inches)
Width	43.2 cm (17 inches)
Depth	58.4 cm (23 inches)

Tower chassis:

Height	43.9 cm (17.3 inches)
Width	26.1 cm (10.3 inches)
Depth	59.2 cm (23.3 inches)

Weight 31.75 kg (70.0 lb) maximum configuration

Environmental

Temperature:

Operating	10°C to 35°C (50°F to 95°F)
Storage	-40°C to 65°C (-40°F to 149°F)

Relative humidity:

Operating	8% to 80% (noncondensing)
Storage	5% to 95% (noncondensing)

Maximum vibration:

Operating	0.25 G (half-sine wave) at a sweep of 3 to 200 Hz for 15 minutes
Storage	0.5 G at 3 to 200 Hz for 15 minutes

Maximum shock:

Operating	six consecutive shock pulses in the positive and negative x, y, and z axes (one pulse on each side of the system) at 50 G for 2 milliseconds
Storage	six consecutive shock pulses in the positive and negative x, y, and z axes (one pulse on each side of the system) at 92 G for 2 milliseconds

Altitude:

Operating	-16 to 3048 m (-50 to 10,000 ft)
Storage	-16 to 10,600 m (-50 to 35,000 ft)

Basic Troubleshooting: Dell™ PowerEdge™ 2400 Systems Service Manual

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Overview

This section 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" in the *Dell PowerEdge 2400 Systems Installation and Troubleshooting Guide*. Dell recommends that you perform the following procedures in the order presented.

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. After the user describes the problem, perform the following steps:

1. Ask the user to back up any data on the hard-disk drive if the system's condition permits. See "Maintaining the System" in the *Dell PowerEdge 2400 Systems User's Guide* for 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 "[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, perform the following 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.

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. Verify that network cables (if present) are properly attached.
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 "[Removing and Replacing Parts](#)."

No. Proceed to "[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 to complete all of these steps.

To perform the following procedure, you need a *Dell Diagnostics Diskette* created from the "*Dell OpenManage Server Assistant*" CD. If such a diskette is not available, you can create it as described in "Using the *Dell OpenManage Server Assistant* CD," in the *Dell PowerEdge 2400 Systems User's Guide*. If a separate diagnostics diskette is included with the system, you may need to use that diskette.

To observe problem indications during the boot routine, perform the following 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 indications:

- Beep codes — A beep code is a series of beeps that indicates an error condition. See "[System Beep Codes](#)."
- System error messages — These messages can indicate problems or provide status information. If a system error message appears, see "[System Messages](#)."
- 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.](#)"

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.](#)"

No. Proceed to "[Internal Visual Inspection.](#)"

Internal Visual Inspection

NOTICE: 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 application programs 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, see "[System Features](#)" to locate components referenced in the inspection procedure.

To perform the internal visual inspection, perform the following steps:

1. Turn off the system, including any attached peripherals, and disconnect all the AC power cables from electrical outlets.



CAUTION: 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 "[Removing the Computer Cover.](#)"



CAUTION: 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.



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

3. Verify that the chips, DIMMs, expansion cards, and SEC cartridge and heat sink assembly or assemblies are fully seated in their sockets or connectors.
4. To ensure that the chips are fully seated in their sockets, press firmly on the top of each chip.
5. To remove and reseat an SEC cartridge and heat sink assembly, perform the steps described in

["Microprocessor SEC Cartridge/Heat Sink Assembly."](#)

6. To remove and reseat a DIMM, perform the steps described in "[DIMMs](#)."
7. If you need to remove and reseat an expansion card, remove the card as described in "[Expansion Cards](#)," and carefully reinsert the card in its connector until fully seated.
8. Verify that all jumpers are set correctly.

For information about jumper settings, see "[System Board Jumpers](#)."

9. Check all cable connectors inside the computer to verify that they are firmly attached to their appropriate connectors.
10. Reinstall the computer cover.
11. 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 "[Eliminating Resource Conflicts](#)" and to "[Getting Help](#)."

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, the same resource may be 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 "Using the Resource Configuration Utility" in the *Dell PowerEdge 2400 Systems User's Guide*.

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 the *Dell Diagnostics Diskette* using the *Dell OpenManage Server Assistant* CD as described in "Using the Dell OpenManage Server Assistant CD" in the *User's Guide*. If a separate *Dell Diagnostics Diskette* is included with the system, you may need to use that diskette.

To start the Dell Diagnostics, turn off the system, insert the *Dell Diagnostics Diskette* into the diskette drive, and then turn on the system.

Starting the diagnostics causes the Dell logo screen to appear on the monitor, 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 telling you which

DIMM has failed appears on the screen.

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

See "Running Dell Diagnostics" in the *Dell PowerEdge 2400 Systems Installation and Troubleshooting Guide* for specific information about the Dell Diagnostics.

Getting Help

If none of the troubleshooting procedures in this section 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, refer to the **Support** pages at <http://www.dell.com> or call Dell for technical assistance. For instructions on contacting Dell, see "Getting Help" in the *Installation and Troubleshooting Guide*.

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Overview

This section describes beep codes and system error messages that can occur during system start-up or, in the case of some failures, during normal system operation. The tables in this section list faults that can cause a beep code or system error message to occur and the probable causes of the fault in each case. This section also suggests actions you can take to resolve problems indicated by a message.

If a faulty system does not emit beep codes or display system error messages to indicate a failure, you should run the appropriate tests in the Dell Diagnostics to help isolate the source of the problem. See "Running the Dell Diagnostics" in the *Dell PowerEdge 2400 Systems Installation and Troubleshooting Guide*.

Several different types of messages can indicate when the system is not functioning properly:

- System messages
- System beep codes
- Warning messages
- Diagnostics messages
- Alert messages
- SCSI hard-disk drive indicator codes

System Messages

System messages alert you to a possible operating system problem or to a conflict between the software and hardware. [Table 1](#) lists the system error messages that can occur and the probable cause for each message.

If the table does not lead to the source of the problem, run the appropriate tests in the Dell Diagnostics (see the *Installation and Troubleshooting Guide*) to assist in troubleshooting the problem.



NOTE: If you receive a system message that is not listed in Table 1, check the documentation for the application program that is running when the message appears and/or the operating system documentation for an explanation of the message and recommended action.

Table 1. 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.
Alert! Maximum memory size exceeded. Limiting memory size to 2 MB	System supports up to 2 MB of memory.	Remove one or more DIMMs so that total memory is 2 MB or less.
Alert! Uncorrectable memory error previously detected in xxxx xxxh	Improperly seated or faulty DIMMs	Remove and reseal the DIMMs. If the problem persists, replace the DIMMs.
Alert! Unsupported memory in DIMM slot(s) n.	Unsupported DIMM(s) installed	Replace one or more DIMMs so that all DIMMs are the same type.
Alert! Single-bit memory error previously detected in xxxx xxxh	Improperly seated or faulty DIMMs	Remove and reseal the DIMMs. If the problem persists, replace the DIMMs.
Amount of memory has changed	Missing or faulty DIMMs	Check that DIMMs have not been removed. Remove and reseal the DIMMs. If the problem persists, replace the DIMMs.
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 Controller has failed	Faulty diskette/tape drive subsystem or hard-disk drive subsystem (defective system board)	Replace the system board.
CPUs with different level	Two different types of	Install a correct version of the microprocessor so

2 cache sizes detected	microprocessors are installed.	both microprocessors have the same level 2 cache size.
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 reseal the DIMMs . If the problem persists, replace the DIMMs .
Detected missing RAID hardware for the onboard RAID channel. Potential for data loss exists! Press <Y> to switch mode to SCSI, any other key to disable the channel.	Either the RAID DIMM or the RAID key is missing or is not properly seated in its socket	Press Y to switch to the SCSI mode if you do not have the integrated RAID option. Install the integrated RAID hardware option if it is available and restart the system.
Diskette drive 0 seek failure Diskette drive 1 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. See " Using the System Setup Program ." Check the drive interface and power cables.
Diskette read failure	Faulty diskette, faulty or improperly connected diskette/tape drive interface cable, or loose power cable	Replace the diskette. Check the diskette/tape drive interface cable and power cable connections to the drive. See " Drives ." 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.
Embedded server management error 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	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.
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. See " Jumpers, Switches, and Connectors " for instructions. Check the System Setup configuration settings. Replace the battery. See " Replacing the Battery. "
Invalid CPU speed detected	Microprocessor not supported by system	Install a correct version of the microprocessor in the specified microprocessor connector.
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.
I/O parity interrupt at address	Expansion card improperly installed or faulty	Reinstall the expansion cards (see " Expansion Cards "). If the problem persists, replace the expansion card.
Keyboard controller failure	Defective keyboard/mouse controller (defective system board)	Replace the system board.
Keyboard 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 data line failure 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.
Memory address line failure at address, read value expecting value Memory double	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.

<p>word logic failure at <i>address</i>, read <i>value</i> expecting <i>value</i></p> <p>Memory odd/even logic failure at <i>address</i>, read <i>value</i> expecting <i>value</i></p> <p>Memory write/read failure at <i>address</i>, read <i>value</i> expecting <i>value</i></p>		
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/tape drive subsystem, hard-disk drive, hard-disk drive subsystem, or no boot disk in drive A	If booting from a diskette, ensure the diskette is bootable. If booting from a hard-disk drive, replace the 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	Verify the hard-disk drive System Setup information is correct. Install an operating system on the hard-disk drive.
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	Ensure the diskette is a bootable diskette. If booting from a hard-disk drive, ensure the hard-disk drive is formatted and contains an operating system. 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. See " Microprocessors " for instructions.

Read fault 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 .
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. See " Drives ." Replace the diskette/tape drive interface cable. Reinstall the hard-disk drive. Check the interface cable and power cable connections to the backplane board. See " Drives ."
ROM bad checksum = <i>address</i>	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 system board	Replace the system board .
Time-of-day clock stopped	Defective battery or faulty chip (defective system board)	Replace the system battery . If the problem persists, replace the system board .
Time-of-day not set - please run SETUP program	Incorrect Time or Date settings or defective system battery	Check the Time and Date settings. See " Using the System Setup Program " for instructions. If the problem persists, replace the system battery . If the problem still persists, replace the system board .
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> Unsupported CPU speed detected!	Microprocessor not supported by system	Install a correct version of the microprocessor in the specified microprocessor connector.
Unsupported CPU combination detected. System halted!	One microprocessor is operating at a different internal frequency or cache size than the other microprocessor	Ensure that both microprocessors are identical in type, operating frequency, and cache size.

Unsupported CPU speed in CMOS	Microprocessor not supported by BIOS	Upgrade the BIOS. See " Using the System Setup Program " for instructions.
Unsupported DIMM installed in the RAID DIMM slot!	Unsupported DIMM(s) installed in the onboard RAID DIMM socket	Install only unbuffered 64-MB SDRAM DIMM in the RAID DIMM socket.
Unsupported RAID key detected!	Unsupported RAID key detected installed in the onboard RAID key connector	Install the RAID key provided with the onboard RAID option kit in the integrated RAID hardware connector (RAID_KEY).
Utility partition not available	A utility partition was not found when <F10> was pressed	Install the utility partition in order to use it.
Warning! Detected mode switch from RAID to SCSI on the onboard RAID channel. Potential for data loss exists! Press <Y> to confirm the change; press any other key to cancel.	Type of controller has changed since previous system boot	Back up information on the drives before changing the type of controller used with the hard-disk drives. If <Y> is pressed, this message appears: Press <Y> to verify the change; press any other key to cancel the change.
Write fault Write fault on selected drive	Faulty diskette or hard-disk drive	Replace the diskette or hard-disk drive.

System Beep Codes

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

When a beep code is emitted, record it on a copy of the Diagnostics Checklist, and then look it up in [Table 2](#). If you are unable to resolve the problem by looking up the meaning of the beep code, use the Dell Diagnostics to identify a more serious cause. See "Running the Dell Diagnostics" in the *Dell PowerEdge 2400 Systems Installation and Troubleshooting Guide*.

Table 2. System Beep Codes

Code	Cause	Corrective Action
1-1-3	CMOS write/read failure	Replace the system board.
1-1-4	BIOS checksum	Reflash the BIOS firmware. If the problem persists, replace the system board.

	failure	
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 reseal the DIMMs. If the problem persists, replace one or more DIMMs. If the problem still persists, replace the system board.
1-3-2	No memory installed	Remove and reseal the DIMMs. If the problem persists, replace the DIMMs. If the problem still 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. If the problem persists, replace the DIMMs. If the problem still 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	Address line failure in the first 64 KB of main memory	
2-1-1 through 2-4-4	Parity failure in the first 64 KB of main memory	
	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	
3-1-4		

	failure 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 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 board test 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 3-4-2 3-4-3	Screen initialization failure Screen-retrace test failure Search for video ROM failure	Run the video tests in the Dell Diagnostics.
4-2-1 4-2-2	No timer tick Shutdown failure	Replace the system board .
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.
4-3-1	Improperly seated or faulty DIMMs	Remove and reseal the DIMMs . If the problem persists, replace the DIMMs . If the problem still persists, replace the system board .
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 chip failure (defective system board)	Replace the system board .
4-4-2	Parallel-port test failure	Replace the system board .

	(defective system board)	
4-4-3	Math coprocessor failure (defective microprocessor)	Remove and reseat the specified microprocessor . If the problem still persists, replace the microprocessor.
4-4-4	Cache test failure (defective microprocessor)	Remove and reseat the specified microprocessor . If the problem still persists, replace the microprocessor.

Warning Messages

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



NOTE: Warning messages are generated by either the application program or the operating system. See your *Installation and Troubleshooting Guide* and the documentation that accompanied the operating system and application program for more information on warning messages.

Diagnostics Messages

When you run a test group or subtest in the Dell Diagnostics, an error message may result. These particular error messages are not covered in this section. Record the message on a copy of the Diagnostics Checklist, and then follow the instructions in that section for obtaining technical assistance.

Alert Log Messages From the Dell OpenManage™ HIP Application

The Dell Hardware Instrumentation Package (HIP) server management application program 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. (More information about the **Alert Log** window and options is provided in the Dell HIP online help and the HP OpenView Network Node Manager (NNM) Special Edition (SE) with Dell OpenManage HIP *User's Guide*.)

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](#) lists some of the alert log messages from the Dell HIP application.

Table 3. Dell HIP Application Alert Log Messages

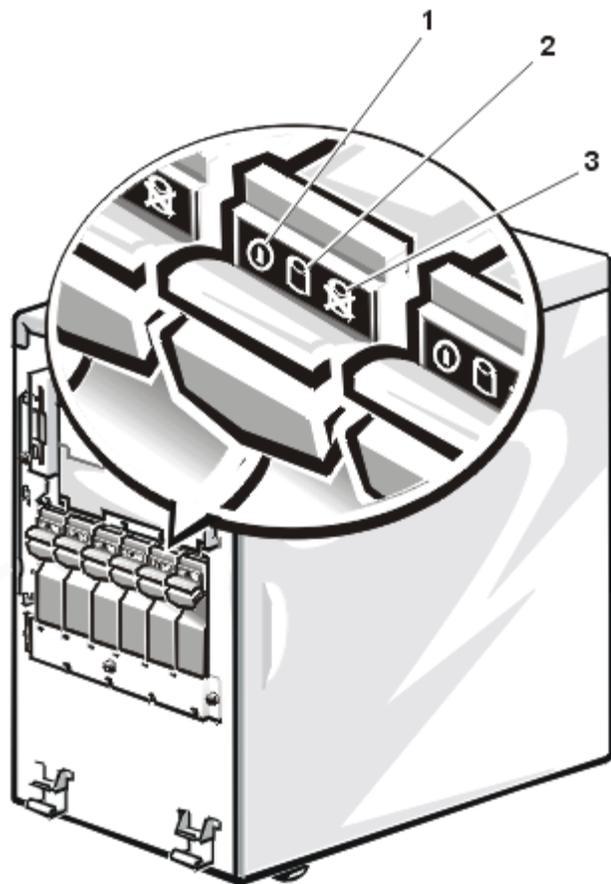
Message	Cause	Corrective Action
Automatic management	The server stopped functioning and	The server will reboot if the Reset or Power Cycle

notification has occurred	called the notification number specified in the DC Console Actions tab.	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.
Chassis intrusion detected*	The chassis of an attached system has been opened.	Check to make sure the system chassis is closed.
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 on 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.
Memory ECC fault detected	An ECC error has occurred in system memory.	Run the appropriate memory test(s) from the Dell Diagnostics.
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. If the problem persists, replace the system board.
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. If the problem persists, replace the system board .
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. If the problem persists, replace the system board .
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. If the problem persists, replace the system board .

