Installation and Troubleshooting Guide

Notes, Notices, and Cautions

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

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

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

Abbreviations and Acronyms

For a complete list of abbreviations and acronyms, see the "Glossary" in the *User's Guide*.

Contents

5   Troubleshooting Your System

7 Installing Drives

Figures

Tables

1

Introduction

Your system includes the following significant service and upgrade features:

- Embedded server management hardware, which monitors temperatures and voltages throughout the system and notifies you if there is a fault or failure
- System diagnostics, which checks for hardware problems (if the system can boot)

The following system options are offered:

- Microprocessors
- System memory
- Expansion-card options, including RAID controller cards
- Non–hot-plug SATA or hot–plug-ready SCSI hard drives
- IDE and SCSI half-height tape drives
- Redundant, hot-plug power supplies

Other Documents You May Need

⚠ The *Product Information Guide* provides important safety and regulatory information. Warranty information may be included within this document or as a separate document.

- The *Rack Installation Guide* or *Rack Installation Instructions* included with your rack solution describes how to install your system into a rack.
- The *Getting Started Guide* provides an overview of initially setting up your system.
- The *User's Guide* provides information about system features and technical specifications.
- The *Installation and Troubleshooting Guide* describes how to troubleshoot the system and install or replace system components.
- Systems management software documentation describes the features, requirements, installation, and basic operation of the software.
- Operating system documentation describes how to install (if necessary), configure, and use the operating system software.
- Documentation for any components you purchased separately provides information to configure and install these options.

- Updates are sometimes included with the system to describe changes to the system, software, and/or documentation.

  NOTE: Always read the updates first because they often supersede information in other documents.

- Release notes or readme files may be included to provide last-minute updates to the system or documentation or advanced technical reference material intended for experienced users or technicians.

Obtaining Technical Assistance

If at any time you do not understand a procedure described in this guide or if your system does not perform as expected, a number of tools are provided to help you. For more information on these help tools, see "Getting Help."

2

Indicators, Codes, and Messages

The system, applications, and operating systems can identify problems and alert you to them. Any of the following can indicate when the system is not operating properly:

- System indicators
- System messages
- Beep codes
- Warning messages
- Diagnostics messages
- Alert messages

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

Figure 2-1.   Tower and Rack-Mount Orientations
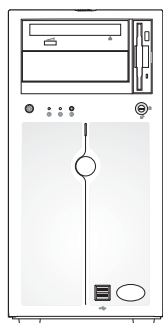
tower version with
standard bezel
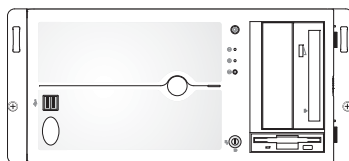
rack version with
standard bezel

Front-Panel Indicators and Features

Figure 2-2, Figure 2-3, and Figure 2-4 show the system's front-panel features. Table 2-1 and Table 2-2 describe the front-panel controls and indicators.

Figure 2-2. Front-Panel Controls and Indicators
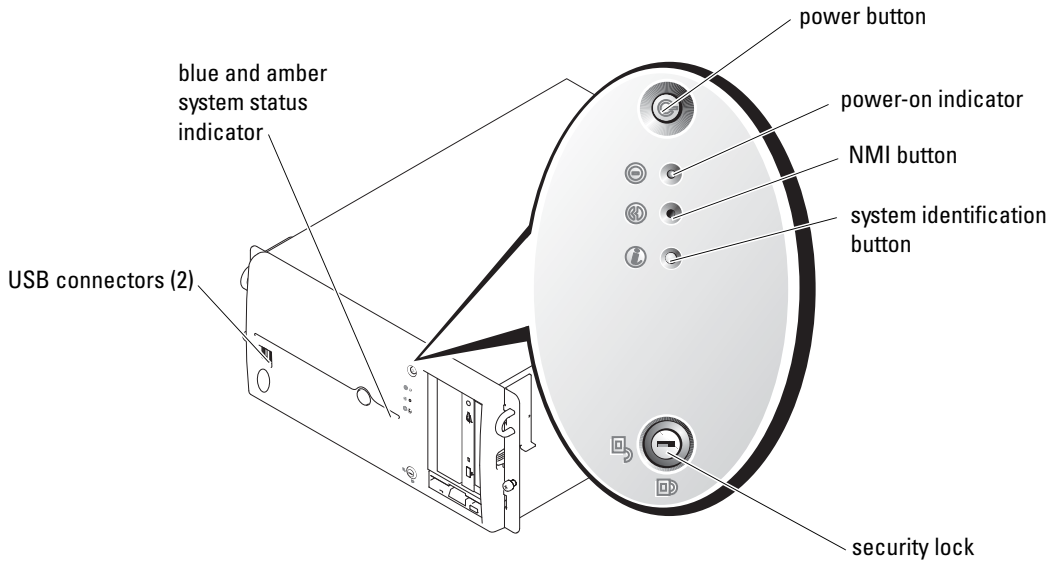
System Status Indicators

The system front panel incorporates blue and amber system status indicators. The blue indicator lights up when the system is operating correctly. The amber indicator lights up when the system needs attention due to a problem with power supplies, fans, system temperature, or SCSI hard drives.

Table 2-1 lists the system's indicator patterns. Different patterns are displayed as events occur in the system.

Table 2-1. System Status Indicator Patterns

Blue indicator	Amber Indicator	Description
Off	Off	Power is not available to the system.
Off	Blinking	Power is available to the system, but the system is not powered on.

Table 2-1.   System Status Indicator Patterns *(continued)*

Blue indicator	Amber Indicator	Description
Off	Blinking	The system is powered on and has detected an error. See "System Messages" and "Troubleshooting Your System" for more information.
On	Off	Power is on, and the system is operational.
Blinking	Off	The indicator has been activated to identify the system in a rack.

NOTE: While the system is being identified, the blue indicator blinks even though an error has been detected. After the system is identified, the blue indicator stops blinking and the amber indicator resumes blinking.

Table 2-2.   Front-Panel LED Indicators, Buttons, and Connectors

Indicator, Button, or Connector	Icon	Description
Blue system status indicator		The blue system status indicator lights up during normal system operation. Both the systems management software and the identification buttons located on the front and back of the system can cause the blue system status indicator to flash to identify a particular system.
Amber system status indicator		The amber system status indicator flashes when the system needs attention due to a problem with power supplies, fans, system temperature, or SCSI hard drives. **NOTE:** If the system is connected to AC power and an error has been detected, the amber system status indicator flashes regardless of whether the system has been powered on.

Table 2-2.   Front-Panel LED Indicators, Buttons, and Connectors *(continued)*

Indicator, Button, or Connector	Icon	Description
Power-on indicator	⏻	The power-on indicator lights when the system power is on. The power-on indicator blinks when power is available to the system, but the system is not powered on. The power button controls the DC power supply output to the system. **NOTE:** If you turn off the system using the power button and the system is running an ACPI-compliant operating system, the system performs a graceful shutdown before the power is turned off. If the system is not running an ACPI-compliant operating system, the power is turned off immediately after the power button is pressed.
System identification button	ⓘ	The identification buttons on the front and back panels can be used to locate a particular system within a rack. When one of these buttons is pushed, the blue system status indicator on the front and back blinks until one of the buttons is pushed again.
USB connectors	⇄	Connects USB 2.0-compliant devices to the system.
NMI button	↻	Used to troubleshoot software and device driver errors when using certain operating systems. This button can be pressed using the end of a paper clip. **NOTE:** Use this button only if directed to do so by qualified support personnel or by the operating system's documentation.

Figure 2-3. **System With SATA Hard Drives**

up to six SATA hard
drives (behind faceplate)

CD drive (or optional data-only
DVD or combination drive)

peripheral bay

diskette drive
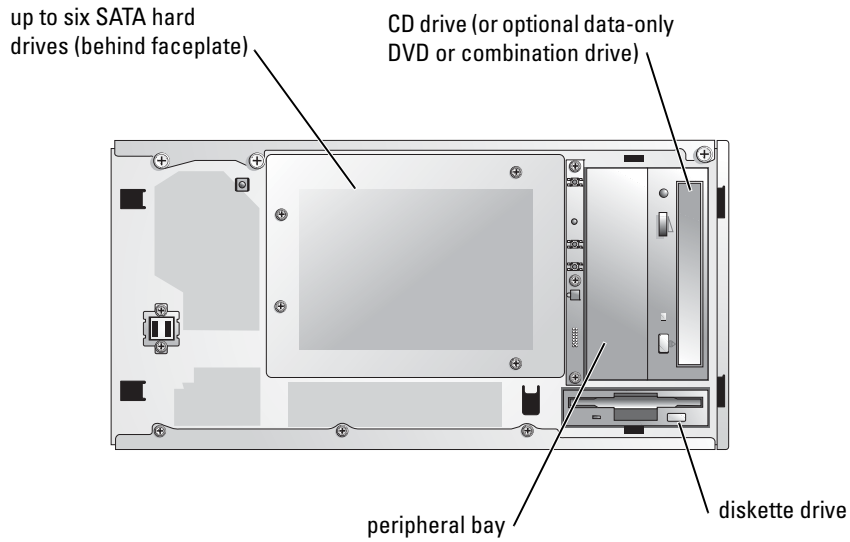
Figure 2-4. **System With SCSI Hard Drives**

up to six SCSI
hard drives

CD drive (or optional data-only
DVD or combination drive)

peripheral bay

diskette drive
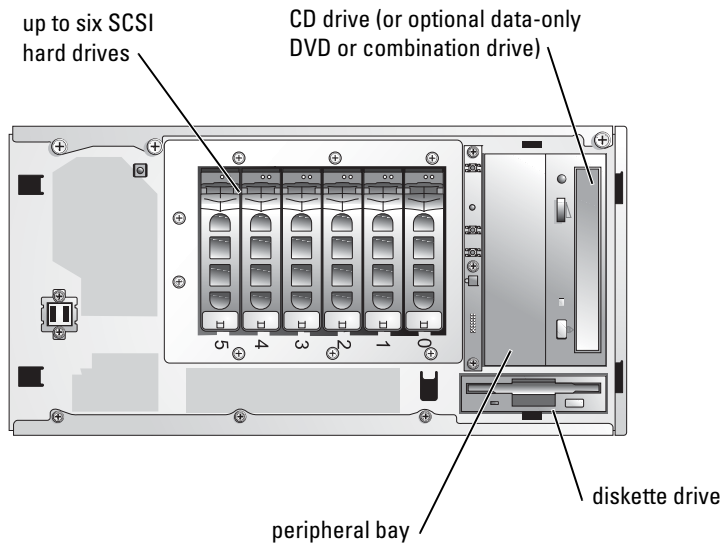
Back-Panel Indicators and Features

Figure 2-5 shows the back-panel features of the system. Table 2-3 describes the back-panel features.

Figure 2-5.   Back-Panel Features

power cable strain relief loop

parallel connector

NIC connector

optional redundant power supply PS1

Kensington lock

optional redundant power supply PS2

PS/2 mouse connector

PS/2 keyboard connector

serial connector

video connector

system status indicator connector

expansion slots (6)

system status indicators

system identification button

USB connectors (2)

Table 2-3.   Back-Panel Features

Component	Description
PS/2 mouse connector	Connects a mouse to the system.
PS/2 keyboard connector	Connects a keyboard to the system.
Serial connector	Connects a serial device to the system.
Parallel connector	Connects a parallel device to the system.
Video connector	Connects a monitor to the system.
System status indicator connector	Connects to an indicator that can signify when the system is operating correctly or when the system needs attention. See "Front-Panel Indicators and Features."
USB connectors (2)	Connects USB 2.0-compliant devices to the system.
NIC indicators	Provide information on NIC status. See "NIC Indicator Codes."
System identification button	Locates a particular system within a rack. See "Front-Panel Indicators and Features."
System status indicators	Functions the same as the front-panel system status indicators. See "System Status Indicators."

Power Indicator Codes

The power button on the front panel controls the power input to the system's power supplies. The power indicator can provide information on power status. See Figure 2-2. Table 2-4 lists the power button indicator codes.

Table 2-4.   Power Button Indicators

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

The indicators on the optional redundant power supplies show whether power is present or whether a power fault has occurred. See Figure 2-6.

Figure 2-6.   Redundant Power Supply Indicators

power supply status indicator

power-supply fault indicator

AC line status indicator
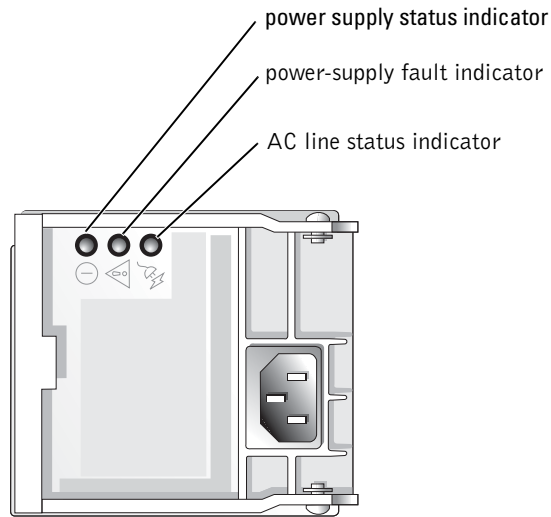
Table 2-5.   Redundant Power Supply Indicators

Indicator	Function
Power supply status	Green indicates that the power supply is operational.
Power supply fault	Amber indicates a problem with the power supply.
AC line status	Green indicates that a valid AC source is connected to the power supply.

SCSI Hard-Drive Indicator Codes

Each SCSI hard-drive carrier has two indicators: a busy indicator and a status indicator. See Figure 2-7. The indicators provide information on the status of the respective SCSI hard drive.

NOTE: Hard-drive indicator codes are not available on SATA hard drives.

Figure 2-7. SCSI Hard-Drive Indicators

green drive-activity indicator

drive-status indicator (green and amber)
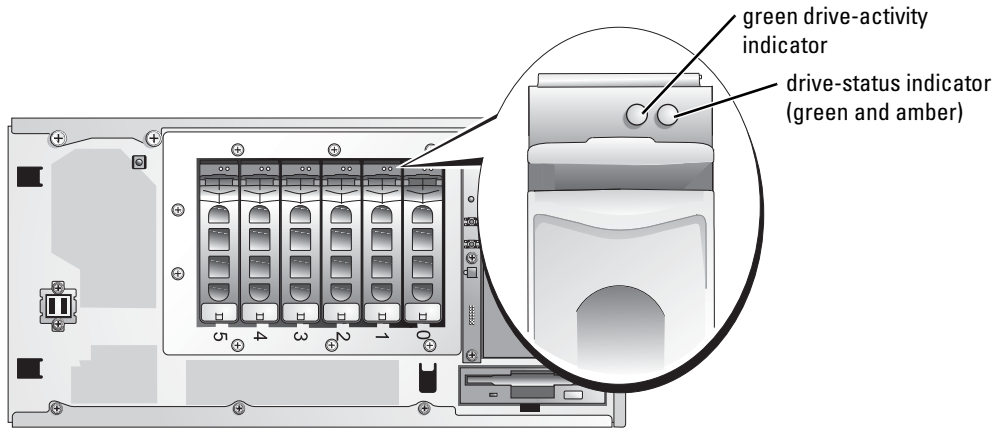
Table 2-6 lists the drive status indicator codes. Different codes display as drive events occur in the system. For example, in the event of a hard-drive failure, the "drive fail" code appears. After the drive is selected for removal, the "preparing for removal" code appears. After the replacement drive is installed, the "preparing for operation, drive online" code appears.

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

Table 2-6. SCSI Hard-Drive Status Indicator Codes

Drive-Status Indicator	Indicator Code
Drive bay empty	Off
Drive being prepared for operation, drive online	Steady green
Drive being identified or prepared for removal	Blinks green three times per second at equal intervals
Drive rebuilding	Blinks green once per second
Drive offline or failed	Steady amber

NIC Indicator Codes

The NIC on the back panel has an indicator that provides information on network activity and link status. See Figure 2-8. Table 2-7 lists the NIC indicator codes.

Figure 2-8.   NIC Indicators

link indicator ————   ———— activity indicator
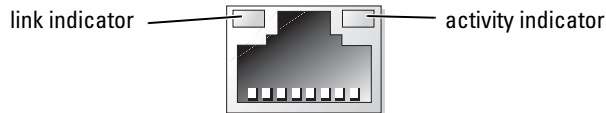
Table 2-7.   NIC Indicator Codes

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

System Messages

System messages appear on the screen to notify you of a possible problem with the system. Table 2-9 lists the system messages that can occur and the probable cause and corrective action for each message.

> **NOTE:** If you receive a system message that is not listed in Table 2-9, check the documentation for the application that is running when the message appears or the operating system's documentation for an explanation of the message and recommended action.

> ⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

Table 2-8.   System Messages

Message	Causes	Corrective Actions
Address mark not found	Faulty CD/diskette drive subsystem or hard-drive subsystem; faulty system board.	See "Troubleshooting a Diskette Drive," "Troubleshooting a CD Drive," "Troubleshooting SCSI Hard Drives," and "Troubleshooting SATA Hard Drives" in "Troubleshooting Your System."

Table 2-8.   System Messages *(continued)*

Message	Causes	Corrective Actions
`Alert! Current configuration does not support redundant memory. Redundant memory is disabled.`	Memory modules installed are not the same type and size in all banks; faulty memory module(s).	This message is not applicable to this system.
`Amount of available memory limited to 256 MB!`	**OS Install Mode** is enabled in the System Setup program.	Disable **OS Install Mode** in the System Setup program. See "Using the System Setup program" in the *User's Guide*.
`Auxiliary device failure`	Loose or improperly connected mouse or keyboard cable; faulty mouse or keyboard.	See "Troubleshooting the Mouse" and "Troubleshooting the Keyboard" in "Troubleshooting Your System."
`BIOS Update Attempt Failed!`	Remote BIOS update attempt failed.	Retry the BIOS update. If problem persists, see "Getting Help."
`CD-ROM drive not found`	**IDE CD-ROM Controller** option is enabled in the System Setup program, but the CD drive is not detected.	If the system does not have a CD drive, disable the **IDE CD-ROM Controller** option in the System Setup program. See "Using the System Setup program" in the *User's Guide*.
		If the system has a CD drive, ensure that it is properly connected. See "Troubleshooting a CD Drive" in "Troubleshooting Your System."
`CPUs with different cache sizes detected`	Microprocessors with different cache sizes are installed.	Ensure that all microprocessors have the same cache size and that they are properly installed. See "Processors" in "Installing System Options."
`Decreasing available memory`	Faulty or improperly installed memory modules.	See "Troubleshooting System Memory" in "Troubleshooting Your System."
`Diskette drive n seek failure`	Incorrect configuration settings in the System Setup program.	Run the System Setup program to correct the settings. See "Using the System Setup Program" in the *User's Guide*.
	Faulty or improperly installed diskette drive.	See "Troubleshooting a Diskette Drive" in "Troubleshooting Your System."
`Diskette read failure`	Faulty or improperly inserted diskette.	Replace the diskette.
`Diskette subsystem reset failed`	Faulty or improperly installed diskette drive.	See "Troubleshooting a Diskette Drive" in "Troubleshooting Your System."

Table 2-8.   System Messages *(continued)*

Message	Causes	Corrective Actions
`ECC memory error`	Faulty or improperly installed memory modules.	See "Troubleshooting System Memory" in "Troubleshooting Your System."
`Embedded RAID error`	Embedded RAID firmware responds with an error.	This message is not applicable to this system.
`Embedded RAID Firmware is not present`	Embedded RAID Firmware does not respond.	This message is not applicable to this system.

`Error: Incorrect memory configuration.`
 	
`Ensure memory in slots DIMM1_A and DIMM1_B, DIMM2_A and DIMM2_B, DIMM3_A and DIMM3_B match identically in size, speed, and rank.`
	Unmatched DIMM pairs are detected.	Ensure that the memory modules are installed in matched pairs. See "General Memory Module Installation Guidelines" in "Installing System Components."

`Error: Incorrect memory configuration.`
 	
`Memory slots DIMM3_A and DIMM3_B only support single rank DIMMs. Remove the dual rank DIMMs from slots DIMM3_A and DIMM3_B.`
	Dual-rank memory modules are installed in memory slots DIMM3_A and DIMM3_B. These memory slots do not support dual-rank memory modules.	Remove the memory modules from slots DIMM3_A and DIMM3_B. See "General Memory Module Installation Guidelines" in "Installing System Components."

`Error: Incorrect memory configuration.`
 	
`Memory slots DIMM3_A and DIMM3_B must be empty if Dual Rank memory DIMMs are in slots DIMM2_A and DIMM2_B.`
	Memory modules are installed in memory slots DIMM3_A and DIMM3_B. These memory slots must be empty if dual rank DIMMs are installed in memory slots DIMM2_A and DIMM2_B.	Remove the memory modules from slots DIMM3_A and DIMM3_B. See "General Memory Module Installation Guidelines" in "Installing System Components."

`Error: Incorrect memory configuration.`
 	
`Move DIMM3_A and DIMM3_B into DIMM2_A and DIMM2_B.`
	Memory modules are not populated from lowest-number bank to highest-number bank.	Move memory modules from memory slots DIMM3_A and DIMM3_B into memory slots DIMM2_A and DIMM2_B. See "General Memory Module Installation Guidelines" in "Installing System Components."

Table 2-8.   System Messages *(continued)*

Message	Causes	Corrective Actions

`Error: Incorrect memory configuration.`
 	
`Swap the DIMMs in slots DIMM1_A and DIMM1_B with DIMMs in slots DIMM2_A and DIMM2_B.`
	Memory slots DIMM1_A and DIMM1_B must be populated with dual-rank DIMMs if dual-rank DIMMs are populated in the system.	Swap the memory modules in DIMM1_A and DIMM1_B with the memory modules in slots DIMM2_A and DIMM2_B. See "General Memory Module Installation Guidelines" in "Installing System Components."

`Error: Maximum PCI option ROM count exceeded!`	Too many expansion cards have ROM enabled in the System Setup program.	Disable ROM for some of the expansion cards. See "Using the System Setup Program" in the *User's Guide*.
`Gate A20 failure`	Faulty keyboard controller; faulty system board.	See "Getting Help."

`Hard disk controller failure`
 	
`Hard disk read failure`
	Incorrect configuration settings in System Setup program; improperly installed hard drive, or loose interface or power cable; faulty hard-drive controller subsystem.	Run the System Setup program to correct the drive type. See "Using the System Setup Program" in the *User's Guide*. If the problem persists, see "Troubleshooting SCSI Hard Drives" and "Troubleshooting SATA Hard Drives" in "Troubleshooting Your System."

`I/O parity interrupt at` *address*	Faulty or improperly installed expansion card.	See "Troubleshooting Expansion Cards" in "Troubleshooting Your System."
`Invalid configuration information - please run SETUP program`	Incorrect configuration settings in System Setup program; NVRAM_CLR jumper is installed; faulty system battery.	Check the System Setup configuration settings. See "Using the System Setup Program" in the *User's Guide*. Remove the NVRAM_CLR jumper. See Figure A-2 for jumper location. If the problem persists, see "Troubleshooting the System Battery" in "Troubleshooting Your System."

Table 2-8. System Messages *(continued)*

Message	Causes	Corrective Actions
`Invalid NVRAM configuration, resource re-allocated`	System configuration data has been ignored.	Check the System Setup configuration settings. See "Using the System Setup Program" in the *User's Guide*.

`Invalid SCSI configuration`
 	
`SCSI cable detected on connector SCSIB of the SCSI backplane, daughter card not present`
	A SCSI cable is connected to the channel B connector on the SCSI backplane board; SCSI backplane daughter card is not installed.	This message is not applicable to this system.

`Keyboard controller failure`	Faulty keyboard controller; faulty system board.	See "Getting Help."

`Keyboard clock line failure`
 	
`Keyboard data line failure`
 	
`Keyboard failure`
 	
`Keyboard stuck key failure`
	Loose or improperly connected keyboard cable; faulty keyboard; faulty keyboard controller.	See "Troubleshooting the Keyboard" in "Troubleshooting Your System."

`Memory address line failure at address, read value expecting value`
 	
`Memory double word logic failure at address, read value expecting value`
 	
`Memory high address line failure at start address to end address`
 	
`Memory high data line failure at start address to end address`
 	
`Memory odd/even logic failure at start address to end address`
 	
`Memory write/read failure at address, read value expecting value`
	Faulty or improperly installed memory modules.	See "Troubleshooting System Memory" in "Troubleshooting Your System."

Table 2-8. System Messages *(continued)*

Message	Causes	Corrective Actions
`Memory parity failure at` *`start address`* `to` *`end address`* `Memory parity error at` *`address`*	Faulty or improperly installed memory modules.	See "Troubleshooting System Memory" in "Troubleshooting Your System."
`No boot device available`	Faulty or missing CD/diskette drive subsystem, hard drive, or hard-drive subsystem.	Use a bootable diskette, CD, or hard drive. If the problem persists, see "Troubleshooting a Diskette Drive," "Troubleshooting a CD Drive," "Troubleshooting SCSI Hard Drives," and "Troubleshooting SATA Hard Drives" in "Troubleshooting Your System."
`No boot sector on hard-disk`	No operating system on hard drive.	Check the hard-drive configuration settings in the System Setup program. See "Using the System Setup Program" in the *User's Guide*.
`No PXE-capable device available`	<F12> pressed during POST and no PXE devices are detected.	Check the configuration settings in the System Setup program for the NICs. See "Using the System Setup Program" in the *User's Guide*. If the problem persists, see "Troubleshooting a NIC" in "Troubleshooting Your System."
`No timer tick interrupt`	Faulty system board.	See "Getting Help."
`Not a boot diskette`	No operating system on diskette.	Use a bootable diskette.
`PCI BIOS failed to install`	Loose cables to expansion card(s); faulty or improperly installed expansion card.	Ensure that all appropriate cables are securely connected to the expansion cards. If the problem persists, see "Troubleshooting Expansion Cards" in "Troubleshooting Your System."

Table 2-8.   System Messages *(continued)*

Message	Causes	Corrective Actions
`PCIe Degraded Link Width Error: Embedded Bus#`*nn*`/Dev#`*nn*`/Func`*n* `Expected Link Width is` *n* `Actual Link Width is` *n*	Faulty PCIe controller; faulty system board.	See "Getting Help."
`PCIe Degraded Link Width Error:  Slot` *n* `Expected Link Width is` *n* `Actual Link Width is` *n*	Faulty or improperly installed PCIe card in the specified slot number.	Reseat the PCIe card in the specified slot number. See "Expansion Cards." If the problem persists, see "Getting Help."
`PCIe Training Error: Embedded Bus#`*nn*`/Dev#`*nn*`/Func`*n*	Faulty PCIe controller; faulty system board.	See "Getting Help."
`PCIe Training Error: Slot` *n*	Faulty or improperly installed PCIe card in the specified slot number.	Reseat the PCIe card in the specified slot number. See "Expansion Cards." If the problem persists, see "Getting Help."
`Plug & Play Configuration Error Embedded` *xxx*	Error encountered in initializing PCI device; faulty system board.	Install the NVRAM_CLR jumper and reboot the system. See Figure A-2 for jumper location. If the problem persists, see "Troubleshooting Expansion Cards" in "Troubleshooting Your System."
`Plug & Play Configuration Error PCI_`*n*	Error encountered in initializing PCI adapter.	
`Primary backplane is not present`	Faulty or improperly installed SCSI backplane board.	This message is not applicable to this system.

