

Dell™ PowerVault™ 775N Systems Service Manual

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Notes, Notices, and Cautions



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



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



CAUTION: A CAUTION indicates a potential for property damage, personal injury, or death.

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System Overview

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Your system is a high-speed, full-featured server that offers significant service and upgrade features.

System Features

- One or two Intel® Xeon™ microprocessors with an internal operating speed of at least 1.8 GHz, a 512 KB cache, and a front-side (external) bus speed of 400 MHz.

The microprocessors in your system provide NetBurst microarchitecture and Hyper-Threading Technology to significantly increase microprocessor performance. Hyper-Threading allows one physical microprocessor to appear as two logical processors to the operating system and application programs. Hyper-Threading also allows each microprocessor to simultaneously execute multiple tasks using shared hardware resources.

These new technology features in the microprocessor provide the following for multithreaded tasks:

- Enhanced system performance
- Improved reaction and response time for the system
- Increased number of users that a system can support
- Increased number of transactions that can be executed simultaneously by the system

You can find more information about Hyper-Threading at developer.intel.com.

- SMP, which is available on systems with two Xeon microprocessors. SMP greatly improves overall system performance by dividing microprocessor operations between independent microprocessors. To take advantage of this feature, you must use an operating system that supports multiprocessing.



NOTE: If you decide to upgrade your system by installing an additional microprocessor, you must order the microprocessor upgrade kits from the company where you purchased your system. Not all versions of the Intel Xeon MP microprocessor will work properly as additional microprocessors. The upgrade kit contains the correct version of the microprocessor as well as the instructions for performing the upgrade. All microprocessors must have the same internal operating frequency and cache size.

- A minimum of 512 MB of system memory. To add additional system memory, install identical pairs of DDR SDRAM memory modules in the six memory module sockets on the system board.
- Support for up to five 1-inch, internal Ultra3 SCSI hard drives with hot-plug capability.
- A single, 1.44-MB, 3.5-inch diskette drive.
- An IDE CD drive.
- Up to two hot-pluggable, 500-W AC or DC power supplies in a 1 + 1 redundant configuration.
- Hot-pluggable system cooling fans and two additional fans integrated in the power supplies.

- An intrusion switch that signals the appropriate systems management software if the bezel is removed.

System Board Features

- Three 64-bit PCI/PCI-X slots located on the riser card (two slots on bus 1 and one slot on bus 2). Slots accept full-length cards designed for PCI-X up to 133 MHz.
- An integrated VGA-compatible video subsystem with an ATI RAGE XL video controller. This video subsystem contains 8 MB of SDRAM video memory (nonupgradable). Maximum resolution is 1600 x 1200 x 16.7 million colors (noninterlaced).
- An integrated, dual-channel Ultra3 SCSI host adapter. The internal channel supports up to five SCSI hard drives on a 1 x 5 or 2 x 3 split SCSI backplane and provides internal RAID support. The SCSI backplane automatically configures SCSI ID numbers and SCSI termination on individual hard drives, greatly simplifying drive installation.
- Memory spare bank feature, which provides your system with failover to a previously reserved row of memory if one row of memory fails.
- An integrated RAID on motherboard (ROMB) incorporates a 128-MB cache memory module, a RAID battery, and a RAID key.
- Two integrated 10/100/1000 NICs, which provide an Ethernet interface.
- Integrated systems management circuitry that monitors operation of the system fans as well as critical system voltages and temperatures. The systems management circuitry works in conjunction with your systems management software.
- Back-panel connectors including video, keyboard, mouse, two serial, two USB, embedded remote access Ethernet, and two NICs.
- Front-panel connectors including video, keyboard, mouse, and USB.

For more information about specific features, see "[Technical Specifications](#)."

Supported Operating Systems

Your system supports the Microsoft® Windows® Powered operating system.

Service Features

The system includes the following service features to make troubleshooting and repair easy and effective, in most cases without tools or service aids:

- System diagnostics are available for downloading from the Dell | Support website at **support.dell.com**.
 - Systems management hardware and Server Administrator software, which monitor temperatures and voltages throughout the system and notify you if the system overheats, if a system cooling fan malfunctions, if a microprocessor overheats, or if a power supply or VRM fails. For information about the systems management option, see your systems management software documentation.
 - The system simplifies removing and replacing components. You can replace microprocessors or memory modules without removing the system board. The SCSI backplane board and hard-drive carriers eliminate the extensive cabling and drive configuration usually required for a SCSI subsystem.
-

Power Protection Devices

A number of devices are available to protect your system from the effects of power problems such as power surges, transients, and power failures. The following subsections describe some of these devices.

Surge Protectors

Surge protectors are available in a variety of types and usually provide a level of protection commensurate with the cost of the device. Surge protectors prevent overvoltage spikes, such as those that may occur during an electrical storm, from entering the system through the electrical outlet. Surge protectors do not offer protection against brownouts, which occur when the voltage drops more than 20 percent below the normal AC line voltage level.

Line Conditioners

Line conditioners go beyond the overvoltage protection of surge protectors. Line conditioners keep a system's AC power source voltage at a fairly constant level and provide protection from brownouts of short duration. Because of this added protection, line conditioners cost more than surge protectors—up to several hundred dollars. However, these devices cannot protect against a complete loss of power.


Uninterruptible Power Supplies

UPS systems offer the most complete protection against variations in power because they use battery power to keep the system running when AC power is unavailable or unusable. The battery is charged by the AC power while it is available so that once AC power is lost, the battery can provide power to the system for a limited amount of time—from 15 minutes to an hour or so—depending on the UPS system.

UPS systems that provide only 5 minutes of battery power allow you to conduct shutdown of the system but are not intended to provide continued operation. Use surge protectors with all UPS systems, and ensure that the UPS systems are UL safety approved.


Other Documents You May Need

The following documentation is included with your system:

 The *System Information* document provides important safety and regulatory information. Warranty information might be included within this document or as a separate document.

- The *Setting Up Your System* document provides general instructions for setting up your system.
- The *User's Guide* describes system features, technical specifications, and the System Setup program.
- The *Installation and Troubleshooting Guide* describes how to install, troubleshoot, and upgrade your system.
- The *System Administrator's Guide* provides system operation and management information.
- The systems management software documentation describes the features, requirements, installation, and basic operation of the system management software. See the software's online help for information about the alert messages issued by the software.
- Operating system documentation describes how to install (if necessary), configure, and use the operating system software.
- Documentation included with any options you purchased separately from the system, which provides information you need to configure and install these options in your system.

You may also have the following documents.

- Documentation updates are sometimes included with the system to describe changes to the system or software.
 -  **NOTE:** Always read these updates before consulting any other documentation because the updates often contain information that supersedes the information in the other documents.
- The *Rack Installation Guide* describes how to unpack, set up, and install your system in a rack.
- Technical information files—sometimes called "release notes"—may be included on the *Resource CD* to provide last-minute updates about technical changes to the system or advanced technical reference material intended for

experienced users or technicians.

Technical Specifications

Microprocessor	
Microprocessor type	up to two Intel Xeon microprocessors with a minimum internal operating frequency of at least 1.8 GHz
Front-side bus (external) speed	400 MHz
Internal cache	512 KB cache
Math coprocessor	internal to microprocessor

Expansion Bus	
Bus type	PCI/PCI-X
Expansion slots	3 dedicated PCI/PCI-X (full-length, 64-bit, up to 133 MHz; 2 slots on bus 1, and 1 slot on bus 2

Memory	
Architecture	72-bit ECC PC-1600 DDR SDRAM DIMMs, with 2-way interleaving
Memory module sockets	six 72-bit wide 184-pin DIMM sockets
Memory module capacities	256-, 512 MB, or 1-GB registered SDRAM DIMMs, rated for 200-MHz DDR operation
Minimum RAM	512 MB

Drives	
Diskette drive	3.5-inch, 1.44-MB diskette drive
SCSI hard drives	up to five 1-inch, internal Ultra3 SCSI
CD drive	one IDE CD drive

Ports and Connectors	
Rear:	
Serial	two 9-pin connectors
USB	two 4-pin connectors
NIC	two RJ45 connectors for integrated 10/100/1000 NICs
Embedded remote access Ethernet	one RJ45 connector for embedded remote access card (100 Mbit Ethernet controller)
Video	one 15-pin connector
PS/2-style keyboard	6-pin mini-DIN connector
PS/2-compatible mouse	6-pin mini-DIN connector
Front:	

Video	one 15-pin connector
USB	one 4-pin connector
PS/2-style keyboard/mouse	6-pin mini-DIN, keyboard default (mouse optional with combination Y adapter)

Video	
Video type	ATI Rage XL PCI video controller; VGA connector
Video memory	8 MB

Power	
System heat dissipation	180 W or 614.3 BTU/hr
AC power supply:	
Wattage	500 W (AC)
Voltage	100–240 VAC, 50/60 Hz, 5.0 A 200–240 VAC, 50/60 Hz, 5.0 A
Output hold up time	20 ms minimum
Maximum inrush current	under typical line conditions and over the entire system ambient operating range, the inrush current may reach 55 A per power supply for 10 ms or less
System battery	CR2032 3.0-V lithium coin cell

Physical	
Height	8.56 cm (3.375 inches)
Width	48.26 cm (19.0 inches)
Depth	69.85 cm (27.5 inches)
Weight	maximum 25 kg (55 lbs)

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	20% to 80% (noncondensing) with a maximum humidity gradation of 10% per hour
Storage	5% to 95% (noncondensing) with a maximum humidity gradation of 10% per hour
Maximum vibration:	
Operating	0.25 G at 3 to 200 Hz for 15 minutes
Storage	0.5 G at 3 to 200 Hz for 15 minutes
Maximum shock:	

Operating	one shock pulse in the positive and negative x, y, and z axes (one pulse on each side of the system) of 41 G for up to 2 ms
Storage (non-operational)	six consecutively executed shock pulses in the positive and negative x, y, and z axes (one pulse on each side of the system) of 71 G for up to 2 ms
Altitude:	
Operating	-16 to 3,048 m (-50 to 10,000 ft.)
Storage	-16 to 10,600 m (-50 to 35,000 ft)

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Basic Troubleshooting


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- [Observing the Boot Routine](#)
- [Internal Visual Inspection](#)
- [Running the System Diagnostics](#)
- [Using the System Diagnostics](#)
- [Using the Device Groups Menu](#)
- [Device Groups Menu Options](#)
- [Error Messages](#)

The basic troubleshooting procedures can help you diagnose a system problem. These procedures can often reveal the source of a problem or indicate the correct starting point for servicing the system. See your *Installation and Troubleshooting Guide* for more detailed instructions for troubleshooting your system.

A brief explanation of how to load and start the system diagnostics can be found in "[Running the System Diagnostics](#)."

Perform the following procedures in the order presented.

 **NOTE:** While your NAS system can be run headless (without a keyboard, mouse, and monitor), some of the following diagnostic procedures will require that you have a keyboard, mouse, and monitor connected to your NAS system.

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 drive if the system's condition permits. See the documentation provided with the operating system or applications software 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 the user to the appropriate user documentation for the correct procedure.

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

External Visual Inspection

Improperly set switches and controls and loose or improperly connected cables are the most likely source of problems for the system, monitor, or other peripherals (such as a keyboard, mouse, or other external equipment). A quick check of all the switches, controls, and cable connections can easily solve these problems.

The external visual inspection consists of a quick inspection of the exterior of the system, the monitor, (if attached), the keyboard (if attached), any peripherals, and cables. While performing the visual inspection, make any necessary corrections.

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

1. Inspect the status indicators that can signify component malfunction.
2. Turn off the system, the monitor (if attached), and all peripherals.
3. Verify that all power cables are properly connected to the system, the monitor and peripherals, and their power sources.
4. Inspect connections to any attached devices including network cables, keyboard, monitor, mouse (if used), or keyboard/video/mouse (KVM) switch (if used), as well as any devices attached to the serial port.
5. Inspect all external monitor controls for any obvious damage or improper settings (if used). For proper settings of the video monitor controls, see the documentation for the monitor.
6. Inspect the keyboard (if used) to ensure that no keys are sticking. If keys are sticking, it may be necessary to replace the keyboard.
7. Inspect the exterior of the system, 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, 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.

 **NOTE:** You can run the system diagnostics from a set of diskettes you create by downloading the system diagnostics from the Dell | Support website at support.dell.com.

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

1. If the system is off, turn on all peripherals and the system.
2. Check the power-supply indicators.

Is the red fault indicator lit?

Yes. Troubleshoot the system power supply (see your *Installation and Troubleshooting Guide*).

No. Proceed to step 3.

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. Replace the keyboard with a known working keyboard. If the problem persists, 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 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 drive subsystem, as appropriate.
5. Insert a copy of the diagnostics diskette into the diskette drive, and reboot the system.

Does the **Diagnostics** menu appear?


Yes. See "[Running the System 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 system'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 "[Jumpers and Connectors](#)" to locate components referenced in the inspection procedure.

 **CAUTION:** Before you perform this procedure, read the safety instructions in your *System Information* document.

 **CAUTION:** See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

1. Remove the bezel (see "[Removing the Bezel](#)").
2. Turn off the system, including any attached peripherals, and disconnect all the power cables from electrical outlets.
3. Remove the cover (see "[Removing the Cover](#)").

 **CAUTION:** The microprocessor 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 microprocessor and heat-sink assembly, take care to avoid sharp edges on the heat sink.

4. Verify that the memory modules, expansion cards, and microprocessors are fully seated in their sockets or connectors.
 - To remove and reseat microprocessors, perform the steps described in "[Microprocessors](#)."
 - To remove and reseat a memory module, perform the steps described in "[Memory Modules](#)."
 - To remove and reseat an expansion card, perform the steps described in "[Expansion Cards](#)."
5. Verify that all jumpers are set correctly (see [Figure 5-2](#)).
6. Check all cable connectors inside the system to verify that they are firmly attached to their appropriate connectors.
7. Replace the cover (see "[Replacing the Cover](#)").
8. Reconnect the system 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 "[Running the System Diagnostics](#)."

Running the System Diagnostics


You can run system diagnostics from a set of diskettes that you create by downloading the system diagnostics from the Dell | Support website at support.dell.com.

 **NOTE:** To perform the tasks in this section, you can connect a keyboard, mouse, and monitor to your system, or you can use the console redirection function on the serial port (COM1). See the *Installation and Troubleshooting Guide* for detailed instructions and the location of the serial port. See the *System Administrator's Guide* for information on console redirection.

To run the system diagnostics from the diskettes, perform the following steps:

1. Insert the first diskette from the set of diagnostics diskettes into the system's diskette drive.
2. Boot the system.

When you start the diagnostics, a message is displayed telling you that the diagnostics is loading. The **Diagnostics** menu appears. The menu allows you to run all or specific diagnostic tests or to exit system diagnostics.

 **NOTE:** Before you read the rest of this section, start the system diagnostics so that you can see it on your monitor screen.

For a quick check of the system, select **Test All Devices** and then select **Quick Tests**. This option runs only the device tests that do not require user interaction and that do not take a long time to run. Dell recommends that you choose this option first to increase the chance of tracing the source of the problem quickly. To test a particular device, select **Test One Device**. For a complete check of the system, select **Test All Devices** and then select **Extended Tests**.

To check a particular area of the system, choose **Advanced Testing**. When you select **Advanced Testing**, the main screen of the diagnostics appears. This screen includes a listing of the various device groups in the system and the system's service tag.

To view data on test results, select **Information and Results**. Select **Program Options** to view the program options screen, which lets you set various test parameters.

By selecting the **Device Configuration** option, you can see an overview of the devices in the system.

Selecting **Exit to MS-DOS** exits the diagnostics and returns you to the MS-DOS® operating system environment.

To select an option from the **Diagnostics** menu, highlight the option and press <Enter>, or press the key that corresponds to the highlighted letter in the option you choose.

Using the System Diagnostics

When you select **Advanced Testing** from the **Diagnostics** menu, the main screen of the diagnostics appears.

Information on the main screen of the diagnostics is presented in the following areas:

- Two lines at the top of the main screen identify the diagnostics, the version number, and the system service tag.
- On the left side of the screen, **Device Groups** lists the diagnostic device groups in the order they will run if you select **All** under the **Run Tests** submenu. Press the up- or down-arrow key to highlight a device group.
- On the right side of the screen, **Devices for Highlighted Group** lists the specific devices within a particular test group.
- Two lines at the bottom of the screen make up the menu area. The first line lists the menu options you can select; press the left- or right-arrow key to highlight an option. The second line gives information about the highlighted option.

Using the Device Groups Menu

The **Device Groups** menu at the bottom of the screen provides options that enable you to select and run specific diagnostic tests from the diagnostics main screen. Press the left- and right-arrow keys to select the options on the menu. As you move from one menu option to another, a brief explanation of the highlighted option appears on the bottom line of the screen.

If you want more information about a device group or device, highlight the **Help** option and press <Enter>. After you read the information, press <Esc> to return to the previous screen.

Device Groups Menu Options

Five options are listed at the bottom of the diagnostics main screen: **Run Tests**, **Devices**, **Select**, **Config**, and **Help**.

There are two ways to select a menu option:

- Look on the screen to see which letter in the option is capitalized, and type that letter (for example, type r to select the **R**un option).
- Move the highlight to the option you want to select by pressing the left- or right-arrow key, and then press <Enter>.

Whenever one of the options is selected, additional choices become available.

The following subsections explain the menu options as listed from left to right in the **Device Groups** menu.

Run Tests

Run Tests displays seven options:

- **One** — Runs all the devices within the highlighted device group.
- **All** — Runs all of the tests in all of the device group tests (device group tests are run in the same order that they are listed).
- **Select** — Runs only the selected device groups or the devices that you selected within the device groups.
- **Options** — Provides a set of global parameters that allow you control over how the device group tests or device tests are run and how results are reported.
- **Results** — Displays the results of the tests.
- **Errors** — Displays errors detected during the tests.
- **Help** — Displays a series of help options, including **Menu**, **Keys**, **Device Group**, **Device**, **Test**, and **Versions**.

Devices

Most of the device groups consist of several devices. Use the **Devices** option to select individual devices within the device group(s).

When you select **Devices**, the following options are displayed: **Run Tests**, **Tests**, **Select**, **Parameters**, and **Help**. [Table 2-1](#) lists all of the possible values for each option.

Table 2-1. Devices Options

Option	Functions
Run Tests	Displays seven options: One , All , Select , Options , Results , Errors , and Help .

Tests	Allows you to select individual devices to tailor the testing process to your particular needs. You can choose one or more devices from the list. When you choose Tests , four options are displayed: Run Tests , Select , Parameters , and Help .
Select	Allows you to choose one or more devices from a particular device group. Three options are displayed: One , All , and Help .
Parameters	Determines how a particular test will be run.
Help	Displays a list of help topics.

Select

The **Select** option in the **Device Groups** menu allows you to choose one or more devices from a particular device group. Three options are displayed: **One**, **All**, and **Help**.

Config

Choosing **Config** from the **Device Groups** menu displays information about the particular device that is highlighted.

Error Messages

When you run a test in the diagnostics, error messages may result. Use these messages to identify the faulty component.

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Indicators, Codes, and Messages

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- [System Identification Indicators](#)
- [Front-Panel Indicators and Features](#)
- [Back-Panel Indicators and Features](#)
- [Power Indicator Codes](#)
- [Hard-Drive Indicator Codes](#)
- [NIC Indicator Codes](#)
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- [LCD Status Messages](#)
- [System Messages](#)
- [System Beep Codes](#)
- [Warning Messages](#)
- [Diagnostics Messages](#)
- [Alert Messages](#)

The system indicators and features are illustrated in this section. This section also describes each type of message, and lists the possible causes and actions you can take to resolve any problems indicated by a message.

System-Status Indicators

The system's bezel has an indicator that can represent system status when the bezel is installed (see [Figure 3-1](#)). The indicator signifies when the system is operating properly or when the system needs attention. The back-panel indicator functions the same as the bezel indicator. The back-panel indicator connector allows an indicator to be attached that will also function the same as the bezel indicator (see [Figure 3-3](#)).

A caution code signifies a problem with microprocessors, power supply, system or power-supply fans, system temperature, hard drives, system memory, expansion cards, or integrated SCSI controller.

[Table 3-1](#) lists the system's status indicator codes.

Figure 3-1. System-Status Indicators

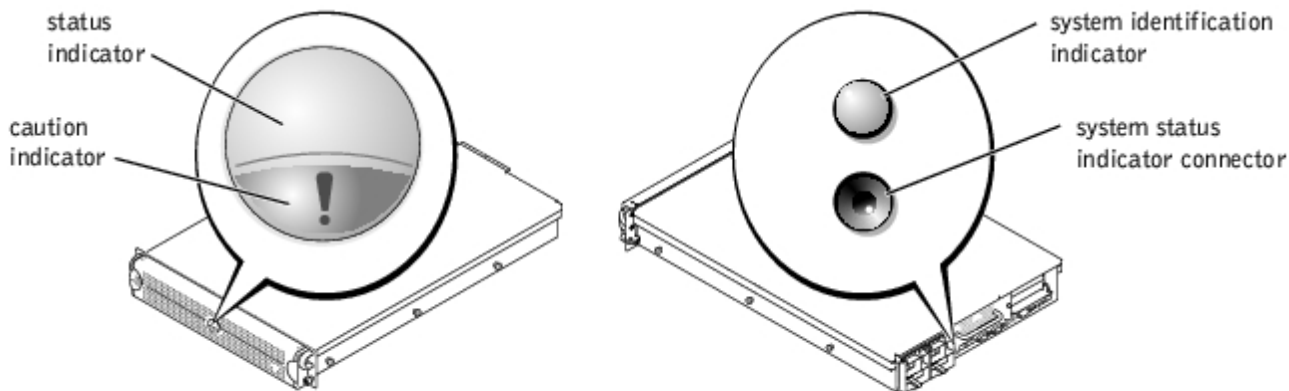


Table 3-1. System-Status Indicator Codes

Bezel Indicators		Back-Panel Indicators	Indicator Code
Status	Caution		
Off	Off	Off	No power is available to the system, or the system is not powered on.
On	Off	Blue	The system is operating normally.
Off	Blinking	Amber blinking	The system has detected an error and requires attention.

Blinking	Off	Blue blinking	The system is identifying itself (see " System Identification Indicators ").
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System Identification Indicators

The identification buttons on the front and back panels can be used to identify a particular system within a rack. See [Figure 3-2](#) to locate the front-panel system identification button. See [Figure 3-3](#) to locate the back-panel system identification button and indicator.

When either of the identification buttons is pushed, the identification indicator on the back blinks until one of the buttons is pushed again. If the bezel is installed, the system status indicator will also blink. If an indicator is connected to the back-panel system status indicator connector, that indicator will also blink.

Systems management software can also be used to cause the status and identification indicators to blink to identify a particular system. For more information, see the systems management software documentation.

Front-Panel Indicators and Features

Additional indicators are located behind the bezel. The front-panel status LCD provides information using an alphanumeric character display (see "[LCD Status Messages](#)"). See [Figure 3-2](#) for the front-panel indicators and features. [Table 3-2](#) describes the front-panel features.

Figure 3-2. Front-Panel Features

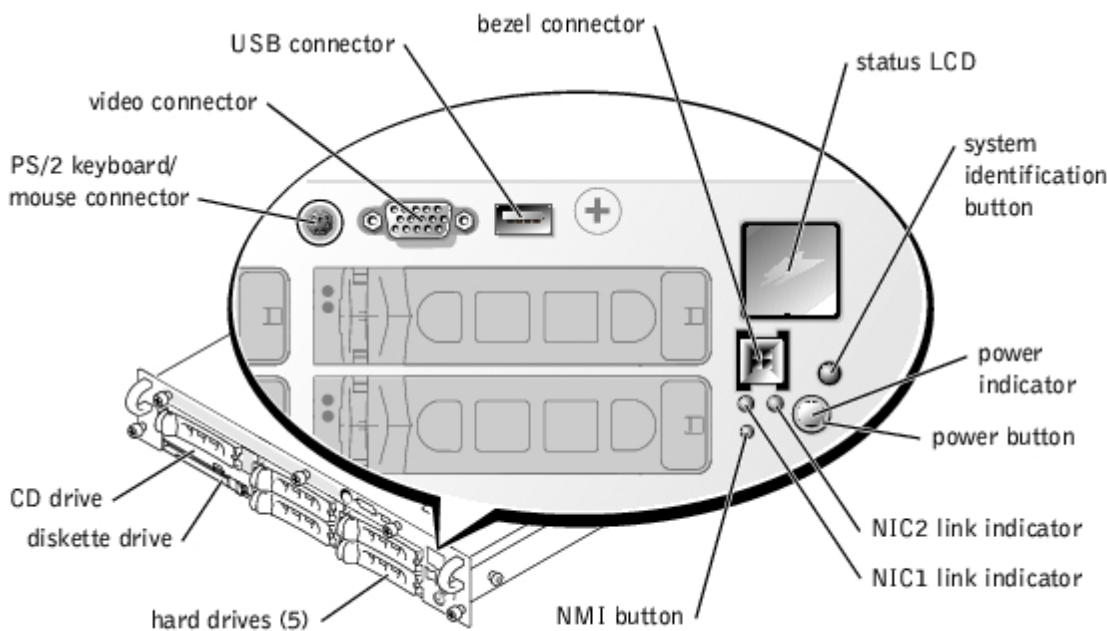


Table 3-2. Front-Panel Features

Component	Description
Power button	Turns system power off and on. The button is enabled in the System Setup program. When disabled, the button can only turn system power on. For more information, see your <i>User's Guide</i> and the operating system's documentation.
Power indicator	Provides information on power status (see " Power Indicator Codes ").
CD and diskette	Indicates read or write access to the respective drive.

drive indicators	
Hard-drive indicators	Provide information on the status of the respective hard drive (see " Hard-Drive Indicator Codes ").
NIC indicators	Indicate whether the NIC has a valid link to the network (see " NIC Indicator Codes ").
Status LCD	Can signify when the system is operating correctly or when the system needs attention (see " LCD Status Messages ").
System identification button	Can be used to identify a particular system (see " System Identification Indicators ").
NMI button	Can be used to troubleshoot software and device driver errors when using certain operating systems. This button is often referred to as a "force dump switch" and can be pressed using the end of a paper clip. When the option is enabled in the System Setup program and the button is pressed, an NMI alerts the system. Use this button only if directed to do so by qualified support personnel or by the operating system's documentation. For more information, see your <i>User's Guide</i> and the operating system's documentation.

Back-Panel Indicators and Features

[Figure 3-3](#) shows the back-panel features of the system. [Table 3-3](#) describes the back-panel features.

Figure 3-3. Back-Panel Features

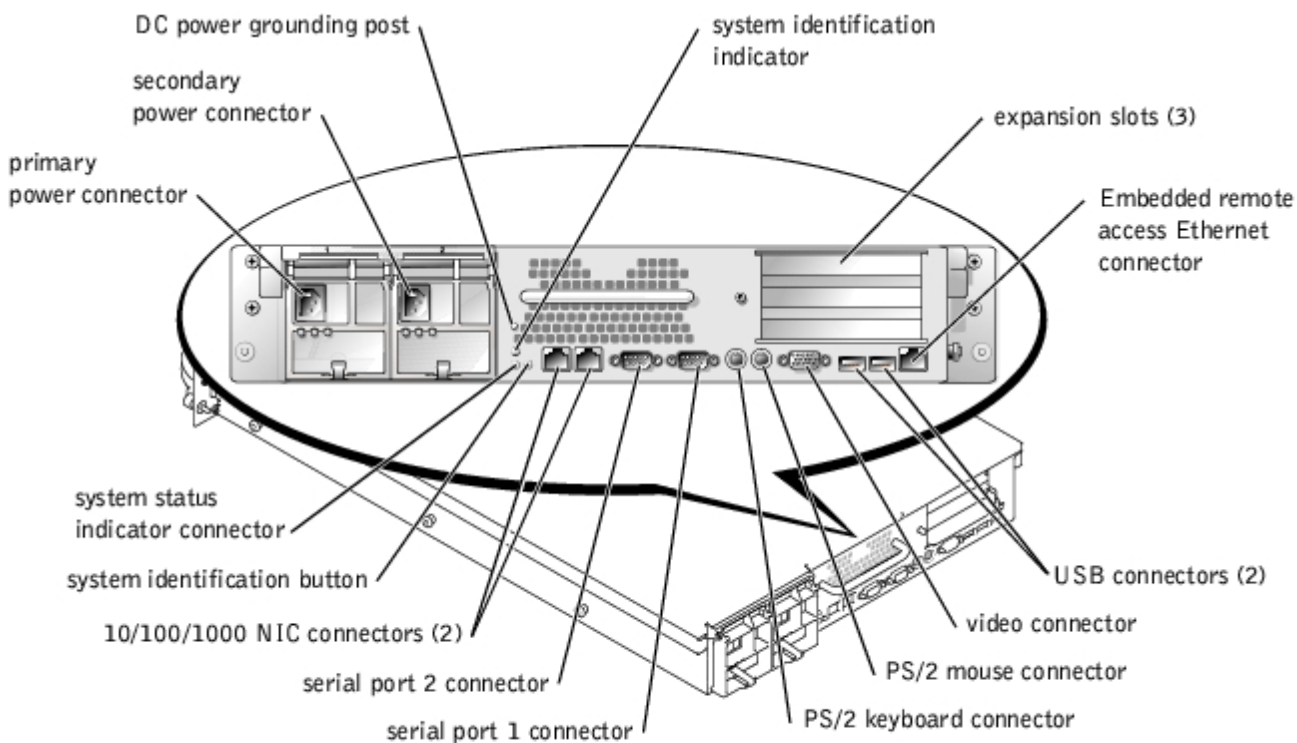


Table 3-3. Back-Panel Features

Component	Description
Power supply indicators	Provides information on power status (see " Power Indicator Codes ").
NIC indicators	Provides information on NIC status (see " NIC Indicator Codes ").