SCSI Hard-Disk Drive Indicator Codes

If a redundant arrays of independent disks (RAID) controller such as the optional PowerEdge RAID Controller (PERC) 2/Si controller is installed in the system, three light-emitting diode (LED) indicators on each of the hard-disk drive carriers provide information on the status of the SCSI hard-disk drives (see Figure 1). The SCSI backplane firmware controls the drive online and drive failure indicators.

Figure 1. Hard-Disk Drive Indicators



- 1 Drive online indicator
- 2 Drive activity indicator
- 3 Drive failure indicator

[Table 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 RAID controller installed, you will see only the "drive online" and "drive bay empty" indicator patterns.

Table 4. SCSI Hard-Disk Drive Indicator Patterns

Condition	Indicator Code
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.

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Removing and Replacing Parts: Dell™ PowerEdge™ 2400 Systems Service Manual

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-

Overview

This section provides troubleshooting procedures for components inside the computer. Before you start any of the procedures in this section, perform the following tasks:

- Perform the procedures described in "[External Visual Inspection](#)."
 - Read the safety instructions in "[Safety First—For You and Your Computer](#)."
-

Recommended Tools

You need the following items to perform the procedures in this section:

- *Dell OpenManage Server Assistant* CD
- Formatted 3.5-inch diskette
- *Dell PowerEdge 2400 User's Guide*
- Key to the system keylock
- #1 and #2 Phillips screwdriver
- 1/4-inch nut driver, preferably with magnetic insert tip
- Wrist grounding strap as explained in "[Protecting Against Electrostatic Discharge](#)"

Safety First—For You and Your Computer

The procedures in this guide require that you remove the cover and work inside the computer. While working inside the computer, do not attempt to service the computer except as explained in this guide and elsewhere in Dell documentation. Always follow the instructions closely.

Working inside the computer is safe—if you observe the following precautions.

WARNING FOR YOUR PERSONAL SAFETY AND PROTECTION OF THE EQUIPMENT

Before starting to work on the computer, perform the following steps in the sequence listed:

1. **Turn off your computer and any peripherals (unless you are installing or removing a hard-disk drive).**
2. **Disconnect the computer and any attached peripherals. Also, disconnect any telephone or telecommunication lines from the computer.**
3. **Wear a wrist grounding strap, and clip it to any unpainted metal surface on the computer chassis, such as the metal around the card-slot openings at the back of the computer, before touching anything inside your computer.**

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

Precautions for Rack-Mountable Products

Observe the following precautions for rack stability and safety. Also refer to the rack installation documentation accompanying the system and the rack for specific warning and/or caution statements and procedures.

 **WARNING: Installing Dell system components in a Dell rack without the front and side stabilizers installed could cause the rack to tip over, potentially resulting in bodily injury under certain circumstances. Therefore, always install the stabilizers before installing components in the rack.**

After installing system components in a rack, never pull more than one component out of the rack on its slide assemblies at one time. The weight of more than one extended component could cause the rack to tip over and injure someone.

 *NOTE: Dell's server and storage systems are certified as components for use in Dell's rack cabinet using the Dell customer rack kit. The final installation of Dell systems and rack kits in any other brand of rack cabinet has not been approved by any safety agencies. It is the customer's responsibility to have the final combination of Dell systems and rack kits for use in other brands of rack cabinets evaluated for suitability by a certified safety agency.*

- System rack kits are intended to be installed in a Dell rack by trained service technicians. If you install the kit in any other rack, be sure that the rack meets the specifications of a Dell rack.
- Do not move large racks by yourself. Due to the height and weight of the rack, Dell recommends a minimum of two people to accomplish this task.
- Before working on the rack, make sure that the stabilizers are secure to the rack, extend to the floor, and that the full weight of the rack rests on the floor. Install front and side stabilizers on a single rack or front stabilizers for joined multiple racks before working on the rack.
- Always load the rack from the bottom up, and load the heaviest item in the rack first.
- Make sure that the rack is level and stable before extending a component from the rack.
- Extend only one component at a time from the rack.
- Use caution when pressing the component rail release latches and sliding a component into or out of a rack; the slide rails can pinch your fingers.
- After a component is inserted into the rack, carefully extend the rail into a locking position, and then slide the component into the rack.

- Do not overload the AC supply branch circuit that provides power to the rack. The total rack load should not exceed 80 percent of the branch circuit rating.
 - Ensure that proper airflow is provided to components in the rack.
 - Do not step on or stand on any system or component when servicing other systems or components in a rack.
-

Protecting Against Electrostatic Discharge

Static electricity can harm delicate components inside your computer. To prevent static damage, discharge static electricity from your body before you touch any of your computer's electronic components, such as the microprocessor. You can do so by wearing a wrist strap when working inside the computer, or, if a wrist strap is not available, by touching an unpainted metal surface on the computer chassis to discharge any static charge from your body.

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

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

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

The following notice may appear throughout this document to remind you of these precautions:

NOTICE: See "[Protecting Against Electrostatic Discharge](#)."

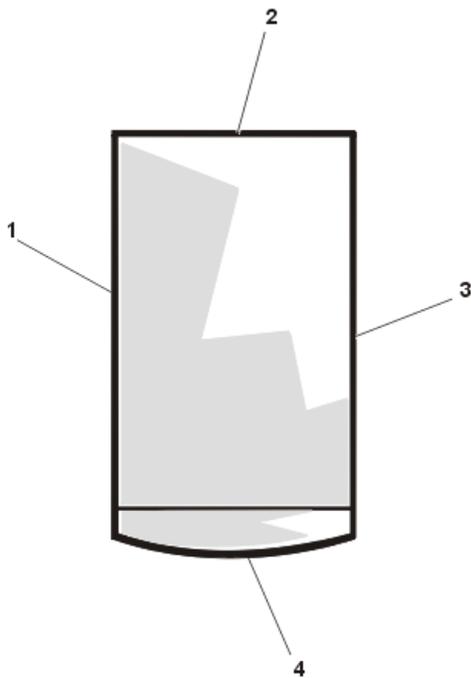
In addition, Dell recommends that you periodically review the safety instructions for this system as defined in the *Installation and Troubleshooting Guide*.

Computer Orientation

When following the procedures in this document, assume that the locations or directions relative to the computer are as shown in Figure 1.

Figure 1. Computer Orientation

- 1 Left side of system
- 2 Back of system
- 3 Right side of system
- 4 Front of system



Computer Covers

The computer is enclosed by a front bezel, a top cover, and a left- and right-side cover. To access the inside of the computer for service, you need to remove the front bezel and one or both of the side covers. To access the hard-disk drives, you must remove the front bezel. Removal of the right-side computer cover allows access to the system board, SCSI backplane board, and external SCSI devices. Removal of the left-side computer cover permits access to the diskette drive interface cable. Removal of the top cover permits access to the optional power supply distribution board, if two optional hot-pluggable power supplies are installed.

Front Bezel Removal

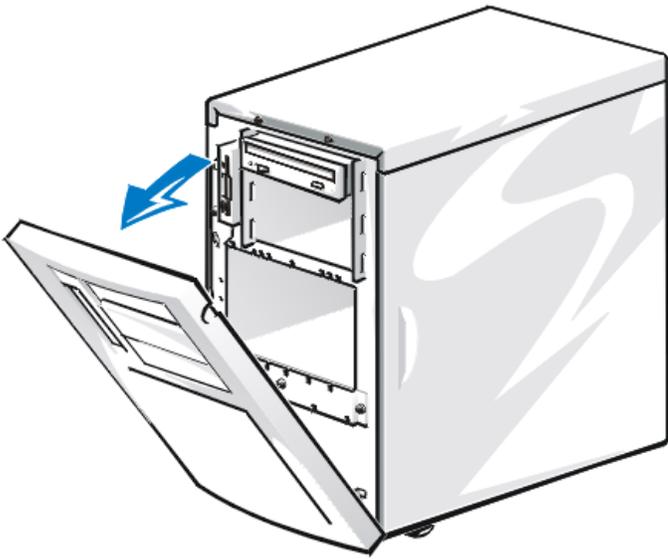
To remove the front bezel of the computer, perform the following steps:



CAUTION: See "[Safety First—For You and Your Computer](#)" before working inside your computer."

1. Turn the keylock on the front bezel of the computer to the unlocked position.
2. Grasp the bezel by the indentations on each 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 downward (see Figure 2) until it is at a right angle to the computer chassis.

Figure 2. Front Bezel Removal



4. Grasp the bezel along the edge adjacent to the computer chassis and unsnap the bezel to remove it from the chassis.

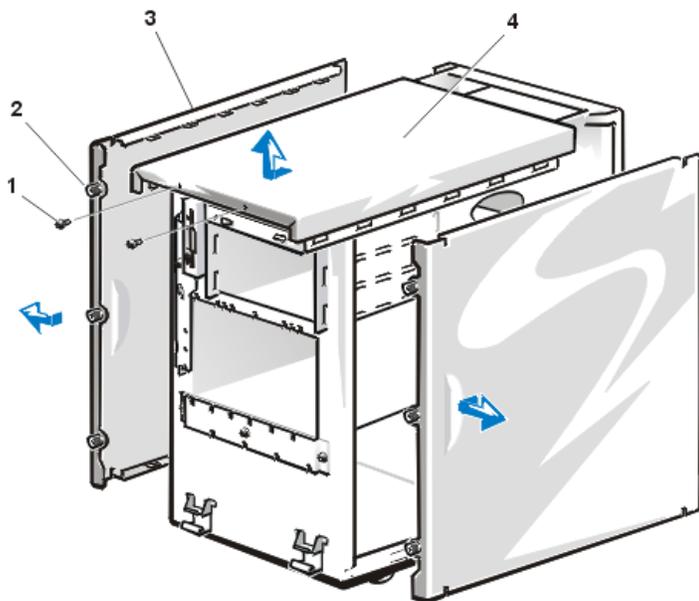
Front Bezel Replacement

To replace the front bezel, perform the following steps:

1. Make sure the keylock is in the unlocked position.
2. Snap the two tabs near the lower inside edge of the front bezel into the corresponding metal clips on the chassis, and pivot the bezel upwards into its closed position.
3. Set the keylock to the locked position.

Side Cover Removal

Figure 3. Computer Cover Removal



- 1 Screw (2)
- 2 Thumbscrew (3 per side cover)
- 3 Side Cover (2)
- 4 Top cover

To remove the computer side covers, perform the following steps:



CAUTION: See "[Safety First—For You and Your Computer](#)" before working inside your computer."

1. [Remove the front bezel.](#)
2. Loosen the three thumbscrews along the front edge of either side cover (see [Figure 3](#)).
3. Slide one cover forward about 12 millimeters (a half-inch) and grasp 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.
4. Repeat steps 2 and 3 to remove the remaining side cover, if necessary.

Side Cover Replacement

To replace a computer side cover, perform the following steps.

NOTICE: Make sure that there are no cables or cable connectors lying on the top diskette drive in the upper drive cage. Foreign objects on top of the drive can interfere with drive operation and permanently damage the drive. Check all cable connections, especially those that might have come loose during your work. Fold cables out of the way so that they do not catch on the computer cover.

1. Check that no tools or parts (including screws) are left inside the computer.
2. Fit the cover over the side rail at the bottom of the chassis, and slide it closed.
3. Secure the cover with the three thumbscrews (see [Figure 3](#)).

Top Cover Removal

To remove the top cover, perform the following steps:

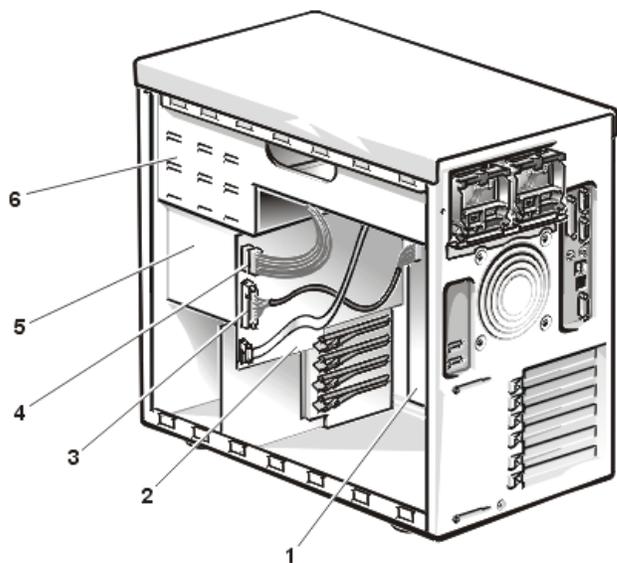
1. Remove both side covers.
2. Remove the two screws at the front edge of the top cover (see [Figure 3](#)).
3. Slide the top cover forward about 12 millimeters (a half inch) and lift the top cover off the chassis.

To replace the top cover, perform this procedure in reverse order.

Inside the Chassis

In Figure 4, the cover on the right side of the computer is removed to provide an interior view. Figure 4 also identifies the drive bays. Refer to these illustrations to locate interior features and components discussed later in this guide.

Figure 4. Inside the System (Right-Side View)



- 1 System board
- 2 SCSI backplane board
- 3 Interface cable
- 4 DC power cable
- 5 Hard-disk drive bays (4 or 6)
- 6 External drive bays (4)

The system board holds the computer's control circuitry, microprocessors, and other electronic components. Some hardware options are installed directly on the system board. The external drive bays provide space for up to three half-height 5.25-inch drives, typically CD-ROM drives or other removable-media drives. The diskette drive bay holds a 3.5-inch diskette drive. The hard-disk drive bays provide space for up to four 1.6-inch or six 1-inch SCSI hard-disk drives. These hard-disk drives are connected to a SCSI host adapter on the system board or on an expansion card, via the SCSI backplane board.

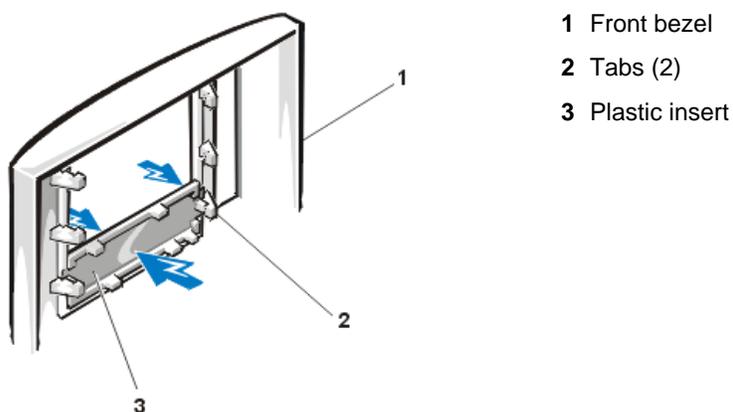
When you look inside the computer, note the power cables leading from the power supply(s). The power cables supply power to the system board, SCSI backplane board, externally accessible drives, and any expansion cards that connect to external peripherals.

For non-SCSI drives such as the diskette drive, an interface cable connects each drive to an interface connector on the system board or on an expansion card. For SCSI devices, interface cables connect externally accessible SCSI devices and the SCSI backplane board to a SCSI host adapter either on the system board or on an expansion card.