Table 2-8.   System Messages *(continued)*

Message	Causes	Corrective Actions

`Processor n internal error`
 	
`Processor bus parity error`
	Faulty microprocessor; faulty system board.	See "Troubleshooting the Microprocessors" in "Troubleshooting Your System."

`Processor in socket 1 not installed!`	No microprocessor installed in primary microprocessor socket.	Install a microprocessor in the primary microprocessor socket. See "Processors" in "Installing System Options."

`Remote access controller error`
 	
`Remote access controller is not present`
	Embedded remote access memory may be temporarily corrupted.	This message is not applicable to this system.

`SCSI cable not present on connector A or B of the primary backplane`	SCSI cable is loose, improperly connected, or faulty.	This message is not applicable to this system.
`Shutdown failure`	Shutdown test failure.	See "Troubleshooting System Memory" in "Troubleshooting Your System."
`Spare bank enabled`	Memory spare bank enabled	This message is not applicable to this system.
`System backplane error`	Faulty or improperly installed SCSI backplane board.	This message is not applicable to this system.
`System halted! Must power down`	Wrong password entered too many times.	Information only.
`The amount of system memory has changed`	Memory has been added or removed or a memory module may be faulty.	If memory has been added or removed, this message is informative and can be ignored. If memory has not been added or removed, check the SEL to determine if single-bit or multi-bit errors were detected and replace the faulty memory module. See "Troubleshooting System Memory" in "Troubleshooting Your System."
`Time-of-day clock stopped`	Faulty battery.	See "Troubleshooting the System Battery" in "Troubleshooting Your System."
`Time-of-day not set - please run SETUP program`	Incorrect Time or Date settings; faulty system battery.	Check the Time and Date settings. See "Using the System Setup Program" in the *User's Guide*. If the problem persists, replace the system battery. See "Replacing the System Battery" in "Installing System Options."

Table 2-8. System Messages *(continued)*

Message	Causes	Corrective Actions
`Timer chip counter 2 failed`	Faulty system board.	See "Getting Help."
`Unsupported CPU combination` `Unsupported CPU stepping detected`	Microprocessor(s) is not supported by the system.	Install a supported microprocessor combination. See "Processors" in "Installing System Options."
`Unsupported DIMM detected in the RAID DIMM slot!`	RAID memory module is not supported by the system.	This message is not applicable to this system.
`Unsupported RAID key detected!`	RAID hardware key is not supported by the system.	This message is not applicable to this system.
`Utility partition not available`	The <F10> key was pressed during POST, but no utility partition exists on the boot hard drive.	Create a utility partition on the boot hard drive. See "Using the Dell OpenManage Server Assistant CD" in your *User's Guide*."
`The VRM for the processor in socket n is not installed.`	Specified microprocessor VRM is faulty, unsupported, improperly installed, or missing.	This message is not applicable to this system.
`Warning: Detected mode change from RAID to SCSI x of the embedded RAID subsystem.`	Type of controller has changed from optional RAID (when available) to SCSI since previous system boot.	This message is not applicable to this system.
`Warning: Detected mode change from SCSI to RAID x of the embedded RAID subsystem.`	Type of controller has changed from SCSI to optional RAID (when available) since previous system boot.	This message is not applicable to this system.
`Warning: Detected missing RAID hardware for the embedded RAID subsystem. Data loss will occur! Press Y to switch mode to SCSI, press any other key to disable both channels. Press Y to confirm the change; press any other key to cancel.`	Type of controller has changed since previous system boot.	This message is not applicable to this system.
`Warning: Firmware is out-of-date, please update.`	Firmware error.	Update the firmware. See "Getting Help."

Table 2-8. System Messages *(continued)*

Message	Causes	Corrective Actions
`Warning! No microcode update loaded for processor X`	BIOS error.	Update the BIOS firmware. See "Getting Help."
`Write fault` `Write fault on selected drive`	Faulty diskette, CD/diskette drive assembly, hard drive, or hard-drive subsystem.	See "Troubleshooting a Diskette Drive," "Troubleshooting a CD Drive," "Troubleshooting SCSI Hard Drives," and "Troubleshooting SATA Hard Drives" in "Troubleshooting Your System."

NOTE: For the full name of an abbreviation or acronym used in this table, see the "Glossary" in the *User's Guide*.

System Beep Codes

If an error that cannot be reported on the screen occurs during POST, the system may emit a series of beeps that identifies the problem.

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

If a beep code is emitted, write down the series of beeps and then look it up in Table 2-9. If you are unable to resolve the problem by looking up the meaning of the beep code, use system diagnostics to identify the possible cause. If you are still unable to resolve the problem, see "Getting Help."

Table 2-9. System Beep Codes

Code	Cause	Corrective Action
1-1-2	CPU register test failure	See "Troubleshooting the Microprocessors" in "Troubleshooting Your System."
1-1-3	CMOS write/read failure; faulty system board	See "Getting Help."
1-1-4	BIOS error	Reflash the BIOS firmware. See "Getting Help."
1-2-1	Programmable interval-timer failure; faulty system board	See "Getting Help."

Table 2-9.   System Beep Codes *(continued)*

Code	Cause	Corrective Action
1-2-2	DMA initialization failure	See "Troubleshooting System Memory" in "Troubleshooting Your System."
1-2-3	DMA page register write/read failure	
1-3-1	Main-memory refresh verification failure	
1-3-2	No memory installed	
1-3-3	Chip or data line failure in the first 64 KB of main memory	
1-3-4	Odd/even logic failure in the first 64 KB of main memory	
1-4-1	Address line failure in the first 64 KB of main memory	
1-4-2	Parity failure in the first 64 KB of main memory	
1-4-3	Fail-safe timer test failure	
1-4-4	Software NMI port test failure	
2-1-1 through 2-4-4	Bit failure in the first 64 KB of main memory	
3-1-1	Slave DMA-register failure	See "Getting Help."
3-1-2	Master DMA-register failure	
3-1-3	Master interrupt-mask register failure	
3-1-4	Slave interrupt-mask register failure	
3-2-2	Interrupt vector loading failure	
3-2-4	Keyboard-controller test failure	See "Troubleshooting the Keyboard" in "Troubleshooting Your System."

Table 2-9. System Beep Codes *(continued)*

Code	Cause	Corrective Action
3-3-1	CMOS failure	See "Getting Help."
3-3-2	System configuration check failure	
3-3-3	Keyboard controller not detected	
3-3-4	Video memory test failure	
3-4-1	Screen initialization failure	
3-4-2	Screen-retrace test failure	
3-4-3	Video ROM search failure	
4-2-1	No timer tick	
4-2-2	Shutdown test failure	
4-2-3	Gate A20 failure	
4-2-4	Unexpected interrupt in protected mode	See "Troubleshooting Expansion Cards" in "Troubleshooting Your System."
4-3-1	Improperly installed or faulty memory modules	See "Troubleshooting System Memory" in "Troubleshooting Your System."
4-3-2	No memory modules installed in the first memory module connector	Install a memory module in the first memory module connector. See "System Memory" in "Installing System Options."
4-3-3	Faulty system board	See "Getting Help."
4-3-4	Time-of-day clock stopped	See "Troubleshooting the System Battery" in "Troubleshooting Your System."
4-4-1	Super I/O chip failure; faulty system board	See "Getting Help."
4-4-4	Cache test failure; faulty microprocessor	See "Troubleshooting the Microprocessors" in "Troubleshooting Your System."

Warning Messages

A warning message alerts you to a possible problem and prompts you to respond before the system continues a task. For example, before you format a diskette, a message will warn you that you may lose all data on the diskette. Warning messages usually interrupt the task 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. For more information, see "Finding Software Solutions" and the documentation that accompanied the operating system or application.

Diagnostics Messages

When you run system diagnostics, an error message may result. Diagnostic error messages are not covered in this section. Record the message on a copy of the Diagnostics Checklist in "Getting Help," and then follow the instructions in that section for obtaining technical assistance.

Alert Messages

Systems management software generates alert messages for your system. Alert messages include information, status, warning, and failure messages for drive, temperature, fan, and power conditions. For more information, see the systems management software documentation.

3

Finding Software Solutions

Software problems can be caused by:

- Improper installation or configuration of an application
- Application conflicts
- Input errors
- Interrupt assignment conflicts

Ensure that you are installing the software application according to the software manufacturer's recommended procedures. If a problem occurs after you install the software, you might need to troubleshoot your software application and your system.

See the documentation that accompanied the software or contact the software manufacturer for detailed troubleshooting information.

> **NOTE:** If all of the system diagnostic tests complete successfully, then the problem is most likely caused by the software and not the hardware.

Before You Begin

- Scan the software media with antivirus software.
- Read the software documentation before you run the installation utility.
- Be prepared to respond to prompts from the installation utility.

  The installation utility may require you to enter information about your system, such as how the operating system is configured, and the type of peripherals that are connected to the system. Have this information available before running the installation utility.

Troubleshooting Errors and Conflicts

While configuring and running software, problems might occur that are caused by input errors, application conflicts, and/or IRQ assignment conflicts. The problems are sometimes indicated by error messages.

Error messages are generated by system hardware or software. "Indicators, Codes, and Messages" provides information about error messages that are hardware-based. If you receive an error message that is not listed, see your operating system or software program documentation for troubleshooting information.

Input Errors

Pressing a specific key or set of keys at the wrong time may produce unexpected results. See the documentation that came with the software application to ensure that the values or characters you are entering are valid.

Ensure that your operating system is configured properly to run the application. Remember that whenever you change the parameters of the operating system, the changes can conflict with an application's operating requirements. After you configure the operating system, you may need to reinstall or reconfigure a software application so that it can run properly in its new environment.

Application Conflicts

Some applications can leave unnecessary files or data behind after they are deleted from your system. Device drivers can also create application errors. If application errors occur, see your application device driver or operating system documentation for troubleshooting information.

IRQ Assignment Conflicts

Most PCI devices can share an IRQ with another device, but they cannot use an IRQ simultaneously. To avoid this type of conflict, see the documentation for each PCI device for specific IRQ requirements.

Table 3-1.   IRQ Assignment Defaults

IRQ Line	Assignment
IRQ0	System timer
IRQ1	Keyboard controller
IRQ2	Interrupt controller 1 to enable IRQ8 through IRQ15
IRQ3	Serial port 2 (COM2 and COM4)
IRQ4	Serial port 1 (COM1 and COM3)
IRQ5	Remote access controller
IRQ6	Diskette drive controller
IRQ7	Parallel port
IRQ8	Real-time clock
IRQ9	ACPI functions (used for power management)
IRQ10	*Available*

Table 3-1. IRQ Assignment Defaults *(continued)*

IRQ Line	Assignment
IRQ11	*Available*
IRQ12	PS/2 mouse port unless the mouse is disabled through the System Setup program
IRQ13	Math coprocessor
IRQ14	IDE CD drive controller
IRQ15	*Available*

4

Running System Diagnostics

If you experience a problem with your system, run the diagnostics before calling for technical assistance. The purpose of the diagnostics is to test your system's hardware without requiring additional equipment or risking data loss. If you are unable to fix the problem yourself, service and support personnel can use diagnostics test results to help you solve the problem.

Using Server Administrator Diagnostics

To assess a system problem, first use the online Server Administrator diagnostics. If you are unable to identify the problem, then use the system diagnostics.

To access the online diagnostics, log into the Server Administrator home page, and then click the **Diagnostics** tab. For information about using diagnostics, see the online help. For additional information, see the *Server Administrator User's Guide*.

System Diagnostics Features

The system diagnostics provides a series of menus and options for particular device groups or devices. The system diagnostics menus and options allow you to:

- Run tests individually or collectively.
- Control the sequence of tests.
- Repeat tests.
- Display, print, or save test results.
- Temporarily suspend testing if an error is detected or terminate testing when a user-defined error limit is reached.
- View help messages that briefly describe each test and its parameters.
- View status messages that inform you if tests are completed successfully.
- View error messages that inform you of problems encountered during testing.

When to Use the System Diagnostics

If a major component or device in the system does not operate properly, component failure may be indicated. As long as the microprocessor and the system's input/output devices (monitor, keyboard, and diskette drive) are functioning, you can use the system diagnostics to help identify the problem.

Running the System Diagnostics

The system diagnostics can be run either from the utility partition on your hard drive or from a set of diskettes that you create using the *Dell OpenManage Server Assistant* CD.

NOTICE: Use the system diagnostics to test only your system. Using this program with other systems may cause invalid results or error messages. In addition, use only the program that came with your system (or an updated version of that program).

From the Utility Partition

1 As the system boots, press <F10> during POST.

2 From the utility partition's main menu, select the **Run System Diagnostics** option.

From the Diagnostics Diskettes

1 Create a set of diagnostics diskettes from the *Dell OpenManage Server Assistant* CD. See "Using the Dell OpenManage Server Assistant CD" in your *User's Guide* for information on creating the diskettes.

2 Insert the first diagnostics diskette.

3 Reboot the system.

If the system fails to boot, see "Getting Help."

When you start the system diagnostics, a message is displayed stating that the diagnostics are initializing. Next, the **Diagnostics** menu appears. The menu allows you to run all or specific diagnostics tests or to exit the system diagnostics.

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

System Diagnostics Testing Options

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.

Table 4-1 provides a brief explanation of testing options.

Table 4-1.   System Diagnostics Testing Options

Testing Option	Function
Quick Tests	Performs a quick check of the system. Select **Test All Devices** and then select **Quick Tests**. This option runs device tests that do not require user interaction. Use this option to quickly identify the source of your problem.
Test One Device	Tests a particular device.
Extended Tests	Performs a more thorough check of the system. Select **Test All Devices** and then select **Extended Tests**.
Advanced Testing	Checks a particular area of the system.
Information and Results	Displays test results.
Program Options	Sets various test parameters.
Device Configuration	Displays an overview of the devices in the system.
Exit to MS-DOS	Exits the diagnostics and returns to the **System Utilities** menu.

Using the Advanced Testing Options

When you select **Advanced Testing** from the **Diagnostics** menu, the main screen of the diagnostics appears and displays the following information:

- Two lines at the top of the screen identify the diagnostics utility, the version number, and the system's service tag number.

- The left side of the screen under **Device Groups** lists the diagnostic device groups in the order that they are tested if you select **All** under the **Run Tests** submenu. Press the up- or down-arrow keys to highlight a particular device group. Press the left- or right-arrow keys to select the options on the menu. As you move from one menu option to another, a brief explanation of the highlighted option appears at the bottom of the screen.

- The right side of the screen under **Devices for Highlighted Group** lists the specific devices within a particular test group.

- The menu area consists of two lines at the bottom of the screen. The first line lists the menu options that you can select; press the left- or right-arrow key to highlight an option. The second line provides information about the highlighted option.

For more information about a device group or device, highlight the Help option and press <Enter>. Press <Esc> to return to the previous screen.

Error Messages

When you run a system diagnostics test, you may receive an error message during testing. Record the message on a copy of the Diagnostics Checklist. For a copy of the Diagnostics Checklist and instructions for obtaining technical assistance, see "Getting Help."

5

Troubleshooting Your System

Safety First—For You and Your System

To perform certain procedures in this document, you must remove the system cover and work inside the system. While working inside the system, do not attempt to service the system except as explained in this guide and elsewhere in your system documentation.

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

Start-Up Routine

Look and listen during the system's start-up routine for the indications described in Table 5-1.

Table 5-1.   Start-Up Routine Indications

Look/listen for:	Action
An error message displayed on the monitor.	See "System Messages" in "Indicators, Codes, and Messages."
A series of beeps emitted by the system.	See "System Beep Codes" in "Indicators, Codes, and Messages."
Alert messages from the systems management software.	See the systems management software documentation.
The monitor's power indicator.	See "Troubleshooting the Video Subsystem."
The keyboard indicators.	See "Troubleshooting the Keyboard."
The USB diskette drive activity indicator.	See "Troubleshooting a USB Device."
The USB CD drive activity indicator.	See "Troubleshooting a USB Device."
The diskette drive activity indicator.	See "Troubleshooting a Diskette Drive."
The CD drive activity indicator.	See "Troubleshooting a CD Drive."
The hard-drive activity indicator.	See "Troubleshooting SCSI Hard Drives"
An unfamiliar constant scraping or grinding sound when you access a drive.	See "Getting Help."

Checking the Equipment

This section provides troubleshooting procedures for external devices attached to the system, such as the monitor, keyboard, or mouse. Before you perform any of the procedures, see "Troubleshooting External Connections."

Troubleshooting External Connections

Loose or improperly connected cables are the most likely source of problems for the system, monitor, and other peripherals (such as a printer, keyboard, mouse, or other external device). Ensure that all external cables are securely attached to the external connectors on your system. See Figure 2-5 for the back-panel connectors on your system.

Troubleshooting the Video Subsystem

Problem

- Monitor is not working properly.
- Video memory is faulty.

Action

1 Check the system and power connections to the monitor.
2 Run the appropriate online diagnostic test. See "Using Server Administrator Diagnostics" in "Running System Diagnostics."

   If the tests run successfully, the problem is not related to video hardware. See "Finding Software Solutions."

   If the tests fail, see "Getting Help."

Troubleshooting the Keyboard

Problem

- System message indicates a problem with the keyboard.
- Keyboard is not functioning properly.

Action

1 Run the appropriate online diagnostic test. See "Using Server Administrator Diagnostics" in "Running System Diagnostics."
2 Press each key on the keyboard, and examine the keyboard and its cable for signs of damage.

3 Swap the faulty keyboard with a working keyboard.

If the problem is resolved, replace the faulty keyboard. See "Getting Help."

If the problem is not resolved, see "Getting Help."

Troubleshooting the Mouse

Problem

- System message indicates a problem with the mouse.
- Mouse is not functioning properly.

Action

1 Run the appropriate online diagnostic test. See "Using Server Administrator Diagnostics" in "Running System Diagnostics."

If the test fails, continue to the next step.

2 Examine the mouse and its cable for signs of damage.

If the mouse is not damaged, go to step 4.

If the mouse is damaged, continue to the next step.

3 Swap the faulty mouse with a working mouse.

If the problem is resolved, replace the faulty mouse. See "Getting Help."

4 Enter the System Setup program and ensure that the mouse controller is enabled. See "Using the System Setup Program" in your *User's Guide*.

If the problem is not resolved, see "Getting Help."

Troubleshooting Basic I/O Functions

Problem

- Error message indicates a problem with a serial or parallel port.
- Device connected to a serial or parallel port is not operating properly.

Action

1 Enter the System Setup program and ensure that the serial port and parallel port are enabled. See "Using the System Setup Program" in the *User's Guide*.

2 If the problem is confined to a particular application, see the application documentation for specific port configuration requirements that the program may require.

3   Run the appropriate online diagnostic test. See "Using Server Administrator Diagnostics" in "Running System Diagnostics."

If the tests run successfully but the problem persists, see "Troubleshooting a Serial I/O Device."

Troubleshooting a Serial I/O Device

Problem

- Device connected to the serial port is not operating properly.

Action

1   Turn off the system and any peripheral devices connected to the serial port.

2   Swap the serial interface cable with a working cable, and turn on the system and the serial device.

If the problem is resolved, replace the interface cable. See "Getting Help."

3   Turn off the system and the serial device, and swap the device with a comparable device.

4   Turn on the system and the serial device.

If the problem is resolved, replace the serial device. See "Getting Help."

If the problem persists, see "Getting Help."

Troubleshooting a USB Device

Problem

- System message indicates a problem with a USB device.
- Device connected to a USB port is not operating properly.

Action

1   Enter the System Setup program, and ensure that the USB ports are enabled. See "Using the System Setup Program" in your *User's Guide*.

2   Turn off the system and any USB devices.

3   Disconnect the USB devices, and connect the malfunctioning device to the other USB connector.

4   Turn on the system and the reconnected device.

If the problem is resolved, the USB connector might be defective. See "Getting Help."

5   If possible, swap the interface cable with a working cable.

If the problem is resolved, replace the interface cable. See "Getting Help."

6 Turn off the system and the USB device, and swap the device with a comparable device.

7 Turn on the system and the USB device.

If the problem is resolved, replace the USB device. See "Getting Help."

If the problem persists, see "Getting Help."

Troubleshooting a NIC

Problem

- NIC cannot communicate with network.

Action

1 Run the appropriate online diagnostic test. See "Using Server Administrator Diagnostics" in "Running System Diagnostics."

2 Check the appropriate indicator on the NIC connector. See "NIC Indicator Codes" in "Indicators, Codes, and Messages."

- If the link indicator does not light, check all cable connections.

- If the activity indicator does not light, the network driver files might be damaged or missing.

  Remove and reinstall the drivers if applicable. See the NIC's documentation.

- Change the autonegotiation setting, if possible.

- Use another connector on the switch or hub.

If you are using a NIC card instead of an integrated NIC, see the documentation for the NIC card.

3 Ensure that the appropriate drivers are installed and the protocols are bound. See the NIC's documentation.

4 Enter the System Setup program and confirm that the NICs are enabled. See "Using the System Setup Program" in your *User's Guide*.

5 Ensure that the NICs, hubs, and switches on the network are all set to the same data transmission speed. See the network equipment documentation.

6 Ensure that all network cables are of the proper type and do not exceed the maximum length. See "Network Cable Requirements" in your *User's Guide*.

Responding to a Systems Management Software Alert Message

Systems management software monitors critical system voltages and temperatures, fans, and hard drives in the system. Alert messages appear in the **Alert Log** window. For information about the **Alert Log** window, see the systems management software documentation.

Inside the System

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

Figure 5-1 shows an interior view of the system.

Figure 5-1.   Inside the System
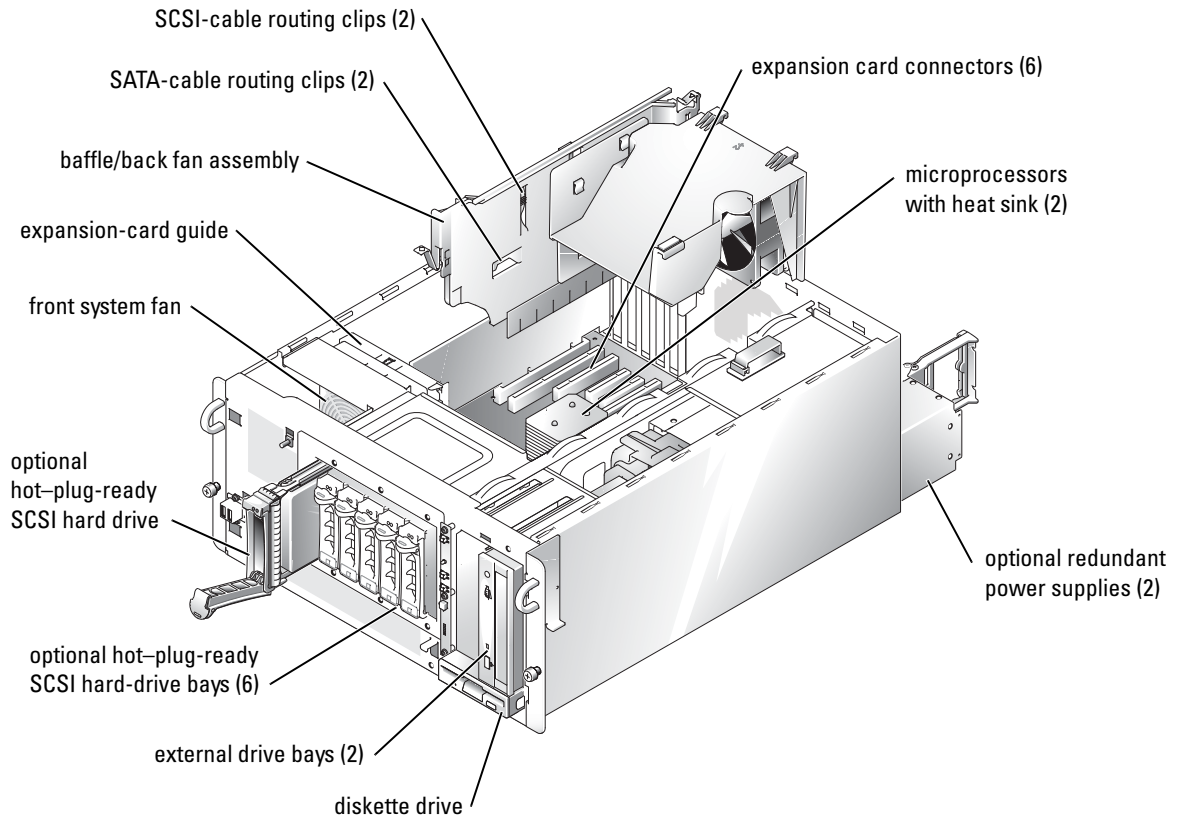
The system board contains the system's control circuitry and other electronic components. Several hardware options, such as the microprocessors and memory, are installed directly on the system board.

The system accommodates up to six expansion cards (one PCI Express [PCIe] x8-lane slot, one PCIe x4-lane slot, two PCI-X 64-bit/100-MHz slots, one PCI 64-bit/66-MHz slot, and one PCI 32-bit/33-MHz 5V slot). System memory is contained in six memory module sockets.

✍ **NOTE:** Although the PCIe x4-lane expansion slot is physically a PCIe x8 connector, it functions only as a PCIe x4-lane slot.

The system supports a 3.5-inch diskette drive and up to two externally accessible 5.25-inch drives, such as CD, data-only DVD, or half-height tape drives. The hard-drive bays support the following hard drive configurations:

• Up to two non–hot-plug SATA hard drives when the hard drives are connected to the system board SATA controllers

- Up to six non–hot-plug SATA hard drives when the hard drives are connected to an optional SATA controller card.
- Up to six optional hot–plug-ready SCSI hard drives when the optional SCSI hard-drive cage is installed.

NOTE: SCSI hot-plug functionality is available only when SCSI RAID is used. See the SCSI RAID controller's documentation to verify that its configuration supports hot-plug SCSI hard drives.

During an installation or troubleshooting procedure, you may be required to change a jumper setting. For more information, see "Jumpers, Switches, and Connectors."
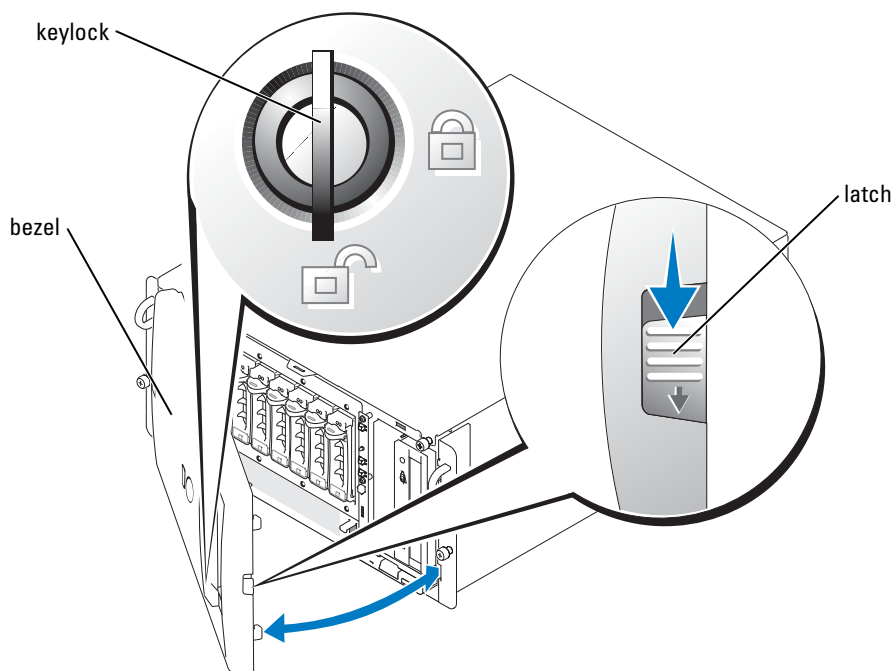
Bezel

The front bezel has status and attention indicators. You must remove the bezel to open the system.