System status indicator connector	Connects to an indicator that can signify when the system is operating correctly or when the system needs attention (see " System-Status Indicators ").
System identification indicator	Signifies when the system is operating correctly or when the system needs attention, and can identify a particular system (see " System Identification Indicators ").
System identification button	Can be used to identify a particular system (see " System Identification Indicators ").
Expansion slots	The expansion cards are installed on the system's riser board (see Figure 5-4 to identify the expansion slots).
I/O ports and connectors	Attach peripheral devices to the system. For more information, see "I/O Ports and Connectors" in your <i>User's Guide</i> .
Embedded remote access Ethernet connector	Used for remote system administration. For more information, see your systems management documentation.
Power connectors and grounding post	Connects the system's power supplies to a power source (see " Power Supplies ").

Power Indicator Codes

The system has indicators on the front panel and the power supplies that signify system power status.

Power-Button Indicator Codes

The power button controls the power input to the system's power supplies. The power button indicator can provide information on power status (see [Figure 3-2](#) "Front Panel Features").

[Table 3-4](#) lists the power button indicator codes.

Table 3-4. Power-Button Indicator Codes

Indicator	Indicator Code
On	Indicates that power is supplied to the system, and the system is operational.
Off	Indicates that no power is supplied to the system.
Blinking	Indicates that power is supplied to the system, but the system is in a standby state. For more information on standby states, see your operating system documentation.

Power-Supply Indicator Codes

Each hot-pluggable power supply has indicators that can provide information on power status, fault, and the presence of power (see [Figure 3-4](#)). [Table 3-5](#) lists the power-supply indicator codes.

Figure 3-4. Power-Supply Indicators

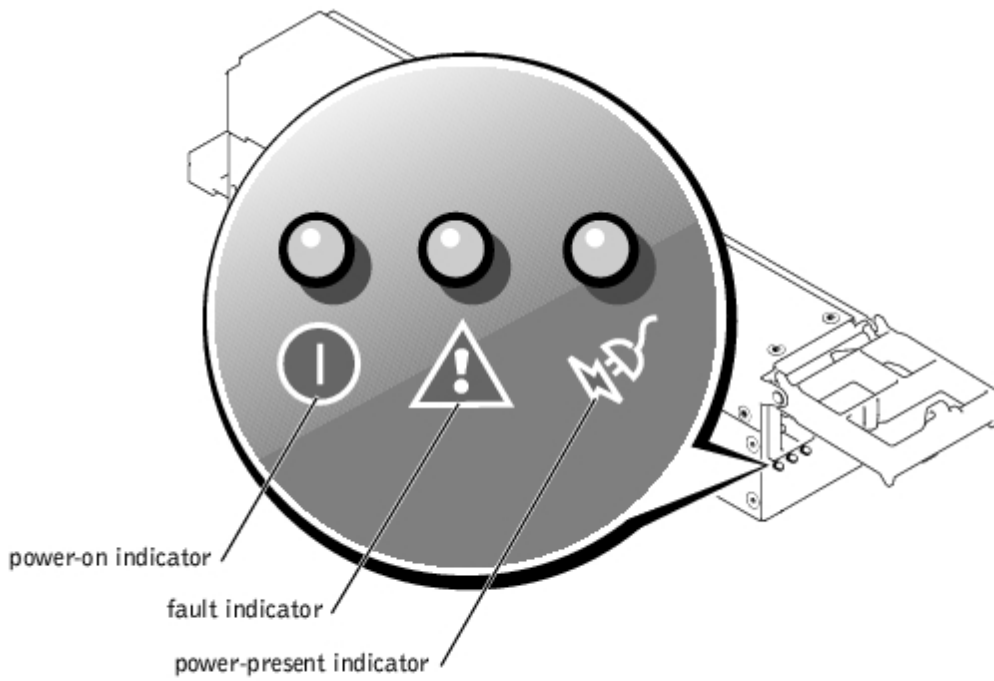


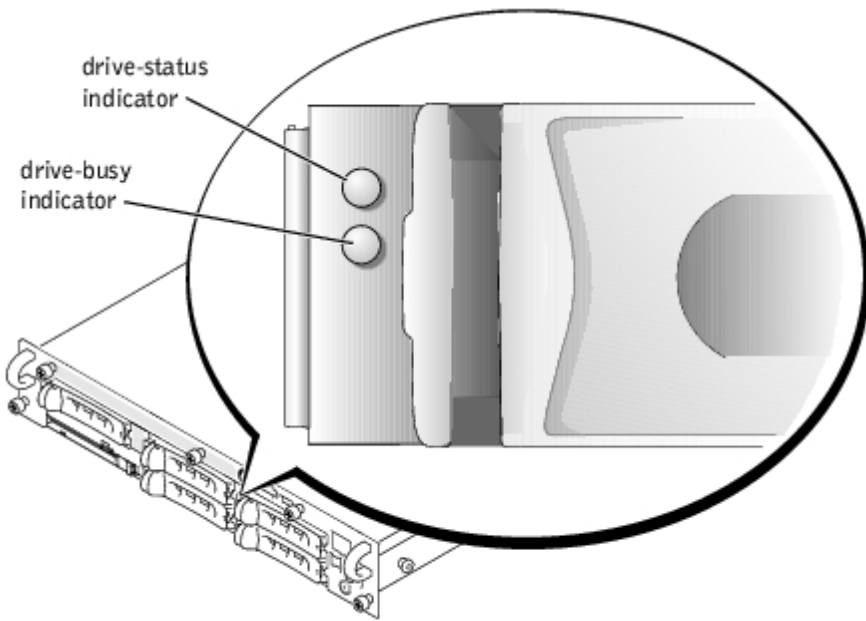
Table 3-5. Power-Supply Indicator Codes

Indicator	Indicator Code
Power-on	Green indicates that the power supply is operational.
Fault	Red indicates a problem with the power supply (fan failure, voltage error, and so forth).
Power present	Green indicates that power is present at the power supply and that the system is connected to a power source.

Hard-Drive Indicator Codes

Each hard-drive carrier has two indicators: a busy indicator and a status indicator (see [Figure 3-5](#)). The indicators provide information on the status of the respective hard drive.

Figure 3-5. Hard-Drive Indicators



[Table 3-6](#) lists the drive indicator codes. Different codes display as drive events occur in the system. For example, in the event of a hard-drive failure, the "drive failed" code appears. After the drive is selected for removal, the "preparing for removal" code appears. After the replacement drive is installed, the "preparing for operation, drive online" code appears.

NOTE: The drive-busy indicator signifies whether the hard drive is active on the SCSI bus. This indicator is controlled by the hard drive.

Table 3-6. Hard-Drive Indicator Codes

Indicator	Indicator Code
Drive bay empty, ready for insertion or removal	Off
Drive being prepared for operation, drive online	Steady green
Drive being identified	Blinks green four times per second
Drive being prepared for removal	Blinks green twice per second at equal intervals
Drive rebuilding	Blinks green twice per second at unequal intervals
Drive failed	Blinks amber four times per second
Predicted failure for the drive	Blinks green, then amber, and then off, repeating this sequence every two seconds

NIC Indicator Codes

Each NIC on the back panel has an indicator that provides information on network activity and link status (see [Figure 3-6](#)). [Table 3-7](#) lists the NIC indicator codes on the back panel.

The front panel has a link indicator for each NIC (see [Figure 3-2](#)). Each indicator signifies whether the corresponding NIC is connected to a valid link partner on the network.

Figure 3-6. NIC Indicators

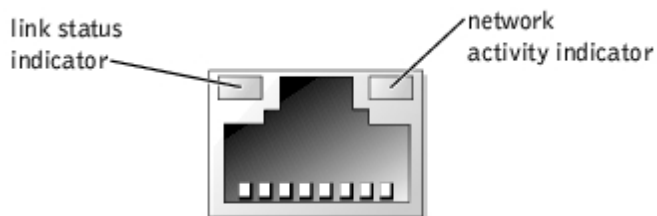


Table 3-7. NIC Indicator Codes

Indicator	Indicator Code
Link and activity indicators are off	The NIC is not connected to the network.
Link indicator is green	The NIC is connected to a valid link partner on the network.
Activity indicator is amber blinking	Network data is being sent or received.

Cooling Fan Indicator Codes

Each individual fan has a status indicator on the system board adjacent to the respective fan's connector (see [Figure 3-7](#)). To locate the fan connectors on the system board, see [Figure 5-3](#). [Table 3-8](#) lists the fan indicator codes.

Figure 3-7. Cooling Fan Indicators

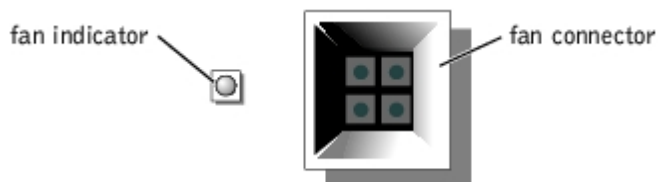


Table 3-8. Cooling Fan Indicator Codes

Indicator	Indicator Code
Off	The fan is not required.
Green	The fan is operating normally.
Amber blinking	The fan is malfunctioning.

LCD Status Messages

The system's bezel indicator can signify when the system is operating correctly or when the system needs attention (see [Figure 3-1](#)). When the bezel indicator signifies an error condition, remove the bezel to see further information provided by the status LCD.

The LCD can display two lines of alphanumeric characters. The display codes are presented in two color combinations:

- White characters on a blue background — Information only; no action is required.
- Amber characters on a black background — The system needs attention.

[Table 3-9](#) lists the LCD status messages that can occur and the probable cause for each message. The LCD messages refer to events recorded in the SEL. For information on the SEL and configuring system management settings, see the systems

Table 3-9. LCD Status Messages

Line 1 Message	Line 2 Message	Causes	Corrective Actions
<i>SYSTEM ID</i>	SYSTEM NAME	<p><i>SYSTEM ID</i> is a unique name, five characters or less, defined by the user.</p> <p><i>SYSTEM NAME</i> is a unique name, 16 characters or less, defined by the user.</p> <p>The system ID and name display under the following conditions:</p> <ul style="list-style-type: none"> • The system is powered on. • The power is off and active POST errors are displayed. 	<p>This message is for information only.</p> <p>You can change the system ID and name in the System Setup program (see "Using the System Setup Program").</p>
E0000	OVRFLW CHECK LOG	<p>LCD overflow message.</p> <p>A maximum of three error messages can display sequentially on the LCD. The fourth message displays as the standard overflow message.</p>	Check the SEL for details on the events.
E0119	TEMP AMBIENT	Ambient system temperature is out of acceptable range.	Ensure that the system cooling fans are properly installed. If the problem persists, replace the faulty fan(s) (see " System Fans ").
E0119	TEMP BP	Backplane board is out of acceptable temperature range.	Ensure that the system cooling fans are properly installed. If the problem persists, replace the faulty fan(s) (see " System Fans "). If the problem persists, replace the backplane board (see " SCSI Backplane Board ").
E0119	TEMP CPU <i>n</i>	Specified microprocessor is out of acceptable temperature range.	Ensure that the system cooling fans are properly installed. If the problem persists, replace the faulty fan(s) (see " System Fans "). If the problem persists, ensure that the specified microprocessor's heat sink is properly installed. If the problem persists, replace the faulty microprocessor (see " Microprocessors ").
E0119	TEMP SYSTEM	System board is out of acceptable temperature range.	Ensure that the system cooling fans are properly installed. If the problem persists, replace the faulty fan(s) (see " System Fans "). If the problem persists, replace the system board (see " System Board ").
E0212	VOLT 3.3	System power supply is out of acceptable voltage range; faulty or improperly installed power supply.	Ensure that the power supplies are properly installed. If the problem persists, replace the faulty power supply(ies) (see " Power Supplies ").
E0212	VOLT 5		
E0212	VOLT 12		
E0212	VOLT BATT	Faulty battery; faulty system board.	Ensure that the system battery is properly installed. If the problem persists, replace the battery (see " System Battery "). If the problem persists, replace the system board (see " System Board ").

E0212	VOLT BP 12	Backplane board is out of acceptable voltage range.	Ensure that the power cables are securely connected to the backplane board (see " SCSI Backplane Board "). Ensure that the power supplies are properly installed. If the problem persists, replace the faulty power supply(ies) (see " Power Supplies ").
E0212	VOLT BP 3.3		
E0212	VOLT BP 5		
E0212	VOLT CPU VRM	Microprocessor VRM voltage is out of acceptable range; faulty or improperly installed microprocessor VRM; faulty system board.	Ensure that supported VRMs of the same type are properly installed. If the problem persists, replace the VRMs (see Figure 4-30). If the problem persists, replace the system board (see " System Board ").
E0212	VOLT NIC 1.8V	Integrated NIC voltage is out of acceptable range; faulty or improperly installed power supply; faulty system board.	Ensure that the power supplies are properly installed. If the problem persists, replace the faulty power supply(ies) (see " Power Supplies "). If the problem persists, replace the system board (see " System Board ").
E0212	VOLT NIC 2.5V		
E0212	VOLT PLANAR REG		
E0276	CPU VRM <i>n</i>	Specified microprocessor VRM is faulty, unsupported, improperly installed, or missing.	Ensure that supported VRMs of the same type are properly installed. If the problem persists, replace the VRM (see Figure 4-30).
E0276	MISMATCH VRM <i>n</i>		
E0280	MISSING VRM <i>n</i>		
E0319	PCI OVER CURRENT	Faulty or improperly installed expansion card.	Ensure that the expansion cards are properly installed. If the problem persists, replace the faulty expansion card(s) (see " Expansion Cards ").
E0412	RPM FAN <i>n</i>	Specified cooling fan is faulty, improperly installed, or missing.	Ensure that the system cooling fans are properly installed. If the problem persists, replace the faulty fan(s) (see " System Fans ").
E0780	MISSING CPU 1	Microprocessor is not installed in socket 1.	A microprocessor must be installed in socket 1, and a VRM must be installed for each installed microprocessor. Install a microprocessor in the specified socket or remove the VRM for the specified microprocessor if that microprocessor is not installed (see " Microprocessors "). To identify the microprocessors and VRMs, see Figure 5-3 .
E07F0	CPU IERR	Faulty or improperly installed microprocessor.	Ensure that the microprocessors are properly installed. If the problem persists, replace the faulty microprocessor(s) (see " Microprocessors ").
E07F1	TEMP CPU <i>n</i> HOT	Specified microprocessor is out of acceptable temperature range and has halted operation.	Ensure that the system cooling fans are properly installed. If the problem persists, replace the faulty fan(s) (see " System Fans "). If the problem persists, ensure that the microprocessor heat sinks are properly installed. If the problem persists, replace the faulty microprocessor (see " Microprocessors ").
E07F4	POST CACHE	Faulty or improperly installed microprocessor.	Ensure that the microprocessors are properly installed. If the problem persists, replace the faulty
E07F4	POST CPU REG		

			microprocessor(s) (see " Microprocessors ").
E07F4	POST CPU SMI	SMI handler failed to initialize; faulty system board.	Replace the system board (see " System Board ").
E07FA	TEMP CPU <i>n</i> THERM	Specified microprocessor is out of acceptable temperature range and is operating at a reduced speed, or frequency.	Ensure that the system cooling fans are properly installed. If the problem persists, replace the faulty fan(s) (see " System Fans "). If the problem persists, ensure that the microprocessor heat sinks are properly installed. If the problem persists, replace the faulty microprocessor (see " Microprocessors ").
E0876	POWER PS <i>n</i>	No power available from the specified power supply; specified power supply is improperly installed or faulty.	Ensure that the power supplies are properly installed. If the problem persists, replace the faulty power supply(ies) (see " Power Supplies ").
E0880	INSUFFICIENT PS	Insufficient power is being supplied to the system; power supplies are improperly installed, faulty, or missing.	
E0CB2	MEM SPARE BANK	Correctable errors threshold was met in a memory bank: errors were remapped to the spare bank.	Ensure that the memory modules are properly installed. If the problem persists, replace the faulty memory module(s) (see " Memory Modules ").
E0CF1	MBE DIMM Bank <i>n</i>	Memory modules installed in the specified bank are not the same type and size; faulty memory module(s).	Ensure that all banks contain memory modules of the same type and size and that they are properly installed. If the problem persists, replace the faulty memory module(s) (see " Memory Modules ").
E0CF1	POST MEM 64K	Parity failure in the first 64 KB of main memory.	Ensure that the memory modules are properly installed. If the problem persists, replace the faulty memory module(s) (see " Memory Modules ").
E0CF1	POST NO MEMORY	Main-memory refresh verification failure.	Ensure that all banks contain memory modules of the same type and size and that they are properly installed. If the problem persists, replace the faulty memory module(s) (see " Memory Modules ").
E0CF5	LOG DISABLE SBE	Multiple single-bit errors on a single memory module.	Ensure that the memory modules are properly installed. If the problem persists, replace the faulty memory module(s) (see " Memory Modules ").
E0D76	DRIVE FAIL	Faulty or improperly installed hard drive or RAID controller.	Ensure that the hard drives are properly installed. If the problem persists, replace the faulty hard drive(s) (see " Hard Drives "). If the problem persists, replace the RAID controller (see " Integrated RAID Controller " and " RAID Controller Card ").
E0F04	POST CMOS	CMOS write/read failure; faulty system board.	Replace the system board (see " System Board ").
E0F04	POST CPU SPEED	Microprocessor speed control sequence failure.	Ensure that the microprocessors are properly installed. If the problem persists, replace the faulty microprocessor(s) (see

			"Microprocessors").
E0F04	POST DMA INIT	DMA initialization failure; DMA page register write/read failure.	Ensure that the memory modules are properly installed. If the problem persists, replace the faulty memory module(s) (see " Memory Modules ").
E0F04	POST DMA REG	Faulty system board.	Replace the system board (see " System Board ").
E0F04	POST KYB CNTRL	Faulty keyboard controller; faulty system board.	Replace the system board (see " System Board ").
E0F04	POST MEM RFSH	Main-memory refresh verification failure.	Ensure that the memory modules are properly installed. If the problem persists, replace the faulty memory module(s) (see " Memory Modules ").
E0F04	POST PIC REG	Master or slave PIC register test failure.	Replace the system board (see " System Board ").
E0F04	POST SHADOW	BIOS-shadowing failure.	Ensure that the memory modules are properly installed. If the problem persists, replace the faulty memory module(s) (see " Memory Modules ").
E0F04	POST SHD TEST	Shutdown test failure.	
E0F04	POST SIO	Super I/O chip failure; faulty system board.	Replace the system board (see " System Board ").
E0F04	POST TIMER	Programmable interval timer test failure; faulty system board.	Replace the system board (see " System Board ").
E0F0B	POST ROM CHKSUM	Faulty or improperly installed expansion card.	Ensure that the expansion cards are properly installed. If the problem persists, replace the faulty expansion card(s) (see " Expansion Cards ").
E0F0C	VID MATCH CPU <i>n</i>	Specified microprocessor is faulty, unsupported, improperly installed, or missing.	Ensure that the microprocessors are properly installed. If the problem persists, replace the faulty microprocessor(s) (see " Microprocessors ").
E10F3	LOG DISABLE BIOS	BIOS disabled logging errors.	Check the SEL for details on the errors.
E13F2	IO CHANNEL CHECK	Faulty or improperly installed expansion card; faulty system board.	Ensure that the expansion cards are properly installed. If the problem persists, replace the faulty expansion card(s) (see " Expansion Cards "). If the problem persists, replace the system board (see " System Board ").
E13F4	PCI PARITY		
E13F5	PCI SYSTEM		
E13F8	CPU BUS INIT	Faulty or improperly installed microprocessor or system board.	Ensure that the microprocessors are properly installed. If the problem persists, replace the faulty microprocessor(s) (see " Microprocessors "). If the problem persists, replace the system board (see " System Board ").
E13F8	CPU BUS PARITY	Faulty system board.	Replace the system board (see " System Board ").
E13F8	CPU MCKERR	Machine check error; faulty or improperly installed microprocessor; faulty system board.	Ensure that the microprocessors are properly installed. If the problem persists, replace the faulty microprocessor(s) (see " Microprocessors "). If the problem persists, replace the system board (see " System Board ").
E13F8	HOST BUS	Faulty system board.	Replace the system board (see " System Board ").

E13F8	HOST TO PCI BUS		
E13F8	MEM CONTROLLER	Faulty or improperly installed memory module; faulty system board.	Ensure that the memory modules are properly installed. If the problem persists, replace the faulty memory module(s) (see " Memory Modules "). If the problem persists, replace the system board (see " System Board ").
E1580	POWER CONTROL	Faulty system board.	Replace the system board (see " System Board ").
E20F1	OS HANG	Operating system watchdog timer timed out.	Restart your system. If the problem persists, see your operating system documentation.
EFFF0	RAC ERROR	Remote access controller firmware failure; faulty system board.	Replace the expansion-card riser board (see " Expansion-Card Riser Board ").
EFFF1	POST ERROR	BIOS error.	Update the BIOS firmware. Download the latest firmware from the Dell Support website at support.dell.com .
EFFF2	BP ERROR	Faulty or improperly installed backplane board.	Ensure that the interface cables are securely connected to the SCSI backplane board. If the problem persists, replace the backplane board (see " SCSI Backplane Board ").

Solving Problems Described by LCD Status Messages

When a single message appears on the status LCD, locate the code in [Table 3-9](#) and perform the suggested corrective action. The code on the LCD can often specify a very precise fault condition that is easily corrected. For example, if the code E0280 MISSING VRM 2 appears, you know that a microprocessor is installed in socket 2, but the VRM for that microprocessor is either improperly installed or missing.

In contrast, you might be able to determine the problem if multiple related errors occur. For example, if you receive a series of messages indicating multiple voltage faults, you might determine that the problem is a failing power supply.

Removing LCD Status Messages

For faults associated with sensors, such as temperature, voltage, fans, and so on, the LCD message is automatically removed when that sensor returns to a normal state. For example, if temperature for a component goes out of range, the LCD displays the fault; when the temperature returns to the acceptable range, the message is removed from the LCD. For other faults, you must take action to remove the message from the display:

- Clear the SEL — You can perform this task remotely, but you will lose the event history for the system.
- Chassis intrusion — When you remove the cover, the system assumes that you are servicing the bad component; the LCD clears when you replace the cover.
- Power cycle — Turn off the system and disconnect it from the electrical outlet; wait approximately ten seconds, reconnect the power cable, and restart the system.

Any of these actions will remove fault messages, and return the status indicators and LCD colors to the normal state. Messages will reappear under the following conditions:

- The sensor returns to a normal state but fails again, resulting in a new SEL entry.
- The system is reset and new error events are detected.
- A failure is recorded from another source that maps to the same display entry.

System Messages

System messages appear on the console during POST to notify you of a possible problem with the system. If you are performing console redirection, system messages will appear on the remote console. [Table 3-10](#) lists the system messages that can occur and the probable cause for each message.


 **NOTE:** If you receive a system message that is not listed in [Table 3-10](#), check the documentation for the application program that is running when the message appears or the operating system's documentation for an explanation of the message and recommended action.