During a service procedure, you may be required to change a jumper or switch setting. For information on the system board jumpers, see "[Jumpers, Switches, and Connectors.](#)"

Front Bezel Inserts

Figure 5. Plastic Insert Removal



To remove a plastic insert, perform the following 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 5).
3. Pull the insert out of the bezel.

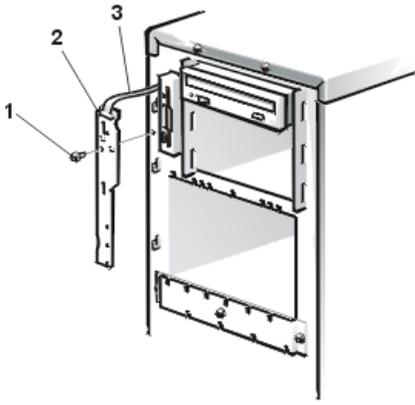
To replace a plastic insert, position the insert over the bay opening from the inside of the bezel and carefully press the insert into place.

If you need to remove a metal upper 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 6. Control Panel Assembly Removal

- 1 Screw
- 2 Control Panel
- 3 Control panel cable



To remove the control panel assembly, perform the following steps.

NOTICE: See "[Protecting Against Electrostatic Discharge.](#)"

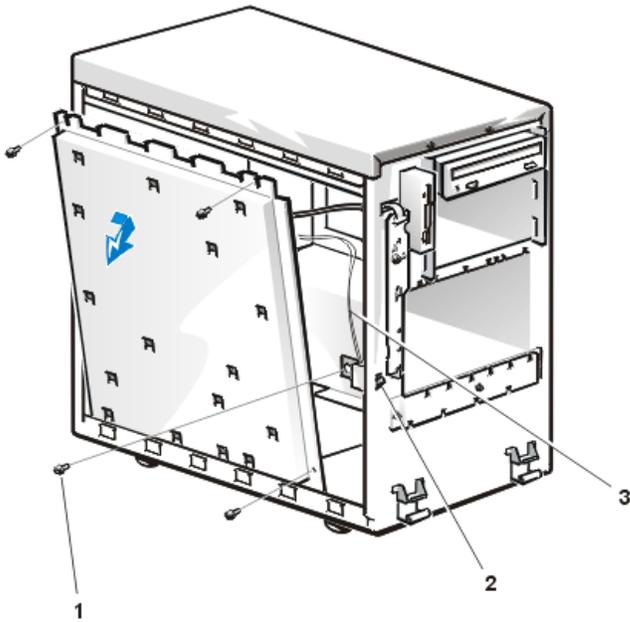
1. [Remove the front bezel.](#)
2. [Remove the computer covers.](#)
3. Disconnect the control panel cable from the PANEL connector on the system board (see "[System Board Features](#)").
The PANEL connector is near the top of the system board toward the front of the computer chassis.
4. Remove the screw holding the control panel assembly to the front of the computer chassis (see [Figure 6](#)).
5. Lift the control panel assembly out of the chassis hooks.
6. 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 6](#)), then slide the assembly down until its bottom edge engages the lower chassis hook. Secure the assembly with the screw, and reconnect the control panel cable to the system board PANEL connector.

Chassis Intrusion Switch

Figure 7. Chassis Intrusion Switch Removal

- 1 Screw
- 2 Chassis intrusion switch
- 3 Cable to system board



To remove the chassis intrusion switch, perform the following steps.

NOTICE: See "[Protecting Against Electrostatic Discharge.](#)"

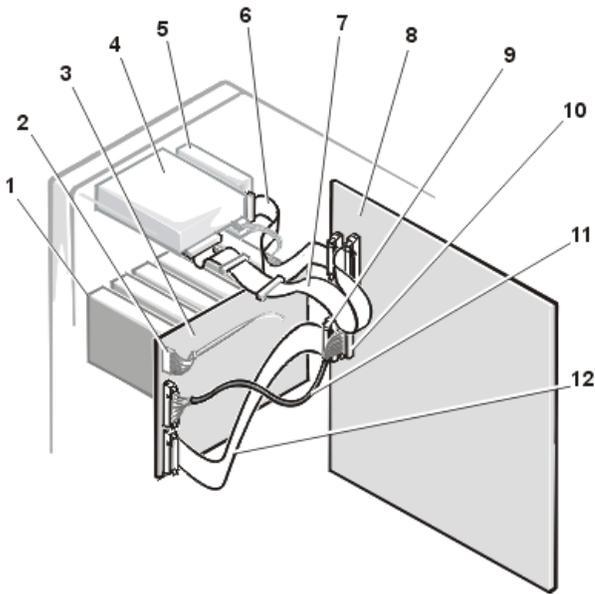
1. [Remove the front bezel.](#)
2. [Remove the computer covers.](#)
3. Disconnect the chassis intrusion switch cable from the INTRUS2 connector on the system board (see [system board features](#)).
The INTRUS2 connector is located at the left (front) edge of the system board.
4. Remove the screw holding the intrusion switch and its bracket to the computer chassis (see [Figure 7](#)).
5. Lift the chassis intrusion switch and cable out of the chassis.

Drives

Figure 8 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 8. Drive Hardware

- 1 SCSI hard-disk drive (4 or 6 slots)
- 2 Power input connector (POWER)
- 3 SCSI backplane board
- 4 SCSI CD-ROM drive
- 5 Diskette-drive
- 6 Diskette-drive interface cable
- 7 SCSI connector (SCSI2 ULTRA NARROW)
- 8 System board
- 9 SCSI connector (SCSI1 Ultra2/LVD)

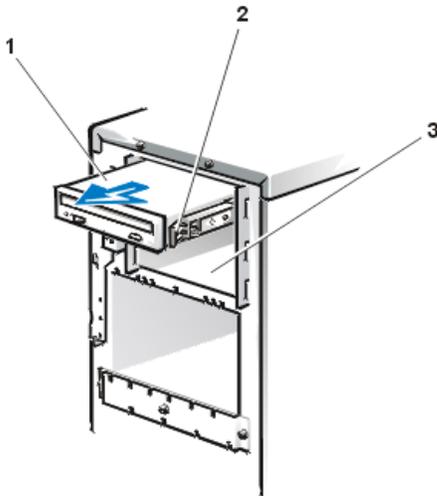


- 10 Ultra2/LVD SCSI cable
- 11 SCSI backplane interface cable
- 12 SCSI connector (BACKPLANE)

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.

Figure 9. Externally-Accessible 5.25-Inch Drive Removal



- 1 CD-ROM drive
- 2 Drive release tab
- 3 Lower bay for optional drives (2 slots)

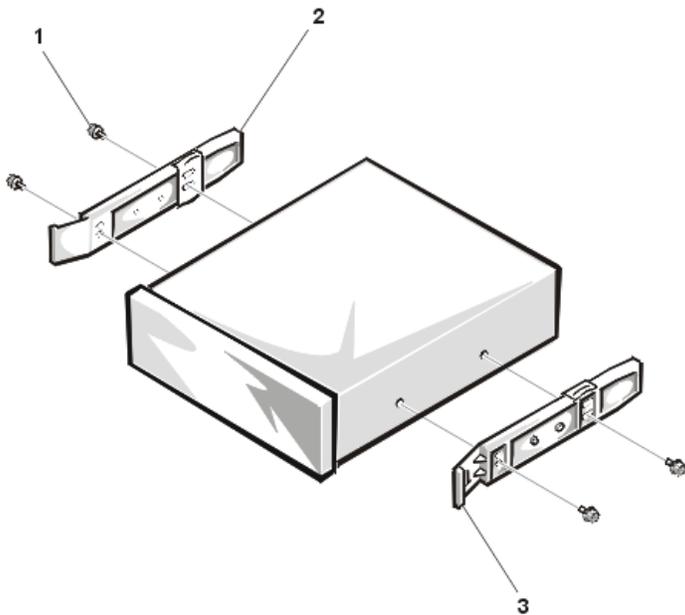
To remove a 5.25-inch drive assembly from one of the externally accessible drive bays, perform the following steps.

NOTICE: See "[Protecting Against Electrostatic Discharge.](#)"

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 the drive) on the two drive-release tabs, and slide the drive out of the bay (see [Figure 9](#)).
3. Remove the drive-mounting rails from the drive (see [Figure 10](#)).

Figure 10. Drive Mounting Rail Removal

- 1 Screws (4)



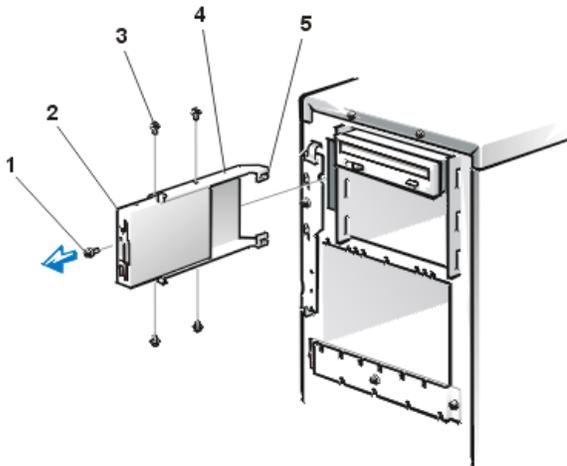
- 2 Drive mounting rails (2)
- 3 Drive release tabs (2)

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.

Figure 11. 3.5-inch Diskette Drive Removal



- 1 Retaining screw
- 2 3.5-inch diskette drive
- 3 Bracket mounting screws (4)
- 4 Drive bracket
- 5 Tabs (2)

To remove the 3.5-inch diskette drive, perform the following 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 11](#)).
4. Slide the drive assembly out of the bay.
5. Rotate the assembly to the right so the tabs at the back of the bracket clear the drive bay opening.

6. Remove the four bracket mounting screws securing the bracket to the drive (see [Figure 11](#)), and remove the drive.

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

Hard-Disk Drives

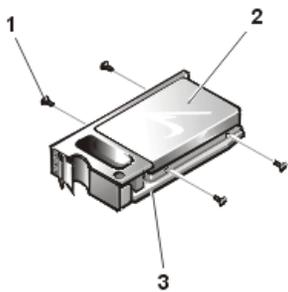
Each hard-disk drive is mounted in a hard-disk drive carrier. The front bezel must be removed to remove a drive carrier. Hot-pluggable drives may be individually powered down and replaced.

To remove a hard-disk drive and its carrier, perform the following steps.

NOTICE: See "[Protecting Against Electrostatic Discharge.](#)"

1. [Remove the front bezel.](#)
2. Wait until the drive status indicators adjacent to the drive bay signal that the drive may be removed safely.
3. The drive status indicators will flash sequentially as the drive is powered down. When all the drive's status indicators are turned off, the drive is ready for removal.
4. Open the drive carrier handle to release the carrier (see Figure 12).
5. Slide the carrier toward you until it is free of the drive bay.
6. Remove the four screws that secure the hard-disk drive to the carrier and remove the drive from the carrier.

Figure 12. Hard-Disk Drive and Carrier Removal



- 1 Screws (4)
- 2 Hard-disk drive
- 3 Carrier

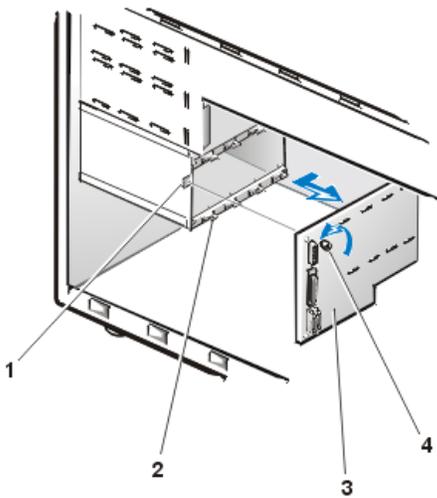
To install a replacement hard-disk drive, perform the following steps:

1. Insert the replacement hard-disk drive into the carrier and install four screws to secure the drive.
2. Install the replacement hard-disk drive and carrier into its slot. Raise the handle until it engages the front panel, then close the latch to ensure that the drive is fully seated in the SCSI backplane board.

SCSI Backplane Boards

Figure 13. SCSI Backplane Removal

- 1 Tabs on chassis
- 2 Tabs on hard-disk drive cage
- 3 SCSI backplane board
- 4 Thumbscrew



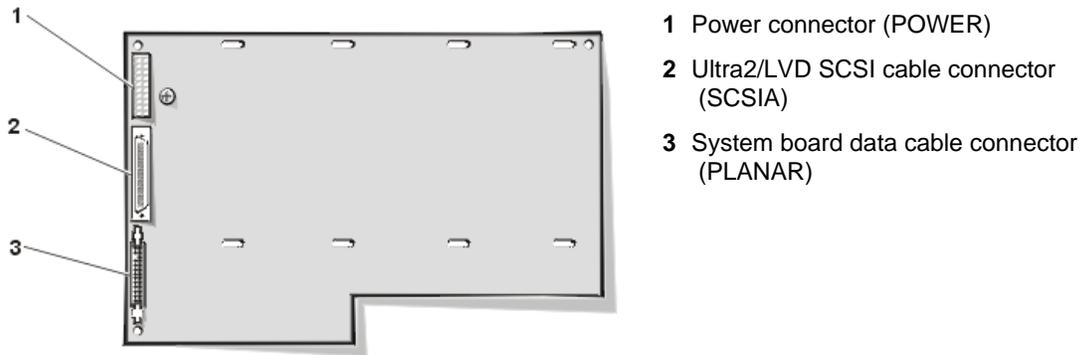
To remove a SCSI backplane board, perform the following steps.

NOTICE: See "[Protecting Against Electrostatic Discharge.](#)"

1. Unlatch and pull the hard-disk drives 12 millimeters (1/2 inch) away from their SCSI backplane connector.
2. Record the connector used and disconnect all cables attached to the SCSI backplane board (see Figure 14).

DC power connector (POWER) is connected to the power input connector on the backplane board. The interface cable connectors vary with the type of SCSI backplane board installed.

Figure 14. SCSI Backplane Connectors



3. Loosen the thumbscrew on the SCSI backplane board (see [Figure 13](#)).
4. Slide the SCSI backplane board out and away from the system board about 6.3 millimeters (a quarter-inch) and lift it off the L-shaped mounting tabs on the hard-disk drive cage.

When installing a replacement SCSI backplane board, ensure that the replacement board is identical to the SCSI backplane you just removed.

Cooling Shroud

The plastic cooling shroud inside the system is used to improve airflow over the microprocessors. You will need to remove this shroud to access certain components on the system board.

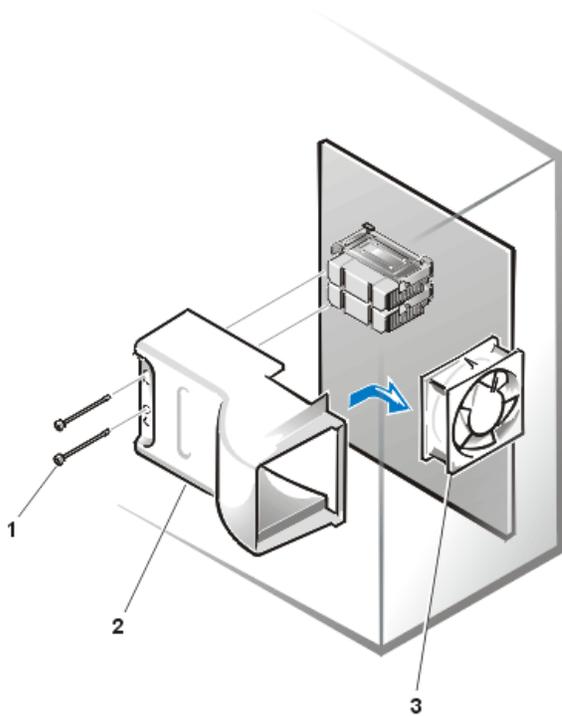
Cooling Shroud Removal

To remove the cooling shroud, perform the following steps.

