Dell® PowerEdge® 2300 Systems

INSTALLATION AND TROUBLESHOOTING GUIDE

www.dell.com

February 1998 P/N 32268

Safety Instructions

Use the following safety guidelines to help protect your computer system from potential damage and to ensure your own personal safety.

When Using Your Computer System

As you use your computer system, observe the following safety guidelines:

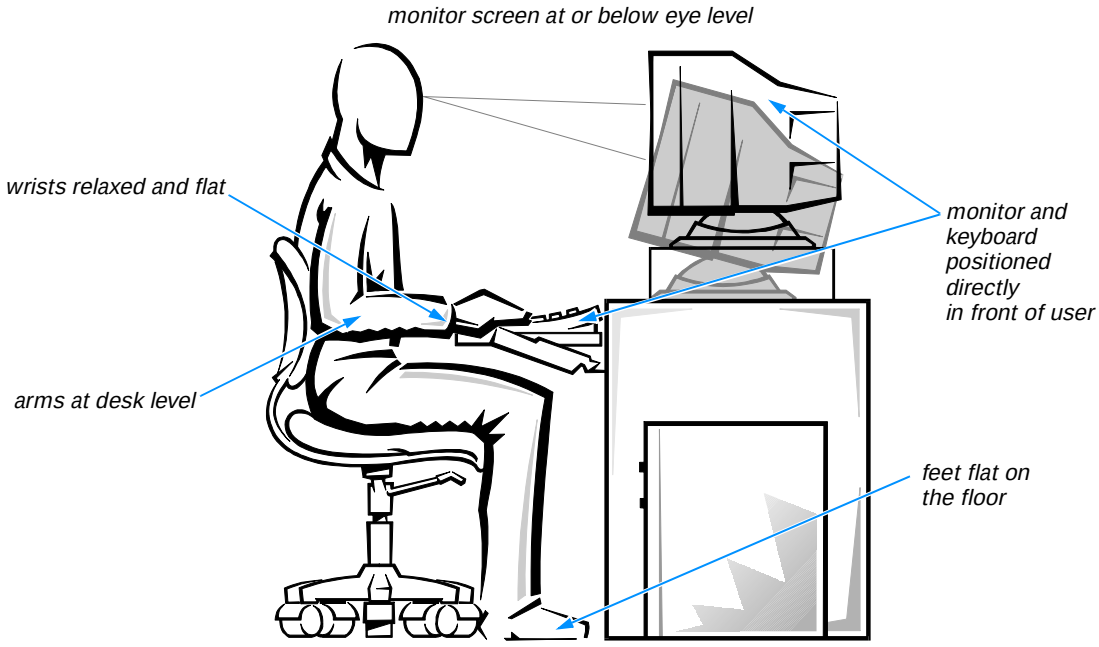
- Be sure your computer, monitor and attached peripherals are electrically rated to operate with the AC power available in your location.
- To help avoid possible damage to the system board, wait 5 seconds after turning off the system before removing a component from the system board or disconnecting a peripheral device from the computer.
- To help prevent electric shock, plug the computer and peripheral power cables into properly grounded power sources. These cables are equipped with three-prong plugs to help ensure proper grounding. Do not use adapter plugs or remove the grounding prong from a cable. If you must use an extension cable, use a three-wire cable with properly grounded plugs.
- To help protect your computer system from sudden, transient increases and decreases in electrical power, use a surge suppressor, line conditioner, or uninterruptible power supply (UPS).
- Be sure nothing rests on your computer system's cables and that the cables are not located where they can be stepped on or tripped over.
- Do not spill food or liquids on your computer. If the computer gets wet, consult Chapter 7, "Checking Inside Your Computer."
- Do not push any objects into the openings of your computer. Doing so can cause fire or electric shock by shorting out interior components.
- Keep your computer away from radiators and heat sources. Also, do not block cooling vents.

Ergonomic Computing Habits

WARNING: Improper or prolonged keyboard use may result in injury.

For comfort and efficiency, observe the following ergonomic guidelines when setting up and using your computer system:

- Position your system so that the monitor and keyboard are directly in front of you as you work. Special shelves are available (from Dell and other sources) to help you correctly position your keyboard.
- Set the monitor at a comfortable viewing distance (usually 510 to 610 millimeters [20 to 24 inches] from your eyes).
- Make sure the monitor screen is at eye level or slightly lower when you are sitting in front of the monitor.
- Adjust the tilt of the monitor, its contrast and brightness settings, and the lighting around you (such as overhead lights, desk lamps, and the curtains or blinds on nearby windows) to minimize reflections and glare on the monitor screen.
- Use a chair that provides good lower back support.
- Keep your forearms horizontal with your wrists in a neutral, comfortable position while using the keyboard or mouse.
- Always leave space to rest your hands while using the keyboard or mouse.
- Let your upper arms hang naturally at your sides.
- Sit erect, with your feet resting on the floor and your thighs level.
- When sitting, make sure the weight of your legs is on your feet and not on the front of your chair seat. Adjust your chair's height or use a footrest, if necessary, to maintain proper posture.
- Vary your work activities. Try to organize your work so that you do not have to type for extended periods of time. When you stop typing, try to do things that use both hands.



When Working Inside Your Computer

Before you remove the computer covers, perform the following steps in the sequence indicated.

CAUTIONS: Do not attempt to service the computer system yourself, except as explained in this guide and elsewhere in Dell documentation. Always follow installation and service instructions closely.

To help avoid possible damage to the system board, wait 5 seconds after turning off the system before removing a component from the system board or disconnecting a peripheral device from the computer.

1. **Turn off your computer and any peripherals.**
2. **Disconnect your computer and peripherals from their power sources. Also, disconnect any telephone or telecommunication lines from the computer.**

   Doing so reduces the potential for personal injury or shock.
3. **Touch an unpainted metal surface on the chassis, such as the metal around the card-slot openings at the back of the computer, before touching anything inside your computer.**

   While you work, periodically touch an unpainted metal surface on the computer chassis to dissipate any static electricity that might harm internal components.

In addition, take note of these safety guidelines when appropriate:

- When you disconnect a cable, pull on its connector or on its strain-relief loop, not on the cable itself. Some cables have a connector with locking tabs; if you are disconnecting this type of cable, press in on the locking tabs before disconnecting the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before you connect a cable, make sure both connectors are correctly oriented and aligned.
- Handle components and cards with care. Don't touch the components or contacts on a card. Hold a card by its edges or by its metal mounting bracket. Hold a component such as a microprocessor chip by its edges, not by its pins.

WARNING

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.

Protecting Against Electrostatic Discharge

Static electricity can harm delicate components inside your computer. To prevent static damage, discharge static electricity from your body before you touch any of your computer's electronic components, such as the microprocessor. You can do so by touching an unpainted metal surface on the computer chassis.

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

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

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

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

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

Preface

About This Guide

This guide is intended for anyone who wants to upgrade or troubleshoot their Dell PowerEdge 2300 computer system. Before calling Dell for technical assistance, follow the recommended procedure(s) in this guide to solve most hardware and software problems yourself. The chapters and appendixes are summarized as follows:

- Chapter 1, "Introduction," provides a brief overview of the system's service features.
- Everyone should read Chapter 2, "Checking the Basics," for some initial checks and procedures that you can use to solve basic computer problems. It also directs you to the appropriate chapter in this guide for more detailed troubleshooting information and procedures to solve more complex problems.
- Whenever you receive an error message or code, you should read Chapter 3, "Messages and Codes." This chapter discusses system messages, system beep codes, warning messages, diagnostics messages, alert log messages, and small computer system interface (SCSI) hard-disk drive indicator codes.
- If you suspect that the problems are software-related, or you are still having problems after testing the computer's hardware, read Chapter 4, "Finding Software Solutions."
- For hardware-related problems, read Chapter 5, "Running the Dell Diagnostics." Chapter 6, "Checking the Equipment," and Chapter 7, "Checking Inside the Computer," provide troubleshooting procedures for equipment connected to the input/output (I/O) panel of the computer and components inside the computer, respectively. Chapter 7 also provides information on removing the computer covers.
- Chapter 8, "Installing System Board Options," Chapter 9, "Installing Drives in the External Bays," and Chapter 10, "Installing Hard-Disk Drives," are intended for anyone who wants to install or remove components inside the computer, such as dual in-line memory modules (DIMMs), expansion cards, or SCSI devices.
- Chapter 11, "Getting Help," describes the help tools Dell provides to assist you should you have a problem with the computer. It also explains how and when to call Dell for technical assistance. Chapter 11 also includes a Diagnostics Checklist that you can copy and fill out as you perform the troubleshooting procedures. If you need to call Dell for technical assistance, use the completed checklist to tell

the Dell technical support representative what procedures you performed to better help the representative give you assistance. If you must return a piece of hardware to Dell, include a filled-out checklist.

- Appendix A, "Diagnostic Video Tests," discusses the tests for the Video Test Group in the Dell Diagnostics to help you test the monitor.
- Appendix B, "Jumpers and Switches," is intended for anyone who is troubleshooting the system or is adding internal options and needs to change jumper or switch settings.
- A table of the abbreviations and acronyms used throughout this guide and in other Dell documentation for the system precedes the Index.

Other Documentation You May Need

Besides this *Installation and Troubleshooting Guide*, the following documentation is included with your system:

- The *Dell PowerEdge 2300 Systems User's Guide*, which describes system features and technical specifications, video and SCSI device drivers, the System Setup program, software support utilities, and the Resource Configuration Utility.
- The *HP OpenView NNM SE 1.1 With Dell OpenManage HIP 3.1 User's Guide*, which describes the alert messages issued by the server management software.

You may also have one or more of the following documents.

NOTE: Documentation updates are sometimes included with the system to describe changes to the system or software. Always read these updates ***before*** *consulting any other documentation because the updates often contain information that supersedes the information in the other documents.*

- The Dell PowerEdge 2300 rack installation documentation, which provides detailed instructions for installing the system in a rack.
- Operating system documentation is included with the system if you ordered the operating system software from Dell. This documentation describes how to install (if necessary), configure, and use the operating system software.
- Documentation is included with any options you purchase separately from the system. This documentation includes information that you need to configure and install these options in your Dell computer.
- Technical information files—sometimes called "readme" files—may be installed on the hard-disk drive to provide last-minute updates about technical changes to the system or advanced technical reference material intended for experienced users or technicians.

Notational Conventions

The following subsections describe notational conventions used in this document.

Warnings, Cautions, and Notes

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

WARNING: A WARNING indicates the potential for bodily harm and tells you how to avoid the problem.

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

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

Typographical Conventions

The following list defines (where appropriate) specific elements of text and illustrates the typographical conventions used throughout this document as visual cues for those elements:

- *Keycaps*, the labeling that appears on the keys on a keyboard, are enclosed in angle brackets.

  Example: <Enter>

- *Key combinations* are series of keys to be pressed simultaneously (unless otherwise indicated) to perform a single function.

  Example: <Ctrl><Alt><Enter>

- *Commands* presented in lowercase bold are for reference purposes only and are not intended to be typed when referenced.

  Example: "Use the **format** command to . . . ."

  In contrast, commands presented in the Courier New font are part of an instruction and intended to be typed.

  Example: "Type `format a:` to format the diskette in drive A."

- *Filenames* and *directory names* are presented in lowercase bold.

  Examples: **autoexec.bat** and **c:\windows**

- *Syntax lines* consist of a command and all its possible parameters. Commands are displayed in lowercase bold; variable parameters (those for which you substitute a value) are displayed in lowercase italics; constant parameters are displayed in lowercase bold. The brackets indicate items that are optional.

  Example: **del** [*drive***:**] [*path*] *filename* [**/p**]

- *Command lines* consist of a command and may include one or more of the command's possible parameters. Command lines are presented in the Courier New font.

  Example: `del c:\myfile.doc`

- *Screen text* is text that appears on the screen of your monitor or display. It can be a system message, for example, or it can be text that you are instructed to type as part of a command (referred to as a *command line*). Screen text is presented in the Courier New font.

  Example: The following message appears on your screen:

  ```
  No boot device available
  ```

  Example: "Type `md c:\dos` and press <Enter>."

- *Variables* are placeholders for which you substitute a value. They are presented in italics.

  Example: DIMM_*x* (where *x* represents the DIMM socket designation)

Contents

Figures

Tables

CHAPTER 1
Introduction

Dell® PowerEdge® 2300 computer systems are high-speed servers that offer significant service and upgrade features.

The Dell PowerEdge 2300 systems include the following service features to make troubleshooting easy and effective:

- Dell Diagnostics checks for hardware problems (if the system can boot).
- Embedded server management hardware monitors temperatures and voltages throughout the system and notifies you if the system overheats or if a system cooling fan malfunctions.

The Dell PowerEdge 2300 system chassis simplifies removing and replacing computer components. You can perform processor and memory upgrades without removing the system board. The Dell-designed small computer system interface (SCSI) backplane board and hard-disk drive carriers eliminate the extensive cabling and drive configuration usually required for a SCSI subsystem. The plastic drive rails attached to devices mounted in the external drive bays allow you to remove these devices without removing a single screw.

Many upgrade options are offered for the Dell PowerEdge 2300 systems, including the following:

- A secondary microprocessor
- Additional memory
- A variety of expansion-card options (including redundant array of inexpensive disks [RAID] controller host adapter cards)
- Additional SCSI CD-ROM, tape, and hard-disk drives

CHAPTER 2
Checking the Basics

If your Dell PowerEdge 2300 computer system is not working as expected, start your troubleshooting with the procedures in this chapter. This chapter guides you through some initial checks and procedures that can solve basic computer problems. It can also direct you to the appropriate chapter in this guide for detailed troubleshooting information and procedures to solve more complex problems.

NOTE: When you see the question, "Is the problem resolved?" *in a troubleshooting procedure, perform the operation that caused the problem.*

Backing Up Files

If the system is behaving erratically, back up the files immediately. See the documentation that came with the operating system for instructions on how to back up the files.

Basic Checks

The following procedure leads you through the checks necessary to solve some basic computer problems:

1. **Was an alert message issued by the Dell Hardware Instrumentation Package (HIP) server management application?**

   Yes. Go to "Alert Log Messages From the Dell HIP Application" in Chapter 3.

   No. Go to step 2.

2. **Is the computer wet or damaged?**

   Yes. Go to Chapter 7, "Checking Inside the Computer."

   No. Go to step 3.

3. **Perform the steps in "Checking Connections and Switches" found next in this chapter.**

   Is the problem resolved?

   Yes. The power to the computer system was faulty, or the connections to the computer system were loose. You have fixed the problem.

   No. Go to step 4.

4. **Follow the procedures described in "Look and Listen" found later in this chapter.**

   Did the computer system complete the boot routine?

   Yes. Go to step 5.

   No. A serious malfunction may have occurred. Go to Chapter 11, "Getting Help."

5. **Did you receive a system message or beep code?**

   Yes. Go to Chapter 3, "Messages and Codes."

   No. Go to step 6.

6. **Verify the settings in the System Setup program as explained in "The System Setup Program" found later in this chapter.**

   Is the problem resolved?

   Yes. The system configuration information was incorrect. You have fixed the problem.

   No. Go to step 7.

7. **Run the Dell Diagnostics as described in Chapter 5, "Running the Dell Diagnostics."**

Checking Connections and Switches

Improperly set switches and controls and loose or improperly connected cables are the most likely source of problems for the computer, monitor, or other peripherals (such as a printer, keyboard, mouse, or other external equipment). A quick check of all the switches, controls, and cable connections can easily solve these problems. Figure 2-1 shows the back panel connections on the computer. Figure 2-2 shows the switches and controls on the computer.

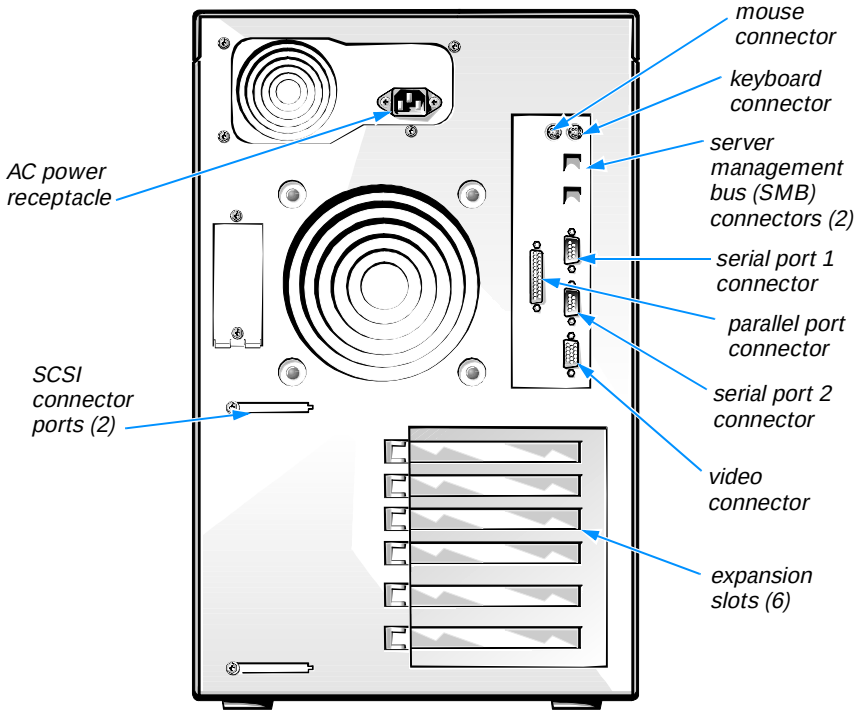


Figure 2-1. Back Panel Features

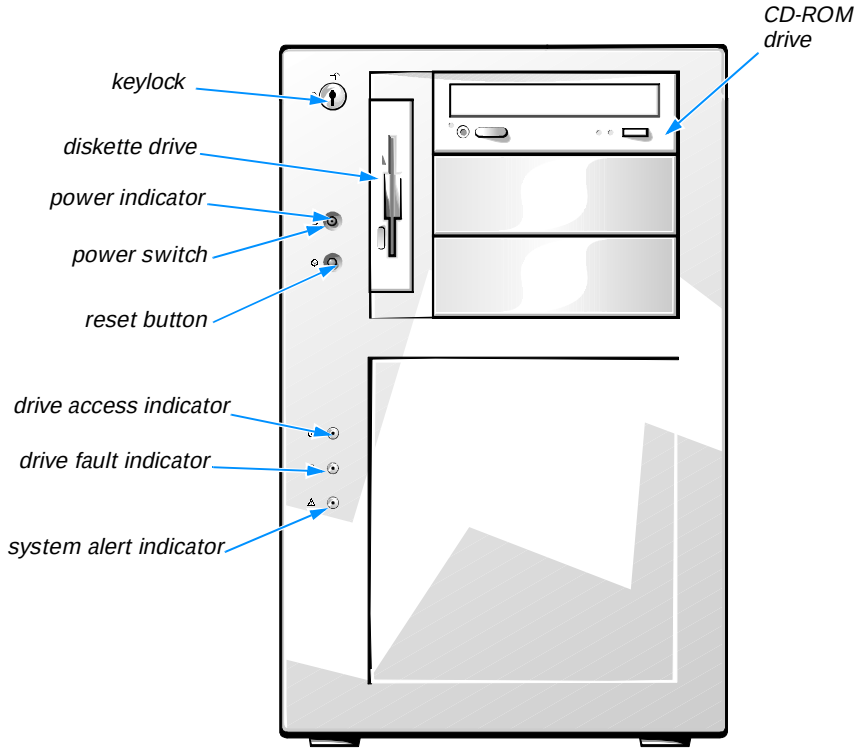


Figure 2-2. Front Panel Features

Complete the following procedure to check all the connections and switches:

1. **Turn off the system, including any attached peripherals (such as the monitor, keyboard, printer, external drives, scanners, and plotters). Disconnect all the AC power cables from their power sources.**

2. **If the computer is connected to a power strip, turn the power strip off and then on again.**

   Is the power strip receiving power?

   Yes. Go to step 5.

   No. Go to step 3.

3. **Plug the power strip into another electrical outlet.**

   Is the power strip receiving power?

   Yes. The original electrical outlet probably does not function. Use a different electrical outlet.

   No. Go to step 4.

4. **Plug a lamp that you know works into the electrical outlet.**

   Does the lamp receive power?

   Yes. The power strip is probably not functioning properly. Use another power strip.

   No. Go to step 5.

5. **Reconnect the system to AC power.**

   Make sure that all connections fit tightly together.

6. **Turn on the system.**

   Is the problem resolved?

   Yes. The connections were loose. You have fixed the problem.

   No. Go to step 7.

7. **Is the monitor operating properly?**

   Yes. Go to step 8.

   No. Go to "Troubleshooting the Monitor" in Chapter 6.

8. **Is the keyboard operating properly?**

   Yes. Go to step 9.

   No. Go to "Troubleshooting the Keyboard" in Chapter 6.

9. **Is the mouse or printer operating properly?**

   Yes. Continue with "Look and Listen" found next in this chapter.

   No. Go to "Troubleshooting I/O Ports" in Chapter 6.

Look and Listen

Looking at and listening to the system is important in determining the source of a problem. Look and listen for the indications described in Table 2-1.

Table 2-1. Boot Routine Indications

Look/Listen for:	Action
An error message	See Chapter 3, "Messages and Codes."
Alert messages from the Dell HIP software	The server management software has detected a problem inside the computer. See "Alert Log Messages From the Dell HIP Application" in Chapter 3.
The monitor's power indicator	Most monitors have a power indicator (usually on the front bezel). If the monitor's power indicator does not come on, see "Troubleshooting the Monitor" in Chapter 6.
The keyboard indicators	Most keyboards have one or more indicators (usually in the upper-right corner). Press the <Num Lock> key, the <Caps Lock> key, or the <Scroll Lock> key to toggle their respective keyboard indicators on and off. If the indicators do not light up, see "Troubleshooting the Keyboard" in Chapter 6.
The diskette-drive access indicator	The diskette-drive access indicator should quickly flash on and off when you access data on the diskette drive. If the diskette-drive access indicator does not light up, see "Troubleshooting the Diskette Drive Subsystem" in Chapter 7.
The hard-disk drive activity indicators	The hard-disk drive activity indicators should quickly flash on and off when you access data on the hard-disk drives. On a system running the Microsoft® Windows NT® operating system, you can test the drive by opening Windows Explorer and clicking the icon for drive C. If the hard-disk drive access indicator does not come on, see "Troubleshooting SCSI Hard-Disk Drives" in Chapter 7.
A series of beeps	See Chapter 3, "Messages and Codes."
An unfamiliar constant scraping or grinding sound when you access a drive	Make sure the sound is not caused by the application you are running. The sound could be caused by a hardware malfunction. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance from Dell.
The absence of a familiar sound	When you turn on the system, you should hear the hard-disk drives spin up, and the system tries to access the boot files from the hard-disk drive, the diskette drive, or the CD-ROM drive. See Chapter 5, "Running the Dell Diagnostics." If the system does not boot, see Chapter 11, "Getting Help."

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list that precedes the Index.

If you have not resolved the problem after looking at and listening to the computer, continue with the instructions in "The System Setup Program" found next in this chapter.

The System Setup Program

You can easily correct certain system problems by verifying the correct settings in the System Setup program. When you boot the system, the system checks the system configuration information and compares it with the current hardware configuration. If the system hardware configuration doesn't match the information recorded by the System Setup program, an error message may appear on the screen.

This problem can happen if you changed the system's hardware configuration and forgot to run the System Setup program. To correct this problem, enter the System Setup program, correct the corresponding System Setup setting, and reboot the system. See Chapter 4, "Using the System Setup Program," in the *Dell PowerEdge 2300 Systems User's Guide* for detailed instructions on using the System Setup program.

The Resource Configuration Utility

If you are experiencing problems with the system, you may have a conflict between the information stored by the System Setup program and the Resource Configuration Utility. Although the Resource Configuration Utility can read changes from the System Setup program, changes are not recorded into configuration memory until you run the Resource Configuration Utility and save the new information. See Chapter 5, "Using the Resource Configuration Utility," in the *Dell PowerEdge 2300 Systems User's Guide* for detailed instructions on using the Resource Configuration Utility and saving new information.

If after using the Resource Configuration Utility you have not resolved the problem, see Chapter 5, "Running the Dell Diagnostics."

CHAPTER 3
Messages and Codes

Applications, operating systems, and the computer itself are capable of identifying problems and alerting you to them. When a problem occurs, a message may appear on the monitor screen or a beep code may sound.

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

- System messages
- System beep codes
- Warning messages
- Diagnostics messages
- Alert messages
- Small computer system interface (SCSI) hard-disk drive indicator codes

This chapter describes each type of message and lists the possible causes and actions you can take to resolve any problems indicated by a message. To determine what type of message you have received, read the following sections.

System Messages

System messages alert you to a possible operating system problem or to a conflict between the software and hardware.Table 3-1 lists the system error messages that can occur and the probable cause for each message.

NOTE: If you receive a system message that is not listed in Table 3-1, check the documentation for the application that is running when the message appears and/or the operating system documentation for an explanation of the message and recommended action.

Table 3-1. System Messages

Message	Cause	Corrective Action
`Address mark not found`	Faulty diskette/tape drive subsystem or hard-disk drive subsystem (defective system board)	Replace the system board. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.
`Alert! Unbuffered and registered DIMMs cannot be mixed`	Combination of unbuffered and registered DIMMs installed	Replace one or more DIMMs so that all DIMMs are the same type. See "Installing DIMMs" and "Removing DIMMs" in Chapter 8.
`Auxiliary device failure`	Mouse cable connector loose or improperly connected, defective mouse	Check the mouse cable connection. If the problem persists, replace the mouse.
`Attachment failed to respond`	Diskette drive or hard-disk drive controller cannot send data to associated drive	Replace the drive's interface cable.

`Bad error-correction code(ECC) on disk read`
 	
`Controller has failed`
	Faulty diskette/tape drive subsystem or hard-disk drive subsystem (defective system board)	Replace the system board. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

`Data error`	Faulty diskette, diskette drive, or hard-disk drive	Replace the diskette, diskette drive, or hard-disk drive.
`Decreasing available memory`	One or more DIMMs improperly seated or faulty	Remove and reseat the DIMMs. See "Installing DIMMs" and "Removing DIMMs" in Chapter 8. If the problem persists, replace the DIMMs.

`Diskette drive 0 seek failure`
 	
`Diskette drive 1 seek failure`
	Faulty or improperly inserted diskette, incorrect configuration settings in System Setup program, loose diskette/tape drive interface cable, or loose power cable	Replace the diskette. Run the System Setup program to correct the diskette drive type. See Chapter 4, "Using the System Setup Program," in the *Dell PowerEdge 2300 Systems User's Guide* for instructions. Check the diskette/tape drive interface cable and power cable connections to the drive.

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list that precedes the Index.

Table 3-1. System Messages *(continued)*

Message	Cause	Corrective Action
`Diskette read failure`	Faulty diskette, faulty or improperly connected diskette/tape drive interface cable, or loose power cable	Check the diskette/tape drive interface cable and power cable connections to the drive. See Chapter 9, "Installing Drives in the External Bays." Replace the diskette drive interface cable.
`Diskette sub-system reset failed`	Faulty diskette/tape drive controller (defective system board)	Replace the system board. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.
`Diskette write protected`	Diskette write-protect feature activated	Move the write-protect tab on the diskette.
`Drive not ready`	Diskette missing from or improperly inserted in diskette drive	Reinsert or replace the diskette.

`Embedded server management error`
 	
`Embedded server management is not present`
	Embedded server management memory may be temporarily corrupted	Shut down the system to clear the memory, and then restart the system. If the problem persists, see Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

`Gate A20 failure`	Faulty keyboard controller (defective system board)	Replace the system board. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.
`General failure`	Operating system corrupted or not installed properly	Reinstall the operating system.

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list that precedes the Index.

Table 3-1. System Messages *(continued)*

Message	Cause	Corrective Action

`Hard disk controller failure`
 	
`Hard disk drive read failure`
 	
`Hard disk failure`
	Incorrect configuration settings in System Setup program, improperly connected hard-disk drive, faulty hard-disk drive controller subsystem (defective system board), or loose power cable	Check the hard-disk drive configuration settings in the System Setup program. See Chapter 4, "Using the System Setup Program," in the *Dell PowerEdge 2300 Systems User's Guide* for instructions. Reinstall the hard-disk drive. Check the interface cable and power cable connections to the backplane board. See Chapter 10, "Installing Hard-Disk Drives."

`Invalid configuration information - please run SETUP program`	Incorrect ISA_CLR jumper configuration, incorrect configuration settings in System Setup program, or faulty battery	Remove the plug from the ISA_CLR jumper. See Appendix B, "Jumpers and Switches," for instructions. Check the System Setup configuration settings. See Chapter 4, "Using the System Setup Program," in the *Dell PowerEdge 2300 Systems User's Guide* for instructions. Replace the battery. See Chapter 8, "Installing System Board Options."
`Invalid CPU speed detected - check jumpers`	Incorrect microprocessor jumper configuration	Check the microprocessor speed jumper. See Appendix B, "Jumpers and Switches."
`Invalid NVRAM configuration, resource reallocated`	System detected and corrected a resource conflict when system resources were allocated using the Resource Configuration Utility	No action is required.
`I/O parity interrupt at address`	Expansion card improperly installed or faulty	Reinstall the expansion cards (see Chapter 8, "Installing System Board Options"). If the problem persists, replace the expansion card.

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list that precedes the Index.

Table 3-1. System Messages *(continued)*

Message	Cause	Corrective Action

`Keyboard clock line failure`
 	
`Keyboard failure`
	Keyboard cable connector loose or improperly connected, defective keyboard, or defective keyboard/mouse controller (defective system board)	Check the keyboard cable connection. Replace the keyboard. If the problem persists, replace the system board. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

`Keyboard controller failure`	Defective keyboard/ mouse controller (defective system board)	Replace the system board. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

`Keyboard data line failure`
 	
`Keyboard stuck key failure`
	Keyboard cable connector loose or improperly connected, defective keyboard, or defective keyboard/mouse controller (defective system board)	Check the keyboard cable connection. Replace the keyboard. If the problem persists, replace the system board. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

`Memory address line failure at` *`address`*`, read` *`value`* `expecting` *`value`* `Memory double word logic failure at` *`address`*`, read` *`value`* `expecting` *`value`* `Memory odd/even logic failure at` *`address`*`, read` *`value`* `expecting` *`value`* `Memory write/ read failure at` *`address`*`, read` *`value`* `expecting` *`value`*	Faulty or improperly seated DIMMs or defective system board	Remove and reseat the DIMMs. If the problem persists, replace the DIMMs. See "Installing DIMMs" and "Removing DIMMs" in Chapter 8.
`Memory allocation error`	Faulty application	Restart the application.

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list that precedes the Index.

Table 3-1. System Messages (continued)

Message	Cause	Corrective Action
`Memory parity interrupt at address`	Improperly seated or faulty DIMMs	Remove and reseat the DIMMs. If the problem persists, replace the DIMMs. See "Installing DIMMs" and "Removing DIMMs" in Chapter 8.
`Memory tests terminated by keystroke`	POST memory test terminated by pressing <Spacebar>	No action is required.
`No boot device available`	Faulty diskette, diskette/tape drive subsystem, hard-disk drive, hard-disk drive subsystem, or no boot disk in drive A	Replace the diskette or hard-disk drive. If the problem persists, replace the system board. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.
`No boot sector on hard-disk drive`	Incorrect configuration settings in System Setup program, or no operating system on hard-disk drive	Check the hard-disk drive configuration settings in the System Setup program. See Chapter 4, "Using the System Setup Program," in the *Dell PowerEdge 2300 Systems User's Guide* for instructions.
`No timer tick interrupt`	Defective system board	Replace the system board. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.
`Non-system disk or disk error`	Faulty diskette, diskette/tape drive subsystem, or hard-disk drive subsystem	Replace the diskette or hard-disk drive. If the problem persists, replace the system board. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.
`Not a boot diskette`	No operating system on diskette	Use a bootable diskette.
`Processor or terminator card not installed!`	No microprocessor or terminator card installed in secondary microprocessor connector	Install a terminator card or microprocessor in the secondary microprocessor connector. See Chapter 8, "Installing System Board Options," for instructions.