Table 3-10. System Messages

Message	Causes	Corrective Actions
Address mark not found	Faulty CD/diskette drive subsystem or hard-drive subsystem; faulty system board.	Replace the faulty drive(s) (see " CD and Diskette Drives " and " Hard Drives "). If the problem persists, replace the system board (see " System Board ").
Alert! Current configuration does not support redundant memory. Redundant memory is disabled.	Memory modules installed are not the same type and size in all banks; faulty memory module(s).	Ensure that all banks contain memory modules of the same type and size and that they are properly installed. If the problem persists, replace the faulty memory module(s) (see " Memory Modules ").
Alert! Unsupported memory or incomplete sets in the following bank(s): Bank n	Memory modules installed in the specified bank are not the same type and size; faulty memory module(s).	
Amount of available memory limited to 256 MB!	OS Install Mode is enabled in the System Setup program.	Disable OS Install Mode in the System Setup program (see " Using the System Setup Program ").
Auxiliary device failure	Loose or improperly connected mouse or keyboard cable; faulty mouse or keyboard.	Check the mouse and keyboard cables and connectors. If the problem persists, replace the mouse and keyboard. If the problem persists, replace the system board (see " System Board ").
BIOS Update Attempt Failed!	Remote BIOS update attempt failed.	Retry the BIOS update. Download the latest firmware from the Dell Support website at support.dell.com .
CD-ROM drive not found	Improperly connected or missing CD drive.	Ensure that the CD drive is properly installed. If the problem persists, replace the CD drive (see " CD and Diskette Drives ").
CPUs with different cache sizes detected	Microprocessors with different cache sizes are installed.	Ensure that all microprocessors have the same cache size and that they are properly installed (see " Microprocessors ").
Decreasing available memory	Faulty or improperly installed memory modules.	Ensure that the memory modules are properly installed. If the problem persists, replace the faulty memory module(s) (see " Memory Modules ").
Diskette drive n seek failure	Incorrect configuration settings in the System Setup program.	Run the System Setup program to correct the settings (see " Using the System Setup Program ").
	Faulty or improperly installed diskette drive.	Ensure that the diskette drive is properly installed. If the problem persists, replace the diskette drive (see " CD and Diskette Drives ").
Diskette read failure		

	Faulty or improperly inserted diskette.	Replace the diskette.
Diskette subsystem reset failed	Faulty or improperly installed diskette drive.	Ensure that the diskette drive is properly installed. If the problem persists, replace the diskette drive (see " CD and Diskette Drives ").
ECC memory error	Faulty or improperly installed memory modules.	Ensure that the memory modules are properly installed. If the problem persists, replace the faulty memory module(s) (see " Memory Modules ").
Error: Maximum PCI option ROM count exceeded!	Too many expansion cards have ROM enabled in the System Setup program.	Disable ROM for some of the expansion cards (see " Using the System Setup Program ").
Gate A20 failure	Faulty keyboard controller; faulty system board.	Replace the system board (see " System Board ").
Hard disk controller failure	Incorrect configuration settings in System Setup program; improperly installed hard drive, or loose interface or power cable; faulty hard-drive controller subsystem.	Run the System Setup program to correct the drive type (see " Using the System Setup Program "). If the problem persists, ensure that the hard drives are properly installed (see " Hard Drives "). If the problem persists, replace the system board (see " System Board ").
Hard disk read failure		
I/O parity interrupt at address	Faulty or improperly installed expansion card.	Ensure that the expansion cards are properly installed. If the problem persists, replace the faulty expansion card(s) (see " Expansion Cards ").
Invalid configuration information - please run SETUP program	Incorrect configuration settings in System Setup program; NVRAM_CLR jumper is installed; faulty system battery.	Check the System Setup configuration settings (see " Using the System Setup Program "). Remove the NVRAM_CLR jumper (see Figure 5-2 for jumper location). If the problem persists, replace the system battery (see " System Battery ").
Invalid NVRAM configuration, resource re-allocated	System configuration data has been ignored.	Check the System Setup configuration settings (see " Using the System Setup Program ").
Invalid SCSI configuration SCSI cable detected on connector SC51B of the SCSI backplane, daughter card not present	A SCSI cable is connected to the channel B connector on the SCSI backplane board; SCSI backplane daughter card is not installed.	If a cable is connected to the SC51B backplane board connector, the SCSI backplane daughter card must be installed. Ensure that the backplane daughter card is properly installed (see " Installing the SCSI Cable Strain-Relief Bracket ").
Keyboard controller failure	Faulty keyboard controller; faulty system board.	Replace the system board (see " System Board ").
Keyboard clock line failure	Loose or improperly connected keyboard cable; faulty keyboard; faulty keyboard controller.	Check the keyboard cable and connector. If the problem persists, replace the keyboard. If the problem persists, replace the system board (see " System Board ").
Keyboard data line failure		
Keyboard failure		
Keyboard stuck key failure		
Memory address line failure at address, read value expecting value	Faulty or improperly installed memory modules.	Ensure that the memory modules are properly installed. If the problem persists, replace the faulty memory module(s) (see " Memory Modules ").
Memory double word logic failure at address, read value expecting value		
Memory high address line failure at start address to end address		

Memory high data line failure at <i>start address</i> to <i>end address</i>		
Memory odd/even logic failure at <i>start address</i> to <i>end address</i>		
Memory parity failure at <i>start address</i> to <i>end address</i>		
Memory parity error at <i>address</i>		
Memory write/read failure at <i>address</i> , read value expecting value		
No boot device available	Faulty or missing CD/diskette drive subsystem, hard drive, or hard-drive subsystem.	Check the configuration settings in the System Setup program for Integrated Devices (see " Using the System Setup Program "). If booting from a SCSI controller, ensure that the controller is properly connected. If the problem persists, replace the faulty drive(s) (see " CD and Diskette Drives " and " Hard Drives "). If the problem still persists, replace the system board (see " System Board ").
No boot sector on hard- disk	No operating system on hard drive.	Check the hard-drive configuration settings in the System Setup program (see " Using the System Setup Program ").
No PXE-capable device available	<F12> pressed during POST and no PXE devices are detected.	Check the configuration settings in the System Setup program for the NICs (see " Using the System Setup Program ").
No timer tick interrupt	Faulty system board.	Replace the system board (see " System Board ").
Not a boot diskette	No operating system on diskette.	Use a bootable diskette.
PCI BIOS failed to install	Loose cables to expansion card(s); faulty or improperly installed expansion card.	Ensure that cables to expansion cards are properly connected. Ensure that the expansion cards are properly installed. If the problem persists, replace the faulty expansion card(s) (see " Expansion Cards ").
Plug & Play Configuration Error Embedded xxx	Error encountered in initializing PCI device; faulty system board.	Install the NVRAM_CLR jumper and reboot the system (see Figure 5-2 for jumper location). If the problem persists, ensure that the expansion cards are properly installed. If the problem persists, replace the faulty expansion card(s) (see " Expansion Cards "). If the problem persists, update the BIOS firmware. Download the latest firmware from the Dell Support website at support.dell.com .
Plug & Play Configuration Error PCI_n	Error encountered in initializing PCI adapter.	
Primary backplane is not present	Faulty or improperly installed SCSI backplane board.	Ensure that the SCSI backplane board is properly installed. If the problem persists, replace the backplane board (see " SCSI Backplane Board ").
Processor n internal error	Faulty microprocessor; faulty system board.	Ensure that the microprocessors are properly installed. If the problem
Processor bus parity error		

		persists, replace the faulty microprocessor(s) (see " Microprocessors "). If the problem persists, replace the system board (see " System Board ").
Processor in socket 1 not installed!	No microprocessor installed in primary microprocessor socket.	Install a microprocessor in the primary microprocessor socket. Also, ensure that a VRM for processor 1 is installed (see " Microprocessors ").
Remote access controller error	Embedded remote access memory may be temporarily corrupted.	To clear the embedded remote access memory, shut down the system, disconnect the power cords, wait approximately 30 seconds, reconnect the power cords, and restart the system. If the problem persists, ensure that the expansion-card riser board is properly installed. If the problem persists, replace the expansion-card riser board (see " Expansion-Card Riser Board "). If the problem persists, replace the system board (see " System Board ").
Remote access controller is not present		
SCSI cable not present on connector A or B of the primary backplane	SCSI cable is loose, improperly connected, or faulty.	Ensure that the SCSI cables are properly installed. If problem persists, add or replace the cables.
Shutdown failure	Shutdown test failure.	Ensure that the memory modules are properly installed. If the problem persists, replace the faulty memory module(s) (see " Memory Modules ").
System backplane error	Faulty or improperly installed SCSI backplane board.	Ensure that the SCSI backplane board is properly installed. If the problem persists, replace the backplane board (see " SCSI Backplane Board ").
System halted! Must power down	Wrong password entered too many times.	Information only.
Time-of-day clock stopped	Faulty battery.	Ensure that the system battery is properly installed. If the problem persists, replace the battery (see " System Battery ").
Time-of-day not set - please run SETUP program	Incorrect Time or Date settings; faulty system battery.	Check the Time and Date settings (see " Using the System Setup Program "). If the problem persists, replace the system battery (see " System Battery ").
Timer chip counter 2 failed	Faulty system board.	Replace the system board (see " System Board ").
Unsupported CPU combination	Microprocessor(s) is not supported by the system.	Update the BIOS firmware. Download the latest firmware from the Dell Support website at support.dell.com . If the problem persists, install a supported microprocessor combination (see " Microprocessors ").
Unsupported CPU stepping detected		
Unsupported DIMM detected in the RAID DIMM slot!	RAID memory module is not supported by the system.	Install a correct version of the RAID memory module (see " Integrated RAID Controller ").
Unsupported RAID key detected!	RAID hardware key is not supported by the system.	Install the RAID hardware key for your specific system (see " Integrated RAID Controller ").

The VRM for the processor in socket <i>n</i> is not installed.	Specified microprocessor VRM is faulty, unsupported, improperly installed, or missing.	A VRM must be installed for each installed microprocessor. Install a VRM for the specified microprocessor or remove the VRM for the specified microprocessor if that microprocessor is not installed (see " Microprocessors "). To identify the microprocessors and VRMs, see Figure 5-3 .
Warning: Detected mode change from RAID to SCSI B of the embedded RAID subsystem. Warning: Detected missing RAID hardware for the embedded RAID subsystem. Data loss will occur! Press Y to switch mode to SCSI, press any other key to disable both channels. 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 hard drives before changing the type of controller used with the drives.
Warning: Firmware is out-of-date, please update.	Firmware error.	Update the firmware. Download the latest firmware from the Dell Support website at support.dell.com .
Warning! No microcode update loaded for processor <i>n</i>	BIOS error.	Update the BIOS firmware. Download the latest firmware from the Dell Support website at support.dell.com .
Warning! System FRU is not programmed	Faulty or corrupt data in NVRAM.	Ensure that the system board is properly installed (see " System Board "). If the problem persists, obtain technical assistance.
Write fault Write fault on selected drive	Faulty diskette, CD/diskette drive assembly, hard drive, or hard-drive subsystem.	Replace the faulty drive(s) (see " CD and Diskette Drives " and " Hard Drives "). If the problem persists, replace the system board (see " System Board ").

System Beep Codes

When an error that cannot be reported on the monitor occurs during a boot routine, the system may emit a series of beeps that identifies the problem.

When a beep code is emitted, record it in and then look it up in [Figure 3-11](#). If you are unable to resolve the problem by looking up the meaning of the beep code, use the system diagnostics to identify a more serious cause.


 **NOTE:** If the system boots without a keyboard, mouse, or monitor attached, the system will not issue beep codes related to those peripherals.

Table 3-11. System Beep Codes

Code	Cause	Corrective Action
1-1-2	CPU register test failure.	Ensure that the microprocessors are properly installed. If the problem persists, replace the faulty microprocessor(s) (see " Microprocessors ").
1-1-3	CMOS write/read failure; faulty system board.	Replace the system board (see " System Board ").
1-1-4	BIOS error.	Update the BIOS firmware. Download the latest firmware from the Dell Support website at support.dell.com .
1-2-1	Programmable interval-timer failure;	Replace the system board (see " System Board ").

	faulty system board.	
1-2-2	DMA initialization failure.	Ensure that the memory modules are properly installed. If the problem persists, replace the faulty memory module(s) (see " Memory Modules ").
1-2-3	DMA page register write/read failure.	
1-3-1	Main-memory refresh verification failure.	
1-3-2	No memory installed.	
1-3-3	Chip or data line failure in the first 64 KB of main memory.	
1-3-4	Odd/even logic failure in the first 64 KB of main memory.	
1-4-1	Address line failure in the first 64 KB of main memory.	
1-4-2	Parity failure in the first 64 KB of main memory.	
1-4-3	Fail-safe timer test failure.	
1-4-4	Software NMI port test failure.	
2-1-1 through 2-4-4	Bit failure in the first 64 KB of main memory.	
3-1-1	Slave DMA-register failure.	
3-1-2	Master DMA-register failure.	
3-1-3	Master interrupt-mask register failure.	
3-1-4	Slave interrupt-mask register failure.	
3-2-2	Interrupt vector loading failure.	
3-2-4	Keyboard-controller test failure.	Check the keyboard cable and connector. If the problem persists, replace the keyboard. If the problem persists, replace the system board (see " System Board ").
3-3-1	CMOS failure.	Replace the system board (see " System Board ").
3-3-2	System configuration check failure.	
3-3-3	Keyboard controller not detected.	
3-3-4	Video memory test failure.	
3-4-1	Screen initialization failure.	
3-4-2	Screen-retrace test failure.	
3-4-3	Video ROM search failure.	
4-2-1	No timer tick.	
4-2-2	Shutdown test failure.	
4-2-3	Gate A20 failure.	
4-2-4	Unexpected interrupt in protected mode.	Ensure that the expansion cards are properly installed. If the problem persists, replace the faulty expansion card(s) (see " Expansion Cards ").
4-3-1	Improperly installed or faulty memory modules.	Ensure that the memory modules are properly installed. If the problem persists, replace the faulty memory module(s) (see " Memory Modules ").
4-3-2	No memory modules installed in bank 1.	Install memory modules in bank 1 of the same type and size (see " Memory Modules ").
4-3-3	Faulty system board.	Replace the system board (see " System Board ").

4-3-4	Time-of-day clock stopped.	Ensure that the system battery is properly installed. If the problem persists, replace the battery (see " System Battery ").
4-4-1	Super I/O chip failure; faulty system board.	Replace the system board (see " System Board ").
4-4-2	BIOS-shadowing failure.	Ensure that the system cooling fans are properly installed. If the problem persists, replace the faulty fan(s) (see " System Fans "). If the problem persists, replace the system board (see " System Board ").
4-4-3	Microprocessor speed control sequence failure.	Ensure that the microprocessors are properly installed. If the problem persists, replace the faulty microprocessor(s) (see " Microprocessors "). If the problem persists, replace the system board (see " System Board ").
4-4-4	Cache test failure; faulty 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. 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 the documentation that accompanied the operating system or application program.

Diagnostics Messages

When you run a test group or subtest in system diagnostics, an error message may result. Diagnostic error messages are not covered in this section. Record the message and then obtain technical assistance.

Alert Messages

The optional systems management software generates alert messages for your system. For example, the software generates messages that appear in the SNMP trap log file. Alert messages consist of information, status, warning, and failure messages for drive, temperature, fan, and power conditions. For more information, see the systems management software documentation.

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Removing and Replacing Parts


Dell™ PowerVault™ 775N Systems Service Manual

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- [Front-Panel I/O Board](#)
- [Control Panel](#)
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- [Power Supplies](#)
- [Expansion-Card Cage](#)
- [Expansion Cards](#)
- [Expansion-Card Riser Board](#)
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- [CD and Diskette Drives](#)
- [SCSI Configuration Information](#)
- [External SCSI Tape Drive](#)
- [Hard Drives](#)
- [Integrated RAID Controller](#)
- [RAID Controller Card](#)
- [Installing the SCSI Cable Strain-Relief Bracket](#)
- [SCSI Backplane Daughter Card](#)
- [SCSI Backplane Board](#)
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- [System Board Tray Levers](#)
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- [System Battery](#)
- [System Board](#)

The procedures in this manual require that you remove the cover and work inside the system. While working inside the system, do not attempt to service the system except as explained in this manual and elsewhere in your system documentation. Always follow the instructions closely. Review all of the procedures in your *System Information* document.

 **CAUTION:** Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. See your *System Information* document for complete safety information.

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

-  Read the safety information in the *System Information* document.
- Perform the procedures described in "[External Visual Inspection](#)."

When there is no replacement procedure provided, use the removal procedure in reverse order to install the replacement part.

Recommended Tools

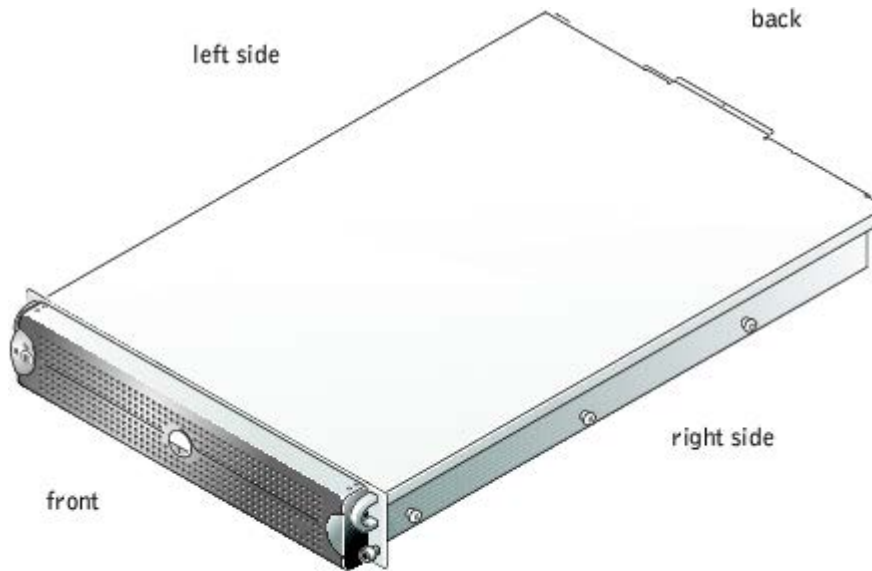
You need the following items to perform the procedures in this section:

- Key to the system keylock
 - #2 Phillips screwdriver
 - Wrist grounding strap
-

System Orientation

The illustrations in this document are based on the positioning of the system as shown in [Figure 4-1](#).

Figure 4-1. System Orientation



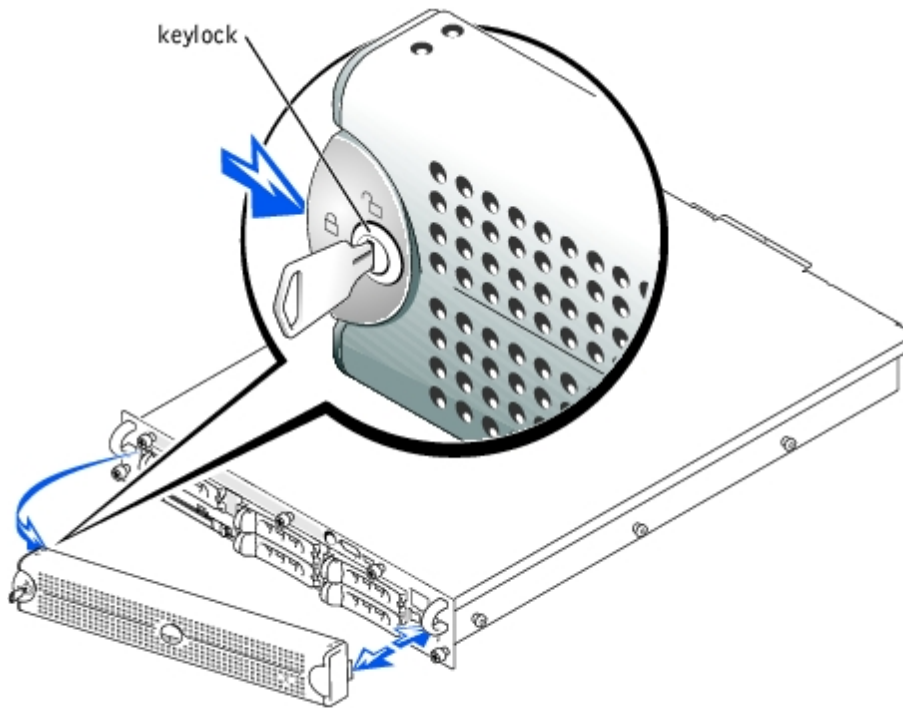
Bezel

The bezel has a system status indicator. A lock on the bezel restricts access to the power button, diskette drive, CD drive, hard drive(s), and the interior of the system.

Removing the Bezel

1. Using the system key, unlock the bezel.
2. Press the tab at the left end of the bezel.
3. Rotate the left end of the bezel away from the system to release the right end of the bezel.
4. Pull the bezel away from the system (see [Figure 4-2](#)).

Figure 4-2. Removing the Bezel



Replacing the Bezel

1. Fit the tabs on the right end of the bezel into the corresponding slots in the front panel.
2. Rotate the left end of the bezel toward the system to secure the left end of the bezel.
3. Using the system key, lock the bezel.

System Cover

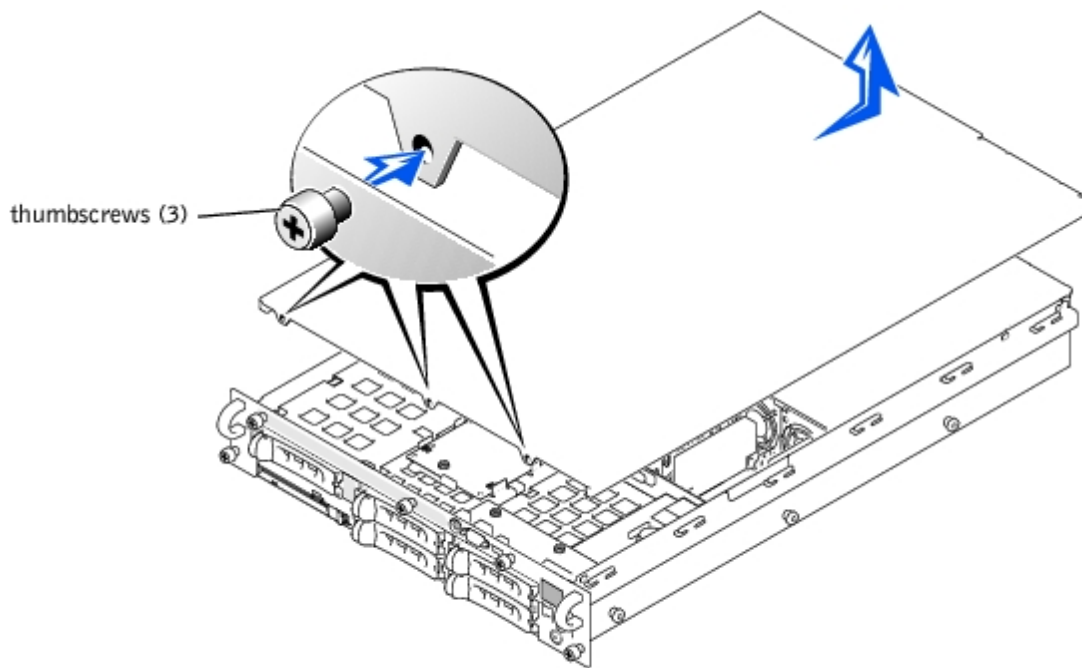
To upgrade or troubleshoot the system, remove the system cover to gain access to internal components.

Removing the Cover

⚠ CAUTION: Before you perform this procedure, read the safety instructions in your *System Information* document.

1. Remove the bezel (see "[Removing the Bezel](#)").
2. Loosen the three thumbscrews that secure the cover to the chassis (see [Figure 4-3](#)).
3. Slide the back cover backward and grasp the cover at both ends.
4. Carefully lift the cover away from the system.

Figure 4-3. Removing the Cover



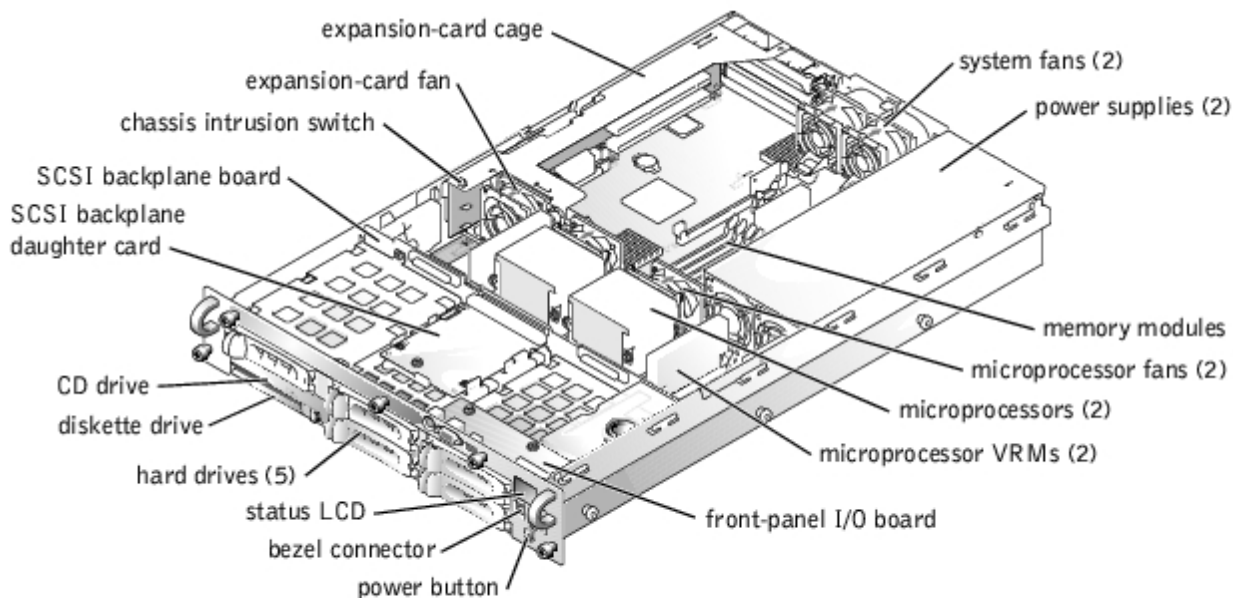
Replacing the Cover

1. Ensure that no tools or parts are left inside the system and that any cables are routed so that they will not be damaged by the cover.
2. Align the cover with the cover alignment hooks on the sides of the chassis, and slide the cover forward (see [Figure 4-3](#)).
3. Tighten the three thumbscrews that secure the cover to the chassis.
4. Replace the bezel (see "[Replacing the Bezel](#)").

Inside the System

In [Figure 4-4](#), the covers and bezel are removed to provide an interior view of the system.

Figure 4-4. Inside the System



The system board holds the system's control circuitry and other electronic components. Several hardware options, such as the microprocessors and memory, are installed directly on the system board. The expansion-card cage accommodates up to three full-length PCI or PCI-X expansion cards.

The system provides space for a 3.5-inch diskette drive and a CD drive. The CD/diskette drive tray connects to the controllers on the system board through the SCSI backplane board. For more information, see "[CD and Diskette Drives](#)."

The hard-drive bays provide space for up to five 1-inch SCSI hard drives. The hard drives connect to a controller on the system board or a RAID controller card through the SCSI backplane board. For more information, see "[Hard Drives](#)."

During an installation or troubleshooting procedure, you may be required to change a jumper setting. For more information, see "[Jumpers and Connectors](#)."

Control-Panel Cable Cover

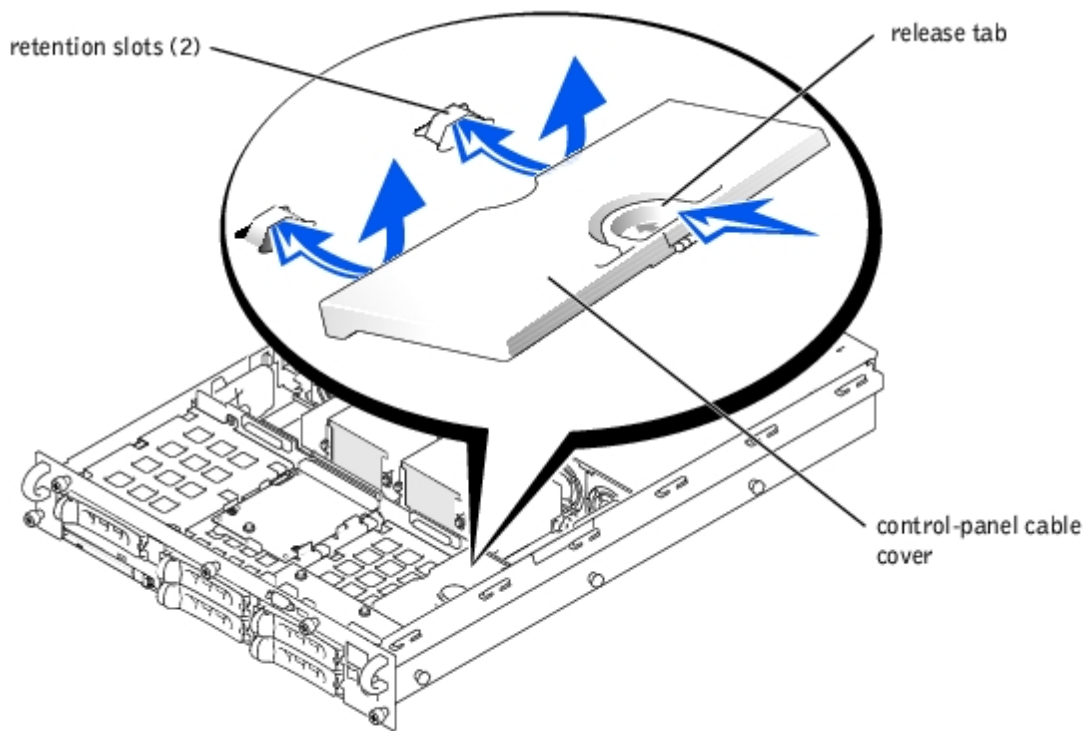
The control-panel cable cover shields the cable connected between the control panel board and the SCSI backplane board.

Removing the Control-Panel Cable Cover

CAUTION: Before you perform this procedure, read the safety instructions in your *System Information* document.

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2. Remove the cover (see "[Removing the Cover](#)").
3. Press the release tab on the control-panel cable cover and lift the cable cover straight up to clear the chassis (see [Figure 4-5](#)).

Figure 4-5. Removing and Replacing the Control-Panel Cable Cover



Replacing the Control-Panel Cable Cover

CAUTION: Before you perform this procedure, read the safety instructions in your *System Information* document.

1. Align the retention tabs on the control-panel cable cover with the slots in the chassis.
2. Lower the control-panel cable cover into the system until the cable cover snaps into position (see [Figure 4-5](#)).
3. Replace the cover (see "[Replacing the Cover](#)").

Front-Panel I/O Board

The front-panel I/O board provides connectors for PS/2 keyboard and mouse, video, and USB devices.