NOTICE: See "[Protecting Against Electrostatic Discharge.](#)"

1. Turn off the system, including any attached peripherals, and disconnect the power cable from the electrical outlet.
2. Remove the right-side [computer cover](#).
3. Unscrew and remove the two retention pins (see Figure 15).

Figure 15. Cooling Shroud Removal



- 1 Retention pins
- 2 Cooling shroud
- 3 Cooling fan

4. Remove the shroud by lifting the end of the shroud closest to the front of the system until the opposite end of the shroud disengages from the cooling fan on the system back panel.

Cooling Shroud Replacement

To replace the cooling shroud, perform the following steps:

1. Hook the upper edge of the large opening on the end of the cooling shroud over the top of the cooling fan on the system back panel.
2. Lower the other end of the shroud into place over the microprocessor(s).

NOTICE: Hand tighten the retention pins securing the cooling shroud. Do not use tools or over-tighten these retention pins.

3. Secure the shroud by reinstalling the two retention pins.

Cooling Fans

Two cooling fans are installed in the Dell PowerEdge 2400 system chassis: a fan on the chassis back panel and a front fan beneath the drive bays.

Back Panel Fan Removal

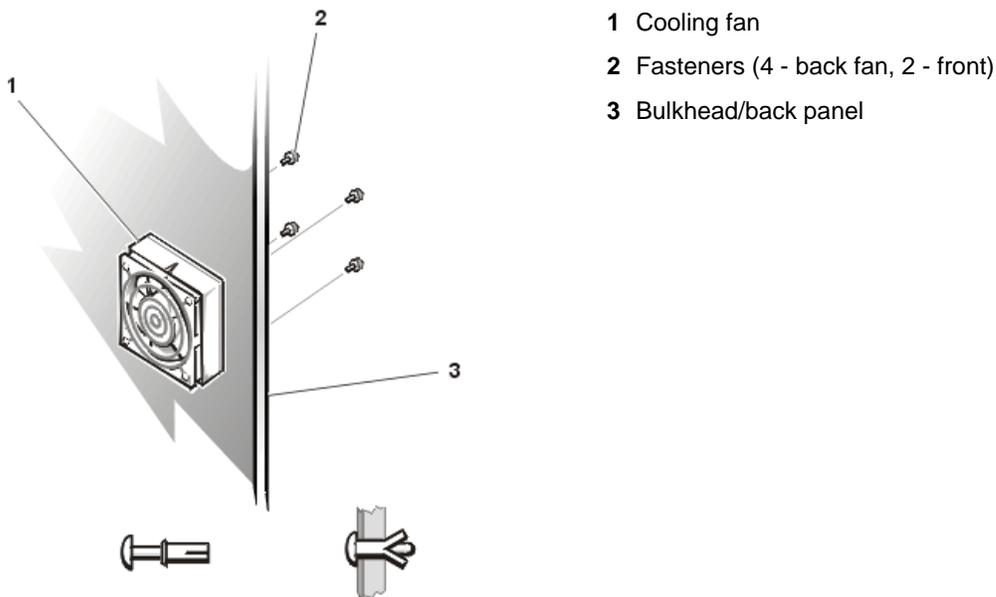
To remove and replace the cooling fan at the chassis back panel, perform the following steps.

NOTICE: See "[Protecting Against Electrostatic Discharge.](#)"

1. Turn off the system, including any attached peripherals, and disconnect the AC power cable from its power source.
2. Remove the right-side [computer cover](#).
3. [Remove the cooling shroud](#).
4. Disconnect the cooling fan cable from the FAN3 (back fan) connector on the system board (see [System Board Features](#)).
5. Remove the four fasteners that secure the fan to the back of the chassis:
 - a. On the fan side, push the plunger of each fastener back into the fastener barrel, using a coin, the flat surface of a flat-tipped screwdriver, or other small flat object.
 - b. On the opposite side of the back panel, grasp the extended head of the fastener and pull the fastener completely out of the back panel, as shown in Figure 16.

Keep the four fasteners for securing the replacement fan.

Figure 16. Fan Removal



6. Remove the fan from the chassis.

Back Panel Fan Replacement

To install the replacement fan on the back of the chassis, perform the following steps.

NOTICE: See "[Protecting Against Electrostatic Discharge.](#)"

1. Secure the fan to the back of the chassis using the four fasteners you removed in [step 5](#) of the Back Fan Removal procedure.
2. Connect the fan power cord to the system board FAN3 connector.
3. Replace the right-side [computer cover](#) and reconnect the system to AC power.
4. Connect the system and any attached peripherals to an AC power source and turn on the system.

Front Fan Removal

To remove the cooling fan beneath the drive bays at the chassis front, perform the following steps.

NOTICE: See "[Protecting Against Electrostatic Discharge](#)."

1. Turn off the system, including any attached peripherals, and disconnect the AC power cable from its power source.
2. [Remove the front bezel](#).
3. Remove the right-side [computer cover](#).
4. Unlatch and pull each hard-disk drive 25-mm (1-inch) out of its slot.
5. [Remove the SCSI backplane board](#).
6. If a full-length expansion card is installed in slot #1, remove that expansion card.

This ensures adequate clearance to remove the fan fastener from the bulkhead.

7. Disconnect the front cooling fan cable from the FAN1 (front fan) connector on the system board (see [System Board Features](#)).
 8. Remove the two fasteners that secure the fan to the chassis back panel:
 - a. At the fan side, push the plunger of each fastener back into the fastener barrel, using a coin, the flat surface of a flat-tipped screwdriver, or other small flat object.
 - b. On the opposite side of the bulkhead, grasp the extended head of the fastener and pull the fastener completely out of the back panel.
- Keep the two fasteners for securing the replacement fan.

9. Remove the fan from the chassis.

Front Fan Replacement

To install the replacement fan to the inner bulkhead beneath the drive bays at the chassis front, perform the following steps.

NOTICE: See "[Protecting Against Electrostatic Discharge](#)."

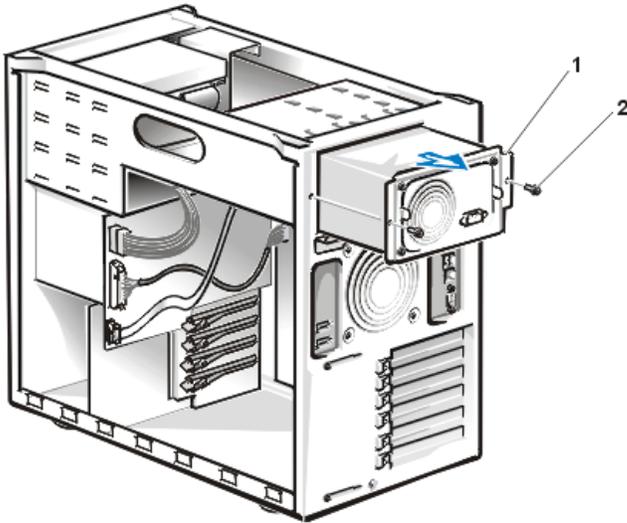
1. Slide the left side of the fan under the two chassis tabs on the left side and position the fan to rest on a third tab extending from the bulkhead.
 2. Secure the fan to the bulkhead using the two fasteners you removed in [step 8](#) of the Front Fan Removal procedure.
 3. Route the fan power cord through the hole in the inner chassis wall near the system board FAN1 connector.
 4. Connect the fan power cord to the system board FAN1 connector.
 5. Install any expansion card you removed from slot #1.
 6. Install the SCSI backplane board.
 7. Install each hard-disk drive into its slot and close its latch.
 8. Replace the right-side [computer cover](#) and reconnect the system to AC power.
 9. [Replace the front bezel](#).
 10. Connect the system and any attached peripherals to an AC power source and turn on the system.
-

Power Supplies

Dell PowerEdge 2400 systems may contain a single, standard, power supply, or it may contain two optional, redundant, hot-pluggable power supplies.

Standard Power Supply

Figure 17. Standard Power Supply Removal



- 1 Power supply
- 2 Mounting screws (2)

To remove a standard power supply, perform the following steps.

NOTICE: See "[Protecting Against Electrostatic Discharge](#)."

! **CAUTION:** The power supply is heavy. Support it with both hands when installing or removing it.

1. Turn off the system, including any attached peripherals, and disconnect the AC power cable from its power source.
2. [Remove the front bezel](#).
3. Remove both [computer side covers](#).
4. [Remove the top cover](#).
5. Disconnect the power cable harness from the POWER connector on the [SCSI backplane board](#), the POWER1 connector on the [system board](#), and the diskette drive and other drives in the external drive bays.

When you disconnect a cable connector from the SCSI backplane board and the system board, press the plastic latch on one side of the connector to release it.

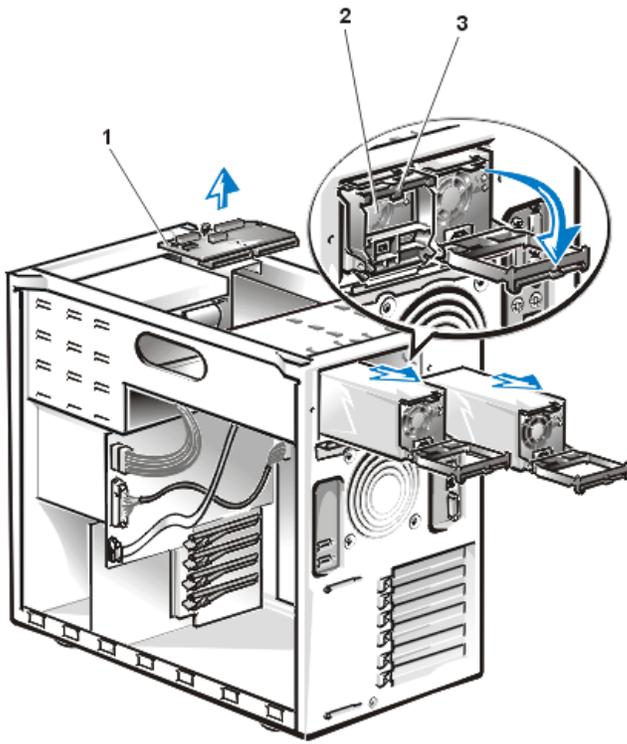
6. Remove the two screws on either side of the power supply (see [Figure 17](#)).
7. Using both hands, slowly remove the power supply and its cable harness from its slot.

When installing the replacement power supply, insert the cable harness into the slot and route the separate connectors to their respective locations as you are inserting the power supply.

Hot-Pluggable Power Supply

Figure 18. Hot-Pluggable Power Supply Removal

- 1 Power supply distribution board (PSDB)



- 2 Power supply
- 3 Latch on handle

To remove a hot-pluggable power supply with the system operating, perform the following steps.

NOTICE: See "[Protecting Against Electrostatic Discharge.](#)"



CAUTION: The power supply is heavy. Support it with both hands to avoid possible injury to yourself or to others when installing or removing it.



CAUTION: Avoid touching the card-edge connector on the back of the power supply. Wait 10 to 20 seconds after disconnecting the power supply from its slot connector before removing the power supply or coming into contact with its back card-edge connector.

1. Verify that the red failure indicator is lit on the faulty power supply.
2. Disconnect the AC power cable from the AC power receptacle on the back of the power supply you intend to remove.
3. Remove the power supply:
 - a. Using your thumb and index finger, squeeze the catch in the middle of the power supply handle (see [Figure 18](#)).
 - b. Rotate the handle downward to release the power supply from the system chassis.
 - c. Pull the power supply 25 mm (1 inch) away from its back connector and wait 10 to 20 seconds to allow energized components to dissipate.
 - d. Pull the power supply out of the chassis.

To install a Replacement Hot-Pluggable Power Supply, perform the following steps.

NOTICE: Do not use excessive force when sliding the power supply into the chassis.



CAUTION: The power supply is heavy. Support it with both hands to avoid possible injury to yourself or to others when installing or removing it.

1. Slide the power supply into the chassis.
2. Rotate the power supply handle to the closed position ([see Figure 18](#)).

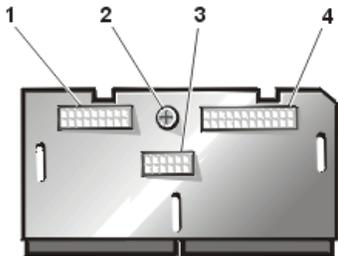
For better leverage, press against the upper corners of the handle.

 **NOTE:** The power supply will not function until the handle is closed.

3. Repeat steps 1 and 2 to install the second power supply, if necessary.
4. [Replace top and side covers](#).
5. [Replace the front bezel](#).
6. Connect the AC power cable to the power supplies and to the electrical outlet.
Make sure that the AC power cable passes through the plastic strain-relief clip on the system back panel.
7. Connect the system and any attached peripherals to an AC power source and turn on the system.
8. Observe the back panel of the power supply to verify that the green power indicator LED is lit and that the red failure LED is off.

Power Supply Distribution Board

Figure 19. Power Supply Distribution Board Removal



- 1 Power connector P2
- 2 Thumbscrew
- 3 Power connector P3
- 4 Power connector P1

To remove the power supply distribution board (PSDB), perform the following steps.

NOTICE: See "[Protecting Against Electrostatic Discharge](#)."

 **NOTE:** The PSDB is present only in systems with hot-pluggable power supplies.

1. Turn off the system, including any attached peripherals, and disconnect the AC power cable from its power source.
2. [Remove the front bezel](#).
3. Remove both [computer side covers](#).
4. [Remove the top cover](#).
5. Disconnect the AC power cable from the AC power receptacle on the back of the power supply.



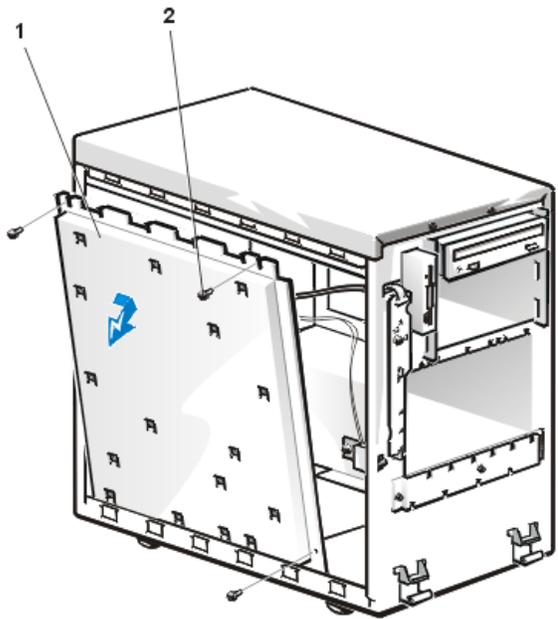
CAUTION: The power supply is heavy. Support it with both hands to avoid possible injury to yourself or to others when installing or removing it.

6. [Remove both hot-pluggable power supplies.](#)
7. At the PSDB (see [Figure 18](#)), record the mating connector location and disconnect the 12-conductor power cable harness attached to the P3 connector.
8. Record the mating connector location and disconnect the 24-conductor power cable harness attached to the P1 connector on the PSDB.
9. Record the mating connector location and disconnect the 18-conductor power cable harness attached to the P2 connector on the PSDB.
10. Loosen the thumbscrew on the PSDB and remove the PSDB from the chassis.

When installing the replacement PSDB, fold the cable harnesses out of the way as you are inserting the PSDB.

System Board

Figure 20. System Board Removal



- 1 System board bracket
- 2 Screws (3)

To remove the system board, perform the following steps.

NOTICE: See "[Protecting Against Electrostatic Discharge.](#)"

1. Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
2. Remove the right-side [computer cover](#).
3. Remove all external peripheral cables from their connectors at the back of the computer.
4. Remove the [cooling shroud](#).
5. Record the locations and remove all internal cables attached to the system board.
6. Record the slot number and remove any expansion card internal cables, and then remove all [expansion cards](#).
7. Remove the three screws securing the system board bracket to the chassis (see [Figure 20](#)).
8. Slide the system board and bracket assembly toward the front of the chassis until it stops.

