

Dell™ PowerVault™ 100 Systems Hardware Owner's Manual

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Notes, Notices, and Cautions

-  **NOTE:** A NOTE indicates important information that helps you make better use of your computer.
 -  **NOTICE:** A NOTICE indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.
 -  **CAUTION:** A CAUTION indicates a potential for property damage, personal injury, or death.
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August 2007 P/N CX393 Rev. A00

About Your System

Dell™ PowerVault™ 100 Systems Hardware Owner's Manual

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This section describes the physical, firmware, and software interface features that provide and ensure the essential functioning of your system. The physical connectors on your system's front and back panels provide convenient connectivity and system expansion capability. The system firmware, applications, and operating systems monitor the system and component status and alert you when a problem arises. System conditions can be reported by any of the following:

- 1 Front or back panel indicators
- 1 System messages
- 1 Warning messages
- 1 Diagnostics messages
- 1 Beep codes
- 1 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.

Other Information You May Need

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

- 1 The *Getting Started Guide* provides an overview of system features, setting up your system, and technical specifications.
- 1 CDs included with your system provide documentation and tools for configuring and managing your system.
- 1 Systems management software documentation describes the features, requirements, installation, and basic operation of the software.
- 1 Operating system documentation describes how to install (if necessary), configure, and use the operating system software.
- 1 Documentation for any components you purchased separately provides information to configure and install these options.
- 1 Updates are sometimes included with the system to describe changes to the system, software, and/or documentation.

 **NOTE:** Always check for updates on support.dell.com and read the updates first because they often supersede information in other documents.

- 1 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.

Accessing System Features During Startup

[Table 1-1](#) describes keystrokes that may be entered during startup to access system features. If your operating system begins to load before you enter the keystroke, allow the system to finish booting, and then restart your system and try again.

Table 1-1. Keystrokes for Accessing System Features

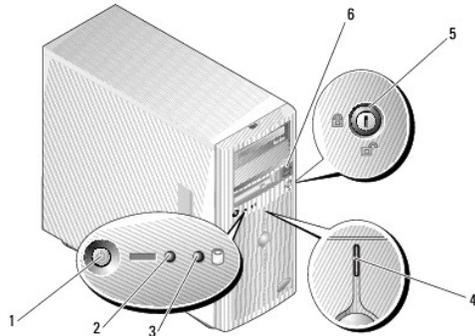
Keystroke	Description
<F2>	Enters the System Setup program. See Using the System Setup Program .
<F10>	Opens the utility partition, allowing you to run the system diagnostics. See Running the System Diagnostics .
<Ctrl+E>	Enters the Baseboard Management Controller (BMC) Management Utility, which allows access to the system event log (SEL). See the <i>BMC User's Guide</i> for more information on setup and use of BMC.
<Ctrl+C>	Enters the SAS Configuration Utility. See your SAS adapter <i>User's Guide</i> for more information.
<Ctrl+R>	Enters the RAID configuration utility, which allows you to configure an optional RAID card. For more information, see the documentation for your RAID card.

<Ctrl+S>	Option is displayed only if you have PXE support enabled through the System Setup Program (see Integrated Devices Screen). This keystroke allows you to configure NIC settings for PXE boot. For more information, see the documentation for your integrated NIC.
<Ctrl+D>	If you have the optional Dell Remote Access Controller (DRAC), this keystroke allows access to selected DRAC configuration settings. See the DRAC User's Guide for more information on setup and use of DRAC.

Front-Panel Features and Indicators

[Figure 1-1](#) shows the controls, indicators, and connectors located on the system's front panel. [Table 1-2](#) provides component descriptions.

Figure 1-1. Front-Panel Features and Indicators



1	power button	2	power-on indicator	3	hard-drive activity indicator
4	system status indicator	5	security lock	6	USB connectors (2)