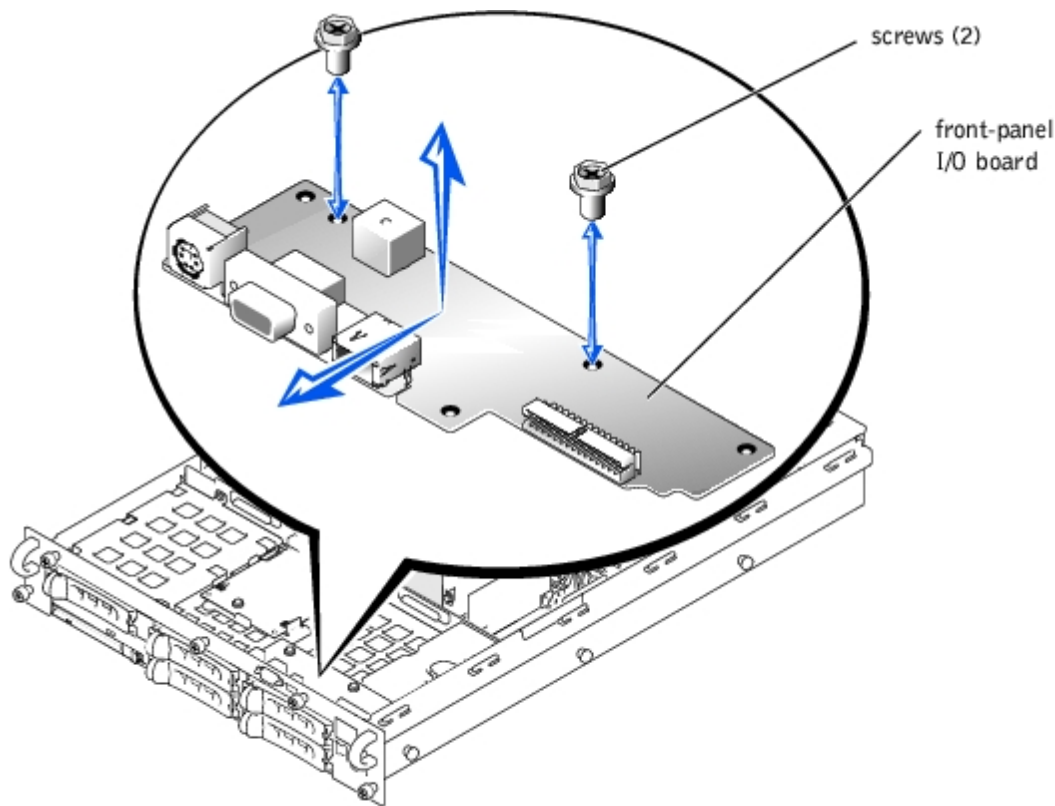
Removing the Front-Panel I/O Board

CAUTION: Before you perform this procedure, read the safety instructions in your *System Information* document.

CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

1. Remove the control-panel cable cover (see "[Removing the Control-Panel Cable Cover](#)").
2. Remove the two screws that secure the front-panel I/O board in the system (see [Figure 4-6](#)).
3. Pull the front-panel I/O board away from the front panel to disconnect the I/O board from the control panel board (see [Figure 4-6](#)).
4. Lift the front-panel I/O board out of the system (see [Figure 4-6](#)).

Figure 4-6. Removing and Replacing the Front-Panel I/O Board



Replacing the Front-Panel I/O Board

CAUTION: Before you perform this procedure, read the safety instructions in your *System Information* document.

CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

1. Lower the front-panel I/O board into the system and align the I/O board connector with the control panel board connector (see [Figure 4-6](#)).
2. Press the I/O board toward the front panel to connect the I/O board to the control panel board (see [Figure 4-6](#)).
3. Replace the two screws that secure the front-panel I/O board in the system (see [Figure 4-6](#)).
4. Replace the control-panel cable cover (see "[Replacing the Control-Panel Cable Cover](#)").

Control Panel

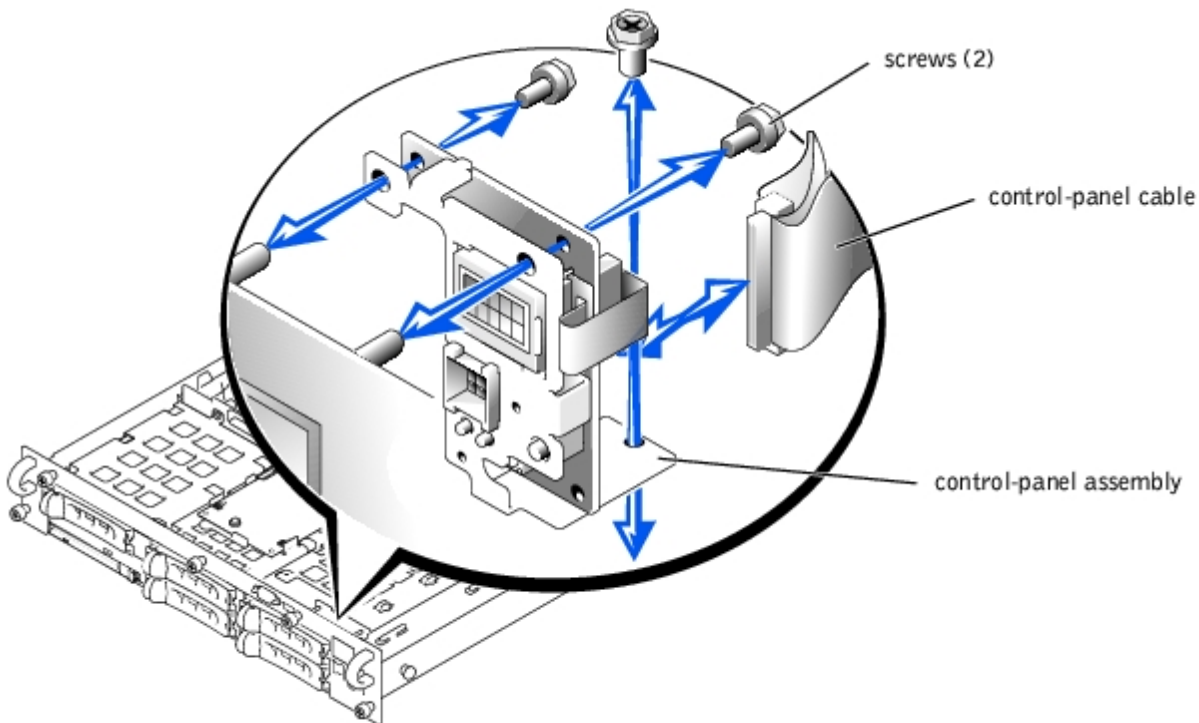
Removing the Control Panel

CAUTION: Before you perform this procedure, read the safety instructions in your *System Information* document.

CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

1. Remove the control-panel cable cover (see "[Removing the Control-Panel Cable Cover](#)").
2. Remove the front-panel I/O board (see "[Removing the Front-Panel I/O Board](#)").
3. Remove the screws that secure the control-panel assembly in the system (see [Figure 4-7](#)).
 - Two screws at the top of the control-panel assembly that secure the assembly to the front panel.
 - One screw at the bottom of the control-panel that secures the assembly to the bottom of the chassis.
4. Slide the control-panel assembly away from the front panel.
5. Lift the assembly and disconnect the cable from the control panel board (see [Figure 4-7](#)).
6. Lift the assembly out of the system (see [Figure 4-7](#)).

Figure 4-7. Removing and Replacing the Control-Panel Assembly



Replacing the Control Panel

⚠ CAUTION: Before you perform this procedure, read the safety instructions in your *System Information* document.

⚠ CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

1. Lower the control-panel assembly into the system.
2. Connect the control-panel cable to the control panel board (see [Figure 4-7](#)).
3. Align the assembly with the posts on the front panel (see [Figure 4-7](#)).
4. Replace the screws that secure the control-panel assembly in the system (see [Figure 4-7](#)).
 - Two screws at the top of the control-panel assembly that secure the assembly to the front panel.
 - One screw at the bottom of the control-panel that secures the assembly to the bottom of the chassis.

5. Replace the front-panel I/O board (see "[Replacing the Front-Panel I/O Board](#)").
6. Replace the control-panel cable cover (see "[Replacing the Control-Panel Cable Cover](#)").


System Fans

The system includes the following hot-pluggable cooling fans:


- Two system fans
- One expansion-card fan
- One microprocessor fan for each installed microprocessor

The system may also include other optional hot-pluggable fans.

Removing a Cooling Fan

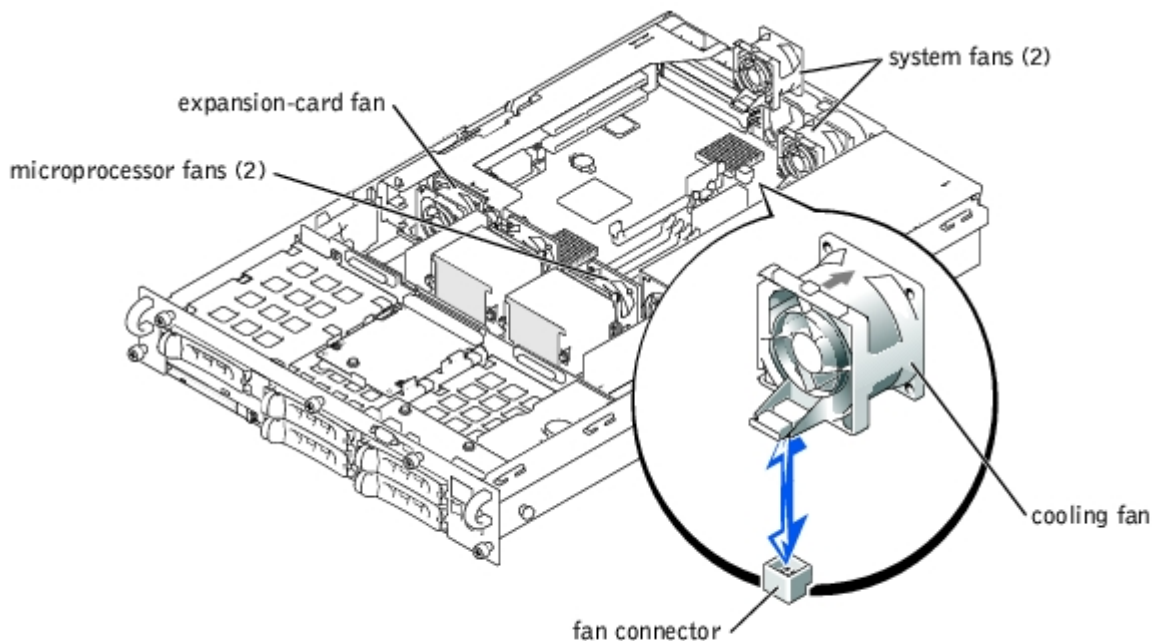
 **NOTE:** The procedure for removing each individual fan is the same.

 **CAUTION:** See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.


 **NOTICE:** The cooling fans are hot-pluggable. To maintain proper cooling while the system is on, replace only one fan at a time.

1. Remove the cover (see "[Removing the Cover](#)").
2. Pull the fan straight up to clear the chassis (see [Figure 4-8](#)).

Figure 4-8. Removing and Installing a Cooling Fan




Replacing a Cooling Fan

 **NOTE:** The procedure for installing each individual fan is the same.

 **CAUTION:** See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

1. Lower the fan into the retention base until the fan snaps into position (see [Figure 4-8](#)).

 **NOTE:** After installing a new fan, allow up to 30 seconds for the system to recognize the fan and determine whether it is functioning properly. The status indicator will turn green to signify that the fan is functioning properly (see "[Cooling Fan Indicator Codes](#)").

2. Replace the cover (see "[Replacing the Cover](#)").
-

System-Fan Bracket

The system-fan bracket mounts two cooling fans to the inside of the rear chassis wall.

Removing the System-Fan Bracket

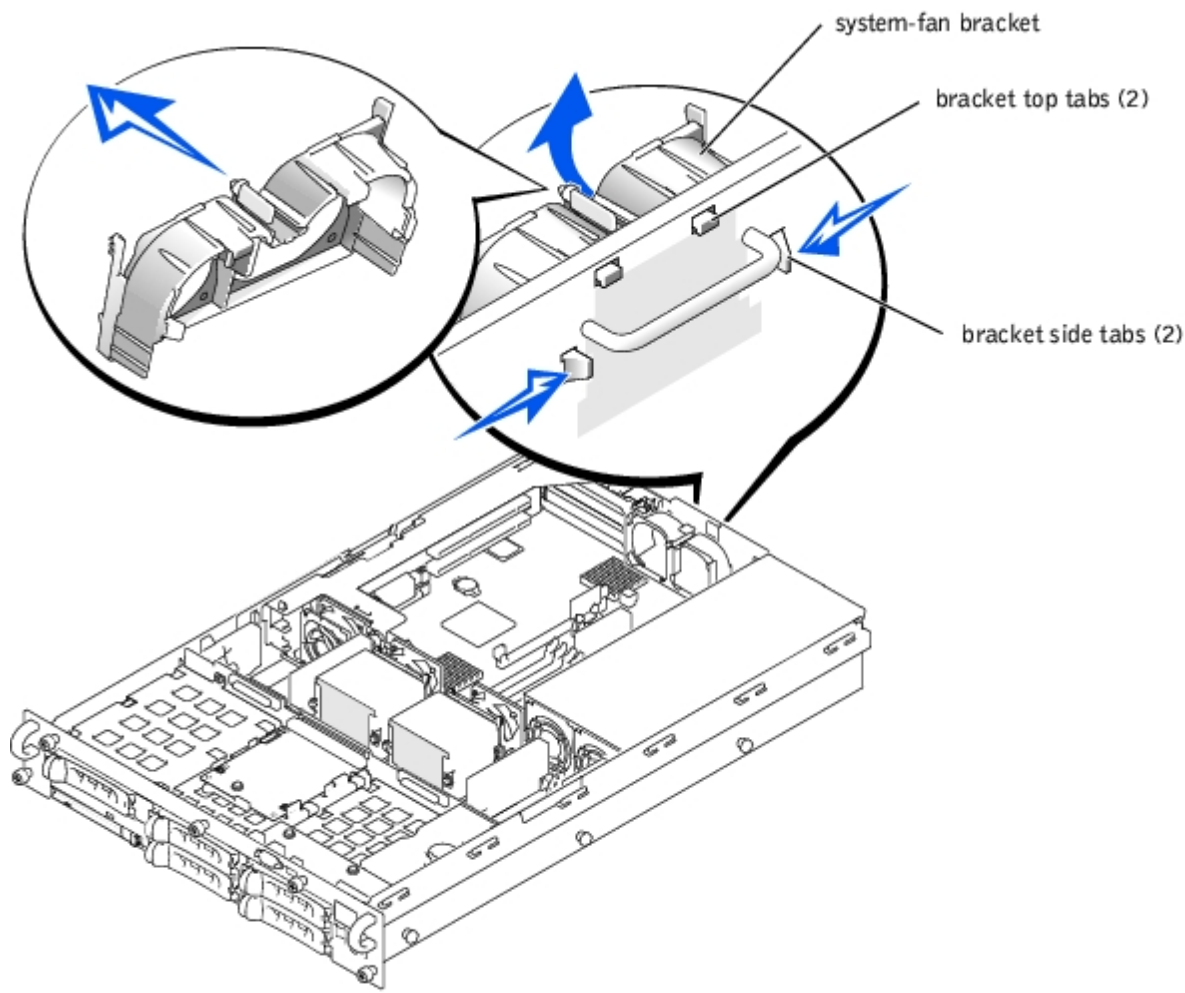
 **CAUTION:** See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

1. Remove the two system fans (see "[Removing a Cooling Fan](#)").

To identify the system fans, see [Figure 4-8](#).

2. Remove the system-fan bracket (see [Figure 4-9](#)):
 - a. From the rear of the chassis, press the two bracket side tabs inward that protrude through rear chassis wall.
 - b. Rotate the bottom of the bracket toward the inside of the chassis and then lift the bracket out of the system.

Figure 4-9. Removing and Replacing the System-Fan Bracket



Replacing the System-Fan Bracket

⚠ CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

1. Replace the system-fan bracket (see [Figure 4-9](#)):
 - a. Lower the bracket into the chassis, hooking the top bracket tabs into the slots in the rear chassis wall.
 - b. Swing the bottom of the bracket toward the rear chassis wall until the two side bracket tabs snap into place on the rear wall.
2. Replace the two system fans (see "[Replacing a Cooling Fan](#)").

Power Supplies

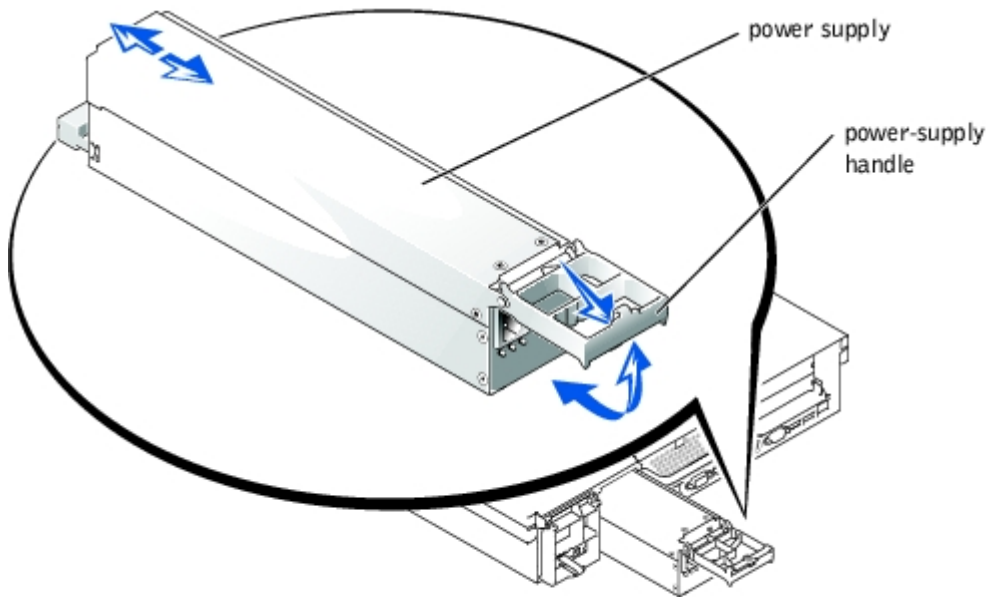
The system includes one or two hot-pluggable power supplies.

Removing a Power Supply

ⓘ NOTICE: The power supplies are hot-pluggable. The system requires one power supply to be installed for the system to operate normally. The system is in the redundant mode when two power supplies are installed. Remove and replace only one power supply at a time in a system that is powered on.


1. Squeeze the latch at the bottom of the power-supply handle.
2. Rotate the power-supply handle up until the power supply is released from the chassis (see [Figure 4-10](#)).
3. Pull the power supply straight out to clear the chassis (see [Figure 4-10](#)).

Figure 4-10. Removing and Installing a Power Supply



Replacing a Power Supply


1. With the power-supply handle in the extended position, slide the new power supply into the chassis (see [Figure 4-10](#)).
2. Rotate the handle down until it snaps into place (see [Figure 4-10](#)).

 **NOTE:** After installing a new power supply, allow several seconds for the system to recognize the power supply and determine whether it is working properly. The power-on indicator will turn green to signify that the power supply is functioning properly (see "[Power Indicator Codes](#)").

Expansion-Card Cage

The removable expansion-card cage simplifies many installation procedures by allowing you to remove the riser board and all installed expansion cards in a single step.

Removing the Expansion-Card Cage

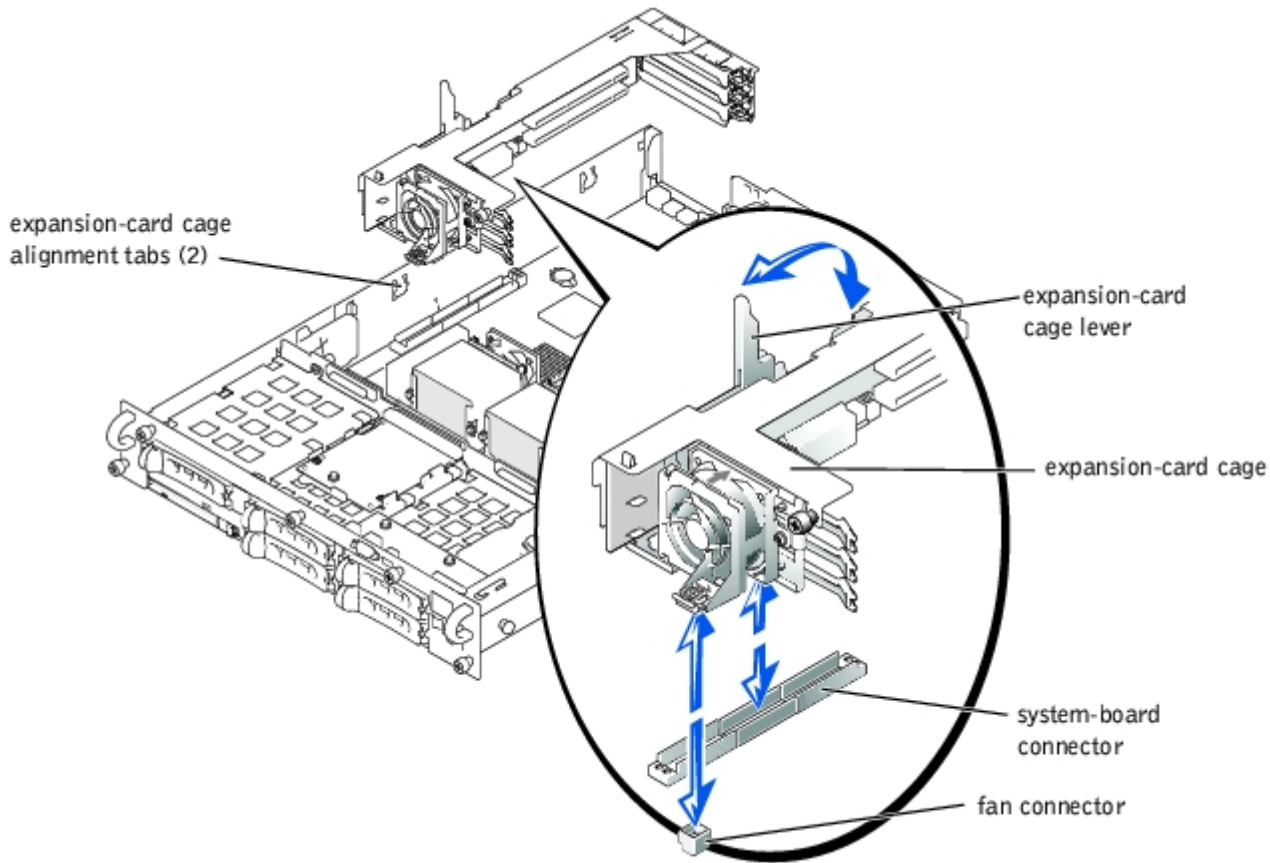
 **CAUTION:** Before you perform this procedure, read the safety instructions in your *System Information* document.

 **CAUTION:** See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2. Remove the cover (see "[Removing the Cover](#)").

3. Disconnect all expansion-card cables.
4. Rotate the expansion-card cage lever up until the cage is released from the chassis (see [Figure 4-11](#)).
5. Lift the cage straight up to clear the chassis (see [Figure 4-11](#)).

Figure 4-11. Removing and Installing the Expansion-Card Cage



Replacing the Expansion-Card Cage

- CAUTION:** Before you perform this procedure, read the safety instructions in your *System Information* document.
- CAUTION:** See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.
- NOTICE:** To avoid damage to the system, keep the bottom of the expansion-card cage parallel to the system board, while lowering the cage into the chassis.

1. With the expansion-card cage lever in the upright position, carefully lower the cage into the chassis until it is aligned with the tabs on the chassis side wall (see [Figure 4-11](#)).
2. Rotate the expansion-card cage lever down until the handle is flush with the top of the cage, and the cage is secured in the chassis (see [Figure 4-11](#)).
3. Reconnect all expansion-card cables.
4. Replace the cover (see "[Replacing the Cover](#)").

Expansion Cards

The system includes three expansion slots. The expansion cards are installed on the system's riser board (see [Figure 5-4](#) to identify the expansion slots).

Expansion Card Installation Guidelines

You can install expansion cards of different operating speeds on the same bus; however, the bus will operate at the slowest operating speed of the cards on that bus. For example, if one card on the bus has an operating speed of 66 MHz and the other card has an operating speed of 100 MHz, the bus will only operate at 66 MHz.

To identify expansion slots and PCI buses, see [Figure 5-4](#). [Table 4-1](#) lists the PCI bus and operating speed for each expansion-card slot.

Table 4-1. Expansion Slot Speeds

Slot	Bus	Operating Speed
1	1	33, 66, or 100 MHz
2	1	<ul style="list-style-type: none">Slot 1 is not empty — 33, 66, or 100 MHzSlot 1 is empty — 33, 66, 100, or 133 MHz
3	2	33, 66, 100, or 133 MHz

NOTE: If you are using expansion cards of different operating speeds, you should install the fastest card in slot 3 and the slowest card in slot 1.

PCI Bus Scan Order

The system's BIOS scans and numbers PCI buses and devices during startup. Expansion slots are scanned according to the host bus ordering, not by the slot numbers. See [Table 4-2](#) for the order in which the expansion slots and integrated PCI devices are scanned. [Figure 5-4](#) provides a diagram of buses and expansion slots.

An additional factor affects the assignment of PCI bus numbers: an expansion card may have its own PCI bridge chip which requires the assignment of a bus number for the card as well as one for the bridge. A particular expansion card may have two PCI bridge chips which would result in three sequential PCI bus numbers all assigned in the same expansion slot.

If you install expansion cards, you may have some difficulty in directly determining the bus number of a controller on a particular expansion card. However, the PCI bus scan order listed in [Table 4-2](#) can help determine the relative numbering of PCI buses within the expansion slots. For example, a PCI controller residing in expansion slot 3 will never have a lower bus number than one in slot 2 because slot 2 precedes slot 3 in the scan order.

Table 4-2. PCI Bus Scan Order

Order	Device or Slot
1	Video
2	Embedded remote access components
3	Expansion slot 1
4	Expansion slot 2
5	Expansion slot 3
6	Integrated NIC 1
7	Integrated NIC 2
8	Integrated SCSI controller on the system board
9	Integrated RAID controller on the system board

Installing an Expansion Card

 **CAUTION:** Before you perform this procedure, read the safety instructions in your *System Information* document.

 **CAUTION:** See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

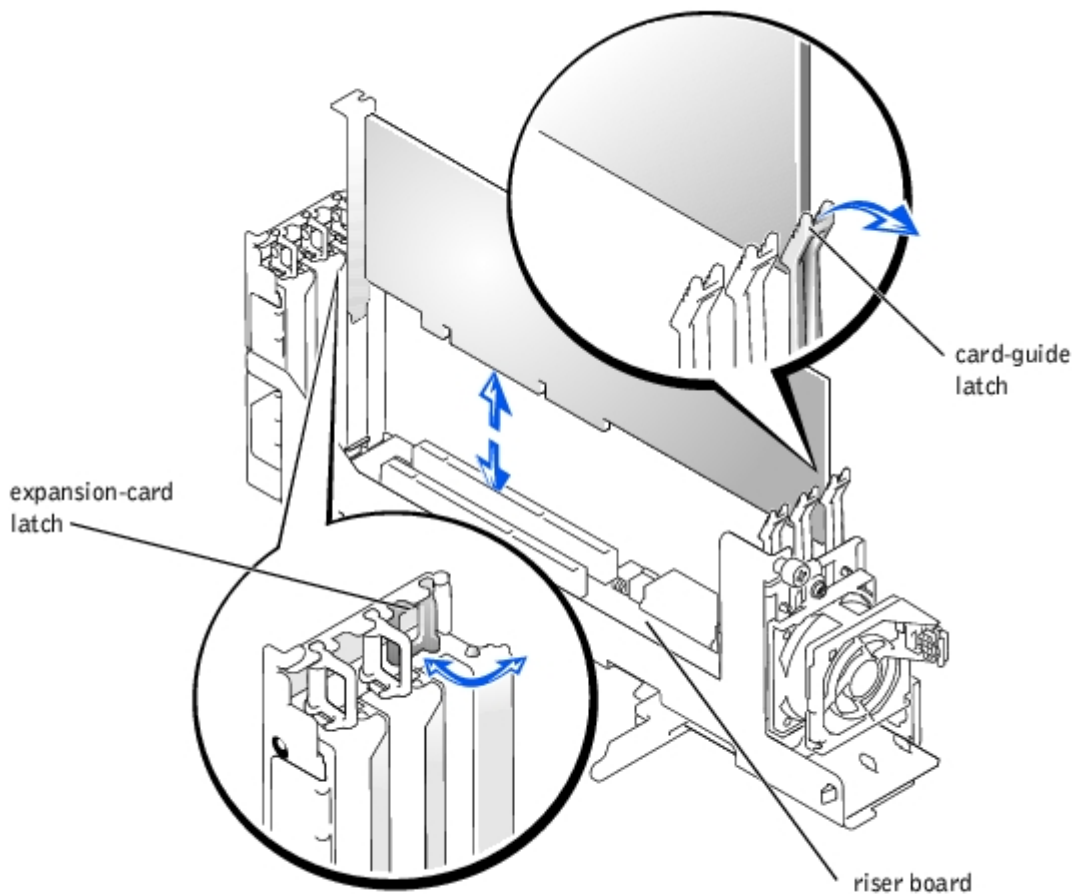
1. Unpack the expansion card, and prepare it for installation.