9. Allow the system board and bracket assembly to tilt outward slightly (see [Figure 20](#)).
10. Lift the system board and bracket up and out of the chassis and lay the bracket, system board side up, on a flat surface.
11. Unscrew the thumbscrew securing the system board to the bracket.
12. Slide the system board toward the front of the bracket about 6.3 mm (1/4 inch).
13. Carefully lift the system board off the bracket. Be sure to lift evenly and not twist the system board.
14. [Remove the microprocessor\(s\)](#) and [terminator card](#).
15. Remove the [DIMMs](#).
16. Remove the integrated RAID hardware key connector (if installed).
17. Remove the integrated RAID SDRAM DIMM (if installed).

Keep this DIMM separate from the system memory DIMMs.

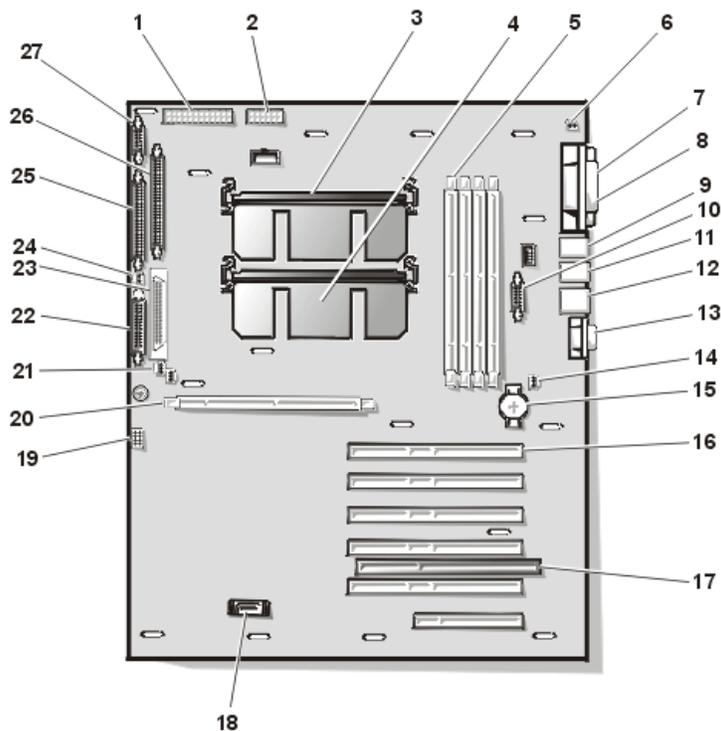
NOTICE: Only use unbuffered 64-MB SDRAM DIMM in the DIMM_RAID socket

When installing the replacement system board, install the system board on the bracket, then install the following components which you removed from the old system board: DIMMs, microprocessor(s), terminator card or secondary microprocessor, expansion cards, RAID hardware key and RAID DIMM (if the integrated RAID system is used). Set the system board jumpers to the same settings on the board you removed. Next, install the cooling shroud, connect all internal cables to the system board, and then replace the computer covers. Reconnect the I/O cables and power cables to the back panel, and turn the system power on.

System Board Features

Figure 21 defines the system board features. Use this figure when replacing your system board or components that attach to the system board.

Figure 21. System Board Features



1	Power input connector (POWER1)
---	--------------------------------

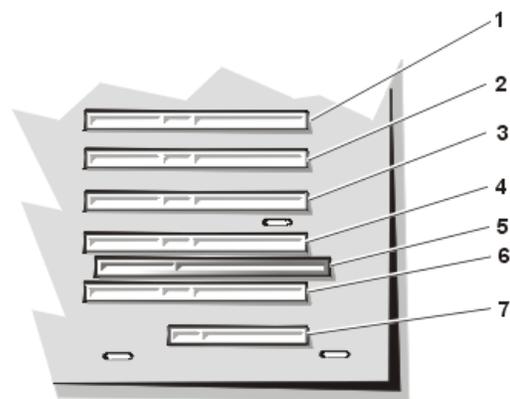
2	Power input connector (POWER2)
3	Primary microprocessor (PROC_1)
4	Secondary microprocessor (PROC_2)
5	DIMM sockets (DIMM_A [right]–DIMM_D)
6	Chassis intrusion switch connector (unused) (INTRUS1)
7	Parallel port connector (PARALLEL)
8	Serial port connectors (2) (SERIAL1 and SERIAL2)
9	Keyboard and mouse connectors (KYBD/MOUSE)
10	Integrated RAID hardware key connector (RAID_KEY)
11	Universal Serial Bus (USB) connectors (2)
12	Network interface connector (ENET)
13	Video connector (VGA)
14	Fan connector (FAN3)
15	Battery connector (BATTERY)
16	PCI connectors (PCI1 [top] through PCI6)
17	ISA connector (ISA5)
18	Dell Remote Assistant Card connector (SVR_MGT)
19	Configuration jumpers

20	DIMM socket for optional RAID controller (DIMM_RAID)
21	Fan connectors (FAN1, FAN2)
22	SCSI backplane board interface cable connector (BACKPLANE)
23	Ultra2/LVD SCSI connector (SCSI1 ULTRA2/LVD)
24	Chassis intrusion switch connector (INTRUS2)
25	Diskette-drive interface connector (FLOPPY)
26	Ultra/Narrow SCSI connector (SCSI2 ULTRA NARROW)
27	Control panel interface cable connector (PANEL)

Expansion Cards

The system board contains five 64-bit 33-megahertz (MHz) PCI expansion-card connectors (PCI1 through PCI5), one 32-bit 33-MHz PCI expansion card connector (PCI6), and one ISA expansion-card connector (ISA5) (see Figure 22). Because the ISA expansion-card connector shares an expansion slot with expansion-card connector PCI5, you can install a maximum of six expansion cards.

Figure 22. Expansion-Card Connectors



- 1 PCI expansion-card connector PCI1
- 2 PCI expansion-card connector PCI2
- 3 PCI expansion-card connector PCI3
- 4 PCI expansion-card connector PCI4
- 5 ISA expansion-card connector ISA5
- 6 PCI expansion-card connector PCI5
- 7 PCI expansion-card connector PCI6

Choosing an Expansion Slot

Follow these guidelines when you add an expansion card:

- Install 64-bit PCI expansion cards in connectors PCI1 through PCI5.
- Install a Dell Remote Assistant Card (DRAC), version 2.0, in connector PCI6.
- Install an ISA expansion card in connector ISA5.
- Install full-length expansion cards in PCI slots PCI3 through PCI6 and ISA slot ISA5.

Expansion Card Installation

To install an expansion card, perform the following steps.

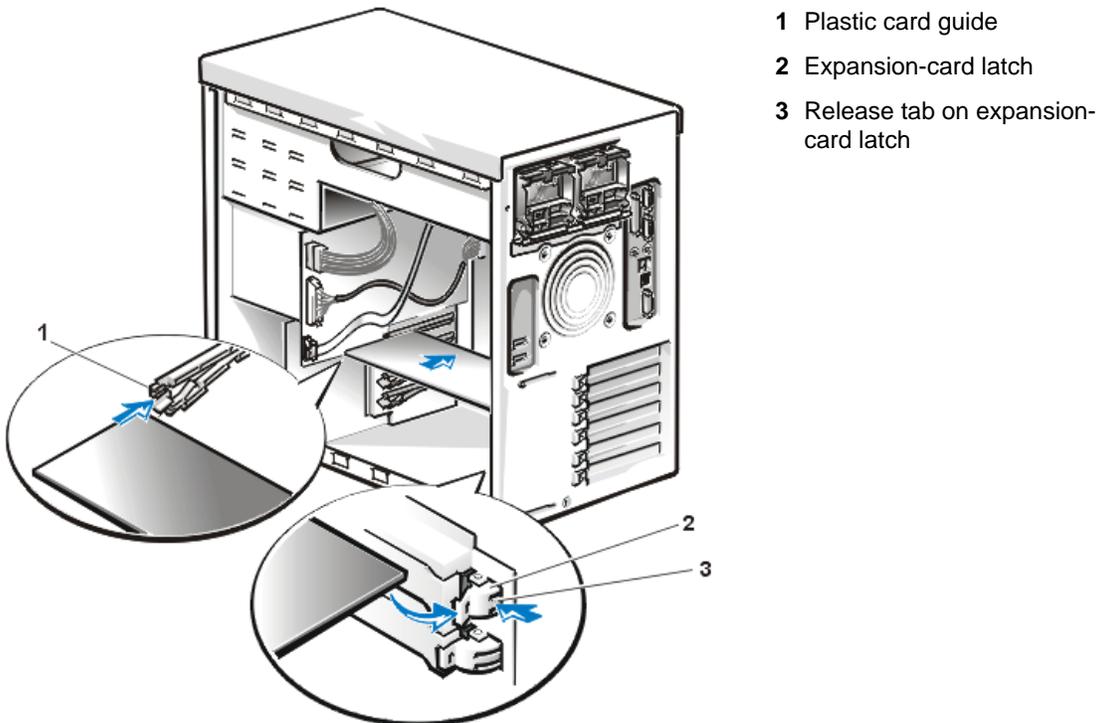
NOTICE: You must use the Resource Configuration Utility (RCU) when you add or remove an ISA expansion card. Failure to do so may cause resource conflicts between PCI devices (such as PCI expansion cards, the built-in video controller, or the built-in SCSI host adapter). See "Using the Resource Configuration Utility" in the *User's Guide* for instructions.

NOTICE: See "[Protecting Against Electrostatic Discharge.](#)"

1. If you are installing an ISA expansion card, start the Resource Configuration Utility, and add the new expansion card to the configuration information.
2. Remove the right-side [computer cover](#).
3. Prepare the expansion card for installation.

See the documentation that came with the expansion card for information on configuring the card, making internal connections, or otherwise customizing the card for the system.
4. Select the expansion slot that you will install the new expansion card in.
5. To release the expansion card bracket, press and hold the clip on the back of the system while you press the release tab on the latch inside the system (see [Figure 23](#)), and then rotate the latch away from the expansion-card bracket.

Figure 23. Expansion Card Installation



6. To install the card, insert the card-edge connector firmly into the expansion-card connector on the chassis.
7. When the card is firmly seated in the connector and the card-mounting bracket is aligned with the brackets on either side of it, close the expansion-card latch.
8. If the expansion card is a full-length card, secure the inner end of the card by closing the plastic latch on the card guide over the top edge of the card ([see Figure 23](#)).
9. Connect any cables that should be attached to the card.

See the documentation that came with the card for information about cable connections.

10. Replace the right-side [computer cover](#), and then reconnect the computer and peripherals to their AC power sources and turn them on.
11. If you installed an ISA expansion card, run the Resource Configuration Utility and add the new expansion card to the configuration.

See "Using the Resource Configuration Utility" in the *User's Guide* for instructions.

Expansion Card Removal

To remove an expansion card, perform the following steps.

NOTICE: See "[Protecting Against Electrostatic Discharge](#)."

1. Remove the right-side [computer cover](#).
2. Disconnect any cables connected to the card.
3. To release the expansion card bracket, press and hold the clip on the back of the system while you press the release tab on the latch inside the system ([see Figure 23](#)), and then rotate the latch away from the expansion-card bracket.
4. If the expansion card is a full-length card, release the card's inner end (towards the front of the system) by opening the tab on the plastic card guide ([see Figure 23](#)).
5. Grasp the expansion card by its top corners, and carefully remove it from the expansion-card connector.
6. If you are removing the card permanently, install a metal filler bracket over the empty card-slot opening.



NOTE: Installing a filler bracket over an empty expansion slot is necessary to maintain Federal Communications Commission (FCC) certification of the system. The brackets also keep dust and dirt out of the computer and aid in proper cooling and airflow inside the computer.

7. Replace the right-side [computer cover](#), and then reconnect the computer and peripherals to their AC power sources and turn them on.
8. If you are relocating or removing an ISA expansion card, run the Resource Configuration Utility, and delete the expansion card from the configuration information.

See "Using the Resource Configuration Utility," in the *User's Guide* for instructions.

DIMMs

The four dual in-line memory module (DIMM) sockets on the system board can accommodate 64 megabytes (MB) to 2 gigabyte (GB) of registered SDRAM. The DIMM sockets are located near the back edge of the system board ([see Figure 21](#)).

NOTICE: Only use unbuffered 64-MB SDRAM DIMM in the DIMM_RAID socket.

A single optional DIMM socket (DIMM_RAID) for the integrated RAID controller is shown in [Figure 21](#). This DIMM is removed and replaced using the following procedures for conventional memory DIMMs; however, only unbuffered 64-MB SDRAM DIMM that are specifically for use with the integrated RAID controller can be used.

Memory Upgrade Kits

The system is upgradable to 2 GB by installing combinations of 64-, 128-, 256-, and 512-MB registered DIMMs. You can purchase memory upgrade kits from Dell as needed.

 **NOTE:** The DIMMs must be rated to run at 133 MHz or faster.

DIMM Installation Guidelines

Starting with the socket nearest to the system board's back edge, the DIMM sockets are labeled "DIMM_A" through "DIMM_D" (see [Figure 24](#)). When you install DIMMs, follow these guidelines:

- Install a DIMM in socket DIMM_A before socket DIMM_B, socket DIMM_B before socket DIMM_C, and so on.
- If you install different sizes of DIMMs, install them in order of descending capacity, beginning with the highest-capacity DIMM in socket DIMM_A.
- You do not need to install DIMMs in pairs.

Figure 24. DIMM Socket Locations

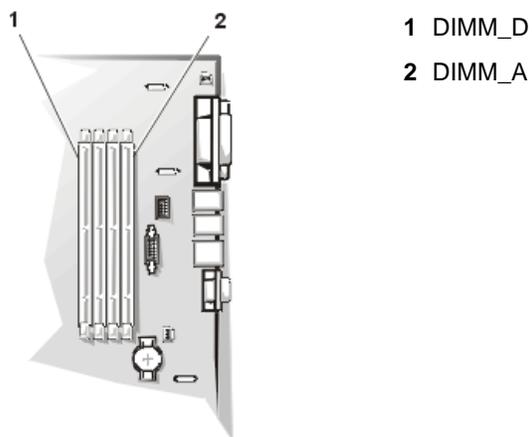


Table 1 illustrates several sample memory configurations based on these guidelines.

Table 1. Sample DIMM Configurations

Total Desired Memory	DIMM Sockets			
	DIMM_A	DIMM_B	DIMM_C	DIMM_D
64 MB	64 MB	None	None	None
128 MB	64 MB	64 MB	None	None
128 MB	128 MB	None	None	None
192 MB	128 MB	64 MB	None	None
512 MB	256 MB	256 MB	None	None
1 GB	256 MB	256 MB	256 MB	256 MB
2 GB	512 MB	512 MB	512 MB	512 MB

Performing a Memory Upgrade

To perform a memory upgrade to the system board, perform the following steps.

NOTICE: See "[Protecting Against Electrostatic Discharge.](#)"

1. Turn off the system, including any attached peripherals, and disconnect the AC power cable from its power source.
2. [Remove the front bezel](#).
3. Remove the right-side [computer cover](#).
4. Remove the [cooling shroud](#).
5. Locate the DIMM sockets in which you will install or replace DIMMs.

[Figure 21](#) shows the relative location of the DIMM sockets on the system board. [Figure 24](#) shows the labeling of the DIMMs sockets.

6. [Install](#) or [replace](#) the DIMMs as necessary to reach the desired memory total.
7. Replace the [cooling shroud](#), the [computer cover](#), the [front bezel](#), reconnect the system to the electrical outlet, and turn on the system.

After the system completes the power-on self-test (POST) routine, it runs a memory test that displays the new memory total, which includes all newly installed memory.