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list that precedes the Index.

Table 3-1. System Messages *(continued)*

Message	Cause	Corrective Action

`Read fault`
 	
`Requested sector not found`
	Faulty diskette, diskette/tape drive subsystem, or hard-disk drive subsystem (defective system board)	Replace the diskette or hard-disk drive. If the problem persists, replace the system board. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

`Reset failed`	Improperly connected diskette/tape drive, hard-disk drive, or power cable	Check the diskette/tape drive interface cable and power cable connections to the diskette drive. See Chapter 9, "Installing Drives in the External Bays." Replace the diskette drive interface cable. Reinstall the hard-disk drive. Check the interface cable and power cable connections to the backplane board. See Chapter 10, "Installing Hard-Disk Drives."
`ROM bad checksum = address`	Expansion card improperly installed or faulty	Reinstall the expansion cards (see Chapter 8, "Installing System Board Options"). If the problem persists, replace the expansion card.
`Sector not found`	Defective sectors on diskette or hard-disk drive	Replace the diskette or hard-disk drive.
`Seek error`	Defective sectors on diskette or hard-disk drive	Replace the diskette or hard-disk drive.
`Seek operation failed`	Faulty diskette or hard-disk drive	Replace the diskette or hard-disk drive.
`Shutdown failure`	Defective system board.	Replace the battery. See Chapter 8, "Installing System Board Options."
`Time-of-day clock stopped`	Defective battery or faulty chip (defective system board)	Replace the battery. See Chapter 8, "Installing System Board Options." If the problem persists, replace the system board. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list that precedes the Index.

Table 3-1. System Messages *(continued)*

Message	Cause	Corrective Action
`Time-of-day not set`	Incorrect Time or Date settings or defective system battery	Check the Time and Date settings. See Chapter 4, "Using the System Setup Program," in the *Dell PowerEdge 2300 Systems User's Guide* for instructions. If the problem persists, replace the battery as instructed in Chapter 8, "Installing System Board Options."
`Timer chip counter 2 failed`	Defective system board	Replace the system board. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.
`Unexpected interrupt in protected mode`	Improperly seated DIMMs or faulty keyboard/mouse controller chip (defective system board)	Remove and reseat the DIMMs. If the problem persists, replace the DIMMs. See "Installing DIMMs" and "Removing DIMMs" in Chapter 8. If the problem still persists, replace the system board. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.
`Unsupported CPU detected in SLOT` *n*	Microprocessor not supported by system	Install a correct version of the microprocessor in the specified microprocessor connector. See Chapter 8, "Installing System Board Options," for instructions.
`Unsupported CPU speed in CMOS`	Microprocessor not supported by BIOS	Upgrade the BIOS. See Chapter 2, "Using the System Setup Program," in the *Dell PowerEdge 2300 Systems User's Guide* for instructions.

`Write fault`
 	
`Write fault on selected drive`
	Faulty diskette or hard-disk drive	Replace the diskette or hard-disk drive.

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list that precedes the Index.

System Beep Codes

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

When a beep code is emitted, write it down on a copy of the Diagnostics Checklist found in Chapter 11, "Getting Help," and then look it up in Table 3-2. If you are unable to resolve the problem by looking up the meaning of the beep code, use the Dell Diagnostics to identify a more serious cause (see Chapter 5, "Running the Dell Diagnostics"). If you are still unable to resolve the problem, see Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

Table 3-2. System Beep Codes

Code	Cause	Corrective Action
1-1-3	NVRAM write/read failure	Replace the system board. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.
1-1-4	BIOS checksum failure	This fatal error usually requires that you replace the BIOS firmware. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.
1-2-1	Programmable interval-timer failure	Replace the system board. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.
1-2-2	DMA initialization failure	
1-2-3	DMA page register write/read failure	
1-3-1	Main-memory refresh verification failure	Remove and reseat the DIMMs. See "Removing DIMMs" and "Installing DIMMs" in Chapter 8. Reboot the system. If the problem persists, replace the system board. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.
1-3-2	No memory installed	Remove and reseat the DIMMs. See "Removing DIMMs" and "Installing DIMMs" in Chapter 8. Reboot the system. If the problem persists, replace the system board. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list that precedes the Index.

Table 3-2. System Beep Codes *(continued)*

Code	Cause	Corrective Action
1-3-3	Chip or data line failure in the first 64 KB of main memory	Remove and reseat the DIMMs. See "Removing DIMMs" and "Installing DIMMs" in Chapter 8. Reboot the system. If the problem persists, replace the system board. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.
1-3-4	Odd/even logic failure in the first 64 KB of main memory	
1-4-1	Address line failure in the first 64 KB of main memory	
1-4-2	Parity failure in the first 64 KB of main memory	
2-1-1 through 2-4-4	Bit failure in the first 64 KB of main memory	
3-1-1	Slave DMA-register failure	Replace the system board. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.
3-1-2	Master DMA-register failure	
3-1-3	Master interrupt-mask register failure	
3-1-4	Slave interrupt-mask register failure	
3-2-4	Keyboard-controller test failure	Check the keyboard cable and connector for proper connection. If the problem persists, run the Keyboard Test Group in the Dell Diagnostics to determine whether the keyboard or keyboard controller is faulty. See Chapter 5, "Running the Dell Diagnostics."If the keyboard controller is faulty, replace the system board. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.
3-3-1	CMOS failure	Run the System Set Test Group in the Dell Diagnostics to isolate the problem. See Chapter 5, "Running the Dell Diagnostics."
3-3-2	System configuration check failure	Replace the system board. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list that precedes the Index.

Table 3-2. System Beep Codes *(continued)*

Code	Cause	Corrective Action
3-3-3	Keyboard controller not detected	Replace the system board. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.
3-3-4	Screen initialization failure	Run the Video Test Group in the Dell Diagnostics. See Chapter 5, "Running the Dell Diagnostics."
3-4-1	Screen-retrace test failure	
3-4-2	Search for video ROM failure	
4-2-1	No timer tick	Replace the system board. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.
4-2-2	Shutdown failure	
4-2-3	Gate A20 failure	Replace the system board. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.
4-2-4	Unexpected interrupt in protected mode	Ensure that all expansion cards are properly seated, and then reboot the system.
4-3-1	Improperly seated or faulty DIMMs	Remove and reseat the DIMMs. See "Removing DIMMs" and "Installing DIMMs" in Chapter 8. If the problem persists, replace the DIMMs.
4-3-3	Defective system board	Replace the system board. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.
4-3-4	Time-of-day clock stopped	Replace the battery (see Chapter 8, "Installing System Board Options"). If the problem persists, replace the system board. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.
4-4-1	Faulty I/O chip (defective system board)	Replace the system board. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.
4-4-1	Super I/O controller failure	Replace the system board. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.
4-4-2	Parallel-port test failure (defective system board)	Replace the system board. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list that precedes the Index.

Table 3-2. System Beep Codes (continued)

Code	Cause	Corrective Action
4-4-3	Math coprocessor failure (defective microprocessor)	Replace the microprocessor. See Chapter 8, "Installing System Board Options," for instructions.
4-4-4	Cache test failure (defective microprocessor)	Replace the microprocessor. See Chapter 8, "Installing System Board Options," for instructions.

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list that precedes the Index.

Warning Messages

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

NOTE: Warning messages are generated by either the application or the operating system. See Chapter 4, "Finding Software Solutions," and the documentation that accompanied the operating system and application for more information on warning messages.

Diagnostics Messages

When you run a test group or subtest in the Dell Diagnostics, an error message may result. These particular error messages are not covered in this chapter. Record the message on a copy of the Diagnostics Checklist found in Chapter 11, "Getting Help," and then follow the instructions in that chapter for obtaining technical assistance.

Alert Log Messages From the Dell HIP Application

The Dell Hardware Instrumentation Package (HIP) server management application generates alert messages that appear in the simple network management protocol (SNMP) trap log file. To see the trap log, select any enterprise under the SNMP trap log icon. (More information about the Alert Log window and options is provided in the Dell HIP online help and the *HP OpenView NNM SE 1.1 With Dell OpenManage HIP 3.1 User's Guide*.)

Alert log messages consist of information, status, warning, and failure messages for drive, temperature, fan, and power conditions. They can assist you with identifying a

problem and may provide you with information to help you resolve the problem. Table 3-3 lists some of the alert log messages from the Dell HIP application.

Table 3-3. Dell HIP Application Alert Log Messages

Message	Cause	Corrective Action
`Automatic management notification has occurred`	The server stopped functioning and called the notification number specified in the DC Console Actions tab.	The server will reboot if the Reset or Power Cycle option was selected in the Action on Hung Server Notification section of the System Console System tab. If neither option was selected, the system can be reset using the Remote Management feature in the Dell Remote Assistant.
`Chassis intrusion detected*`	The chassis of an attached system has been opened.	Check to make sure the system chassis is closed.
`Fan sensor detected a failure*`	A failure of one or more fans was detected by the thermal-monitoring facility in the specified server. If possible, the chassis number and fan number are provided.	Check for a possible blockage on or inadequate ventilation around the fan. If the fan is not blocked and ventilation is adequate, check fan connections. If the problem is still not resolved, call Dell for technical assistance.
`Fan sensor warning detected*`	A fan sensor reading on the specified server has exceeded the user-settable warning thresholds. If possible, the chassis number and fan number are provided.	Check for a possible blockage of or inadequate ventilation around the fan. If the fan is not blocked and ventilation is adequate, check fan connections. If the problem is still not resolved, call Dell for technical assistance.
`Memory ECC fault detected`	An ECC error has occurred in system memory.	Run the appropriate memory test(s) from your Dell Diagnostics. See Chapter 5, "Running the Dell Diagnostics," for more information.

* *Supported for local server action*

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviations and acronyms list that precedes the Index.

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

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

* *Supported for local server action*

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviations and acronyms list that precedes the Index.

SCSI Hard-Disk Drive Indicator Codes

If a 1 x 6 hot-pluggable SCSI backplane board is installed in the system, three light-emitting diode (LED) indicators adjacent to each of the six SCSI hard-disk drive bays provide information on the status of the SCSI hard-disk drives (see Figure 3-1). The SCSI backplane firmware controls the drive online and drive failure indicators.

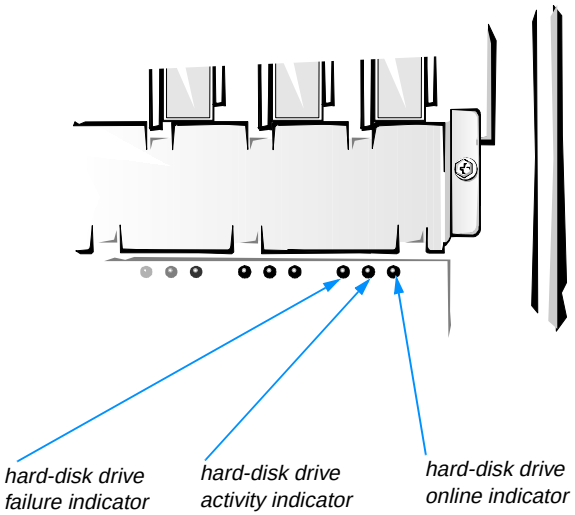


Figure 3-1. Hard-Disk Drive Indicators

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

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

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

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

CHAPTER 4
Finding Software Solutions

Because most computer systems have several applications installed in addition to the operating system, isolating a software problem can be confusing. Software errors can also appear to be hardware malfunctions at first.

Software problems can result from the following circumstances:

- Improper installation or configuration of a program
- Input errors
- Device drivers that may conflict with certain applications
- Interrupt conflicts between devices

You can confirm that a computer system problem is caused by software by running the System Set Test Group as described in Chapter 5, "Running the Dell Diagnostics." If all tests in the test group complete successfully, the error condition is most likely caused by software.

This chapter provides some general guidelines for analyzing software problems. For detailed troubleshooting information on a particular program, see the documentation that accompanied the software or consult the support service for the software.

Installing and Configuring Software

You should use virus-scanning software to check newly acquired programs and files for viruses before installing the programs on the computer's hard-disk drive. Viruses, which are pieces of code that can replicate themselves, can quickly use all available system memory, damage and/or destroy data stored on the hard-disk drive, and permanently affect the performance of the programs they infect. Several commercial virus-scanning programs are available for purchase, and most bulletin board services (BBSs) archive freely distributed virus-scanning programs that you can download with a modem.

Before installing a program, you should read its documentation to learn how the program works, what hardware it requires, and what its defaults are. A program usually includes installation instructions in its accompanying documentation and a software installation routine on its program diskettes.

The software installation routine assists users in transferring the appropriate program files to the computer's hard-disk drive. Installation instructions may provide details about how to configure the operating system to successfully run the program. You should always read the installation instructions before running a program's installation routine.

When you run the installation routine, you should be prepared to respond to prompts for information about how the computer's operating system is configured, what type of computer you have, and what peripherals are connected to the computer.

Using Software

The following subsections discuss errors that can occur as a result of software operation or configuration.

Error Messages

Error messages can be produced by an application, the operating system, or the computer. Chapter 3, "Messages and Codes," discusses the error messages that are generated by the computer. If you receive an error message that is not listed in Chapter 3, check the operating system or application documentation.

Input Errors

If a specific key or set of keys is pressed at the wrong time, a program may give you unexpected results. See the documentation that came with the application to make sure that the values or characters you are entering are valid.

Make sure that the operating environment is set up to accommodate the programs you use. Keep in mind that whenever you change the parameters of the computer's operating environment, you may affect the successful operation of the programs. Sometimes, after modifying the operating environment, you may need to reinstall a program that no longer runs properly.

Program Conflicts

Some programs may leave portions of their setup information behind, even though you have exited from them. As a result, other programs cannot run. Rebooting the system can confirm whether or not these programs are the cause of the problem.

There are also programs that use specialized subroutines called *device drivers* that can cause problems with the computer system. For example, a variation in the way the data is sent to the monitor may require a special screen driver program that *expects* a certain kind of video mode or monitor. In such cases, you may have to develop an alternative method of running that particular program—by creating a boot file made especially for that program, for example. Call the support service for the software you are using to help you with this problem.

Avoiding Interrupt Assignment Conflicts

Problems can arise if two devices attempt to use the same interrupt request (IRQ) line. To avoid this type of conflict, check the documentation for the default IRQ line setting for each installed expansion card. Then consult Table 4-1 to configure the card for one of the available IRQ lines.

Table 4-1. Default IRQ Line Assignments

IRQ Line	Used/Available
IRQ0	Used by the system timer
IRQ1	Used by the keyboard to signal that the output buffer is full
IRQ2	Used by interrupt controller 1 to enable IRQ8 through IRQ15
IRQ3	Used by serial port 2 (COM2 and COM4)
IRQ4	Used by serial port 1 (COM1 and COM3)
IRQ5	Available unless used by a secondary parallel port
IRQ6	Used by the diskette drive controller
IRQ7	Used by the primary parallel port
IRQ8	Used by the RTC
IRQ9	Used for power management functions
IRQ10	Available
IRQ11	Available
IRQ12	Used by the PS/2 mouse port unless mouse is disabled in System Setup program
IRQ13	Used by the math coprocessor
IRQ14	Available
IRQ15	Used by embedded server management functions

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list that precedes the Index.

CHAPTER 5
Running the Dell Diagnostics

Unlike many diagnostic programs, the Dell Diagnostics helps you check the computer's hardware without any additional equipment and without destroying any data. By using the diagnostics, you can have confidence in the computer system's operation. And if you find a problem you cannot solve by yourself, the diagnostic tests can provide you with important information you will need when talking to Dell's technical support representative.

CAUTION: Use the Dell Diagnostics to test *only* Dell computer systems. Using this program with other computers may cause incorrect computer responses or result in error messages.

Features of the Dell Diagnostics

The Dell Diagnostics provides a series of menus and options from which you choose particular test groups or subtests. You can also control the sequence in which the tests are run. The diagnostic test groups or subtests also have these helpful features:

- Options that let you run tests individually or collectively
- An option that allows you to choose the number of times a test group or subtest is repeated
- The ability to display or print test results or to save them in a file
- Options to temporarily suspend testing if an error is detected or to terminate testing when an adjustable error limit is reached
- A menu option, called *About*, that briefly describes each test and its parameters
- Status messages that inform you whether test groups or subtests are completed successfully
- Error messages that appear if any problems are detected

When to Use the Dell Diagnostics

Whenever a major component or device in the computer system does not function properly, you may have a component failure. As long as the microprocessor and the input and output components of the computer system (the monitor, keyboard, and

CD-ROM drive) are working, you can use the Dell Diagnostics. If you know what component(s) you need to test, simply select the appropriate diagnostic test group(s) or subtest(s). If you are unsure about the scope of the problem, read the rest of this chapter.

Starting the Dell Diagnostics

Follow these steps to run the diagnostics:

1. **Create a diagnostics diskette using the *Dell Server Assistant* CD.**

   See "Create Diskettes" in Chapter 2 of the *Dell PowerEdge 2300 Systems User's Guide*.

2. **Boot the system from the diagnostics diskette.**

   If the system fails to boot, see Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

3. **From the main menu, select the Run System Diagnostics option from Run System Utilities.**

NOTE: Before you read the rest of this chapter, you may want to start the Dell Diagnostics so you can see it on the screen of the monitor.

When you start the diagnostics, the Dell logo screen appears, followed by a message telling you that the diagnostics is loading. Before the diagnostics loads into memory, a program tests the random-access memory (RAM) that will be used by the diagnostics.

If no errors are found in RAM, the diagnostics loads, and the Diagnostics Menu appears (see Figure 5-1). The menu allows you to run all or specific diagnostic tests or to exit the Dell Diagnostics.

For a quick check of the system, select the Run Quick Tests option. This option runs only the subtests 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 odds of tracing the source of the problem quickly. For a complete check of the system, select the Run All Tests option. To check a particular area of the system, select the Run Specific Tests option.

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.

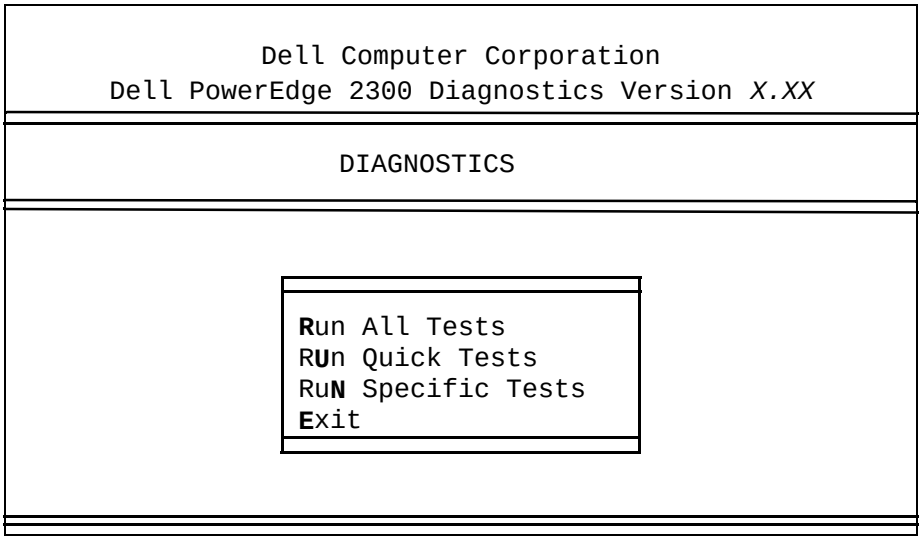


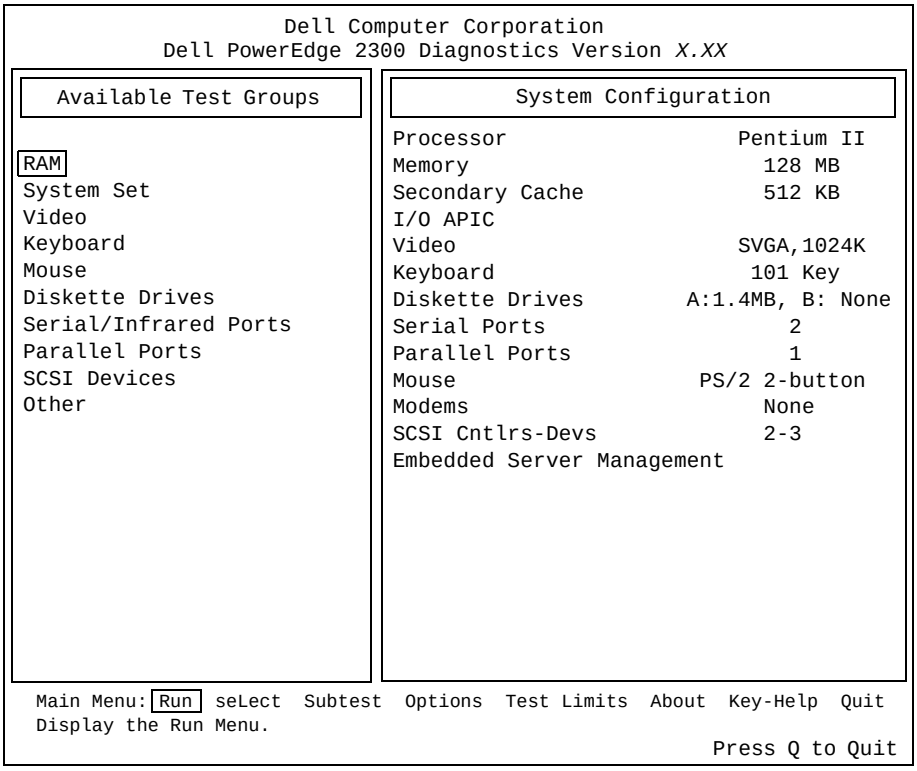
Figure 5-1. Diagnostics Menu

How to Use the Dell Diagnostics

When you select Run Specific Tests from the Diagnostics Menu, the main screen of the diagnostics appears. Figure 5-2 shows a sample main screen; the actual text on your system may vary depending on your system configuration.

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

- Two lines at the top of the main screen identify the diagnostics and give its version number.
- On the left side of the screen, the Available Test Groups area lists the diagnostic test groups in the order they will run if you select All under the Run submenu. Press the up- or down-arrow key to highlight a test group.
- On the right side of the screen, the System Configuration area lists the computer's current hardware settings.
- Two lines at the bottom of the screen make up the Main 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.



NOTE: The options displayed on the screen should reflect the hardware configuration of the computer system.

Figure 5-2. Dell Diagnostics Main Screen

Confirming the System Configuration Information

When you boot the system from the diagnostics diskette, the Dell Diagnostics checks the system configuration information and displays it in the System Configuration area on the main screen.

The following sources supply this configuration information for the Dell Diagnostics:

- The system configuration information settings (stored in nonvolatile RAM [NVRAM]) that you selected while using the System Setup program
- Identification tests of the microprocessor, the video controller, the keyboard controller, and other key components
- Basic input/output system (BIOS) configuration information temporarily saved in RAM

Do not be concerned if the System Configuration area does not list the names of all the components or devices you know are part of the computer system. For example,

you may not see a printer listed, although you know one is attached to the computer. Instead, the printer is listed as a parallel port. The computer recognizes the parallel port as LPT1, which is an address that tells the computer where to send outgoing information and where to look for incoming information. Because the printer is a parallel communications device, the computer recognizes the printer by its LPT1 address and identifies it as a parallel port.

How to Use the Main Menu

One of the Main Menu options is already highlighted. You can move the highlight from one option to another by pressing the left- or right-arrow key. 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 test group or subtest, move the highlight to the About option and press <Enter>. After reading the information, press the <Esc> key to return to the previous screen.

Main Menu Options

Eight options are listed in the Main Menu of the diagnostics main screen: Run, Select, Subtest, Options, Test Limits, About, Key-Help, and Quit. (An additional option, Display the Run Menu, returns you to the Diagnostics Menu shown in Figure 5-1)

NOTE: Before running any test groups or subtests (by selecting Run), you should consider setting global parameters within the Options option. They offer you greater control over how the test groups or subtests are run and how results are reported.

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 Run option).
- Move the highlight to the option you wish to select by pressing the left- or right-arrow key, and then press <Enter>.

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

The following subsections explain the menu options as listed from left to right in the Main Menu.

Run

Run displays five options: One, Selected, All, Key-Help, and Quit Menu. If you select One, all the subtests within the highlighted test group are run. If you choose Selected, only the selected test groups or the subtests that you selected within the test groups are run. If you select All, all of the subtests in all of the test groups are run. (The test groups or subtests are run in the same order as they are listed.)

The Key-Help option displays a list of key controls available for the particular option you have chosen. The Quit Menu option returns you to the previous menu.

Select

Select allows you to select individual test groups to tailor the testing process to your particular needs. You can choose one or more test groups and run them sequentially or individually. When you choose Select, five options are displayed: All, One, Clear All, Key-Help, and Quit Menu.

To select all the test groups, press <Enter> when All is highlighted in the Select menu.

To select an individual test group, highlight the test group and press <Spacebar> or highlight One and press <Enter>. Press the up- or down-arrow key to change the highlighted test group.

To reverse a test group selection, highlight the test group and press <Spacebar>. To clear all selections, select Clear All.

The Key-Help option displays a list of key controls available for the particular option you have chosen. The Quit Menu option returns you to the previous menu.

Subtest

Most of the test groups consist of several subtests. Use the Subtest option to select individual subtests within the test group(s).

When you select Subtest, many of the same options as those on the Main Menu are displayed: Run, Select, Options, Test Limits, About, Key-Help, and Quit Menu. Each of these options is explained in the following subsections.

Run Under Subtest

Run in the Subtest menu displays five options: One, Selected, All, Key-Help, and Quit Menu. If you select One, only the highlighted subtest is run. If you select Selected, only the selected subtests are run. If you select All, all of the subtests listed on the screen are run. (The subtests are run in the same order as they are listed.)

The Key-Help option displays a list of key controls available. The Quit Menu option returns you to the previous menu.

Select Under Subtest

Select in the Subtest menu allows you to select individual subtests to tailor the testing process to your particular needs. You can choose one or more subtests from the list. When you choose Select, five options are displayed: All, One, Clear All, Key-Help, and Quit Menu.

To select all the subtests, press the <Enter> key when All is highlighted in the Select menu. To select an individual subtest, highlight the subtest and press the <Spacebar> or highlight One and press <Enter>. Press the up- or down-arrow key to highlight a subtest to be selected.

To reverse a subtest selection, highlight the subtest and press the <Spacebar>. To clear all selections, select Clear All.

The Key-Help option displays a list of key controls available. The Quit Menu option returns you to the previous menu.

Options Under Subtest

The Options option in the Subtest menu functions the same way as the Options option in the Main Menu. For information on this option, see “Options” found later in this chapter.

Test Limits Under Subtest

The Test Limits option in the Subtest menu functions the same way as the Test Limits option in the Main Menu. For information on this option, see “Test Limits” found later in this chapter.

About Under Subtest

The About option in the Subtest menu displays information about the highlighted subtest.

Key-Help Under Subtest

The Key-Help option in the Subtest menu displays a list of key controls available.

Quit Menu Under Subtest

The Quit Menu option in the Subtest menu returns you to the previous menu.

Options

Table 5-1 lists all of the possible values for each global parameter of Options. A brief description of each parameter follows the table. To change Options parameters, press the <Spacebar>, the left- and right-arrow keys, or the plus (+) and minus (–) keys.

Table 5-1. Option Parameters

Parameter	Possible Values
Number of Times to Repeat Test(s)	0001 through 9999, or 0000, which loops indefinitely until you press the <Ctrl> and <Break> keys. The default is 1.
Maximum Errors Allowed	0000 through 9999, where 0000 means that there is no error limit.The default is 1.
Pause for User Response	Yes, No Allows you to decide whether tests will wait for user input. The default is Yes to wait for user input.
Output Device for Status Messages	Display, Printer, File If you have a printer attached to the computer, you can use it to print the status messages, if any, that are generated when a test runs. (The printer must be turned on and in the online mode to print.) If you select File, the messages are printed to a file named **result** on a diskette in drive A. The default is Display.
Output Device for Error Messages	Display, Printer, File This parameter has the same effect as the Output Device for Status Messages parameter, except that it pertains only to error messages. The default is Display.

Number of Times to Repeat Test(s)

This parameter specifies the number of times the tests run when you select Run. To change the default, type the desired value. If you type 0 (zero), the tests will run indefinitely.

Maximum Errors Allowed

This parameter specifies the maximum number of errors that can occur before testing is stopped. The error count begins from zero each time you run a subtest or test group individually or each time you select All to run all of them. To change the default, type the desired value. If you type 0 (zero), you are specifying that there be no limit on the number of errors that can occur—testing will not be stopped, regardless of the number of errors.

Pause for User Response

If this parameter value is set to Yes, the diagnostics pauses when one of the following occurs:

- Your interaction is needed to verify the Video Test Group screens or the Keyboard Test Group key functions, or another type of interaction, such as inserting a diskette, is required.
- The maximum error limit is reached.

If the Pause parameter is set to No, the diagnostics ignores some subtests that require your interaction; certain subtests can run only if this option is set to Yes because they require user interaction. Use the Pause parameter in situations where

you may want to prevent subtests that require user interaction from running—such as when you run the diagnostics overnight.

Output Device for Status Messages

Ordinarily, all status messages appear only on the screen. This parameter allows you to direct status messages to either a printer or a file, in addition to the screen. If you choose the File option, status messages are written to a file named **result**. This file is automatically created on a diskette in drive A when you run the diagnostics. If the **result** file already exists on the diskette, then new status messages are added to it.

The **result** file is an ordinary American Standard Code for Information Interchange (ASCII) text file. You can access the **result** file with the MS-DOS® **type** command as follows:

1. **Select Quit to exit the diagnostics and return to the operating system prompt.**
2. **At the operating system prompt, type the following command and press <Enter>:**

   ```
   type result
   ```

   The contents of the file appear on the screen.

After running particular diagnostic tests and viewing the status messages generated by the tests in the **result** file, you can erase the contents of the file so that it is clear for the next set of messages generated. Otherwise, the next messages are added at the end of the previous ones in the file.

Output Device for Error Messages

Ordinarily, all error messages appear only on the screen. The Output Device for Error Messages parameter allows you to direct error messages to either a printer or a file, in addition to the screen. If you choose the File option, error messages are written to the **result** file used for status messages. This file is automatically created on a diskette in drive A when you run the diagnostics. If the **result** file already exists on the diskette, then new error messages are added to it.

The **result** file is an ordinary ASCII text file. You can access and review the **result** file with the MS-DOS **type** command as described in the previous subsection, “Output Device for Status Messages.”

After running particular diagnostic tests and viewing the error messages generated by the tests in the **result** file, you can erase the contents of the file so that it is clear for the next set of messages generated. Otherwise, the next messages are added at the end of the previous ones in the file.

Test Limits

NOTE: The diagnostics program sets default limits on all tests. The only reason to change the default would be to limit the amount of testing done.

The RAM Test Group, the Video Test Group, the Diskette Drives Test Group, the Serial/Infrared Ports Test Group, the Parallel Ports Test Group, and the SCSI Devices Test Group allow you to designate limits. Whether you select Test Limits for a highlighted test group (from the Main Menu) or a subtest (from the Subtest menu), you set the limits for all the subtests in that test group. When you select Test Limits, a new screen appears and the Key-Help area lists keys to use with the new screen.

How you change a value for the limits of a test group or subtest depends on the type of parameter associated with it. Different keys are used to change values for different types of parameters. For example, memory address limits specified for the RAM Test Group are changed by typing numbers over the digits of a given limit or by pressing the plus (+) or minus (–) key to increase or decrease the given limit. In contrast, to set limits for the Serial/Infrared Ports Test Group, you use the <Spacebar> to toggle between Yes and No.