For instructions, see the documentation accompanying the card.

2. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
3. Remove the cover (see "[Removing the Cover](#)").
4. Disconnect all expansion-card cables.
5. Remove the expansion-card cage (see "[Removing the Expansion-Card Cage](#)").
6. Position the expansion-card cage so that the riser board lies horizontally on your work surface.
7. Open the expansion-card latch (see [Figure 4-12](#)) and remove the filler bracket.
8. Install the expansion card (see [Figure 4-12](#)).
 - a. Position the expansion card so that the card-edge connector aligns with the expansion-card connector on the expansion-card riser board.
 - b. Insert the card-edge connector firmly into the expansion-card connector until the card is fully seated.
 - c. When the card is seated in the connector, close the expansion-card latch (see [Figure 4-12](#)).


The card guide latch closes automatically as the card is seated in the connector.

Figure 4-12. Installing an Expansion Card



9. Replace the expansion-card cage (see "[Replacing the Expansion-Card Cage](#)").
10. Reconnect all expansion-card cables, including those for the new card.

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

 **NOTE:** If the expansion card you are installing is of a different operating speed as the card already installed on the same PCI bus, all expansion cards on that bus will operate at the slower speed.

11. Replace the cover (see "[Replacing the Cover](#)").


Removing an Expansion Card

 **CAUTION:** Before you perform this procedure, read the safety instructions in your *System Information* document.

 **CAUTION:** See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2. Remove the cover (see "[Removing the Cover](#)").
3. Disconnect all expansion-card cables.
4. Remove the expansion-card cage (see "[Removing the Expansion-Card Cage](#)").
5. Position the expansion-card cage so that the riser board lies horizontally on your work surface.

6. Release the expansion card:
 - a. Open the expansion-card latch (see [Figure 4-12](#)).
 - b. Press the release tab on the card-guide latch (see [Figure 4-12](#)).
 - c. Grasp the expansion card by its top corners, and carefully remove it from the expansion-card connector.
7. If you are removing the card permanently, install a metal filler bracket over the empty expansion slot opening and close the expansion-card latch.


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

8. Replace the expansion-card cage (see "[Replacing the Expansion-Card Cage](#)").
 9. Reconnect all expansion-card cables.
 10. Replace the cover (see "[Replacing the Cover](#)").
-

Expansion-Card Riser Board

The expansion-card riser board contains three PCI/PCI-X expansion slots and the chassis intrusion switch.

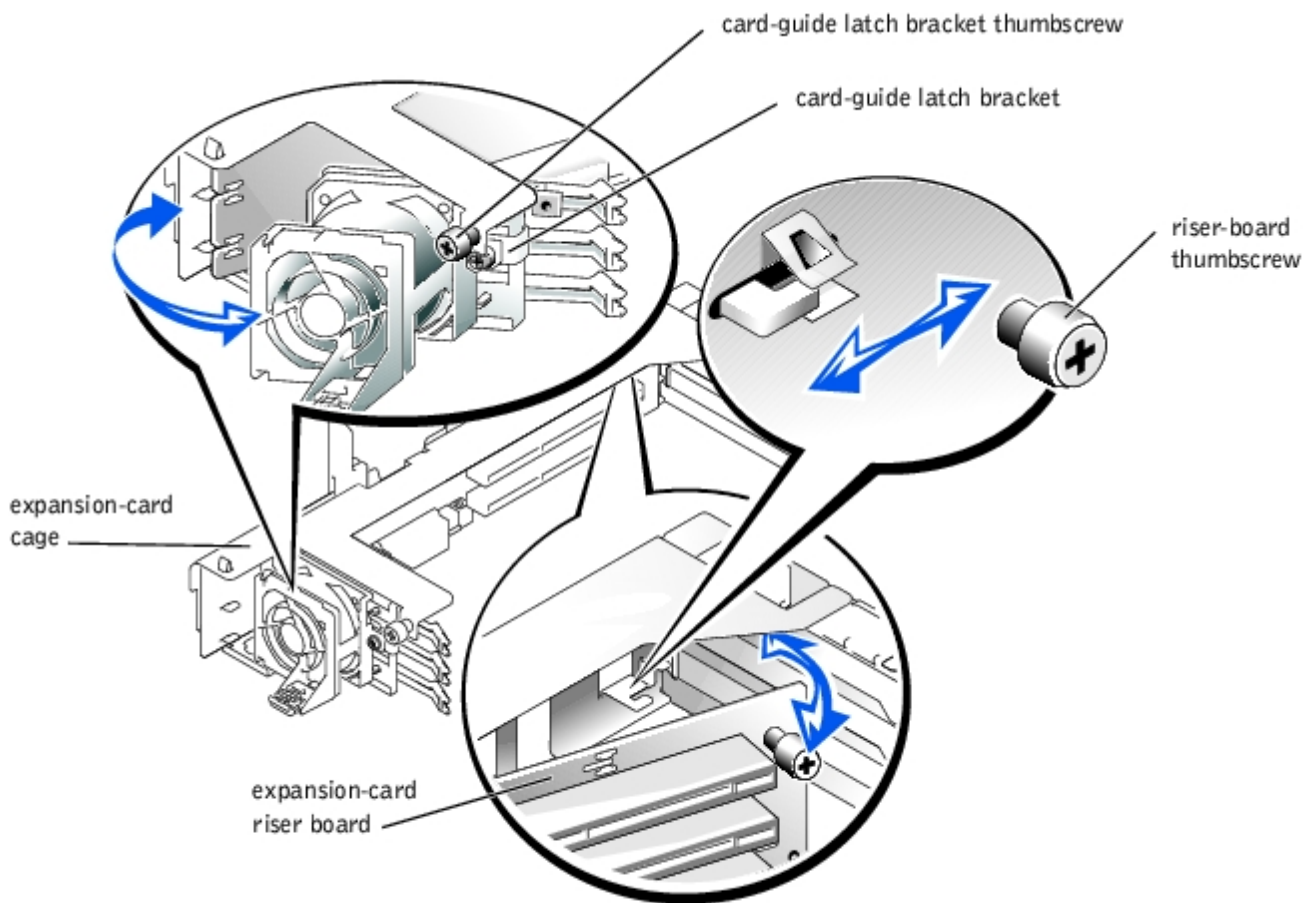
Removing the Expansion-Card Riser Board

 **CAUTION:** Before you perform this procedure, read the safety instructions in your *System Information* document.

 **CAUTION:** See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

1. Remove the expansion-card cage (see "[Removing the Expansion-Card Cage](#)").
2. Remove all expansion cards (see "[Removing an Expansion Card](#)").
3. Remove the expansion-card riser board (see [Figure 4-13](#)):
 - a. Loosen the thumbscrew on the card-guide latch bracket.
 - b. Rotate the card-guide latch bracket.
 - c. Loosen the thumbscrew on the riser board.
 - d. Slide the riser board toward the expansion slot openings about 0.5 inch.
 - e. Lift the riser board off the expansion-card cage's grounding tabs.

Figure 4-13. Removing and Replacing the Expansion-Card Riser Board



Replacing the Expansion-Card Riser Board

CAUTION: Before you perform this procedure, read the safety instructions in your *System Information* document.

CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

1. Replace the expansion-card riser board (see [Figure 4-13](#)):
 - a. Align the riser board with the expansion-card cage's grounding tabs.
 - b. Slide the riser board toward the card-guide latch bracket about 0.5 inch.
 - c. Tighten the thumbscrew on the riser board.
 - d. Rotate the card-guide latch bracket back into position.
 - e. Tighten the thumbscrew on the card-guide latch bracket.
2. Install all expansion cards (see "[Installing an Expansion Card](#)").
3. Replace the expansion-card cage (see "[Replacing the Expansion-Card Cage](#)").

Memory Modules

The six memory module connectors on the system board can accommodate a minimum of 512 MB of registered memory modules. The memory module connectors are arranged in pairs which consist of three banks (DIMM A – DIMM C).

Memory Upgrade Kits

The system is upgradable by installing combinations of 256-, 512-MB, and 1-GB registered DDR SDRAM modules. You can purchase memory upgrade kits as needed.

 **NOTE:** The memory modules must be PC-1600 compliant.

Memory Module Installation Guidelines

Starting with the connector nearest the power supplies, the memory module connectors are labeled "DIMM A1" through "DIMM C2" (see Figure 5-3). When you install memory modules, follow these guidelines:


- Install memory modules in matched pairs.
- Install a pair of memory modules in connectors DIMM A1 and A2 before installing a second pair in connectors B1 and B2, and so on.

[Table 4-3](#) lists several sample memory configurations based on these guidelines.

Table 4-3. Sample Memory Module Configurations

Total Desired Memory	DIMM A		DIMM B		DIMM C	
	1	2	1	2	1	2
512 MB	256 MB	256 MB	None	None	None	None
1 GB	512 MB	512 MB	None	None	None	None
2 GB	512 MB	512 MB	512 MB	512 MB	None	None
3 GB	512 MB	512 MB	512 MB	512 MB	512 MB	512 MB

Performing a Memory Upgrade

 **CAUTION:** Before you perform this procedure, read the safety instructions in your *System Information* document.

 **CAUTION:** See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2. Remove the cover (see "[Removing the Cover](#)").
3. Install or replace the memory module pairs as necessary to reach the desired memory total (see "[Installing Memory Modules](#)" and "[Removing Memory Modules](#)").

See [Figure 5-3](#) to locate the memory module connectors.

4. Replace the cover (see "[Replacing the Cover](#)").
5. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

After the system completes the POST routine, it runs a memory test.

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

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

6. Press <F2> to enter the System Setup program, and check the **System Memory** setting.

The system should have already changed the value in the **System Memory** setting to reflect the newly installed memory.

7. If the **System Memory** value is incorrect, one or more of the memory modules may not be installed properly. Repeat steps 1 through 6, ensuring that the memory modules are firmly seated in their connectors.
8. Run the system memory test in system diagnostics.

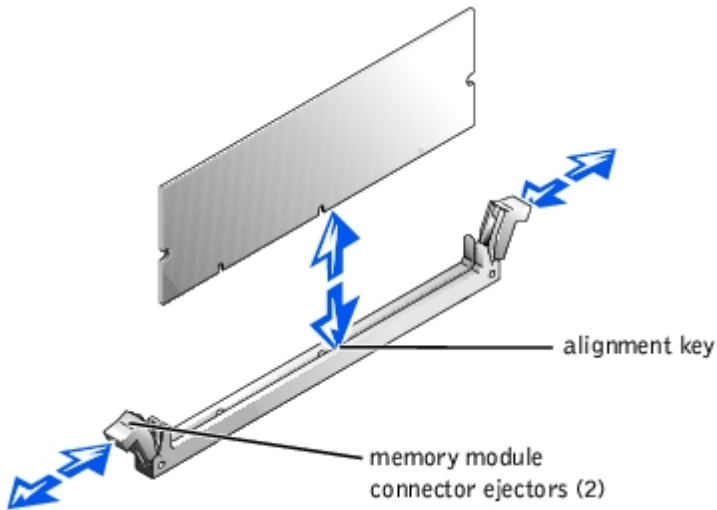
Installing Memory Modules

CAUTION: Before you perform this procedure, read the safety instructions in your *System Information* document.

CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2. Remove the cover (see "[Removing the Cover](#)").
3. Locate the memory module connectors in which you will install a memory module (see [Figure 5-3](#)).
4. Press down and outward on the memory module connector ejectors, as shown in [Figure 4-14](#), to allow the memory module to be inserted into the connector.

Figure 4-14. Removing and Installing a Memory Module



5. Align the memory module's edge connector with the alignment key, and insert the memory module in the connector (see [Figure 4-14](#)).

The memory module connector has an alignment key that allows the memory module to be installed in the connector in only one way.

6. Press down on the memory module with your thumbs while pulling up on the ejectors with your index fingers to lock the memory module into the connector (see [Figure 4-14](#)).

When the memory module is properly seated in the connector, the memory module connector ejectors should align with the ejectors on the other connectors with memory modules installed.

7. Repeat steps 3 through 6 of this procedure to install the remaining memory modules.
8. Perform steps 4 through 8 of the procedure in "[Performing a Memory Upgrade](#)."

Removing Memory Modules

CAUTION: Before you perform this procedure, read the safety instructions in your *System Information* document.

⚠ CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
 2. Remove the cover (see "[Removing the Cover](#)").
 3. Locate the memory module connectors from which you will remove memory modules (see [Figure 5-3](#)).
 4. Press down and outward on the memory module connector ejectors until the memory module pops out of the connector (see [Figure 4-14](#)).
 5. Repeat steps 3 and 4 of this procedure to remove any other memory modules.
 6. Perform steps 4 through 8 of the procedure in "[Performing a Memory Upgrade](#)."
-

CD and Diskette Drives

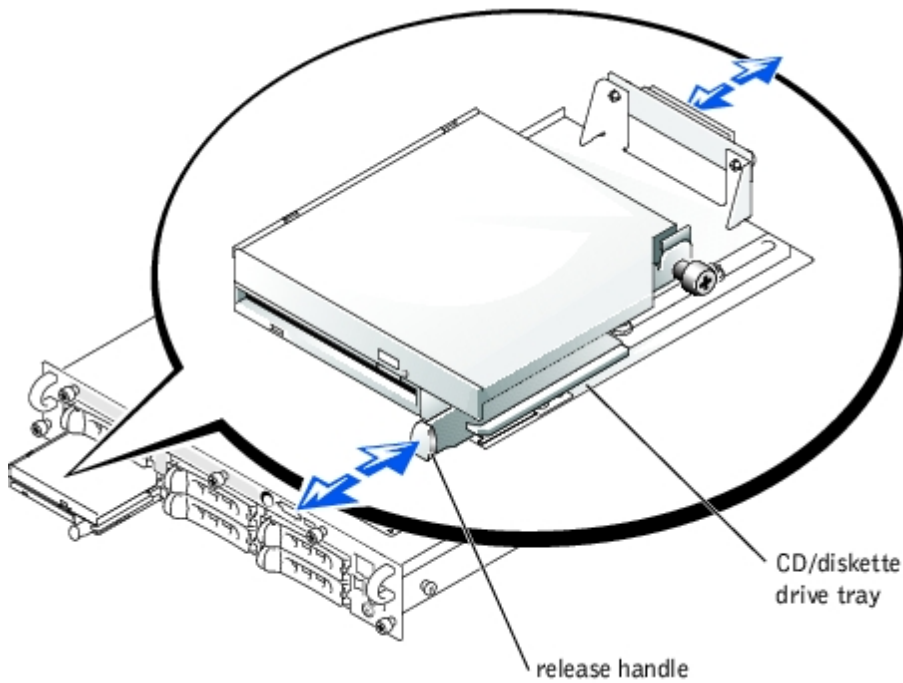
A CD drive and a diskette drive mount together on a tray that slides in the front panel and connects to the controllers on the system board through the SCSI backplane board.

Removing the CD/Diskette Drive Tray

⚠ CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

1. Remove the bezel (see "[Removing the Bezel](#)").
2. Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
3. Grasp the CD/diskette drive tray release handle and pull the tray out of the system (see [Figure 4-15](#)).

Figure 4-15. Removing and Installing the CD/Diskette Drive Tray



Replacing the CD/Diskette Drive Tray

 **CAUTION:** See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

1. Align the CD/diskette drive tray with the opening in the front panel.
2. Press the CD/diskette drive tray release handle until the tray snaps into place (see [Figure 4-15](#)).
3. Reconnect your system and peripherals to their electrical outlets, and turn on the system.
4. Replace the bezel (see "[Replacing the Bezel](#)").

Removing the CD and Diskette Drives From the Tray

 **CAUTION:** See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

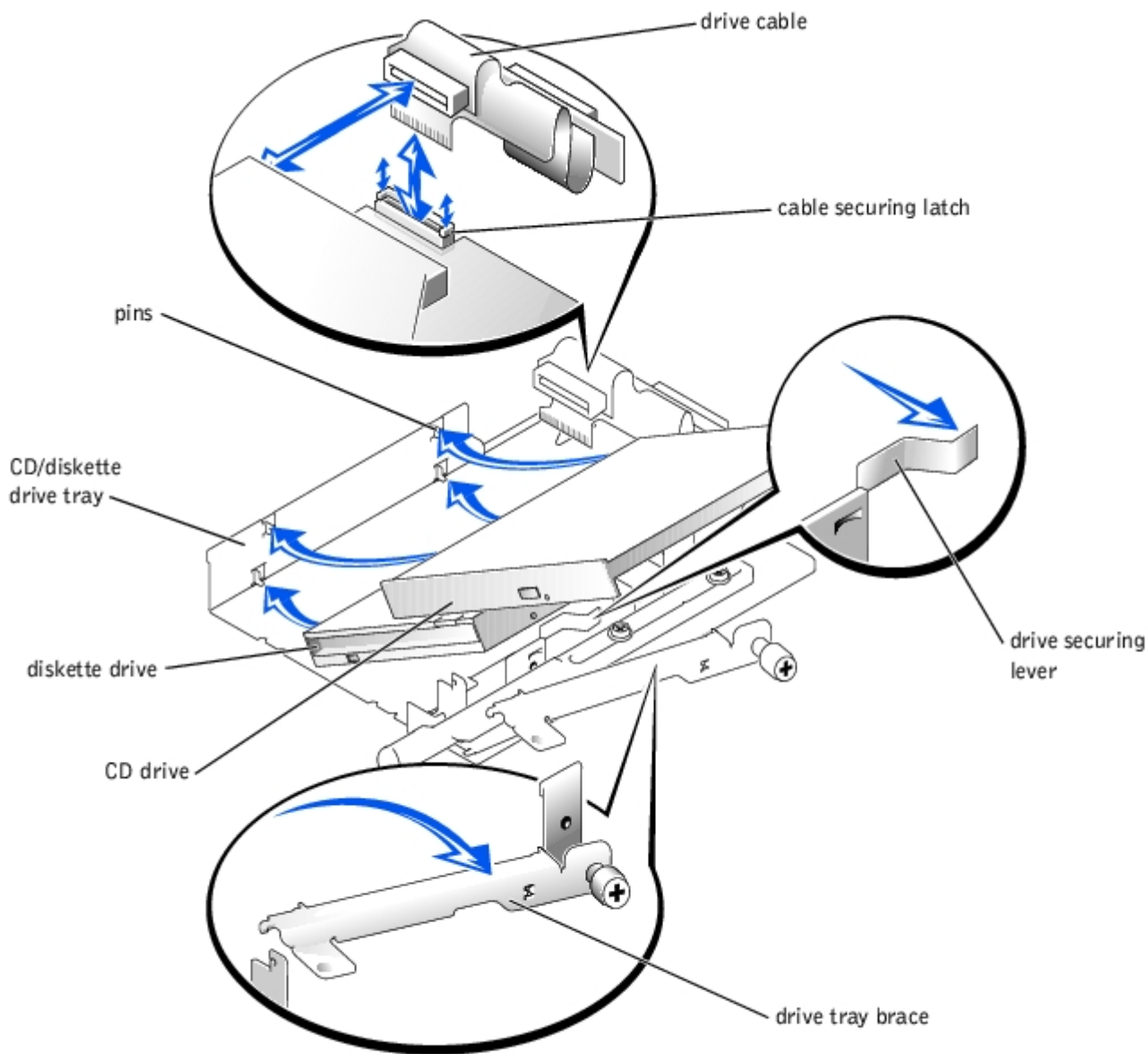
1. Remove the CD/diskette drive tray (see "[Removing the CD/Diskette Drive Tray](#)").
2. Disconnect the cable from the CD drive by pulling the cable connector away from the drive connector (see [Figure 4-16](#)).
3. Loosen the thumbscrew on the drive tray brace and remove the brace (see [Figure 4-16](#)).
4. Lift the CD drive up and to the right, away from the drive tray. (see [Figure 4-16](#))



NOTE: If you are only replacing the CD drive, it is not necessary to remove the diskette drive from the drive tray. Go to the procedure, "[Replacing the CD and Diskette Drives on the Tray](#)."

5. Disconnect the cable from the diskette drive (see [Figure 4-16](#)):
 - a. Pull the securing latch on the drive's connector upward to release the cable.
 - b. Slide the cable out of the drive's connector.
6. Lift the diskette drive up and to the right, away from the drive tray.

Figure 4-16. Removing and Replacing the CD and Diskette Drives



Replacing the CD and Diskette Drives on the Tray

⚠ CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.


1. Install the diskette drive on the drive tray (see [Figure 4-16](#)):
 - a. Lower the left side of the drive to the tray with the tray's pins aligned with the drive's holes.
 - b. Pull the drive securing lever to the right and lower the right side of the drive onto the tray.
2. Connect the cable to the diskette drive (see [Figure 4-16](#)):
 - a. Ensure that the securing latch on the drive's connector is in the released position.
 - b. Slide the cable into the drive's connector.
 - c. Press the cable securing latch into the locked position.
3. Install the CD drive on the drive tray (see [Figure 4-16](#)):

- a. Lower the left side of the drive to the tray with the tray's pins aligned with the drive's holes.
 - b. Lower the right side of the drive onto the tray.
4. Replace the drive tray brace by aligning the end of the brace with the notch on the tray, and then tighten the brace's thumbscrew (see [Figure 4-16](#)).
 5. Connect the cable to the CD drive by pressing the cable connector to the drive connector.
 6. Replace the CD/diskette drive tray (see "[Replacing the CD/Diskette Drive Tray](#)").

Removing the CD/Diskette Drive Cable

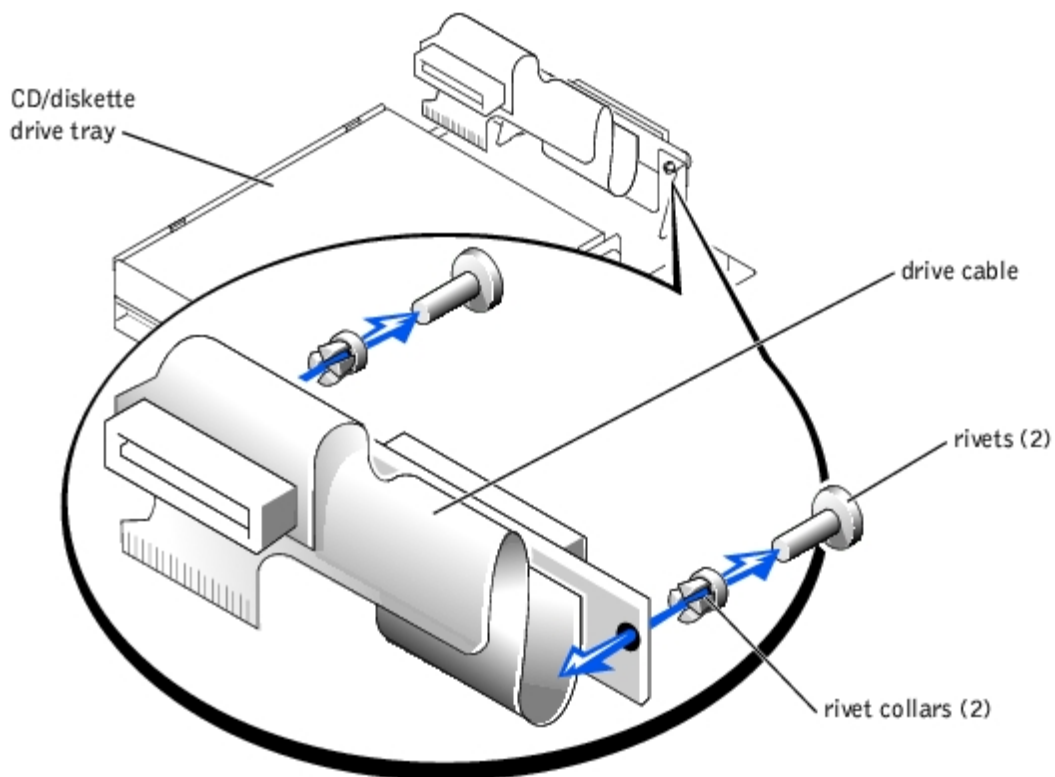
 **CAUTION:** See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

1. Remove the CD/diskette drive tray (see "[Removing the CD/Diskette Drive Tray](#)").

 **NOTE:** You do not have to remove the CD and diskette drives from the tray to remove the drive cable (see "[Removing the CD and Diskette Drives From the Tray](#)"). However, you must disconnect the cable from the drives to replace the cable.

2. If you did not remove the CD and diskette drives from the tray, disconnect the cable from the drives (see [Figure 4-16](#)):
 - a. Disconnect the cable from the CD drive by pulling the cable connector away from the drive.
 - b. Disconnect the cable from the diskette drive by pulling the securing latch on the drive's connector upward to release the cable, and then sliding the cable out of the drive's connector.
3. Remove the drive cable assembly from the tray bracket (see [Figure 4-17](#)):
 - a. Remove the two rivets that secure the cable assembly board to the tray bracket.
 - b. Remove the two rivet collars from the board.
 - c. Lift the board away from the tray bracket.

Figure 4-17. Removing the CD/Diskette Drive Cable



Replacing the CD/Diskette Drive Cable

⚠ CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

1. Replace the drive cable assembly on the tray bracket (see [Figure 4-17](#)):
 - a. Align the holes in the cable assembly board with the holes in the tray bracket.
 - b. Replace the two rivet collars in the board.
 - c. Replace the two rivets that secure the board to the tray bracket.
2. If you removed the CD and diskette drives from the tray, replace the drives on the tray (see "[Replacing the CD and Diskette Drives on the Tray](#)").
3. If you did not remove the CD and diskette drives from the tray, connect the cable to the drives (see [Figure 4-16](#)):
 - a. Connect the cable to the diskette drive by raising the securing latch on the drive's connector to the released position, sliding the cable into the drive's connector, and pressing the cable securing latch into the locked position.
 - b. Connect the cable to the CD drive by pressing the cable connector to the drive connector.
4. Replace the CD/diskette drive tray (see "[Replacing the CD/Diskette Drive Tray](#)").

SCSI Configuration Information

Although SCSI devices are installed in essentially the same way as other devices, their configuration requirements are different. To install and configure an external SCSI device, follow the guidelines in the following subsections.

SCSI Interface Cables

SCSI interface connectors are keyed for correct insertion. Keying ensures that the pin-1 wire in the cable connects to pin 1 in the connectors on both ends. When you disconnect an interface cable, take care to grasp the cable connector, rather than the cable itself, to avoid stress on the cable.

SCSI ID Numbers

Each device attached to a SCSI host adapter must have a unique SCSI ID number from 0 to 15.

A SCSI tape drive is configured by default as SCSI ID 6.



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

Device Termination

SCSI logic requires that termination be enabled for the two devices at opposite ends of the SCSI chain and disabled for all devices in between. For internal SCSI devices, termination is configured automatically. For external SCSI devices, you should disable termination on all devices and use terminated cables. See the documentation provided with any optional SCSI device you purchase for information on disabling termination.

External SCSI Tape Drive

This subsection describes how to configure and install an external SCSI tape drive.

Installing an External SCSI Tape Drive



CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
 2. Prepare the tape drive for installation.

Ground yourself by touching an unpainted metal surface on the back of the system, unpack the drive (and controller card, if applicable), and compare the jumper and switch settings with those in the drive documentation. Change any settings necessary for your system's configuration.
 3. Connect the tape drive's interface cable to the external SCSI connector on the controller card.
 4. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.
 5. Perform a tape backup and verification test with the drive as instructed in the software documentation that came with the drive.
-


Hard Drives

This subsection describes how to install and configure SCSI hard drives in the system's internal hard-drive bays.


Before You Begin

Before attempting to remove or install a drive while the system is running, see the documentation for the RAID controller card ensure that the system is configured correctly to support hot-pluggable drive removal and insertion.

SCSI hard drives are supplied in special drive carriers that fit in the hard-drive bays.

 **NOTE:** You should only use drives that have been tested and approved by the system manufacturer for use with the SCSI backplane board.

You may need to use different programs than those provided with the operating system to partition and format hard drives. See "Installing and Configuring SCSI Drivers" in the *User's Guide* for information and instructions.

 **NOTICE:** Do not turn off or reboot your system while the drive is being formatted. Doing so can cause a drive failure.

When you format a high-capacity hard drive, allow enough time for the formatting to be completed. Long format times for these drives are normal. For example, an exceptionally large drive can take over an hour to format.