NOTE: If the memory total is incorrect, turn off and disconnect the computer and peripherals from their AC power sources, remove the right-side computer cover, and check all the installed DIMMs to make sure they are seated properly in their sockets. Ensure that the installed DIMMs conform to one of the configurations listed in Table 1.

The system detects that the new memory does not match the system configuration information, which is stored in nonvolatile RAM (NVRAM). The monitor displays an error message that ends with the following words:

Press <F1> to continue; <F2> to enter System Setup

9. Press <F2> to enter the System Setup program, and check the **System Memory** setting in the system data box on the System Setup screens. The system should have already changed the value in the **System Memory** setting to reflect the newly installed memory.
10. If the **System Memory** value is incorrect, one or more of the DIMMs may not be installed properly. Repeat steps 1 through 9.
Carefully examine each DIMM to ensure proper seating in its socket.
11. Run the Resource Configuration Utility. Then save the configuration and exit the utility.

Running the Resource Configuration Utility and saving the configuration is required for the system to recognize the newly installed DIMM(s). See "Using the Resource Configuration Utility" in the *User's Guide* for instructions on running the utility and saving the configuration.

12. Run the system memory test in the Dell Diagnostics (see your *Installation and Troubleshooting Guide* for complete information).

DIMM Installation

To install a DIMM, perform the following steps.

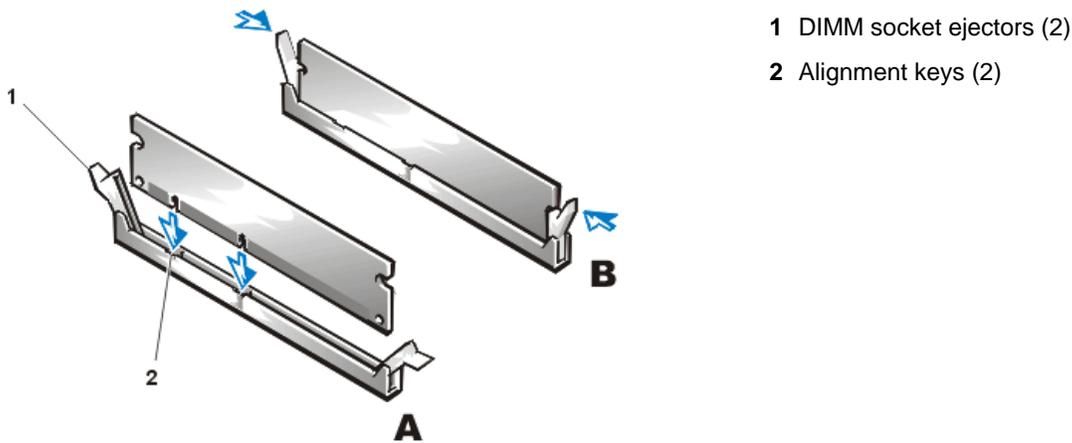
NOTICE: See "[Protecting Against Electrostatic Discharge](#)."

1. Turn off the system, including any attached peripherals, and disconnect the AC power cable from its power source.
2. [Remove the front bezel](#).
3. Remove the right-side [computer cover](#).
4. Disconnect the AC power cable and all peripheral cables from the back panel of the system.
5. Remove the [cooling shroud](#).
6. Locate the DIMM sockets in which you will install or replace DIMMs.

Figure 21 shows the relative location of the DIMM sockets on the system board. Figure 24 shows the labeling of the DIMMs sockets.

7. Press down and outward on the ejectors on the DIMM socket, as shown in Figure 25, to allow the DIMM to be inserted into the socket.

Figure 25. DIMM Installation



8. Align the DIMM's edge connector with the slot in the center of the DIMM socket, and insert the DIMM in the socket (see step A in Figure 25).

The DIMM socket has two alignment keys that allow the DIMM to be installed in the socket in only one way.

9. Press down on the DIMM with your thumbs while pulling up on the ejectors with your index fingers to lock the DIMM into the socket (see step B in Figure 25). When the DIMM is properly seated in the socket, the ejectors on the DIMM socket should align with the ejectors on the other sockets with DIMMs installed.

10. Repeat steps 7 through 9 to install the remaining DIMMs.

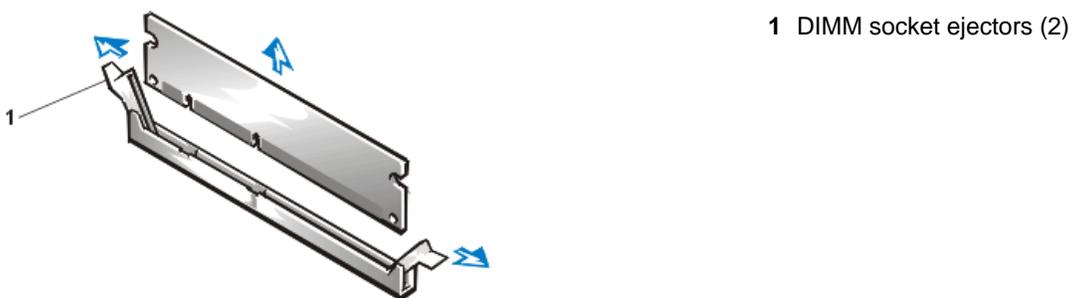
DIMM Removal

To remove a DIMM, press down and outward on the ejectors on each end of the socket until the DIMM pops out of the socket (see Figure 26).

 **NOTES:** This procedure assumes the power is off and you have access to the DIMM slots. See steps 1 through 6 of the DIMM Installation procedure for these preliminary steps.

If you encounter difficulty in moving the ejector nearest to the chassis wall, press down on the opposite ejector and lift that end of the DIMM slightly to free the DIMM from its socket.

Figure 26. DIMM Removal



Microprocessor

The microprocessor is contained within a single-edge contact (SEC) cartridge and heat sink assembly. The system board has two guide bracket assemblies, which hold the SEC cartridge and heat sink assemblies. If your system has only one microprocessor, the secondary guide bracket assembly connector must contain a terminator card. If your system has two microprocessors, the secondary microprocessor must have the same operating frequency as the first. For example, if the system has a 600-MHz primary microprocessor, your secondary

microprocessor must also be a 600-MHz microprocessor.

NOTICE: If you are upgrading a system by installing a secondary microprocessor, you must order an upgrade kit from Dell. The upgrade kit from Dell contains the correct version of the microprocessor for use as a secondary microprocessor.

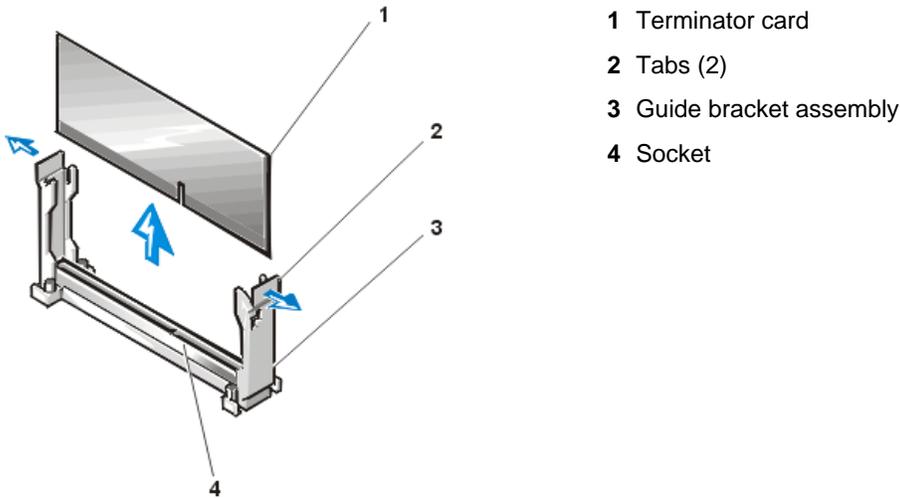
Terminator Card Removal

To remove a terminator card, perform the following steps.

NOTICE: See "[Protecting Against Electrostatic Discharge.](#)"

1. Turn off the system, including any attached peripherals, and disconnect the AC power cable from its power source.
2. [Remove the front bezel.](#)
3. Remove the right-side [computer cover.](#)
4. Disconnect the AC power cable and all peripheral cables from the back panel of the system.
5. Remove the [cooling shroud.](#)
6. Lift the terminator card up and out of the guide bracket assembly (see Figure 27).

Figure 27. Terminator Card Removal



Installing a Terminator Card

To install a terminator card, align the notch on the terminator card with the socket on the guide bracket assembly and guide the card into the empty guide bracket assembly.

SEC Cartridge and Heat Sink Assembly Removal

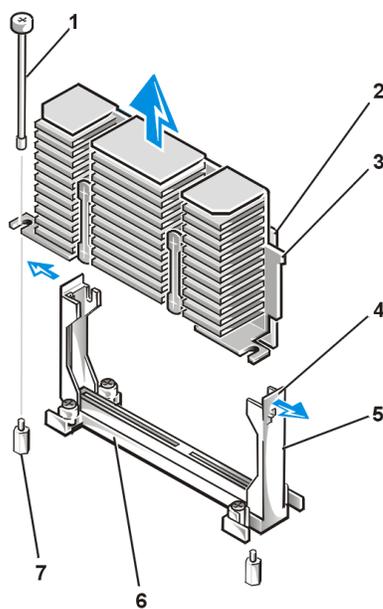
To remove the SEC cartridge and heat sink assembly, perform the following steps.

- CAUTION:** The SEC cartridge and heat sink assembly can get extremely hot during system operation. Be sure the assembly has had sufficient time to cool before you touch it.
- CAUTION:** When handling the SEC cartridge and heat sink assembly, take care to avoid sharp edges on the heat sink.

NOTICE: See "[Protecting Against Electrostatic Discharge.](#)"

1. Turn off the system, including any attached peripherals, and disconnect the AC power cable from its power source.
2. [Remove the front bezel.](#)
3. Remove the right-side [computer cover.](#)
4. Disconnect the AC power cable and all peripheral cables from the back panel of the system.
5. Remove the [cooling shroud.](#)
6. Deflect and lift one end of the guide bracket about 6.3 mm (0.25 inch) to disengage one end of the microprocessor's connector from the socket.
7. Deflect the tab on the other end of the guide bracket to disengage the tab on the heat sink.
8. Lift the cartridge and heat sink assembly away from the guide bracket assembly (see Figure 28).

Figure 28. SEC Cartridge and Heat Sink Removal



- 1 Retention pin (removed with cooling shroud)
- 2 SEC cartridge
- 3 Tab on heat sink (2)
- 4 Tab on guide bracket (2)
- 5 Guide bracket assembly
- 6 Socket
- 7 Threaded stud

SEC Cartridge and Heat Sink Assembly Replacement

To install the replacement SEC cartridge and heat sink assembly, refer to [Figure 28](#) and perform the following steps:

1. Remove the [terminator card](#) or old [SEC cartridge](#) from the guide bracket assembly.
2. Slide the SEC cartridge into the guide bracket assembly, and firmly seat the assembly until the tabs on the guide bracket assembly snap into place over the ends of the heat sink (see Figure 28).
3. Replace the [cooling shroud](#) and [computer cover.](#)

Battery

The system battery maintains system configuration, date, and time information in a special section of memory when you turn off the system. The operating life of the battery ranges from 2 to 5 years, depending on how you use the system (for example, if you keep the system on most of the time, the battery gets little use and thus lasts longer). You may need to replace the battery if an incorrect time or date is displayed during the boot routine along with the following or similar message:

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

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

or

System CMOS checksum bad -- Run SETUP

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

or

Invalid configuration information -- please run SETUP program

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

To determine if the battery needs replacing, reenter the time and date through the System Setup program. Turn off the system for a few hours, and then turn it on again. Enter the System Setup program. If the date and time are not correct in the System Setup program, replace the battery.



NOTES: Some software may cause the system time to speed up or slow down. If the system seems to operate normally except for the time kept in the System Setup program, the problem may be caused by software rather than by a defective battery.

If the system is turned off for long periods of time (for weeks or months), the NVRAM may lose its system configuration information. This situation is not caused by a defective battery.

You can operate the system without a battery; however, the system configuration information maintained by the battery in NVRAM is erased each time you shut down the computer. Therefore, you must reenter the system configuration information and reset the options each time the system initializes until you replace the battery.

The battery is a 3.0-volt (V), coin-cell CR2032-type battery. To remove the battery, perform the following steps.



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

1. Enter the System Setup program and, if possible, make a printed copy of the System Setup screens.
See "Using the System Setup Program" in the *User's Guide* for instructions.
2. Shut down the system, including any attached peripherals, and disconnect the system from the electrical outlet.

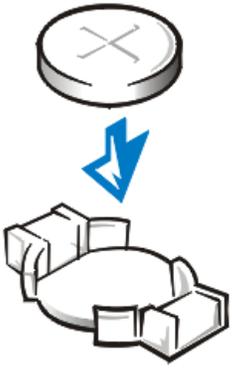
NOTICE: See "[Protecting Against Electrostatic Discharge](#)."

3. Remove the right-side [computer cover](#).
4. Remove the [cooling shroud](#).
5. If necessary, remove the [expansion cards](#) to gain access to the battery.
6. Remove the battery.

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

7. Install the new battery with the side labeled "+" facing up (see Figure 29).

Figure 29. Battery Replacement



8. Reinstall the [expansion cards](#) if you removed them in step 5.
9. Replace the [cooling shroud](#) and [computer cover](#), and then reconnect the computer and peripherals to their AC power sources and turn them on.
10. Enter the System Setup program to confirm that the battery is operating properly.
11. Enter the correct time and date through the System Setup program's **Time** and **Date** settings. Also reenter any system configuration information that is no longer displayed on the System Setup screens, and then exit the System Setup program.
12. Turn off the computer and peripherals, and leave them off for at least an hour.
13. After an hour, turn on the system and enter the System Setup program. If the time and date are still incorrect, replace the system board.

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Jumpers, Switches, and Connectors: Dell™ PowerEdge™ 2400 Systems Service Manual

- [Overview](#)
- [System Board Labels](#)
- [Jumpers and Switches—A General Explanation](#)
- [SCSI Backplane Boards](#)
- [System Board Jumpers](#)
- [Disabling a Forgotten Password](#)

Overview

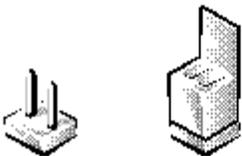
This section provides specific information about the jumpers on the system board. It also provides some basic information on jumpers and switches and describes the connectors and sockets on the various boards in the computer.

Jumpers and Switches—A General Explanation

Jumpers and switches provide a convenient and reversible way of reconfiguring the circuitry on a printed circuit board. When installing replacement parts or reconfiguring the system, you may need to change jumper settings on the system board. You may also need to change jumper and/or switch settings on expansion cards or drives.

Jumpers

Jumpers are small blocks on a circuit board with two or more pins emerging from them. Plastic plugs containing a wire fit down over the pins. The wire connects the pins and creates a circuit. To change a jumper setting, pull the plug off its pin(s) and carefully fit it down onto the pin(s) indicated.



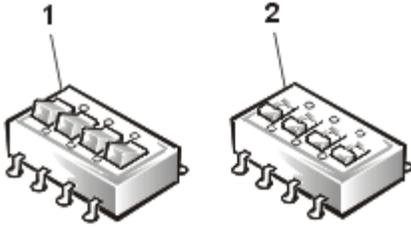
NOTICE: Make sure the system is turned off before you change a jumper setting. Otherwise, damage to the system or unpredictable results may occur.

A jumper is referred to as open or unjumped when the plug is pushed down over only one pin or if there is no plug at all. When the plug is pushed down over two pins, the jumper is referred to as jumped. The jumper setting is often shown in text as two numbers, such as 1-2. The number 1 is printed on the circuit

board so that you can identify each pin number based on the location of pin 1.