After you are satisfied with the limits, return to the main screen of the diagnostics by pressing the <Esc> key. The values you selected under Test Limits remain in effect for all the test groups or subtests you run, unless you change them. However, the values are reset to their defaults when you restart the diagnostics.

About

About in the Main Menu lists all of the subtests for the selected test group and displays information about the subtest that is highlighted.

Key-Help

Key-Help always displays a list of key controls available for the particular option you have selected.

Quit

Selecting Quit from the Main Menu exits the diagnostics and returns you to your operating system environment.

CAUTION: It is important that you quit the diagnostics program correctly because the program writes data to the computer's memory that can cause problems unless properly cleared.

Tests in the Dell Diagnostics

To troubleshoot components or devices, run the appropriate test (test group or subtest) in the diagnostics. The diagnostics exercises the functional components and devices of the computer system more vigorously and thoroughly than they are exercised during normal operation. The diagnostics is organized by components into test

groups and subtests within each test group. Each subtest is designed to detect any errors that may interfere with the normal operation of a specific device of the computer.

NOTE: Some subtests requiring hardware not listed in the System Configuration area of the main screen appear to run, but they conclude with a status message stating `Component not present (or disabled)`.

Table 5-2 lists the diagnostic test groups, their subtests, and comments concerning their use.

Table 5-2. Dell Diagnostics Tests

Test Groups	Subtests	Description
RAM	Quick Memory Test Comprehensive Memory Test Cache Memory Test	Tests the system RAM and processor cache.
System Set	CMOS Confidence Test DMA Controller Test Real-Time Clock Test System Timers Test Interrupt Controller Test APIC Test APIC MP Test System Speaker Test	Tests the system board's support chips, DMA controller, computer timer, NVRAM, speaker controller, and cache, as appropriate.
	Coprocessor Calculation Test Coprocessor Duty Cycle Test Coprocessor Error Exception Test	Tests the math coprocessor that is internal to the microprocessor.
	Multiprocessor Test	For systems with multiprocessors, confirms that the secondary microprocessor is operational.
Video	Video Memory Test Video Hardware Test Text Mode Character Test Text Mode Color Test Text Mode Pages Test Graphics Mode Test Color Palettes Test Solid Colors Test	Tests the video subsystem and monitor by checking various aspects of video output.
Keyboard	Keyboard Controller Test Keyboard Key Sequence Test Keyboard Interactive Test Stuck Key Test External Key Pad Test	Tests the keyboard by checking the keyboard controller and by finding keys that stick or respond incorrectly.

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list that precedes the Index.

Table 5-2. Dell Diagnostics Tests *(continued)*

Test Groups	Subtests	Description
Mouse	Mouse	Tests the electronic pointing device (bus mouse, serial mouse, trackball, or PS/2 mouse).
Diskette Drives	Change Line Test Seek Test Read Test Write Test	Tests a drive that uses removable diskettes. Also tests the associated interface.
Serial/ Infrared Ports	Serial/Infrared Baud Rate Test Serial/Infrared Interrupt Test Serial/Infrared Internal Transmission Test Serial External Transmission Test	Tests the components through which peripherals that use the serial or infrared ports, such as communications devices, send and receive data.
Parallel Ports	Parallel Internal Test Parallel External Loopback Test Parallel External Interrupt Test Parallel Printer Pattern Test	Tests the components through which peripherals that use the parallel port, such as printers and communications devices, send and receive data.
SCSI Devices	Internal Diagnostic Seek Test Read Test Write Test Audio Output Test Eject Removable Media Display Information	Tests SCSI host adapters and all the SCSI devices attached to them. Also can be used to remove CDs and tape cartridges from SCSI devices and to display information about the types of SCSI devices installed and the resources allocated to them.
Other	ESM Firmware Status ESM Interface Test ESM Sensor Test	Tests the components of the ESM system.

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list that precedes the Index.

Error Messages

When you run a test group or subtest in the diagnostics, error messages may result. These particular error messages are not covered in this chapter because the errors that generate these messages can be resolved only with Dell technical assistance. Record the messages on a copy of the Diagnostics Checklist found in Chapter 11, "Getting Help;" also see Chapter 11 for instructions on obtaining technical assistance and informing the technical support representative of these messages.

RAM Test Group

The RAM Test Group subtests check all the directly addressable RAM.

Subtests

Three subtests are available for RAM: the Quick Memory Test, the Comprehensive Memory Test, and the Cache Memory Test. The Quick Memory Test performs an address check to determine whether the computer is properly setting and clearing individual bits in RAM and whether the RAM read and write operations are affecting more than one memory address location at one time. This subtest checks all available RAM.

The Comprehensive Memory Test performs an address check as well as the following:

- Data pattern checks, to look for RAM bits that are stuck high or low, short-circuited data lines, and some data pattern problems that are internal to the memory chips
- A parity check that verifies the ability of the memory subsystem to detect errors
- A refresh check, to verify that the dynamic RAM (DRAM) is being recharged properly

The Cache Memory Test confirms the functionality of the computer's cache controller chip and the cache memory.

Why Run a RAM Test?

Faulty memory can cause a variety of problems that may not appear to be happening in RAM. If the computer is displaying one or more of the following symptoms, run the subtests in the RAM Test Group to verify that the memory is not at fault:

- A program is not running as usual, or a proven piece of software appears to malfunction and you confirm that the software itself is not at fault. (You can confirm that the software is functioning properly by moving it to another computer and running it there.)
- The computer periodically *locks up* (becomes un-usable and must be rebooted), especially at different places and times in different programs.
- You get a parity error (any error message that contains the word *parity*) at any time during operation. These errors are usually accompanied by a reference to an *address*—the location of the portion of memory where the error occurred—which you should record on a copy of the Diagnostics Checklist found in Chapter 11, "Getting Help."
- You receive the `Memory ECC fault detected` message from the Dell Hardware Instrumentation Package (HIP) server management application. See Chapter 3, "Messages and Codes," for more information on this program.

System Set Test Group

The subtests in the System Set Test Group check the computer's basic system board components and verify their related functions.

Subtests

The subtests that constitute the System Set Test Group and the computer functions they confirm follow:

- CMOS Confidence Test

  Checks the NVRAM for accessibility and reliability of data storage by performing a data pattern check and verifying the uniqueness of memory addresses.

- DMA Controller Test

  Tests the direct memory access (DMA) controller and verifies the correct operation of its page and channel registers by writing patterns to the registers.

- Real-Time Clock Test

  Confirms the functionality and accuracy of the computer's real-time clock (RTC).

- System Timers Test

  Checks the timers used by the microprocessor for event counting, frequency generation, and other functions. Only the functions that can be activated by software are tested.

- Interrupt Controller Test

  Generates an interrupt on each interrupt request (IRQ) line to verify that devices using that line can communicate with the microprocessor and that the interrupt controllers send the correct memory addresses to the microprocessor.

- APIC Test

  Tests that the procedure used to boot a multiprocessor system is able to properly receive interrupts from the input/output (I/O) Advanced Peripheral Interrupt Controller (APIC).

- APIC MP Test

  Ensures that all microprocessors are able to properly receive interrupts from the I/O APIC.

- System Speaker Test

  Checks the functionality of the speaker by generating eight tones.

- Coprocessor Calculation Test

  Checks the use of different types of numbers and the math coprocessor's ability to calculate correctly.

- Coprocessor Duty Cycle Test

  Tests the math coprocessor's ability to perform complex mathematical operations.

- Coprocessor Error Exception Test

  Verifies the math coprocessor's ability to handle errors and to send IRQs to the microprocessor.

- Multiprocessor Test

  For systems with multiprocessors, confirms that the secondary microprocessor is operational.

Why Run a System Set Test?

The System Set subtests double-check many system board components, such as the computer's I/O circuitry, that are tested by other test groups or subtests in the diagnostics. You should run the System Set Test Group if you are having a problem and cannot isolate the failure or malfunction to a particular system board component.

The System Set Test Group also verifies the proper operation of other computer components, such as the speaker, that are not tested elsewhere in the diagnostics.

The following symptoms usually suggest a problem with a component or subassembly that warrants running a System Set subtest:

- A program is not running as usual, or a proven piece of software appears to malfunction and you confirm that the software itself is not at fault. (You can confirm that the software is functioning properly by moving it to another computer and running it there.)
- An option card you previously accessed can no longer be accessed.
- You get a parity error or page fault failure—any error message that contains the word[s] *parity* or *page fault*—at any time during operation. These errors are usually accompanied by a reference to an address, which you should record on a copy of the Diagnostics Checklist found in Chapter 11, "Getting Help."
- Correcting errors in the system configuration information in the System Setup program does not resolve a problem.
- The computer's clock/calendar stops.
- The speaker no longer functions. The problem could be a failure of the system timers as well as a failure of the speaker itself. Run the System Timers Test, followed by the System Speaker Test.
- A peripheral device appears to malfunction. Run the Interrupt Controllers Test.
- A spreadsheet program or other type of mathematical application runs abnormally slow, generates error messages concerning calculations or operations, runs incorrectly, or generates incorrect results, or a proven piece of the program appears to malfunction and you confirm that the software itself is not at fault. (You can confirm that the software is not at fault by moving the program to another computer and running it there.)

- The computer periodically locks up, especially at different places and times in different programs.
- The computer halts in the middle of performing calculations or complex mathematical operations.

Video Test Group

The subtests in the Video Test Group verify the proper operation of the video controller and the video control circuitry installed in the computer. These subtests check for the correct operation of the readable registers in the video circuitry and the controller. They write, read, and verify data patterns in the cursor registers of the controller. The Video Test Group also tests all the video memory and provides additional subtests to test the color features of a color monitor.

Subtests

The eight subtests in the Video Test Group and the video functions they test follow:

- Video Memory Test

  Checks the read/write capability of video memory in various video modes.

- Video Hardware Test

  Checks the cursor registers and the horizontal and vertical retrace bit registers in the video controller.

- Text Mode Character Test

  Checks the video subsystem's ability to present data in text modes.

- Text Mode Color Test

  Checks the video subsystem's ability to present color in text modes.

- Text Mode Pages Test

  Checks the video subsystem's ability to map and present all available video pages on the screen, one page at a time.

- Graphics Mode Test

  Checks the video subsystem's ability to present data and color in graphics modes.

- Color Palettes Test

  Checks the video subsystem's ability to display all of the available colors.

- Solid Colors Test

  Checks the video subsystem's ability to show screens full of solid colors. Allows you to check for missing color subpixels.

Many of these tests display characters or graphics on the screen for you to verify. Samples of these screens are shown in Appendix A, "Diagnostic Video Tests."

NOTE: The default limit for testing super video graphics array (SVGA) modes is No. If you are testing an external monitor, change the default to Yes.

Why Run a Video Test?

Many of the symptoms that would prompt you to run a subtest in the Video Test Group are obvious, because the monitor is the visual component of the computer system. Before you run the Video Test Group or any of its subtests, you should make sure that the problem is not in the software or caused by a hardware change. You should also try running all of the software support utilities provided for the monitor and the video subsystem.

If the following symptoms still occur, run the appropriate test(s) as follows:

- If the monitor shows a partially formed or distorted image, run *all* of the subtests in the Video Test Group.
- If the alignment of text or images is *off*, regardless of the program you are running, run the Text Mode Character Test, Text Mode Pages Test, and Graphics Mode Test.
- If you have a color monitor or a program that runs in color, but the color is intermittent or not displayed at all, run the Text Mode Color Test, Color Palettes Test, and Solid Colors Test.
- If the monitor malfunctions in one mode but works fine in another (for example, text is displayed correctly, but graphics are not), run the Text Mode Character Test, Text Mode Color Test, Text Mode Pages Test, and Graphics Mode Test.

Keyboard Test Group

The subtests in the Keyboard Test Group verify the correct operation of the keyboard and the keyboard controller chip.

Subtests

The five keyboard subtests and the keyboard functions they test follow:

- Keyboard Controller Test

  Confirms the ability of the keyboard controller chip to communicate with the keyboard and the programming of the controller chip

- Keyboard Key Sequence Test

  Verifies that the keys on the keyboard function correctly when you press the keys in a predefined order

- Keyboard Interactive Test

  Checks the internal microcode of the keyboard and the external interface of the keyboard controller chip for a malfunctioning key

- Stuck Key Test

  Checks the internal microcode of the keyboard and the external interface of the keyboard controller chip for a repeating-key signal

- External Key Pad Test

  Checks the contact beneath each key for an electrical impulse to ensure that each key is working properly

Why Run a Keyboard Test?

Keyboard problems are not always caused by the keyboard. For example, if the computer system locks up, rendering the keyboard inoperable, the problem is most likely not caused by the keyboard. There are three symptoms that are likely to be keyboard-related. Sometimes, the configuration of a program changes the function of a key or key combination. Likewise, key configuration programs can change a key's function. Because these programs are memory resident, you should be sure to clear them out of the computer's memory before running a subtest in the Keyboard Test Group. (Clear them from memory by rebooting the computer from the diagnostics diskette.) When these possibilities have been eliminated, and if the following symptoms occur, you should run one or more of the subtests in the Keyboard Test Group:

- When you press a key, the character represented by that key appears repeatedly; the key seems to be stuck. Run the Stuck Key Test.
- When you press a key and the response is different from the usual response or the response you anticipated, the key contact may be damaged. Run the Keyboard Interactive Test.
- When a key does not work at all, run all of the subtests in the Keyboard Test Group.

Mouse Test

The Mouse Test checks the functionality of the mouse controller (which coordinates cursor movement on the screen with corresponding movement of the mouse or touch pad) and the operation of the mouse keys/touch pad.

Subtests

There are no subtests for the Mouse Test Group.

Why Run the Mouse Test?

Mouse or touch pad problems are as likely to originate in RAM as they are to be caused by a faulty mouse or touch pad. Three sources of RAM-related problems include the configuration of a program (which changes the function of the mouse or touch pad), memory-resident programs, and failure of a device driver (the software that controls the function of the mouse or touch pad). If these possibilities have been eliminated and the following symptoms persist, run the Mouse Test:

- When you press a mouse button or the touch pad, the function of the button (or touch pad) continues; that is, the button (or touch pad) seems to be stuck.
- When you press a mouse button or the touch pad, the response is different from the usual or anticipated response, which indicates the button (or touch pad) contact may be damaged.
- A mouse button or the touch pad does not work at all.
- The cursor does not respond on the screen in accordance with the movements you make with the mouse or touch pad.

Diskette Drives Test Group

The subtests in the Diskette Drives Test Group allow you to test 3.5-inch diskette drives of all capacities.

Subtests

The four diskette drive subtests in the Diskette Drives Test Group and the drive functions they test follow:

- Change Line Test

  Checks for bent pins on the diskette drive controller and for defective lines on the diskette cable

- Seek Test

  Checks the drive's ability to search for a specified track on the diskette and to position its read/write heads to all tracks

- Read Test

  Positions the read/write heads at each cylinder of the diskette for reading data and verifies that all tracks on the diskette can be read correctly

- Write Test

  Positions the read/write heads at each cylinder of the diskette and verifies that all tracks on the diskette can be written to correctly

Why Run a Diskette Drives Test?

Very often, a diskette drive problem may first appear to be a diskette problem. A box of defective diskettes might produce faulty-drive error messages. The test results can be confusing, so Dell suggests running the subtests in the Diskette Drives Test Group more than once using diskettes from different sources.

A command that is typed in an incorrect form (usually called a *syntax* error) is another possible cause of diskette drive problems. Be sure you have entered the command in the proper form.

If the diskette(s) and command syntax are eliminated as causes, the following symptoms usually suggest a drive problem and warrant running a subtest in the Diskette Drives Test Group:

- An error message appears on the screen stating that the computer cannot *read* from or *write* to a diskette.
- A diskette cannot be properly formatted, or format error messages appear on the screen.
- Data on diskettes is corrupted or lost; these problems may be intermittent.

Serial/Infrared Ports Test Group

The subtests in the Serial/Infrared Ports Test Group check the computer's interface with external devices, such as a printer and a mouse, that are connected to the computer through a serial or infrared port. The subtests in this test group are not intended as a diagnostic test for the actual peripheral attached to each port.

NOTES: With certain modems installed, the subtests in the Serial/Infrared Ports Test Group may fail because the modem appears to the diagnostics as a serial or infrared port, but it cannot be tested as a serial or infrared port. If a modem is installed and one of the subtests in the Serial/Infrared Ports Test Group fails, remove the modem and run the diagnostic tests again.

If an external loopback connector is not attached to a serial or infrared port, the Serial External Transmission Test will fail for that port and the results of this test should be ignored. An external modem connected to the port does not substitute for an external loopback connector.

Subtests

The four subtests in the Serial/Infrared Ports Test Group and the port functions they test follow:

- Serial/Infrared Baud Rate Test

  Checks the baud rate generator in each serial communications chip against the computer's clock

- Serial/Infrared Interrupt Test

  Checks the serial port's ability to send IRQs to the microprocessor

- Serial/Infrared Internal Transmission Test

  Checks several internal functions of the serial port using the internal loopback mode of the serial communications chip

- Serial External Transmission Test

  If a loopback device is attached, checks the line control bits of the serial port and sends a test pattern at several baud rates, checking the returned values

Why Run a Serial/Infrared Ports Test?

If the diagnostics does not recognize the computer's serial or infrared ports, enter the System Setup program and check the Serial/Infrared Port option to see whether the port has been disabled. (See Chapter 4, "Using the System Setup Program," in the *Dell PowerEdge 2300 Systems User's Guide* for instructions.) The subtests in the Serial/Infrared Ports Test Group cannot test a port unless it is enabled.

When a port is faulty, it may not be immediately evident that the port, and not the device connected to the port, is faulty. Instead, the peripheral might behave erratically or not operate at all. If the external device is not properly installed through the software, it also may not function properly. Try operating the peripheral from different programs or through the operating system. If it still does not work, you can eliminate the software configuration as the cause of the problem.

Another possible cause for errors is the external device. Use the documentation that came with the peripheral to troubleshoot the device and confirm that it is working properly.

After you eliminate incorrect system configuration information settings, peripheral malfunctions, and software errors as potential causes of port problems, you can run the subtests in the Serial/Infrared Ports Test Group to check the hardware. Although the following symptoms can be caused by faulty peripherals or software errors, they might also suggest a port problem:

- If a peripheral works intermittently or produces intermittent errors, the port may be faulty.
- If the computer displays an error message that is related to the external device connected to a port but corrections to the device do not resolve the error, run the appropriate subtest in the Serial/Infrared Ports Test Group.
- If the software and the diagnostics do not recognize that you have a serial or infrared port, you should check the Serial/Infrared Port option in the System Setup program and, if necessary, run the appropriate subtest in the Serial/Infrared Ports Test Group.

Parallel Ports Test Group

The subtests in the Parallel Ports Test Group check the computer's interface with external devices, such as a printer, that are connected to the computer through a parallel port. The subtests in this test group are not intended as diagnostic tests for the

actual peripheral attached to each port. (The only exception is a printer, as described in the following subsection.)

NOTE: If an external loopback connector is not attached to the parallel port, the Parallel External Loopback Test will fail for that port and the results of the test should be ignored.

Subtests

The four subtests in the Parallel Ports Test Group and the port functions they test follow:

- Parallel Internal Test

  Checks several internal functions of the parallel port

- Parallel External Loopback Test

  Tests the functionality of the control lines through an external loopback connector, if an external loopback connector is available

- Parallel External Interrupt Test

  Tests the parallel port's ability to generate interrupts from all possible sources, if an external loopback connector or printer is available

- Parallel Printer Pattern Test

  Tests a printer and tests the parallel port's ability to send a pattern to the printer, if a printer is connected

Why Run a Parallel Ports Test?

If the diagnostics does not recognize the computer's parallel port, enter the System Setup program and check the Parallel Port option to see if the port has been disabled. (See Chapter 4, "Using the System Setup Program," in the *Dell PowerEdge 2300 Systems User's Guide* for instructions.) The subtests in the Parallel Ports Test Group cannot test a port unless it is enabled.

When a port is faulty, it may not be immediately evident that the port, and not the device connected to the port, is faulty. Instead, the peripheral might behave erratically or not operate at all. If the external device is not properly installed through the software, it also may not function properly. Try operating the peripheral from different programs or through the operating system. If it still does not work, you can eliminate the software setup as the cause of the problem.

Another possible cause for errors is the external device. Use the documentation that came with the peripheral to troubleshoot the device and confirm that it is working properly. (Most printers have a self-test.)

After you eliminate incorrect system configuration information settings, peripheral malfunctions, and software errors as potential causes of port problems, you can run the subtests in the Parallel Ports Test Group to check the hardware. Although the

following symptoms can be caused by faulty peripherals or software errors, they might also suggest a port problem:

- If a peripheral works intermittently or produces intermittent errors, the port may be faulty.
- If the computer displays an error message that is related to the external device connected to a port but corrections to the device do not resolve the error, run the appropriate subtest in the Parallel Ports Test Group.
- If the software and the diagnostics do not recognize that you have a parallel port, check the Parallel Port setting in the System Setup program and, if necessary, run the appropriate subtest in the Parallel Ports Test Group.

SCSI Devices Test Group

The subtests in the SCSI Devices Test Group check the functionality of up to four small computer system interface (SCSI) host adapters and all the SCSI devices attached to them.

NOTES: Before conducting these subtests on CD-ROM drives, insert a CD with audio and data tracks (such as a multimedia CD) into each CD-ROM drive. All of the subtests, except for the Audio Output Test, require a CD with data tracks. The Audio Output Test requires a CD with audio tracks.

If a CD-ROM drive is empty or if it contains a CD that does not have the required data or audio tracks (depending on the subtest[s] being conducted), the subtest(s) will fail.

Subtests

The seven subtests in the SCSI Devices Test Group and the drive functions they test follow:

- Internal Diagnostic

  Causes the device to run its internal self-test.

- Seek Test

  Checks the device's ability to search for a specified track on the device and to position its read/write heads to all tracks.

- Read Test

  Positions the read/write heads at each block of the device for reading data and verifies that all tracks on the device can be read correctly.

- Write Test

  Positions the read/write heads at each block of the device for writing data and verifies that all tracks on the device can be written to correctly.

- Audio Output Test

  Causes the CD-ROM drive to begin playing the first audio track on an audio CD. To determine whether the test passed, listen to the audio output of the drive.

NOTE: To conduct the Audio Output Test, you must select it individually. It will not run as part of the test group.

- Eject Removable Media

  Causes a CD-ROM drive to eject its CD or a SCSI tape drive to eject its tape cartridge.

- Display Information

  Displays a screen of information about each SCSI host adapter in the computer, the resources allocated to each SCSI host adapter, and a list of target devices attached to the SCSI host adapter.

Why Run a SCSI Devices Test?

If you check the SCSI hard-disk drive to determine the amount of available space, the operating system will probably report problem areas. Problem areas on hard-disk drives are common, because most hard-disk drives have a small amount of space that is not usable. The hard-disk drive keeps a record of this space so that the computer will not attempt to use it. Identification of unusable disk space, unless it is an unusually large amount (over five percent of the possible total), should not be regarded as a cause for testing the hard-disk drive.

These are the most common symptoms that might prompt you to test a SCSI device:

- A SCSI hard-disk drive fails during the boot routine.
- *Seek* errors are reported by the operating system or applications.
- An error message appears on the screen stating that the computer cannot read from or write to a SCSI device.
- Data on a SCSI device is corrupted or lost; this problem may be intermittent. Once saved by a program, files cannot be properly recalled.

Other Test Group

The subtests in the Other Test Group verify that the embedded server management (ESM) system is working properly. The ESM system interacts with the system BIOS and operating system to ensure that critical parameters, such as temperature, are monitored and that appropriate action is taken if a problem is detected.

Subtests

The three subtests in the Other Test Group and the functions they test follow:

- ESM Firmware Status

  Tests to make sure the ESM software was downloaded correctly and that the system is operational.

- ESM Interface Test

  Tests the interface between the host system and the ESM system to ensure that all bits in the data port function correctly.

- ESM Sensor Test

  Verifies the current measurements of the ESM sensors.

Why Run an Other Test?

These are the most common symptoms that might prompt you to run the ESM sub-tests in the Other Test Group:

- If the Dell HIP server management application returns a warning dealing with server management
- If you want to verify that all voltages in the system are being reported properly

CHAPTER 6
Checking the Equipment

This chapter provides troubleshooting procedures for equipment that connects directly to the input/output (I/O) panel of the computer, such as the monitor, keyboard, mouse, or printer. Before performing any of the procedures in this chapter, see "Checking Connections and Switches" in Chapter 2. Then perform the troubleshooting procedures for the equipment that is malfunctioning.

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

- The *Dell Server Assistant* CD
- A blank, formatted diskette
- The system documentation

NOTE: When you see the question, "Is the problem resolved?" *in a troubleshooting procedure, perform the operation that caused the problem.*

Troubleshooting the Monitor

Troubleshooting video problems involves determining which of the following is the source of the problem:

- Monitor and monitor interface cable
- Video memory
- Video logic of the computer or a video expansion card

If information on the monitor screen is displayed incorrectly or not at all, complete the following steps to solve the problem:

1. **Turn on the system, including any attached peripherals.**
2. **Adjust the switches and controls including the horizontal and vertical position and size, as specified in the monitor's documentation, to correct the video image.**

   Is the problem resolved?

   Yes. You have fixed the problem.

   No. Go to step 3.

3. **Run the Dell Diagnostics.**

   See Chapter 5, "Running the Dell Diagnostics." Does the monitor display text properly?

   Yes. Go to step 5.

   No. Go to step 4.

4. **Type** g **and press the down-arrow key four times. Then press the plus (+) key to send all *error* messages to a printer. To send the error messages to a file named results on a diskette, insert a blank diskette into drive A, and then press the plus (+) key twice to send the error messages to the file.**

5. **Run the Video Test Group in the Dell Diagnostics.**

   See Chapter 5, "Running the Dell Diagnostics." Most of the tests in the Video Test Group require you to respond before the diagnostics continues with the next test.

   Do the tests complete successfully?

   Yes. You have fixed the problem.

   No. Go to step 6.

6. **Turn off the system and disconnect it from AC power. Swap the monitor with one of the same type that is working, and reconnect the system to AC power.**

7. **Run the Video Test Group in the Dell Diagnostics again.**

   Do the tests complete successfully?

   Yes. The monitor must be replaced. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

   No. If a video expansion card is installed in the computer, see "Troubleshooting Expansion Cards" in Chapter 7. If no video expansion card is installed, the built-in video controller is faulty; see Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

Troubleshooting the Keyboard

This procedure determines what kind of keyboard problem you have. If a system error message indicates a keyboard problem when you start up the computer system or while the Dell Diagnostics is running, complete the following steps:

1. **Look at the keyboard and the keyboard cable for any signs of damage. Press and release each key on the keyboard.**

   Do the keyboard and its cable appear to be free of physical damage, and do the keys work?

   Yes. Go to step 3.

   No. Go to step 2.

2. **Swap the faulty keyboard with a working keyboard.**

   To swap a faulty keyboard, unplug the keyboard cable from the computer's back panel and plug in a working keyboard.

   Is the problem resolved?

   Yes. The keyboard must be replaced. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

   No. Go to step 3.

3. **Run the Keyboard Test Group in the Dell Diagnostics.**

   See Chapter 5, "Running the Dell Diagnostics."

   Can you use the keyboard to select the Keyboard Test Group?

   Yes. Go to step 4.

   No. Go to step 5.

4. **Does the Keyboard Interactive Test complete successfully?**

   Yes. Go to step 6.

   No. Go to step 5.

5. **Swap the faulty keyboard with a working keyboard.**

6. **Does the Keyboard Controller Test complete successfully?**

   Yes. The keyboard must be replaced. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

   No. The keyboard controller on the system board is faulty. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

Troubleshooting I/O Ports

This section provides a procedure for troubleshooting the ports on the computer's I/O panel and the equipment connected to them, such as a printer, scanner, or other peripheral device.

You can also use this procedure to test I/O ports on expansion cards. However, you should first complete the procedures in "Troubleshooting Expansion Cards" in Chapter 7 to verify that the card is configured and installed correctly.

If a system error message indicates a port problem or if equipment connected to a port seems to perform incorrectly or not at all, the source of the problem may be any of the following:

- A faulty connection between the I/O port and the peripheral device
- A faulty cable between the I/O port and the peripheral device
- A faulty peripheral device
- Incorrect settings in the System Setup program
- Incorrect settings in the system's configuration files
- Faulty I/O port logic on the system board

NOTE: With certain modems installed, subtests in the Serial Port Test Group may fail because the modem appears to the diagnostics as a serial port but it cannot be tested as a serial port. If you have a modem installed and you experience a serial-port test failure, remove the modem and run the diagnostic tests again.

Troubleshooting the Basic I/O Functions

This procedure determines whether the computer's basic I/O functions are operational. If a system error message indicates an I/O port problem or the device connected to the port does not function properly, follow these steps:

1. **Enter the System Setup program, and check the Serial Port 1, Serial Port 2, Parallel Port, and Mouse settings.**

   Are the communications ports set to Auto, and is Mouse set to Enabled?

   Yes. Go to step 3.

   No. Go to step 2.

2. **Change the Serial Port 1, Serial Port 2, and Parallel Port settings to Auto, and change the Mouse setting to Enabled; then reboot the system.**

   Is the problem resolved?

   Yes. You have fixed the problem.

   No. Go to step 3.

3. **Check the contents of the start-up files.**

   See "Installing and Configuring Software" in Chapter 4.

   Are the port configuration commands correct?

   Yes. Go to step 5.

   No. Go to step 4.

4. **Change the necessary statements in the start-up files.**

   If the port problem is confined to a particular application, see the application's documentation for specific port configuration requirements.

   Is the problem resolved?

   Yes. You have fixed the problem.

   No. Go to step 5.

5. **Reboot the system from the diagnostics diskette, and run the Serial/Infrared Ports Test Group and/or the Parallel Ports Test Group in the Dell Diagnostics.**

   See Chapter 5, "Running the Dell Diagnostics."

   The Serial/Infrared Ports Test Group and the Parallel Ports Test Group test the basic functions of the system board's I/O port logic. Also, if a parallel printer is connected to the parallel port, the Parallel Ports Test Group tests the communications link between the system board's I/O port logic and the printer.

   Do the tests complete successfully?

   Yes. Go to step 6.

   No. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

6. **If the problem persists, go to "Troubleshooting a Parallel Printer" or "Troubleshooting a Serial I/O Device" found later in this chapter, depending on which device appears to be malfunctioning.**

Troubleshooting a Parallel Printer

If the procedure in the preceding subsection, "Troubleshooting the Basic I/O Functions," indicates that the problem is with a parallel printer, follow these steps:

1. **Turn off the parallel printer and computer.**
2. **Swap the parallel printer interface cable with a known working cable.**
3. **Turn on the parallel printer and computer.**

4. **Attempt a print operation on the parallel printer.**

   Does the print operation complete successfully?

   Yes. The interface cable must be replaced. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

   No. Go to step 5.

5. **Run the parallel printer's self-test.**

   Does the self-test complete successfully?

   Yes. Go to step 6.

   No. The printer is probably defective. If the printer was purchased from Dell, see Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

6. **Attempt another print operation on the parallel printer.**

   Does the print operation complete successfully?

   Yes. You have fixed the problem.

   No. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

Troubleshooting a Serial I/O Device

If the procedure in "Troubleshooting the Basic I/O Functions," found earlier in this chapter, indicates that the problem is with a device connected to one of the serial ports, follow these steps:

1. **Turn off the computer and any peripheral devices connected to the serial ports.**

   Are two serial devices connected to the computer?

   Yes. Go to step 2.

   No. Go to step 4.

2. **Disconnect the devices from serial ports 1 and 2, and connect the malfunctioning serial device to the opposite port.**

3. **Turn on the computer and the reconnected serial device.**

   Is the problem resolved?

   Yes. The serial port may be defective. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

   No. Go to step 4.

4. **Swap the interface cable (that connects the device to the serial port) with a known working cable.**

   Is the problem resolved?

   Yes. The interface cable must be replaced. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

   No. Go to step 5.