SCSI Backplane Board Configuration

The hard-drive bays provide space for up to five 1-inch SCSI hard drives. The hard drives connect to a controller on the system board or a RAID controller card through the SCSI backplane board.

The system provides several options for hard drive configurations:

- SCSI backplane daughter card (see "[Installing the SCSI Backplane Daughter Card](#)"):
 - 1 x 5 configuration, without the SCSI backplane daughter card installed
 - 2 x 3 split configuration, with the SCSI backplane daughter card installed
- SCSI controller:
 - Integrated SCSI controller
 - Integrated RAID controller (see "[Activating the Integrated RAID Controller](#)")
 - RAID controller card (see "[Installing a RAID Controller Card](#)")
- An integrated RAID controller card is installed by default; no cables are required to use the integrated RAID controller in either a 1 x 5 or 2 x 3 split configuration.

See [Figure 5-5](#) to locate the connectors on the SCSI backplane board.

Removing a Hard Drive

1. Remove the bezel (see "[Removing the Bezel](#)").
2. Take the hard drive offline and wait until the hard-drive indicator codes on the drive carrier signal that the drive may be removed safely (see [Table 3-6](#)).

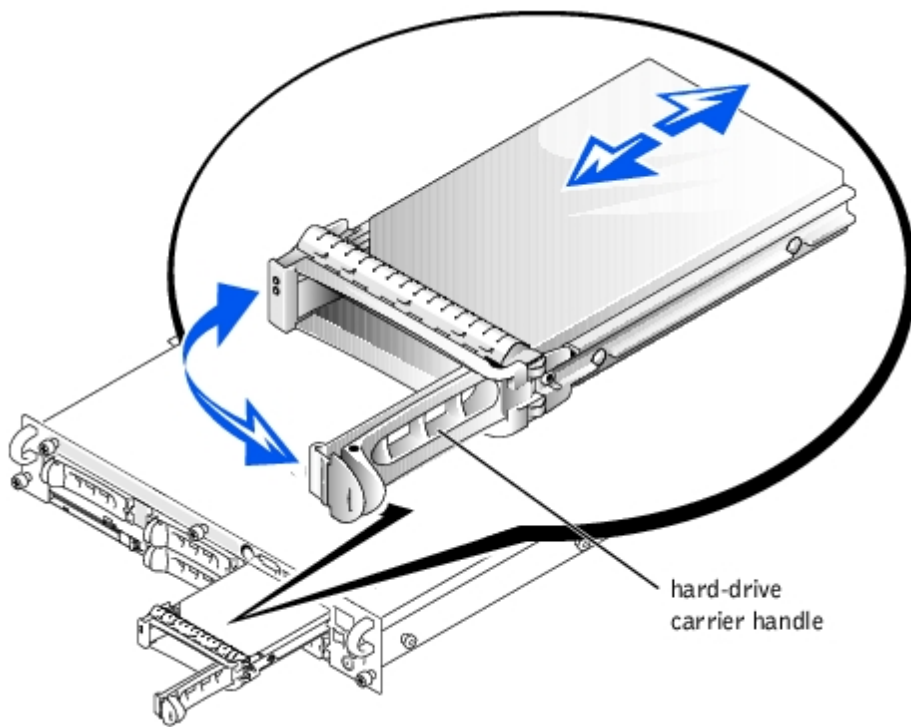
If the drive has been online, the drive status indicator will blink green twice per second as the drive is powered down. When all indicators are off, the drive is ready for removal.

See your operating system documentation for more information on taking the hard drive offline.

3. Open the hard-drive carrier handle to release the drive (see [Figure 4-18](#)).
4. Slide the hard drive out until it is free of the drive bay (see [Figure 4-18](#)).

If you are permanently removing the hard drive, install a blank insert.

Figure 4-18. Removing and Installing a Hard Drive



5. Replace the bezel (see "[Replacing the Bezel](#)").
6. If your replacement hard drive does not have a carrier, remove the faulty drive from its carrier (see "[Removing a Hard Drive From Its Carrier](#)").

Installing a Hard Drive

➡ **NOTICE:** When installing a hard drive, ensure that the adjacent drives are fully installed. Inserting a hard-drive carrier and attempting to lock its handle next to a partially installed carrier can damage the partially installed carrier's shield spring and make it unusable.

1. Remove the bezel (see "[Removing the Bezel](#)").
2. If your replacement hard drive does not have a carrier, install the new drive on a carrier (see "[Installing a Hard Drive on a Carrier](#)").
3. Open the hard-drive carrier handle (see [Figure 4-18](#)).

➡ **NOTICE:** Do not insert a hard-drive carrier and attempt to lock its handle next to a partially installed carrier. Doing so can damage the partially installed carrier's shield spring and make it unusable. Ensure that the adjacent drive carrier is fully installed.

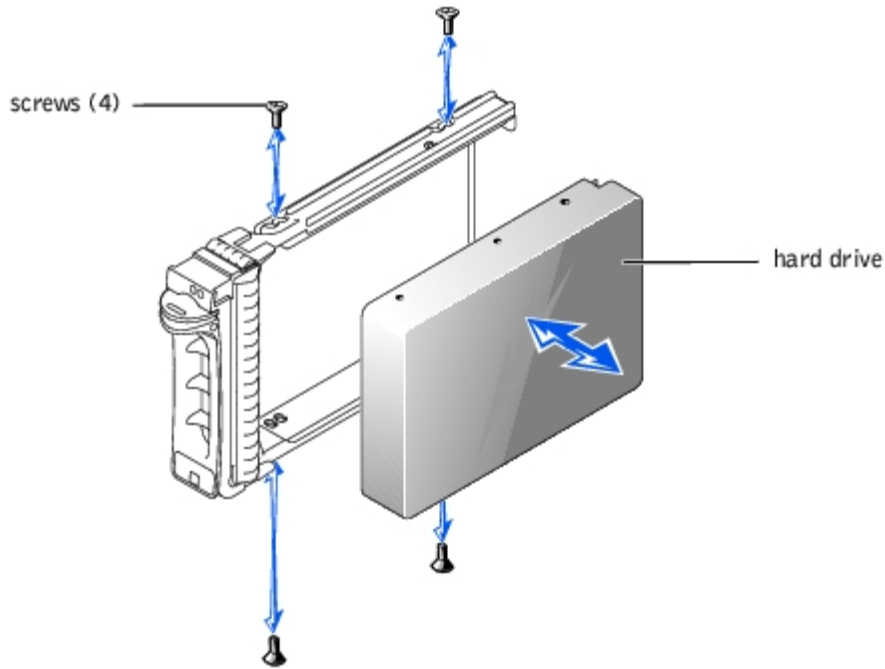
4. Insert the hard-drive carrier into the drive bay (see [Figure 4-18](#)).
5. Close the hard-drive carrier handle to lock it in place.
6. Replace the bezel (see "[Replacing the Bezel](#)").
7. Install any required SCSI device drivers (see "Installing and Configuring SCSI Drivers" in the *User's Guide* for information).
8. If the hard drive is new, run the SCSI controllers test in system diagnostics.

Removing a Hard Drive From Its Carrier

⚠ CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

1. Remove the hard drive from the system (see "[Removing a Hard Drive](#)").
2. Remove the four screws that secure the drive to the carrier (see [Figure 4-19](#)).
3. Remove the hard drive from the carrier.

Figure 4-19. Removing a Hard Drive From its Carrier



Installing a Hard Drive on a Carrier

⚠ CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

1. Insert the replacement hard drive into the carrier (see [Figure 4-19](#)).
2. Install the four screws that secure the drive to the carrier.
3. Install the hard drive in the system (see "[Installing a Hard Drive](#)").




Integrated RAID Controller

The integrated RAID controller in your NAS system is activated when you receive it. The RAID controller memory module, hardware key, and battery must be present for the integrated RAID controller to operate properly.

To activate the integrated RAID controller, you must install three components, the RAID controller memory module, hardware key, and battery.

Activating the Integrated RAID Controller

⚠ CAUTION: Before you perform this procedure, read the safety instructions in your *System Information* document.


-  **CAUTION:** See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.
-  **CAUTION:** Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions. See the *System Information* document for additional information.
-  **NOTICE:** The integrated RAID controller in your NAS system comes activated from the factory. To avoid loss of data, do not disable the RAID controller.

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2. Remove the cover (see "[Removing the Cover](#)").
3. Push the ejectors on the RAID memory module connector down and outward to allow the memory module to be inserted into the connector (see [Figure 4-20](#)).

See [Figure 5-3](#) to locate the RAID memory module connector on the system board.

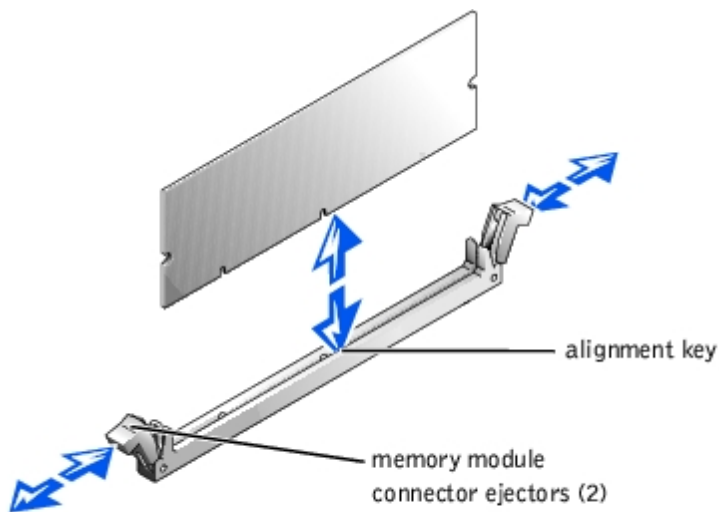
4. Align the memory module's edge connector with the alignment keys, and insert the memory module into the connector (see [Figure 4-20](#)).

The memory module connector has two alignment keys that allow the memory module to be installed into the connector in only one way.

 **NOTE:** The RAID controller memory module must be an unbuffered memory module, rated to run at 100 MHz or faster. Do not substitute registered memory modules such as those used for system memory.

5. Press on the memory module with your thumbs while pulling up on the ejectors with your index fingers to lock the memory module into the connector.

Figure 4-20. Installing the RAID Controller Memory Module

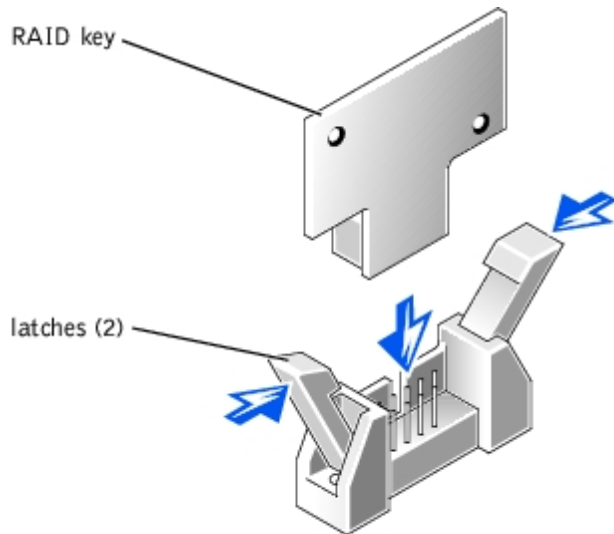


6. Push the ejectors on the RAID hardware key connector down and outward to allow the key to be inserted into the connector (see [Figure 4-21](#)).
7. Insert the RAID hardware key into its connector on the system board and secure the key with the latches on each end of the connector (see [Figure 4-21](#)).

See [Figure 5-3](#) to locate the RAID hardware key on the system board.

8. Press on the hardware key with your thumbs while pulling up on the ejectors with your index fingers to lock the hardware key into the connector.

Figure 4-21. Installing the RAID Hardware Key

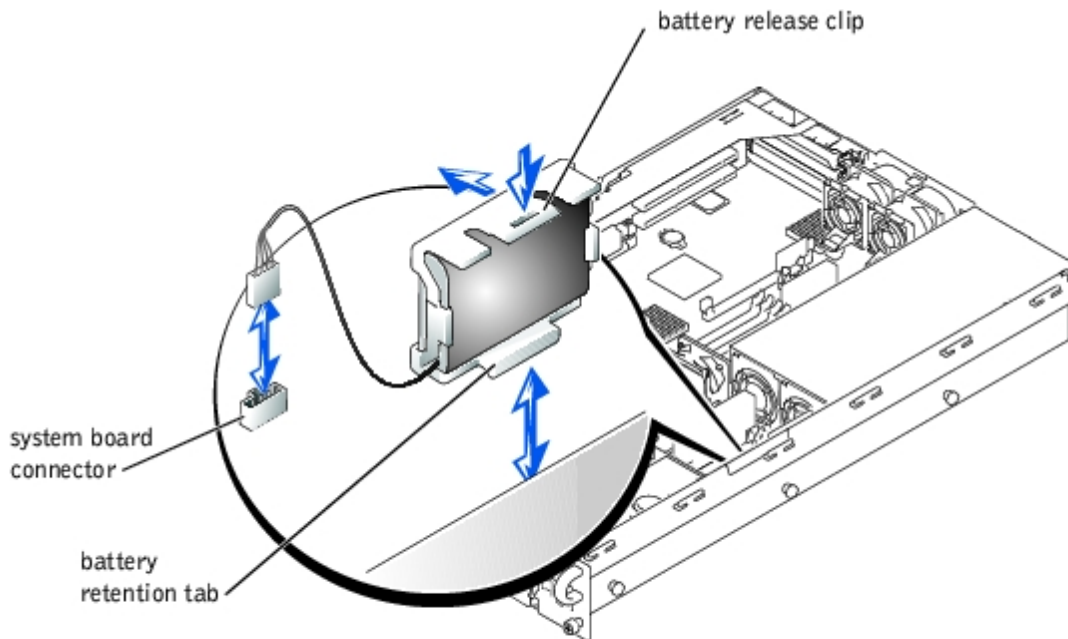


9. Connect the battery cable to the RAID battery cable connector on the system board.

See [Figure 5-3](#) to locate the RAID battery cable connector on the system board.

10. Hook the retention tab on the bottom of the battery into the slot in the chassis side wall, and then snap the battery release clip into place (see [Figure 4-22](#)).

Figure 4-22. Removing and Installing the RAID Battery




11. Replace the cover (see "[Replacing the Cover](#)").
12. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.
13. Enter the System Setup program and verify that the setting for the SCSI controller has changed to reflect the presence of the RAID hardware (see "[Using the System Setup Program](#)").
14. Install the RAID software.

See the RAID controller documentation for more information.


RAID Controller Card

Installing a RAID Controller Card

Follow these general guidelines when installing a RAID controller card. For specific instructions, see the documentation supplied with the RAID controller card.

 **CAUTION:** Before you perform this procedure, read the safety instructions in your *System Information* document.

 **CAUTION:** See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

 **NOTICE:** The integrated RAID controller in your NAS system is activated when you receive it. To avoid loss of data, do not disable the RAID controller.

1. Unpack the RAID controller card, and prepare it for installation.

For instructions, see the documentation accompanying the card.


2. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
3. Remove the cover (see "[Removing the Cover](#)").
4. Install the RAID controller card (see "[Installing an Expansion Card](#)").
5. Connect the external SCSI devices to the card's external connector on the system's back panel.

If you are attaching multiple external SCSI devices, daisy-chain the devices to each other using the cables shipped with each device.


6. Replace the cover (see "[Removing the Cover](#)").
7. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.
8. Install any required SCSI device drivers (see "Installing and Configuring SCSI Drivers" in the *User's Guide*).
9. Test the SCSI devices.

Test a SCSI hard drive by running the **SCSI Controllers** test in the system diagnostics.

Installing the SCSI Cable Strain-Relief Bracket

 **CAUTION:** Before you perform this procedure, read the safety instructions in your *System Information* document.

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2. Ensure that the system is pushed back as far as possible in the rack.

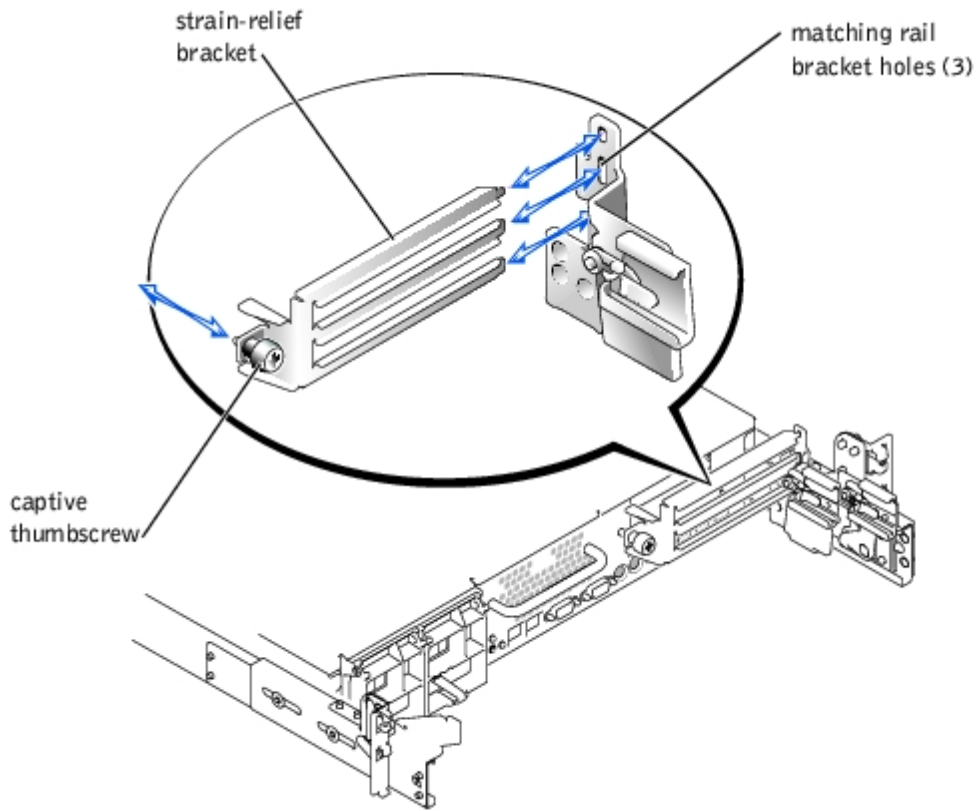
 **NOTE:** To use the strain-relief bracket, only two SCSI cables can be connected to the system at a time. The cables cannot be stacked, one above the other; they must be either side-by-side or placed diagonally to each other.

3. Connect the SCSI cables to the system before connecting the I/O cables.
4. Install the strain-relief bracket in the back of the system.
 - a. Insert the ends of the three long portions of the strain-relief bracket into the three matching holes in the rail bracket (see [Figure 4-23](#)).
 - b. Secure the captive thumbscrew to the back of the system (see [Figure 4-23](#)).


5. Connect the I/O cables to the back of the system.

For information on routing system cables, see your *Rack Installation Guide*.

Figure 4-23. Installing the Strain-Relief Bracket






SCSI Backplane Daughter Card

-  **NOTE:** Your system supports two- or five-drive configurations. The two-drive configuration is supported with the 1 x 5 backplane configuration, and the five-drive configuration is supported with the 2 x 3 backplane configuration. Upgrading to a five-drive configuration requires that you add a SCSI backplane daughter card.

To operate the SCSI backplane in a split backplane configuration, you must install a daughter card. In a split backplane configuration, the five hard-drive bays are arranged in one group of two drives and another group of three drives. This configuration is referred to as a 2 x 3 split backplane configuration.

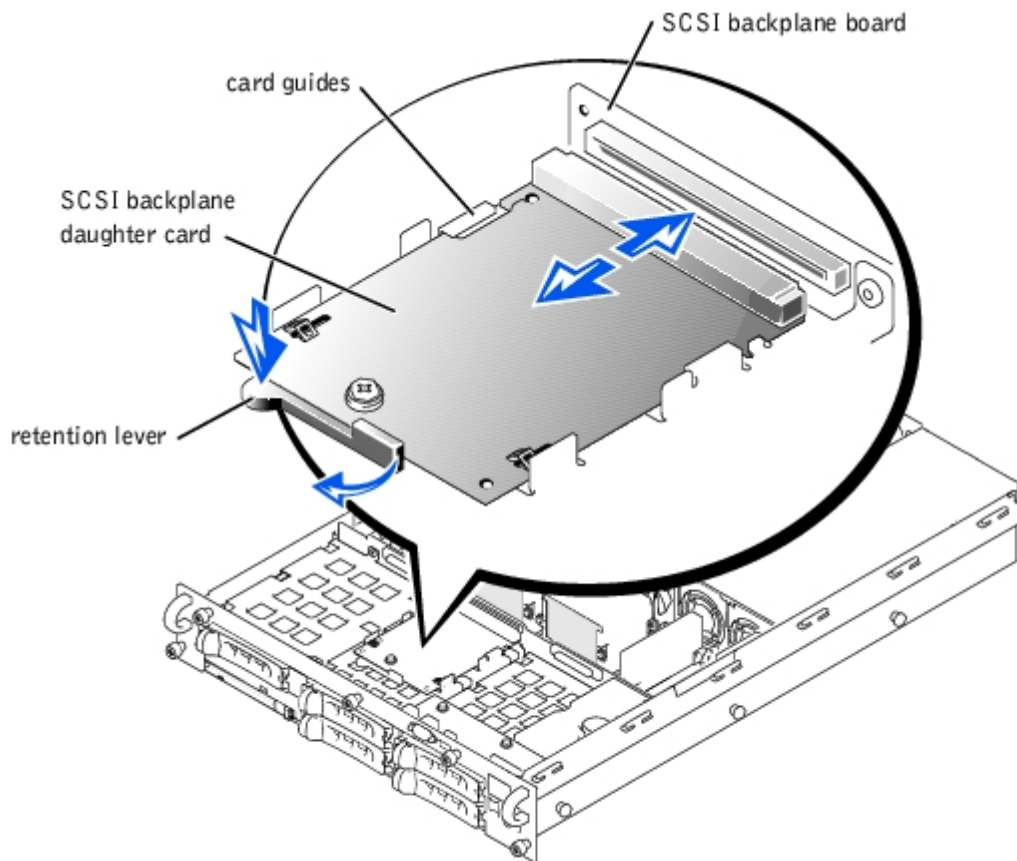
Installing the SCSI Backplane Daughter Card

-  **CAUTION:** Before you perform this procedure, read the safety instructions in your *System Information* document.
-  **CAUTION:** See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.
-  **NOTICE:** To avoid possible data loss, back up all data on the hard drives before changing the SCSI configuration.

1. Unpack the SCSI backplane board daughter card kit.
2. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.

3. Remove the cover (see "[Removing the Cover](#)").
4. The daughter card fits between the sides of the card guide above the drive bay. To install the daughter card in the card guide, performing the following steps:
 - a. Hold the daughter card by its edges with the component side facing up and the card connector facing the SCSI backplane board (see [Figure 4-24](#)).
 - b. Ensure that the retention lever is in the open position.
 - c. Position the card in the drive bay so that the notches on the left and right edges of the card are aligned with the tabs on the card guide above the drive bay.
 - d. Lower the card into the card guide.
 - e. Close the retention lever to slide the daughter card into the SCSI backplane connector and lock the card into place (see [Figure 4-24](#)).

Figure 4-24. Installing a SCSI Backplane Daughter Card



5. Reconfigure the SCSI cable connections to the SCSI backplane as necessary to operate the backplane as a 2 x 3 split backplane:


An integrated RAID controller card is installed by default; no cables are required to use the integrated RAID controller in either the 1 x 5 or 2 x 3 split configuration. See [Figure 5-5](#) to locate the connectors on the SCSI backplane board.
6. Replace the cover (see "[Removing the Cover](#)").
7. Reconnect your system and peripherals to their electrical outlets, and turn on the system.

Removing the SCSI Backplane Daughter Card

CAUTION: Before you perform this procedure, read the safety instructions in your *System Information*

 document.

 **CAUTION:** See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.


 **NOTICE:** To avoid possible data loss, back up all data on the hard drives before changing the SCSI configuration.

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2. Pull the retention lever to slide the daughter card away from the SCSI backplane connector (see [Figure 4-24](#)).
3. Lift the card up and away from the tabs on the card guide above the drive bay (see [Figure 4-24](#)).

SCSI Backplane Board

The system contains a 3.5-inch diskette drive and a CD drive mounted on the CD/diskette drive tray that connects to the controllers on the system board through the SCSI backplane board. The system also contains up to five 1-inch SCSI hard drives that connect to a controller on the system board or a RAID controller card through the SCSI backplane board.

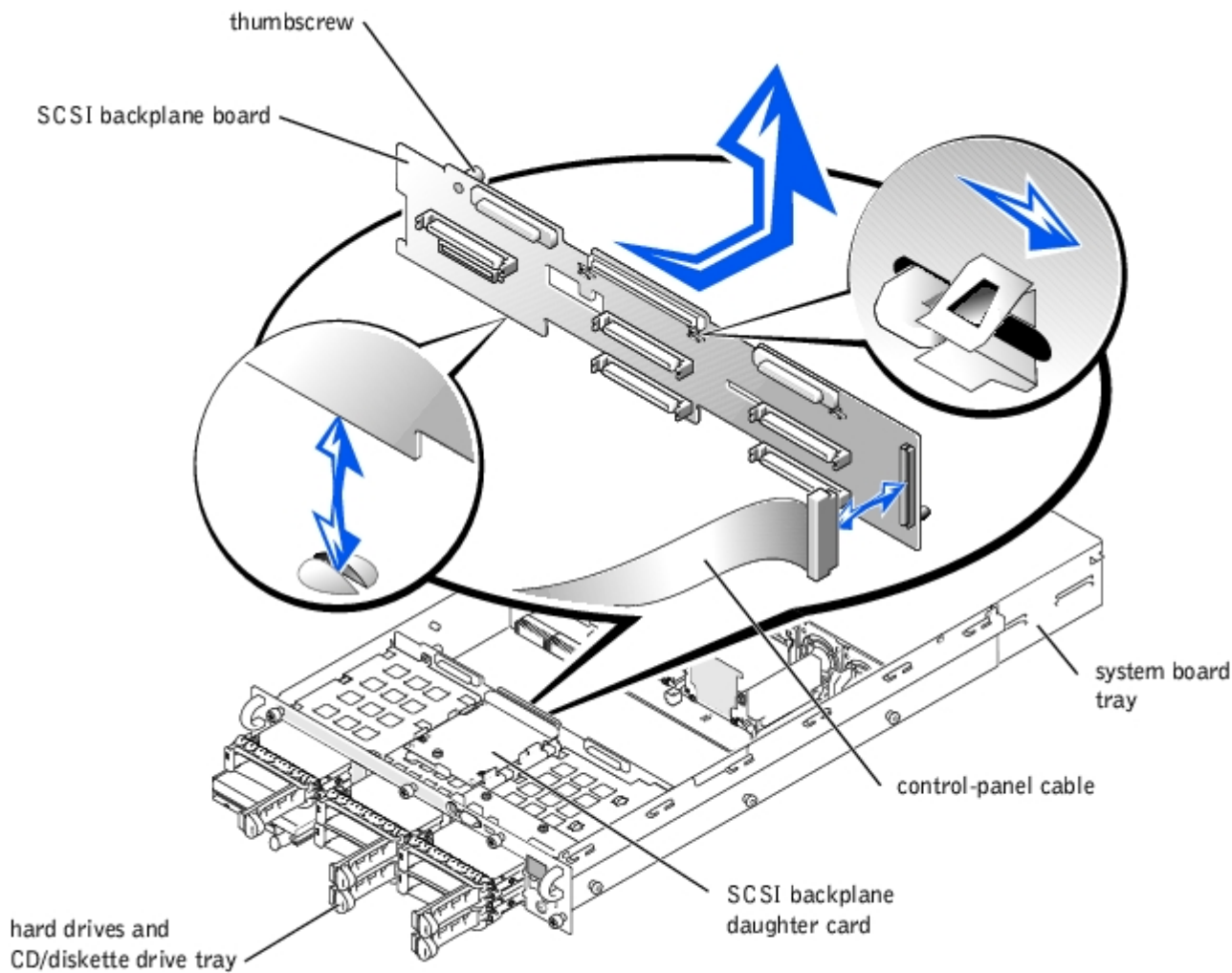
Removing the SCSI Backplane Board

 **CAUTION:** Before you perform this procedure, read the safety instructions in your *System Information* document.

 **CAUTION:** See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2. Remove the cover (see "[Removing the Cover](#)").
3. Remove the control-panel cable cover (see "[Removing the Control-Panel Cable Cover](#)").
4. Pull the system board tray straight back until it stops (see "[Removing the System Board Tray](#)").
5. Remove the SCSI backplane daughter card if it is installed (see "[Removing the SCSI Backplane Daughter Card](#)").
6. Remove the CD/diskette drive tray (see "[Removing the CD/Diskette Drive Tray](#)").
7. Remove all hard drives (see "[Removing a Hard Drive](#)").
8. Loosen the thumbscrew that secures the SCSI backplane board in the system (see [Figure 4-25](#)).
9. Slide the backplane board toward the right side chassis wall about 0.5 inch.
10. Lift the backplane board off of its grounding tabs.
11. Lift the backplane board and disconnect the control-panel cable from the board (see [Figure 4-5](#)).
12. Lift the backplane board out of the system board tray (see [Figure 4-25](#)).