Removing the Bezel

⚠️ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Using the system key, unlock the front bezel. See Figure 5-2.

Figure 5-2. Removing the Bezel

2 Slide the latch down and pull the right edge of the bezel away from the front panel. See Figure 5-2.

3 Pivot the bezel outward until it is at a right angle to the front panel.

4 Remove the bezel from the slots on the front panel.

Installing the Bezel

1 Insert the two tabs on the inside left edge of the bezel into the corresponding slots on the system front panel, and pivot the bezel inward to its closed position.

    NOTE: When closing the right side of the rack-mount system's bezel, hold the bezel's left side so that the inside bezel tabs remain properly engaged in the front-panel bezel slots.

2 Using the system key, lock the bezel.

Stabilizing the Tower System

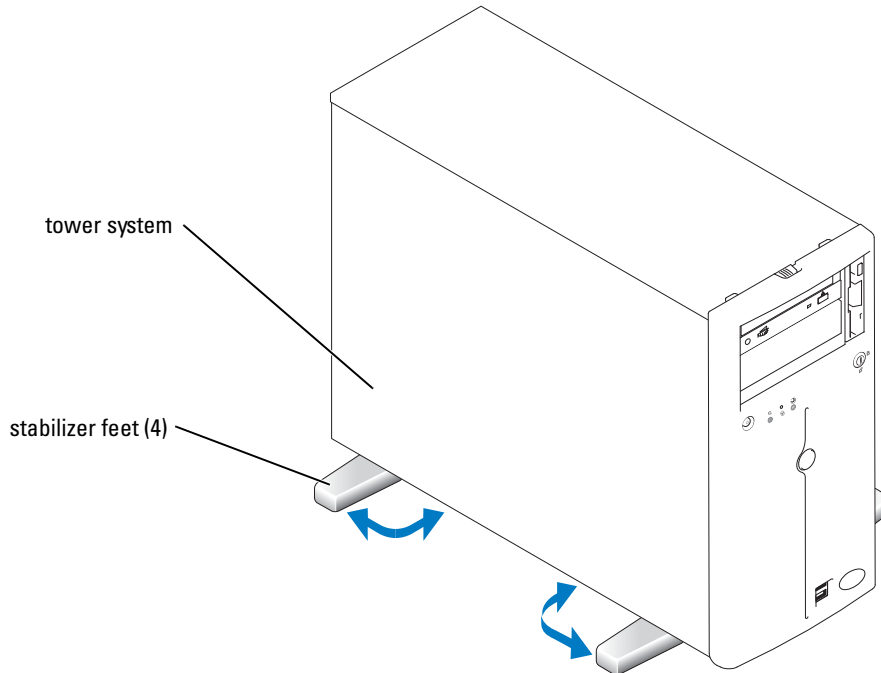⚠ **CAUTION: The tower system has four stabilizer feet on its bottom panel that can be rotated outward to help properly stabilize the system. Ensure that the four stabilizer feet are rotated outward before you operate the system. See Figure 5-3.**

Figure 5-3.   Rotating the Tower System Stabilizer Feet

System Cover

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

Opening the System

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Remove the bezel. See "Removing the Bezel."

2 If your system is a tower, lay it on its right side.

3 Loosen the three thumbscrews on the left-side cover. See Figure 5-4.

4 Grasp the cover at both ends and slide it toward the front of the system.

5 Lift the cover away from the system.

Figure 5-4. Opening the System
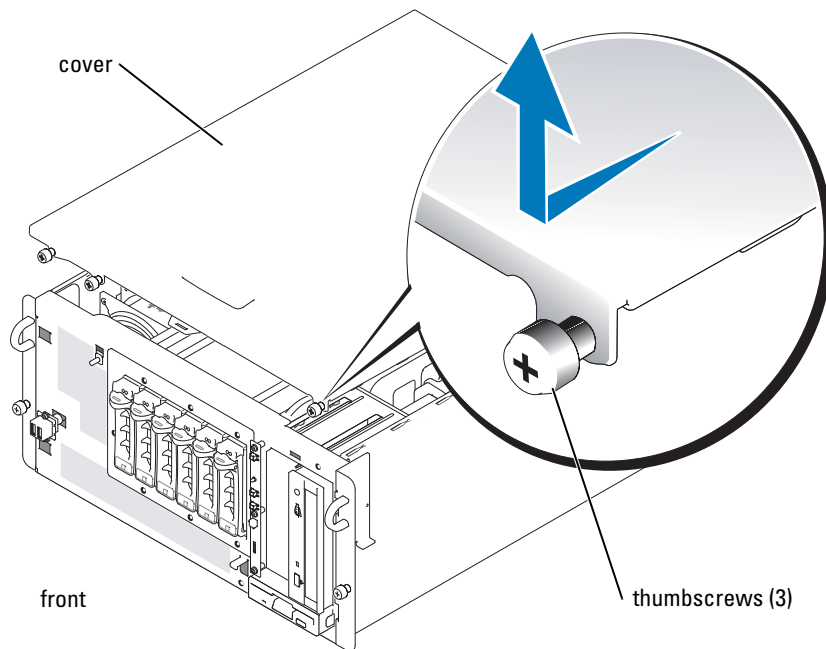
Closing the System

1 Ensure that no tools or loose parts are left inside the system.

2   Fit the cover on the side of the system, and slide the cover backward.

3   Tighten the three cover thumbscrews. See Figure 5-4.

4   If your system is a tower, stand it upright.

5   Replace the bezel.

Baffle/Back Fan Assembly

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

The vertical plastic baffle/back fan assembly in the center of the system improves system cooling by guiding the airflow within the system. You must remove the baffle/back fan assembly when performing certain procedures inside the system to improve access to some internal components.

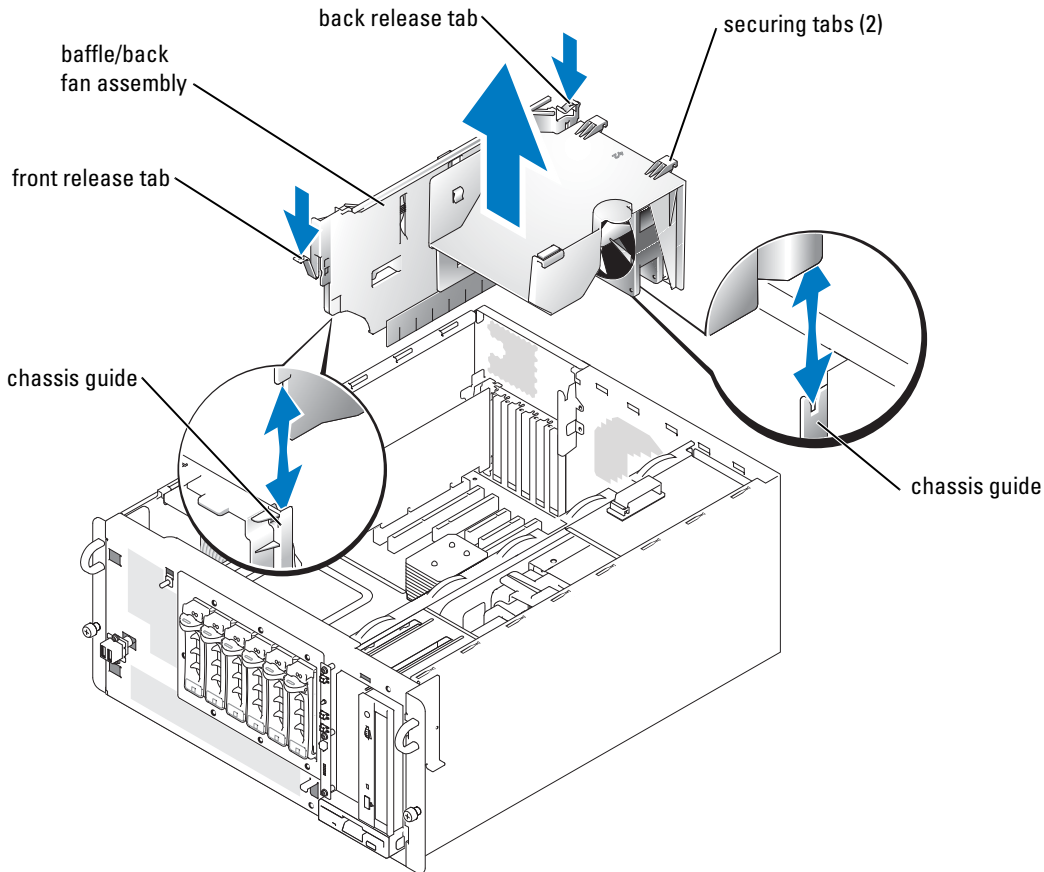**Figure 5-5.   Removing the Baffle/Back Fan Assembly**

Removing the Baffle/Back Fan Assembly

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

To remove the baffle/back fan assembly, perform the following steps:

1   Press the release tab at the front of the assembly and the release tab at the back of the assembly.

2   Slightly lift up the baffle/back fan assembly and disconnect the back fan assembly cable from the system board. See Figure A-3 for the location of the system-board back fan connector.

3   Lift the baffle/back fan assembly out of the chassis.

⊘ **NOTICE:** You must reinstall the baffle/back fan assembly to maintain proper airflow for system cooling.

Installing the Baffle/Back Fan Assembly

Reconnect the back fan cable to the system board connector. Align both ends of the assembly with the chassis guides, and then slide the assembly into the system until the two securing tabs properly seat in the chassis slots and the two release tabs lock into position. See Figure 5-5.

Troubleshooting a Wet System

Problem

- Liquid spilled on the system.
- Excessive humidity.

Action

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

2 Open the system. See "Opening the System."

3 Remove all expansion cards installed in the system. See "Removing an Expansion Card" in "Installing System Options."

4 Let the system dry thoroughly for at least 24 hours.

5 Close the system. See "Closing the System."

6 Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.

   If the system does not start properly, see "Getting Help."

7 If the system starts properly, shut down the system and reinstall all of the expansion cards that you removed. See "Installing an Expansion Card" in "Installing System Options."

8 Run the appropriate online diagnostic test. See "Using Server Administrator Diagnostics" in "Running System Diagnostics."

   If the tests fail, see "Getting Help."

Troubleshooting a Damaged System

Problem

- System was dropped or damaged.

Action

⚠️ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Open the system. See "Opening the System."
2 Ensure that the following components are properly installed:
    - Expansion cards
    - Power supplies
    - Fans
    - Drive-carrier connections to the SCSI backplane board, if applicable
3 Ensure that all cables are properly connected.
4 Close the system. See "Closing the System."
5 Run the system board tests in the system diagnostics. See "Running System Diagnostics."

   If the tests fail, see the appropriate section in this chapter.

Troubleshooting the System Battery

Problem

- System message indicates a problem with the battery.
- System Setup program loses system configuration information.
- System date and time do not remain current.

📝 **NOTE:** 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 caused by a defective battery.

Action

⚠️ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Re-enter the time and date through the System Setup program. See "Using the System Setup Program" in your *User's Guide*.

2 Turn off the system and disconnect it from the electrical outlet for at least one hour.

3 Reconnect the system to the electrical outlet and turn on the system.

4 Enter the System Setup program.

If the date and time are not correct in the System Setup program, replace the battery. See "System Battery" in "Installing System Options."

If the problem is not resolved by replacing the battery, see "Getting Help."

✎ **NOTE:** 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.

Troubleshooting Power Supplies

Problem

- System-status indicators are amber.
- Power-supply fault indicators are amber.

Action

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Run the appropriate online diagnostics test. See "Using Server Administrator Diagnostics" in "Running the System Diagnostics."

2 Locate the faulty power supply.

The power supply's fault indicator is lit. See "Power Indicator Codes" in "Indicators, Codes, and Messages."

⊘ **NOTICE:** You can hot-plug the power supplies. One power supply must be installed for the system to operate. The system is in the redundant mode when two power supplies are installed. Remove and install only one power supply at a time in a system that is powered on. Operating the system with only one power supply installed for extended periods of time can cause the system to overheat.

3 Ensure that the power supply is properly installed by removing and reinstalling it. See "Removing a Redundant Power Supply" and "Installing a Redundant Power Supply" in "Installing System Options."

✎ **NOTE:** After installing a power supply, allow several seconds for the system to recognize the power supply and to determine if it is working properly. The power indicator turns green to signify that the power supply is functioning properly. See "Power Indicator Codes" in "Indicators, Codes, and Messages."

4 If reseating the power supply did not resolve the problem, remove the faulty power supply. See "Removing a Redundant Power Supply" in "Installing System Options."

5 Install a new power supply. See "Installing a Redundant Power Supply" in "Installing System Options."

If the problem persists, see "Getting Help."

Troubleshooting System Cooling Problems

Problem

- Systems management software issues a fan-related error message.

Action

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

Ensure that none of the following conditions exist:

- Ambient temperature is too high.
- External airflow is obstructed.
- Cables inside the system obstruct airflow.
- An individual cooling fan has failed. See "Troubleshooting a Fan."

Troubleshooting a Fan

Problem

- System-status indicator is amber.
- Systems management software issues a fan-related error message.

Action

⚠️ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Run the appropriate diagnostic test. See "Using Server Administrator Diagnostics" in Running System Diagnostics."

2 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

3 Open the system. See "Opening the System."

4 Ensure that the faulty fan's power cable is firmly attached to the fan power connector. See "System Fans" in "Installing System Options."

5 If the problem is not resolved, install a new fan. See "System Fans" in "Installing System Options."

   If the replacement fan is working properly, close the system. See "Closing the System."

   If the replacement fan does not operate, see "Getting Help."

Troubleshooting System Memory

Problem

- Faulty memory module.
- Faulty system board.

Action

⚠️ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Run the appropriate online diagnostic test. See "Using Server Administrator Diagnostics" in "Running System Diagnostics."

2 Turn on the system and attached peripherals.

   If an error messages does not appear, go to step 13.

3 Enter the System Setup program and check the system memory setting. See "Using the System Setup Program" in your *User's Guide*.

   If the amount of memory installed matches the system memory setting, go to step 13.

4 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

5 Open the system. See "Opening the System."

6 Remove the baffle/back fan assembly. See "Removing the Baffle/Back Fan Assembly."

7 Ensure that the memory banks are populated correctly. See "General Memory Module Installation Guidelines" in "Installing System Options."

If the memory modules are populated correctly, continue to the next step.

8 Reseat the memory modules in their sockets. See "Installing Memory Modules" in "Installing System Options."

9 Install the baffle/back fan assembly. See "Installing the Baffle/Back Fan Assembly."

10 Close the system. See "Closing the System."

11 Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.

12 Enter the System Setup program and check the system memory setting. See "Using the System Setup Program" in your *User's Guide*.

If the amount of memory installed does not match the system memory setting, then perform the following steps:

a Turn off the system and attached peripherals, and disconnect the system from its electrical outlet.

b Open the system. See "Opening the System."

c Remove the baffle/back fan assembly. See "Removing the Baffle/Back Fan Assembly."

🖉 **NOTE:** Several configurations for the memory modules exist; see "General Memory Module Installation Guidelines" in "Installing System Options."

d Swap the memory modules in bank 1 with another bank of the same capacity. See "Installing Memory Modules" in "Installing System Options."

e Install the baffle/back fan assembly. See "Installing the Baffle/Back Fan Assembly."

f Close the system. See "Closing the System."

g Reconnect the system to its electrical outlet, and turn on the system and attached peripherals.

h As the system boots, observe the monitor screen and the indicators on the keyboard.

13 Perform the following steps:

a Turn off the system and attached peripherals, and disconnect the system from its electrical outlet.

b Open the system. See "Opening the System."

c Remove the baffle/back fan assembly. See "Removing the Baffle/Back Fan Assembly."

d Repeat step d through step h in step 12 for each memory module installed.

If the problem persists, see "Getting Help."

Troubleshooting a Diskette Drive

Problem

- Error message indicates a diskette drive problem.

Action

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1. Enter the System Setup program and verify that the diskette drive is configured correctly. See "Using the System Setup Program" in the *User's Guide*.

2. Run the appropriate online diagnostic test. See "Using Server Administrator Diagnostics" in "Running System Diagnostics."

3. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

4. Open the system. See "Opening the System."

5. Ensure that the diskette drive interface cable is securely connected to the diskette drive and the system board.

6. Ensure that a power cable is properly connected to the drive.

7. Close the system. See "Closing the System."

8. Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.

9. Run the appropriate online diagnostic test to see whether the diskette drive works correctly.

10. Turn off the system and attached peripherals, and disconnect the system from its electrical outlet.

11. Open the system. See "Opening the System."

12. Remove all expansion cards installed in the system. See "Removing an Expansion Card" in "Installing System Options."

13. Close the system. See "Closing the System."

14. Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.

15. Run the appropriate online diagnostic test to see whether the diskette drive works correctly.

    If the tests run successfully, an expansion card may be conflicting with the diskette drive logic, or an expansion card may be faulty. Continue to the next step.

    If the tests fail, see "Getting Help."

16 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

17 Open the system. See "Opening the System."

18 Reinstall one of the expansion cards you removed in step 12. See "Installing an Expansion Card" in "Installing System Options."

19 Close the system. See "Closing the System."

20 Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.

21 Run the appropriate online diagnostic test to see whether the diskette drive works correctly.

22 Repeat step 16 through step 22 until all expansion cards are reinstalled or one of the expansion cards causes the tests to fail.

If the problem is not resolved, see "Getting Help."

Troubleshooting a CD Drive

Problem

- System cannot read data from a CD in an IDE or SCSI CD drive.
- CD drive indicator does not blink during boot.

Action

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Try using a different CD that you know works properly.

2 Enter the System Setup program and ensure that the drive's IDE or SCSI controller is enabled. See "Using the System Setup Program" in the *User's Guide*.

3 Run the appropriate online diagnostic test. See "Using Server Administrator Diagnostics" in "Running System Diagnostics."

4 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

5 Turn off the system and attached peripherals, and disconnect the system from the electrical

6 Open the system. See "Opening the System."

7 Ensure that the CD interface cable is securely connected to the CD drive and to the controller.

8 Ensure that a power cable is properly connected to the drive.

9 Close the system. See "Closing the System."

10 Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.

If the problem is not resolved, see "Getting Help."

Troubleshooting an External SCSI Tape Drive

Problem

- Defective tape drive
- Defective tape cartridge
- Missing or corrupted tape-backup software or tape drive device driver
- Defective SCSI controller

Action

1 Remove the tape cartridge you were using when the problem occurred, and replace it with a tape cartridge that you know works.

2 Ensure that the SCSI device drivers for the tape drive are installed and are configured correctly. See "Installing and Configuring SCSI Drivers" in "Installing Drives."

3 Reinstall the tape-backup software as instructed in the tape-backup software documentation.

4 Ensure that the tape drive's interface/DC power cable is connected to the tape drive and SCSI controller card.

5 Verify that the tape drive is configured for a unique SCSI ID number and that the tape drive is terminated or not terminated, based on the interface cable used to connect the drive.

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

6 Run the appropriate online diagnostics tests. See "Using Server Administrator Diagnostics" in "Running System Diagnostics."

7 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

⚠️ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

8 Open the system. See "Opening the System."

9 Ensure that the SCSI controller card is firmly seated in its connector. See "Installing an Expansion Card" in "Installing System Options."

10 Close the system. See "Closing the System."

11 Reconnect the system to the electrical outlet, and turn on the system, including attached peripherals.

12 If the problem is not resolved, see the documentation for the tape drive for additional troubleshooting instructions.

13 If you cannot resolve the problem, see "Getting Help" for information on obtaining technical assistance.

Troubleshooting SCSI Hard Drives

Troubleshooting a SCSI Hard Drive (System With a SCSI Backplane)

Problem

- Device driver error.
- Hard drive not recognized by the system.

Action

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

◯ **NOTICE:** This procedure can destroy data stored on the hard drive. Before you continue, back up all files on the hard drive.

1 Run the appropriate online diagnostic test. See "Using Server Administrator Diagnostics" in "Running System Diagnostics."

For information about testing the controller, see the SCSI or RAID controller's documentation.

If the tests fail, continue to the next step.

2 If the integrated SCSI host adapter controls the SCSI hard drives, restart the system and press <Ctrl><a> to enter the SCSI configuration utility program.

📝 **NOTE:** If your system has an optional RAID controller card installed, restart the system and press <Ctrl><a> or <Ctrl><m>, depending on the utility. See the documentation supplied with the controller for information about the configuration utility.

3 Ensure that the primary SCSI channel is enabled, and restart the system.

4 Verify that the device drivers are installed and configured correctly. See the operating system documentation.

5 Remove the hard drive and install it in another drive bay.

6 If the problem is resolved, reinstall the hard drive in the original bay. See "Installing and Removing Hot-Plug SCSI Hard Drives" in "Installing Drives."

If the hard drive functions properly in the original bay, the drive carrier could have intermittent problems. Replace the drive carrier. See "Installing and Removing Hot-Plug SCSI Hard Drives" in "Installing Drives."

If the problem persists, the SCSI backplane board has a defective connector. See "Getting Help."

7 Check the SCSI cable connections inside the system:

a Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.

b Open the system. See "Opening the System."

c Verify that the SCSI cable is securely connected to the SCSI host adapter.

The SCSI cable may be connected to the SCSI host adapter on the system board or to a SCSI host adapter card installed in an expansion slot.

d Close the system. See "Closing the System."

8 Format and partition the hard drive. See the operating system documentation.

9 If possible, restore the files to the drive.

If the problem persists, see "Getting Help."

Troubleshooting SATA Hard Drives

Troubleshooting a SATA Hard Drive

Problem

- Faulty hard drive
- Damaged or improperly connected hard-drive cables

Action

⚠️ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

🚫 **NOTICE:** This troubleshooting procedure can destroy data stored on the hard drive. Before you proceed, back up all files on the hard drive.

📝 **NOTE:** If the hard drive is used in a RAID configuration, see "Troubleshooting a SATA Hard Drive in a RAID Configuration."

1   Run the appropriate online diagnostic test. See "Using Server Administrator Diagnostics" in "Running the System Diagnostics."

2   Enter the System Setup program and verify that the system is configured correctly. See "Using the System Setup Program" in your *User's Guide*.

3   Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

4   Open the system. See "Opening the System."

5   Ensure that the hard-drive interface cable is properly connected between the drive and the system board.

    To identify system board connectors, see Figure A-3.

6   If the hard drive is the boot drive, ensure that the drive is configured and connected properly. See "Configuring the Boot Drive" in "Installing Drives."

7   Ensure that the power cable is properly connected to the drive.

8   Close the system. See "Closing the System."

9   Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.

10 Format and partition the hard drive. See the operating system documentation.

11 If possible, restore the files to the drive.

    If the problem persists, see "Getting Help."

Troubleshooting a SATA Hard Drive in a RAID Configuration

Problem
- Device driver error
- Damaged or improperly connected hard-drive cables

Action

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

⊘ **NOTICE:** This troubleshooting procedure can destroy data stored on the hard drive. Before you proceed, back up all files on the hard drive.

1   Run the appropriate online diagnostic test. See "Using Server Administrator Diagnostics" in "Running the System Diagnostics."

2   Restart your system and enter the RAID configuration utility. See the RAID controller documentation.

3   Ensure that the required device drivers are installed and are configured correctly. See the *Dell OpenManage Server Assistant* CD and the RAID controller's documentation.

4   Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

5   Open the system. See "Opening the System."

6   Ensure that the hard-drive interface cable is properly connected to the drive and to the controller card. See the documentation that accompanied the controller card.

7   If the hard drive is the boot drive, ensure that the drive is configured and connected properly. See "Configuring the Boot Drive" in "Installing Drives."

8   Ensure that the power cable is properly connected to the drive.

9   Close the system. See "Closing the System."

10 Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.

    If the problem persists, continue to the next step.

11 Format and partition the hard drive. See the operating system documentation.

12 If possible, restore the files to the drive.

    If the problem persists, see "Getting Help."

Troubleshooting a RAID Controller Card

NOTE: When troubleshooting a RAID controller card, also see the documentation for your operating system and the RAID controller.

Problem

•   Error message indicates a RAID controller problem.

•   RAID controller performs incorrectly or not at all.

Action

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1   Run the appropriate online diagnostic test. See "Using Server Administrator Diagnostics" in "Running the System Diagnostics."

2   Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

3   Open the system. See "Opening the System."

4 Ensure that the controller card is firmly seated in its connector. See "Installing a RAID Controller Card" in "Installing System Options."

5 Ensure that the appropriate cables are firmly connected to their corresponding connectors on the controller card.

6 Close the system. See "Closing the System."

7 Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.

If the problem persists, see the RAID controller's documentation for more information on troubleshooting.

Troubleshooting Expansion Cards

📝 **NOTE:** When troubleshooting an expansion card, see the documentation for your operating system and the expansion card.

Problem

- Error message indicates a problem with an expansion card.
- Expansion card performs incorrectly or not at all.

Action

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Run the appropriate online diagnostic test. See "Using Server Administrator Diagnostics" in "Running System Diagnostics."

2 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

3 Open the system. See "Opening the System."

4 Ensure that each expansion card is firmly seated in its connector. See "Installing an Expansion Card" in "Installing System Options."

5 Close the system. See "Closing the System."

6 Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.

If the problem persists, go to the next step.

7 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

8 Open the system. See "Opening the System."

9   Remove all expansion cards installed in the system. See "Removing an Expansion Card" in "Installing System Options."

10 Close the system. See "Closing the System."

11 Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.

12 Run the appropriate online diagnostic test.

    If the tests fail, see "Getting Help."

13 For each expansion card you removed in step 9, perform the following steps:

    a   Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

    b   Open the system. See "Opening the System."

    c   Reinstall one of the expansion cards.

    d   Close the system. See "Closing the System."

    e   Run the appropriate diagnostic test.

        If the tests fail, see "Getting Help."

Troubleshooting the Microprocessors

Problem

- Error message indicates a processor problem.
- A heat sink is not installed for each processor.

Action

⚠ CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1   Run the appropriate online diagnostics test. See "Using Server Administrator Diagnostics" in "Running the System Diagnostics."

2   Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

3   Open the system. See "Opening the System."

4   Ensure that each processor and heat sink are properly installed. See "Processors" in "Installing System Options."

5   Close the system. See "Closing the System."

6   Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.

7   Run the appropriate online diagnostic test.

    If the tests fail or the problem persists, continue to the next step.