5. **Turn off the computer and the serial device, and swap the device with a comparable working device.**

   For example, if the serial mouse has a problem, swap it with a serial mouse that you know is working properly.

6. **Turn on the computer and the serial device.**

   Is the problem resolved?

   Yes. The serial device must be replaced. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

   No. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

CHAPTER 7
Checking Inside the Computer

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

- Perform the procedures described in "Checking Connections and Switches" and "The System Setup Program" in Chapter 2.
- Read the safety instructions in "Safety First—For You and the Computer" found next in this chapter.

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

- The *Dell Server Assistant* CD and a blank, formatted 3.5-inch diskette
- The *Dell PowerEdge 2300 Systems User's Guide*
- The key to the system keylock

NOTE: When you see the question, "Is the problem resolved?" in a troubleshooting procedure, perform the operation that caused the problem.

Safety First—For You and Your Computer

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

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

WARNING FOR YOUR PERSONAL SAFETY AND PROTECTION OF THE EQUIPMENT

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

1. ***Turn off* the computer and all peripherals.**
2. ***Disconnect* the computer, peripherals, and power supplies from their AC power sources. Also disconnect any telephone or telecommunication lines from the computer. Doing so reduces the potential for personal injury or shock.**

3. **If you are working inside the computer, wait until the STANDBY_LED indicator on the system board is off before adding or removing components or connecting or disconnecting cables from the system board.**
4. ***Touch* an unpainted metal surface on the computer chassis, such as the power supply, before touching anything inside the computer.**
5. **While you work, periodically touch an unpainted metal surface on the computer chassis to dissipate any static electricity that might harm internal components.**
6. **Never place conductive objects such as tools, metal pens, or screws on the system board.**

In addition, Dell recommends that you periodically review the safety instructions at the front of this guide.

Computer Orientation

When following the procedures in this guide, assume that the locations or directions relative to the computer are as shown in Figure 7-1.

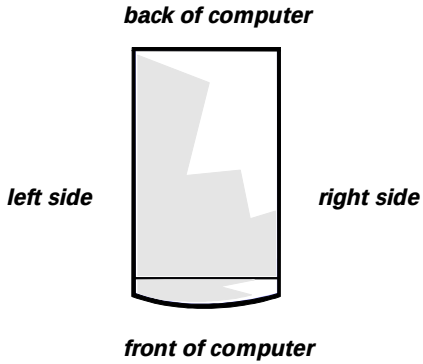


Figure 7-1. Computer Orientation

Removing and Replacing the Computer Covers

The computer is enclosed by a front bezel and a left- and right-side cover. To troubleshoot problems inside the computer, you may need to remove the front bezel and one or both of the side covers. To access the hard-disk drives, you must remove the front bezel. Removal of the right-side computer cover allows access to the system board, SCSI backplane board, and external SCSI devices. Removal of the left-side computer cover permits access to the diskette-drive interface cable.

Removing the Computer Covers

Use the following procedure to remove the computer covers:

1. **Observe the precautions in "Safety First—For You and the Computer" found earlier in this chapter. Also observe the safety instructions at the front of this guide.**
2. **Turn the keylock on the front bezel of the computer to the unlocked position.**
3. **Grasp the bezel on either side of the external drive bays and pull it slightly away from the chassis to release the two detents on the back of the bezel.**
4. **Pivot the bezel downward (see Figure 7-2) until it is at right angles to the computer chassis.**
5. **Grasp the bezel along the edge adjacent to the computer chassis and unsnap the bezel to remove it from the chassis.**

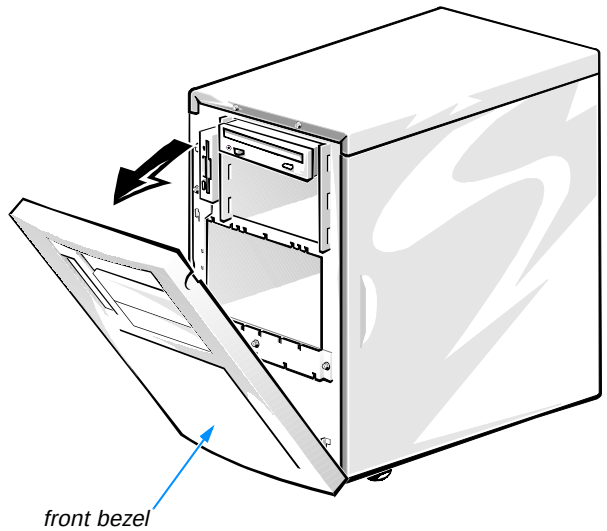


Figure 7-2. Opening the Front Bezel

6. **Loosen the three thumbscrews along the front edge of either side cover (see Figure 7-3).**
7. **Slide one cover a half-inch (about a centimeter) or so toward the front of the computer, grasp the top of the cover at both ends. Rotate the top edge of the cover away from the chassis, and lift it away from the chassis.**
8. **Repeat steps 6 and 7 to remove the remaining side cover, if necessary.**

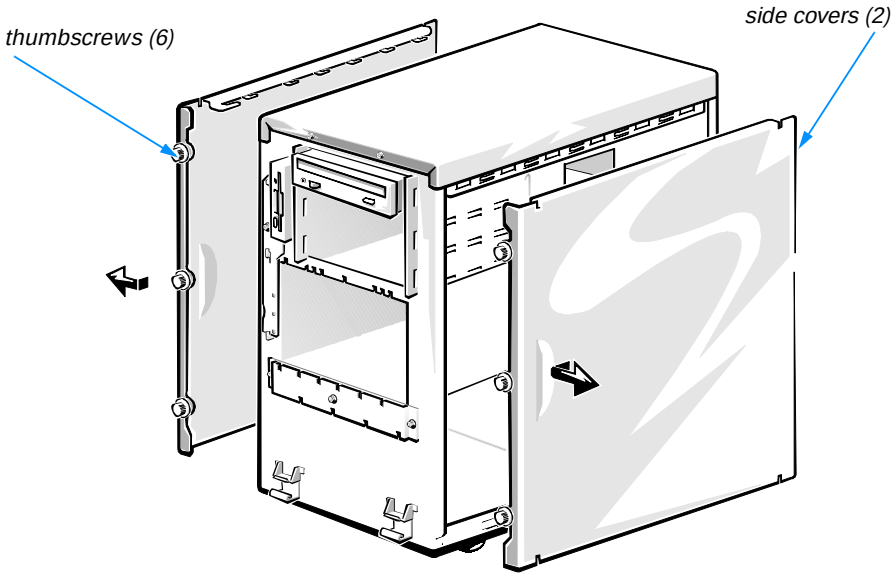


Figure 7-3. Removing the Computer Covers

Replacing the Computer Covers

Use the following procedure to replace a computer cover:

1. **Check all cable connections, especially those that might have come loose during your work. Fold cables out of the way so that they do not catch on the computer cover.**

   CAUTION: Make sure that there are no cables or cable connectors lying on the top diskette drive in the upper drive cage. Foreign objects on top of the drive can interfere with drive operation and permanently damage the drive.

2. **Check that no tools or parts (including screws) are left inside the computer.**
3. **Fit the cover over the side rail at the bottom of the chassis, and slide it closed.**
4. **Secure the cover with the three thumbscrews.**
5. **Make sure the keylock is in the unlocked position.**
6. **Snap the two tabs near the lower inside edge of the front bezel into the corresponding metal clips on the chassis, and pivot the bezel upwards into its closed position.**
7. **Set the keylock to the locked position.**

Inside the Chassis

In Figure 7-4, the cover on the right side of the computer is removed to provide an interior view. Figure 7-4 also identifies the drive bays. Refer to these illustrations to locate interior features and components discussed later in this guide.

The *system board*—the large, vertical, printed circuit board at the left side of the chassis—holds the computer's control circuitry and other electronic components. Some hardware options are installed directly on the system board. The *external drive bays* provide space for up to three half-height 5.25-inch drives, typically CD-ROM drives or tape drives. The diskette drive bay holds a 3.5-inch diskette drive. The *hard-disk drive bays* provide space for up to four 1.6-inch or six 1-inch small computer system interface (SCSI) hard-disk drives. These hard-disk drives are connected to a SCSI host adapter on the system board or on an expansion card, via the *SCSI backplane board*.

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

The wide ribbon cables are the *interface cables* for internal drives. For non-SCSI drives such as the diskette drive, an interface cable connects each drive to an interface connector on the system board or on an expansion card. For SCSI devices, interface cables connect externally accessible SCSI devices and the SCSI backplane board to a SCSI host adapter either on the system board or on an expansion card. (For more information, see Chapter 9, "Installing Drives in the External Bays" and Chapter 10, "Installing Hard-Disk Drives.")

During an installation or troubleshooting procedure, you may be required to change a *jumper* or switch setting. For information on the system board jumpers, see Appendix B, "Jumpers and Switches."

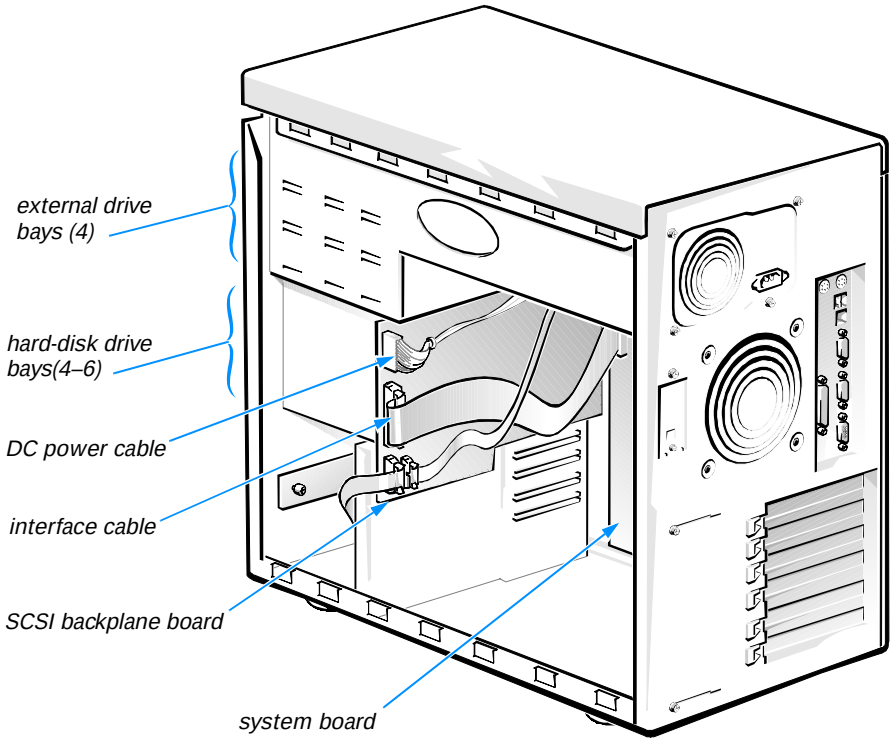


Figure 7-4. Inside the System (Right-Side View)

Responding to a Dell HIP Alert Message

The Dell Hardware Instrumentation Package (HIP) server management application monitors critical system voltages and temperatures, the system cooling fans, and the status of the SCSI hard-disk drives in the computer. The application generates alert messages that appear in the simple network management protocol (SNMP) trap log file. See Chapter 3, "Messages and Codes," for a listing of these alert messages. (More information about the Alert Log window and options is provided in the Dell HIP online help and the *HP OpenView NNM SE 1.1 With Dell OpenManage HIP 3.1 User's Guide*.)

Troubleshooting a Wet Computer

Liquid spills, splashes, and excessive humidity can cause damage to the system. If an external device (such as a printer or an external drive) gets wet, contact the device manufacturer for instructions. If the computer gets wet, complete the following steps:

1. **Turn off the system, including any attached peripherals, and disconnect the AC power cable from its power source.**

2. **Remove the computer covers.**

   See "Removing the Computer Covers" found earlier in this chapter.

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

3. **Let the computer dry for at least 24 hours.**

   Make sure that it is thoroughly dry before proceeding.

4. **Remove all expansion cards installed in the computer.**

   See "Removing an Expansion Card" in Chapter 8.

5. **Replace the computer covers, reconnect the system to AC power, and turn on the system.**

   Does the system have power?

   Yes. Go to step 6.

   No. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

6. **Turn off the system, disconnect it from AC power, remove the right-side computer cover, and reinstall all expansion cards you removed in step 4.**

   See "Installing an Expansion Card" in Chapter 8.

7. **Replace the right-side computer cover, and reconnect the system to AC power.**

8. **Run the System Set Test Group in the Dell Diagnostics.**

   See Chapter 5, "Running the Dell Diagnostics."

   Do the tests complete successfully?

   Yes. The system is operating properly.

   No. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

Troubleshooting a Damaged Computer

If the computer was dropped or damaged while being moved, you should check the computer to see if it functions properly. If an external device attached to the computer is dropped or damaged, contact the manufacturer of the device for instructions or see Chapter 11, "Getting Help," for information on obtaining technical assistance from Dell. Follow these steps to troubleshoot a damaged computer:

1. **Turn off the system, including any attached peripherals, and disconnect the AC power cable from its power source.**

2. **Remove the right-side computer cover.**

   See "Removing the Computer Covers" found earlier in this chapter.

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

3. **Check all the board and card connections in the computer.**

   Check the following connections:

   - Expansion-card connections to the system board
   - Drive carrier connections to the SCSI backplane board

4. **Verify all internal cable and component connections.**

   Make sure that all cables are properly connected and that all components are properly seated in their connectors and sockets.

5. **Replace the right-side computer cover and reconnect the system to AC power.**

6. **Run the System Set Test Group in the Dell Diagnostics.**

   See Chapter 5, "Running the Dell Diagnostics."

   Do the tests complete successfully?

   Yes. The system is operating properly.

   No. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

Troubleshooting the Battery

If an error message indicates a problem with the battery, or if the System Setup program loses the system configuration information when the computer is turned off, the battery may be defective.

Follow these steps to troubleshoot the battery:

1. **Turn off the system, including any attached peripherals, and disconnect the AC power cable from its power source.**

2. **Remove the right-side computer cover.**

   See "Removing the Computer Covers" found earlier in this chapter.

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

3. **Check the connection of the coin cell battery to the system board.**

   Is the battery firmly installed in the battery socket on the system board?

   Yes. Go to step 5.

   No. Go to step 4.

4. **Reseat the battery in its socket.**

   Is the problem resolved?

   Yes. The battery was loose. You have fixed the problem.

   No. Go to step 5.

5. **Replace the battery.**

   See "Replacing the Battery" in Chapter 8 for instructions on replacing the battery.

   Is the problem resolved?

   Yes. The battery's charge was low. You have fixed the problem.

   No. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

Troubleshooting a Cooling Fan

Two cooling fans are installed in the Dell PowerEdge 2300 system chassis. If you observe that one of the cooling fans is not operating, if the cooling fan in the power supply bay is not operating, or if the Dell HIP server-management application issues a fan-related error message, follow these steps to troubleshoot the problem:

1. **Turn off the system, including any attached peripherals, and disconnect the AC power cable from its power source.**

2. **Remove the right-side computer cover.**

   See "Removing the Computer Covers" found earlier in this chapter.

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

3. **Check the fan cable connections to the system board.**

4. **Replace the right-side computer cover and reconnect the system to AC power.**

5. **Turn on the system.**

   Do the fans operate properly?

   Yes. You have fixed the problem.

   No. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

Troubleshooting Expansion Cards

If an error message indicates an expansion-card problem or if an expansion card seems to perform incorrectly or not at all, the problem could be a faulty connection, a conflict with software or other hardware, or a faulty expansion card. Follow these steps to troubleshoot expansion cards:

1. **Start the Resource Configuration Utility, and verify that all Industry-Standard Architecture (ISA) expansion cards have been configured correctly. Save the configuration before exiting the utility.**

   See Chapter 5, "Using the Resource Configuration Utility," in the *Dell PowerEdge 2300 Systems User's Guide* for instructions.

2. **Turn off the system, including any attached peripherals, and disconnect the AC power cable from its power source.**

3. **Remove the right-side computer cover.**

   See "Removing the Computer Covers" found earlier in this chapter.

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

4. **Verify that each expansion card is firmly seated in its connector.**

   Are the expansion cards properly seated in their connectors?

   Yes. Go to step 6.

   No. Go to step 5.

5. **Reseat the expansion cards in their connectors.**

   See "Removing an Expansion Card" and "Installing an Expansion Card" in Chapter 8 for instructions on removing and replacing expansion cards.

   Is the problem resolved?

   Yes. The connection was loose. You have fixed the problem.

   No. Go to step 6.

6. **Verify that any appropriate cables are firmly connected to their corresponding connectors on the expansion cards.**

   For instructions on which cables should be attached to specific connectors on an expansion card, see the expansion card's documentation.

   Are the appropriate cables firmly attached to their connectors?

   Yes. Go to step 8.

   No. Go to step 7.

7. **Reconnect the cable connectors to the appropriate connectors on the expansion cards.**

   Is the problem resolved?

   Yes. The cable connections were loose. You have fixed the problem.

   No. Go to step 8.

8. **Inspect all jumpers and configuration switches on each expansion card.**

   Most ISA expansion cards have configuration settings for an interrupt request (IRQ) line, a direct memory access (DMA) channel, and a base-memory or basic input/output system (BIOS) address. To keep expansion cards from conflicting with each other, you need to know both the starting memory address and the amount of memory required by each card. For instructions on jumpers and configuration settings, see the expansion card's documentation.

   Is each expansion card configured correctly?

   Yes. Go to step 10.

   No. Go to step 9.

9. **Reconfigure the card according to the instructions in the card's documentation.**

   Is the problem resolved?

   Yes. The memory configuration of the card was incorrect. You have fixed the problem.

   No. Go to step 10.

10. **Remove all expansion cards.**

    See "Removing an Expansion Card" in Chapter 8 for information on removing expansion cards.

11. **Replace the right-side computer cover, reconnect the system to AC power, and turn on the system.**

12. **Enter the System Setup program, and update the system configuration information.**

    See Chapter 4, "Using the System Setup Program," in the *Dell PowerEdge 2300 Systems User's Guide* for instructions.

    For any ISA expansion cards, run the Resource Configuration Utility and update the configuration information.

    See Chapter 5, "Using the Resource Configuration Utility," in the *Dell PowerEdge 2300 Systems User's Guide* for instructions.

13. **Run the RAM Test Group in the Dell Diagnostics.**

    See Chapter 5, "Running the Dell Diagnostics."

    Do the tests complete successfully?

    Yes. Go to step 14.

    No. See Chapter 11, "Getting Help," for information on obtaining technical assistance.

14. **Turn off the system, disconnect it from AC power, and remove the right-side computer cover.**

15. **Reinstall one of the expansion cards you removed in step 10, and repeat steps 11 through 13.**

16. **Run the RAM Test Group in the Dell Diagnostics.**

    See Chapter 5, "Running the Dell Diagnostics."

    Do the tests complete successfully?

    Yes. Go to step 17.

    No. See Chapter 11, "Getting Help," for information on obtaining technical assistance.

17. **Repeat steps 14 through 16 for each of the remaining expansion cards that you removed in step 10.**

    Have you reinstalled all of the expansion cards without encountering a test failure?

    Yes. You have fixed the problem.

    No. See Chapter 11, "Getting Help," for information on obtaining technical assistance.

Troubleshooting System Memory

A system memory problem can be a faulty dual in-line memory module (DIMM) or a faulty system board. If a random-access memory (RAM) error message appears, the system probably has a memory problem.

When you turn on or reboot the system, the Caps Lock and Scroll Lock indicators on the keyboard should flash momentarily and then turn off. If the Num Lock category in the System Setup program is set to On, the Num Lock indicator should flash momentarily and then remain on; otherwise, it should turn off. Abnormal operation of these indicators can result from a defective DIMM in socket DIMM_A.

Follow these steps to troubleshoot system memory:

1. **Turn on the system, including any attached peripherals.**

   Is there an error message indicating invalid system configuration information after the memory count completes?

   Yes. Go to step 2.

   No. Go to step 8.

2. **Enter the System Setup program to check the Total Memory or System Memory setting.**

   See Chapter 4, "Using the System Setup Program," in the *Dell PowerEdge 2300 Systems User's Guide* for instructions.

   Does the amount of memory installed match the Total Memory or System Memory setting?

   Yes. Go to step 8.

   No. Go to step 3.

3. **Turn off the system, including any attached peripherals, and disconnect the AC power cable from its power source.**

4. **Remove the right-side computer cover.**

   See "Removing the Computer Covers" found earlier in this chapter.

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

5. **Reseat the DIMMs in their sockets.**

   See "Adding Memory" in Chapter 8 for instructions on removing and replacing DIMMs.

6. **Replace the computer cover, reconnect the system to AC power, and turn on the system.**

7. **Enter the System Setup program and check the Total Memory or System Memory setting again.**

   Does the amount of memory installed match the Total Memory or System Memory setting?

   Yes. Go to step 8.

   No. Go to step 9.

8. **Reboot the system, and observe the monitor screen and the Num Lock, Caps Lock, and Scroll Lock indicators on the keyboard.**

   Does the monitor screen remain blank, and do the Num Lock, Caps Lock, and Scroll Lock indicators on the keyboard remain on?

   Yes. Go to step 9.

   No. Go to step 11.

9. **Turn off the system, disconnect it from AC power, and remove the right-side computer cover.**

10. **If possible, swap the DIMM in socket DIMM_A with one of the same capacity, reboot the system, and observe the monitor screen and the indicators on the keyboard.**

    Is the problem resolved?

    Yes. You have fixed the problem.

    No. Go to step 11.

11. **Run the RAM Test Group in the Dell Diagnostics.**

    See Chapter 5, "Running the Dell Diagnostics."

    Do the tests complete successfully?

    Yes. You have fixed the problem.

    No. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

Troubleshooting the Video Subsystem

Troubleshooting video problems involves determining which of the following is the source of the problem: the monitor, the monitor interface cable, the video memory, or the video logic of the computer. You can also have a high-resolution video expansion card installed, which overrides the video logic of the computer.

The following procedure troubleshoots problems with the video memory and video logic only. Before you begin, perform the procedure found in "Troubleshooting the Monitor" in Chapter 6 to determine whether or not the monitor is the source of the problem.

If you have a high-resolution video expansion card, first complete the steps in "Troubleshooting Expansion Cards" found earlier in this chapter to verify that the card is configured and installed correctly.

Follow these steps to troubleshoot the video subsystem:

1. **Run the Video Test Group in the Dell Diagnostics.**

   See Chapter 5, "Running the Dell Diagnostics."

   Most of the tests in the Video Test Group are interactive; that is, you must respond before the diagnostics continues with the next test.

   Do the tests complete successfully?

   Yes. It is not a video hardware problem. Go to Chapter 4, "Finding Software Solutions."

   No. Go to step 2.

2. **Turn off the system, including any attached peripherals, and disconnect the AC power cable from its power source.**

3. **Remove the right-side computer cover.**

   See "Removing the Computer Covers" found earlier in this chapter.

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

4. **Determine whether a video expansion card is installed.**

   Is a video expansion card installed?

   Yes. Go to step 5.

   No. The on-board video controller is faulty. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

5. **Remove the video expansion card, and repeat step 1.**

   Do the tests complete successfully?

   Yes. The video expansion card is faulty. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

   No. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

Troubleshooting the System Board

A system board problem can result from a defective system board component, a faulty power supply, or a defective component connected to the system board. If an error message indicates a system board problem, follow these steps to troubleshoot the problem:

1. **Turn off the system, including any attached peripherals, and disconnect the AC power cable from its power source.**

2. **Remove the right-side computer cover.**

   See "Removing the Computer Covers" found earlier in this chapter.

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

3. **Remove all expansion cards except the SCSI host adapter card and the video expansion card (if they are installed).**

4. **Replace the right-side computer cover, reconnect the system to AC power, and turn on the system.**

5. **For any ISA expansion cards, run the Resource Configuration Utility and update the configuration information.**

   See Chapter 5, "Using the Resource Configuration Utility," in the *Dell PowerEdge 2300 Systems User's Guide* for instructions.

6. **Enter the System Setup program, and update the system configuration information.**

   See Chapter 4, "Using the System Setup Program," in the *Dell PowerEdge 2300 Systems User's Guide* for instructions.

7. **Run the System Set Test Group in the Dell Diagnostics.**

   See Chapter 5, "Running the Dell Diagnostics."

   Do the tests complete successfully?

   Yes. Go to step 8.

   No. Go to step 13.

8. **Turn off the system, disconnect it from AC power, and remove the right-side computer cover.**

9. **Reinstall one of the expansion cards you removed in step 3, repeat steps 4, 5, and 6, and continue with step 10.**

10. **Replace the computer cover, and reconnect the system to AC power.**

11. **Run the System Set Test Group again.**

    Do the tests complete successfully?

    Yes. Go to step 12.

    No. Go to step 13.

12. **Repeat steps 8, 9, and 10 for each of the remaining expansion cards you removed in step 3.**

    Have you reinstalled all of the expansion cards without encountering a test failure?

    Yes. Go to step 13.

    No. The expansion card is faulty. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

13. **Disconnect the keyboard and reboot the system.**

    Does the system boot successfully?

    Yes. Go to step 14.

    No. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

14. **Swap the keyboard with a comparable working keyboard, and run the System Set Test Group again.**

    Do the tests complete successfully?

    Yes. You have fixed the problem.

    No. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

Troubleshooting the Diskette Drive Subsystem

If the monitor displays a system error message indicating a diskette drive problem during execution of either the boot routine or the Dell Diagnostics, the problem may be caused by any of the following conditions:

- The system configuration settings do not match the physical diskette subsystem configuration.
- The diskette drive cable is not properly connected or are faulty.
- An expansion card is interfering with proper drive operations.
- A diskette drive may be improperly configured.
- The diskette drive is faulty.
- The computer's power supply is not providing sufficient power for the drives.
- The computer's diskette drive logic is faulty.

Follow these steps to troubleshoot the diskette drive subsystem:

1. **Enter the System Setup program, and verify that the system is configured correctly for the Diskette Drive A and Diskette Drive B settings.**

See Chapter 4, "Using the System Setup Program," in the *Dell PowerEdge 2300 Systems User's Guide* for instructions.

2. **If the system configuration settings are incorrect, make the necessary corrections in the System Setup program, and then reboot the system.**

3. **Run the Diskette Drives Test Group in the Dell Diagnostics to see whether the diskette drive subsystem now works correctly.**

   See Chapter 5, "Running the Dell Diagnostics," for more information.

   Do the tests complete successfully?

   Yes. If you were in the middle of another procedure, continue with the next step in the procedure you were performing.

   No. Go to step 4.

4. **Turn off the system, including any attached peripherals, and disconnect the AC power cable from its power source.**

5. **Remove both computer covers.**

   See "Removing the Computer Covers" found earlier in this chapter.

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

6. **Check the diskette drive cabling.**

   Is the diskette drive securely connected to the diskette drive interface cable connector? Is the diskette drive interface cable connector securely connected to the interface connector (labeled "FLOPPY") on the system board? Is the drive's DC power cable firmly connected to the drive?

   Yes. Go to step 8.

   No. Go to step 7.

7. **Reconnect the cable connectors.**

8. **Replace the computer covers, reconnect the system to AC power, and turn on the system.**

9. **Run the Diskette Drives Test Group in the Dell Diagnostics to see whether the diskette drive subsystem now works correctly.**

   See Chapter 5, "Running the Dell Diagnostics," for more information.

   Do the tests complete successfully?

   Yes. You have fixed the problem.

   No. Go to step 10.

10. **Repeat steps 4 and 5, and remove all expansion cards.**

    See "Removing an Expansion Card" in Chapter 8 for instructions.

11. **Replace the computer covers, reconnect the system to AC power, and turn on the system.**

12. **Run the Diskette Drives Test Group in the Dell Diagnostics to see whether the diskette drive subsystem now works correctly.**

    Do the tests complete successfully?

    Yes. An expansion card may be conflicting with the diskette drive logic, or you may have a faulty expansion card. Repeat steps 1, 2, and 3.

    No. Go to step 13.

13. **Repeat steps 4 and 5, and reinstall one of the expansion cards you removed in step 10.**

    See "Installing an Expansion Card" in Chapter 8 for instructions.

14. **Replace the computer covers, reconnect the system to AC power, and turn on the system.**

15. **Run the Diskette Drives Test Group in the Dell Diagnostics to see whether the diskette drive subsystem now works correctly.**

    Do the tests complete successfully?

    Yes. Go to step 16.

    No. Go to step 17.

16. **Repeat steps 13 through 15 until all expansion cards have been reinstalled or until one of the expansion cards prevents the system from booting from the diagnostics diskette.**

17. **Repeat steps 4 and 5. Verify that the drive's termination is enabled and that the drive-select jumper is set to the DS1 position.**

NOTE: Some diskette drives may require you to remove the drive from the computer to change the drive's termination and drive-select settings.

For information about the drive's termination and drive-select settings, refer to the documentation for the drive.

Is the drive configured correctly?

Yes. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

No. Go to step 18.

18. **Correct the drive-select jumper and drive termination settings.**

19. **Replace the computer covers, reconnect the system to AC power, and turn on the system.**

20. **Run the Diskette Drives Test Group in the Dell Diagnostics to see whether the diskette drive subsystem now works correctly.**

Do the tests complete successfully?

Yes. You have solved the problem.

No. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

Troubleshooting a SCSI Tape Drive

A SCSI tape drive can be an internal device installed in one of the externally accessible drive bays or an external device that attaches to a SCSI host adapter connector on the back panel of the computer. The SCSI tape drive is controlled by a SCSI host adapter card installed in the computer, which may also control other SCSI devices connected to one or more SCSI cables. SCSI devices often require device drivers for the particular operating system being used by the computer system.

Tape drive problems often result from a defective tape drive, a defective tape cartridge, or software. Follow these steps to troubleshoot a SCSI tape drive:

1. **Remove the tape that was in use when the problem occurred, and replace it with a tape that you know is not defective.**

   Is the problem resolved?

   Yes. The original tape was defective. Replace it with a new tape. You have fixed the problem.

   No. Go to step 2.

2. **Reboot the system and press <F2> to enter the System Setup program.**

   Is Secondary SCSI set to Enabled?

   Yes. Go to step 4.

   No. Go to step 3.

3. **Verify that any required SCSI device drivers are installed on the hard-disk drive and are configured correctly.**

   See Chapter 3, "Installing and Configuring SCSI Drivers," in the *Dell PowerEdge 2300 Systems User's Guide* for instructions on installing and configuring the SCSI device drivers for the system's on-board SCSI host adapter or Dell PowerEdge Expandable RAID Controller host adapter card. For any other type of SCSI host adapter card, see the documentation that accompanied the SCSI host adapter card.

   Are the drivers installed and configured correctly?

   Yes. The SCSI device drivers were installed or configured incorrectly or were corrupted. You have fixed the problem.

   No. Go to step 4.

4. **Reinstall the tape backup software as instructed in the tape-backup software documentation.**

   Is the problem resolved?

   Yes. The tape backup software was corrupted. You have fixed the problem.

   No. Go to step 5.

5. **Reboot the system and check for the presence of the tape drive during the optional read-only memory (ROM) scan sequence.**

   Is the problem resolved?

   Yes. The drive is correctly cabled and is receiving power. Go to step 10.

   No. Go to step 6.

6. **Turn off the system, including any attached peripherals, and disconnect the AC power cable from its power source.**

7. **Remove the right-side computer cover.**

   See "Removing the Computer Covers" found earlier in this chapter.

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

8. **Check the SCSI cable connections to the tape drive and to the SCSI host adapter connector. If the tape drive is an internal device, check the DC power cable connection to the tape drive.**

   Are the cables firmly connected?

   Yes. Go to step 10.

   No. Go to step 9.

9. **Reseat the cable connectors and replace the computer cover. Reconnect the system to AC power and turn it on.**

   Is the problem resolved?

   Yes. You have fixed the problem.

   No. Go to step 10.