Figure 4-25. Removing and Replacing the SCSI Backplane Board



Replacing the SCSI Backplane Board

CAUTION: Before you perform this procedure, read the safety instructions in your *System Information* document.

CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

1. Lower the backplane board into the system board tray.
2. Connect the control-panel cable to the SCSI backplane board (see [Figure 4-5](#)).

NOTICE: To avoid damage to the system, align the bottom of the backplane board in the board's mounting grooves before rotating the top of the board onto the grounding tabs (see [Figure 4-25](#)).

3. Align the bottom of the backplane board in the board's mounting grooves (see [Figure 4-25](#)).
4. Rotate the top of the backplane board onto the board's grounding tabs.
5. Slide the backplane board toward the left side chassis wall about 0.5 inch.
6. Tighten the thumbscrew on the backplane board.
7. Install all SCSI hard drives (see "[Installing a Hard Drive](#)").
8. Replace the CD/diskette drive tray (see "[Replacing the CD/Diskette Drive Tray](#)").

9. If necessary, install the SCSI backplane daughter card (see "[Installing the SCSI Backplane Daughter Card](#)").
 10. Replace the system board tray (see "[Replacing the System Board Tray](#)").
 11. Replace the control-panel cable cover (see "[Replacing the Control-Panel Cable Cover](#)").
 12. Replace the cover (see "[Replacing the Cover](#)").
 13. Reconnect your system and peripherals to their electrical outlets, and turn on the system.
-

System Board Tray

See [Figure 5-3](#) to identify the system board components.

Removing the System Board Tray

⚠ CAUTION: Before you perform this procedure, read the safety instructions in your *System Information* document.

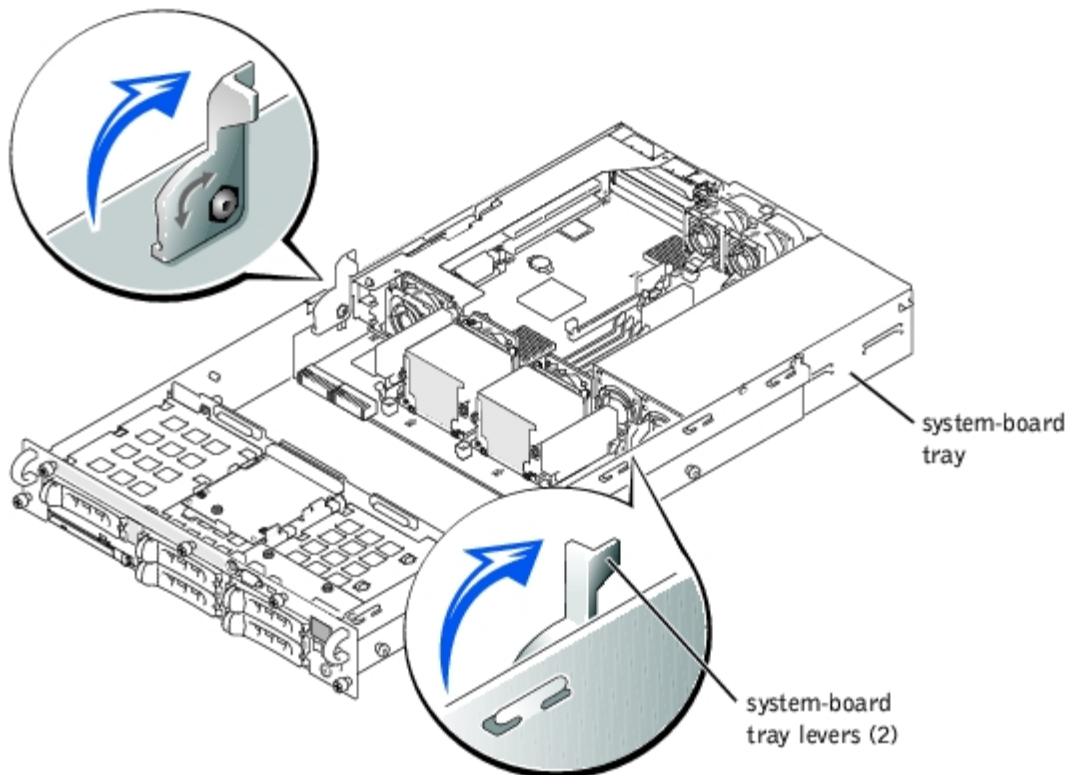
⚠ CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2. Remove the cover (see "[Removing the Cover](#)").

➡ NOTICE: To prevent damage to the system board tray levers, rotate the levers simultaneously to remove or replace the system board tray.


3. Rotate the system board tray levers up simultaneously until the tray releases from the chassis (see [Figure 4-26](#)).

Figure 4-26. Removing and Installing the System Board Tray




4. Pull the system board tray straight back until it stops.
5. Lift the front of the system board tray upward slightly and then pull the tray straight back until it clears the chassis.

Replacing the System Board Tray

 **CAUTION:** Before you perform this procedure, read the safety instructions in your *System Information* document.


 **CAUTION:** See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

1. With the system board tray levers in the upright position, slide the tray into the chassis until it stops (see [Figure 4-26](#)).


 **NOTICE:** To prevent damage to the system board tray levers, rotate the levers simultaneously to remove or replace the system board tray.

2. Rotate the system board tray levers down simultaneously until the tray is secured in the chassis (see [Figure 4-11](#)).
 3. Replace the cover (see "[Replacing the Cover](#)").
-

System Board Tray Levers

 **NOTICE:** To prevent damage to the system board tray levers, rotate the levers simultaneously to remove or replace the system board tray.

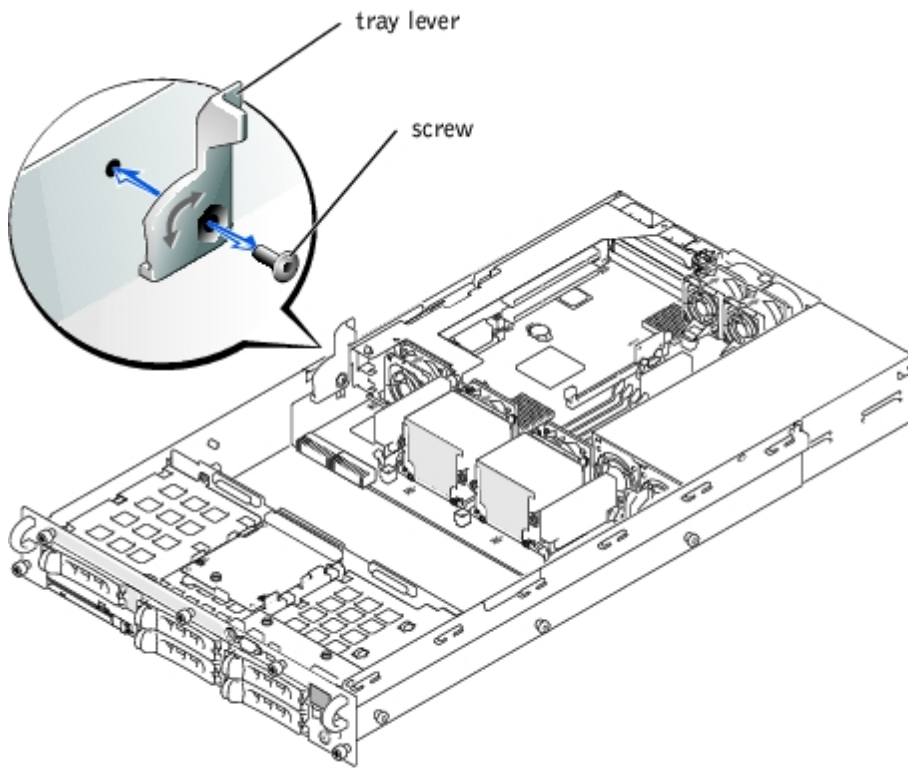
Removing the System Board Tray Levers

 **CAUTION:** Before you perform this procedure, read the safety instructions in your *System Information* document.

 **CAUTION:** See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

1. Remove the system board tray (see "[Removing the System Board Tray](#)").
2. For each lever, remove the screw securing the lever to the tray (see [Figure 4-27](#)).

Figure 4-27. Removing the System Board Tray Levers



Replacing the System Board Tray Levers

CAUTION: Before you perform this procedure, read the safety instructions in your *System Information* document.

CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

NOTICE: Ensure that the screw securing each lever to the system board tray is firmly tightened.

1. For each lever, replace the screw securing the lever to the system board tray (see [Figure 4-27](#)).
2. Replace the system board tray (see "[Replacing the System Board Tray](#)").

Microprocessors

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

NOTICE: The second microprocessor must be of the same type as the first. If the two microprocessors are different speeds, both will operate at the speed of the slower microprocessor.

Each microprocessor and its associated cache memory are contained in a PGA package that is installed in a ZIF socket on the system board.


NOTE: A microprocessor must be installed in socket 1, and a VRM must be installed for each installed microprocessor. To identify microprocessors and VRMs, see [Figure 5-3](#).

NOTE: In a single microprocessor system, the microprocessor must be installed in the PROC 1 socket.

The following items are included in the microprocessor upgrade kit:

- A microprocessor
- A heat sink
- Two securing clips
- A cooling fan
- A VRM, if adding a second microprocessor


Adding or Replacing a Microprocessor

 **CAUTION:** Before you perform this procedure, read the safety instructions in your *System Information* document.


 **CAUTION:** See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.


1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2. Remove the cover (see "[Removing the Cover](#)").


If you are installing a second microprocessor, go to step 6.

 **NOTE:** The system is designed to allow you to remove the microprocessor heat sink without removing the microprocessor cooling fan. However, you can remove the fan to provide easier access to the heat sink retention clips (see "[Removing a Cooling Fan](#)").

3. Remove the microprocessor heat sink:
 - a. Press down on the heat-sink securing clips to release the clips from the retaining tabs on the ZIF socket (see [Figure 4-28](#)).
 - b. Remove the heat sink securing clips.

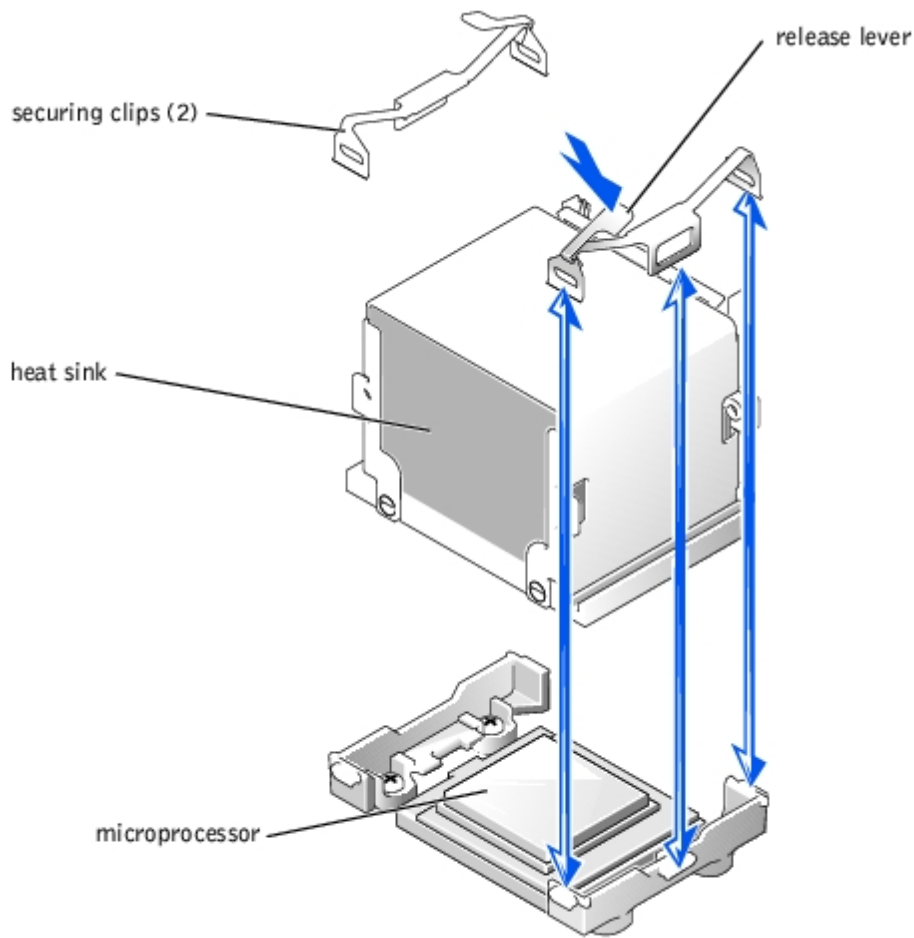
 **CAUTION:** The microprocessor and heat sink can become extremely hot. Be sure the microprocessor has had sufficient time to cool before handling.

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

 **NOTICE:** After removing the heat sink, place it upside down on a flat surface to prevent the thermal interface material from being damaged or contaminated.

- c. Remove the heat sink.

Figure 4-28. Removing and Installing the Heat Sink

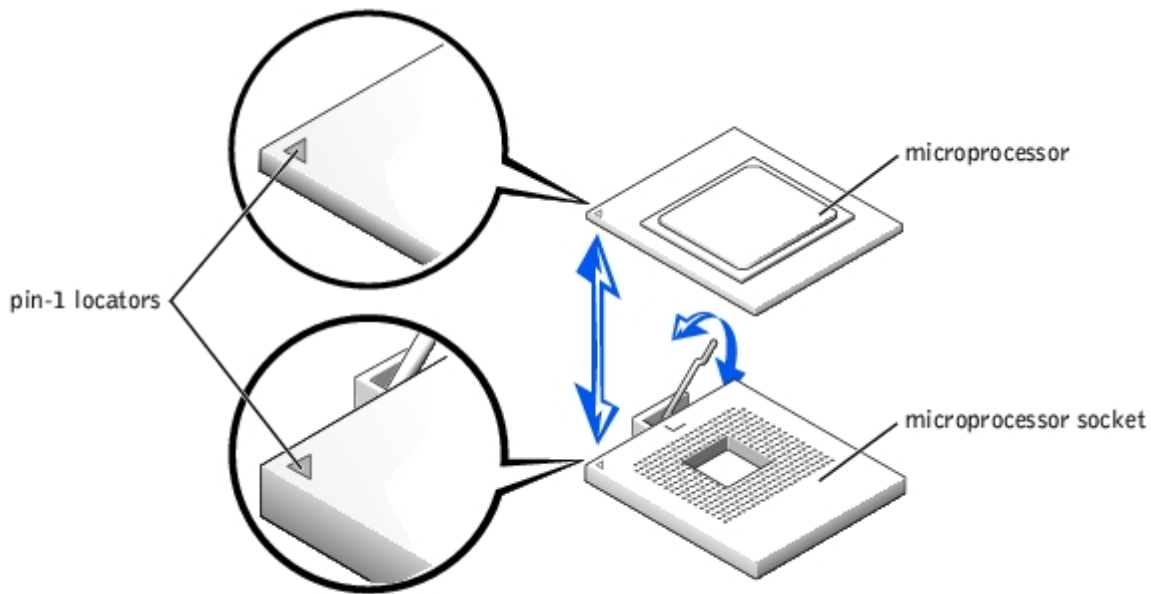


4. Pull the socket release lever upward to the fully open position (see [Figure 4-29](#)).

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

5. Lift the microprocessor out of the socket and leave the release lever in the open position so that the socket is ready for the new microprocessor (see [Figure 4-29](#)).

Figure 4-29. Removing and Installing the Microprocessor



6. Unpack the new microprocessor.

If any of the pins on the microprocessor appear bent excessively, return the microprocessor to the system manufacturer.

7. Ensure that the microprocessor socket release lever is in the fully open position.

8. Align pin 1 on the microprocessor (see [Figure 4-29](#)) with pin 1 on the microprocessor socket.

NOTE: No force is needed to install the microprocessor in the socket. When the microprocessor is aligned correctly, it should drop into the socket.

9. Install the microprocessor in the socket (see [Figure 4-29](#)).

NOTICE: Positioning the microprocessor incorrectly can permanently damage the microprocessor and the system when you turn on the system. When placing the microprocessor in the socket, be sure that all of the pins on the microprocessor go into the corresponding holes. Be careful not to bend the pins.

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

11. Place the new heat sink on top of the microprocessor (see [Figure 4-28](#)).

12. Orient the securing clips as shown in [Figure 4-28](#).

13. Hook the end of the clips without the latch to the tab on the edge of the socket.

14. Push down and pivot the securing clip latch until the hole on the clip latches onto the ZIF socket tab.

NOTICE: A cooling fan is required for each microprocessor to maintain proper thermal conditions.

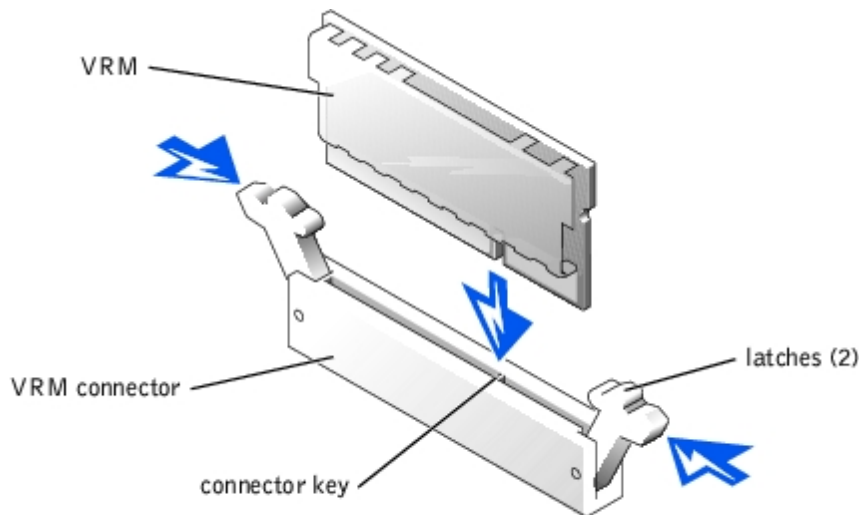
15. Ensure that the microprocessor cooling fan is installed:

- If you removed the microprocessor cooling fan before you removed the microprocessor heat sink, replace the fan.
- If you installed a second microprocessor, install the fan for the new microprocessor.

For information on installing or replacing a cooling fan, see "[Replacing a Cooling Fan](#)."

16. If you are adding a second microprocessor, install the VRM in the VRM 2 connector, pushing down firmly to make sure that the latches engage (see [Figure 4-30](#)).

Figure 4-30. Installing the VRM



17. Replace the cover (see "[Replacing the Cover](#)").
18. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.
19. Enter the System Setup program, and ensure that the microprocessor options match the new system configuration (see "[Using the System Setup Program](#)").

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

Two 1.8 GHZ Processors, Processor Bus: 400 MHz, L2 cache 512 KB Advanced

If only one microprocessor is installed, a message similar to the following appears:

One 1.8 GHz Processor, Processor Bus: 400 MHz, L2 cache 512 KB Advanced




20. Confirm that the top line of the system data area in the System Setup program correctly identifies the installed microprocessor(s) (see "[Using the System Setup Program](#)").
21. Exit the System Setup program.
22. Run the system diagnostics to verify that the new microprocessor is operating correctly.

See "[Running the System Diagnostics](#)" for information on running the diagnostics and troubleshooting any problems that may occur.

System Battery

The system battery is a 3.0-volt (V), coin-cell battery.

Replacing the System Battery

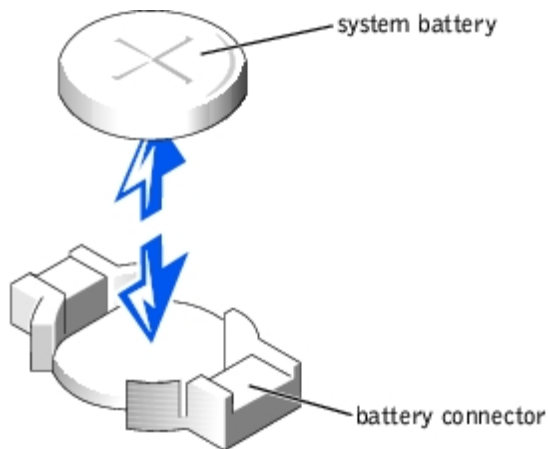
-  **CAUTION:** Before you perform this procedure, read the safety instructions in your *System Information* document.
-  **CAUTION:** There is a danger of a new battery exploding if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions. See the *System Information* document for additional information.
-  **CAUTION:** See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2. Remove the cover (see "[Removing the Cover](#)").
3. Remove the expansion-card cage (see "[Removing the Expansion-Card Cage](#)").
4. Remove the system battery (see [Figure 4-31](#)). See [Figure 5-3](#) to locate the system battery on the system board.

You can pry the system battery out of its connector with your fingers or with a blunt, nonconductive object such as a plastic screwdriver.

5. Install the new system battery with the side labeled "+" facing up (see [Figure 4-31](#)).



Figure 4-31. Removing and Installing the System Battery



6. Replace the expansion-card cage (see "[Replacing the Expansion-Card Cage](#)").
7. Replace the cover (see "[Replacing the Cover](#)").
8. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.
9. Enter the System Setup program to confirm that the battery is operating properly (see "[Using the System Setup Program](#)").
10. Enter the correct time and date in the System Setup program's **Time** and **Date** fields.
11. Exit the System Setup program.
12. To test the newly installed battery, turn off the system and disconnect it from the electrical outlet for at least an hour.
13. After an hour, reconnect the system to its electrical outlet and turn it on.
14. Enter the System Setup program and if the time and date are still incorrect, replace the system board (see "[System Board](#)")."

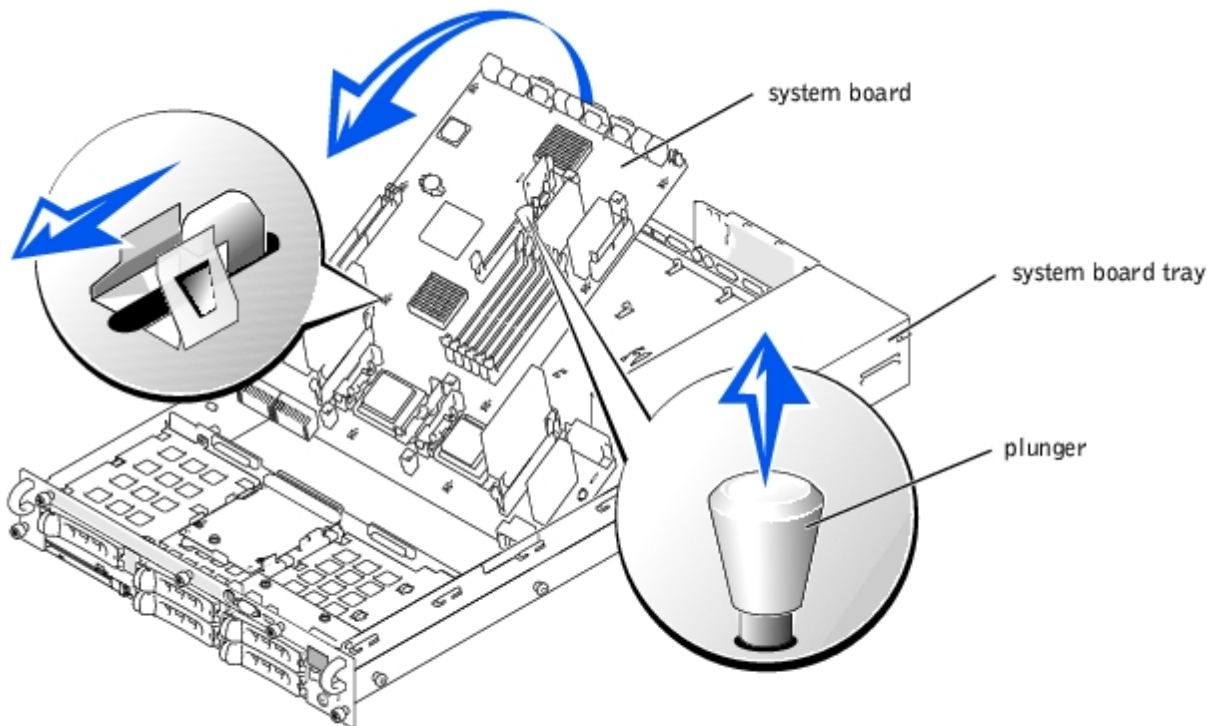
System Board

Removing the System Board

-  **CAUTION:** Before you perform this procedure, read the safety instructions in your *System Information* document.
-  **CAUTION:** See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2. Remove the cover (see "[Removing the Cover](#)").
3. Remove the power supplies (see "[Removing a Power Supply](#)").
4. Remove the cooling fans (see "[Removing a Cooling Fan](#)").
5. Remove the system fan bracket (see "[Removing the System-Fan Bracket](#)").
6. Remove the expansion-card cage (see "[Removing the Expansion-Card Cage](#)").
7. Remove the memory modules (see "[Removing Memory Modules](#)").
8. Remove the memory module, hardware key, and battery for the integrated RAID controller (if those components are installed) (see "[Activating the Integrated RAID Controller](#)").
9. Remove the microprocessors and VRMs (see "[Adding or Replacing a Microprocessor](#)").
10. Remove the system battery (see "[Replacing the System Battery](#)").
11. Remove the system board tray (see "[Removing the System Board Tray](#)").
12. Remove the system board (see [Figure 4-32](#)):
 - a. Lift the system board's plunger and slide the system board forward about 0.5 inch.
 - b. Lift the system board off its grounding tabs in the system board tray.
 - c. Lift the back of the system board upward and then lift the board away from the tray.

Figure 4-32. Removing the System Board



Replacing the System Board

CAUTION: Before you perform this procedure, read the safety instructions in your *System Information* document.

 **CAUTION:** See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

1. Replace the system board (see [Figure 4-32](#)):
 - a. Lower the front of the system board into the system board tray, under the tray levers.
 - b. Lower the system board onto its grounding tabs in the system board tray and slide the system board back until the board's plunger snaps into place.
 2. Replace the system board tray (see "[Replacing the System Board Tray](#)").
 3. Replace the system battery (see "[Replacing the System Battery](#)").
 4. Replace the microprocessors and VRMs (see "[Adding or Replacing a Microprocessor](#)").
 5. If necessary, replace the memory module, hardware key, and battery for the integrated RAID controller (see "[Activating the Integrated RAID Controller](#)").
 6. Install the memory modules (see "[Installing Memory Modules](#)").
 7. Replace the expansion-card cage (see "[Replacing the Expansion-Card Cage](#)").
 8. Replace the system fan bracket (see "[Replacing the System-Fan Bracket](#)").
 9. Replace the cooling fans (see "[Replacing a Cooling Fan](#)").
 10. Replace the power supplies (see "[Replacing a Power Supply](#)").
 11. Replace the cover (see "[Replacing the Cover](#)").
 12. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.
-

[Back to Contents Page](#)

Jumpers and Connectors

Dell™ PowerVault™ 775N Systems Service Manual

- [Jumpers—A General Explanation](#)
- [System Board Jumpers](#)
- [System Board Connectors](#)
- [Expansion-Card Riser-Board Components and PCI Buses](#)
- [SCSI Backplane Board Connectors](#)

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

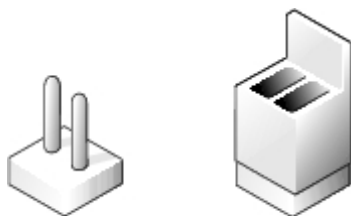
Jumpers—A General Explanation

Jumpers provide a convenient and reversible way of reconfiguring the circuitry on a printed circuit board. When reconfiguring the system, you may need to change jumper settings on circuit boards 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. [Figure 5-1](#) shows an example of a jumper.