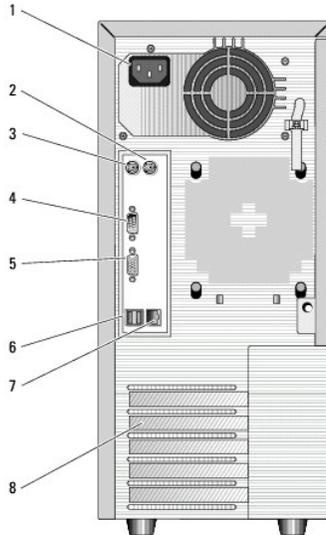
Table 1-2. Front-Panel Components

Item	Component	Icon	Description
1	Power button		<p>The power button turns system power off and on.</p> <p>NOTICE: If you turn off the system using the power button and the system is running an ACPI-compliant operating system, the system can perform an orderly shutdown before power is turned off. If the power button is pressed for more than 4 seconds, the system power will turn off regardless of the current operating system state. If the system is not running an ACPI-compliant operating system, power is turned off immediately after the power button is pressed.</p> <p>The power button is enabled in the System Setup program. When disabled, the button can only turn the system power on. For more information, see Using the System Setup Program and the operating system's documentation.</p>
2	Power-on indicator		<p>On: System power is on.</p> <p>Blinking: System is on but in standby state, or system is off but still connected to the power source.</p>
3	Hard-drive activity indicator		Flashes when data is being read from or written to the internal SATA hard drives that are connected to the integrated controller.
4	System status indicator		<p>Blue: Normal system operation.</p> <p>Amber: Flashes when the system needs attention due to a problem with power supplies, fans, system temperature, or hot-plug hard drives.</p> <p>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.</p>
5	Security lock		Controls access to the system's internal components.
6	USB connectors		Connects USB 2.0-compliant devices to the system.

Back-Panel Features and Indicators

Figure 1-2 shows the connectors located on the system's back panel.

Figure 1-2. Back-Panel Features



1	AC power connector	2	mouse connector	3	keyboard connector
4	serial connectors (5)	5	video connector	6	USB connector (2)
7	NIC connector	8	expansion slots (5)		

Connecting External Devices

When connecting external devices to your system, follow these guidelines:

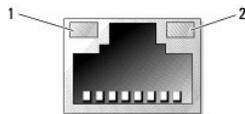
- Most devices must be connected to a specific connector and device drivers must be installed before the device operates properly. (Device drivers are normally included with your operating system software or with the device itself.) See the documentation that accompanied the device for specific installation and configuration instructions.
- Always attach an external device while your system and the device are turned off. Next, turn on any external devices before turning on the system (unless the documentation for the device specifies otherwise).

See [Using the System Setup Program](#) for information about enabling, disabling, and configuring I/O ports and connectors.

NIC Indicator Codes

The NIC on the back panel has an indicator that provides information on network activity and link status. See [Figure 1-3](#). [Table 1-3](#) lists the NIC indicator codes.

Figure 1-3. NIC Indicators



1	link indicator	2	activity indicator
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Table 1-3. NIC Indicator Codes

Indicator Type	Indicator Code	Description
Activity	Off	When off at the same time that the link indicator is off, the NIC is not connected to the network or the NIC is disabled in the System

		Setup program. See Using the System Setup Program .
	Blinking yellow	Indicates that network data is being sent or received.
Link	Off	When off at the same time that the activity indicator is off, the NIC is not connected to the network or the NIC is disabled in the System Setup program. See Using the System Setup Program .
	On (green)	Indicates active link.

Diagnostics Indicator Codes

Four diagnostic indicator lights are located behind the bezel on the I/O control panel. To access the lights, see [Opening the System](#). These lights display error codes during system startup. Table 1-4 lists the causes and corrective actions associated with these codes and the power light status before system POST. Table 1-4 lists the causes and possible corrective actions for these codes during POST. A highlighted circle indicates the light is on; a non-highlighted circle indicates the light is off.

Table 1-4. Diagnostic Indicator Lights

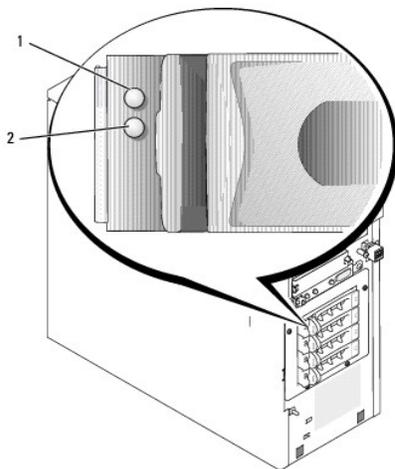
Code	Causes	Corrective Action
 A B	No power is applied to the system.	See Troubleshooting Power Supplies .
 A B	A possible processor failure has occurred.	See Troubleshooting the Microprocessor .
 A B	Memory failure.	See Troubleshooting System Memory .
 A B	Possible expansion-card failure.	See Troubleshooting Expansion Cards .
 A B	Possible video card failure.	See Troubleshooting Expansion Cards .
 A B	Diskette or hard-drive failure.	Ensure that the diskette drive and hard drive(s) are properly connected. See Troubleshooting a Hard Drive for information on the drive(s) installed in your system.
 A B	Possible USB failure.	See Troubleshooting a USB Device .
 A B	No memory modules detected.	See Troubleshooting System Memory .
 A B	System board failure.	See Getting Help .
 A B	Memory configuration error.	See Troubleshooting System Memory .
 A B	Possible system board resource and/or system board hardware failure.	See Getting Help .