8   Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

9   Open the system. See "Opening the System."

10 Remove the processors, leaving only processor 1 installed. See "Processors" in "Installing System Options."

    To locate the processors, see Figure A-3.

    If only one processor is installed, see "Getting Help."

11 Close the system. See "Closing the System."

12 Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.

13 Run the appropriate online diagnostic test.

    If the tests complete successfully, go to step 19.

14 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

15 Open the system. See "Opening the System."

16 Replace processor 1 with another processor of the same capacity. See "Processors" in "Installing System Options."

17 Close the system. See "Closing the System."

18 Run the appropriate online diagnostic test.

    If the tests complete successfully, replace processor 1. See "Getting Help."

19 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

20 Open the system. See "Opening the System.""

21 Reinstall the processors that you removed in step 10. See "Processors" in "Installing System Options."

22 Close the system. See "Closing the System."

23 Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.

    If the problem persists, see "Getting Help."

6

Installing System Options

This section describes how to remove and install the following components:

*   System fans
*   Optional redundant power supplies
*   Expansion cards
*   Memory modules
*   Microprocessors
*   System battery
*   Control panel

For information on installing a hard drive or other drives, see "Installing Drives."

System Fans

Your system includes the following system cooling fans:

*   Front system fan
*   Back system fan

Removing the Front System Fan

⚠️ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.

2 Open the system. See "Opening the System" in "Troubleshooting Your System."

3 If your system is configured as a tower, lay the system on its right side.

4 Remove the baffle/back fan assembly. See "Removing the Baffle/Back Fan Assembly."

5 Remove all full-length expansion cards, if installed. See "Removing an Expansion Card."

6 Remove the expansion-card guide:

    a Press and hold the expansion-card guide release tab. See Figure 6-1.

    b Pivot the guide assembly away from the fan assembly and lift the guide assembly away from the system.

7 Disconnect the fan power cable from the front fan connector on the system board.

To identify system board connectors, see Figure A-3.

8 Remove the front fan assembly:

    a Press and hold the front-fan release tab. See Figure 6-1.

    b Pivot the fan assembly away from the chassis and remove the fan assembly from the system.

Installing the Front System Fan

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Connect the fan cable to the front fan connector on the system board.

To identify system board connectors, see Figure A-3.

2 Replace the front fan assembly:

    a Insert the two fan securing tabs into the two securing slots on the chassis. See Figure 6-1.

    b Pivot the fan assembly forward until it is fully closed.

3 Replace the expansion-card guide:

    a Insert the two expansion-card guide securing tabs into the two securing slots on the fan assembly. See Figure 6-1.

    b Pivot the expansion-card guide forward until it is fully closed.

    Be careful not to trap the fan power cable between the fan bay and the expansion-card guide.

4 Reinstall all full-length expansion cards, if applicable. See "Installing an Expansion Card."

5 Reinstall the baffle/back fan assembly. See "Installing the Baffle/Back Fan Assembly."

6 Close the system. See "Closing the System" in "Troubleshooting Your System."

7 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

Figure 6-1.   Removing the Expansion-Card Guide and Front System Fan
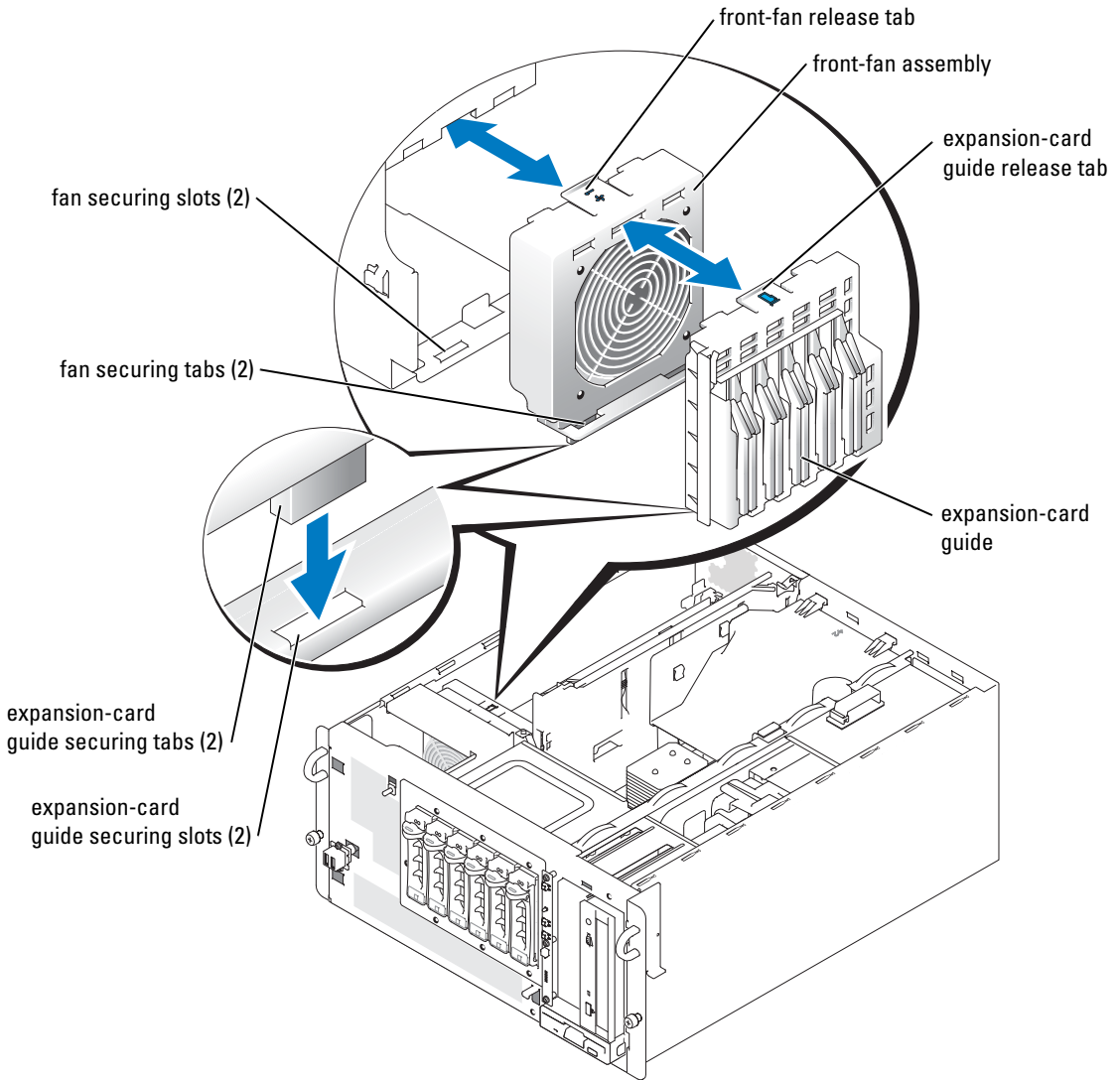
Redundant Power Supplies

The optional redundant power supplies are accessible from the back panel.

Removing a Redundant Power Supply

⚠ **CAUTION: To prevent risk of personal injury from electrical shock, do not reach into an empty power supply bay.**

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

1 Disconnect the power cord from the power supply.

2 Press the spring tab that secures the power supply handle, and then pull the handle outward to release the power supply. See Figure 6-2.

3 Slide the power supply out of the chassis.

Installing a Redundant Power Supply

1 Slide the power supply into the chassis.

2 When the power supply is fully inserted, rotate the power supply handle inward to lock the power supply in place.

The power supply does not function until the handle is fully closed.

3 Plug the power cable into the power supply, ensuring that the cable passes through the power cable strain relief loop.

⬜ **NOTE:** After installing a new power supply, allow several seconds for the system to recognize the power supply and determine whether it is working properly. The power-on indicator turns green to signify that the power supply is functioning properly. See Figure 2-4.

Figure 6-2.   Removing and Installing an Optional Redundant Power Supply
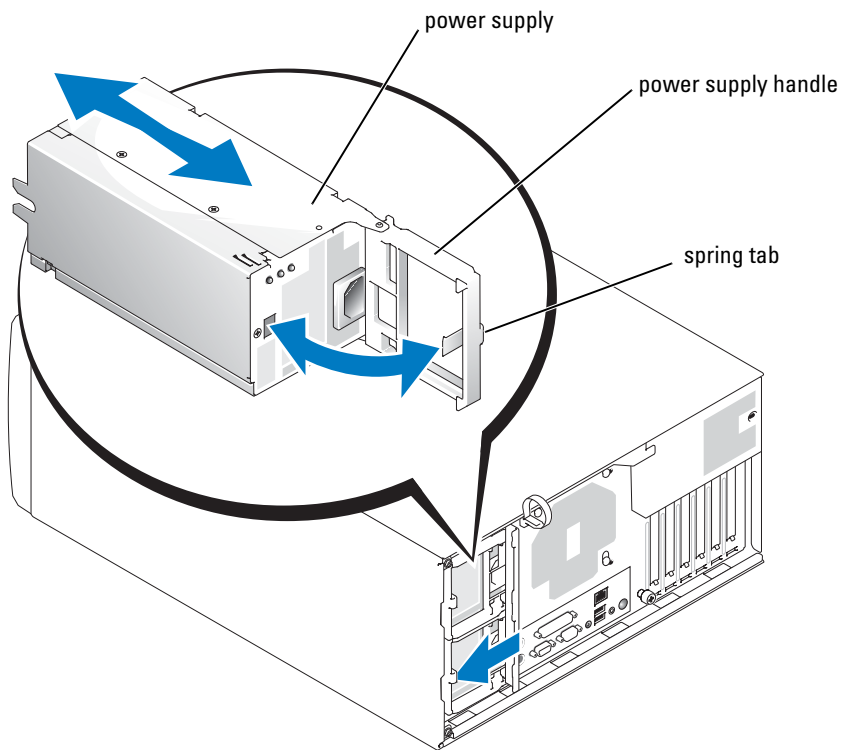
Expansion Cards

The system includes six expansion slots, configured as follows:

- Slot 1 is PCI 64-bit, 66-MHz (3.3 V).
- Slot 2 is PCI Express x4 lane (3.3 V).
- Slot 3 is PCI Express x8 lane (3.3 V).
- Slot 4 is PCI 32-bit, 33-MHz (5 V).
- Slots 5 and 6 are PCI-X 64-bit, 100-MHz (3.3 V).

NOTE: Although the PCIe x4-lane expansion slot is physically a PCIe x8 connector, it functions only as a PCIe x4-lane slot.

NOTE: The PCI and PCI-X slots can accommodate slower-rated expansion cards of the same type.

NOTE: The PCIe slots do not accommodate PCI-X or PCI cards and the PCI-X and PCI slots do not accommodate PCIe cards.

Slots 2, 3, 4, and 5 can accommodate full-length cards. Slot 6 can accommodate a full-length card if the integrated SCSI connector is not used. Slot 1 accommodates only half-length cards. To identify expansion-card slots, see Figure A-3.
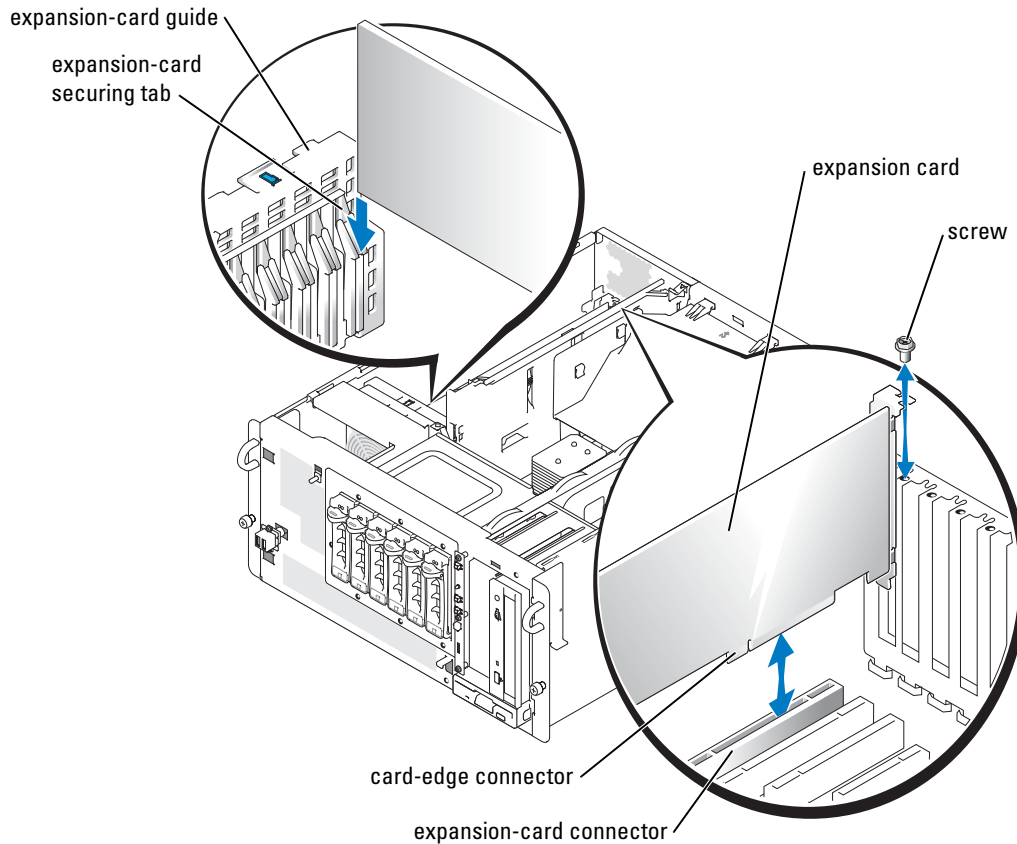
Installing an Expansion Card

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

✍ **NOTE:** A RAC expansion card must be installed in expansion-card slot 4. See Figure A-3 to locate the correct expansion-card slot.

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

   For instructions, see the documentation that accompanied the card.

2 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.

3 Open the system. See "Opening the System" in "Troubleshooting Your System."

4 If your system is configured as a tower, lay the system on its right side.

5 Remove the filler bracket from the expansion slot.

6 Install the expansion card:

   a Position the expansion card so that the card-edge connector aligns with the expansion-card connector on the system board. If the card is a full-length card, insert its front edge into the expansion-card guide. See Figure 6-3.

   b Insert the card-edge connector firmly into the expansion-card connector until the card is fully seated.

   c Install the screw that secures the expansion-card bracket to the back panel.

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

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

8 Close the system. See "Closing the System" in "Troubleshooting Your System."

9 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

Figure 6-3. Removing and Installing an Expansion Card

expansion-card guide

expansion-card securing tab

expansion card

screw

card-edge connector

expansion-card connector

Removing an Expansion Card

⚠️ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.

2 Open the system. See "Opening the System" in "Troubleshooting Your System."

3 If your system is configured as a tower, lay the system on its right side.

4 Disconnect any cables attached to the card.

5 Remove the expansion card:

    a Remove the screw that secures the expansion-card bracket to the back panel.

    b Press the expansion-card securing tab (if the expansion card is full-length), grasp the expansion card by its top corners, and then carefully remove it from the expansion-card connector. See Figure 6-3.

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

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

7 Close the system. See "Closing the System" in "Troubleshooting Your System."

8 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

System Memory

The six memory module sockets can accommodate from 256 MB to 12 GB of registered ECC PC2-3200 (DDR 2 400) memory. The memory sockets are located on the system board under the memory module shroud adjacent to the power supply bays. See Figure A-3.

You can upgrade the system memory by installing combinations of 256-MB, 512-MB, 1-GB, and 2-GB registered memory modules. You can purchase memory upgrade kits from Dell.

◩ NOTE: Two-way interleaving is not supported in the minimum memory configuration (single 256-MB memory module) and the maximum memory configuration depends on the availability of single-rank 2-GB memory modules.

◩ NOTE: The memory modules must be PC2-3200 compliant.

◯ NOTICE: If you remove your original memory modules from the system during a memory upgrade, keep them separate from any new memory modules that you may have, even if you purchased the new memory modules from Dell. Use only registered ECC DDR II memory modules.

The memory module sockets are arranged in three banks on two channels (A and B). The memory module banks are identified as follows:

- Bank 1: DIMM1_A and DIMM1_B
- Bank 2: DIMM2_A and DIMM2_B
- Bank 3: DIMM3_A and DIMM3_B

General Memory Module Installation Guidelines

- If only one memory module is installed, it must be a 256 MB module installed in socket DIMM_1A.
- If two or more memory modules are installed, they must be installed in pairs of matched memory size, speed, and technology.
- Install memory modules in order of decreasing capacity, beginning with bank 1, then bank 2, and then bank 3.
- The system supports both single-ranked and dual-ranked memory modules.

  Memory modules marked with a 1R are single ranked and modules marked with a 2R are dual ranked.

- If you install both single-ranked and dual-ranked memory modules, the dual-ranked memory modules must be installed in bank 1, regardless of capacity.

  NOTE: Dual-rank memory modules with less capacity take precedence over single-ranked memory modules with greater capacity.

- Dual-ranked memory modules are not supported in bank 3.

Table 6-1 and Table 6-2 show examples of different memory configurations. Table 6-2 lists the various allowable combinations of single- and dual-ranked memory modules.

Table 6-1.   Sample Memory Configurations

Total Memory	DIMM_1A	DIMM_1B	DIMM_2A	DIMM_2B	DIMM_3A	DIMM_3B
256 MB	256 MB	none	none	none	none	none
1 GB	256 MB	256 MB	256 MB	256 MB	none	none
1 GB	512 MB	512 MB	none	none	none	none
2 GB	512 MB	512 MB	512 MB	512 MB	none	none
2 GB	1 GB	1 GB	none	none	none	none
3 GB	1 GB	1 GB	512 MB	512 MB	none	none
3 GB	512 MB	512 MB	512 MB	512 MB	512 MB	512 MB
4 GB	1 GB	1 GB	1 GB	1 GB	none	none
4 GB	1 GB	1 GB	512 MB	512 MB	512 MB	512 MB
6 GB	2 GB	2 GB	1 GB	1 GB	none	none
6 GB	1 GB	1 GB	1 GB	1 GB	1 GB	1 GB
8 GB	2 GB	2 GB	2 GB	2 GB	none	none
8 GB	2 GB	2 GB	1 GB	1 GB	1 GB	1 GB
12 GB	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB

**Table 6-2.   Allowable Memory Module Configurations – Single-Ranked and Dual-Ranked Memory Modules**

DIMM1_A	DIMM1_B	DIMM2_A	DIMM2_B	DIMM3_A	DIMM3_B
Single Rank	none	none	none	none	none
Single Rank	Single Rank	none	none	none	none
Dual Rank	Dual Rank	none	none	none	none
Single Rank	Single Rank	Single Rank	Single Rank	none	none
Dual Rank	Dual Rank	Dual Rank	Dual Rank	none	none
Dual Rank	Dual Rank	Single Rank	Single Rank	none	none
Single Rank	Single Rank	Single Rank	Single Rank	Single Rank	Single Rank
Dual Rank	Dual Rank	Single Rank	Single Rank	Single Rank	Single Rank

Installing Memory Modules

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1   Open the system. See "Opening the System" in Troubleshooting Your System."

2   If your system is configured as a tower, lay the system on its right side.

3   Remove the baffle/back fan assembly. See "Removing the Baffle/Back Fan Assembly."

4   Locate the memory module sockets. See Figure A-3.

5   Press the ejectors on the memory module socket down and out, as shown in Figure 6-4, to allow the memory module to be inserted into the socket.

Figure 6-4.   Installing and Removing a Memory Module

memory module

memory module
socket ejectors (2)

socket

alignment keys (2)

front
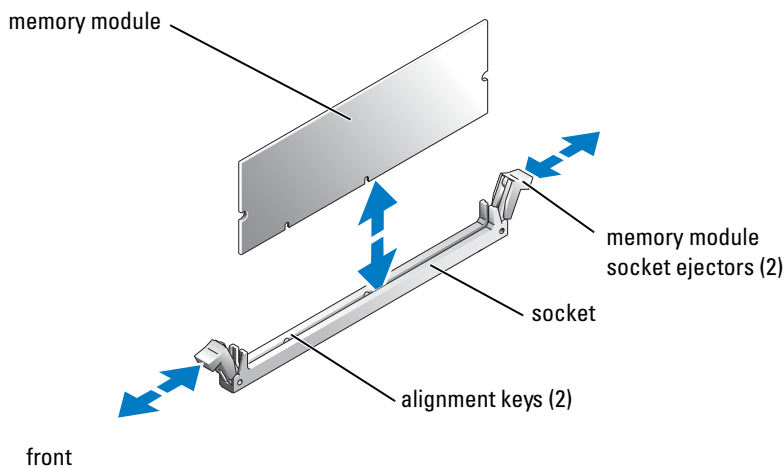
6   Align the memory module's edge connector with the alignment keys of the memory module socket, and insert the memory module in the socket.

   ⃰ **NOTE:** The memory module socket has two alignment keys that allow you to install the memory module in the socket in only one way.

7   Press down on the memory module with your thumbs while pulling up on the ejectors with your index fingers to lock the memory module into the socket.

   When the memory module is properly seated in the socket, the ejectors on the memory module socket align with the ejectors on the other sockets that have memory modules installed.

8   Repeat step 4 through step 7 of this procedure to install the remaining memory modules. See Table 6-1 and Table 6-2 for sample memory configurations.

9   Reinstall the baffle/back fan assembly. See "Installing the Baffle/Back Fan Assembly."

10   Close the system. See "Closing the System" in "Troubleshooting Your System."

11   (Optional) Press <F2> to enter the System Setup program, and check the **System Memory** setting on the main **System Setup** screen.

   The system should have already changed the value to reflect the newly installed memory.

12   If the value is incorrect, one or more of the memory modules may not be installed properly. Repeat step 1 through step 11 of this procedure, checking to ensure that the memory modules are firmly seated in their sockets.

13   Run the system memory test in the system diagnostics. See "Running System Diagnostics."

Removing Memory Modules

⚠️ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Open the system. See "Opening the System" in Troubleshooting Your System."

2 If your system is configured as a tower, lay the system on its right side.

3 Remove the baffle/back fan assembly. See "Removing the Baffle/Back Fan Assembly."

4 Locate the memory module sockets. See Figure A-3.

5 Press down and out on the ejectors on each end of the socket until the memory module pops out of the socket. See Figure 6-4.

6 Reinstall the baffle/back fan assembly. See "Installing the Baffle/Back Fan Assembly."

7 Close the system. See "Closing the System" in "Troubleshooting Your System."

Processors

It is possible to upgrade your processor(s) to take advantage of future options in speed and functionality. Each processor and its associated internal cache memory are contained in a pin grid array (PGA) package that is installed in a ZIF socket on the system board.

The following items are included in the processor upgrade kit:

• Processor

• Heat sink

1 Open the system. See "Opening the System" in Troubleshooting Your System."

2 If your system is configured as a tower, lay the system on its right side.

3 Remove the baffle/back fan assembly. See "Removing the Baffle/Back Fan Assembly."

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

4 Press the tab on the end of one of the heat-sink retention levers to disengage the lever, then lift the lever 90 degrees. See Figure 6-5.

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

Figure 6-5. Installing and Removing the Heat Sink

heat sink

heat-sink retention levers (2)
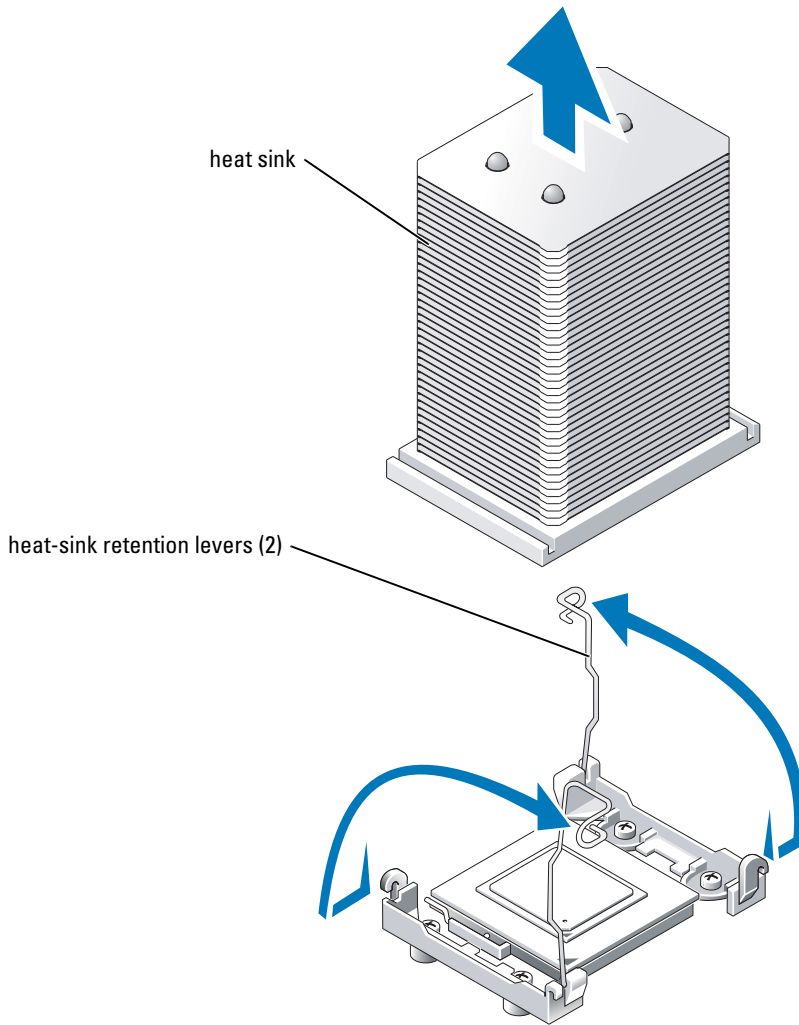
✎ **NOTE:** When removing the heat sink, the possibility exists that the processor might adhere to the heat sink and be removed from the socket. It is recommended that you remove the heat sink while the processor is still warm.

5   Wait 30 seconds for the heat sink to loosen from the processor.

6   Repeat step 4 to open the other heat sink retention lever.

7 Remove the heat sink:

    a If the processor is removed from the socket with the heat sink, twist or slide the processor off of the heat sink. Do not pry the processor off of the heat sink.

    b Set the heat sink on its side so as not to contaminate the thermal grease.

8 Pull the socket-release lever straight up until the processor is released from the socket. See Figure 6-6.

Figure 6-6.   Installing and Removing the Processor
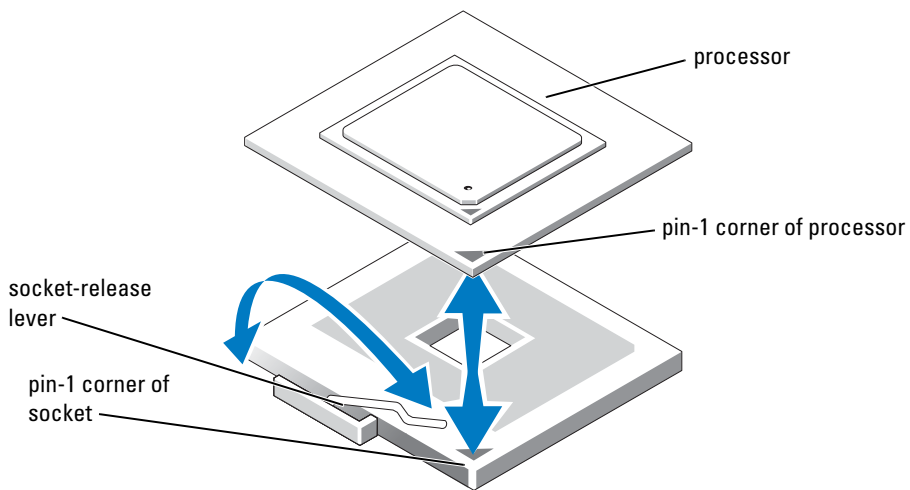
9 Lift the processor out of the socket and leave the release lever up so that the socket is ready for the new processor.