10. **Turn off the system, including any attached peripherals, and disconnect the AC power cable from its power source. Then remove the right-side computer cover.**

11. **Remove the tape drive. Then verify that the tape drive is configured for a unique SCSI identification (ID) number and that the tape drive is terminated or not terminated as appropriate.**

    See the documentation for the tape drive for instructions on selecting the SCSI ID and enabling or disabling termination.

    Is the tape drive configured correctly?

    Yes. Go to step 14.

    No. Go to step 12.

12. **Reconfigure the tape drive's SCSI ID and termination settings as appropriate. Reinstall the tape drive, replace the computer cover, and reconnect the system to AC power and turn it on.**

    Is the problem resolved?

    Yes. The tape drive was configured incorrectly. You have fixed the problem.

    No. Go to step 13.

13. **Turn off the system, including any attached peripherals, and disconnect the AC power cable from its power source. Then remove the right-side computer cover.**

14. **Replace the SCSI cable that connects the tape drive to the SCSI host adapter. Replace the computer covers, and then reconnect the system to AC power and turn it on.**

    Is the problem resolved?

    Yes. You have fixed the problem.

    No. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

Troubleshooting SCSI Hard-Disk Drives

Hard-disk drive problems can be caused by a number of conditions, including problems with the drive itself, the SCSI backplane board, or a cable connected to the SCSI backplane board.

The SCSI backplane board monitors the SCSI hard-disk drives connected to the backplane board. In the event of a drive failure, systems using the optional Dell PowerEdge Expandable RAID Controller host adapter card will issue the following signals using the drive indicator lights adjacent to each SCSI hard-disk drive:

- If a drive shows signs of imminent failure, the drive online indicator stays on and the drive failure indicator blinks on briefly each second.
- If a drive has failed, the drive online indicator turns off and the drive failure indicator blinks off briefly each second.

Other drive indicator patterns are listed in Table 3-4.

Use the following procedure to troubleshoot a hard-disk drive problem.

CAUTION: This troubleshooting procedure can destroy data stored on the hard-disk drive. Before you proceed, make sure you have backed up all the files on the hard-disk drive.

1. **If the on-board SCSI host adapter is being used to control the SCSI backplane board, reboot the system and press <F2> to enter the System Setup program.**

   Is Primary SCSI set to Enabled?

   Yes. Go to step 3.

   No. Go to step 2.

2. **Change the Primary SCSI setting to Enabled, and reboot the system.**

   Is the problem resolved?

   Yes. You have fixed the problem.

   No. Go to step 3.

3. **Verify that the SCSI device drivers are installed and configured correctly.**

   See Chapter 3, "Installing and Configuring SCSI Drivers," in the *Dell PowerEdge 2300 Systems User's Guide* to determine which drivers are required and how they should be installed and configured.

   Are the required SCSI device drivers installed and configured correctly?

   Yes. Go to step 5.

   No. Go to step 4.

4. **Reinstall and/or reconfigure the required SCSI device drivers. Then reboot the system.**

   Is the problem resolved?

   Yes. You have fixed the problem.

   No. Go to step 5.

5. **Remove the drive carrier and install it in another drive bay.**

   Is the problem resolved?

   Yes. The SCSI backplane board has a defective connector. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

   No. Go to step 6.

6. **Remove the right-side computer cover.**

   See "Removing the Computer Covers" found earlier in this chapter.

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

7. **Check the SCSI cable connections to the SCSI backplane board and to the SCSI host adapter. Check the DC power cable connection to the SCSI backplane board.**

   The SCSI cable may be connected to the SCSI host adapter on the system board, or to a SCSI host adapter card in an expansion slot. See Chapter 10, "Installing Hard-Disk Drives," for the location of the cable connectors on the SCSI backplane board and the SCSI host adapter.

   Are the cables firmly connected?

   Yes. Go to step 9.

   No. Go to step 8.

8. **Reseat the cable connectors, and then reconnect the computer and peripherals to their AC power sources and turn them on.**

   Is the problem resolved?

   Yes. The cable connections were faulty. You have fixed the problem.

   No. Go to step 9.

9. **Partition and logically format the hard-disk drive. If possible, restore the files to the drive.**

   To partition and logically format the drive, see the documentation for the computer's operating system.

   Is the problem resolved?

   Yes. The hard-disk drive format was corrupted. You have fixed the problem.

   No. See Chapter 11, "Getting Help," for instructions on obtaining technical assistance.

CHAPTER 8
Installing System Board Options

This chapter describes how to install the following options:

- Industry-Standard Architecture (ISA) and Peripheral Component Interconnect (PCI) expansion cards
- Memory upgrades
- Microprocessor upgrades

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

Use Figure 8-1 to locate the system board features mentioned in this chapter and elsewhere.

WARNING: Before you perform the procedures in this chapter, you must turn off the computer and disconnect it from its AC power source. For more information, refer to "Safety First—For You and Your Computer" in Chapter 7.

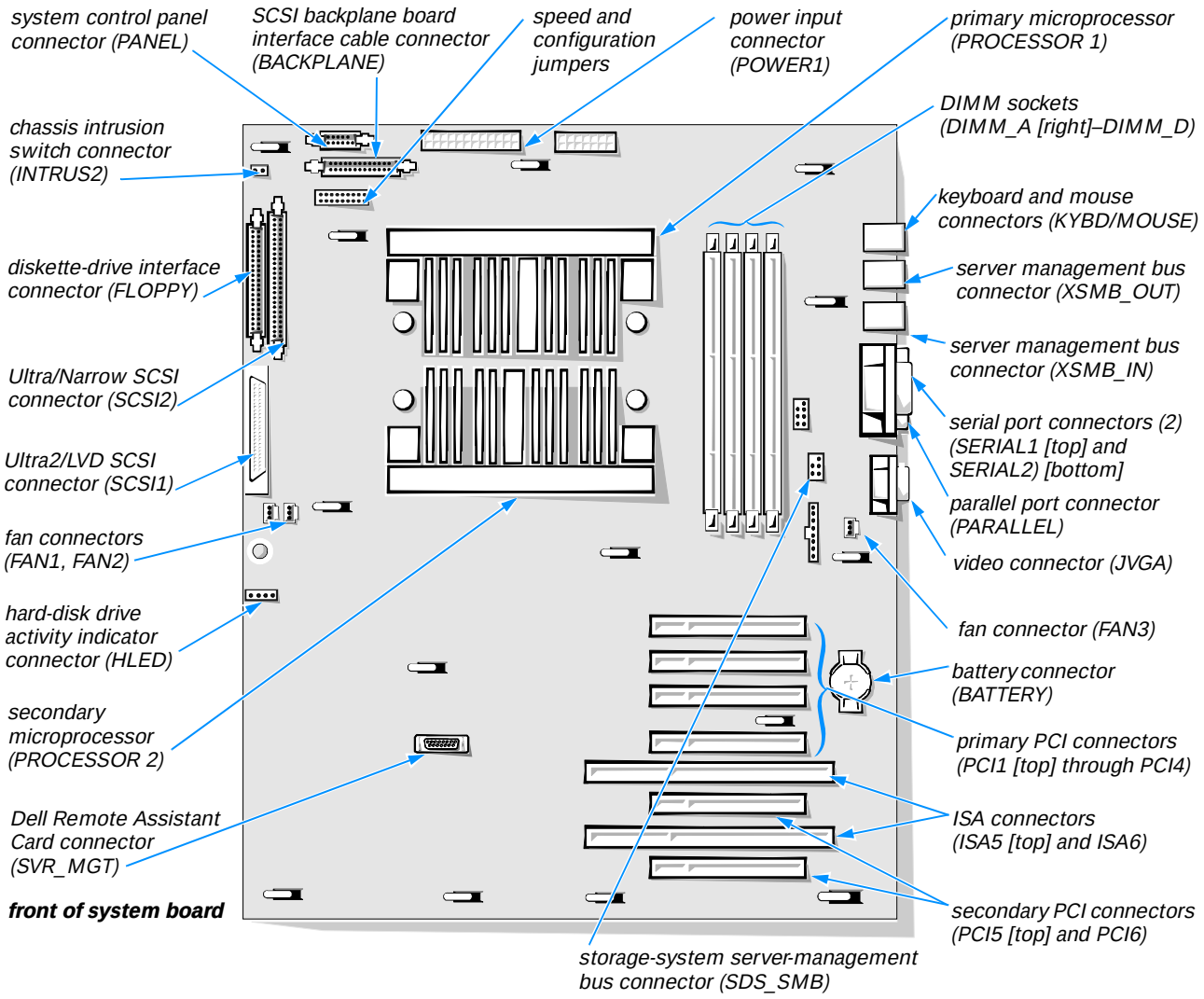
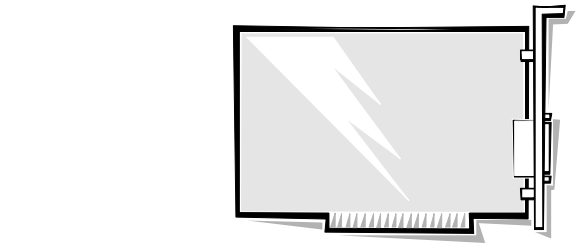


Figure 8-1. System Board Features

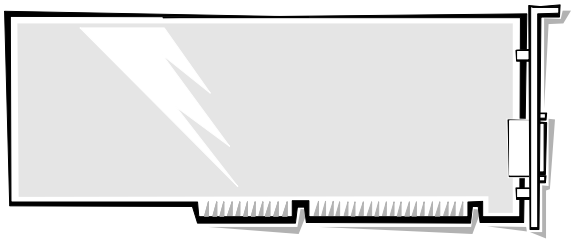
Expansion Cards

The computer's six expansion-card slots can accommodate a mix of 32-bit PCI cards and 8- and 16-bit ISA cards. Figure 8-2 shows examples of the different types of expansion cards.

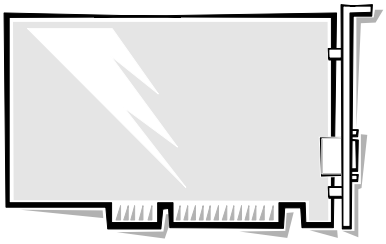
The system board contains six PCI expansion-card connectors and two ISA expansion-card connectors (see Figure 8-3).



8-bit ISA expansion card



16-bit ISA expansion card



32-bit PCI expansion card

Figure 8-2. Expansion Cards

Two expansion slots are shared by one PCI expansion-card connector and one ISA expansion-card connector, so a maximum of six expansion cards can be installed. Connectors PCI1 through PCI6 support 32-bit PCI cards (see Figure 8-3). Connectors ISA5 and ISA6 support 8- and 16-bit ISA cards.

Choosing an Expansion Slot

Follow these guidelines when adding an expansion card:

- PCI video expansion cards should be installed in one of the four primary PCI slots (PCI1 through PCI4).
- You can install full-length expansion cards in PCI slots PCI3 through PCI6 and ISA slots ISA5 and ISA6. PCI slots PCI1 and PCI2 support half-length expansion cards.

- If you are installing one or more SCSI host adapter cards, the boot order is influenced by the particular expansion slot in which the card is installed. In descending order of precedence, the system boot order is as follows: CD-ROM, diskette, PCI1, PCI2, PCI3, PCI4, PCI5, PCI6, and built-in SCSI host adapter (internal drives).

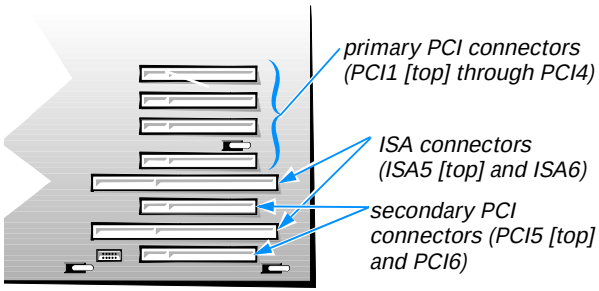


Figure 8-3. Expansion-Card Connectors

Installing an Expansion Card

Follow this general installation procedure:

1. **If you are installing an ISA expansion card, start the Resource Configuration Utility, and add the new expansion card to the configuration information.**

CAUTION: You *must* use the Resource Configuration Utility when you add an ISA expansion card to your computer. Failure to do so may cause resource conflicts between PCI devices (such as PCI expansion cards, the built-in video controller, or the built-in small computer system interface [SCSI] host adapter).

See Chapter 5, "Using the Resource Configuration Utility," in the *Dell PowerEdge 2300 Systems User's Guide* for instructions.

NOTE: If you are installing a PCI expansion card, your system automatically performs any required PCI configuration tasks during the boot routine.

2. **Prepare the expansion card for installation, and remove the right-side computer cover.**

See "Removing the Computer Covers" in Chapter 7.

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

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

3. **Select the expansion slot that you will install the new expansion card in.**

4. **To release the expansion slot filler bracket, press the release tab on the plastic expansion card latch.**

   Open the expansion card latch and remove the filler bracket.

5. **Insert the card-edge connector firmly into the expansion-card connector on the chassis.**

6. **When the card is firmly seated in the connector and the card-mounting bracket is aligned with the brackets on either side of it, close the expansion card latch.**

7. **Connect any cables that should be attached to the card.**

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

8. **Replace the right-side computer cover, and then reconnect the computer and peripherals to their AC power sources and turn them on.**

9. **Run the Resource Configuration Utility and add the new expansion card to the configuration.**

   See Chapter 5, "Using the Resource Configuration Utility," in the *Dell PowerEdge 2300 Systems User's Guide* for instructions.

NOTE: If you installed a PCI expansion card, the system automatically performs any required PCI configuration tasks during the boot routine.

Removing an Expansion Card

Follow this procedure to remove an expansion card:

1. **If you are relocating or removing an ISA expansion card permanently, run the Resource Configuration Utility and delete the expansion card from the configuration.**

   See Chapter 5, "Using the Resource Configuration Utility," in the *Dell PowerEdge 2300 Systems User's Guide* for instructions.

2. **Remove the right-side computer cover.**

   See "Removing the Computer Covers" in Chapter 7.

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

3. **Disconnect any cables connected to the card.**

4. **Press the release tab on the plastic expansion-card latch, and open the latch.**

5. **Grasp the card by its top corners and ease it out of its connector.**

6. **If you are removing the card permanently, install a metal filler bracket over the empty card-slot opening.**

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

7. **Replace the right-side computer cover, and then reconnect the computer and peripherals to their AC power sources and turn them on.**

8. **If you are relocating or removing an ISA expansion card, run the Resource Configuration Utility, and delete the expansion card from the configuration information.**

   See Chapter 5, "Using the Resource Configuration Utility," in the *Dell PowerEdge 2300 Systems User's Guide* for instructions.

NOTE: If you removed a PCI expansion card, the system automatically performs any required re-configuration tasks during the boot routine.

Adding Memory

The four dual in-line memory module (DIMM) sockets on the system board can accommodate 64 megabytes (MB) to 1 gigabyte (GB) of dynamic random-access memory (DRAM) (when 256-MB DIMMs are available). Dell PowerEdge 2300 systems use 72-bit DIMMs in these 168-pin sockets. The DIMM sockets are located near the back edge of the system board (see Figure 8-1).

Memory Upgrade Kits

The system is upgradable to 1 GB by installing combinations of 64- and 128-MB unbuffered DIMMs or 256-MB registered (when available) DIMMs. Memory upgrade kits can be purchased from Dell as needed.

NOTE: The DIMMs must be rated to run at 100 megahertz (MHz) or faster.

DIMM Installation Guidelines

Starting with the socket nearest to the system board's back edge, the DIMM sockets are labeled "DIMM_A" through "DIMM_D" (see Figure 8-4). When installing DIMMs, follow these guidelines:

- Install a DIMM in socket DIMM_A before socket DIMM_B, socket DIMM_B before socket DIMM_C, and so on.
- If you install different sizes of DIMMs, install them in order of descending capacity, beginning with the highest-capacity DIMM in socket DIMM_A.

- Unbuffered and registered DIMMs cannot be mixed. If you install 256-MB registered DIMMs, you must remove any 64- or 128-MB unbuffered DIMMs from the computer.
- DIMMs need not be installed in pairs.

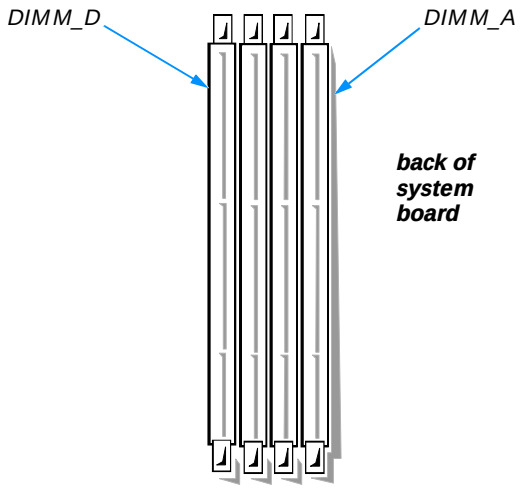


Figure 8-4. DIMM Sockets

Table 8-1 illustrates several sample memory configurations based on these guidelines.

Table 8-1. Sample DIMM Configurations

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

Performing a Memory Upgrade

Use the following procedure to perform a memory upgrade to the system board:

1. **Remove the right-side computer cover.**

   See "Removing the Computer Covers" in Chapter 7.

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

2. **Locate the DIMM sockets in which you will install or replace DIMMs.**

   Figure 8-1 shows the relative location of the DIMM sockets on the system board. Figure 8-4 shows the labeling of the DIMMs sockets.

3. **Install or replace the DIMMs as necessary to reach the desired memory total.**

   Follow the instructions in "Installing DIMMs" or "Removing DIMMs" found later in this section, as appropriate.

4. **Replace the right-side computer cover, and then reconnect the computer and peripherals to their AC power sources and turn them on.**

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

NOTE: If the memory total is incorrect, turn off and disconnect the computer and peripherals from their AC power sources, remove the right-side computer cover, and check all the installed DIMMs to make sure they are seated properly in their sockets. Then repeat step 4.

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

```
Press <F1> to continue; <F2> to enter System Setup,
<CTRL><ALT><F10> to enter Utility Mode.
```

5. **Press <F2> to enter the System Setup program, and check the System Memory settings in the system data box on the System Setup screens.**

   The system should have already changed the value in the System Memory setting to reflect the newly installed memory. Verify the new total by adding the Base Memory and Extended Memory values.

   If the total is incorrect, one or more of the DIMMs may not be installed properly. Repeat this procedure again, checking to make sure the DIMMs are firmly seated in their sockets.

6. **Run the Resource Configuration Utility. Then save the configuration and exit the utility.**

   Running the Resource Configuration Utility and saving the configuration is required for the system to recognize the newly installed DIMM(s). See Chapter 5, "Using the Resource Configuration Utility," in the *Dell PowerEdge 2300 Systems User's Guide* for instructions on running the utility and saving the configuration.

7. **Run the RAM Test Group in the Dell Diagnostics.**

   See Chapter 5, "Running the Dell Diagnostics," for information.

Installing DIMMs

Install DIMMs starting with socket DIMM_A, located nearest to the system board's back edge, and working towards DIMM_D. If a DIMM is already installed in the socket, you must remove it. Follow the instructions in the next subsection, "Removing DIMMs," if appropriate.

To install a DIMM, follow these steps:

1. **Press the ejectors on the DIMM socket down and outward as shown in Figure 8-5 to allow the DIMM to be inserted in the socket.**

2. **Align the DIMM's edge connector with the slot in the center of the DIMM socket, and insert the DIMM in the socket.**

   The card-edge connector on the DIMM is keyed using two notches so that the DIMM can be installed in the socket in only one way (see Figure 8-5).

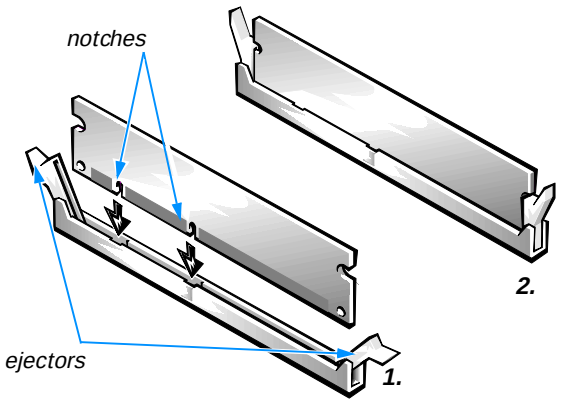


Figure 8-5. Installing a DIMM

3. **Press down on the two outer edges of the DIMM with your thumbs while pulling up on the ejectors with your index fingers to lock the DIMM into the socket.**

   When the DIMM is properly seated in the socket, the ejectors on the DIMM socket should align with the ejectors on the other sockets with DIMMs installed.

4. **Continue with step 4 of "Performing a Memory Upgrade" found earlier in this section.**

Removing DIMMs

To remove a DIMM, press down and outward on the ejectors on each end of the socket until the DIMM pops out of the socket (see Figure 8-6).

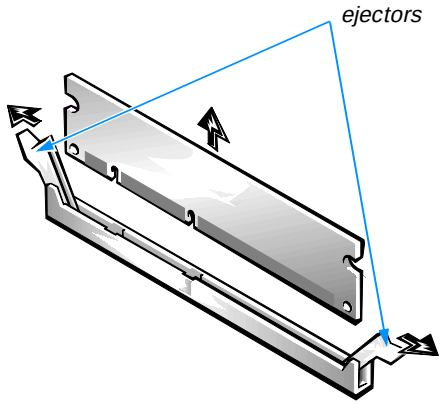


Figure 8-6. Removing a DIMM

Upgrading the Microprocessor or Installing a Secondary Microprocessor

The microprocessor is contained within a single-edge contact (SEC) cartridge and heat sink assembly. The system board has two guide bracket assemblies, which hold the SEC cartridge and heat sink assemblies. If your system has only one microprocessor, the secondary guide bracket assembly connector *must* contain a terminator card. If you are adding a microprocessor, the secondary microprocessor must have the same operating frequency as the first. For example, if the system has a 350-MHz primary microprocessor, your secondary microprocessor must also be a 350-MHz microprocessor.

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

Removing a Terminator Card

Use the following procedure, which is illustrated in Figure 8-7, to remove a terminator card from a guide bracket assembly:

1. **Unsnap the retaining clip from the guide bracket assembly and remove the clip.**

   Using the thumb and forefinger of each hand, pinch the vertical tabs at each end of the retaining clip and lift the clip straight up.

2. **Slide the terminator card up and out of the guide bracket assembly.**

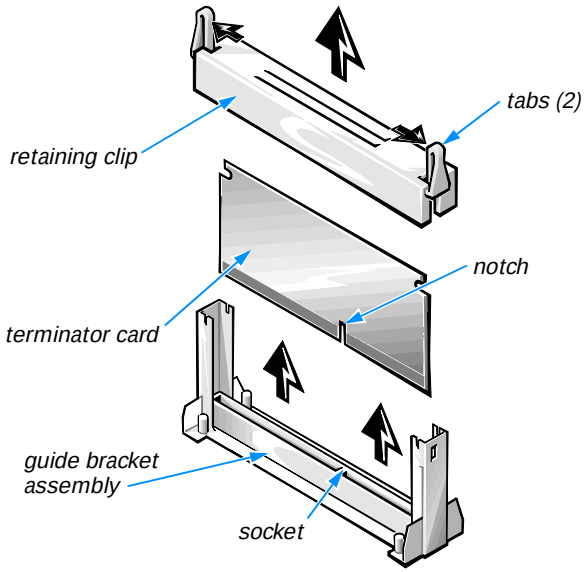


Figure 8-7. Removing a Terminator Card

Installing a Terminator Card

Use the following procedure to install a terminator card in a guide bracket assembly:

1. **Align the notch on the terminator card with the socket on the guide bracket assembly (see Figure 8-7), and guide the card into the empty guide bracket assembly.**

2. **Snap the retaining clip onto the guide bracket assembly on top of the terminator card.**

Removing the SEC Cartridge and Heat Sink Assembly

Use the following procedure to remove the SEC cartridge and heat sink assembly.

WARNINGS: The SEC cartridge and heat sink assembly can get extremely hot during system operation. Be sure the assembly has had sufficient time to cool before you touch it.

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

1. **Press the SEC cartridge release latches toward the cartridge until they snap into position, as shown in Figure 8-8.**

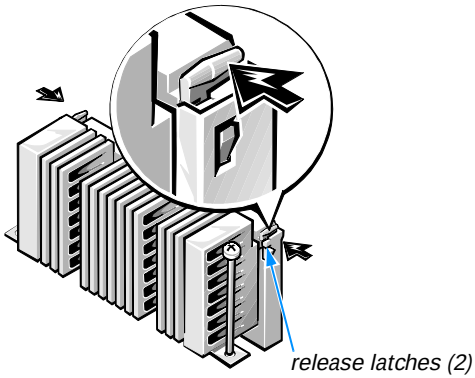


Figure 8-8. SEC Cartridge Release Latches

2. **Remove the two retention pins from the SEC cartridge and heat sink assembly (see Figure 8-9).**

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

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

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

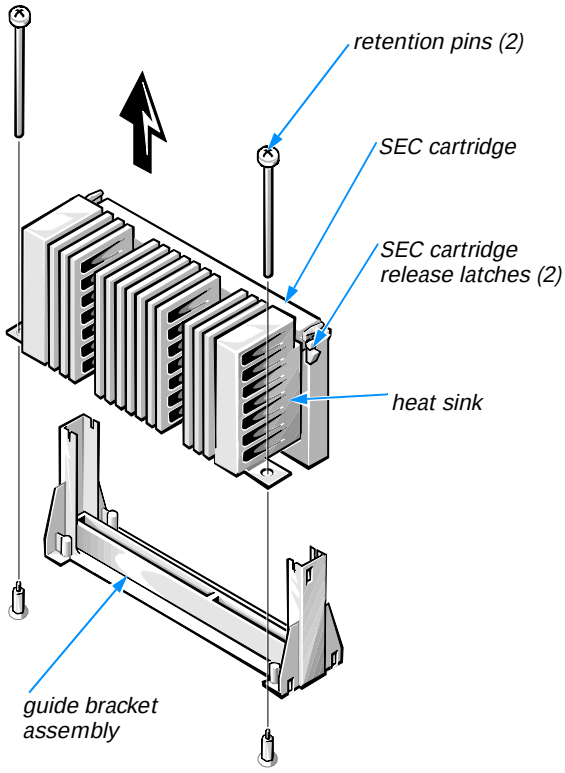


Figure 8-9. Removing an SEC Cartridge and Heat Sink

Replacing the SEC Cartridge and Heat Sink Assembly

Use the following procedure to install the replacement SEC cartridge and heat sink assembly:

1. **Remove the terminator card or old SEC cartridge from the guide bracket assembly.**

   Follow the instructions in "Removing a Terminator Card" or "Removing the SEC Cartridge and Heat Sink Assembly" found earlier in this chapter, as appropriate.

2. **With the heat sink facing toward the other microprocessor socket, slide the SEC cartridge into the guide bracket assembly, and firmly seat the assembly (see Figure 8-10).**

3. **Reinstall the two retention pins to secure the SEC cartridge and heat sink assembly.**

4. **Verify that the cartridge release latches on the guide bracket assembly are pulled out.**

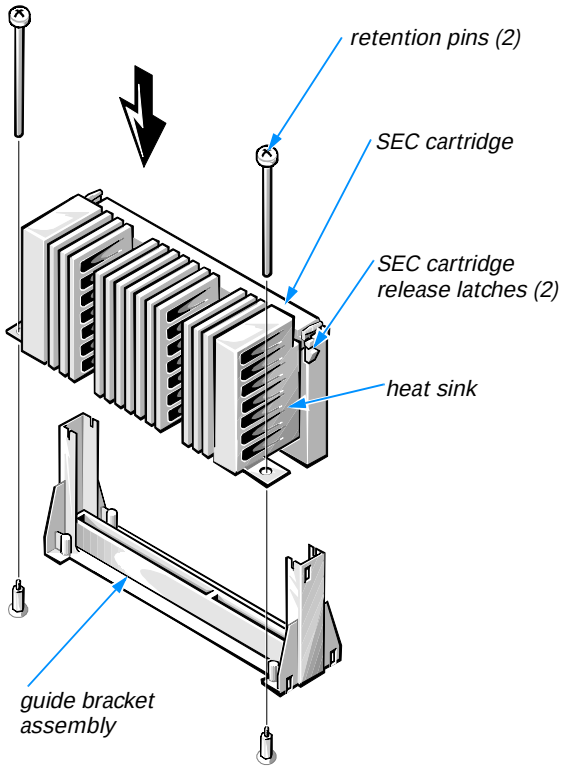


Figure 8-10. Installing an SEC Cartridge and Heat Sink Assembly

Replacing the Battery

The system battery maintains system configuration, date, and time information in a special section of memory when the system is turned off.

The operating life of the battery ranges from two to five years, depending on how the system is used (for example, if the system is on most of the time, the battery gets little use and thus lasts longer). The battery may need replacing if an incorrect time or date is displayed during the boot routine along with a message such as the following:

```
Time-of-day not set – please run SETUP program
Strike the F1 key to continue, F2 to run the setup utility
```

or

```
System CMOS checksum bad – Run SETUP
Strike the F1 key to continue, F2 to run the setup utility
```

or

```
Invalid configuration information – please run SETUP program
Strike the F1 key to continue, F2 to run the setup utility
```

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

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

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

The system can be operated without a battery; however, the system configuration information maintained by the battery in NVRAM is erased each time the computer is turned off. Therefore, the system configuration information must be reentered and the options reset *each time the system boots* until the battery is replaced.

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

WARNING

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

1. **If possible, enter the System Setup program and make a printed copy of the System Setup screens.**

   See Chapter 4, "Using the System Setup Program," in the *Dell PowerEdge 2300 Systems User's Guide* for instructions.

2. **Remove the right-side computer cover.**

   See "Removing the Computer Covers" in Chapter 7.

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

3. **Remove the battery.**

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

4. **Install the new battery with the "+" side facing up (see Figure 8-11).**

5. **Replace the right-side computer cover, reconnect the computer and peripherals to their AC power sources, and turn on the system.**

6. **Enter the System Setup program to confirm that the battery is operating properly.**

   Enter the correct time and date through the System Setup program's Time and Date settings. Also reenter any system configuration information that is no longer displayed on the System Setup screens, and then exit the System Setup program.

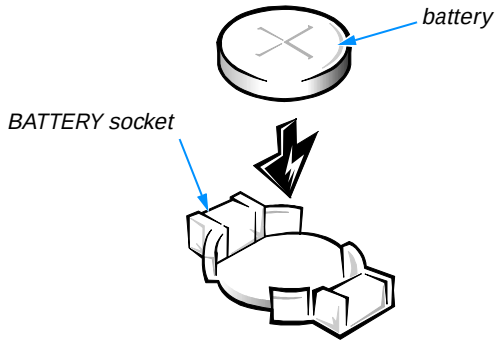


Figure 8-11. Installing the Battery

7. **Turn the computer and peripherals off, and leave them off for at least an hour.**

8. **After an hour, turn on the system and enter the System Setup program. If the time and date are still incorrect, see Chapter 11, "Getting Help," for instructions on obtaining technical assistance.**

CHAPTER 9
Installing Drives in the External Bays

The external drive bays at the front of a Dell PowerEdge 2300 system hold up to three user-accessible, half-height 5.25-inch devices (typically CD-ROM or tape drives). A small computer system interface (SCSI) CD-ROM drive is standard in the first external drive bay, while two additional devices of your choice can be installed in the next two external drive bays. External SCSI devices are connected to the Ultra/Narrow SCSI controller on the system board. A fourth drive bay accommodates a standard 3.5-inch diskette drive, which is controlled by the diskette drive controller on the system board. See Figure 9-1 for a general view of the various drives, connector cables, and power cables in the external drive bays.