	Possible expansion card failure.	See Troubleshooting Expansion Cards .
	Other failure.	Ensure that the diskette drive, optical drive, and hard drive(s) are properly connected. See Troubleshooting Your System for the appropriate drive(s) installed in your system. If the problem persists, see See Getting Help .
	The system is in a normal operating condition after POST.	Information only.
 = yellow  = green  = off		

Hard-Drive Indicator Codes

If an optional SAS backplane is installed in the system, two indicators on each of the hard-drive carriers provide information on the status of the hard drives. See [Figure 1-4](#) and [Table 1-5](#). The SAS backplane firmware controls the drive power-on/fault indicator.

Figure 1-4. Hard-Drive Indicators



1	drive status indicator	2	drive busy indicator
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Table 1-5 lists the drive indicator patterns. Different patterns are displayed as drive events occur in the system. For example, if a hard drive fails, the "drive failed" pattern appears. After the drive is selected for removal, the "drive being prepared for removal" pattern appears, followed by the "drive ready for insertion or removal" pattern. After the replacement drive is installed, the "drive being prepared for operation" pattern appears, followed by the "drive online" pattern.

 **NOTE:** If a RAID controller is not installed, only the "drive online" indicator pattern appears. The drive-activity indicator also blinks when the drive is being accessed.

Table 1-5. System Messages

Condition	Indicator Pattern
Identify drive	The green power-on/fault indicator blinks four times per second.
Drive being prepared for removal	The green power-on/fault indicator blinks two times per second.
Drive ready for insertion or removal	Both drive indicators are off.
Drive being prepared for operation	The green power-on/fault indicator is on.
Drive predicted failure	The power-on/fault indicator slowly blinks green, amber, and off.
Drive failed	The amber power-on/fault indicator blinks four times per second.
Drive rebuilding	The green power-on/fault indicator blinks slowly.

Drive online	The green power-on/fault indicator is on.
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System Messages

System messages appear on the screen to notify you of a possible problem with the system. [Table 1-6](#) 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 1-6](#), 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.

Table 1-6. System Messages

Message	Causes	Corrective Actions
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 .
Attempting to update Remote Configuration. Please wait...	Remote Configuration is in progress.	Wait until the process is complete.
BIOS Update Attempt Failed	BIOS remote update failed.	Retry update.
Caution! NVRAM_CLR jumper is installed on system board.	NVRAM_CLR jumper is installed.	Remove the NVRAM_CLR jumper. See Jumpers and Connectors for the Jumper location.
Data error	Faulty diskette, diskette drive, optical drive, hard drive.	Replace the diskette. Ensure that the diskette drive, optical drive, and hard-drive cables are properly connected. See Troubleshooting a Diskette Drive or Troubleshooting an Optical Drive for the appropriate drive(s) installed in your system.
Decreasing available memory	Faulty or improperly installed memory modules.	Ensure that all memory modules are properly installed. See Troubleshooting System Memory .
Diskette drive 0 seek failure	Incorrect configuration settings in System Setup program.	Run the System Setup program to correct the settings. See Using the System Setup Program .
Diskette read failure	Faulty or improperly inserted diskette.	Replace the diskette.
Diskette subsystem reset failed	Faulty diskette drive or optical drive controller.	Ensure that the diskette drive and optical drive cables are properly connected. See Troubleshooting a Diskette Drive and Troubleshooting an Optical Drive . If the problem persists, see Getting Help .
Drive not ready	Diskette missing or improperly inserted in diskette drive.	Reinsert or replace the diskette.
Error: Incorrect memory configuration. Ensure memory in slots DIMM1_A and DIMM1_B, DIMM2_A and DIMM2_B match identically in size, speed, and rank.	An unmatched pair of memory modules is installed.	Install a matched pair of memory modules, or remove the memory module in socket DIMM1_B. See General Memory Module Installation Guidelines .
Error: Remote Access Card initialization failure.	Faulty or improperly installed RAC.	Ensure that the RAC is properly installed. See Troubleshooting Expansion Cards .
Error 8602: Auxiliary device failure. Verify that the mouse and keyboard are securely attached to correct connectors.	Loose or improperly connected mouse or keyboard cable; faulty mouse or keyboard.	Replace the mouse. If the problem persists, replace the keyboard.
Gate A20 failure	Faulty keyboard controller (faulty system board).	See Getting Help .
General failure	Operating system corrupted or improperly installed.	Reinstall the operating system.
IDE Primary drive x not found	Improperly connected or missing optical drive or tape backup unit.	Ensure that the drive cables are properly connected. See Troubleshooting Your System for the appropriate drive installed in your system. If no drive is installed, disable the IDE controller. See Using the System Setup Program .
Invalid memory configuration detected. Potential for data corruption exists!	Unsupported DIMMs are installed in the system, or the memory configuration is incorrect.	Replace or reconfigure the DIMMs. See Memory for memory configuration guidelines, a list of supported DIMMs, and supported memory