Switches

Switches control various circuits or functions in the computer system. The switches that you are most likely to encounter are dual in-line package (DIP) switches, which are normally packaged in groups of two or more switches in a plastic case. Two common types of DIP switches are slide switches and rocker switches (see the following illustration).



Rocker switch

1

Slide switch

2

Each of these switches has two positions, or settings (usually on and off). To change the setting of a slide switch, use a small, pointed object such as a small screwdriver or a straightened paper clip to slide the switch to the proper position. To change the setting of a rocker switch, use the screwdriver or paper clip to press down on the appropriate side of the switch. In either case, do not use a pen, pencil, or other object that might leave a residue on the switch.

System Board Jumpers

Figure 1 shows the location of the configuration jumpers on the system board. [Table 1](#) lists the function of these jumpers.

Figure 1. System Board Jumpers

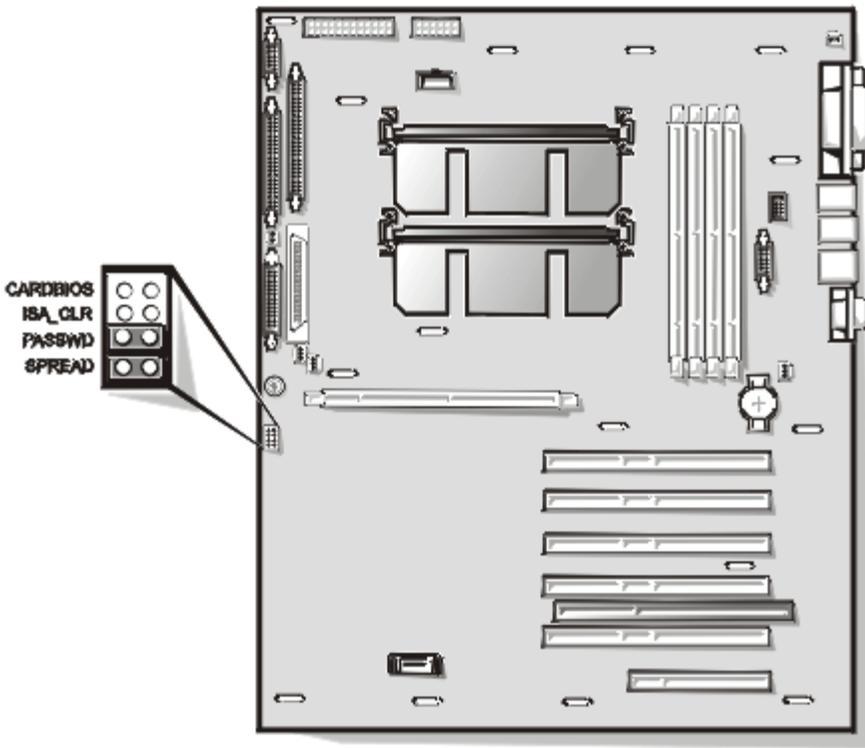


Table 1. System-Board Jumper Settings

Jumper	Setting	Description
CARDBIOS		Reserved (do not change).
ISA_CLR	(default) 	The ISA configuration settings are retained at system boot. The ISA configuration settings are cleared at next system boot. (If the ISA configuration settings become corrupted to the point where the system will not boot, install the jumper plug and boot the system. Remove the jumper before restoring the ISA configuration information.)
PASSWD	(default) 	The password feature is enabled. The password feature is disabled.
SPREAD		Reserved (do not change).
jumpered unjumpered		

System Board Labels

Table 2 lists the connectors and sockets located on the system board.

Table 2. System Board Connectors and Sockets

Connector or Socket	Description
BACKPLANE	Hot-pluggable SCSI backplane board interface cable connector
BATTERY	Battery connector

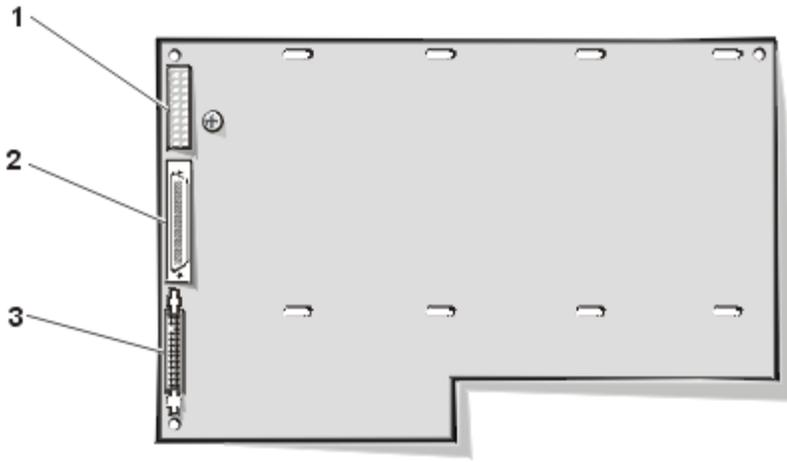
DIMM_x	DIMM sockets
DIMM_RAID	DIMM socket for integrated RAID controller
ENET	Ethernet connector
INTRUS _n	Intrusion-alarm switch connectors
ISA5	ISA expansion-card connector
FAN _n	Fan connectors
FLOPPY	Diskette drive interface connector
KYBD	Keyboard connector
MOUSE	Mouse connector
PANEL	System control panel connector
PARALLEL	Parallel port connector; sometimes referred to as LPT1
PCI _n	PCI expansion-card connectors
POWER _n	Power and power supply status connector
RAID_KEY	Socket for integrated RAID controller hardware key
SCSI1	Ultra2/LVD SCSI host adapter connector
SCSI2	Ultra/Narrow SCSI host adapter connector
SERIAL _n	Serial port connectors; sometimes referred to as COM1 and COM2
SVR_MGT	Connector for DRAC card
USB _n	USB connector
VGA	Video connector
PROC_ _n	Microprocessor guide bracket assembly and connectors

SCSI Backplane Boards

Figure 2 shows the location of the connectors on the 1 x 6 and 1 x 4 SCSI backplane boards.

Figure 2. Connectors on the SCSI Backplane Boards

- 1 Power connector (POWER)
- 2 Ultra2/LVD SCSI cable connector (SCSIA)
- 3 System board interface connector (PLANAR)



Disabling a Forgotten Password

The computer's software security features include a supervisor password and a user password, which are discussed in detail in "Using the System Setup Program" of the *User's Guide*. A password jumper on the system board enables these password features or disables them and clears any password(s) currently in use.

To disable a forgotten supervisor password or user password, perform the following steps.

NOTICE: See "[Protecting Against Electrostatic Discharge](#)."

1. Turn off the system, including any attached peripherals, and disconnect the AC power cable from its power source.
2. [Remove the front bezel](#).
3. Remove the right-side [computer cover](#).
4. Refer to "[System Board Jumpers](#)" for the location of the password jumper (labeled PASSWD) on the system board.
5. Remove the jumper plug from the PASSWD jumper.
6. Replace the right-side [computer cover](#), and then reconnect the computer to an electrical outlet and turn it on.

The existing passwords are not disabled (erased) until the system boots with the PASSWD jumper plug removed. However, before you assign a new system and/or user password, you must install the jumper plug.

 **NOTE:** If you assign a new system and/or user password with the jumper plug still removed, the system disables the new password(s) the next time it boots.

7. Repeat step 1.
8. Install the jumper plug on the PASSWD jumper.
9. Replace the right-side [computer cover](#), and then reconnect the computer and peripherals to their electrical outlets and turn them on.
10. Assign a new system and/or user password.

To assign a new system password using the System Setup program, see "Assigning a System Password" in the *User's Guide*. To assign a new user password using the System Setup program, see "Assigning a User Password" in the *User's Guide*.

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Using the System Setup Program: Dell™ PowerEdge™ 2400 Systems Service Manual

- [Overview](#)
 - [When to Use the System Setup Program](#)
 - [Entering System Setup](#)
 - [System Setup Screens](#)
 - [System Setup Options](#)
 - [Using the System Password Feature](#)
 - [Using the Setup Password Feature](#)
 - [Disabling a Forgotten Password](#)
 - [Responding to Error Messages](#)
-

Overview

This section describes the System Setup program, which is used to change the system configuration information stored in NVRAM on the system board. If the system detects a discrepancy, an error message may appear on the screen that identifies the incorrect configuration settings. Many of these settings are established using the System Setup program. The system then prompts you to enter the System Setup program to correct the setting.

When to Use the System Setup Program

You can use the System Setup program as follows:

- To change the system configuration information default settings
- To set or change user-selectable options
- To restore system configuration settings following a service action
- To enable or disable integrated devices in your system

NOTICE: Whenever you make changes to the System Setup program or add, reposition, or remove ISA expansion cards, add or remove memory, or change settings for integrated devices, you must run the Resource Configuration Utility, make any necessary changes, and save the system configuration information. Failure to do so may cause resource conflicts between PCI devices (such as PCI expansion cards, the integrated video controller, or the integrated SCSI host adapter). See "Using the Resource Configuration Utility" in your *User's Guide* for more information about how PCI devices are configured based on settings in the RCU.

After you set up your system, run the System Setup program to familiarize yourself with your system

configuration information and optional settings. Dell recommends that you print the System Setup screens (by pressing the <Print Screen> key) or write down the information for future reference.

Entering the System Setup Program

Enter the System Setup program by performing the following steps:

1. Turn on your system.

If your system is already on, shut it down and then turn it on again.

2. Press <F2> immediately after you see the following message:

Press <F2> for System Setup

If you wait too long and your operating system begins to load into memory, 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 your operating system.

You can also enter the System Setup program by responding to certain error messages. See "[Responding to Error Messages.](#)"

System Setup Screens

The three System Setup screens, Page 1, Page 2, and the Device List screen, display the current setup and configuration information and optional settings for your system. (Typical examples are illustrated in [Figure 1.](#)) Information on the System Setup screens is organized in five boxed areas:

- Title box — The box at the top of both screens lists the system name, page number, and the revision number of the basic input/output system (BIOS).
- Configuration options — The box on the left half of both screens lists the options that define the installed hardware in your computer.

Fields beside the options contain settings or values; those that appear bright on the screen can be changed. Settings or values that you cannot change because they are determined by the system appear less bright.

Some options have multiple fields, which may show settings or values as bright or less bright depending upon what settings or values you entered in other fields.

- Help — The box on the upper-right half of both screens displays help information for the option with a currently highlighted field.
- System data — The box in the lower-right corner of both screens displays information about your system.
- Key functions — The line of boxes across the bottom of both screens lists keys and their functions

within the System Setup program.

Using the System Setup Program

Table 1 lists the keys that you use to view or change information on the System Setup screens and to exit the program.

Table 1. System-Setup Navigation Keys

Keys	Action
 or 	Moves to the next field.
  or 	Moves to the previous field.
 or 	Cycles through the settings in a field. In many fields, you can also type the appropriate value.
 or 	Scrolls through help information.
 or 	Switches between Page 1 and Page 2.
	<p>Exits the System Setup program and reboots the system if any changes were made.</p> <p>For most of the options, any changes you make are recorded but do not take effect until the next time you boot the system. For a few options (as noted in the help area), the changes take effect immediately.</p>
 	Exits the System Setup program and reboots the system, implementing any changes you have made.

Figure 1. System Setup Screens

Time: 22:46:58 Date:Wed May 12, 1999
 Diskette Drive A: 3.5 inch, 1.44 MB
 Diskette Drive B: Not Installed

Fan Speed: Full Speed
 System Alert: Fault
 Num Lock: On
 Reset Button: Enabled

Processor
 Serial Number: Disabled
 Processor Bus: 133 MHz
 Processor 1: A2
 Processor 2: A2

This category sets the time in 24-hour format (hours:minutes:seconds) for the internal clock/calendar.

To change the value in a field, enter a number or use the left- or right-arrow key.

Changes take effect immediately.

Pentium® III Processor - 600 MHz
 Level 2 Cache: 256 KB Advanced
 System Memory: 128 MB ECC SDRAM
 Video Memory: 4 MB SDRAM
 Service Tag:

Tab, Shift-Tab change fields ←, → change values Alt-P next Esc exit Alt-B reboot

Keyboard Errors: Report
 Boot Sequence: Device List, Ctrl →
 System Password: Disabled by Jumper
 Password Status: Unlocked
 Setup Password: Disabled by Jumper

————— Integrated Devices —————

USB: Enabled
 Mouse: On
 Serial Port 1: COM1
 Serial Port 2: COM2
 Parallel Port: 378h
 Parallel Mode: PS/2

Ethernet Controller: On
 MAC Address: 00B00080A59C
 Diskette: Auto
 Speaker: On
 Onboard RAID: RAID
 Secondary SCSI: On

This category sets whether keyboard-related error messages are reported at system startup.

Pentium® III Processor - 600 MHz
 Level 2 Cache: 256 KB Advanced
 System Memory: 128 MB ECC SDRAM
 Video Memory: 4 MB SDRAM
 Service Tag:

Tab, Shift-Tab change fields ←, → change values Alt-P next Esc exit Alt-B reboot

Dell Computer Corporation (www.dell.com)				
Device List		System PowerEdge 2400/600 Setup		BIOS Version: XXX
Boot Device Priority: Diskette Drive A:		The DEVICE LIST contains devices that may be bootable. The system attempts to boot from the devices in the list as ordered. If you ESC or ALT-B from this menu, the displayed order becomes the boot selection.		
Exclude from Boot Device Priority:		Ctrl-Ins moves items between "Boot Device Priority" and "Exclude from Boot Device Priority" only.		
		PgDn next 1 of 2 PgUp prev		
Device Controller Priority: System BIOS boot devices AIC-7890:00 SEAGATE ST34371W		Pentium® III Processor - 600 MHz Level 2 Cache: 256 KB Advanced System Memory: 128 MB ECC SDRAM Video Memory: 4 MB SDRAM Service Tag:		
Tab, Shift-Tab change fields		←, → change values	Alt-P next	Esc exit
Alt-B reboot				

System Setup Options

The following subsections explain in detail each of the options on the System Setup screens.

Time

Time resets the time on the computer's internal clock.

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

Date

Date resets the date on the computer's internal calendar.

Your system automatically displays the day of the week corresponding to the settings in the three fields that follow (*month, day-of-month, and year*).

To change the date, press the right-arrow key to increase the number in the highlighted field or press the left-arrow key to decrease the number. If you prefer, you can type numbers in the *month* and *day-of-month* fields.

Diskette Drive A and Diskette Drive B

Diskette Drive A and **Diskette Drive B** identify the type of diskette drive installed in your computer. With the standard cabling configuration, **Diskette Drive A** (the boot diskette drive) is the 3.5-inch diskette drive

installed in the top externally accessible drive bay.

The option's settings always match the physical locations of the drives in your computer—the first drive listed on Page 1 of the System Setup screens is the top drive in your computer.

The settings are:

- **3.5 Inch, 720 KB**
- **3.5 Inch, 1.44 MB**
- **5.25 Inch, 360 KB**
- **5.25 Inch, 1.2 MB**
- **Not Installed**

Fan Speed

The **Fan Speed** option has the following settings:

- **Full Speed** (the default setting)
- **Noise Reduced**

System Alert

The **System Alert** option has the following settings:

- **Fault** (the default setting)
- **Warning**

Num Lock

Num Lock determines whether your system boots with the Num Lock mode activated on 101- or 102-key keyboards (it does not apply to 84-key keyboards).

When Num Lock mode is activated, the rightmost bank of keys on your keyboard provides the mathematical and numeric functions shown at the tops of the keys. When Num Lock mode is turned off, these keys provide cursor-control functions according to the label on the bottom of each key.

Reset Button

Setting this option to **Enabled** (the default) allows the system to be reset when the reset button is pushed.

Processor Serial Number

Processor Serial Number enables or disables the processor serial number feature. This option has the following settings:

- **Disabled** (the default setting)
- **Enabled**

Processor Bus

Processor Bus displays the current processor bus speed (100 or 133 MHz). This option has no user-

selectable settings.