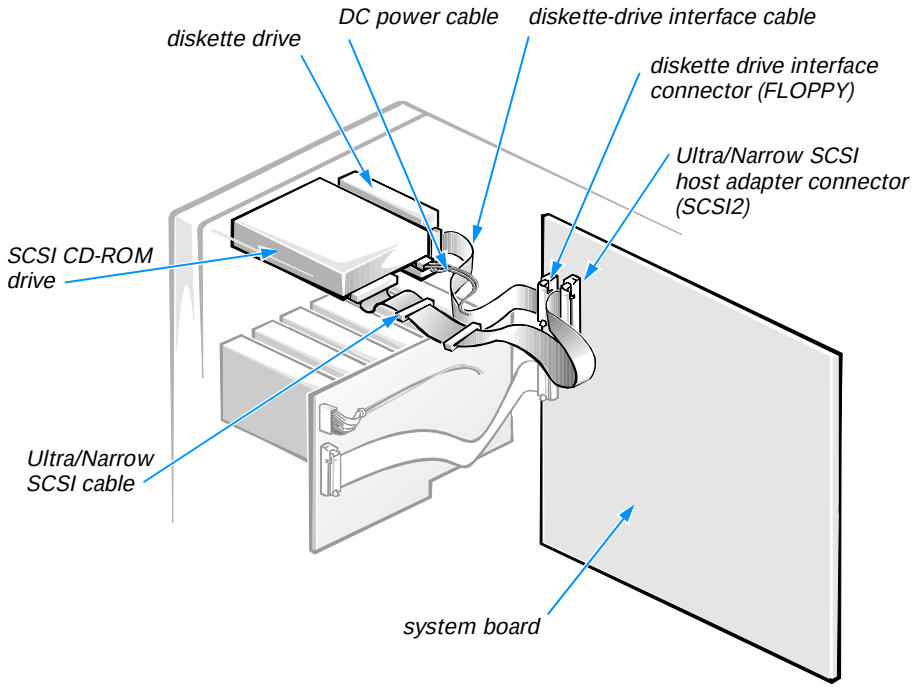


Figure 9-1. External Drive Bay Hardware

Before You Begin

This chapter describes how to install the following options:

- Drives that use the computer's on-board diskette drive controller
- Drives that use the computer's on-board Ultra/Narrow SCSI controller
- Tape drives that use a controller card

NOTE: If you are installing a SCSI hard-disk drive, see Chapter 10, "Installing Hard-Disk Drives."

To remove or install drives in the external bays, you must remove the computer covers and front bezel according to the instructions in "Removing the Computer Covers" in Chapter 7.

WARNING: Before you perform the procedures in this chapter, you must turn off the computer and disconnect it from its AC power source. For more information, refer to "Safety First—For You and Your Computer" in Chapter 7.

To protect the inside of the computer from foreign particles, a plastic front-panel insert covers each empty external drive bay. Before you install a drive in an empty bay, you must first remove the front-panel insert.

Whenever you remove a drive, be sure to replace the front-panel insert over the empty bay.

Removing and Replacing Front-Panel Inserts

To remove the front-panel insert for a drive bay you intend to use, first remove the front bezel as instructed in "Removing the Computer Covers" in Chapter 7. Then, facing the inside of the front bezel, press against the center of the insert with your thumbs until the insert bows sufficiently to loosen the tabs on the sides of the insert. Pull the insert out of the bezel.

To replace a front-panel insert, position the insert over the bay opening from the inside of the front bezel and carefully press the insert into place. A tab on each side of the insert snaps into a corresponding latch on the inside of the front bezel.

Connecting the Drive

This section describes the power input connectors and interface connectors on the backs of most drives.

Figure 9-2 shows the 4-pin *power input connector*, where you connect a DC power cable from the system power supply. The power connectors are *keyed* to avoid incorrect insertion; do not force two connectors together if they do not fit properly.

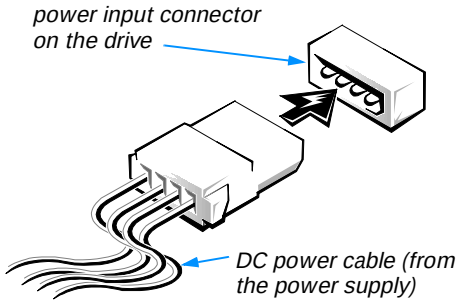


Figure 9-2. Power Connector

A ribbon cable functions as the interface cable for most types of drives. The connector on the cable may be a *header connector* (see Figure 9-3) or a *latching connector* (Figure 9-4).

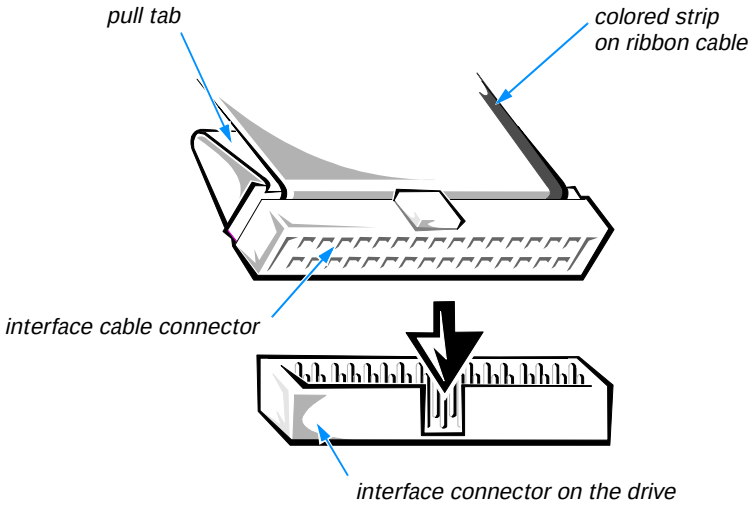


Figure 9-3. Header Interface Connector

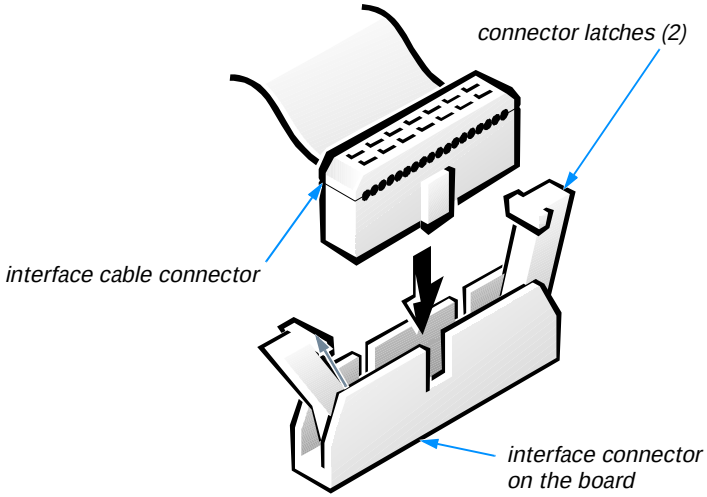


Figure 9-4. Latching Interface Connector

Most interface connectors are keyed for correct insertion; that is, a notch or a raised tab on one connector matches a tab or a notch on the other connector. Keying ensures that the pin-1 wire in the cable (indicated by the colored strip along one edge of the cable) goes to the pin-1 ends of the connectors on both ends.

CAUTION: When connecting an interface cable, do not reverse the interface cable (do not place the colored strip away from pin 1 of the connector). Reversing the cable prevents the drive from operating and could damage the controller, the drive, or both.

DC Power Cables

Each drive in the external drive bays must connect to a 4-wire DC power cable from the system power supply. The connectors on these cables are labeled "P3," "P4," "P5," and "P6." Connectors P3, P4, and P5 are used for 5.25-inch devices, whereas connector P6 is used for the standard 3.5-inch diskette drive. Before connecting a drive to a power cable, refer to Figure 9-5 to identify the correct cable connector to use for a particular drive.

5.25-inch drive connector

3.5-inch drive connector

Figure 9-5. DC Power Cable Connectors

NOTE: Unused power cables may be held in a retention clip just underneath the computer's top cover. The power cable connectors may be covered with protective plastic caps.

Installing SCSI Devices in the External Bays

SCSI devices in the external drive bays are controlled by the Ultra/Narrow SCSI controller on the system board.

SCSI Configuration Information

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

SCSI ID Numbers

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

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

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

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

Device Termination

SCSI logic requires that the two devices at opposite ends of the SCSI chain be terminated and that all devices in between be unterminated.

Before installing SCSI devices in the computer, you must configure the termination on the SCSI device(s) to conform to the following guidelines:

- A single SCSI device (such as the standard CD-ROM drive) must be terminated.
- If two or more SCSI devices are installed, connect the devices as follows:
  - — Attach one of the devices to the end connector on the SCSI cable, and leave the termination enabled on that device.
  - — Connect the other end of the SCSI cable to the computer's on-board Ultra/Narrow SCSI host adapter or to an optional SCSI host adapter card.
  - — Disable the termination on all other devices you attach to the cable.

The standard SCSI CD-ROM drive is configured as the last device on the SCSI cable. Therefore, any additional devices attached to the cable should have their termination disabled.

See the documentation provided with the SCSI device for information on disabling the device's termination.

NOTE: Some systems may have an active terminator installed at the very end of the SCSI cable. If this is the case with your system, all *of the devices attached to the SCSI cable should have their termination disabled.*

SCSI Cable

CAUTION: Dell recommends that you use only SCSI cables purchased from Dell. SCSI cables purchased elsewhere are not guaranteed to work reliably with Dell PowerEdge 2300 systems.

The 50-pin Ultra/Narrow SCSI cable has four connectors:

- The connector at the end of the cable farthest away from the other three connectors attaches to the SCSI host adapter connector labeled "SCSI2" on the system board.
- The other connectors on the cable attach to SCSI devices in the three external drive bays.

Installing a SCSI Device

To install a SCSI device that uses the on-board Ultra/Narrow SCSI controller, follow these steps:

1. **Prepare the drive for installation.**

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

   Ground yourself by touching an unpainted metal surface on the back of the computer, unpack the drive, and compare the jumper and switch settings with those in the drive documentation. (See "SCSI Configuration Information" found earlier in this chapter for information on setting the drive's SCSI ID number and enabling termination [if required].) Change any settings necessary for this system's configuration.

   If the drive does not already have drive rails attached, attach a drive rail to each side of the drive. Orient the drive rails as shown in Figure 9-6. Secure each drive rail to the drive with a screw in each of the *lower* slotted screw holes on the drive rail.

2. **Remove the front bezel and right-side computer cover.**

   See "Removing the Computer Covers" in Chapter 7.

3. **Slide the new drive into its bay until it snaps securely into place.**

   If necessary, you can adjust drive alignment by repositioning one or both rails.

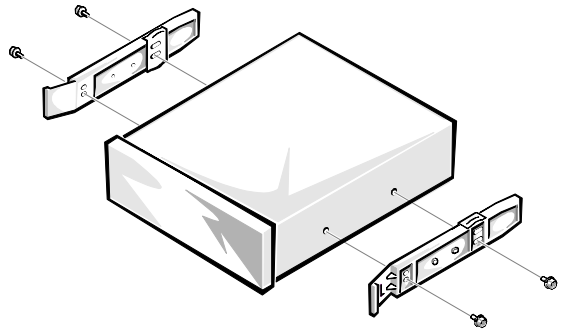


Figure 9-6. Attaching Drive Rails

4. **Connect a DC power cable and one of the connectors on the Ultra/Narrow SCSI cable to the back of the drive (see Figure 9-1).**

   If other installed drives are in the way, temporarily move them out of the way. Press in on the plastic drive rails at the front of the bay to disengage a drive, and then slide the drive slightly toward the front of the chassis.

   Refer to "DC Power Cables," found earlier in this chapter, to determine the correct DC power cable connector to use for the drive. Plug the DC power cable connector into the 4-pin power input connector on the back of the drive.

   Select the connector on the Ultra/Narrow SCSI cable that most easily reaches the new SCSI device, and press the interface cable connector firmly into the drive's interface connector.

   If you moved other drives at the beginning of this step, snap them back into place.

5. **Check all cable connections that may have been loosened during this procedure. Arrange cables so that they will not catch on the computer covers or block the airflow of the fans or cooling vents.**

6. **If a front-panel insert on the front bezel blocks the bay in which you installed the drive, remove the insert.**

   See "Removing and Replacing Front-Panel Inserts" found earlier in this chapter.

7. **Replace the front bezel and right-side computer cover.**

8. **Reconnect the computer and peripherals to their AC power sources, and turn them on.**

9. **Test the SCSI devices.**

   To test a SCSI tape drive, refer to the documentation for the tape drive software to perform a tape drive backup and verification test.

Installing a Tape Drive That Uses a Controller Card

Tape drives that require their own separate controller cards are shipped with the controller card and an interface cable. Install the drive in an external drive bay by performing the following steps:

1. **Configure the controller card if necessary.**

   Refer to the documentation accompanying the tape drive and the card. If the card incorporates jumpers or switches that must be set to work with the system, verify or change the settings as necessary.

2. **Remove the front bezel and right-side computer cover.**

   See "Removing the Computer Covers" in Chapter 7.

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

3. **Slide the new drive into its bay until it snaps securely into place.**

   If necessary, you can adjust drive alignment by repositioning one or both rails.

4. **Install the controller card in an expansion slot.**

   See "Installing an Expansion Card" in Chapter 8.

5. **Connect a DC power cable to the tape drive.**

   If other installed drives are in the way, disengage them by pressing in on the plastic drive rails at the front of the bay, and slide them slightly toward the front of the chassis.

   Refer to "DC Power Cables" found earlier in this chapter to determine which DC power cable connector to use. Plug the DC power cable connector into the 4-pin power input connector on the back of the drive.

6. **Attach the interface cable that came with the drive kit to the interface connector on the back of the drive.**

7. **Connect the interface cable to the controller connector on the controller card.**

   Refer to the controller card's documentation to identify the controller connector on the card.

8. **If you moved other drives in step 5, snap them back into place.**

9. **Check all cable connections that may have been loosened during this procedure. Arrange cables so that they will not catch on the computer covers or block the airflow of the fans or cooling vents.**

10. **If a front-panel insert on the front bezel blocks the bay in which you installed the drive, remove the insert.**

    See "Removing and Replacing Front-Panel Inserts" found earlier in this chapter.

11. **Replace the front bezel and right-side computer cover.**

12. **Reconnect the computer and peripherals to their AC power sources, and turn them on.**

13. **Perform a tape backup and verification test with the drive as instructed in the tape-drive software documentation that came with the drive.**

Connecting an External Tape Drive

Complete the following procedure to connect a stand-alone tape drive that connects to the computer using a controller card and shielded interface/DC power cable:

1. **Prepare the tape drive and controller card for installation.**

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

Ground yourself by touching an unpainted metal surface on the back of the computer. Unpack the tape drive and controller card, and configure them for the system according to the instructions in the documentation that came with the tape drive.

2. **Remove the front bezel and right-side computer cover.**

See "Removing the Computer Covers" in Chapter 7.

3. **Install the controller card in an expansion slot.**

See "Installing an Expansion Card" in Chapter 8.

4. **Replace the right-side computer cover and front bezel.**

5. **Connect the tape drive's interface/DC power cable to the external connector on the controller card; secure the connection by tightening the screws on the connector.**

6. **Reconnect the computer and peripherals to their power sources, and turn them on.**

7. **Perform a tape backup and verification test with the drive as instructed in the software documentation that came with the drive.**

CHAPTER 10
Installing Hard-Disk Drives

This chapter describes how to install and configure small computer system interface (SCSI) hard-disk drives in the computer's internal hard-disk drive bays. Instructions are also included for upgrading the system by installing a hot-pluggable SCSI backplane board or a Dell PowerEdge Expandable RAID Controller host adapter card

WARNING: Before installing a new backplane board or host adapter card, you must turn off the computer and disconnect it from its AC power source. For more information, refer to "Safety First—For You and Your Computer" in Chapter 7.

The hard-disk drive bays provide space for up to four 1.6-inch or six 1-inch hard-disk drives. (See Chapter 9, "Installing Drives in the External Bays," for information on installing SCSI CD-ROM drives and SCSI tape drives in the external drive bays.) Three SCSI backplane board options are available, as shown in Table 10-1.

Figure 10-1 illustrates the hard-disk drive bays, the 1 x 6 hot-pluggable SCSI backplane board, and the Ultra2/low-voltage differential (LVD) SCSI cable. The Ultra2/LVD SCSI cable has two connectors:

- The connector at one end attaches to the Ultra2/LVD SCSI host adapter connector labeled "SCSI1" on the system board, or to an optional SCSI host adapter card such as the Dell PowerEdge Expandable RAID Controller.
- The connector at the other end of the cable attaches to the connector labeled "SCSIA" on the SCSI backplane board.

Table 10-1. SCSI Backplane Board Characteristics

Backplane Type	Hot-Pluggable Drive Support	Duplexing Support	Hard-Disk Drive Size	Drive Status Indicator Support
2 x 2 backplane board	No	Yes	1.6-inch and 1-inch drives	No
2 x 3 backplane board	No	Yes	1-inch drives	No
1 x 6 backplane board	Yes*	No	1-inch drives	Yes

**Backplane board must be controlled by a Dell PowerEdge Expandable RAID Controller*

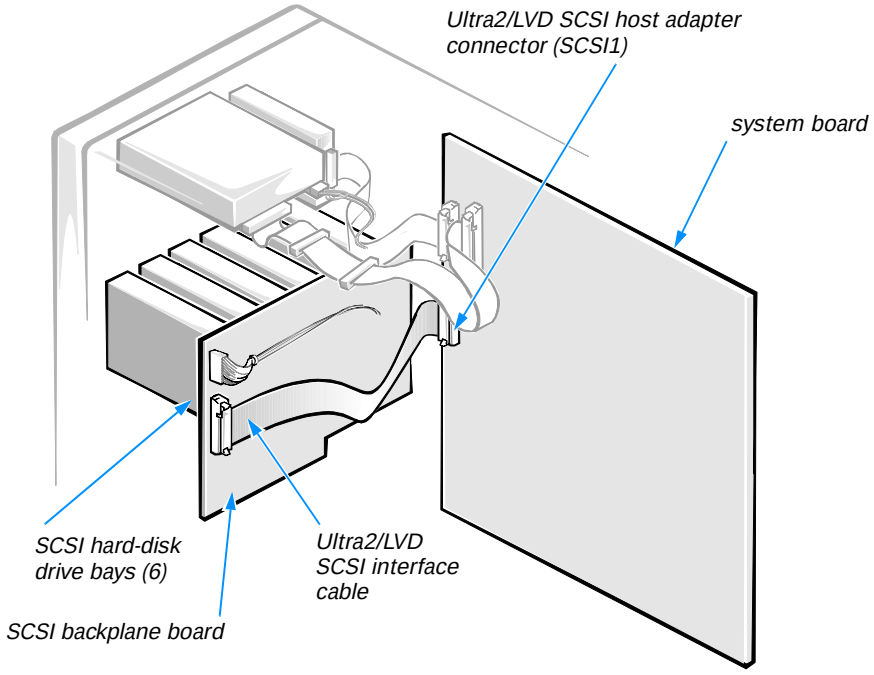


Figure 10-1. Hard-Disk Drive Hardware (1 x 6 Hot-Pluggable SCSI Backplane Board Shown)

Preparing SCSI Hard-Disk Drives for Installation

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

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

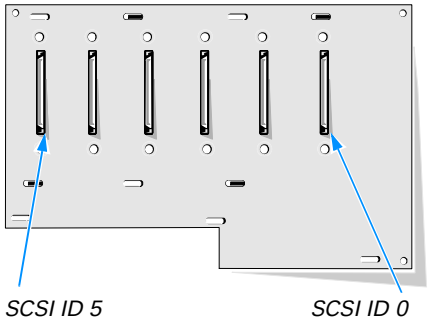
Dell recommends that you use only drives that Dell has tested and approved for use with the SCSI backplane board.

SCSI Hard-Disk Drive Configuration

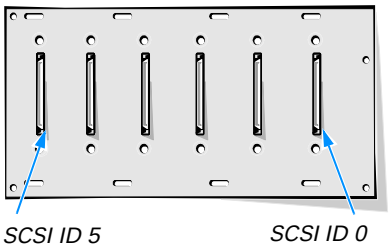
The SCSI drive must be configured as follows:

- Disable termination on the drive. The SCSI backplane board provides termination for the SCSI bus.

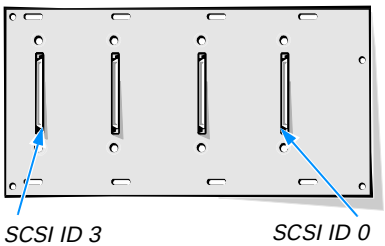
- Set the SCSI ID on all drives to 0. All SCSI ID numbers for the drives are set by the SCSI backplane board, as shown in Figure 10-2.
- Configure the drive so that the drive motor waits for a Start Unit command from the SCSI host adapter before spinning.



1 x 6 hot-pluggable SCSI backplane board



2 x 3 non-hot-pluggable SCSI backplane board



2 x 2 non-hot-pluggable SCSI backplane board

Figure 10-2. SCSI Backplane Boards

Partitioning and Formatting SCSI Hard-Disk Drives

You may need to use different programs than those provided with the operating system to partition and format SCSI hard-disk drives. See Chapter 3, "Installing and Configuring SCSI Drivers," in the *Dell PowerEdge 2300 Systems User's Guide* for information and instructions.

Formatting High-Capacity SCSI Hard-Disk Drives

When formatting a high-capacity SCSI hard-disk drive, be sure to allow enough time for the formatting to complete. Long format times for these drives are normal. A 9-gigabyte (GB) hard-disk drive, for example, can take up to 2.5 hours to format.

CAUTION: Do not turn off or reboot your system while the drive is being formatted. Turning off or rebooting your system while the drive is being formatted can cause a drive failure.

Installing and Removing SCSI Hard-Disk Drives

The following subsections describe how to install and remove SCSI hard-disk drives in the computer's hard-disk drive bays.

Hot-Pluggable SCSI Hard-Disk Drives

Dell PowerEdge 2300 systems with a Dell PowerEdge Expandable RAID Controller host adapter card *and* a 1 x 6 hot-pluggable SCSI backplane board installed support hot-pluggable drive installation and removal. Before attempting to remove or install a drive while the system is running, see the documentation for the Dell PowerEdge Expandable RAID Controller host adapter card to ensure that the SCSI host adapter is configured correctly to support hot-pluggable drive removal and insertion.

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

Indicator Codes for Hot-Pluggable SCSI Hard-Disk Drives

If a 1 x 6 hot-pluggable SCSI backplane board is installed in the Dell PowerEdge 2300 system, three light-emitting diode (LED) indicators adjacent to each of the six SCSI hard-disk drive bays provide information on the status of the SCSI hard-disk drives (see Figure 10-3).

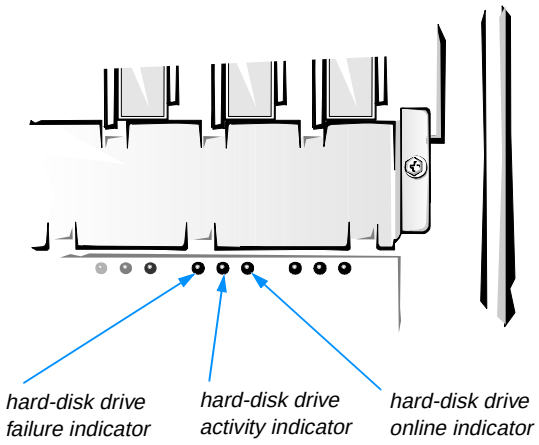


Figure 10-3. Hard-Disk Drive Indicators

Table 10-2 lists the drive indicator patterns established by the SCSI backplane board firmware. Different patterns are displayed as drive events occur in the system. For example, in the event of a hard-disk drive failure, the "drive failed" pattern appears. After the drive is selected for removal, the "drive being prepared for removal" pattern appears, followed by the "drive ready for insertion or removal" pattern. After the replacement drive is installed, the "drive being prepared for operation" pattern appears, followed by the "drive online" pattern.

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

Table 10-2. SCSI Hard-Disk Drive Indicator Patterns

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

Table 10-2. SCSI Hard-Disk Drive Indicator Patterns *(continued)*

Condition	Indicator Pattern
Drive failed	The drive online indicator turns off. The drive failure indicator blinks off briefly each second.
Drive rebuilding	The drive online indicator blinks rapidly.
Drive online	The drive online indicator is on.

Installing a SCSI Hard-Disk Drive

Install a SCSI hard-disk drive in an internal drive bay as follows:

1. **If the computer does not support hot-pluggable hard-disk drives, shut down the system.**
2. **Remove the computer's front bezel.**

   See "Removing the Computer Covers" in Chapter 7 for instructions.
3. **If a non-hot-pluggable SCSI backplane board is installed in the computer, release the locking bar in front of the hard-disk drive carriers.**
4. **With the hard-disk drive facing towards the right side of the computer, align the edge of the carrier with the notch in the hard-disk drive bay key and insert the carrier into the drive bay (see Figure 10-4).**

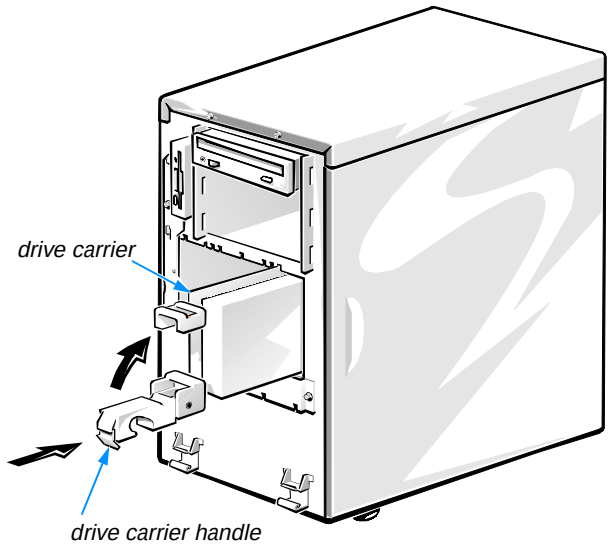


Figure 10-4. Installing a SCSI Hard-Disk Drive Carrier

5. **Close the drive carrier handle to lock the drive in place.**

6. **Close the locking bar (non-hot pluggable backplane board systems only) and replace the front bezel.**

7. **Install any required SCSI device drivers.**

   See Chapter 3, "Installing and Configuring SCSI Drivers," in the *Dell PowerEdge 2300 Systems User's Guide* for information.

8. **If the hard-disk drive is a new drive, run the SCSI Devices Test Group in the Dell Diagnostics.**

   See Chapter 5, "Running the Dell Diagnostics."

Removing a SCSI Hard-Disk Drive

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

1. **If the computer does not support hot-pluggable hard-disk drives, shut down the system.**

2. **Remove the computer's front bezel.**

   See "Removing the Computer Covers" in Chapter 7 for instructions.

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

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

   If the drive has been online, the drive status indicators will flash sequentially as the drive is powered down.

   When all indicators are turned off, the drive is ready for removal.

5. **Open the drive-carrier handle to release the carrier.**

6. **Slide the carrier toward you until it is free of the drive bay.**

7. **Close the locking bar (non-hot-pluggable backplane board systems only) and replace the front bezel.**

Installing a Dell PowerEdge Expandable RAID Controller Host Adapter Card

Use the following procedure to install a Dell PowerEdge Expandable RAID Controller host adapter card.

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

1. **Unpack the host adapter card, and prepare it for installation.**

   Refer to the documentation accompanying the host adapter card.

2. **Remove the right-side computer cover.**

   See "Removing the Computer Covers" in Chapter 7.

3. **Remove the Ultra2/LVD SCSI cable from the computer.**

   Detach one end of the cable from the SCSI host adapter connector labeled "SCSI1" on the system board.

   Detach the other end of the cable from the connector labeled "SCSIA" on the SCSI backplane board.

4. **Install the host adapter card in Peripheral Component Interconnect (PCI) expansion slot PCI3 or PCI4.**

   See "Installing an Expansion Card" in Chapter 8.

   If you are installing one or more SCSI host adapter cards, the boot order is influenced by the particular expansion slot in which the card is installed. In descending order, the system boot order is as follows: CD-ROM, diskette, PCI1, PCI2, PCI3, PCI4, PCI5, PCI6, and on-board SCSI host adapter (internal drives).

5. **Connect the Ultra2/LVD SCSI cable provided in the host adapter card kit to the connector labeled "SCSIA" on the SCSI backplane board (see Figure 10-5).**

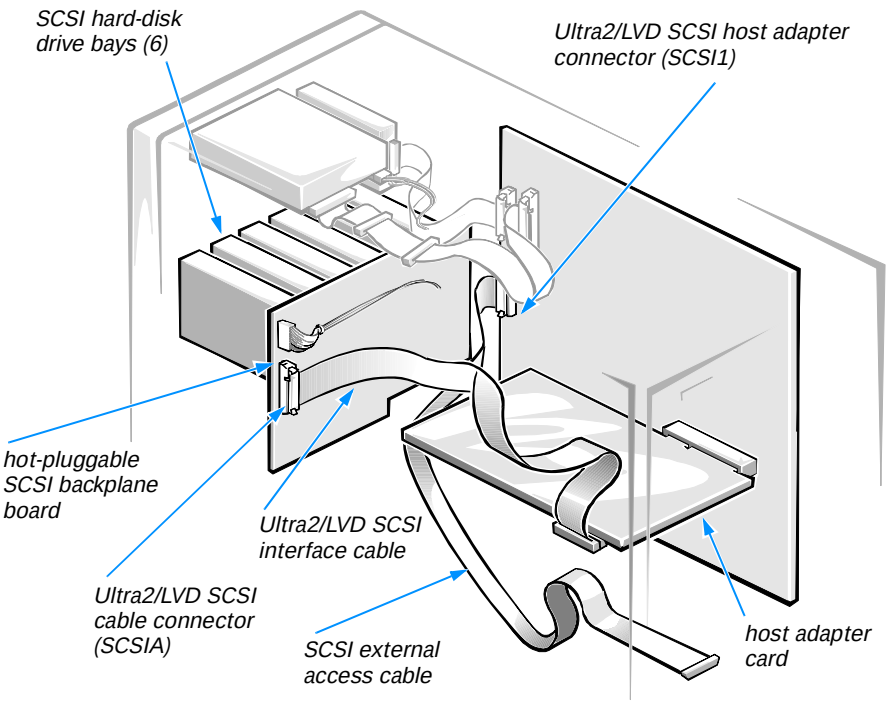


Figure 10-5. Cable Configuration for a Dell PowerEdge Expandable RAID Controller Host Adapter Card

6. **Connect the other end of the SCSI cable to the host adapter card.**

   To identify the correct connector, refer to documentation for the Dell PowerEdge Expandable RAID Controller.

   NOTES: If you will be attaching external SCSI devices using the external SCSI connection slots on the computer's back panel, follow steps 7 through 10.

   If you attach a Dell PowerEdge Scalable Disk System 100 (SDS 100) storage system, connect the SCSI cable to the connector on the back of the host adapter card and the server management bus (SMB) cable to the SMB connector on the computer's back panel. See the documentation supplied with the SDS 100 storage system for more information.

7. **Connect the SCSI external access cable from the host adapter kit to the Ultra2/LVD SCSI host adapter connector (labeled "SCSI1") on the system board.**

   See each device's documentation for information on cabling that device as part of a daisy chain.

8. **Attach the other end of the SCSI external access cable to the computer'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.

9. **Replace the right-side computer cover, and reconnect the computer and peripherals to their AC power sources.**

10. **Connect the external device(s) to AC power.**

    For each external device, plug the socket end of the power cable into the AC power receptacle on the back of the device. Plug the other end of the power cable into an AC power source.

11. **Install any required SCSI device drivers.**

    See Chapter 3, "Installing and Configuring SCSI Drivers," in the *Dell PowerEdge 2300 Systems User's Guide* for information and instructions.

12. **Test the SCSI devices.**

    Test a SCSI hard-disk drive by running the SCSI Devices Test Group in the Dell Diagnostics. See Chapter 5, "Running the Dell Diagnostics," for information.