		configurations.
Keyboard controller failure	Faulty keyboard controller (faulty system board).	See Getting Help .
Keyboard data line failure Keyboard failure Keyboard stuck key failure	Loose or improperly connected keyboard cable; faulty keyboard; faulty keyboard controller.	Ensure that the keyboard is properly connected. If the problem persists, replace the keyboard. If the problem persists, see Getting Help .
Keyboard fuse has failed.	Keyboard fuse has failed.	Replace the keyboard.
Manufacturing mode detected	System is incorrectly configured.	Install the NVRAM_CLR jumper and reboot the system. See System Board Jumpers for jumper location.
Memory address line failure at address, read value expecting value Memory double word logic failure at address, read value expecting value Memory odd/even logic failure at address, read value expecting value Memory write/read failure at address, read value expecting value	Faulty or improperly installed memory modules, or faulty system board.	Ensure that all memory modules are properly installed. See Troubleshooting System Memory . If the problem persists, see Getting Help .
Memory tests terminated by keystroke	The spacebar was pressed during POST to terminate the memory test.	Do not press spacebar during memory test.
More than one RAC detected, system halted		Verify that the RAC is installed in the proper PCI expansion slot (SLOT_5). If a RAC is installed in any other slot, remove it.
No boot device available	Faulty or missing diskette drive, optical drive, or hard drive.	Check the Integrated Devices configuration settings in the System Setup program. See Using the System Setup Program . Ensure that either SATA Controller , Diskette Controller , or IDE Controller is enabled. If the system is booting from a SCSI controller, ensure that the controller is properly connected. If the problem persists, replace the drive. See Hard Drives .
No boot sector on hard-disk drive	An operating system is not on the hard drive.	Check the hard-drive configuration settings in the System Setup program. See Using the System Setup Program .
No timer tick interrupt	Faulty system board.	See Getting Help .
Not a boot diskette	Not a bootable 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. See Troubleshooting Expansion Cards .
PCIe Degraded Link Width Error: Embedded Bus##nn/Dev##nn/Funcn Expected Link Width is n Actual Link Width is n	Faulty or improperly installed PCIe card.	Reseat the PCIe cards. See Expansion Cards . If the problem persists, 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/Funcn	Faulty or improperly installed PCIe card.	Reseat the PCIe cards. See Expansion Cards . If the problem persists, see Getting Help .
PCIe Training Error: Slot n	Faulty or improperly installed PCIe card in the specified slot	Reseat the PCIe card in the specified slot number. See Expansion Cards . If the