Figure 5-1. Example Jumpers



⚠ CAUTION: Ensure that 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.

System Board Jumpers

[Figure 5-2](#) shows the location and default settings of the system jumper blocks. See [Table 5-1](#) for the designations, default settings, and functions of the system's jumpers.

Figure 5-2. System Board Jumpers

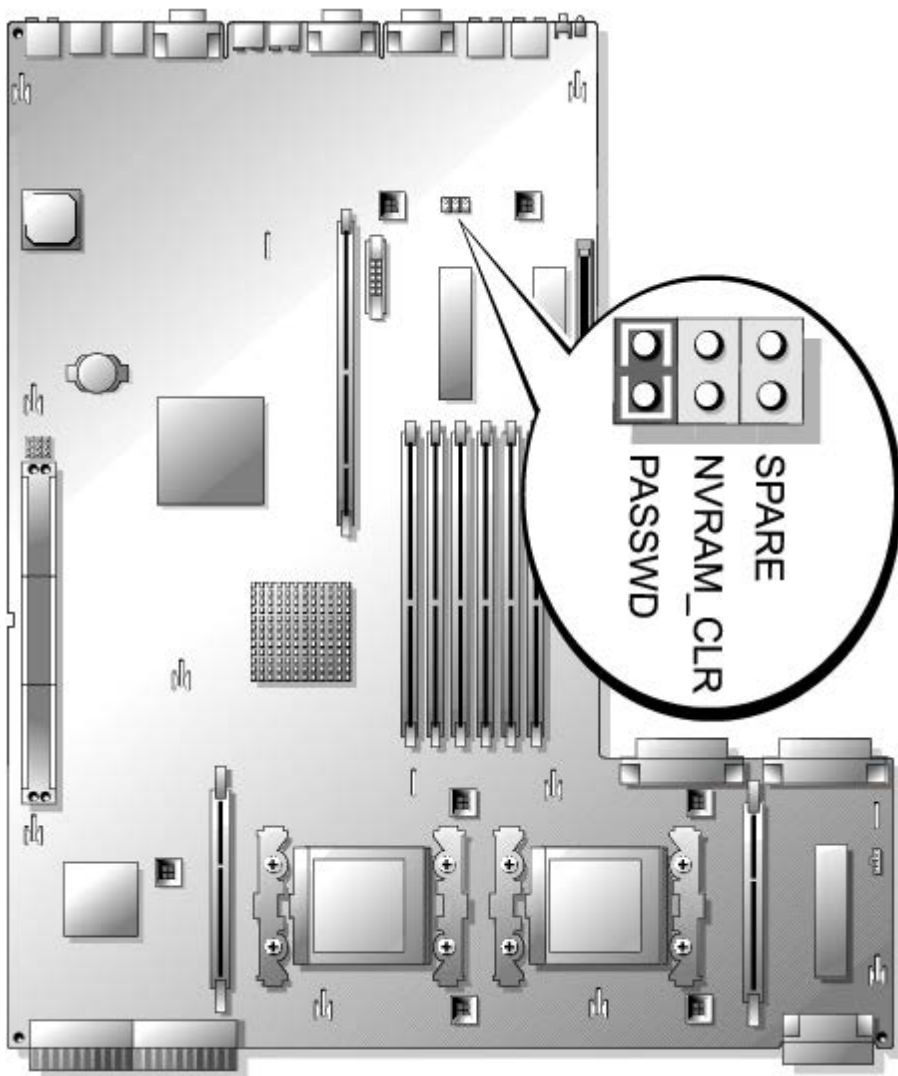






Table 5-1. System Board Jumper Settings

Jumper	Setting	Description
PASSWD	 (default)	The password feature is enabled.
		The password feature is disabled.
NVRAM_CLR	 (default)	The configuration settings are retained at system boot.
		The configuration settings are cleared at next system boot. (If the configuration settings become corrupted to the point where the system will not boot, install the jumper and boot the system. Remove the jumper before restoring the configuration information.)
SPARE	—	To store a spare, unused jumper.

System Board Connectors

See [Figure 5-3](#) and [Table 5-2](#) for the location and description of system board connectors.

Figure 5-3. System Board Connectors

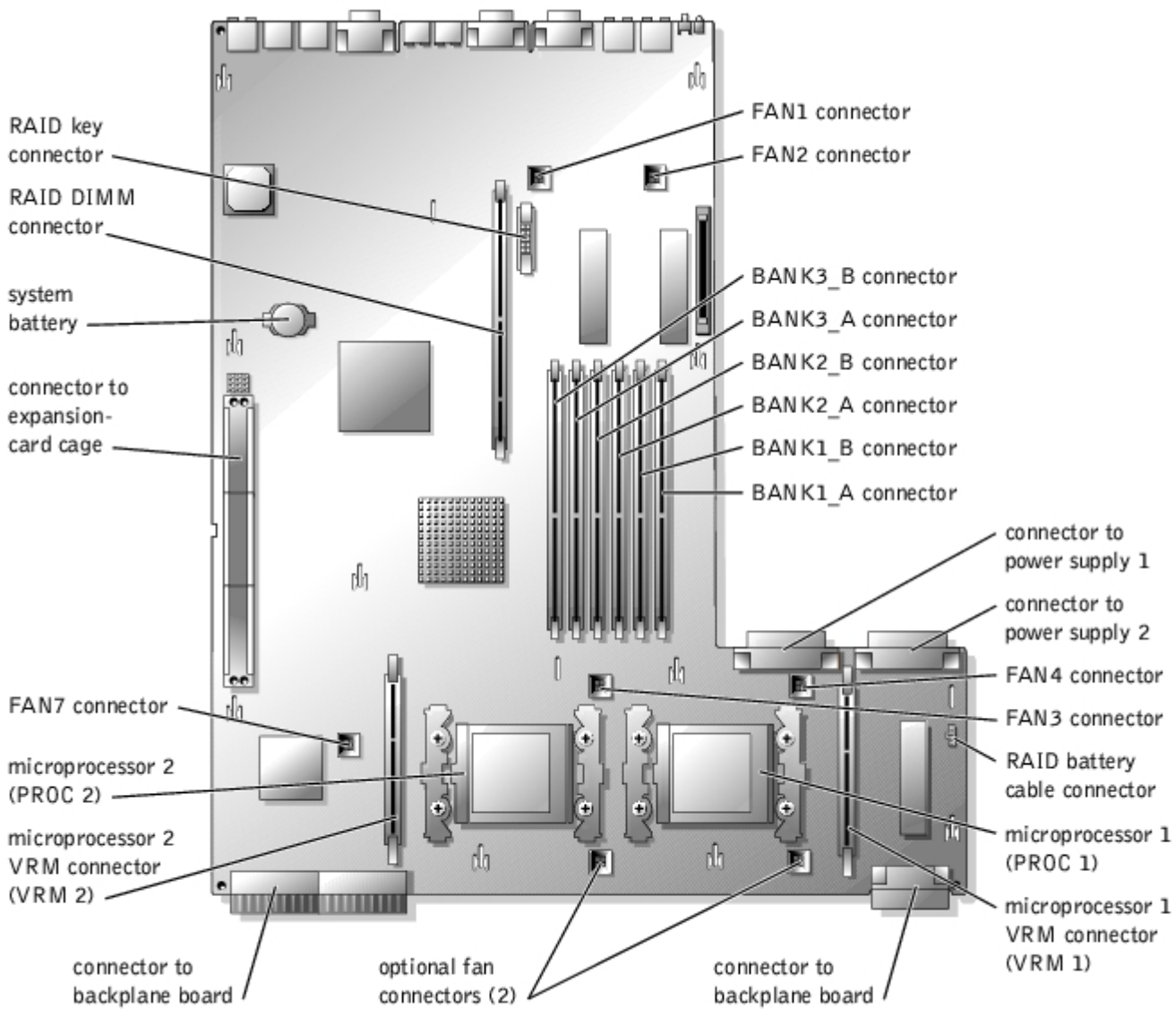


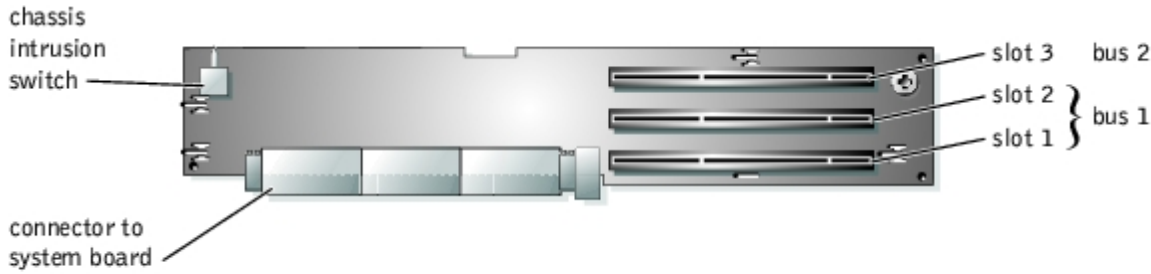
Table 5-2. System Board Connectors

Connector	Description
BATTERY	System battery
BANK n_x	Memory modules (6), where n is the bank and x is the slot in the bank
FAN n	Cooling fans: <ul style="list-style-type: none"> • 1, 2 — system fans • 3, 4 — microprocessors (2) • 5, 6 — optional • 7 — expansion cards
PROC n	Microprocessors (2)
RAID_BAT	Battery cable for optional integrated RAID controller
RAID_DIMM	Memory module for optional integrated RAID controller
RAID_KEY	Hardware key for optional integrated RAID controller
VRM n	Microprocessor VRMs (2)

Expansion-Card Riser-Board Components and PCI Buses

Figure 5-4 shows the components on the expansion-card riser board, including the expansion-card slots and buses. Table 4-1 lists the PCI bus and operating speed for each expansion-card slot.

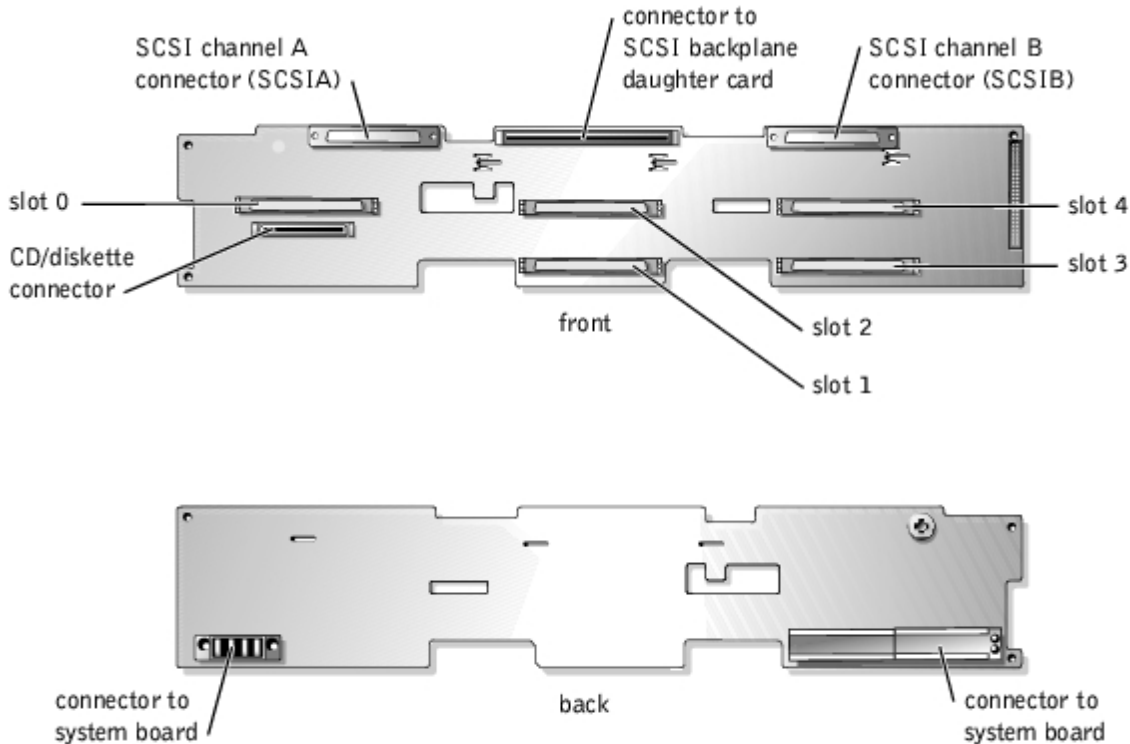
Figure 5-4. Expansion-Card Riser-Board Components



SCSI Backplane Board Connectors

Figure 5-5 shows the location of the connectors on the SCSI backplane board.

Figure 5-5. SCSI Backplane Board Components



Using the System Setup Program

Dell™ PowerVault™ 775N Systems Service Manual

- [Entering the System Setup Program](#)
- [System Setup Options](#)
- [Using the System Password Feature](#)
- [Using the Setup Password Feature](#)
- [Disabling a Forgotten Password](#)


Each time you turn on your system, the system compares the configuration of the hardware installed in the system to the hardware listed in the system configuration information stored in NVRAM on the system board. If the system detects a discrepancy, it generates error messages that identify the incorrect configuration settings. The system then prompts you to enter the System Setup program to correct the settings.

You can use the System Setup program as follows:

- To change the system configuration information after you add, change, or remove any hardware in your system
- To set or change user-selectable options—for example, the time or date on your system
- To enable or disable any integrated device in your system

After you set up your system, run the System Setup program to familiarize yourself with your system configuration information and optional settings. Print the System Setup screens (by pressing <Print Screen>) or record the information for future reference.

Entering the System Setup Program

 **NOTE:** To use the System Setup program, connect a keyboard, monitor, and mouse to the system or use the console redirection function on the serial port 1 (COM1) connector. See Figure 3-3 for the serial port location. See "Using Console Redirection" in the *User's Guide* for more information on console redirection.

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 in the upper-right corner of the screen:

<F2> = System Setup

You can also press <F12> for PXE Boot. PXE Boot forces a system boot from the network.

If you wait too long and your operating system begins to load into memory, let the system complete the load operation, and then shut down the system and try again.


 **NOTE:** To ensure an orderly system shutdown, consult the *System Administrator's Guide* that accompanied your operating system.

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

 **NOTE:** For help using the System Setup program, press <F1> while in the program.

Responding to Error Messages

If an error message appears on your monitor screen while the system is starting up, make a note of the message. Before entering the System Setup program, see "[System Beep Codes](#)" and "[System Messages](#)" for an explanation of the message and suggestions for correcting any errors.

 **NOTE:** After installing a memory upgrade, it is normal for your system to send a message the first time you start your system. In that situation, do not refer to "[System Beep Codes](#)" and "[System Messages](#)." Instead, see "[Memory Modules](#)."

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

Using the System Setup Program

[Table 6-1](#) lists the keys that you use to view or change information on the System Setup screens and to exit the program.

Table 6-1. System Setup Navigation Keys

Keys	Action
Down arrow or <Tab>	Moves to the next field.
Up arrow or <Shift><Tab>	Moves to the previous field.
Left and right arrows or the spacebar	Cycles through the settings in a field. In many fields, you can also type the appropriate value.
<Esc>	Exits the System Setup program and restarts the system if any changes were made.

For most of the options, any changes you make are recorded but do not take effect until the next time you start the system. For a few options (as noted in the help area), the changes take effect immediately.

System Setup Options

The following subsections outline the options on the System Setup screens.

Main Screen

When you open the System Setup program, the main program screen appears (see [Figure 6-1](#)).

Figure 6-1. Main System Setup Screen

Intel® Xeon™ Processor: Processor Speed: XXXX MHz	BIOS Version: XXXX Service Tag : XXXXXX
--	--

```

System Time ..... 09:30:45
System Date ..... Wed Apr 17, 2002

Diskette Drive A: ..... 3.5 inch, 1.44 MB

System Memory ..... 1024 MB ECC DDR
Memory Interleaving ..... 2-Way Interleave
Video Memory ..... 8 MB SDRAM

Redundant Memory ..... Disabled
OS Install Mode ..... OFF
CPU Information ..... <ENTER>

Boot Sequence ..... <ENTER>
Hard-Disk Drive Sequence ..... <ENTER>

Integrated Devices ..... <ENTER>
PCI IRQ Assignment ..... <ENTER>
PCI-X Slot Information ..... <ENTER>

Console Redirection ..... <ENTER>
Embedded Server Management ..... <ENTER>

System Security ..... <ENTER>

Keyboard NumLock ..... On
Report Keyboard Errors ..... Report

Asset Tag ..... XXXXXX

```

Up,Down Arrow to select | SPACE,+, - to change | ESC to exit | F1=HELP

The following options and information fields appear on the main **System Setup** screen:

- **System Time** — Resets the time on the system's internal clock.
- **System Date** — Resets the date on the system's internal calendar.
- **Diskette Drive A:** — Displays the type of diskette drive for your system.
- **System Memory** — Displays the amount of system memory. This option has no user-selectable settings.
- **Memory Interleaving** — Displays memory interleaving information for the system. This option has no user-selectable settings.
- **Video Memory** — Displays the amount of video memory. This option has no user-selectable settings.
- **Redundant Memory** — Displays an option that allows you to enable or disable the redundant memory feature. All banks should have memory modules of the same type and size for this feature to function properly.

The redundant memory options vary according to the number of populated memory banks and whether the same type and size memory modules are installed in each bank:

- **Disabled** — one or two memory banks are populated with the same type and size memory modules, or the memory banks are populated with different types of memory modules.
 - **Spare Bank Enabled** — three memory banks are populated with the same type and size memory modules.
- **OS Install Mode** — Determines the maximum amount of memory available to the operating system. **On** sets the maximum memory available to the operating system to 256 MB. **Off** (default) makes all of the system memory available to the operating system. Some operating systems will not install with more than 2 GB of system memory. Turn this option **On** during operating system installation and **Off** after installation.
- **CPU Information** — Displays information related to the microprocessor bus and microprocessors such as speed, cache size, and so on.

You can also enable or disable Hyper-Threading by changing the setting of the **Logical Processor** option. (The default is enabled.)

- **Boot Sequence** — Displays the **Boot Sequence** screen, discussed later in this section.
- **Hard-Disk Drive Sequence** — Displays the **Hard-Disk Drive Sequence** screen.
- **Integrated Devices** — Displays the **Integrated Devices** screen.
- **PCI IRQ Assignment** — Displays a screen that allows you to change the IRQ allocated to each of the integrated devices on the PCI bus, and any installed expansion cards that require an IRQ.
- **PCIX Slot Information** — Displays a menu that contains information about each of the system's PCI-X slots.
- **Console Redirection** — Displays a screen that allows you to configure console redirection for use through the serial port. The submenu allows you to turn the feature on or off, select the remote terminal type, and enable or disable redirection after booting. For more information on using console redirection, your *User's Guide*.
- **Embedded Server Management** — Displays a menu of three selectable fields: **Front-Bezel Chassis Intrusion**, **Front-Panel LCD Options**, and **User-Defined LCD String** fields.
 - **Front-Bezel Chassis Intrusion** — Selecting this field allows you to enable or disable the chassis-intrusion detection feature.
 - **Front-Panel LCD Options** — Selecting this field allows you to select whether you display the service tag, asset tag, or a user-defined string in the front-panel display.
 - **User-defined LCD String** — Selecting this field allows you to enter the user-defined string to be displayed in the front panel. Line 1 is five characters long, and Line 2 is 16 characters long.
- **System Security** — Displays a screen that allows you to configure the system password and setup password features. See "[Using the System Password Feature](#)" and "[Using the Setup Password Feature](#)" for more information.
- **Keyboard NumLock** — Determines whether your system starts up with the NumLock mode activated on 101- or 102-key keyboards (does not apply to 84-key keyboards).
- **Report Keyboard Errors** — Enables or disables reporting of keyboard errors during the POST. This option is useful when applied to self-starting 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 keyboard controller during POST. This setting does not affect the operation of the keyboard itself if a keyboard is attached to the system.
- **Asset Tag** — Displays the customer-programmable asset tag number for the system if an asset tag number has been assigned. You can enter an asset tag number of up to 10 characters into NVRAM.

See your *Resource CD* for additional information on the asset tag utility.

Boot Sequence Screen

The **Boot Sequence** screen options determine the order in which the system looks for boot devices that it needs to load during system startup. Available options include the diskette drive, CD drive, network, and hard drives. You can enable or disable a device by selecting it and pressing the spacebar. To change the order in which devices are searched, use the <+> and <-> keys.

Hard-Disk Drive Sequence Screen

The **Hard-Disk Drive Sequence** screen options determine the order in which the system searches the hard drives for the files that it needs to load during system startup. The choices depend on the particular hard drives installed in your system. To change the order in which devices are searched, use the <+> and <-> keys. Press <Enter> to confirm your selection.



NOTE: Although you can change the device search order in the Hard-Disk Drive Sequence screen and select the boot drive, Dell recommends that you do not change the default order in the Hard-Disk Drive Sequence screen.


Integrated Devices Screen

This screen is used to configure the following devices:

- **Integrated RAID Controller** — Both channels A and B have the same settings. The configurable options will vary,

depending on the type of ROMB card installed in your system.

The ROMB card is set to **RAID Enabled for RAID functionality**. **Do not turn off** RAID functionality.

 **NOTICE:** If you disable RAID functionality on your system, all data will be lost.

- **Diskette Controller** — Enables or disables the system's diskette drive controller. When **Auto** (default) is selected, the system turns off the controller when necessary to accommodate a controller card installed in an expansion slot. You can also set up the drive to be read-only. Using the read-only setting, the drive cannot be used to write to a disk.
- **USB Controller** — Enables or disables the system's USB ports. Disabling the USB ports makes system resources available for other devices.
- **Integrated 10/100/1000 NIC** — Enables or disables the system's two integrated NICs. Options are **Enabled without PXE**, **Enabled with PXE**, and **Disabled**. PXE support allows the system to boot from the network. Changes take effect after the system reboots.
- **MAC Address** — Displays the address of the MAC address for the 10/100/1000 NIC that is used by the corresponding integrated NIC. This field has no user-selectable settings.
- **Mouse Controller** — Enables or disables the system's mouse controller. Disabling the mouse controller allows an expansion card to use IRQ12.
- **Serial Port** (1 and 2) — Configures the system's integrated serial ports. The options can be set to **Auto** (default) to automatically configure the port, to a particular designation, or to **Off** to disable the port.

If you set the serial port to **Auto** and add an expansion card with a port configured to the same designation, the system automatically remaps the integrated port to the next available port designation that shares the same IRQ setting.

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

System Security Screen


You can set the following security features through the **System Security** screen:

- **Password Status** — When **Setup Password** is set to **Enabled**, this feature 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** — Allows you to restrict access to the System Setup program in the same way that you restrict access to your system with the system password feature.


 **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.

- **System Password** — Displays the current status of your system's password security feature and allows you to assign and verify a new system password.

 **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.

- **Power Button** — When this option is set to **Enabled**, you can use the power button to turn the system off or shut down the system. When this option is set to **Disabled**, you cannot use the power button to turn off the system or perform other system events.

 **NOTE:** You can still turn a system on using the power button, even if the **Power Button** option is set to **Disabled**.

 **NOTICE:** Use the NMI button only if directed to do so by qualified support personnel or by the operating system's documentation. Pressing this button halts the operating system and displays a diagnostic screen.

- **NMI Button** — When this option is set to **Enabled** and the button is pressed, an NMI alerts the system. Use this button only if directed to do so by qualified support personnel or by the operating system's documentation.

Console Redirection Screen

This screen is used to configure the console redirection feature:

- **Console Redirection** — Toggles the console redirection feature **On** (default) or **Off**.
- **Remote Terminal Type** — Allows you to select either **VT 100/VT 220** (default) or **ANSI**.
- **Redirection after Boot** — Enables (default) or disables console redirection after your system restarts.


For more information on using console redirection, your *User's Guide*.


Exit Screen

After you press <Esc> to exit the System Setup program, the **Exit** screen displays the following options:

- **Save Changes and Exit**
- **Discard Changes and Exit**
- **Return to Setup**

Using the System Password Feature

 **NOTICE:** The password features provide a basic level of security for the data on your system. If your data requires more security, it is your responsibility to obtain and use additional forms of protection, such as data encryption programs.


 **NOTE:** Dell recommends that you leave the system password in the **Not Enabled** (default) setting. If the System Password option is set to **Enabled** when operating your system in the headless configuration, you will not be able to enter a system password in order to reboot the system.

Your 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 system prompts you for the system password just after the system starts.

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 must remove the system cover to change a jumper setting that disables the system password feature (see "[Disabling a Forgotten Password](#)"). Note that this erases 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 system unlocked so that someone can disable the password by changing a jumper setting, anyone can access the data stored on your hard 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**. If the **Password Status** option is **Unlocked**, you can change the system password. If the **Password Status** option is **Locked**, you cannot change the system password. When the system password feature is disabled by a jumper setting on the system board, the setting shown is **Disabled**, and you cannot change or enter a new system password.


When no system password is assigned and the password jumper on the system board is in the enabled (default) position, the setting shown for the **System Password** option is **Not Enabled** and the **Password Status** field is **Unlocked**. To assign a system password, perform the following steps:

1. Verify that the **Password Status** option is set to **Unlocked**.
2. Highlight the **System Password** option and then press <Enter>.
3. Type your new system password.

You can use up to 32 characters in your password.


As you press each character key (or the spacebar 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 <Enter> to move to another field, or press <Esc> at any time prior to completing step 5.

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

The **System Password** option changes to **Enabled**. Your system password is now set. You can exit the System Setup program and begin using your system.

 **NOTE:** Password protection does not take effect until you restart the system by turning the system off and then on again.

Using Your System Password to Secure Your System

Whenever you turn on or reboot your 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 completes the startup sequence and you can use the keyboard 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:

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

```
Enter password:
```


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

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 the **System Password** and **Setup Password** options to further protect your system from unauthorized changes.

Deleting or Changing an Existing System Password

1. When prompted, press <Ctrl><Enter> to disable the existing system password, instead of pressing <Enter> to continue with the normal operation of your system.

If you are asked to enter your setup password, you may need to contact your network administrator who has the setup password.

2. Enter the System Setup program by pressing <F2> during POST.
3. Select the **System Security** screen field to verify that the **Password Status** option is set to **Unlocked**.
4. When prompted, type the system password.
5. Confirm that **Not Enabled** is displayed for the **System Password** option.

If **Not Enabled** is displayed 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 restart the system, and then repeat steps 2 through 5.

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

Using the Setup Password Feature


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

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 cannot operate your system or change settings in the System Setup program until you open the system, change the password jumper setting to disable the passwords, and erase the existing passwords (see "[Disabling a Forgotten Password](#)").

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 + or - key. The system prompts you to enter and verify the password. If a character is illegal for password use, the system emits a beep.

 **NOTE:** 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 (restarting 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, the program prompts 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 exception. If **System Password** is not set to **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 the **Setup Password** option to protect the system password from unauthorized changes.

Deleting or Changing an Existing Setup Password

1. Enter the System Setup program and select the **System Security** option.
2. Highlight the **Setup Password** option, press <Enter> to access the setup password window, and press <Enter> twice to clear the existing setup password.

The setting changes to **Not Enabled**.

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

Disabling a Forgotten Password

The system's software security features include a system password and a setup password. The password jumper enables or disables these password features and clears any password(s) currently in use.


 **CAUTION:** See "**Protecting Against Electrostatic Discharge**" in the safety instructions in your **System Information** document.

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2. Remove the cover (see "[Removing the Cover](#)").
3. Remove the jumper plug from the password jumper.

See [Figure 5-2](#) to locate the password jumper (labeled "PASSWD") on the system board.

4. Replace the cover (see "[Replacing the Cover](#)").
5. Reconnect your system and peripherals to their electrical outlets, and turn on the system.

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

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

6. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
7. Remove the cover (see "[Removing the Cover](#)").
8. Install the jumper plug on the password jumper.
9. Replace the cover (see "[Replacing the Cover](#)").
10. Reconnect your system and peripherals to their electrical outlets, and turn on the system.
11. Assign a new system and/or setup password.

To assign new passwords using the System Setup program, see "[Assigning a System Password](#)" and "[Assigning a Setup](#)

[Password.](#)"

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