    To test a SCSI tape drive, also refer to the documentation for the tape drive software to perform a tape drive backup and verification test.

Configuring a 2 x 2 or 2 x 3 SCSI Non-Hot-Pluggable Backplane Board

You can configure a 2 x 2 or 2 x 3 non-hot-pluggable SCSI backplane board as a split backplane board or a single backplane board, depending on how the backplane board is connected. (Figures B-3 and B-4 in Appendix B, "Jumpers and Switches," show the location of the connectors on the SCSI backplane boards.)

Configuring a Non-Hot-Pluggable Backplane Board as a Split Backplane Board

To configure a 2 x 2 or 2 x 3 SCSI backplane board as a split backplane, connect the backplane board to two SCSI channels, such as:

- The computer's on-board Ultra2/LVD host adapter and a SCSI host adapter card
- A SCSI host adapter card with two SCSI channels such as the Dell PowerEdge Expandable RAID Controller card
- Two SCSI host adapter cards

In split-backplane mode, the drives connected to the backplane board are divided as follows:

- On a 2 x 2 backplane board, the SCSI channel attached to connector SCSIA on the SCSI backplane board supports SCSI slots 0 and 1 (see Figure 10-2). The SCSI channel attached to connector SCSIB on the backplane board supports SCSI slots 2 and 3.
- On a 2 x 3 backplane board, the SCSI channel attached to connector SCSIA on the SCSI backplane board supports SCSI slots 0, 1, and 2 (see Figure 10-2). The SCSI channel attached to connector SCSIB on the backplane board supports SCSI slots 3, 4, and 5.

The system automatically configures the backplane board as a split backplane if two SCSI interface cables are connected—no jumper or software changes are required.

Configuring a Non-Hot-Pluggable Backplane Board as a Single Backplane Board

To configure a 2 x 2 or 2 x 3 non-hot-pluggable SCSI backplane board as a single backplane, connect the computer's on-board Ultra2/LVD host adapter to connector SCSIA on the SCSI backplane board.

Installing a 1 x 6 Hot-Pluggable SCSI Backplane Board

The upgrade kit for the 1 x 6 SCSI backplane board includes the following parts:

- 1 x 6 hot-pluggable SCSI backplane board
- SCSI hard-disk drive LED indicator panel
- A hard-disk drive indicator panel data cable
- A control cable that connects the system board and SCSI backplane board

Use the following procedure to install a 1 x 6 hot-pluggable SCSI backplane in your computer.

1. **Unpack the 1 x 6 hot-pluggable SCSI backplane board upgrade kit.**

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

2. **Remove the right-side computer cover.**

   See "Removing the Computer Covers" in Chapter 7.

3. **Remove the retention bar securing the hard-disk drives.**

4. **Remove the hard-disk drives from the system.**

CAUTION: Remove *all* hard-disk drives to avoid damaging the SCSI backplane board when you remove it later in this procedure.

5. **Disconnect the Ultra2/LVD SCSI cables from the connectors labeled "SCSIA" and "SCSIB" on the non-hot-pluggable SCSI backplane board.**

   To avoid damage to the cables, use the "pull loop" to disconnect the cable.

6. **Disconnect the power cable "P2" from the power connector on the non-hot-pluggable SCSI backplane board.**

   To release the connector, press the latch on the side of the connector facing the system board.

7. **Loosen the captive thumbscrew on the non-hot-pluggable SCSI backplane board.**

8. **Slide the non-hot-pluggable SCSI backplane board away from the system board approximately a quarter inch (about 1 cm), and then lift the board off of the L-shaped mounting tabs and away from the chassis.**

9. **Install the hard-disk drive indicator board.**

   While holding the indicator card by its edges, position the board so that the tabs on the computer chassis wall fit through the corresponding slots in the board (see Figure 10-6).

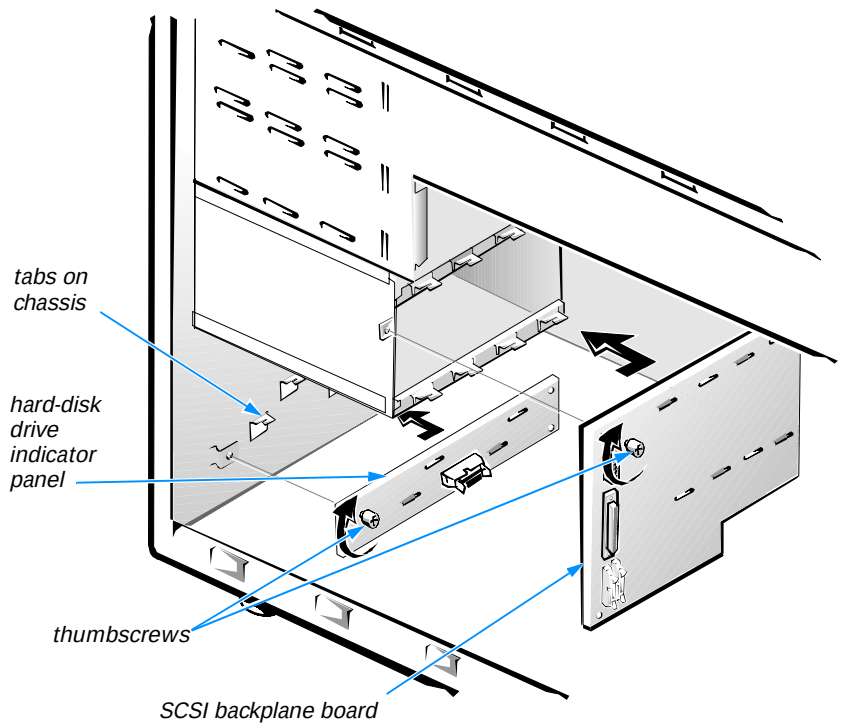


Figure 10-6. Installing the 1 x 6 Hot-Pluggable SCSI Backplane Board and Hard-Disk Drive Indicator Panel

10. **If the SCSI backplane board you removed was a 2 x 2 non-hot-pluggable backplane, you must reorient the hard-disk drive bay key that aligns the drives:**

    a. Remove the hard-disk drive bay key by removing the three screws securing it to the front of the computer chassis.

    b. Turn the key so the six drive positioning slots face towards the drive bays, and reinstall the key using the three screws.

11. **Connect the end of the new Ultra2/LVD cable to the connector labeled "SCSI1" on the system board.**

12. **Install the new hot-pluggable backplane board (see Figure 10-7).**

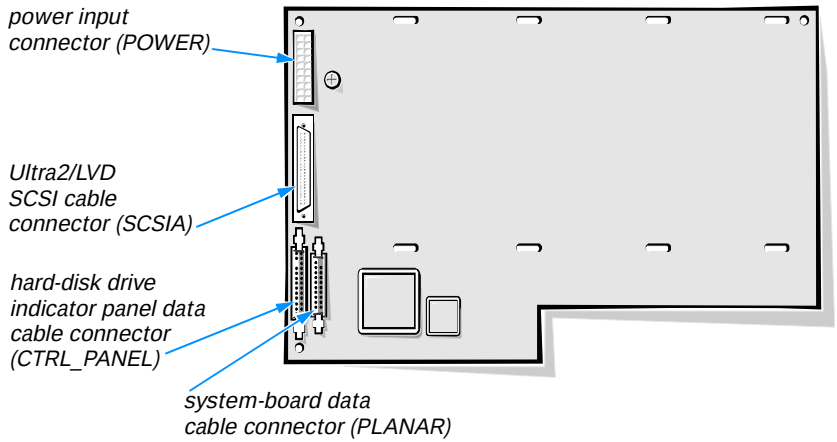


Figure 10-7. Connectors on the 1 x 6 Hot-Pluggable SCSI Backplane Board

    a. While holding the backplane board by its edges, position the board so that the tabs on the computer chassis wall fit through the corresponding slots in the backplane board.

    b. Slide the backplane board slightly towards the system board.

    c. Secure the backplane board by tightening the captive screw.

13. **Connect the wide ribbon cable supplied in the upgrade kit to the connector on the hard-disk drive indicator panel labeled "J1" and the connector labeled "CTRL_PANEL" on the backplane board (see Figure 10-7).**

14. **Connect the narrow data cable supplied in the upgrade kit to the connector on the system board labeled "BACKPLANE" (see Figure 8-1) and the connector on the backplane board labeled "PLANAR."**

15. **Connect the power cable labeled "P2" to the connector on the backplane board labeled "POWER."**

16. **Connect the Ultra2/LVD SCSI cable leading from the system board to the connector labeled "SCSIA" on the backplane board.**

17. **Reinstall the hard-disk drives in the computer.**

NOTE: The 1 x 6 SCSI backplane board only accommodates 1-inch hard-disk drives. Do not attempt to reinstall 1.6-inch hard-disk drives in the computer.

Configuring the Boot Device

If you plan to boot the system from a hard-disk drive, the drive must be attached to the primary (or boot) controller or SCSI host adapter card. The primary controller is automatically determined by the specific system configuration. In descending order of precedence, the system boot order is as follows: CD-ROM, diskette, PCI1, PCI2, PCI3, PCI4, PCI5, PCI6, and on-board SCSI host adapter (internal drives).

CHAPTER 11
Getting Help

This chapter describes the tools Dell provides to help you when you have a problem with your computer. It also tells you when and how to call Dell for technical or customer assistance in the following situations:

- *If you have a technical problem*, read the next section, "Technical Assistance."
- *If you are looking for information about a specific subject or about Dell's services*, read "Help Tools" found later in this chapter.
- *If you have a problem with your order*, read "Problems With Your Order" found later in this chapter.
- *If you need to return an item for warranty repair or credit*, read "Returning Items for Warranty Repair or Credit" found later in this chapter.
- *If you would like to place an order or need information about additional products available from Dell*, call Dell at the appropriate telephone number listed in "Dell Contact Numbers" found later in this chapter.

Technical Assistance

If you need assistance with a technical problem, perform the following steps:

1. **Review the remaining documentation that accompanied your Dell computer system.**

   To decide which document has the answers you need, consult the Preface.

2. **Run the diagnostics for your Dell computer system.**

   See Chapter 5, "Running the Dell Diagnostics," for instructions on using the Dell Diagnostics program.

3. **Make a copy of the Diagnostics Checklist (found later in this chapter), and fill it out.**

NOTE: Save the Diagnostics Checklist in this chapter as a master so you can use it to make copies as needed.

On your copy of the Diagnostics Checklist, document any error messages or beep codes as they occur so you can inform the Dell technician of them.

Describe what you were doing when the error occurred. Note the steps you have taken to solve the problem.

4. **Use the AutoTech service for help with installation and troubleshooting procedures.**

   For instructions on using the AutoTech service, see "AutoTech Service" found later in this chapter

5. **If the preceding steps have not resolved the problem and you need to talk to a Dell technician, you can call Dell's customer technical support service.**

   Before you call Dell, convert your service tag number into an express service code. When prompted by Dell's automated telephone system, enter the express service code to route your call directly to the proper support personnel.

   If you did not convert your service tag number to an express service code the first time you turned on the computer, do it before you call Dell for technical assistance. Find the Express Service Code icon in the Dell Accessories folder or program group. Double-click the icon and follow the directions.

NOTE: Dell's Express Service may not be available in all countries.

For instructions on using the technical support service, see "Technical Support Service" and "Before You Call" found later in this chapter.

Help Tools

Dell provides a number of tools to assist you. Table 11-1 lists subjects you may want information about, tasks you may want to perform, and the tool(s) you can use for help. Each tool is described later in this section.

Table 11-1. Help Tools

Subject or Task	Tool
BIOS revisions	TechConnect BBS
Frequently asked questions	AutoTech service
Information about Dell, its products, and its service and support policies	TechFax service, TechConnect BBS, World Wide Web on the Internet
Installation instructions	*Installation and Troubleshooting Guide*, technical support service, AutoTech service
Interrupt maps	TechFax service
Ordering parts	Technical support service, TechConnect BBS

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list that precedes the Index.

Table 11-1. Help Tools *(continued)*

Subject or Task	Tool
Software update information	TechFax service
System board layouts	TechFax service, *Installation and Troubleshooting Guide*
Technical notes on system compatibility and revisions	TechFax service
Technical training class information	TechFax service
Technical specifications	TechFax service, *User's Guide*
Troubleshooting, step-by-step instructions	*Installation and Troubleshooting Guide*, Dell Diagnostics program, AutoTech service
Unresolved problems requiring assistance from a Dell technician	Technical support service, TechConnect BBS

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list that precedes the Index.

User's Guide

The *Dell PowerEdge 2300 Systems User's Guide* includes information about system features, drivers and utilities, the System Setup program, the Resource Configuration Utility, and connecting external devices.

World Wide Web on the Internet

Dell can be accessed electronically on the Internet via a World Wide Web site, a file transfer protocol (FTP) site, and electronic mail (e-mail) using the following addresses:

- World Wide Web

  http://www.dell.com/

  http://www.dell.com/intl/apcc/ (for Asian/Pacific countries only)

  http://www.dell.com/euro/ (for Europe only)

- Anonymous FTP

  ftp.dell.com/

  Log in as `user: anonymous`, and use your e-mail address as your password.

- Electronic Support Service

  support@us.dell.com

  apsupport@dell.com (for Asian/Pacific countries only)

- Electronic Quote Service

  sales@dell.com

  apmarketing@dell.com (for Asian/Pacific countries only)

- Electronic Information Service

  info@dell.com

Commercial Online Services

Dell can be accessed electronically via CompuServe® by typing `GO DELL`.

Dell Diagnostics Program

Every Dell computer system comes with the Dell Diagnostics, a program that can help you determine what is wrong with the computer system when it does not operate correctly. This program provides valuable information for you and for Dell technicians should you need to call Dell.

See Chapter 5, "Running the Dell Diagnostics," for instructions on using the diagnostics. You can use this diagnostic program to test major components or devices in the computer system, if the computer can boot.

AutoTech Service

Dell's automated technical support service—AutoTech—provides recorded answers to the questions most frequently asked by Dell customers.

When you call AutoTech, you use your touch-tone telephone to select the subjects that correspond to your questions. You can even interrupt an AutoTech session and continue the session later. The code number that the AutoTech service gives you allows you to continue your session where you ended it.

The information available through AutoTech includes:

- Specifications and prices for Dell computers currently on sale
- Installation instructions for Dell computers and peripherals
- Answers to questions about MS-DOS and the Microsoft Windows 95 and Windows 3.*x* operating systems
- Help in troubleshooting your Dell systems

The AutoTech service is available 24 hours a day, seven days a week. You can also access this service through the technical support service. For the telephone number to call, see "Dell Contact Numbers" found later in this chapter.

NOTE: AutoTech is not always available in all locations outside the continental U.S. Please call your local Dell representative for information on availability.

TechFax Service

Dell takes full advantage of fax technology to serve you better. Twenty-four hours a day, seven days a week, you can call the Dell TechFax line toll-free for all kinds of technical information.

Using a touch-tone phone, you can select from a full directory of topics. The technical information you request is sent within minutes to the fax number you designate. TechFax information includes:

- Interrupt maps, system board layouts, and specifications.
- Technical notes on system compatibility and revisions.
- News on updates for operating systems and applications.
- Descriptions of available technical training classes. For Dell-certified technicians, TechFax offers information such as parts lists, drawings, and maintenance and repair data.

For the TechFax telephone number to call, see "Dell Contact Numbers" found later in this chapter.

NOTE: TechFax is not always available in all locations outside the continental U.S. Please call your local Dell representative for information on availability.

TechConnect BBS

Use your modem to access Dell's TechConnect Bulletin Board Service (BBS) 24 hours a day, seven days a week. The service is menu-driven and fully interactive. The modem settings for the BBS are 8 bit, no parity, 1 stop bit.

You can use the BBS to do the following:

- Send questions to a Dell technician
- Request a follow-up call or leave a message for a Dell technical support specialist
- Order parts
- Download basic input/output system (BIOS) and video driver upgrades
- Download updates

For the BBS telephone number to call, see "Dell Contact Numbers" found later in this chapter.

NOTE: The TechConnect BBS is not always available in all locations outside the continental U.S. Please call your local Dell representative for information on availability.

Automated Order-Status System

You can call this automated service to check on the status of any Dell products that you have ordered. A recording prompts you for the information needed to locate and report on your order. For the telephone number to call, see "Dell Contact Numbers" found later in this chapter.

NOTE: The Automated Order-Status System is not always available in all locations outside the continental U.S. Please call your local Dell representative for information on availability.

Technical Support Service

Dell's industry-leading hardware technical support service is open 24 hours a day, seven days a week. At any hour of any day, a Dell technical expert is ready with the answers to your questions about Dell hardware.

Our technical support staff pride themselves on their track record: more than 90 percent of all problems and questions are taken care of in just one toll-free call, usually in less than ten minutes. When you call, our experts can refer to records we keep on your specific Dell system to better understand your particular question. Our technical support staff use computer-based diagnostics to provide fast, accurate answers to your questions.

To contact Dell's technical support service, first refer to the section titled "Before You Call" and then call the number for your country as listed in "Dell Contact Numbers" found later in this chapter. (For information about receiving technical assistance in the U.K., refer to the *Placing a Service Call* card that came with your computer.)

NOTE: Technical support services may vary outside the continental U.S. Contact your local Dell representative for more information.

Problems With Your Order

If you have a problem with your order, such as missing parts, wrong parts, or incorrect billing, contact Dell Computer Corporation for customer assistance. Have your invoice or packing slip handy when you call. For the telephone number to call, see "Dell Contact Numbers" found later in this chapter.

Product Information

If you need information about additional products available from Dell Computer Corporation, or if you would like to place an order, a sales specialist will be glad to help. For the telephone number to call, see "Dell Contact Numbers" found later in this chapter.

Returning Items for Warranty Repair or Credit

Prepare all items being returned, whether for repair or credit, as follows:

1. **Call Dell to obtain an authorization number, and write it clearly and prominently on the outside of the box.**

   For the telephone number to call, see "Dell Contact Numbers" found later in this chapter.

2. **Include a copy of the invoice and a letter describing the reason for the return.**

3. **Include a copy of the Diagnostics Checklist indicating the tests you have run and any error messages reported by the Dell Diagnostics.**

4. **Include any accessories that belong with the item(s) being returned (power cables, software diskettes, guides, and so on) if the return is for credit.**

5. **Pack the equipment to be returned in the original (or equivalent) packing materials.**

   You are responsible for paying shipping expenses. You are also responsible for insuring any product returned, and you assume the risk of loss during shipment to Dell Computer Corporation. Collect on delivery (C.O.D.) packages are not accepted.

Returns that are missing any of the preceding requirements will be refused at our receiving dock and returned to you.

Before You Call

Keep a record of your diagnostic and troubleshooting activities by photocopying the Diagnostics Checklist in Figure 11-1 and filling it out whenever you experience a problem with the computer system.

NOTE: Be sure to save the checklist in Figure 11-1 as a master, so you can use it to make copies as needed.

If you need to call Dell Computer Corporation for assistance, you will be able to inform the support technician of the actions you have taken to resolve the problem. If you must return a piece of hardware to Dell, a technician will assign a Return Material Authorization Number. Record the number on the checklist, and include the completed checklist in the shipping box.

Dell's technical support staff uses computer-based diagnostics to provide fast, accurate answers to your questions. When you call, the technical support staff refers to records regarding your specific Dell computer to better understand your particular question.

NOTE: Have your express service code ready when you call. The code helps Dell's automated support telephone system direct your call more efficiently.

If possible, turn your system on before you call Dell for technical assistance and call from a telephone at or near the computer. You may be asked to type some commands at the keyboard, relay detailed information during operations, or try other troubleshooting steps possible only at the computer system itself. Make sure the computer's user documentation is available.

WARNING: If you need to remove the computer covers, be sure to first disconnect the computer system's power and modem cables from all electrical outlets.

Diagnostics Checklist

Name: _____Date: _____

Address: _____Phone number: _____

Service tag (bar code on the back of the computer): _____

Express service code:_____

Return Material Authorization Number (if provided by Dell support technician):_____

Operating system and version: _____

Peripherals: _____

_____

_____

Expansion cards:_____

_____

_____

Are you connected to a network? ☐ yes ☐ no

Network, version, and network card: _____

Programs and versions:_____

_____

_____

_____

See your operating system documentation to determine the contents of the system's start-up files. If the computer is connected to a printer, print each file. Otherwise, record the contents of each file before calling Dell.

Error message or beep code:_____

Description of problem and troubleshooting procedures you performed: _____

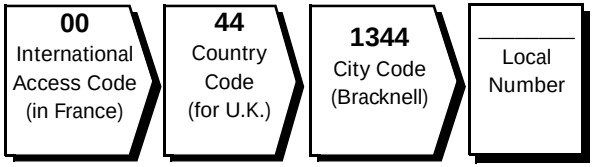
_____

_____

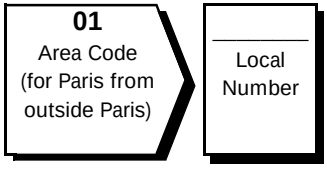
Figure 11-1. Diagnostics Checklist

Dell Contact Numbers

When you need to contact Dell, use the telephone numbers and codes provided in Tables 11-2 and 11-3. Table 11-2 provides the various codes required to make long-distance and international calls. Table 11-3 provides local telephone numbers, area codes, and toll-free numbers, if applicable, for each department or service available in various countries around the world. If you are making a direct-dialed call to a location outside of your local telephone service area, determine which codes to use (if any) in Table 11-2 in addition to the local numbers provided in Table 11-3. For example, to place an international call from Paris, France to Bracknell, England, dial the international access code for France followed by the country code for the U.K., the city code for Bracknell, and then the local number as shown in the following illustration.



To place a long-distance call within your own country, use area codes instead of international access codes, country codes, and city codes. For example, to call Paris, France from Montpellier, France, dial the area code plus the local number as shown in the following illustration.



The codes required depend on where you are calling from as well as the destination of your call; in addition, each country has a different dialing protocol. If you need assistance in determining which codes to use, contact a local or an international operator.

NOTE: Toll-free numbers are for use only within the country for which they are listed. Area codes are most often used to call long distance within your own country (not internationally)—in other words, when your call originates in the same country you are calling.

Table 11-2. International Dialing Codes

Country (City)	International Access Code	Country Code	City Code
Australia (Sydney)	0011	61	2
Austria (Vienna)	900	43	1
Belgium (Brussels)	00	32	2
Brunei	—	673	—
Canada (North York, Ontario)	011	—	Not required
Chile (Santiago)	—	56	2
China (Beijing)	—	86	10
Czech Republic (Prague)	00	420	2
Denmark (Horsholm)	009	45	Not required
Finland (Helsinki)	990	358	9
France (Paris) (Montpellier)	00	33	(1) (4)
Germany (Langen)	00	49	6103
Hong Kong	001	852	Not required
Ireland (Bray)	16	353	1
Italy (Milan)	00	39	2
Japan (Kawasaki)	001	81	44
Korea (Seoul)	001	82	2
Luxembourg	00	352	—
Macau	—	853	Not required
Malaysia (Penang)	00	60	4
Mexico (Colonia Granada)	95	52	5
Netherlands (Amsterdam)	00	31	20
New Zealand	00	64	—
Norway (Lysaker)	095	47	Not required
Poland (Warsaw)	011	48	22
Singapore (Singapore)	005	65	Not required
South Africa (Johannesburg)	09/091	27	11
Spain (Madrid)	07	34	1

Table 11-2. International Dialing Codes (continued)

Country (City)	International Access Code	Country Code	City Code
Sweden (Upplands Vasby)	009	46	8
Switzerland (Geneva)	00	41	22
Taiwan	002	886	—
Thailand	001	66	—
U.K. (Bracknell)	010	44	1344
U.S.A. (Austin, Texas)	011	1	Not required

Table 11-3. Dell Contact Numbers

Country (City)	Department Name or Service	Area Code	Local Number or Toll-Free Number
Australia (Sydney)	Customer Technical Support (Dell Dimension® systems only)		1-300-65-55-33
	Customer Technical Support (Other systems)		toll free: 1-800-808-378
	Customer Care		toll free: 1-800-819-339
	Corporate Sales		toll free: 1-800-808-385
	Transaction Sales		toll free: 1-800-808-312
	Fax		toll free: 1-800-818-341
Austria * (Vienna)	Switchboard		491 04 0
	Technical Support		0660-8779
Belgium * (Brussels)	Customer Technical Support	02	4819288
	Sales		toll free: 0800 16884
	SalesFax	02	4819299
	Switchboard	02	4819100
	Fax	02	4819299
Brunei *NOTE: Customers in Brunei call Malaysia for sales, customer, and technical assistance.*	Customer Technical Support (Penang, Malaysia)		810 4966
	Customer Service (Penang, Malaysia)		810 4949
	Transaction Sales (Penang, Malaysia)		810 4955

* *For technical assistance in this country after normal working hours, use one of the following numbers: (353-1) 204 4008 or (353-1) 286 5908 (English only—the call is rerouted to the U.S.A.).*

Table 11-3. Dell Contact Numbers (continued)

Country (City)	Department Name or Service	Area Code	Local Number or Toll-Free Number
Canada (North York, Ontario) *NOTE: Customers in Canada call the U.S.A. for access to TechConnect BBS.*	Automated Order-Status System		toll free: 1-800-433-9014
	AutoTech (Automated technical support)		toll free: 1-800-247-9362
	Customer Care (From outside Toronto)		toll free: 1-800-387-5759
	Customer Care (From within Toronto)	416	758-2400
	Customer Technical Support		toll free: 1-800-847-4096
	Sales (Direct Sales—from outside Toronto)		toll free: 1-800-387-5752
	Sales (Direct Sales—from within Toronto)	416	758-2200
	Sales (Federal government, education, and medical)		toll free: 1-800-567-7542
	Sales (Major Accounts)		toll free: 1-800-387-5755
	TechConnect BBS (Austin, Texas, U.S.A.)	512	728-8528
	TechFax		toll free: 1-800-950-1329
Chile (Santiago) *NOTE: Customers in Chile call the U.S.A for sales, customer, and technical assistance.*	Sales, Customer Support, and Technical Support		toll free: 1230-020-4823
China (Beijing) *NOTE: Customers in China call Malaysia for customer assistance.*	Customer Service (Penang, Malaysia)		810 4949
	Sales		6846 1122 (extensions 8309 to 8314)
Czech Republic* (Prague)	Technical Support	02	8728 221
	Customer Service and Sales	02	879250
	TechConnect BBS	02	66710274
Denmark* (Horsholm)	Customer Care, Technical Support, and Sales		toll free: 800 171 62
Finland* (Helsinki)	Customer Support and Technical Support		toll free: 0800-534 55
	Sales		toll free: 0800-33 55

* *For technical assistance in this country after normal working hours, use one of the following numbers: (353-1) 204 4008 or (353-1) 286 5908 (English only—the call is rerouted to the U.S.A.).*

Table 11-3. Dell Contact Numbers (continued)

Country (City)	Department Name or Service	Area Code	Local Number or Toll-Free Number
France * (Paris/Montpellier)	Technical Support (Paris)	01	47 62 68 90
	Technical Support (Montpellier)	04	67 06 62 86
	Customer Care (Major Accounts) (Paris)	01	47 62 69 39
	Customer Care (VAR Accounts) (Paris)	01	47 62 69 26
	Customer Care (Direct Sales) (Paris)	01	47 62 69 76
	TechFax (Montpellier)	04	67 22 53 11
	TechConnect BBS (Montpellier)	04	67 22 53 04
	Switchboard (Paris)	01	47 62 68 50
	Switchboard (Montpellier)	04	67 06 65 51
Germany * (Langen)	Customer Technical Support	06103	971-200
	Customer Care	06103	971-500
	TechConnect BBS	06103	971-666
	Sales	06103	971-460
Hong Kong *NOTE: Customers in Hong Kong call Malaysia for customer assistance.*	Technical Support		toll free: 800 96 4107
	Customer Service (Penang, Malaysia)		810 4949
	Transaction Sales		toll free: 800 96 4109
	Corporate Sales		toll free: 800 96 4108
Ireland * (Bray)	Customer Technical Support		1-850-543-543
	Sales		1-850-235-235
	SalesFax	01	286 2020
	Fax	01	286 6848
	TechConnect BBS	01	204 4761
	TechFax	01	204 4044
	Switchboard	01	286 0500
Italy * (Milan)	Switchboard		264 21 820
	Fax		264 13 420

* *For technical assistance in this country after normal working hours, use one of the following numbers: (353-1) 204 4008 or (353-1) 286 5908 (English only—the call is rerouted to the U.S.A.).*

Table 11-3. Dell Contact Numbers (continued)

Country (City)	Department Name or Service	Area Code	Local Number or Toll-Free Number
Japan (Kawasaki)	Technical Support		toll free: 0088-22-7890
	Customer Care	044	556-4240
	Direct Sales	044	556-3344
	Commercial Sales	044	556-3430
			556-3440
	Switchboard	044	556-4300
Korea (Seoul) *NOTE: Customers in Korea call Malaysia for customer assistance.*	Technical Support		toll free: 080-200-3800
	Transaction Sales		toll free: 080-200-3600
	Corporate Sales		toll free: 080-200-3900
	Customer Service (Penang, Malaysia)		810 4949
	Fax		394 3122
	Switchboard		287 5600
Latin America *NOTE: Customers in Latin America call the U.S.A. for sales, customer, and technical assistance.*	Customer Technical Support (Austin, Texas, U.S.A.)	512	728-4093
	Customer Service (Austin, Texas, U.S.A.)	512	728-3619
	Fax (Technical Support and Customer Service) (Austin, Texas, U.S.A.)	512	728-3883
	Sales (Austin, Texas, U.S.A.)	512	728-4397
	SalesFax (Austin, Texas, U.S.A.)	512	728-4600
			728-3772
Luxembourg * *NOTE: Customers in Luxembourg may call Belgium for sales, customer, and technical assistance as well as the SalesFax service, and they call the Netherlands for the TechFax and TechConnect BBS services.*	Customer Technical Support (Brussels, Belgium)		toll free: 0800 2109
	Customer Service (Luxembourg)		295151
	Customer Service (Brussels, Belgium)	02	481 92 99
	SalesFax (Brussels, Belgium)	02	481 92 44
	TechFax (Amsterdam, Netherlands)		682 91 06
	TechConnect BBS (Amsterdam, Netherlands)		686 65 04

* *For technical assistance in this country after normal working hours, use one of the following numbers: (353-1) 204 4008 or (353-1) 286 5908 (English only—the call is rerouted to the U.S.A.).*

Table 11-3. Dell Contact Numbers (continued)

Country (City)	Department Name or Service	Area Code	Local Number or Toll-Free Number
Macau *NOTE: Customers in Macau call Malaysia for customer assistance.*	Technical Support		toll free: 800 582
	Customer Service (Penang, Malaysia)		810 4949
	Transaction Sales		toll free: 0800 581
Malaysia (Penang)	Technical Support		toll free: 1 800 888 298
	Customer Service	04	810 4949
	Transaction Sales		toll free: 1 800 888 202
	Corporate Sales		toll free: 1 800 888 213
Mexico (Colonia Granada) *NOTE: Customers in Mexico call the U.S.A. for access to the Automated Order-Status System and AutoTech.*	Automated Order-Status System (Austin, Texas, U.S.A.)	512	728-0685
	AutoTech (Automated technical support) (Austin, Texas, U.S.A.)	512	728-0686
	Customer Technical Support	525	228-7870
	Sales	525	228-7811
			toll free: 91-800-900-37
			toll free: 91-800-904-49
	Customer Service	525	228-7878
	Main	525	228-7800
Netherlands* (Amsterdam)	Customer Technical Support	020	5818838
	Direct Sales		toll free: 0800-0663
	Direct SalesFax	020	682 7171
	Corporate Sales	020	581 8818
	Corporate SalesFax	020	686 8003
	TechConnect BBS	020	686 6504
New Zealand	Technical Support (Dell Dimension systems only) ($2.50 + GST per call)		0900 51010
	Technical Support (Other systems)		0800 446 255
	Customer Service		0800 444 617
	Sales		0800 441 567
	Fax		0800 441 566
Norway* (Lysaker)	Customer Technical Support and Customer Service		22-67 50 00
	Sales		67-125 711