	number.	problem persists, see Getting Help .
Plug & Play Configuration Error	Error encountered in initializing PCI device; faulty system board.	Install the NVRAM_CLR jumper and reboot the system. See Figure 6-1 for jumper location. Check for a BIOS update. If the problem persists, see Troubleshooting Expansion Cards . If the problem persists, see Getting Help .
Primary drive <i>n</i> configuration error Primary drive 1 failure	Faulty hard-disk drive.	Replace the hard-disk drive. See Troubleshooting SATA Hard Drives or Troubleshooting a SAS RAID Controller in for the appropriate drive(s) installed in your system.
Read fault Requested sector not found	Faulty diskette, diskette drive, optical drive, or hard drive.	Replace the diskette. Ensure that the diskette, optical, and hard-drive cables are properly connected. See Troubleshooting a Diskette Drive , Troubleshooting an Optical Drive , Troubleshooting SATA Hard Drives , or Troubleshooting a SAS RAID Controller for the appropriate drive(s) installed in your system.
Remote Configuration update attempt failed	System could not implement Remote Configuration request.	Retry Remote Configuration.
ROM bad checksum = <i>address</i>	Faulty or improperly installed expansion card.	Remove and reseat the expansion cards. See Troubleshooting Expansion Cards .
SATA Port <i>n</i> hard disk drive configuration error SATA Port <i>n</i> hard disk drive failure SATA Port <i>n</i> hard disk drive auto-sensing error	Faulty SATA hard drive.	Replace the hard-disk drive. See Troubleshooting SATA Hard Drives for the appropriate drive(s) installed in your system.
SATA Port <i>n</i> hard disk not found	SATA hard drive not connected to port <i>n</i> .	Ensure that the hard-drive cable is properly connected. See Hard Drives . If a drive is not connected to port <i>n</i> , check that the SATA port is disabled in the System Setup program. See Using the System Setup Program .
Sector not found Seek error Seek operation failed	Faulty diskette or hard drive.	Replace the diskette. If the problem persists, see Troubleshooting SATA Hard Drives or Troubleshooting SATA Hard Drives for the appropriate drive installed in your system.
Shutdown failure	Shutdown test failure.	Ensure that all memory modules are properly installed. See Troubleshooting System Memory . If the problem persists, see Getting Help .
The amount of system memory has changed.	Faulty memory module.	See Troubleshooting System Memory . If the problem persists, see Getting Help .
The amount of tested memory is below the minimum system configuration. System halted!	Invalid memory configuration Faulty memory module.	See Memory . See Troubleshooting System Memory . If the problem persists, see Getting Help .
Time-of-day clock stopped	Faulty battery; faulty system board.	See Troubleshooting the System Battery . If the problem persists, see Getting Help .
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 your <i>User's Guide</i> . If the problem persists, see Troubleshooting the System Battery .
Timer chip counter 2 failed	Faulty system board.	See Getting Help .
Unexpected interrupt in protected mode	Faulty or improperly installed memory modules or faulty system board.	Ensure that all memory modules are properly installed. See Memory . If the problem persists, see Troubleshooting System Memory . If the problem persists, see Getting Help .

Utility partition not available	<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 the CDs that came with your system.
Warning! No microcode update loaded for processor <i>n</i>	Unsupported processor.	Update the BIOS firmware using the Dell Support website at support.dell.com .
Write fault Write fault on selected drive	Faulty diskette, diskette drive, optical drive and/or hard drive.	Replace the diskette. Ensure that the diskette drive, optical drive, and hard-drive cables are properly connected. See Troubleshooting a Diskette Drive , Troubleshooting an Optical Drive , or Troubleshooting a Hard Drive for the appropriate drive(s) installed in your system.

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 1-7](#). 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 1-7. System Beep Codes

Code	Cause	Corrective Action
1-1-2	CPU register test failure	See Troubleshooting the Microprocessor .
1-1-3	CMOS write/read failure; faulty system board	Replace faulty system board. See Getting Help .
1-1-4	BIOS error	Reflash the BIOS.
1-2-1	Programmable interval-timer failure; faulty system board	Replace faulty system board. See Getting Help .
1-2-2	DMA initialization failure	See Troubleshooting System Memory .
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	Replace faulty system board. 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	
3-3-1	CMOS failure	
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	Replace faulty system board. See Getting
3-4-2	Screen-retrace test failure	
3-4-3	Video ROM search failure	
4-2-1	No timer tick	Replace faulty system board. See Getting

4-2-2	Shutdown test failure	Help
4-2-3	Gate A20 failure	
4-2-4	Unexpected interrupt in protected mode	See Troubleshooting Expansion Cards .
4-3-1	Improperly installed or faulty memory modules	See Troubleshooting System Memory .
4-3-2	No memory modules installed in the first memory module connector	Install a memory module in the first memory module connector. See Memory .
4-3-3	Faulty system board	Replace faulty system board. See Getting Help .
4-3-4	Time-of-day clock stopped	See Troubleshooting System Memory . Replace faulty system board. See Getting Help .
4-4-1	Super I/O chip failure; faulty system board	Replace faulty system board. Faulty system board. See Getting Help .
4-4-4	Cache test failure; faulty processor	See Troubleshooting the Microprocessor .