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

10 Unpack the new processor.

If any of the pins on the processor appear bent, see "Getting Help."

11 Align the pin-1 corner of the processor with the pin-1 corner of the ZIF socket. See Figure 6-6.

📝 **NOTE:** Identifying the pin-1 corners is critical to positioning the processor correctly.

Identify the pin-1 corner of the processor by locating the tiny gold triangle on one corner of the processor. Place this corner in the same corner of the ZIF socket identified by a corresponding triangle.

12 Install the processor in the socket.

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

a If the release lever on the processor socket is not positioned all the way up, move it to that position.

b With the pin-1 corners of the processor and socket aligned, set the processor lightly in the socket, making sure all pins are matched with the correct holes in the socket.

Because the system uses a ZIF processor socket, do not use force, which could bend the pins if the processor is misaligned.

When the processor is positioned correctly, it drops down into the socket with minimal pressure.

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

13 Install the heat sink:

a Using a clean lint-free cloth, remove the existing thermal grease from the heat sink.

📝 **NOTE:** Use the heat sink that you removed in step 7.

b Apply thermal grease evenly to the top of the processor.

c Place the heat sink onto the processor. See Figure 6-6.

d Close one of the two heat sink retention levers until it locks. See Figure 6-6.

e Repeat for the other heat sink retention lever.

14 Reinstall the baffle/back fan assembly. See "Installing the Baffle/Back Fan Assembly."

15 Close the system. See "Closing the System" in "Troubleshooting Your System."

As the system boots, it detects the presence of the new processor and automatically changes the system configuration information in the System Setup program.

16 Press <F2> to enter the System Setup program, and check that the processor information matches the new system configuration.

See your *User's Guide* for instructions about using the System Setup program.

17 Run the system diagnostics to verify that the new processor operates correctly.

See "Running System Diagnostics" for information about running the diagnostics and troubleshooting processor problems.

System Battery
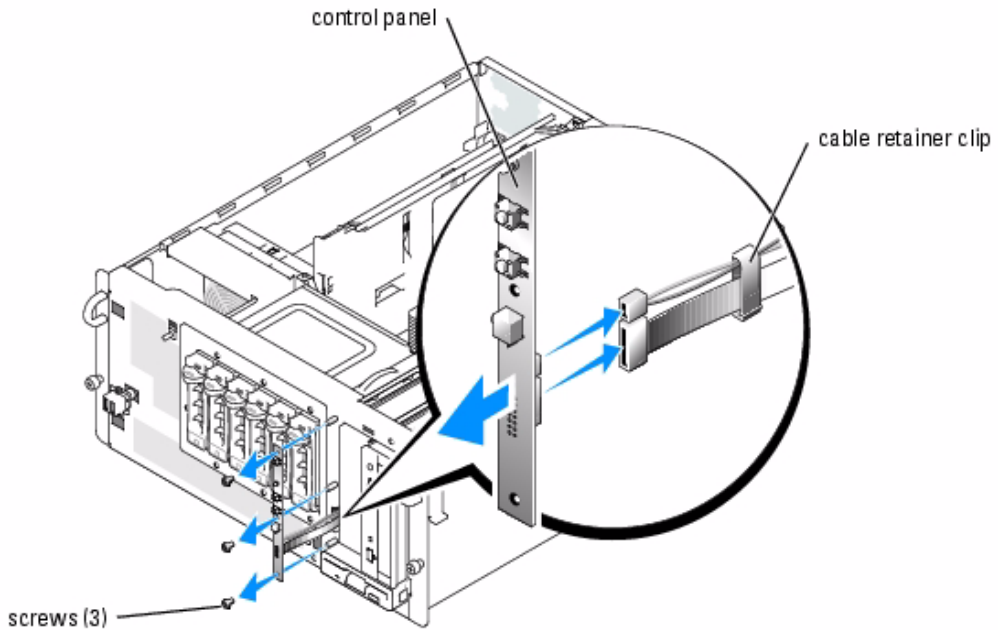
The system battery is a 3-V, coin-cell battery.

Replacing the System Battery

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

⚠ **CAUTION: There is a danger of a new battery exploding if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions. See your *System Information Guide* for additional information.**

1 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.

2 Open the system. See "Opening the System" in "Troubleshooting Your System."

3 If your system is configured as a tower, lay the system on its right side.

4 See Figure A-3 to locate the system battery on the system board.

5 If necessary, remove the expansion cards to access the battery socket.

See "Removing an Expansion Card."

6 Remove the system battery. See Figure 6-7.

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

7 Install the new system battery with the side labeled "+" facing up. See Figure 6-7.

8 If you removed expansion cards in step 4, replace them now.

See "Installing an Expansion Card."

9 Stand the system upright.

10 Close the system. See "Closing the System" in "Troubleshooting Your System."

11 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

Figure 6-7. Replacing the System Battery

system battery

battery connector
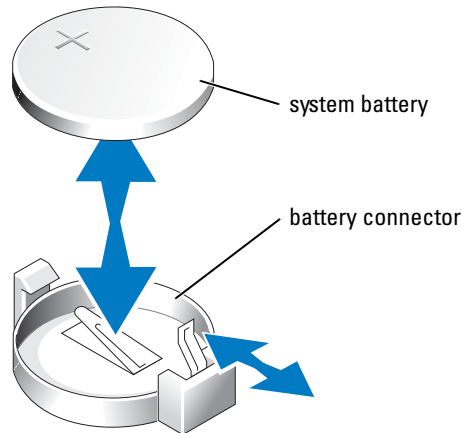
12 Enter the System Setup program to confirm that the battery is operating properly. See "Using the System Setup Program" in your *User's Guide*.

13 Enter the correct time and date in the System Setup program's **Time** and **Date** fields.

14 Exit the System Setup program.

15 To test the newly installed battery, turn off the system and disconnect it from the electrical outlet for at least an hour.

16 After an hour, reconnect the system to its electrical outlet and turn it on.

17 Enter the System Setup program and if the time and date are still incorrect, see "Getting Help" for instructions on obtaining technical assistance.

Control Panel

Removing the Control Panel

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.

2 Remove the bezel. See "Removing the Bezel" in "Troubleshooting Your System."

3 Open the system. See "Opening the System" in "Troubleshooting Your System."

4 If a 5.25-inch drive is installed in the peripheral drive bay, remove it. If that drive bay is empty, remove the chassis drive insert that covers the opening of the empty bay. See "Removing the Front-Panel Drive Inserts" and "Installing a 5.25-Inch Drive" in "Troubleshooting Your System."

5 Open the control panel/chassis-intrusion switch cable retainer clip located below the peripheral drive bay. See Figure 6-8.

6 Remove the three screws securing the control panel to the front of the system. See Figure 6-8.

7 Disconnect the control panel and chassis-intrusion switch cables from the back of the control panel.

Figure 6-8.   Removing and Installing the Control Panel

Installing the Control Panel

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Connect the control panel and chassis-intrusion switch cables to the back of the control panel.

2 Replace the three screws to secure the control panel to the front of the system.

3 Place the control panel and chassis-intrusion switch cables in the cable retainer clip, remove the cable slack between the clip and the control panel, and then close the clip. See Figure 6-8.

4 If you removed a 5.25-inch drive in step 4 of the previous procedure, reinstall the drive. If you removed the chassis drive insert in step 4 of the previous procedure, reinstall the insert. See "Installing the Front-Panel Drive Inserts" and "Installing a 5.25-Inch Drive" in "Troubleshooting Your System."

5 If the system is a tower, stand the system upright.

6 Close the system. See "Closing the System" in "Troubleshooting Your System."

7 Reinstall the bezel. See "Installing the Bezel" in "Troubleshooting Your System."

Installing Drives

Your system supports the following drive configurations:

- Up to two non–hot-plug SATA hard drives when the hard drives are connected to the system board SATA controllers.
- Up to six non–hot-plug SATA hard drives when the hard drives are connected to an optional SATA controller card.
- Up to six optional hot–plug-ready SCSI hard drives when the optional SCSI hard-drive cage is installed.

NOTE: SCSI hot-plug functionality is available only when SCSI RAID is used. See the SCSI RAID controller's documentation to verify that its configuration supports hot-plug SCSI hard drives.

Connecting Drives

Interface Cables

Most interface connectors are keyed for correct insertion. When you disconnect an interface cable, take care to grasp the cable connector, rather than the cable itself, to avoid stress on the cable.

Drive Cable Configurations

Your system can accommodate many different drive configurations, each with specific cable requirements. Table 7-1 shows the cable requirements for common drive configurations.

Table 7-1.   Drive Cable Configuration

Drives	Required Cable	Cable Connections
IDE CD drive, data-only DVD drive, or combination drive. See Figure 7-5.	40-pin IDE 1-drop cable	IDE drive and IDE connector on system board
Up to two non–hot-plug SATA hard drives. See Figure 7-9.	7-pin SATA bundled 2-drop cable	SATA hard drives and SATA controllers on system board
Up to six non–hot-plug SATA hard drives. See Figure 7-10.	7-pin SATA bundled 6-drop cable	SATA hard drives and SATA controller card
Up to six hot–plug-ready SCSI hard drives. See Figure 7-11 and Figure 7-12. **NOTE:** SCSI hot-plug functionality is available only when SCSI RAID is used. See the SCSI RAID controller's documentation to verify that its configuration supports hot-plug SCSI hard drives.	38-cm (15-inch) or 63-cm (25-inch) 68-pin SCSI 1-drop cable (unterminated)	38-cm (15-inch) cable to SCSI backplane and SCSI connector on system board. See Figure 7-11. *or* 63-cm (25-inch) cable to SCSI backplane and RAID controller card. See Figure 7-12.
SCSI half-height tape drive. See Figure 7-6 and Figure 7-7.	68-pin SCSI 1-drop cable (terminated)	SCSI tape drive and SCSI controller on system board. See Figure 7-6. *or* SCSI tape drive and SCSI controller card if SCSI controller is used for SCSI hard drives. See Figure 7-7.

NOTE: For the full name of an abbreviation or acronym used in this table, see the "Glossary" in the *User's Guide*.

DC Power Cables

The 3.5-inch diskette drive, 5.25-inch devices, and SATA hard drives must connect to a DC power cable from the system power supply. (Hot–plug-ready SCSI drives obtain their power from the optional SCSI backplane.)

IDE Configuration Information

The IDE subsystem provides one primary channel. See Figure A-3 for the location of the system board primary IDE connector. The primary channel can support up to two IDE drives (such as CD drives, data-only DVD drives, and half-height tape drives).

Each IDE drive should be configured for the **Cable Select** setting, which assigns master and slave status to a drive according to its position on the interface cable. In this configuration, the drive attached to the last connector on the interface cable is the master or boot drive (drive 0) and the drive attached to the middle connector on the interface cable is the slave drive (drive 1). See the drive's documentation for instructions on configuring the **Cable Select** setting.

SATA Configuration Information

The SATA subsystem provides two SATA channels. See Figure A-3 for the locations of the system board SATA connectors. Each SATA channel can support one non–hot-plug SATA hard drive.

Each 7-pin SATA hard drive cable connects directly between the system board SATA connector and the SATA hard drive. The SATA hard drive that is connected to the system board SATA 0 connector is designated as the primary SATA hard drive, and the SATA hard drive that is connected to the SATA 1 connector is the secondary hard drive.

SCSI Configuration Information

Although SCSI drives are installed in essentially the same way as other drives, their configuration requirements are different. To install and configure a SCSI drive, follow the guidelines in the following subsections.

SCSI Interface Cables

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

SCSI ID Numbers

Each drive attached to a SCSI controller must have a unique SCSI ID number from 0 to 15.

- The SCSI hard drive from which the system boots is configured as SCSI ID 0.
- A SCSI tape drive is typically configured as SCSI ID 6.
- If you install optional SCSI half-height drives or change your SCSI configuration, see the documentation for each SCSI drive for information on setting the appropriate SCSI ID number.

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

Device Termination

SCSI logic requires that termination be enabled for the two drives at opposite ends of the SCSI chain and disabled for all drives in between. For internal SCSI drives, termination is configured automatically. See the documentation provided with any optional SCSI drive you purchase for information on disabling termination.

Configuring the Boot Drive

The drive or device from which the system boots is determined by the boot order specified in the System Setup program. See "Using the System Setup Program" in your *User's Guide*. To boot the system from a hard drive or drive array, the drive(s) must be connected to the appropriate controller:

- To boot from a single SATA hard drive, the master drive (drive 0) must be connected to the primary SATA 0 connector on the system board. To identify system board connectors, see Figure A-3.

- To boot from a single SCSI hard drive, the drive must be connected to the SCSI controller card. See the documentation that accompanied the controller card.

- To boot from a SATA or SCSI RAID array, the drive must be connected to the RAID controller card. See the documentation that accompanied the controller card.
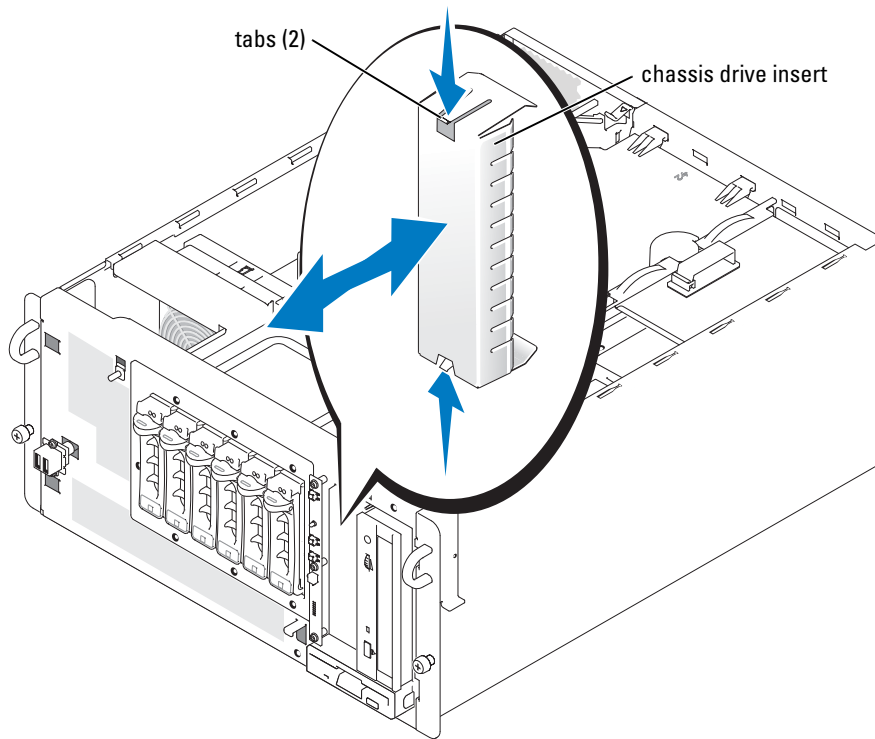
Diskette Drive

Removing a Diskette Drive

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.

2 Open the system. See "Opening the System" in "Troubleshooting Your System."

3 If your system is configured as a tower, lay the system on its right side.

4 Use your thumb and index finger to depress the tabs that secure the diskette drive in the drive bay. See Figure 7-1.

5 Slide the diskette drive forward out of the drive bay.

6 Disconnect the power cable and the interface cable from the diskette drive.

Figure 7-1.   Removing a Diskette Drive
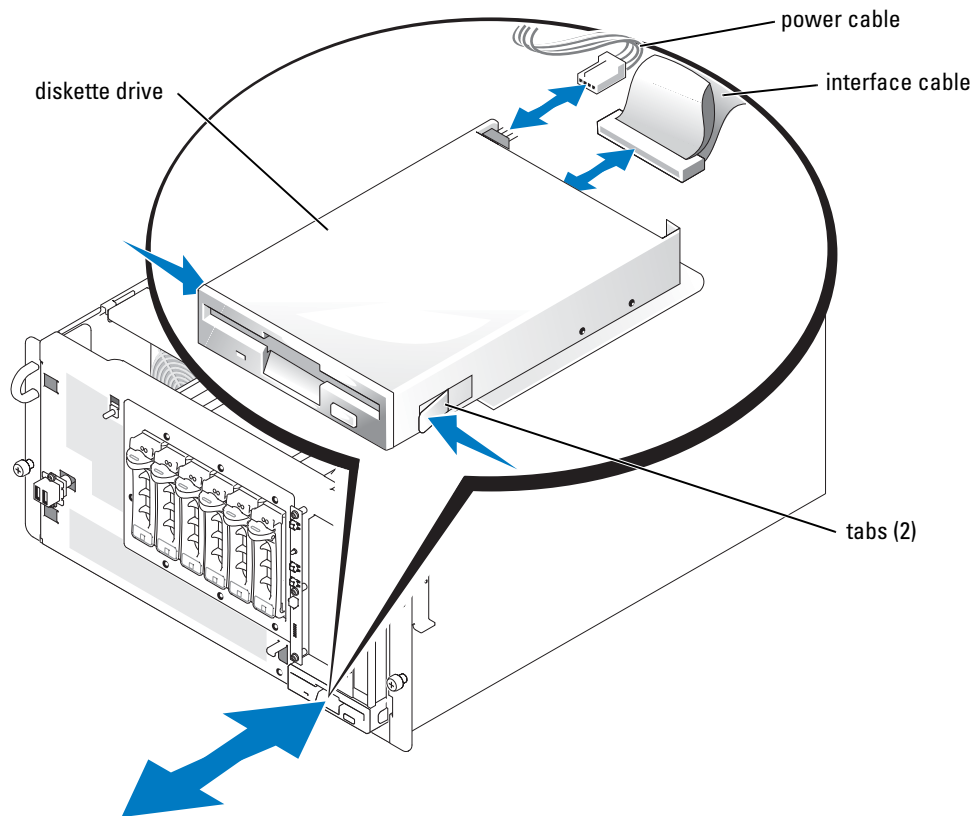
Installing a Diskette Drive

⚠️ **CAUTION: Before you perform this procedure, see "Safety First—For You and Your System" in "Troubleshooting Your System."**

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

1 Connect the power cable and the interface cable to the diskette drive.

2 Slide the diskette drive into the externally accessible drive bay. See Figure 7-1.

3 If your system is configured as a tower, stand the system upright.

4 Close the system. See "Closing the System" in "Troubleshooting Your System".

5 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

Front-Panel Drive Inserts

To help keep dust and dirt out of the system, a plastic insert in the bezel covers each empty external drive bay. Additionally, each empty external drive bay is covered by a metal insert in the chassis to maintain to maintain Federal Communications Commission (FCC) certification of the system.

Before you install a 5.25-inch drive in an empty external drive bay, you must first remove both drive inserts. If you remove a 5.25-inch drive permanently, you must install both the chassis and bezel inserts.

Removing the Front-Panel Drive Inserts

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1   Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.

2   Open the system. See "Opening the System" in "Troubleshooting Your System."

3   If your system is configured as a tower, lay the system on its right side.

4   Remove the bezel drive insert:

   a   From inside the bezel, press the tabs at each end of the insert inward with your thumbs.

   b   Pull the insert out of the bezel.

5   Remove the chassis drive insert:

   a   Press the tabs at each end of the insert inward. See Figure 7-2.

   b   Pull the insert out of the chassis.

Figure 7-2.   Removing the Chassis Drive Insert

Installing the Front-Panel Drive Inserts

⚠️ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

🡆 **NOTICE:** You must install both inserts in an empty 5.25-inch drive bay to maintain Federal Communications Commission (FCC) certification of the system. The inserts also help keep dust and dirt out of the system.

1   Install the chassis drive insert by sliding the insert into the chassis until the tabs on the side of the insert snap into place. See Figure 7-2.

2   Install the bezel drive insert by sliding the insert into the bezel until the tabs on the side of the insert snap into place.

3   If your system is configured as a tower, stand the system upright.

4   Close the system. See "Closing the System" in "Troubleshooting Your System."

5 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

5.25-Inch Drives

A CD drive, data-only DVD drive, or combination drive is standard in the first external drive bay, and an additional drive of your choice can be installed in the second external drive bay. These drives connect either to the system board or to an optional controller card.

Installing a 5.25-Inch Drive

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Unpack the drive (and controller card, if applicable), and prepare the drive for installation.

For instructions, see the documentation that accompanied the drive. Also, see "IDE Configuration Information" or "SCSI Configuration Information" for information on configuring the drive.

2 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.

3 Remove the front-panel inserts for the empty external drive bay. See "Removing the Front-Panel Drive Inserts."

4 If your system is configured as a tower, lay the system on its right side.

5 If the drive was supplied with a controller card, install the controller card in an expansion slot. See "Installing an Expansion Card" in "Installing System Options."

6 Slide the drive into the external drive bay.

7 Install the screws that secure the drive in the drive bay. See Figure 7-3.

Figure 7-3. Installing a 5.25-Inch Drive

screws (2)

power cable

externally accessible drive bay

interface cable

5.25-inch drive
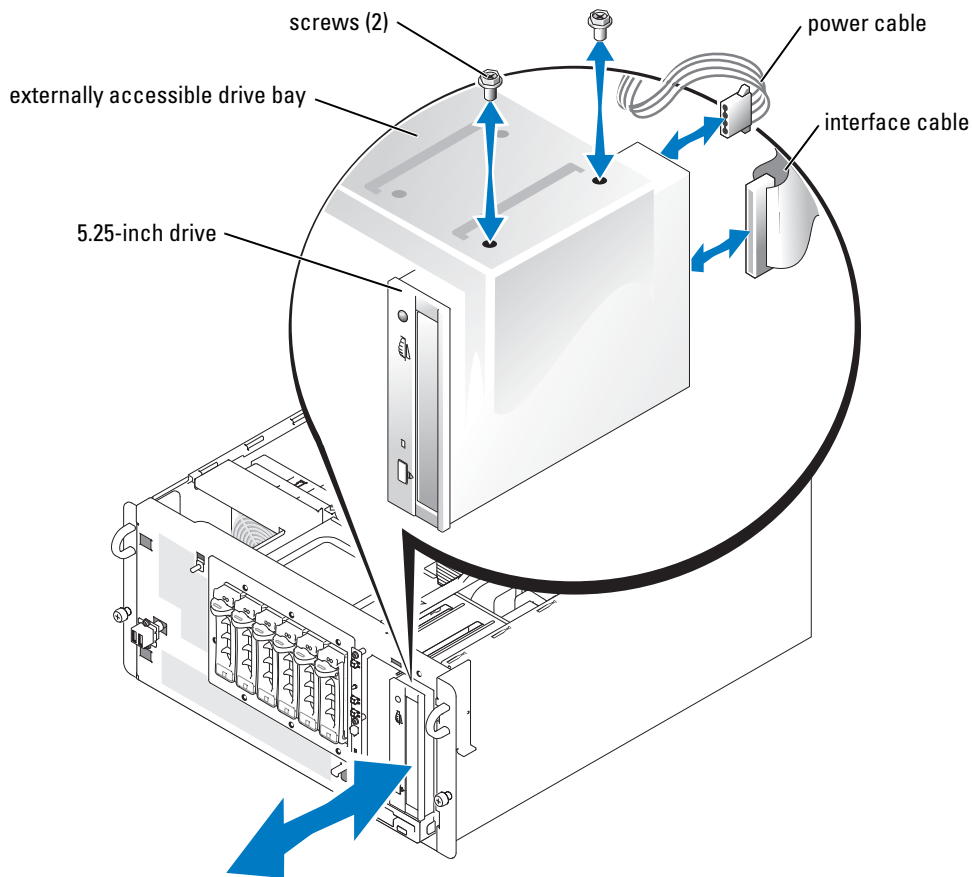
8   Connect a DC power cable connector to the drive's power input connector. See Figure 7-3.

9   If you are connecting the drive to a controller card, proceed to step 10. If you are connecting the interface cable to a system board connector:

   a   Remove the baffle/back fan assembly. See "Removing the Baffle/Back Fan Assembly."

   b   Press and hold the expansion-card guide release tab and remove the expansion-card guide. See Figure 6-1.

   c   Remove the four drive bay screws and slide the drive bay forward to access the drive-cable retainer.

NOTICE: Cables not installed into the drive-cable retainer may block air flow and cause the system to overheat.

   d   Slide the interface cable into the drive-cable retainer.

   e   Replace the hard-drive bay and screws.

   f   Replace the expansion-card guide.

   g   Replace the baffle/back fan assembly. See "Installing the Baffle/Back Fan Assembly."

Figure 7-4. Accessing the System Board Drive Connectors
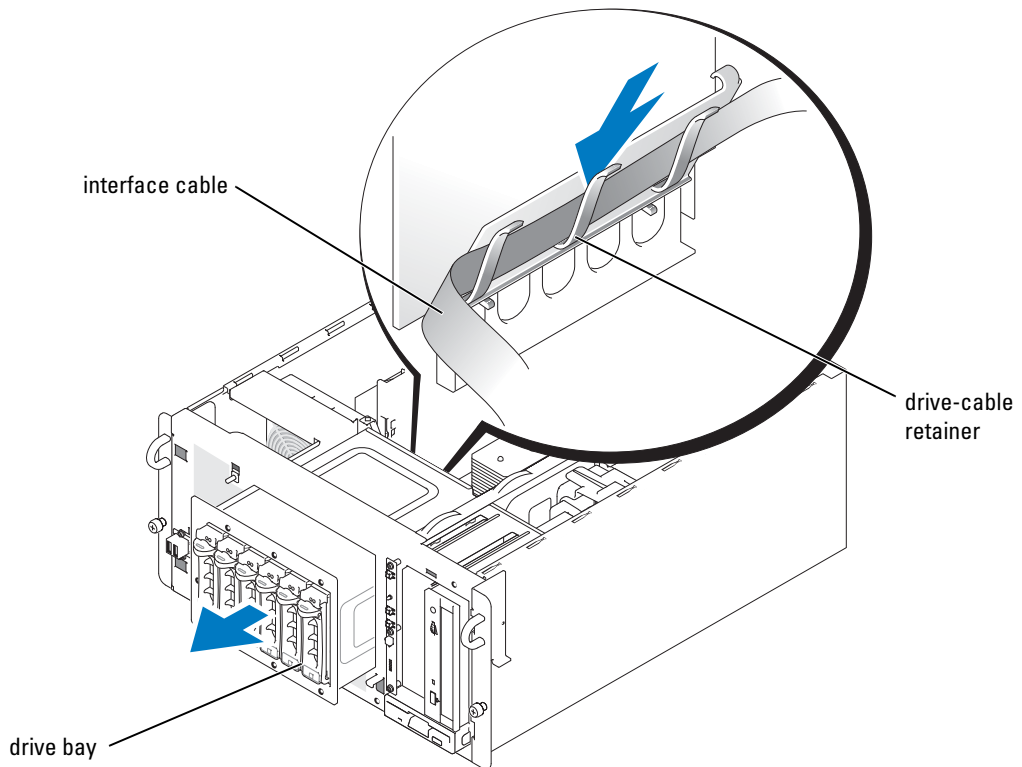
10   Connect the interface cable to the drive and to the system board or controller card.