Table 11-3. Dell Contact Numbers (continued)

Country (City)	Department Name or Service	Area Code	Local Number or Toll-Free Number
Poland * (Warsaw)	Switchboard		60 61 999
	Fax		60 61 998
Singapore (Singapore) *NOTE: Customers in Singapore call Malaysia for customer assistance.*	Technical Support		toll free: 800 6011 051
	Customer Service (Penang, Malaysia)	04	810 4949
	Transaction Sales		toll free: 800 6011 054
	Corporate Sales		toll free: 800 6011 053
South Africa (Johannesburg)	Switchboard	011	709 7700
	Technical Support	011	709 7710
	Fax	011	706 0495
Southeast Asian/ Pacific Countries (excluding Australia, Brunei, China, Hong Kong, Japan, Korea, Macau, Malaysia, New Zealand, Singapore, Taiwan, and Thailand—see individual listings for these countries)	Customer Technical Support, Customer Service, and Sales (Penang, Malaysia)		60 4 810-4810
Spain * (Madrid)	Technical Support	91	902 100 130
	Customer Service	91	329 10 80
	TechConnect BBS	91	329 33 53
	Sales	91	902 100 185
	Switchboard	91	722 92 00
Sweden * (Upplands Vasby)	Technical Support	08	590 05 199
	Customer Care	08	590 05 169
	TechConnect BBS	08	590 05 591
	Sales	08	590 05 185

* *For technical assistance in this country after normal working hours, use one of the following numbers: (353-1) 204 4008 or (353-1) 286 5908 (English only—the call is rerouted to the U.S.A.).*

Table 11-3. Dell Contact Numbers (continued)

Country (City)	Department Name or Service	Area Code	Local Number or Toll-Free Number
Switzerland * (Geneva)	Technical Support		0844 811 411
	Commercial Services	022	799 01 01
	Customer Service	022	799 01 50
	Fax	022	799 01 90
Taiwan *NOTE: Customers in Taiwan call Malaysia for customer assistance.*	Technical Support		toll free: 0080 651 226/0800 33 557
	Customer Service (Penang, Malaysia)		810 4949
	Transaction Sales		toll free: 0080 651 228/0800 33 556
	Corporate Sales		toll free: 0080 651 227/0800 33 555
Thailand *NOTE: Customers in Thailand call Malaysia for customer assistance.*	Technical Support		toll free: 0880 060 07
	Customer Service (Penang, Malaysia)		810 4949
	Sales		toll free: 0880 060 06
U.K. * (Bracknell)	Customer Technical Support (Dell Dimension systems)	01344	720111
	Customer Technical Support (Other systems)	01344	723723
	Customer Care	01344	720110
	TechFax	01344	723178
	TechConnect BBS	01344	723858
	Sales	01344	720000

* *For technical assistance in this country after normal working hours, use one of the following numbers: (353-1) 204 4008 or (353-1) 286 5908 (English only—the call is rerouted to the U.S.A.).*

Table 11-3. Dell Contact Numbers (continued)

Country (City)	Department Name or Service	Area Code	Local Number or Toll-Free Number
U.S.A. (Austin, Texas)	Automated Order-Status System		toll free: 1-800-433-9014
	AutoTech (Automated technical support)		toll free: 1-800-247-9362
	Customer Technical Support for Servers (Return Material Authorization Numbers—warranty repairs)		toll free: 1-800-967-1068
	Dell Customer Service (Credit Return Authorization Numbers)		toll free: 1-800-624-9897
	Dell Sales		toll free: 1-800-247-4618
	DellWare®		toll free: 1-800-753-7201
	DellWare FaxBack Service	512	728-1681
	Fee-Based Technical Support		toll free: 1-800-433-9005
	Sales (Catalogs)		toll free: 1-800-426-5150
	Spare Parts Sales:		
	Dell Direct[1]		toll free: 1-800-274-1490
	Major Accounts[2]		toll free: 1-800-357-3355
	Fax		toll free: 1-800-727-8320
	TechFax		toll free: 1-800-950-1329
	TechConnect BBS	512	728-8528
	Switchboard	512	338-4400

1 *Use this telephone number if your call is about a system purchased for home, personal, or small-business use.*

2 *Use this telephone number if you are calling for an established Dell national account (have your account number handy), if you work for a governmental agency (local, state, or federal), or if you work for an educational or medical institution.*

APPENDIX A
Diagnostic Video Tests

The Video Test Group of the system diagnostics consists of the following eight tests, each of which verifies a particular video function or group of functions:

- Video Memory Test — Checks the integrity of characters generated from data in the video memory.
- Video Hardware Test — Checks the functions of the cursor register and the horizontal and vertical retrace bit registers.
- Text Mode Character Test — Checks the video subsystem's ability to present text mode data.
- Text Mode Color Test — Checks the video subsystem's ability to present color in text modes.
- Text Mode Pages Test — Checks the video subsystem's ability to map and present all available video text pages on the monitor screen, one page at a time.
- Graphics Mode Test — Checks the video subsystem's ability to present graphics mode data and colors.
- Color Palettes Test — Checks the video subsystem's ability to display all available colors.
- Solid Colors Test — Checks the video subsystem's ability to show screens full of solid colors. Allows you to check for missing color subpixels.

All of these tests, except the Video Memory Test and the Video Hardware Test, are interactive. These interactive tests display images on the monitor screen and require the user to respond with the following steps:

1. **Examine a displayed image for correctness.**
2. **If an image is correct, type** y**.**
3. **If an image is incorrect, type** n**.**

The following sections describe each of the tests in the Video Test Group.

Video Memory Test

The Video Memory Test verifies the integrity of the video memory either on the system board or on a video expansion card. As the test runs, it describes which 64-kilobyte (KB) block of video memory is being tested. When a test is complete, a message indicates whether the video memory has passed or failed the test. This test does not require any interaction on your part.

Video Hardware Test

The Video Hardware Test verifies the operation of the cursor registers and the horizontal and vertical retrace bit registers. When a test is complete, a message indicates whether these registers have passed or failed the test. This test does not require any interaction on your part.

Text Mode Character Test

The Text Mode Character Test consists of a group of subtests that display printable characters and character attributes. The subtests check character quality and the monitor's ability to display the characters correctly on its screen. A prompt at the bottom of each screen asks the user to decide whether the display is satisfactory and to respond by typing y or n.

If you respond affirmatively to each subtest, the Text Mode Character Test passes. A negative response to any subtest causes the test to fail.

The following subsections describe the subtests of the Text Mode Character Test in the order in which they appear.

Character Attributes Subtest (80 x 25)

The 80-column x 25-line character attributes subtest displays four lines of text that demonstrate normal-intensity video, reverse video, intensified video, and blinking video.

Character Set Subtest (80 x 25)

The 80-column x 25-line character set subtest displays all 256 characters in the American Standard Code for Information Interchange (ASCII) character set in 80-column by 25-line text mode.

Character Attributes Subtest (40 x 25)

The 40-column x 25-line character attributes subtest displays four lines of text in 40-column by 25-line (double-wide) text mode that demonstrate normal-intensity video, reverse video, intensified video, and blinking video.

Character Set Subtest (40 x 25)

The 40-column x 25-line character set subtest displays all 256 characters in the ASCII character set in 40-column by 25-line (double-wide) text mode.

Text Mode Color Test

The Text Mode Color Test contains three subtests that check the video subsystem's ability to present color in text modes. The following subsections describe these subtests.

NOTE: These subtests are valid for color monitors only.

Color Attributes Subtest (80 x 25)

The 80-column x 25-line color attributes subtest displays a pattern of 16 rows and 16 columns in 80-column by 25-line text mode. Each row has a hexadecimal number in a unique foreground color and each column has a unique background color. Where the same foreground and background color intersect, the hexadecimal number is not visible. Type y if each character is displayed correctly; otherwise, type n. Table A-1 indicates the color in each of the rows and columns.

Table A-1. Color Attributes

Row or Column	Foreground Color	Background Color
0	black	black
1	blue	blue
2	green	green
3	cyan	cyan
4	red	red
5	magenta	magenta
6	brown	brown
7	white	white
8	dark gray *	black
9	light blue *	blue
A	light green *	green
B	light cyan *	cyan
C	light red *	red
D	light magenta *	magenta
E	yellow *	brown
F	intense white *	white

* *These colors blink during the test.*

Color Attributes Subtest (40 x 25)

The 40-column x 25-line color attributes subtest is the same as the previous subtest except that the characters are displayed in 40-column by 25-line (double-wide) text mode. Type y if each character is displayed correctly; otherwise, type n.

Color Bars Subtest

The color bars subtest displays 16 bars in different colors with background intensity enabled. Under each bar is the name of the color that should be displayed. Type y if each color bar is displayed correctly; otherwise, type n.

Text Mode Pages Test

The Text Mode Pages Test checks the video subsystem's ability to map and present all available video pages on the monitor screen, one page at a time. The test displays

eight successive screens, the first of which contains 21 lines of 77 zeros. The remaining seven screens are identical to the first, except that each screen substitutes a different numeral (1 through 7) for the zeros.

Type y if all the rows of numbers on each screen are displayed correctly; otherwise, type n.

Graphics Mode Test

The Graphics Mode Test checks the video subsystem's ability to present graphics mode data and colors. Each screen in this test allows you to check some aspect of graphics mode data and colors. The following subsections describe Graphics Mode Test screens in the order in which they appear.

NOTE: Some of the following tests may not appear if your system does not support the video mode being tested.

320 x 200 Graphics Mode Screens

The Graphics Mode Test displays two successive 320- x 200-pixel graphics mode screens: The first screen displays three pyramids in red, green, and yellow; the second screen displays three pyramids in magenta, cyan, and white. Type y if all the pyramids are the correct colors; otherwise, type n.

640 x 200 Black/White Graphics Mode Screen

The 640- x 200-pixel black/white graphics mode screen displays a black rectangle and a white rectangle on a gray background. Type y if the boxes are displayed correctly; otherwise, type n.

640 x 480 Monochrome Graphics Mode Screen

The 640- x 480-pixel monochrome graphics mode screen displays three chess pieces. Type y if all the chess pieces are identical and displayed correctly; otherwise, type n.

320 x 200 16-Color Graphics Mode Screen

The 320- x 200-pixel 16-color graphics mode screen displays a series of Xs in 16 different colors with the name of the color beneath each X. Type y if all the Xs are the correct colors; otherwise, type n.

640 x 200 16-Color Graphics Mode Screen

The 640- x 200-pixel 16-color graphics mode screen displays a series of hexagons in 16 different colors with the name of the color beneath each hexagon. Type y if all the hexagons are the correct colors; otherwise, type n.

640 x 350 16-Color Graphics Mode Screen

The 640 x 350 16-color graphics mode screen displays a series of octagons in 16 different colors with the name of the color displayed beneath each octagon. Type y if all the octagons are the correct colors; otherwise, type n.

640 x 480 2-Color Graphics Mode Screen

The 640- x 480-pixel 2-color graphics mode screen displays three chess pieces. Type y if all the chess pieces are identical and displayed correctly; otherwise, type n.

640 x 480 16-Color Graphics Mode Screen

The 640- x 480-pixel 16-color graphics mode screen displays a series of stars in 16 different colors with the name of the color beneath each star. Type y if all the stars are the correct colors; otherwise, type n.

320 x 200 256-Color Graphics Mode Screen

The 320- x 200-pixel 256-color graphics mode screen displays a series of squares in 256 different color hues and intensities. Type y if all the squares are the correct colors; otherwise, type n.

640 x 480 256-Color Graphics Mode Screen

The 640- x 480-pixel 256-color graphics mode screen displays a series of squares with two colors in each square. Type y if all the squares appear to be correct; otherwise, type n.

800 x 600 16-Color Graphics Mode Screen

The 800- x 600-pixel 16-color graphics mode screen displays a series of pyramids in 16 different colors. Type y if all the pyramids appear to be correct; otherwise, type n.

800 x 600 256-Color Graphics Mode Screen

The 800- x 600-pixel 256-color graphics mode screen displays a series of squares with four colors in each square. Type y if all the squares appear to be correct; otherwise, type n.

1024 x 768 16-Color Graphics Mode Screen

The 1024- x 768-pixel 16-color graphics mode screen displays a series of hourglasses in 16 different colors. Type y if all the hourglasses appear to be correct; otherwise, type n.

1024 x 768 256-Color Graphics Mode Screen

The 1024- x 768-pixel 256-color graphics mode screen displays a series of asterisks with four colors in each asterisk. Type y if all the asterisks appear to be correct; otherwise, type n.

1280 x 1024 16-Color Graphics Mode Screen

The 1280- x 1024-pixel 16-color graphics mode screen displays a series of squares in 16 different colors located in various positions on the screen. Type y if all the squares appear to be correct; otherwise, type n.

Color Palettes Test

The Color Palettes Test checks the video subsystem's ability to display all available colors. The test displays two screens that allow you to check the quality of different shades of the basic colors and to test the monitor's ability to vary the intensity of these colors.

The first screen contains four sets of 64 squares, one for gray and one for each of the three basic colors (red, green, and blue). Each square contains a different shade of its associated color, ranging from very light to very dark. Type y if all the squares are the correct colors; otherwise type n.

The second screen is the red/green/blue (RGB) color combination screen. This screen allows you to test the monitor's ability to increase or decrease the intensity of the three basic colors.

The RGB color combination screen displays an RGB box in the top center of the screen with individual red, green, and blue boxes beneath it. Underneath the individual color boxes are three lines that show the intensity of each color. Type r, g, or b to adjust the intensity of the corresponding color; then press the right-arrow key to increase the color intensity, or press the left-arrow key to decrease the intensity. The RGB box should be able to display 262,144 different colors when you adjust the intensity levels of red, green, and blue. Type y if all the squares are the correct colors; otherwise type n.

Solid Colors Test

The Solid Colors Test checks whether the video subsystem is displaying the correct colors. This test also lets you check for missing pixels. When this test is running, four screens appear sequentially—a red screen, a green screen, a blue screen, and a white screen. Check each screen for missing pixels, and verify that the correct color is being displayed.

When the test is complete, a message asks if you are satisfied with the quality of the colors. Type y if all the pixels were present and if the correct colors were displayed; otherwise, type n.

APPENDIX B
Jumpers and Switches

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

Jumpers and Switches—A General Explanation

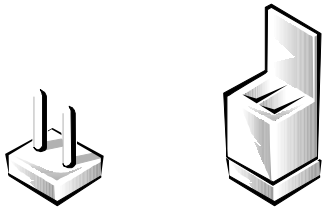
Jumpers and switches provide a convenient and reversible way of reconfiguring the circuitry on a printed circuit board. When reconfiguring the system, you may need to change jumper settings on the system board. You may also need to change jumper and/or switch settings on expansion cards or drives.

Jumpers

Jumpers are small blocks on a circuit board with two or more pins emerging from them.

Plastic plugs containing a wire fit down over the pins. The wire connects the pins and creates a circuit.

To change a jumper setting, pull the plug off its pin(s) and carefully fit it down onto the pin(s) indicated.



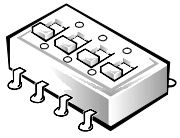
CAUTION: Make sure the system is turned off before you change a jumper setting. Otherwise, damage to the system or unpredictable results may occur.

A jumper is referred to as *open* or *unjumpered* 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 *jumpered*. 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.

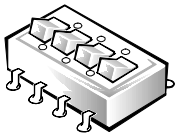
Figure B-1 shows the location and default settings of the jumper blocks on the system board. See Table B-1 for the designations, default settings, and functions of the system's jumpers.

Switches

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



slide switches



rocker switches

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

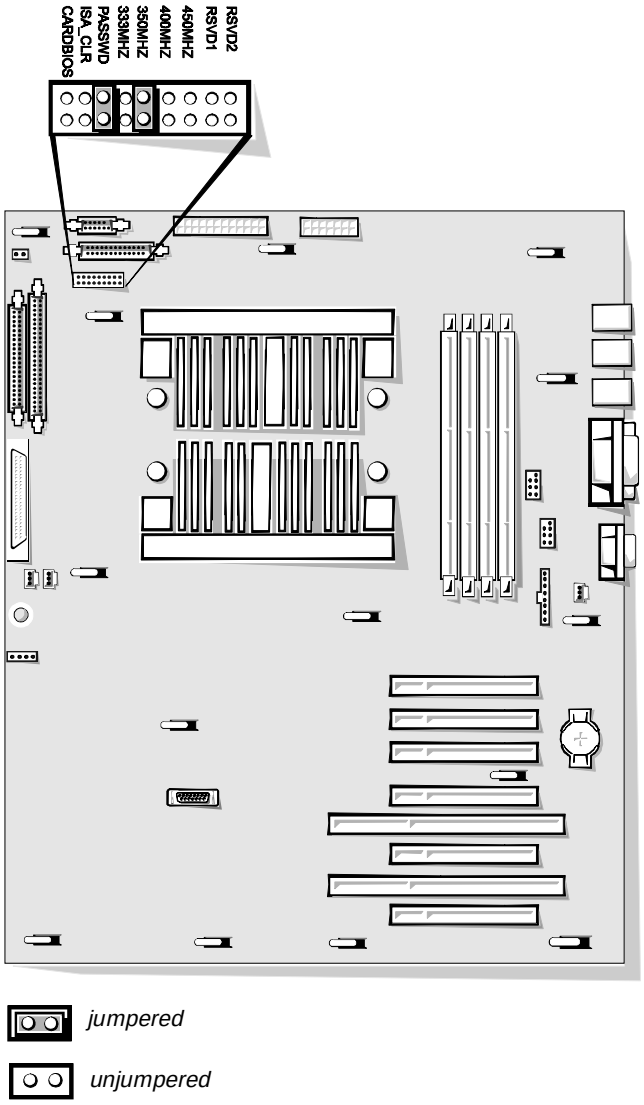


Figure B-1. System Board Jumpers

Table B-1. System-Board Jumper Settings

Jumper	Setting		Description
CARDBIOS			Reserved *(do not change)*.
ISA_CLR		(default)	The ISA configuration settings are retained at system boot.
			The ISA configuration settings are cleared at next system boot. (If the ISA configuration settings become corrupted to the point where the system won't boot, install the jumper plug and boot the system. Remove the jumper before restoring the ISA configuration information.)
PASSWD		(default)	The password feature is enabled.
			The password feature is disabled.
333MHZ*			The microprocessor's internal speed is 333 MHz.
350MHZ*			The microprocessor's internal speed is 350 MHz.
400MHZ*			The microprocessor's internal speed is 400 MHz (when available).
450MHZ*			The microprocessor's internal speed is 450 MHz (when available).
RSVD1*			Reserved *(do not change)*.
RSVD2*			Reserved *(do not change)*.

* *Only one of these jumpers should have a jumper plug installed.*

 *jumpered*  *unjumpered*

System Board Labels

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

Table B-2. System Board Connectors and Sockets

Connector or Socket	Description
BACKPLANE	Hot-pluggable SCSI backplane board interface cable connector
BATTERY	Battery connector
DIMM_*x*	DIMM sockets
INTRUS*n*	Intrusion-alarm switch connectors
ISA*n*	ISA expansion-card connectors
FAN*n*	Fan connectors
FLOPPY	Diskette drive interface connector
HDLED	Hard-disk drive activity indicator connector
JVGA	Video connector
KYBD	Keyboard connector
MOUSE	Mouse connector
PANEL	System control panel connector
PARALLEL	Parallel port connector; sometimes referred to as *LPT1*
PCI*n*	PCI expansion-card connectors
POWER1	Power input connector
SCSI1	Ultra2/LVD SCSI host adapter connector
SCSI2	Ultra/Narrow SCSI host adapter connector
SDS_SMB	Storage system SMB connector
SERIAL*n*	Serial port connectors; sometimes referred to as *COM1* and *COM2*
SVR_MGT	Connector for DRAC card
XSMB_OUT, XSMB_IN	SMB connectors
PROCESSOR*n*	Microprocessor guide bracket assembly and connectors

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list that precedes the Index.

Hot-Pluggable SCSI Backplane Board

Figure B-2 shows the location of the connectors on the 1 x 6 hot-pluggable SCSI backplane board.

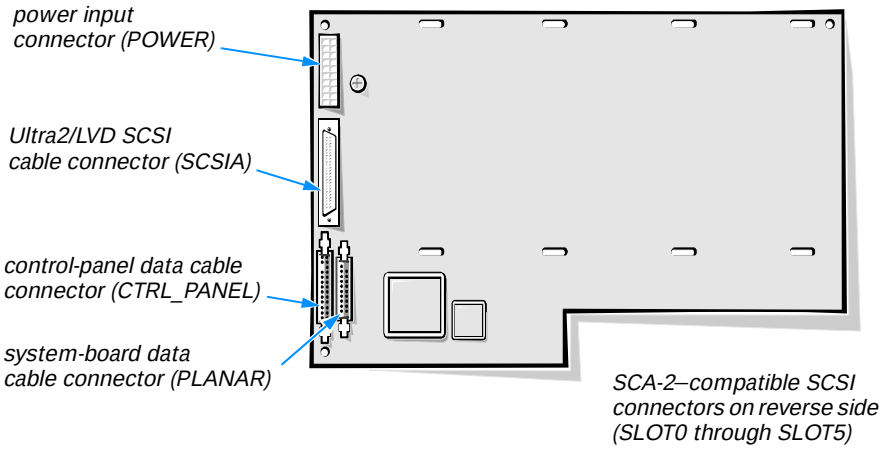


Figure B-2. 1 x 6 Hot-Pluggable SCSI Backplane Board

Table B-3 lists the connectors on the 1 x 6 hot-pluggable SCSI backplane board.

Table B-3. 1 x 6 Hot-Pluggable SCSI Backplane Board Connectors

Connector	Description
CTRL_PANEL	Hard-disk drive indicator panel data cable connector
PLANAR	System board data cable connector
POWER	Power input connector
SCSIA	Ultra2/LVD SCSI cable connector
SLOT*n*	SCA-2–compatible SCSI hard-disk drive connector

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list that precedes the Index.

Non-Hot-Pluggable SCSI Backplane Boards

Figures B-3 and B-4 show the location of the connectors on the two non-hot-pluggable SCSI backplane boards.

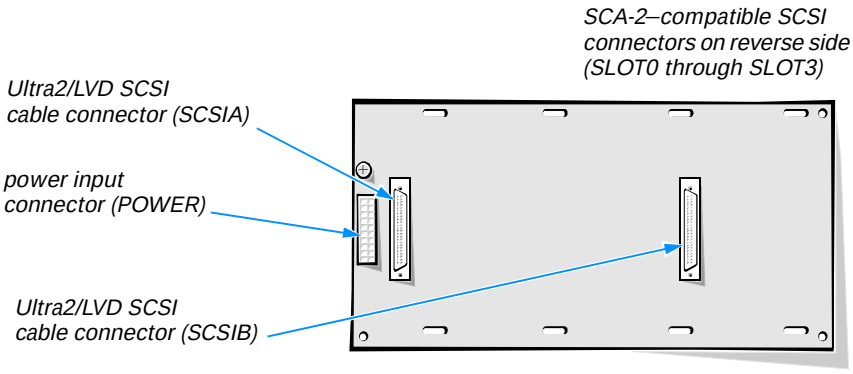


Figure B-3. 2 x 2 Non-Hot-Pluggable SCSI Backplane Board

Table B-4 lists the connectors on the 2 x 2 non-hot-pluggable SCSI backplane board.

Table B-4. 2 x 2 Non-Hot-Pluggable SCSI Backplane Board Connectors

Connector	Description
POWER	Power input connector
SCSIA	Ultra2/LVD SCSI cable connector for SLOT0 and SLOT1 (dual-channel mode) or SLOT0 through SLOT3 (single-channel mode)
SCSIB	Ultra2/LVD SCSI cable connector for SLOT2 and SLOT3 (dual-channel mode)
SLOT*n*	SCA-2–compatible SCSI hard-disk drive connector

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list that precedes the Index.

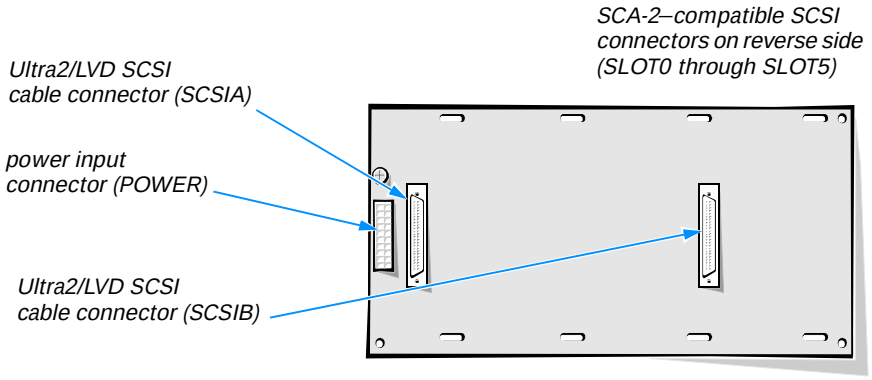


Figure B-4. 2 x 3 Non-Hot-Pluggable SCSI Backplane Board

Table B-5 lists the connectors on the 2 x 3 non-hot-pluggable SCSI backplane board.

Table B-5. 2 x 3 Non-Hot-Pluggable SCSI Backplane Board Connectors

Connector	Description
POWER	Power input connector
SCSIA	Ultra2/LVD SCSI cable connector for SLOT0 through SLOT2 (dual-channel mode) or SLOT0 through SLOT5 (single-channel mode)
SCSIB	Ultra2/LVD SCSI cable connector for SLOT3 through SLOT5 (dual-channel mode)
SLOT*n*	SCA-2–compatible SCSI hard-disk drive connector

NOTE: For the full name of an abbreviation or acronym used in this table, see the abbreviation and acronym list that precedes the Index.

Disabling a Forgotten Password

The computer's software security features include a supervisor password and a user password, which are discussed in detail in Chapter 4, "Using the System Setup Program," of the *Dell PowerEdge 2300 Systems User's Guide*. A password jumper on the system board enables these password features or disables them and clears any password(s) currently in use.

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

1. **Remove the right-side computer cover.**

   See "Removing the Computer Covers" in Chapter 7 for instructions.

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

2. **Refer to "Jumpers and Switches—A General Explanation" found earlier in this appendix for jumper information.**

   Figure B-1 shows the location of the password jumper (labeled "PASSWD") on the system board.

3. **Remove the jumper plug from the PASSWD jumper.**

4. **Replace the right-side computer cover, and then reconnect the computer to its power source and turn it on.**

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

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

5. **Repeat step 1.**

6. **Install the jumper plug on the PASSWD jumper.**

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

8. **Assign a new system and/or user password.**

   To assign a new system password using the System Setup program, see "Assigning a System Password" in Chapter 4 of the *User's Guide*. To assign a new user password using the System Setup program, see "Assigning a User Password" in Chapter 4 of the *User's Guide*.

Abbreviations and Acronyms

A
ampere(s)

AC
alternating current

ADC
analog-to-digital converter

ADI
Autodesk Device Interface

AI
artificial intelligence

ANSI
American National Standards Institute

APIC
Advanced Peripheral Interrupt Controller

ASCII
American Standard Code for Information Interchange

ASIC
application-specific integrated circuit

BASIC
Beginner's All-Purpose Symbolic Instruction Code

BBS
bulletin board service

BIOS
basic input/output system

bpi
bits per inch

bps
bits per second

BTU
British thermal unit

C
Celsius

CCFT
cold cathode fluorescent tube

CD
compact disc

CD-ROM
compact disc read-only memory

CGA
color graphics adapter

cm
centimeter(s)

CMOS
complementary metal-oxide semiconductor

C.O.D.
collect on delivery

cpi
characters per inch

cpl
characters per line

CPU
central processing unit

DAC
digital-to-analog converter

DASH
Dell Advanced SCSI Host

DAT
digital audio tape

dB
decibel(s)

dBA
adjusted decibel(s)

DC
direct current

DIMM
dual in-line memory module

DIN
Deutsche Industrie Norm

DIP
dual in-line package

DMA
direct memory access

DOC
Department of Communications (in Canada)

dpi
dots per inch

DRAC
Dell Remote Assistant Card

DRAM
dynamic random-access memory

DS/DD
double-sided double-density

DS/HD
double-sided high-density

DSA
Dell SCSI Array

ECC
error checking and correction

EDO
extended-data out

EGA
enhanced graphics adapter

EIDE
enhanced integrated drive electronics

EISA
Extended Industry-Standard Architecture

EMI
electromagnetic interference

EMM
expanded memory manager

EMS
Expanded Memory Specification

EPP
Enhanced Parallel Port

EPROM
erasable programmable read-only memory

ESD
electrostatic discharge

ESDI
enhanced small-device interface

ESM
embedded server management

F
Fahrenheit

FAT
file allocation table

FCC
Federal Communications Commission

FIFO
first-in first-out

ft
feet

g
gram(s)

G
gravities

GB
gigabyte(s)

GUI
graphical user interface

h
hexadecimal

HIP
Hardware Instrumentation Package

HMA
high memory area

HPFS
High Performance File System

Hz
hertz

I/O
input/output

ID
identification

IDE
integrated drive electronics

IRQ
interrupt request

ISA
Industry-Standard Architecture

JEIDA
Japanese Electronic Industry Development Association

K
kilo- (1024)

KB
kilobyte(s)

KB/sec
kilobyte(s) per second

Kbit(s)
kilobit(s)

Kbit(s)/sec
kilobit(s) per second

kg
kilogram(s)

kHz
kilohertz

LAN
local area network

lb
pound(s)

LCD
liquid crystal display

LED
light-emitting diode

LIF
low insertion force

LIM
Lotus/Intel/Microsoft

LN
load number

lpi
lines per inch

LVD
low-voltage differential

m
meter(s)

mA
milliampere(s)

mAh
milliampere-hour(s)

MB
megabyte(s)

MBR
master boot record

MDA
monochrome display adapter

MGA
monochrome graphics adapter

MHz
megahertz

mm
millimeter(s)

ms
millisecond(s)

MS-DOS
Microsoft Disk Operating System

MTBF
mean time between failures

mV
millivolt(s)

NIC
network interface controller

NiCad
nickel cadmium

NiMH
nickel-metal hydride

NMI
nonmaskable interrupt

ns
nanosecond(s)

NTFS
NT File System

NVRAM
nonvolatile random-access memory

OS/2
Operating System/2

OTP
one-time programmable

PAL
programmable array logic

PCI
Peripheral Component Interconnect

PCMCIA
Personal Computer Memory Card International Association

PGA
pin grid array

POST
power-on self-test

ppm
pages per minute

PQFP
plastic quad flat pack

PS/2
Personal System/2

PVC
polyvinyl chloride

QIC
quarter-inch cartridge

RAM
random-access memory

RAMDAC
random-access memory digital-to-analog converter

REN
ringer equivalence number

RFI
radio frequency interference

RGB
red/green/blue

ROM
read-only memory

rpm
revolutions per minute

RTC
real-time clock

SCA
Single Controller Architecture

SCSI
small computer system interface

SDS
Scalable Disk System

sec
second(s)

SDRAM
synchronous dynamic random-access memory

SIMM
single in-line memory module

SMB
server management bus

SNMP
simple network management protocol

SRAM
static random-access memory

SVGA
super video graphics array

TFT
thin film transistor

tpi
tracks per inch

TSR
terminate-and-stay-resident

UMB
upper memory block

UPS
uninterruptible power supply

USOC
Universal Service Ordering Code

V
volt(s)

VAC
volt(s) alternating current

VDC
volt(s) direct current

VESA
Video Electronics Standards Association

VGA
video graphics array

VLSI
very-large-scale integration

VRAM
video random-access memory

W
watt(s)

WH
watt-hour(s)

XMM
extended memory manager

XMS
eXtended Memory Specification

ZIF
zero insertion force

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