Processor 1 and Processor 2

Processor 1 and **Processor 2** display the stepping number of the processor in processor slot 1 or slot 2 (such as **A0**), if one is installed. If the stepping number is unknown, **Newer than xxx** is displayed. If no processor is installed in this slot, **Not Installed** is displayed. This option has no user-selectable settings.

Keyboard Errors

Keyboard Errors enables or disables reporting of keyboard errors during the power-on self-test (POST), which is a series of tests that the system performs on the hardware each time you turn on the system or press the reset button.

This option is useful when applied to self-starting servers or host systems that have no permanently attached keyboard. In these situations, selecting **Do Not Report** suppresses all error messages relating to the keyboard or to the keyboard controller during POST. This setting does not affect the operation of the keyboard itself if a keyboard is attached to the computer.

Boot Sequence

Boot Sequence can be set to **Diskette First** (the default setting) or to **Hard Disk Only**.

The term *boot* refers to the system's start-up procedure. When turned on, the system "bootstraps" itself into an operational state by loading into memory a small program, which in turn loads the necessary operating system. **Boot Sequence** tells the system where to look for the files that it needs to load.

- **Diskette First**

Selecting **Diskette First** causes the system to try booting from drive A first. If the system finds a diskette that is not bootable in the drive or finds a problem with the drive itself, it displays an error message. If it does not find a diskette in the drive, the system tries to boot from the hard-disk drive (drive 0). If the hard-disk drive is not bootable, the system tries to boot from the Plug and Play network adapters in the boot order set by the Device List.

- **Hard Disk Only**

Selecting **Hard Disk Only** causes the system to attempt to boot first from the hard-disk drive and then from the Plug and Play network adapters in the boot order set by the Device List.

- **Device List, Ctrl→**

Selecting **Device List, Ctrl→** causes the system to attempt to boot from devices in the list shown on the Device List screen of the System Setup program. Pressing <Ctrl> and the right-arrow key simultaneously causes the Device List screen to appear.

System Password

System Password displays the current status of your system's password security feature and allows you to assign and verify a new password. No one can assign a new password unless the current status is **Not**

Enabled, which is displayed in bright characters.

The settings for the System Password option are:

- **Not Enabled** (the default setting)
- **Enabled**
- **Disabled by Jumper** (jumper removed)



NOTE: See "[Using the System Password Feature](#)" for instructions on assigning a system password and using or changing an existing system password. See "[Disabling a Forgotten Password](#)" for instructions on disabling a forgotten system password.

Password Status

When **Setup Password** is set to **Enabled**, **Password Status** allows you to prevent the system password from being changed or disabled at system start-up.

To lock the system password, you must first assign a setup password in the **Setup Password** option and then change the **Password Status** option to **Locked**. In this state, the system password cannot be changed through the **System Password** option and cannot be disabled at system start-up by pressing <Ctrl><Enter>.

To unlock the system password, you must enter the setup password in the **Setup Password** option and then change the **Password Status** option to **Unlocked**. In this state, the system password can be disabled at system start-up by pressing <Ctrl><Enter> and then changed through the **System Password** option.

Setup Password

Setup Password lets you restrict access to your computer's System Setup program in the same way that you restrict access to your system with the system password feature. The settings are:

- **Not Enabled** (the default setting)
- **Enabled**
- **Disabled by Jumper** (jumper removed)



NOTE: See "[Using the Setup Password Feature](#)" for instructions on assigning a setup password and using or changing an existing setup password. See "[Disabling a Forgotten Password](#)" for instructions on disabling a forgotten setup password.

USB

USB enables or disables the system's Universal Serial Bus (USB) ports. Disabling the USB ports makes system resources available for other devices.

Mouse

Mouse enables or disables the system's integrated Personal System/2 (PS/2)-compatible mouse port. Disabling the mouse allows an expansion card to use IRQ12.

Serial Port 1 and Serial Port 2

Serial Port 1 and **Serial Port 2** configure the system's integrated serial ports. These options can be set to **Auto** (the default setting) to automatically configure a port, to a particular designation (**COM1** or **COM3** for **Serial Port 1**; **COM2** or **COM4** for **Serial Port 2**), or to **Off** to disable the port.

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

- COM1 (input/output [I/O] address 3F8h), which shares IRQ4 with COM3, is remapped to COM3 (I/O address 3E8h).
- COM2 (I/O address 2F8h), which shares IRQ3 with COM4, is remapped to COM4 (I/O address 2E8h).



NOTE: When two COM ports share an IRQ setting, you can use either port as necessary, but you may not be able to use them both at the same time. If the second port (COM3 or COM4) is also in use, the integrated port is turned off.

Parallel Port

Parallel Port configures the system's integrated parallel port. This option can be set to **378h** (the default), to alternate addresses **278h** or **3BCh**, or to **Off** to disable the port.



*NOTE: Do not set **Parallel Port** to **278h** if you have an Enhanced Capabilities Port (ECP) device connected to the port.*

Parallel Mode

Parallel Mode controls whether the system's integrated parallel port acts as an AT-compatible (unidirectional) or PS/2-compatible (bidirectional) port.

Set this option according to the type of peripheral device that is connected to the parallel port. To determine the correct mode to use, see the documentation that came with the device.

Ethernet Controller

Ethernet Controller determines whether the system's integrated network interface controller (NIC) is **On** or **Off** (the default).

MAC Address

The **MAC Address** field displays the address of the media access control (MAC) address used by the integrated NIC. This field has no user-selectable settings.

Diskette

Diskette controls the operation of the system's integrated diskette drive controller.

With **Auto** (the default setting) selected, the system turns off the integrated diskette drive controller when necessary to accommodate a controller card installed in an expansion slot.

With **Write Protect** selected, nothing can be written to diskette drives and tape drives using the system's

integrated diskette drive controller. (The system can still read from the drives.) When this setting is selected, the **Auto** setting (whereby the system turns off the integrated diskette drive controller as necessary) is also in effect.

Selecting **Off** turns off the integrated diskette controller; this setting is used primarily for troubleshooting purposes.

Speaker

Speaker determines whether the integrated speaker is **On** (the default) or **Off**. A change to this option takes effect immediately (rebooting the system is not required).

Primary SCSI and Secondary SCSI

Primary SCSI and **Secondary SCSI** turn the respective SCSI controller on or off. Selecting **On** (the default setting) enables the integrated PCI SCSI controller and scans the associated ROM. For the system to boot from a drive attached to the integrated SCSI controller, the drive must be enabled. Selecting **Off** causes the BIOS to mask the presence of a device.

If the integrated RAID controller is activated, the **RAID** field appears instead of the **Primary SCSI** field.

RAID

The **RAID** field appears if the optional PERC 2/Si integrated RAID controller is activated. The settings are:

- **SCSI**
- **RAID**
- **Off**

NOTICE: To avoid possible data loss, back up all data on the hard-disk drives before changing the mode of operation of the integrated SCSI controller.

System Data Categories

The following categories, which are not selectable, display information about the system:

- The processor line displays the microprocessor type and speed.
- **Level 2 Cache** displays the size of the integrated cache (256 or 512 KB). This field has no user-selectable settings.
- **System Memory** indicates the entire amount of installed memory detected in your system, except for memory on Expanded Memory Specification (EMS) expansion cards. After adding memory, check this option to confirm that the new memory is installed correctly and is recognized by the system.
- **Video Memory** displays the amount of video memory detected in your system.
- **Service Tag** displays the system's five-character service tag number, which was programmed into NVRAM by Dell during the manufacturing process. Refer to this number during technical assistance or service calls. The service tag number is also accessed by certain Dell support software, including the diagnostics software.
- If an asset tag number has been assigned, **Asset Tag** displays the customer-programmable asset tag number for the system. You can use the Asset Tag utility, which is included with your software support

utilities, to enter an asset tag number up to ten characters long into NVRAM.

Using the System Password Feature

NOTICE: The password features provide a basic level of security for the data on your system. However, they are not foolproof. If your data requires more security, it is your responsibility to obtain and use additional forms of protection, such as data encryption programs.

Your Dell system is shipped to you without the system password feature enabled. If system security is a concern, you should operate your system only with system password protection.

You can [assign a system password](#) whenever you use the System Setup program. After a system password is assigned, only those who know the password have full use of the system.

When the **System Password** option is set to **Enabled**, the computer system prompts you for the system password just after the system boots.

To change an existing system password, you must know the password (see "Deleting or Changing an Existing System Password"). If you assign and later forget a system password, you need to be able to remove the computer cover to change a jumper setting that disables the system password feature (see "[Disabling a Forgotten Password](#)"). Note that you will erase the setup password at the same time.

NOTICE: If you leave your system running and unattended without having a system password assigned, or if you leave your computer unlocked so that someone can disable the password by changing a jumper setting, anyone can access the data stored on your hard-disk drive.

Assigning a System Password

Before you can assign a system password, you must enter the System Setup program and check the **System Password** option.

When a system password is assigned, the setting shown for the **System Password** option is **Enabled**. When the system password feature is disabled by a jumper setting on the system board, the setting shown is **Disabled by Jumper**. You cannot change or enter a new system password if either of these settings is displayed.

When no system password is assigned and the password jumper on the system board is in the enabled position (its default setting), the setting shown for the **System Password** option is **Not Enabled**. Only when this option is set to **Not Enabled** can you assign a system password, using the following procedure:

1. Verify that the **Password Status** option is set to **Unlocked**.
For instructions on changing the setting for **Password Status**, see "[Password Status](#)."
2. Highlight the **System Password** option, and then press the left- or right-arrow key.

The option heading changes to **Enter Password**, followed by an empty seven-character field in square brackets.

3. Type your new system password.

You can use up to seven characters in your password.

As you press each character key (or the spacebar key for a blank space), a placeholder appears in the field.

The password assignment operation recognizes keys by their location on the keyboard, without distinguishing between lowercase and uppercase characters. For example, if you have an *M* in your password, the system recognizes either *M* or *m* as correct.

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

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



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

4. Press <Enter>.

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

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

The password setting changes to **Enabled**. Your system password is now set; you can exit the System Setup program and begin using your system. Note, however, that password protection does not take effect until you reboot the system by pressing the reset button or by turning the system off and then on again.

Using Your System Password to Secure Your System

Whenever you turn on your system, press the reset button, or reboot the system by pressing the <Ctrl><Alt> key combination, the following prompt appears on the screen when the **Password Status** option is set to **Unlocked**:

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

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

```
Type the password and press <Enter>.
```

After you type the correct system password and press <Enter>, your system boots and you can use the keyboard and/or mouse to operate your system as usual.



NOTE: If you have assigned a setup password (see "[Using the Setup Password Feature](#)"), the system accepts your setup password as an alternate system password.

If a wrong or incomplete system password is entered, the following message appears on the screen:

```
** Incorrect password. **
```

Enter password:

If an incorrect or incomplete system password is entered again, the same message appears on the screen.

The third and subsequent times an incorrect or incomplete system password is entered, the system displays the following message:

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

The number of unsuccessful attempts made to enter the correct system password can alert you to an unauthorized person attempting to use your system.

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



*NOTE: You can use the **Password Status** option in conjunction with **System Password** and **Setup Password** to further protect your system from unauthorized changes. For more information, see "[Password Status](#)."*

Deleting or Changing an Existing System Password

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

1. Enter the System Setup program, and verify that the **Password Status** option is set to **Unlocked**.

Enter the System Setup program by pressing the <F2> key. Press the <Alt><p> key combination to move to Page 2 of the System Setup screens. For instructions on changing the setting for **Password Status**, see "[Password Status](#)."

2. Reboot your system to force it to prompt you for a system password.
3. When prompted, type the system password.
4. Press the <Ctrl><Enter> key combination to disable the existing system password, instead of pressing <Enter> to continue with the normal operation of your system.
5. Confirm that **Not Enabled** is displayed for the **System Password** option of the System Setup program.

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

6. To assign a new password, follow the procedure in "[Assigning a System Password](#)."

Using the Setup Password Feature

Your Dell system is shipped to you without the setup password feature enabled. If system security is a

concern, you should operate your system with setup password protection.

You can [assign a setup password](#) whenever you use the System Setup program. After a setup password is assigned, only those who know the password have full use of the System Setup program.

To change an existing setup password, you must know the setup password (see "[Deleting or Changing an Existing Setup Password](#)"). If you assign and later forget a setup password, you need to remove the computer cover to change a jumper setting that [disables the setup password feature](#). Note that you erase the system password at the same time.

Assigning a Setup Password

A setup password can be assigned (or changed) only when the **Setup Password** option is set to **Not Enabled**. To assign a setup password, highlight the **Setup Password** option and press the left- or right-arrow key. The system prompts you to enter and verify the password. If a character is illegal for password use, the system emits a beep.

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

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

After you verify the password, the **Setup Password** setting changes to **Enabled**. The next time you enter the System Setup program, the system prompts you for the setup password.

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

Operating With a Setup Password Enabled

If **Setup Password** is set to **Enabled**, you must enter the correct setup password before you can modify the majority of the System Setup options.

When you start the System Setup program, Page 2 of the System Setup screens appears with the **Setup Password** option highlighted, prompting you to type the password.

If you do not enter the correct password in three tries, the system lets you view, but not modify, the System Setup screens—with the following exceptions:

- You can still modify the **Date**, **Time**, **CPU Speed**, **Num Lock**, and **Speaker** options.
- If System Password is not enabled and is not locked via the **Password Status** option, you can assign a system password (however, you cannot disable or change an existing system password).

 *NOTE: You can use the **Password Status** option in conjunction with **Setup Password** to protect the system password from unauthorized changes. For more information, see "[Password Status](#)."*

Deleting or Changing an Existing Setup Password

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

1. Enter the System Setup program.
2. Highlight the **Setup Password** option, and press the left- or right-arrow key to delete the existing setup password.

The setting changes to **Not Enabled**.

3. If you want to assign a new setup password, follow the procedure in "[Assigning a Setup Password](#)."
-

Disabling a Forgotten Password

If the administrator or user forgets the system or setup password, you cannot operate the system or change settings in the System Setup program until you change the password jumper setting to disable the passwords, and erase the existing passwords.

To disable a forgotten supervisor password or user password, perform the following steps.

NOTICE: See "[Protecting Against Electrostatic Discharge](#)."

1. Remove the right-side [computer cover](#).
2. Refer to "[System Board Jumpers](#)" for the location of the password jumper (labeled "PASSWD") on the system board.
3. Remove the jumper plug from the PASSWD jumper.
4. Replace the right-side [computer cover](#), and then reconnect the computer to an electrical outlet and turn it on.

The existing passwords are not disabled (erased) until the system boots with the PASSWD jumper plug removed. However, before you assign a new system and/or user password, you must install the jumper plug.



NOTE: If you assign a new system and/or user password with the jumper plug still removed, the system disables the new password(s) the next time it boots.

5. Repeat steps 1 through 4.
6. Install the jumper plug on the PASSWD jumper.
7. Replace the right-side [computer cover](#).
8. Assign a new system and/or user password.

To assign a new system password using the System Setup program, see "[Assigning a System Password](#)." To assign a new user password using the System Setup program, see "Assigning a User Password" in the *User's Guide*.

Responding to Error Messages

If an error message appears on your monitor screen while the system is booting, make a note of the message. Then, before entering the System Setup program, refer to “System Beep Codes” and “System Messages” in "Messages and Codes" in the *Installation and Troubleshooting Guide* for an explanation of the message and suggestions for correcting any errors.



NOTE: It is normal to receive an error message the first time you boot your system after installing a memory upgrade. In that situation, do not refer to “System Beep Codes” and “System Messages.” Instead, follow the instructions for performing a memory upgrade in “Adding Memory” in "Installing System Board Options" in the *Installation and Troubleshooting Guide*.)

If you are given an option of pressing either <F1> to continue or <F2> to run the System Setup program, press the <F2> key.

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