- Figure 7-5 illustrates a common cable configuration for externally accessible IDE drives.
- Figure 7-6 illustrates a SCSI half-height tape drive connected to the SCSI controller on the system board.
- Figure 7-7 shows a SCSI half-height tape drive connected to a SCSI controller card.

  For information about the controller card, see the documentation that accompanied the card.

Figure 7-5.   Connecting an IDE CD Drive and Optional IDE Tape Drive to the Integrated IDE Controller

IDE connector

IDE CD drive and
optional tape drive

IDE interface cable
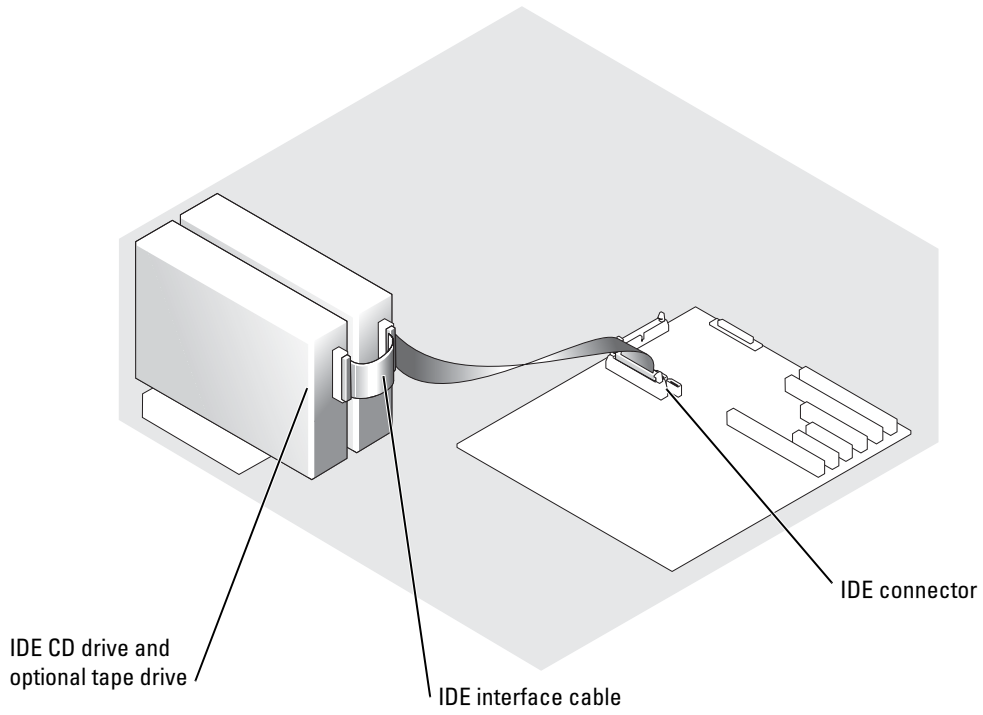
Figure 7-6.   Connecting a SCSI Tape Drive to the Integrated SCSI Controller

optional SCSI tape drive

SCSI interface cable

SCSI controller connector
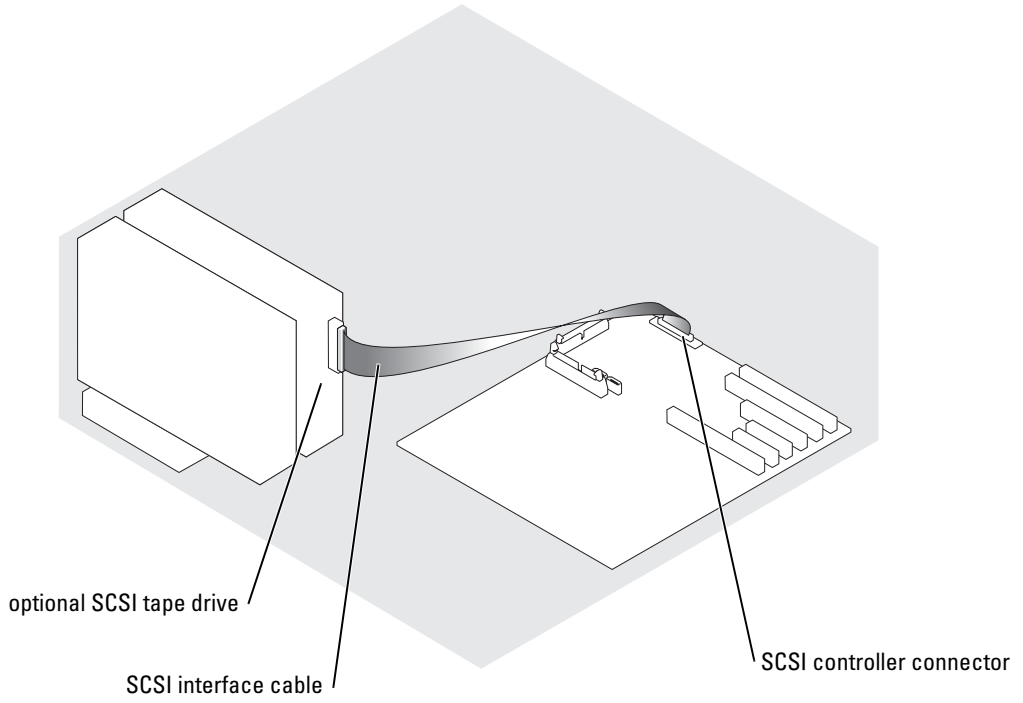
Figure 7-7.   Connecting a SCSI Tape Drive to a SCSI Controller Card

optional SCSI tape drive

SCSI interface cable

SCSI controller card
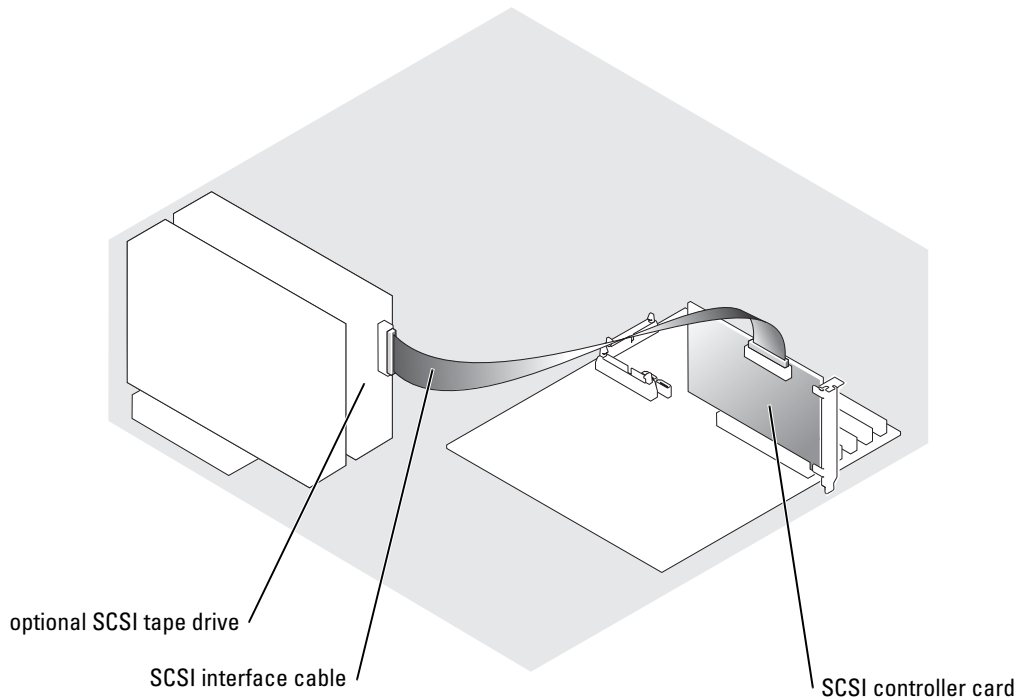
11 Ensure that all cables are firmly connected and arranged so that they do not catch on the computer covers or block airflow inside the system.

12 Close the system. See "Closing the System" in "Troubleshooting Your System."

13 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

14 Test the drive:

   • If you installed an IDE drive, run the IDE devices tests in the system diagnostics to determine whether the tape drive operates properly. See "Running System Diagnostics."

   • If you installed a SCSI drive, run the SCSI controllers test in the system diagnostics. See "Running System Diagnostics."

   • If you installed a tape drive, see the tape drive software documentation to perform a backup and verification test.

Hard Drives

You can install the following hard drive configurations in your system:

- Up to two non–hot-plug SATA hard drives when the hard drives are connected to the system board SATA controllers.
- Up to six non–hot-plug SATA hard drives when the hard drives are connected to an optional SATA controller card.
- Up to six optional hot–plug-ready SCSI hard drives when the optional SCSI hard-drive cage is installed.

NOTE: SCSI hot-plug functionality is available only when SCSI RAID is used. See the SCSI RAID controller's documentation to verify that its configuration supports hot-plug SCSI hard drives.

General Installation Guidelines

Use the following guidelines when installing hard drives:

- You should only use drives tested and approved for use in your system.
- You may need to use different programs than those provided with the operating system to partition and format a hard drive. See the hard drive's documentation for information on setting up the drive.
- When you format a high-capacity hard drive, allow enough time for the formatting to be completed. Long format times for these drives are normal. For example, a large drive can take over an hour to format.
- Do not turn off or reboot your system while the drive is being formatted. Doing so can cause a drive failure.

Installing and Removing SATA Hard Drives

Removing a SATA Hard Drive

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2 Open the system. See "Opening the System" in "Troubleshooting Your System."
3 If your system is configured as a tower, lay the system on its right side.
4 Disconnect all power cables and interface cables from the hard drives in the drive bays.

5 Remove the hard-drive cage:

   a Loosen the four Phillips-head screws that secure the drive cage in the system. See Figure 7-8).

   b Slide the drive cage out of the system.

6 If you are removing a drive, remove the drive from the drive bay:

   a Remove the four screws that secure the drive in the drive bay. See Figure 7-8.

      There are two screws on each side of the drive cage that secure the drive.

   b Slide the drive out of the drive bay.

Figure 7-8.   Removing and Installing a SATA Hard Drive

drive-bay retention screws
(2 screws on each side of drive cage)

hard-drive bay

power cable

drive-cage retention
screws (4)

interface cable
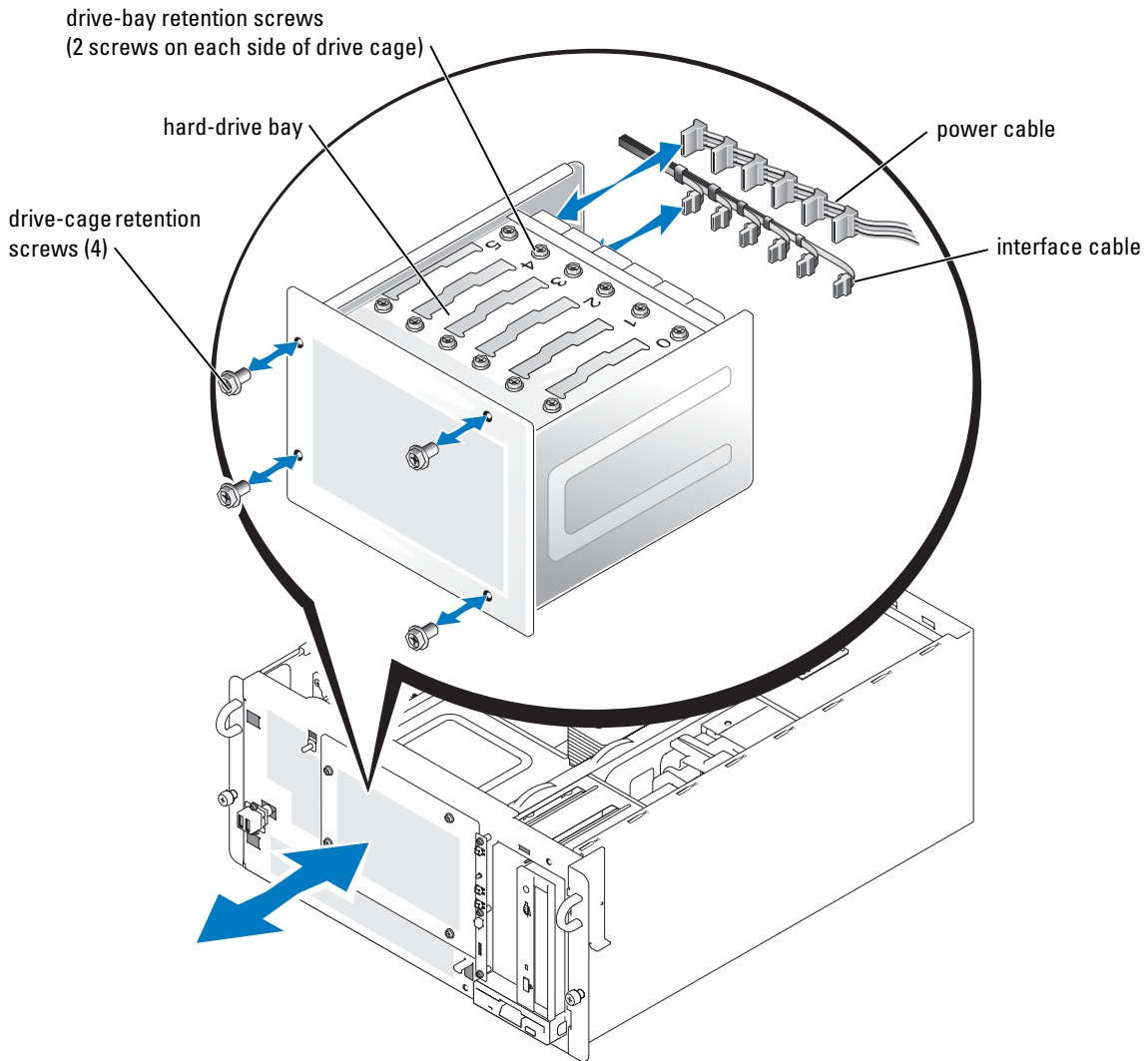
7   Install the hard-drive cage:

   a   With the side of the drive cage labeled "Top" facing toward the external drive bays, slide the drive cage into the system. See Figure 7-8.

   b   Replace the four screws that secure the drive cage in the system.

8   Connect all power cables and interface cables to the hard drives remaining in the drive bays.

9   If your system is configured as a tower, stand the system upright.

10 Close the system. See "Closing the System" in "Troubleshooting Your System."

11 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

Installing a SATA Hard Drive

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Unpack the drive (and controller card, if applicable), and prepare the drive for installation.

For instructions, see the documentation that accompanied the drive. Also, see "SATA Configuration Information" for information on configuring the drive.

2 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.

3 Open the system. See "Opening the System" in "Troubleshooting Your System."

4 If your system is configured as a tower, lay the system on its right side.

5 If the drive was supplied with a controller card, install the controller card in an expansion slot. See "Installing an Expansion Card" in "Installing System Options."

6 Disconnect all power cables and interface cables from the hard drives in the drive bays.

7 Remove the hard-drive cage:

   a Loosen the four Phillips-head screws that secure the drive cage in the system. See Figure 7-8.

   b Slide the drive cage out of the system.

8 Install the drive in the drive bay:

   a Slide the drive into the drive bay with the back of the drive toward the back of the drive cage. See Figure 7-8.

   b Install the four screws that secure the drive in the drive bay.

   There are two screws on each side of the drive cage that secure the drive.

9 Install the hard-drive cage:

   a With the side of the drive cage labeled "Top" facing toward the external drive bays, slide the drive cage into the system. See Figure 7-8.

   b Replace the four screws that secure the drive cage in the system.

10 Connect a DC power cable connector to the drive's power input connector.

11 Connect an interface cable connector to the drive's interface connector:

   • If you are installing one or two SATA hard drives and using the integrated SATA controller(s), connect the interface cable(s) between the drive(s) and the system board SATA connectors. See Figure 7-9.

   NOTE: The drive bays are labeled "0" through "5" and the two-connector SATA interface-cable connectors are labeled "0" and "1." Ensure that you match the connector numbers with the drive bay numbers and the appropriate SATA connector on the system board.

   • If you are installing up to six SATA hard drives and using an optional SATA controller card, connect the interface cables to the drives and the controller card. See Figure 7-10.

   NOTE: The drive bays and the six-connector SATA interface-cable connectors are labeled "0" through "5." Ensure that you match the connector numbers with the drive bay numbers and the appropriate SATA connector on the controller card.

   For information about configuring the SATA controller, see the documentation that came with the SATA controller.

Figure 7-9. Connecting SATA Hard Drives to the Integrated SATA Controller

SATA 0 connector

SATA 1 connector

SATA hard drives (2)

SATA interface cables
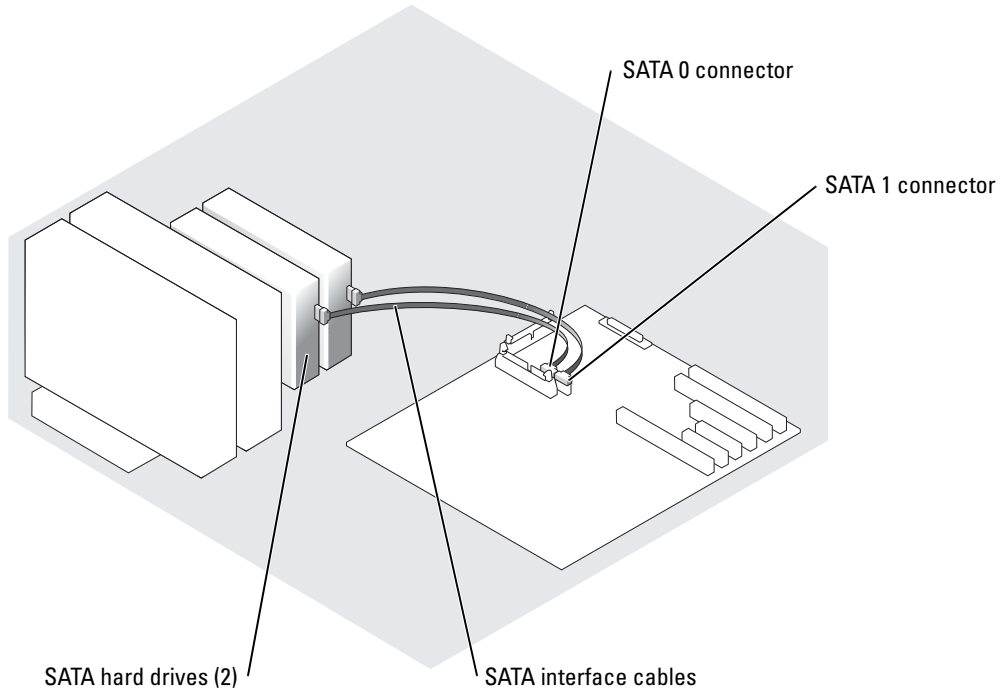
Figure 7-10.   Connecting SATA Hard Drives to an Optional SATA Controller Card

SATA hard drives (6)

SATA interface cable

SATA RAID controller card
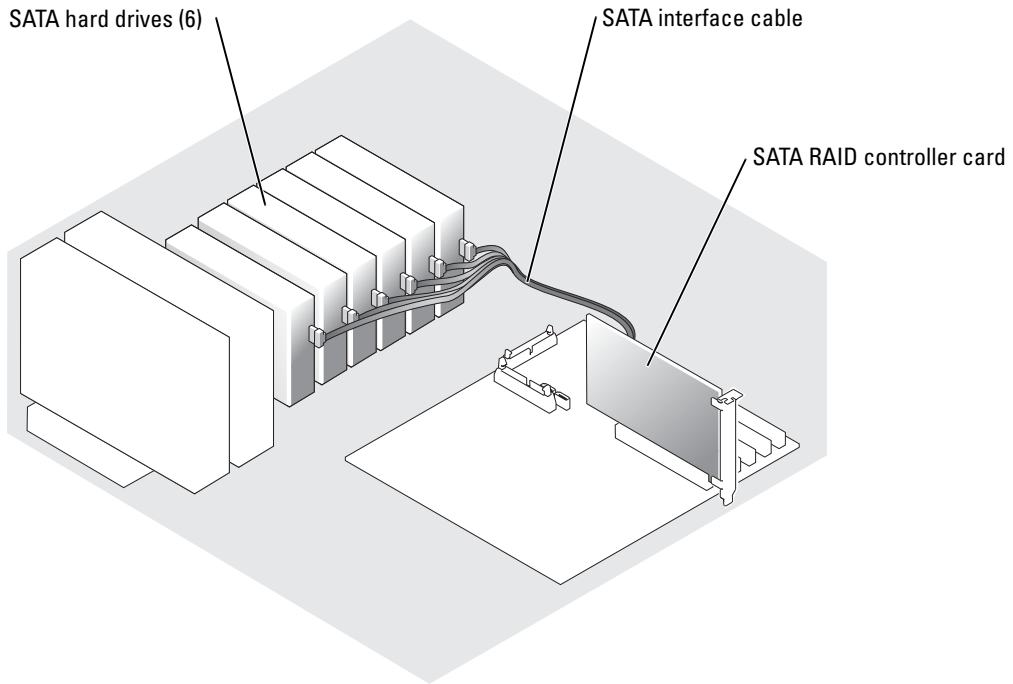
12 Connect all power cables and interface cables to the other hard drives in the drive bay.

13 Ensure that all cables are firmly connected and arranged so that they will not catch on the computer covers or block airflow inside the system.

14 If you removed the baffle/back fan assembly in step 11, replace the assembly now. See "Installing the Baffle/Back Fan Assembly" in "Troubleshooting Your System."

15 Route the SATA interface cable through the SATA-cable routing clips on the outside of the baffle/back fan assembly. See Figure 5-1.

16 If your system is configured as a tower, stand the system upright.

17 Close the system. See "Closing the System" in "Troubleshooting Your System."

18 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

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

19 Partition and logically format the hard drive. See the operating system documentation.

20 Run the hard drive tests in the system diagnostics. See "Running System Diagnostics."

Installing and Removing Hot-Plug SCSI Hard Drives

🖉 **NOTE:** SCSI hot-plug functionality is available only when SCSI RAID is used. See the SCSI RAID controller's documentation to verify that its configuration supports hot-plug SCSI hard drives.

The drive bays in a system with an optional SCSI backplane board provide space for up to six 1-inch hard drives. The hard drives plug into the SCSI backplane board, which is connected to a controller on the system board or to a RAID controller card. See Figure 7-11 and Figure 7-12.

Figure 7-11.   Hot-Plug SCSI Hard Drives Connected to the Integrated SCSI Controller

SCSI hard drives (6)

SCSI backplane board

SCSI connector

38-cm (15-inch) SCSI interface cable
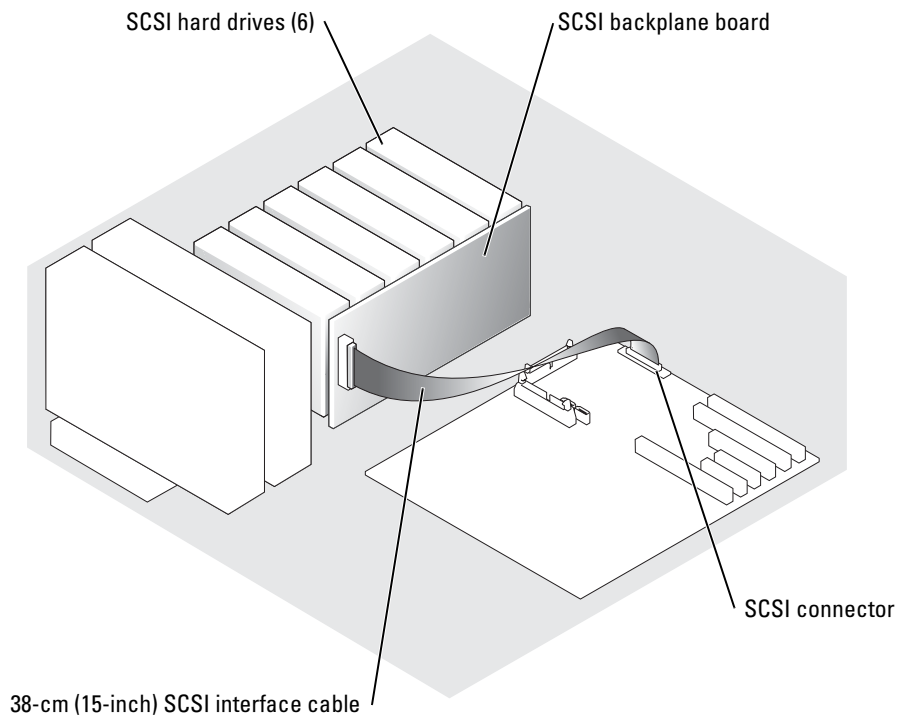
Figure 7-12. Hot-Plug SCSI Hard Drives Connected to a RAID Controller Card

SCSI hard drives (6)

SCSI backplane board

63-cm (25-inch) SCSI interface cable

SCSI RAID controller card
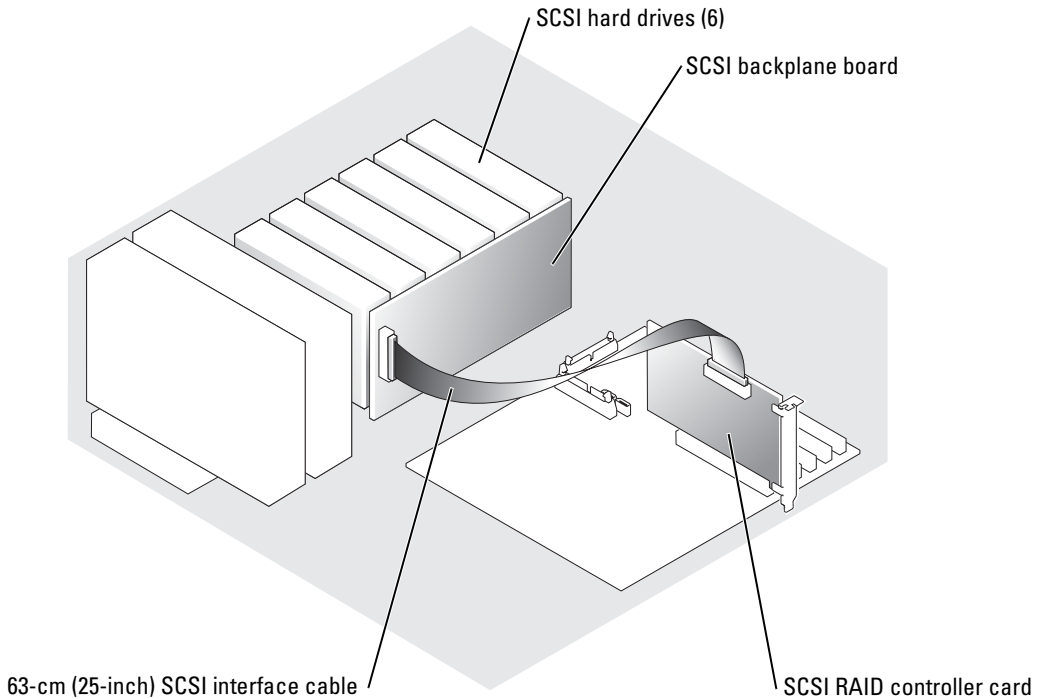
Removing a Hot-Plug Hard Drive

� **NOTICE:** Not all operating systems support hot-plug drive installation. See the documentation supplied with your operating system.

⊡ **NOTICE:** SCSI hot-plug functionality is available only when SCSI RAID is used. See the SCSI RAID controller's documentation to verify that its configuration supports hot-plug SCSI hard drives.

1 Remove the bezel. See "Removing the Bezel" in "Troubleshooting Your System."

2 Take the hard drive offline and wait until the hard-drive indicator codes on the drive carrier signal that the drive can be removed safely. See Table 2-6.

If the drive has been online, the drive-status indicator blinks green two times a second as the drive is powered down. When all indicators are off, the drive is ready for removal.

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

3 Open the hard-drive carrier handle to release the drive. See Figure 7-13.

Figure 7-13. Removing and Installing a Hot-Plug Hard-Drive

hard-drive
carrier handle

SCSI hard drive bays (6)
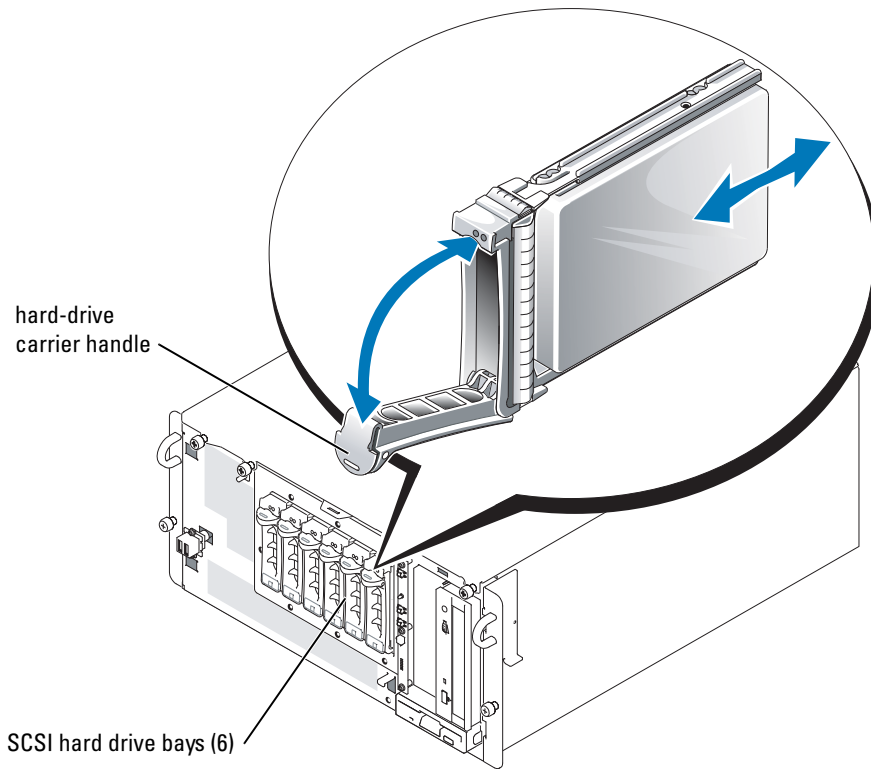
4   Slide the hard drive out until it is free of the drive bay. See Figure 7-13.

5   Replace the bezel. See "Installing the Bezel" in "Troubleshooting Your System."

Installing a Hot-Plug Hard Drive

⊘ **NOTICE:** Not all operating systems support hot-plug drive installation. See the documentation supplied with your operating system.

⊘ **NOTICE:** SCSI hot-plug functionality is available only when SCSI RAID is used. See the SCSI RAID controller's documentation to verify that its configuration supports hot-plug SCSI hard drives.

1   Remove the bezel. See "Removing the Bezel" in "Troubleshooting Your System."

2   Open the hard-drive carrier handle. See Figure 7-13.

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

3 Insert the hard-drive carrier into the drive bay. See Figure 7-13.

4 Close the hard-drive carrier handle to lock it in place.

5 Replace the bezel. See "Installing the Bezel" in "Troubleshooting Your System."

6 Install any required SCSI device drivers.

7 If the hard drive is new, run the SCSI controllers tests and the hard drive tests in the system diagnostics. See "Running System Diagnostics."

Installing a RAID Controller Card

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

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

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

For instructions, see the documentation that accompanied the card.

2 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.

3 Open the system. See "Opening the System" in "Troubleshooting Your System."

4 If your system is configured as a tower, lay the system on its right side.

5 Depending on the type of controller card that you are installing, install the card in the appropriate PCI-X, PCI Express, or PCI expansion slot. See "Installing an Expansion Card" in "Installing System Options".

6 Connect the interface cable to the card and to the drives.

See Figure 7-10, Figure 7-12, and the documentation that accompanied the card for information about cable connections between the drives and RAID card.

7 If your system is configured as a tower, stand the system upright.

8 Close the system. See "Closing the System" in "Troubleshooting Your System."

9 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

10 Ensure that any required device drivers are installed and are configured correctly.

For information on installing device drivers, see the *Dell OpenManage Server Assistant* CD and the documentation that accompanied the controller card.

11 Test the array:

- If you are setting up a SATA RAID array, run the SATA controllers tests and the hard drive tests in the system diagnostics. See "Running System Diagnostics."

- If you are setting up a SCSI RAID array, run the SCSI controllers tests and the hard drive tests in the system diagnostics. See "Running System Diagnostics."

Also, see the RAID controller's documentation for information on testing the array.

Getting Help

Technical Assistance

If you need assistance with a technical problem, perform the following steps:

1 Complete the procedures in "Troubleshooting Your System."

2 Run the system diagnostics and record any information provided.

3 Make a copy of the Diagnostics Checklist, and fill it out.

4 Use Dell's extensive suite of online services available at Dell Support at **support.dell.com** for help with installation and troubleshooting procedures.

   For more information, see "Online Services."

5 If the preceding steps have not resolved the problem, call Dell for technical assistance.

NOTE: Call technical support from a phone near or at the system so that technical support can assist you with any necessary procedures.

NOTE: Dell's Express Service Code system may not be available in all countries.

When prompted by Dell's automated telephone system, enter your Express Service Code to route the call directly to the proper support personnel. If you do not have an Express Service Code, open the **Dell Accessories** folder, double-click the **Express Service Code** icon, and follow the directions.

For instructions on using the technical support service, see "Technical Support Service" and "Before You Call."

NOTE: Some of the following services are not always available in all locations outside the continental U.S. Call your local Dell representative for information on availability.

Online Services

You can access Dell Support at **support.dell.com**. Select your region on the **WELCOME TO DELL SUPPORT** page, and fill in the requested details to access help tools and information.

You can contact Dell electronically using the following addresses:

- World Wide Web

  www.dell.com/

  www.dell.com/ap/ (Asian/Pacific countries only)

  www.dell.com/jp (Japan only)

www.euro.dell.com (Europe only)

www.dell.com/la (Latin American countries)

www.dell.ca (Canada only)

- Anonymous file transfer protocol (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 (Asian/Pacific countries only)

  support.jp.dell.com (Japan only)

  support.euro.dell.com (Europe only)

- Electronic Quote Service

  sales@dell.com

  apmarketing@dell.com (Asian/Pacific countries only)

  sales_canada@dell.com (Canada only)

- Electronic Information Service

  info@dell.com

AutoTech Service

Dell's automated technical support service—AutoTech—provides recorded answers to the questions most frequently asked by Dell customers about their portable and desktop computer systems.

When you call AutoTech, use your touch-tone telephone to select the subjects that correspond to your questions.

The AutoTech service is available 24 hours a day, 7 days a week. You can also access this service through the technical support service. See the contact information for your region.

Automated Order-Status Service

To check on the status of any Dell™ products that you have ordered, you can go to support.dell.com, or you can call the automated order-status service. A recording prompts you for the information needed to locate and report on your order. See the contact information for your region.

Technical Support Service

Dell's technical support service is available 24 hours a day, 7 days a week, to answer your questions about Dell hardware. Our technical support staff use computer-based diagnostics to provide fast, accurate answers.

To contact Dell's technical support service, see "Before You Call" and then see the contact information for your region.

Dell Enterprise Training and Certification

Dell Enterprise Training and Certification is available; see **www.dell.com/training** for more information. This service may not be offered in all locations.

Problems With Your Order

If you have a problem with your order, such as missing parts, wrong parts, or incorrect billing, contact Dell for customer assistance. Have your invoice or packing slip available when you call. See the contact information for your region.

Product Information

If you need information about additional products available from Dell, or if you would like to place an order, visit the Dell website at **www.dell.com**. For the telephone number to call to speak to a sales specialist, see the contact information for your region.

Returning Items for Warranty Repair or Credit

Prepare all items being returned, whether for repair or credit, as follows:

1 Call Dell to obtain a Return Material Authorization Number, and write it clearly and prominently on the outside of the box.

   For the telephone number to call, see the contact information for your region.

2 Include a copy of the invoice and a letter describing the reason for the return.

3 Include a copy of any diagnostic information (including the Diagnostics Checklist) indicating the tests you have run and any error messages reported by the system diagnostics.

4 Include any accessories that belong with the item(s) being returned (such as power cables, media such as CDs and diskettes, and guides) 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. 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

NOTE: Have your Express Service Code ready when you call. The code helps Dell's automated-support telephone system direct your call more efficiently.

Remember to fill out the Diagnostics Checklist. If possible, turn on your system 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. Ensure that the system documentation is available.

⚠ **CAUTION: Before servicing any components inside your computer, see your *Product Information Guide* for important safety information.**

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 possible, print each file. Otherwise, record the contents of each file before calling Dell.

Error message, beep code, or diagnostic code:

Description of problem and troubleshooting procedures you performed:

Contacting Dell

To contact Dell electronically, you can access the following websites:

- www.dell.com
- support.dell.com (technical support)
- premiersupport.dell.com (technical support for educational, government, healthcare, and medium/large business customers, including Premier, Platinum, and Gold customers)

For specific web addresses for your country, find the appropriate country section in the table below.

NOTE: Toll-free numbers are for use within the country for which they are listed.

When you need to contact Dell, use the electronic addresses, telephone numbers, and codes provided in the following table. If you need assistance in determining which codes to use, contact a local or an international operator.

Country (City) International Access Code Country Code City Code	Department Name or Service Area, Website and E-Mail Address	Area Codes, Local Numbers, and Toll-Free Numbers
Anguilla	General Support	toll-free: 800-335-0031
Antigua and Barbuda	General Support	1-800-805-5924
Argentina (Buenos Aires)	Website: www.dell.com.ar	
International Access Code: 00	Tech Support and Customer Care	toll-free: 0-800-444-0733
Country Code: 54	Sales	0-810-444-3355
City Code: 11	Tech Support Fax	11 4515 7139
	Customer Care Fax	11 4515 7138
Aruba	General Support	toll-free: 800-1578
Australia (Sydney)	E-mail (Australia): au_tech_support@dell.com	
International Access Code: 0011	E-mail (New Zealand): nz_tech_support@dell.com	
Country Code: 61	Home and Small Business	1-300-65-55-33
City Code: 2	Government and Business	toll-free: 1-800-633-559
	Preferred Accounts Division (PAD)	toll-free: 1-800-060-889
	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

Country (City) International Access Code Country Code City Code	Department Name or Service Area, Website and E-Mail Address	Area Codes, Local Numbers, and Toll-Free Numbers
Austria (Vienna)	Website: **support.euro.dell.com**	
International Access Code: **900**	E-mail: tech_support_central_europe@dell.com	
Country Code: **43**	Home/Small Business Sales	0820 240 530 00
City Code: **1**	Home/Small Business Fax	0820 240 530 49
	Home/Small Business Customer Care	0820 240 530 14
	Preferred Accounts/Corporate Customer Care	0820 240 530 16
	Home/Small Business Technical Support	0820 240 530 14
	Preferred Accounts/Corporate Technical Support	0660 8779
	Switchboard	0820 240 530 00
Bahamas	General Support	toll-free: 1-866-278-6818
Barbados	General Support	1-800-534-3066
Belgium (Brussels)	Website: **support.euro.dell.com**	
International Access Code: **00**	E-mail: tech_be@dell.com	
Country Code: **32** City Code: **2**	E-mail for French Speaking Customers: **support.euro.dell.com/be/fr/emaildell/**	
	Technical Support	02 481 92 88
	Customer Care	02 481 91 19
	Corporate Sales	02 481 91 00
	Fax	02 481 92 99
	Switchboard	02 481 91 00
Bermuda	General Support	1-800-342-0671
Bolivia	General Support	toll-free: 800-10-0238
Brazil	Website: **www.dell.com/br**	
International Access Code: **00**	Customer Support, Technical Support	0800 90 3355
Country Code: **55**	Tech Support Fax	51 481 5470
City Code: **51**	Customer Care Fax	51 481 5480
	Sales	0800 90 3390
British Virgin Islands	General Support	toll-free: 1-866-278-6820
Brunei	Customer Technical Support (Penang, Malaysia)	604 633 4966
Country Code: **673**	Customer Service (Penang, Malaysia)	604 633 4949
	Transaction Sales (Penang, Malaysia)	604 633 4955

Country (City) International Access Code Country Code City Code	Department Name or Service Area, Website and E-Mail Address	Area Codes, Local Numbers, and Toll-Free Numbers
Canada (North York, Ontario)	Online Order Status: **www.dell.ca/ostatus**	
International Access Code: **011**	AutoTech (automated technical support)	toll-free: 1-800-247-9362
	TechFax	toll-free: 1-800-950-1329
	Customer Care (Home Sales/Small Business)	toll-free: 1-800-847-4096
	Customer Care (med./large business, government)	toll-free: 1-800-326-9463
	Technical Support (Home Sales/Small Business)	toll-free: 1-800-847-4096
	Technical Support (med./large bus., government)	toll-free: 1-800-387-5757
	Sales (Home Sales/Small Business)	toll-free: 1-800-387-5752
	Sales (med./large bus., government)	toll-free: 1-800-387-5755
	Spare Parts Sales & Extended Service Sales	1 866 440 3355
Cayman Islands	General Support	1-800-805-7541
Chile (Santiago) Country Code: **56** City Code: **2**	Sales, Customer Support, and Technical Support	toll-free: 1230-020-4823

Country (City) International Access Code Country Code City Code	Department Name or Service Area, Website and E-Mail Address	Area Codes, Local Numbers, and Toll-Free Numbers
China (Xiamen)	Tech Support website: **support.dell.com.cn**	
Country Code: **86**	Tech Support E-mail: cn_support@dell.com	
City Code: **592**	Tech Support Fax	818 1350
	Technical Support (Dimension™ and Inspiron™)	toll-free: 800 858 2969
	Technical Support (OptiPlex™, Latitude™, and Dell Precision™)	toll-free: 800 858 0950
	Technical Support (servers and storage)	toll-free: 800 858 0960
	Technical Support (projectors, PDAs, printers, switches, routers, and so on)	toll-free: 800 858 2920
	Customer Experience	toll-free: 800 858 2060
	Home and Small Business	toll-free: 800 858 2222
	Preferred Accounts Division	toll-free: 800 858 2557
	Large Corporate Accounts GCP	toll-free: 800 858 2055
	Large Corporate Accounts Key Accounts	toll-free: 800 858 2628
	Large Corporate Accounts North	toll-free: 800 858 2999
	Large Corporate Accounts North Government and Education	toll-free: 800 858 2955
	Large Corporate Accounts East	toll-free: 800 858 2020
	Large Corporate Accounts East Government and Education	toll-free: 800 858 2669
	Large Corporate Accounts Queue Team	toll-free: 800 858 2222
	Large Corporate Accounts South	toll-free: 800 858 2355
	Large Corporate Accounts West	toll-free: 800 858 2811
	Large Corporate Accounts Spare Parts	toll-free: 800 858 2621
Colombia	General Support	980-9-15-3978
Costa Rica	General Support	0800-012-0435

Country (City) International Access Code Country Code City Code	Department Name or Service Area, Website and E-Mail Address	Area Codes, Local Numbers, and Toll-Free Numbers
Czech Republic (Prague) International Access Code: 00 Country Code: 420 City Code: 2	Website: support.euro.dell.com	
	E-mail: czech_dell@dell.com	
	Technical Support	02 2186 27 27
	Customer Care	02 2186 27 11
	Fax	02 2186 27 14
	TechFax	02 2186 27 28
	Switchboard	02 2186 27 11
Denmark (Copenhagen) International Access Code: 00 Country Code: 45	Website: support.euro.dell.com	
	E-mail Support (portable computers): den_nbk_support@dell.com	
	E-mail Support (desktop computers): den_support@dell.com	
	E-mail Support (servers): Nordic_server_support@dell.com	
	Technical Support	7023 0182
	Customer Care (Relational)	7023 0184
	Home/Small Business Customer Care	3287 5505
	Switchboard (Relational)	3287 1200
	Fax Switchboard (Relational)	3287 1201
	Switchboard (Home/Small Business)	3287 5000
	Fax Switchboard (Home/Small Business)	3287 5001
Dominica	General Support	toll-free: 1-866-278-6821
Dominican Republic	General Support	1-800-148-0530
Ecuador	General Support	toll-free: 999-119
El Salvador	General Support	01-899-753-0777

Country (City) International Access Code Country Code City Code	Department Name or Service Area, Website and E-Mail Address	Area Codes, Local Numbers, and Toll-Free Numbers
Finland (Helsinki)	Website: **support.euro.dell.com**	
International Access Code: **990**	E-mail: fin_support@dell.com	
Country Code: **358**	E-mail Support (servers): Nordic_support@dell.com	
City Code: **9**	Technical Support	09 253 313 60
	Technical Support Fax	09 253 313 81
	Relational Customer Care	09 253 313 38
	Home/Small Business Customer Care	09 693 791 94
	Fax	09 253 313 99
	Switchboard	09 253 313 00
France (Paris) (Montpellier)	Website: **support.euro.dell.com**	
International Access Code: **00**	E-mail: **support.euro.dell.com/fr/fr/emaildell/**	
Country Code: **33**	**Home and Small Business**	
City Codes: **(1) (4)**	Technical Support	0825 387 270
	Customer Care	0825 823 833
	Switchboard	0825 004 700
	Switchboard (calls from outside of France)	04 99 75 40 00
	Sales	0825 004 700
	Fax	0825 004 701
	Fax (calls from outside of France)	04 99 75 40 01
	Corporate	
	Technical Support	0825 004 719
	Customer Care	0825 338 339
	Switchboard	01 55 94 71 00
	Sales	01 55 94 71 00
	Fax	01 55 94 71 01

Country (City) International Access Code Country Code City Code	Department Name or Service Area, Website and E-Mail Address	Area Codes, Local Numbers, and Toll-Free Numbers
Germany (Langen)	Website: **support.euro.dell.com**	
International Access Code: **00**	E-mail: tech_support_central_europe@dell.com	
Country Code: **49**	Technical Support	06103 766-7200
City Code: **6103**	Home/Small Business Customer Care	0180-5-224400
	Global Segment Customer Care	06103 766-9570
	Preferred Accounts Customer Care	06103 766-9420
	Large Accounts Customer Care	06103 766-9560
	Public Accounts Customer Care	06103 766-9555
	Switchboard	06103 766-7000
Greece	Website: **support.euro.dell.com**	
International Access Code: 00	E-mail: **support.euro.dell.com/gr/en/emaildell/**	
Country Code: 30	Technical Support	080044149518
	Gold Technical Support	08844140083
	Switchboard	2108129800
	Sales	2108129800
	Fax	2108129812
Grenada	General Support	toll-free: 1-866-540-3355
Guatemala	General Support	1-800-999-0136
Guyana	General Support	toll-free: 1-877-270-4609
Hong Kong	Website: **support.ap.dell.com**	
International Access Code: **001**	E-mail: ap_support@dell.com	
Country Code: **852**	Technical Support (Dimension™ and Inspiron™)	2969 3189
	Technical Support (OptiPlex™, Latitude™, and Dell Precision™)	2969 3191
	Technical Support (PowerApp™, PowerEdge™, PowerConnect™, and PowerVault™)	2969 3196
	Gold Queue EEC Hotline	2969 3187
	Customer Advocacy	3416 0910
	Large Corporate Accounts	3416 0907
	Global Customer Programs	3416 0908
	Medium Business Division	3416 0912
	Home and Small Business Division	2969 3105

Country (City) International Access Code Country Code City Code	Department Name or Service Area, Website and E-Mail Address	Area Codes, Local Numbers, and Toll-Free Numbers
India	Technical Support	1600 33 8045
	Sales	1600 33 8044
Ireland (Cherrywood)	Website: **support.euro.dell.com**	
International Access Code: 16	E-mail: dell_direct_support@dell.com	
Country Code: 353	Technical Support	1850 543 543
City Code: 1	U.K. Technical Support (dial within U.K. only)	0870 908 0800
	Home User Customer Care	01 204 4014
	Small Business Customer Care	01 204 4014
	U.K. Customer Care (dial within U.K. only)	0870 906 0010
	Corporate Customer Care	1850 200 982
	Corporate Customer Care (dial within U.K. only)	0870 907 4499
	Ireland Sales	01 204 4444
	U.K. Sales (dial within U.K. only)	0870 907 4000
	Fax/SalesFax	01 204 0103
	Switchboard	01 204 4444
Italy (Milan)	Website: **support.euro.dell.com**	
International Access Code: 00	E-mail: **support.euro.dell.com/it/it/emaildell/**	
Country Code: 39	**Home and Small Business**	
City Code: 02	Technical Support	02 577 826 90
	Customer Care	02 696 821 14
	Fax	02 696 821 13
	Switchboard	02 696 821 12
	Corporate	
	Technical Support	02 577 826 90
	Customer Care	02 577 825 55
	Fax	02 575 035 30
	Switchboard	02 577 821
Jamaica	General Support (dial from within Jamaica only)	1-800-682-3639

Country (City) International Access Code Country Code City Code	Department Name or Service Area, Website and E-Mail Address	Area Codes, Local Numbers, and Toll-Free Numbers
Japan (Kawasaki)	Website: **support.jp.dell.com**	
International Access Code: **001**	Technical Support (servers)	toll-free: 0120-198-498
Country Code: **81**	Technical Support outside of Japan (servers)	81-44-556-4162
City Code: **44**	Technical Support (Dimension™ and Inspiron™)	toll-free: 0120-198-226
	Technical Support outside of Japan (Dimension and Inspiron)	81-44-520-1435
	Technical Support (Dell Precision™, OptiPlex™, and Latitude™)	toll-free:0120-198-433
	Technical Support outside of Japan (Dell Precision, OptiPlex, and Latitude)	81-44-556-3894
	Technical Support (Axim™)	toll-free: 0120-981-690
	Technical Support outside of Japan (Axim)	81-44-556-3468
	Faxbox Service	044-556-3490
	24-Hour Automated Order Service	044-556-3801
	Customer Care	044-556-4240
	Business Sales Division (up to 400 employees)	044-556-1465
	Preferred Accounts Division Sales (over 400 employees)	044-556-3433
	Large Corporate Accounts Sales (over 3500 employees)	044-556-3430
	Public Sales (government agencies, educational institutions, and medical institutions)	044-556-1469
	Global Segment Japan	044-556-3469
	Individual User	044-556-1760
	Switchboard	044-556-4300
Korea (Seoul)	Technical Support	toll-free: 080-200-3800
International Access Code: **001**	Sales	toll-free: 080-200-3600
Country Code: **82**	Customer Service (Seoul, Korea)	toll-free: 080-200-3800
City Code: **2**	Customer Service (Penang, Malaysia)	604 633 4949
	Fax	2194-6202
	Switchboard	2194-6000

Country (City) International Access Code Country Code City Code	Department Name or Service Area, Website and E-Mail Address	Area Codes, Local Numbers, and Toll-Free Numbers
Latin America	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
		or 512 728-3772
Luxembourg International Access Code: 00 Country Code: 352	Website: support.euro.dell.com	
	E-mail: tech_be@dell.com	
	Technical Support (Brussels, Belgium)	3420808075
	Home/Small Business Sales (Brussels, Belgium)	toll-free: 080016884
	Corporate Sales (Brussels, Belgium)	02 481 91 00
	Customer Care (Brussels, Belgium)	02 481 91 19
	Fax (Brussels, Belgium)	02 481 92 99
	Switchboard (Brussels, Belgium)	02 481 91 00
Macao Country Code: 853	Technical Support	toll-free: 0800 582
	Customer Service (Penang, Malaysia)	604 633 4949
	Transaction Sales	toll-free: 0800 581
Malaysia (Penang) International Access Code: 00 Country Code: 60 City Code: 4	Technical Support (Dell Precision, OptiPlex, and Latitude)	toll-free: 1 800 88 0193
	Technical Support (Dimension and Inspiron)	toll-free: 1 800 88 1306
	Customer Service	04 633 4949
	Transaction Sales	toll-free: 1 800 888 202
	Corporate Sales	toll-free: 1 800 888 213

Country (City) International Access Code Country Code City Code	Department Name or Service Area, Website and E-Mail Address	Area Codes, Local Numbers, and Toll-Free Numbers
Mexico International Access Code: 00 Country Code: 52	Customer Technical Support	001-877-384-8979 or 001-877-269-3383
	Sales	50-81-8800 or 01-800-888-3355
	Customer Service	001-877-384-8979 or 001-877-269-3383
	Main	50-81-8800 or 01-800-888-3355
Montserrat	General Support	toll-free: 1-866-278-6822
Netherlands Antilles	General Support	001-800-882-1519
Netherlands (Amsterdam) International Access Code: 00 Country Code: 31 City Code: 20	Website: support.euro.dell.com	
	E-mail (Technical Support):	
	(Enterprise): nl_server_support@dell.com	
	(Latitude): nl_latitude_support@dell.com	
	(Inspiron): nl_inspiron_support@dell.com	
	(Dimension): nl_dimension_support@dell.com	
	(OptiPlex): nl_optiplex_support@dell.com	
	(Dell Precision): nl_workstation_support@dell.com	
	Technical Support	020 674 45 00
	Technical Support Fax	020 674 47 66
	Home/Small Business Customer Care	020 674 42 00
	Relational Customer Care	020 674 4325
	Home/Small Business Sales	020 674 55 00
	Relational Sales	020 674 50 00
	Home/Small Business Sales Fax	020 674 47 75
	Relational Sales Fax	020 674 47 50
	Switchboard	020 674 50 00
	Switchboard Fax	020 674 47 50

Country (City) International Access Code Country Code City Code	Department Name or Service Area, Website and E-Mail Address	Area Codes, Local Numbers, and Toll-Free Numbers
New Zealand	E-mail (New Zealand): nz_tech_support@dell.com	
International Access Code: **00**	E-mail (Australia): au_tech_support@dell.com	
Country Code: **64**	Home and Small Business	0800 446 255
	Government and Business	0800 444 617
	Sales	0800 441 567
	Fax	0800 441 566
Nicaragua	General Support	001-800-220-1006
Norway (Lysaker)	Website: **support.euro.dell.com**	
International Access Code: **00**	E-mail Support (portable computers):	
Country Code: **47**	nor_nbk_support@dell.com	
	E-mail Support (desktop computers):	
	nor_support@dell.com	
	E-mail Support (servers):	
	nordic_server_support@dell.com	
	Technical Support	671 16882
	Relational Customer Care	671 17514
	Home/Small Business Customer Care	23162298
	Switchboard	671 16800
	Fax Switchboard	671 16865
Panama	General Support	001-800-507-0962
Peru	General Support	0800-50-669
Poland (Warsaw)	Website: **support.euro.dell.com**	
International Access Code: **011**	E-mail: pl_support_tech@dell.com	
Country Code: **48**	Customer Service Phone	57 95 700
City Code: **22**	Customer Care	57 95 999
	Sales	57 95 999
	Customer Service Fax	57 95 806
	Reception Desk Fax	57 95 998
	Switchboard	57 95 999

Country (City) International Access Code Country Code City Code	Department Name or Service Area, Website and E-Mail Address	Area Codes, Local Numbers, and Toll-Free Numbers
Portugal	Website: **support.euro.dell.com**	
International Access Code: **00**	E-mail: **support.euro.dell.com/pt/en/emaildell/**	
Country Code: **351**	Technical Support	707200149
	Customer Care	800 300 413
	Sales	800 300 410 or 800 300 411 or 800 300 412 or 21 422 07 10
	Fax	21 424 01 12
Puerto Rico	General Support	1-800-805-7545
St. Kitts and Nevis	General Support	toll-free: 1-877-441-4731
St. Lucia	General Support	1-800-882-1521
St. Vincent and the Grenadines	General Support	toll-free: 1-877-270-4609
Singapore (Singapore)	Technical Support	toll-free: 800 6011 051
International Access Code: **005**	Customer Service (Penang, Malaysia)	604 633 4949
Country Code: **65**	Transaction Sales	toll-free: 800 6011 054
	Corporate Sales	toll-free: 800 6011 053
South Africa (Johannesburg)	Website: **support.euro.dell.com**	
International Access Code: **09/091**	E-mail: dell_za_support@dell.com	
	Technical Support	011 709 7710
Country Code: **27**	Customer Care	011 709 7707
City Code: **11**	Sales	011 709 7700
	Fax	011 706 0495
	Switchboard	011 709 7700
Southeast Asian and Pacific Countries	Customer Technical Support, Customer Service, and Sales (Penang, Malaysia)	604 633 4810

Country (City) International Access Code Country Code City Code	Department Name or Service Area, Website and E-Mail Address	Area Codes, Local Numbers, and Toll-Free Numbers
Spain (Madrid)	Website: **support.euro.dell.com**	
International Access Code: **00**	E-mail: **support.euro.dell.com/es/es/emaildell/**	
Country Code: **34**	**Home and Small Business**	
City Code: **91**	Technical Support	902 100 130
	Customer Care	902 118 540
	Sales	902 118 541
	Switchboard	902 118 541
	Fax	902 118 539
	Corporate	
	Technical Support	902 100 130
	Customer Care	902 118 546
	Switchboard	91 722 92 00
	Fax	91 722 95 83
Sweden (Upplands Vasby)	Website: **support.euro.dell.com**	
International Access Code: **00**	E-mail: swe_support@dell.com	
Country Code: **46**	E-mail Support for Latitude and Inspiron: Swe-nbk_kats@dell.com	
City Code: **8**	E-mail Support for OptiPlex: Swe_kats@dell.com	
	E-mail Support for Servers: Nordic_server_support@dell.com	
	Technical Support	08 590 05 199
	Relational Customer Care	08 590 05 642
	Home/Small Business Customer Care	08 587 70 527
	Employee Purchase Program (EPP) Support	20 140 14 44
	Fax Technical Support	08 590 05 594
	Sales	08 590 05 185

Country (City) International Access Code Country Code City Code	Department Name or Service Area, Website and E-Mail Address	Area Codes, Local Numbers, and Toll-Free Numbers
Switzerland (Geneva) International Access Code: 00 Country Code: 41 City Code: 22	Website: support.euro.dell.com	
	E-mail: Tech_support_central_Europe@dell.com	
	E-mail for French-speaking HSB and Corporate Customers: support.euro.dell.com/ch/fr/emaildell/	
	Technical Support (Home and Small Business)	0844 811 411
	Technical Support (Corporate)	0844 822 844
	Customer Care (Home and Small Business)	0848 802 202
	Customer Care (Corporate)	0848 821 721
	Fax	022 799 01 90
	Switchboard	022 799 01 01
Taiwan International Access Code: 002 Country Code: 886	Technical Support (portable and desktop computers)	toll-free: 00801 86 1011
	Technical Support (servers)	toll-free: 0080 60 1256
	Transaction Sales	toll-free: 0080 651 228
	Corporate Sales	toll-free: 0080 651 227
Thailand International Access Code: 001 Country Code: 66	Technical Support	toll-free: 0880 060 07
	Customer Service (Penang, Malaysia)	604 633 4949
	Sales	toll-free: 0880 060 09
Trinidad/Tobago	General Support	1-800-805-8035
Turks and Caicos Islands	General Support	toll-free: 1-866-540-3355

Country (City) International Access Code Country Code City Code	Department Name or Service Area, Website and E-Mail Address	Area Codes, Local Numbers, and Toll-Free Numbers
U.K. (Bracknell)	Website: **support.euro.dell.com**	
International Access Code: **00**	Customer Care website: **support.euro.dell.com/uk/en/ECare/Form/Home.asp**	
Country Code: **44**		
City Code: **1344**	E-mail: dell_direct_support@dell.com	
	Technical Support (Corporate/Preferred Accounts/PAD [1000+ employees])	0870 908 0500
	Technical Support (direct/PAD and general)	0870 908 0800
	Global Accounts Customer Care	01344 373 186
	Home and Small Business Customer Care	0870 906 0010
	Corporate Customer Care	01344 373 185
	Preferred Accounts (500–5000 employees) Customer Care	0870 906 0010
	Central Government Customer Care	01344 373 193
	Local Government & Education Customer Care	01344 373 199
	Health Customer Care	01344 373 194
	Home and Small Business Sales	0870 907 4000
	Corporate/Public Sector Sales	01344 860 456
	Home and Small Business Fax	0870 907 4006
Uruguay	General Support	toll-free: 000-413-598-2521

Country (City) International Access Code Country Code City Code	Department Name or Service Area, Website and E-Mail Address	Area Codes, Local Numbers, and Toll-Free Numbers
U.S.A. (Austin, Texas)	Automated Order-Status Service	toll-free: 1-800-433-9014
International Access Code: 011	AutoTech (portable and desktop computers)	toll-free: 1-800-247-9362
Country Code: 1	**Consumer** (Home and Home Office)	
	Technical Support	toll-free: 1-800-624-9896
	Customer Service	toll-free: 1-800-624-9897
	DellNet™ Service and Support	toll-free: 1-877-Dellnet
		(1-877-335-5638)
	Employee Purchase Program (EPP) Customers	toll-free: 1-800-695-8133
	Financial Services website: **www.dellfinancialservices.com**	
	Financial Services (lease/loans)	toll-free: 1-877-577-3355
	Financial Services (Dell Preferred Accounts [DPA])	toll-free: 1-800-283-2210
	Business	
	Customer Service and Technical Support	toll-free: 1-800-822-8965
	Employee Purchase Program (EPP) Customers	toll-free: 1-800-695-8133
	Printers and Projectors Technical Support	toll-free: 1-877-459-7298
	Public (government, education, and healthcare)	
	Customer Service and Technical Support	toll-free: 1-800-456-3355
	Employee Purchase Program (EPP) Customers	toll-free: 1-800-234-1490
	Dell Sales	toll-free: 1-800-289-3355
		or toll-free: 1-800-879-3355
	Dell Outlet Store (Dell refurbished computers)	toll-free: 1-888-798-7561
	Software and Peripherals Sales	toll-free: 1-800-671-3355
	Spare Parts Sales	toll-free: 1-800-357-3355
	Extended Service and Warranty Sales	toll-free: 1-800-247-4618
	Fax	toll-free: 1-800-727-8320
	Dell Services for the Deaf, Hard-of-Hearing, or Speech-Impaired	toll-free: 1-877-DELLTTY
		(1-877-335-5889)
U.S. Virgin Islands	General Support	1-877-673-3355
Venezuela	General Support	8001-3605

A

Jumpers, Switches, and Connectors

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

Jumpers—A General Explanation

Jumpers provide a convenient and reversible way of reconfiguring the circuitry on a printed circuit board. When reconfiguring the system, you may need to change jumper settings on circuit boards or drives.

Jumpers

Jumpers are small blocks on a circuit board with two or more pins emerging from them. Plastic plugs containing a wire fit down over the pins. The wire connects the pins and creates a circuit. To change a jumper setting, pull the plug off its pin(s) and carefully fit it down onto the pin(s) indicated. Figure A-1 shows an example of a jumper.

Figure A-1. Example Jumpers
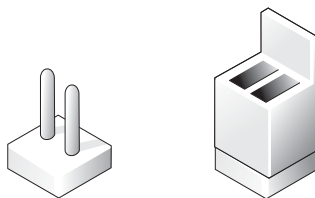
⚠ **CAUTION: Ensure that the system is turned off before you change a jumper setting. Otherwise, damage to the system or unpredictable results may occur.**

A jumper is referred to as open or 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 A-2 shows the location and default settings of the system jumper blocks. See Table A-1 for the designations, default settings, and functions of the system's jumpers.

System Board Jumpers

Figure A-2 shows the location of the configuration jumpers on the system board. Table A-1 lists the jumpers settings.

Figure A-2.   System Board Jumpers
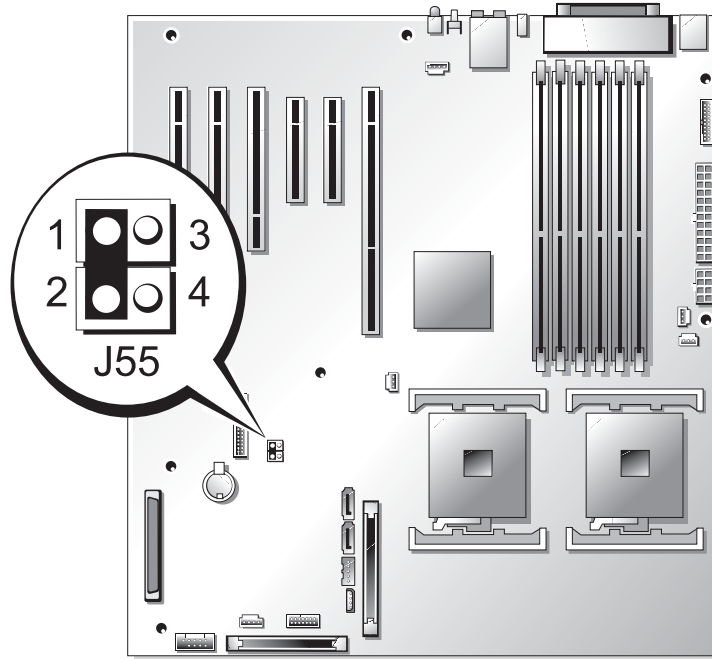
Table A-1.   System Board Jumper Settings

Jumper	Setting		Description
J55 pins 1 and 2	▣	(default)	The password feature is enabled.
	▢		The password feature is disabled.
J55 pins 3 and 4	▢	(default)	The configuration settings in NVRAM are retained at system boot.
	▣		The configuration settings in NVRAM are cleared at next system boot.
▣ jumpered	▢ unjumpered		

System Board Connectors

See Figure A-3 and Table A-2 for the location and description of system board connectors and expansion-card slots.

Figure A-3.   System Board Connectors
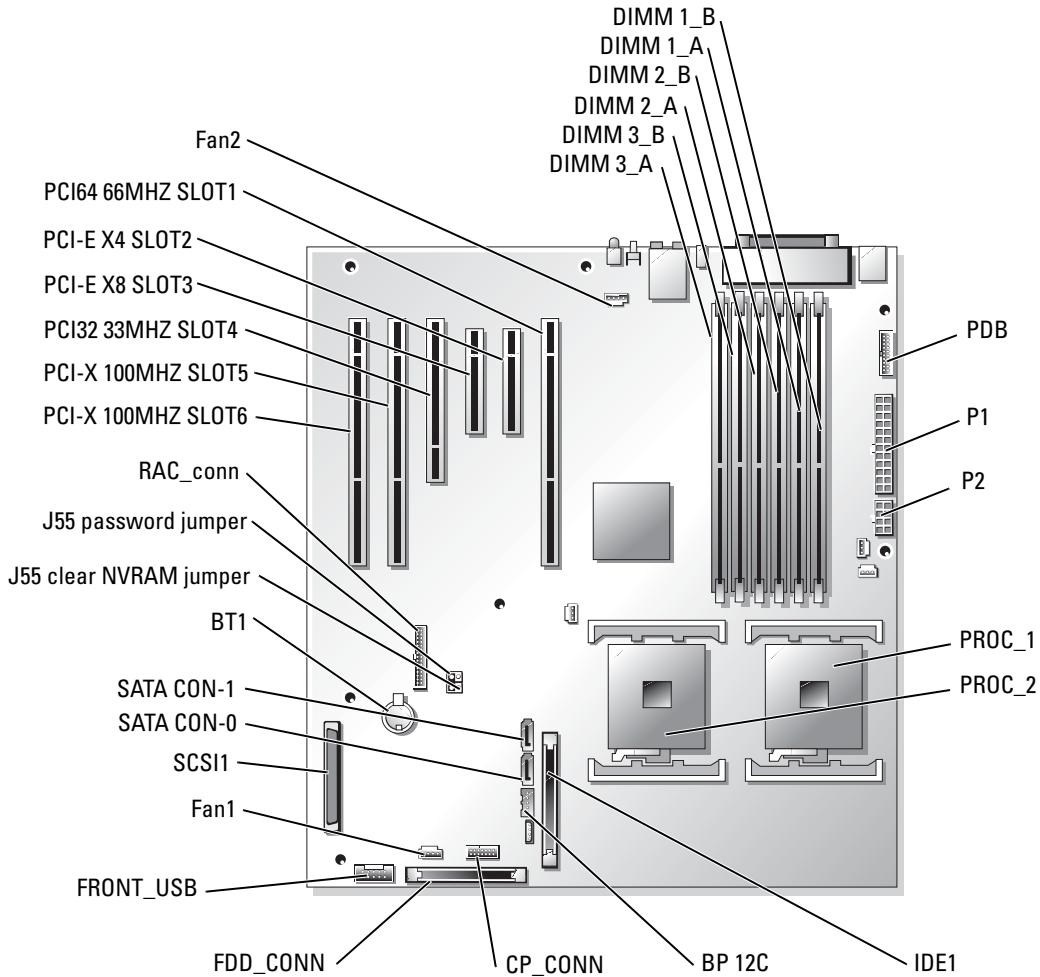
Table A-2. System Board Connectors

Connector	Description
BT1	System battery
BP 12C	SCSI backplane connector
CP_CONN	Control panel connector
DIMM n_X	Memory modules (6), where n is the slot in the bank and X is the bank
Fan1	Front system fan power
Fan2	Back system fan power
FDD_CONN	Diskette drive connector
FRONT_USB	Front USB connector
IDE1	IDE connector
PCI64 66MHZ SLOT1	PCI 64-bit, 66-MHz expansion-card slot
PCI-E X4 SLOT2	PCI Express x4-lane expansion-card slot **NOTE:** Although the PCIe x4-lane expansion slot is physically a PCIe x8 connector, it functions only as a PCIe x4-lane slot.
PCI-E X8 SLOT3	PCI Express x8-lane expansion-card slot
PCI32 33MHZ SLOT4	PCI 32-bit, 33-MHz expansion-card slot
PCI-X 100MHZ SLOT5	PCI-X 100-MHz expansion-card slot
PCI-X 100MHZ SLOT6	PCI-X 100-MHz expansion-card slot
PDB	Power board distribution connector
PROC_n	Microprocessors (2)
Pn	System board power connectors (2)
RAC_conn	Remote access control connector
SCSI1	SCSI controller connector
SATA CON-n	SATA connectors (2)

NOTE: For the full name of an abbreviation or acronym used in this table, see the "Glossary" in the *User's Guide*.

Disabling a Forgotten Password

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

⚠️ **CAUTION: Before you perform this procedure, see "Safety First—For You and Your System" in "Troubleshooting Your System."**

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

⚠️ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1   Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.

2   Open the system. See "Opening the System" in "Troubleshooting Your System."

3   If your system is configured as a tower, lay the system on its right side.

4   Remove the password jumper plug.

    See Figure A-2 to locate the password jumper on the system board.

5   Close the system. See "Closing the System" in "Troubleshooting Your System."

6   Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

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

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

7   Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.

8   Open the system. See "Opening the System" in "Troubleshooting Your System."

9   If your system is configured as a tower, lay the system on its right side.

10 Install the password jumper plug.

    See Figure A-2 to locate the password jumper on the system board.

11 Close the system. See "Closing the System" in "Troubleshooting Your System."

12 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

13 Assign a new system and/or setup password.

    To assign a new password using the System Setup program, see "Using the System Setup Program" in your *User's Guide*.

I/O Ports and Connectors

I/O Connectors

I/O connectors are the gateways that the system uses to communicate with external devices, such as a keyboard, mouse, printer, or monitor. This section describes the various connectors on your system. If you reconfigure the hardware connected to the system, you may also need the pin number and signal information for these connectors. Figure B-1 illustrates the connectors on the system.

Figure B-1.   I/O Connectors
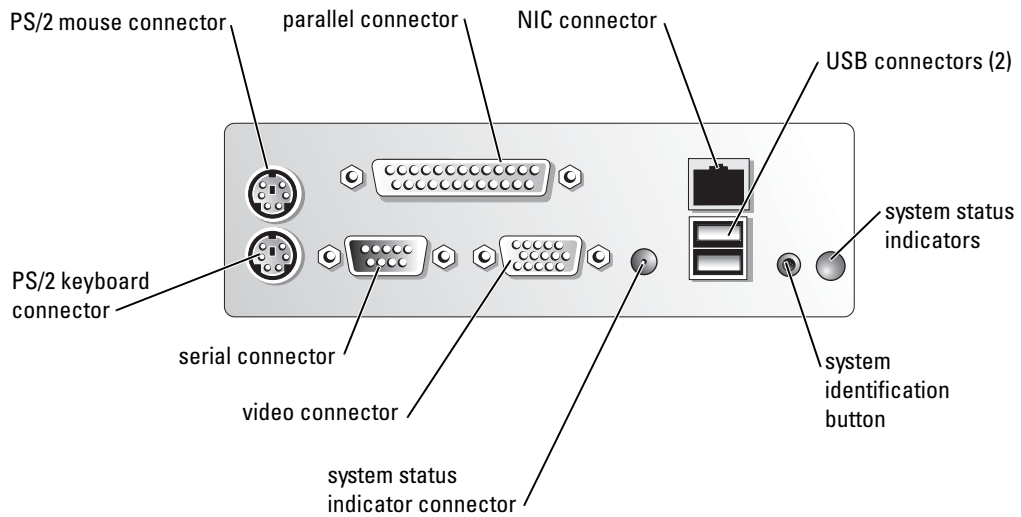
Table B-1 shows the icons used to label the connectors on the system.

Table B-1.   I/O Connector Icons

Icon	Connector
IOIOI	Serial connector
---	Parallel connector
-⊡	Mouse connector
⌨	Keyboard connector
💻	Video connector
•⇔	USB connector
品	NIC connector

Serial Connector

Serial connectors support devices such as external modems, printers, and mice that require serial data transmission. The serial connector uses a 9-pin D-subminiature connector.

Serial Connector Autoconfiguration

The default designation of the integrated serial connector is COM1. When you add an expansion card containing a serial connector that has the same designation as the integrated connector, the system's autoconfiguration feature remaps (reassigns) the integrated serial connector to the next available designation. Both the new and the remapped COM connectors share the same IRQ setting. COM1 and COM3 share IRQ4, while COM2 and COM4 share IRQ3.

✍ **NOTE:** If two COM connectors share an IRQ setting, you may not be able to use them both at the same time. In addition, if you install one or more expansion cards with serial connectors designated as COM1 and COM3, the integrated serial connector is disabled.

Before adding a card that remaps the COM connectors, check the documentation that came with the software to make sure that the software can accommodate the new COM connector designation.

Figure B-2 illustrates the pin numbers for the serial connector and Table B-2 defines the pin assignments for the connector.

Figure B-2.   Serial Connector Pin Numbers
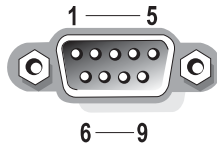
Table B-2.   Serial Connector Pin Assignments

Pin	Signal	I/O	Definition
1	DCD	I	Data carrier detect
2	SIN	I	Serial input
3	SOUT	O	Serial output
4	DTR	O	Data terminal ready
5	GND	N/A	Signal ground
6	DSR	I	Data set ready
7	RTS	O	Request to send
8	CTS	I	Clear to send
9	RI	I	Ring indicator
Shell	N/A	N/A	Chassis ground

Parallel Connector

The integrated parallel connector, intended primarily for use by printers that require data in parallel format, uses a 25-pin D-subminiature connector on the system's back panel. The default designation of the system's parallel connector is LPT1. If you add an expansion card containing a parallel connector configured as LPT1 (IRQ7, I/O address 378h), use the System Setup program to remap the integrated parallel connector. See "Using the System Setup Program" in the *User's Guide*. Figure B-3 illustrates the pin numbers for the parallel connector and Table B-3 defines the pin assignments for the connector.

Figure B-3.   Parallel Connector Pin Numbers
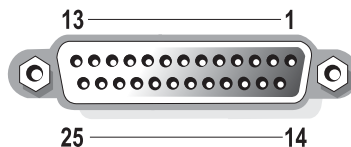
Table B-3.   Parallel Connector Pin Assignments

Pin	Signal	I/O	Definition
1	STB#	I/O	Strobe
2	PD0	I/O	Printer data bit 0
3	PD1	I/O	Printer data bit 1
4	PD2	I/O	Printer data bit 2
5	PD3	I/O	Printer data bit 3
6	PD4	I/O	Printer data bit 4
7	PD5	I/O	Printer data bit 5
8	PD6	I/O	Printer data bit 6
9	PD7	I/O	Printer data bit 7
10	ACK#	I	Acknowledge
11	BUSY	I	Busy
12	PE	I	Paper end
13	SLCT	I	Select
14	AFD#	O	Automatic feed
15	ERR#	I	Error
16	INIT#	O	Initialize printer
17	SLIN#	O	Select in
18–25	GND	N/A	Ground

PS/2-Compatible Keyboard and Mouse Connectors

The PS/2-compatible keyboard and mouse cables attach to 6-pin, miniature DIN connectors. Figure B-4 illustrates the pin numbers for these connectors and Table B-4 defines the pin assignments for these connectors.

Figure B-4.   Keyboard and Mouse Connector Pin Numbers
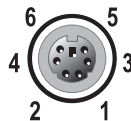
Table B-4.   Keyboard and Mouse Connector Pin Assignments

Pin	Signal	I/O	Definition
1	KBDATA or MFDATA	I/O	Keyboard data or mouse data
2	NC	N/A	No connection
3	GND	N/A	Signal ground
4	FVcc	N/A	Fused supply voltage
5	KBCLK or MFCLK	I/O	Keyboard clock or mouse clock
6	NC	N/A	No connection
Shell	N/A	N/A	Chassis ground

Video Connector

You can attach a VGA-compatible monitor to the system's integrated video controller using a 15-pin high-density D-subminiature connector. Figure B-5 illustrates the pin numbers for the video connector and Table B-5 defines the pin assignments for the connector.

NOTE: Installing a video card automatically disables the system's integrated video controller.

Figure B-5.   Video Connector Pin Numbers
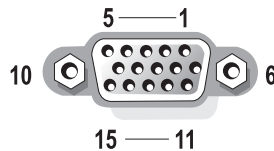
Table B-5.   Video Connector Pin Assignments

Pin	Signal	I/O	Definition
1	RED	O	Red video
2	GREEN	O	Green video
3	BLUE	O	Blue video
4	NC	N/A	No connection
5–8, 10	GND	N/A	Signal ground
9	VCC	N/A	Vcc
11	NC	N/A	No connection

Table B-5.   Video Connector Pin Assignments *(continued)*

Pin	Signal	I/O	Definition
12	DDC data out	O	Monitor detect data
13	HSYNC	O	Horizontal synchronization
14	VSYNC	O	Vertical synchronization
15	NC	N/A	No connection

USB Connector

The system's USB connector supports USB-compliant peripherals such as keyboards, mice, and printers and may also support USB-compliant devices such as diskette drives and CD drives. Figure B-6 illustrates the pin numbers for the USB connector and Table B-6 defines the pin assignments for the connector.

⊘ **NOTICE:** Do not attach a USB device or a combination of USB devices that draw a maximum current of more than 500 mA per channel or +5 V. Attaching devices that exceed this threshold may cause the USB connectors to shut down. See the documentation that accompanied the USB devices for their maximum current ratings.

Figure B-6.   USB Connector Pin Numbers
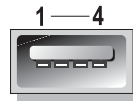
Table B-6.   USB Connector Pin Assignments

Pin	Signal	I/O	Definition
1	Vcc	N/A	Supply voltage
2	DATA	I	Data in
3	+DATA	O	Data out
4	GND	N/A	Signal ground

Integrated NIC Connector

The system's integrated NIC functions as a separate network expansion card while providing fast communication between servers and workstations. Figure B-7 illustrates the pin numbers for the NIC connector and Table B-7 defines the pin assignments for the connector.

Figure B-7. NIC Connector

link indicator   activity indicator

1 ——— 8
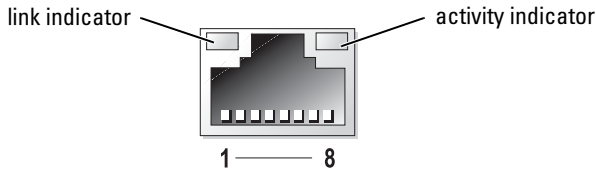
Table B-7. NIC Connector Pin Assignments

Pin	Signal	I/O	Definition
1	TD+	O	Data out (+)
2	TD–	O	Data out (–)
3	RD+	I	Data in (+)
4	NC	N/A	No connection
5	NC	N/A	No connection
6	RD–	I	Data in (–)
7	NC	N/A	No connection
8	NC	N/A	No connection

Network Cable Requirements

The NIC supports a UTP Ethernet cable equipped with a standard RJ45-compatible plug. Observe the following cabling restrictions.

NOTICE: To avoid line interference, voice and data lines must be in separate sheaths.

- Use Category 5 or greater wiring and connectors.
- Do not exceed a cable run length (from a workstation to a hub) of 100 m (328 ft).

For detailed guidelines on operation of a network, see "Systems Considerations of Multi-Segment Networks" in the IEEE 802.3 standard.

Index

Figures

Tables