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 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.

Baseboard Management Controller Messages

The Baseboard Management Controller (BMC) enables you to configure, monitor, and recover systems remotely. BMC uses the system's serial port and integrated NIC1 to support fault logging and SNMP alerting.

 **NOTE:** If the integrated network controller is used in an Ether Channel team or link aggregation team, the BMC management traffic will not function properly. For more information about network teaming, see the documentation for the network controller.

For additional information on using BMC, see the documentation for the BMC and systems management applications.

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Running the System Diagnostics

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- [Running the System Diagnostics](#)
- [System Diagnostics Testing Options](#)
- [Using the Custom Test Options](#)

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 Dell PowerVault Diagnostics

To assess a system problem, first use the online Dell™ PowerVault™ Diagnostics. Dell PowerVault Diagnostics is a suite of diagnostic programs, or test modules, that include diagnostic tests on chassis and storage components such as hard drives, physical memory, communications and printer ports, NICs, CMOS, and more. If you are unable to identify the problem using the PowerVault Diagnostics, then use the system diagnostics.

The files required to run PowerVault Diagnostics for systems running supported Microsoft® Windows® and operating systems are available at support.dell.com and on the CDs that came with your system. For information about using diagnostics, see the *Dell PowerVault Diagnostics 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:

- 1 Run tests individually or collectively.
 - 1 Control the sequence of tests.
 - 1 Repeat tests.
 - 1 Display, print, or save test results.
 - 1 Temporarily suspend testing if an error is detected or terminate testing when a user-defined error limit is reached.
 - 1 View help messages that briefly describe each test and its parameters.
 - 1 View status messages that inform you if tests are completed successfully.
 - 1 View error messages that inform you of problems encountered during testing.
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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 removable bootable media. You can create this media using the CDs that came with your system or from the diagnostic utility that you can download from support.dell.com.

- ➡ **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 main menu under **Run System Utilities**, select **Run System Diagnostics**.

From Removable Bootable Media

You can create a bootable diagnostic partition on a recordable CD, a USB flash drive, or on diskettes using the CDs that came with your system, or the diagnostic utility that you can download from support.dell.com.

1. Insert a recordable CD, USB flash drive, or writable diskette into your system.
2. Run the self-extracting diagnostic utility package from the diagnostic CD that came with your system or the file you downloaded from support.dell.com.
3. Run the diagnostic utility and follow the on-screen instructions to create the diagnostic partition on the bootable media.
4. Restart the system, enter the System Setup program, and set the removable media type as the default boot device.

See [Using the System Setup Program](#) for instructions.

5. Ensure that the removable bootable media is inserted or attached to the system and reboot the system.

If the system fails to boot, see [Getting Help](#).

When you start the system diagnostics, a message is displayed indicating that the diagnostics are initializing. Then the **Diagnostics** menu appears. This 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

Click the testing option in the **Main Menu** window. [Table 4-1](#) provides a brief explanation of testing options.

Table 4-1. System Diagnostics Testing Options

Testing Option	Function
Express Test	Performs a quick check of the system. This option runs device tests that do not require user interaction. Use this option to quickly identify the source of your problem.
Extended Test	Performs a more thorough check of the system. This test can take an hour or longer.
Custom Test	Tests a particular device.
Information	Displays test results.

Using the Custom Test Options

When you select **Custom Test** in the **Main Menu** window, the **Customize** window appears and allows you to select the device(s) to be tested, select specific options for testing, and view the test results.

Selecting Devices for Testing

The left side of the **Customize** window lists devices that can be tested. Devices are grouped by device type or by module, depending on the option you select. Click the (+) next to a device or module to view its components. Click (+) on any component to view the tests that are available. Clicking a device, rather than its components, selects all of the components of the device for testing.

Selecting Diagnostics Options

Use the **Diagnostics Options** area to select how you want to test a device. You can set the following options:

- 1 **Non-Interactive Tests Only** — When checked, runs only tests that require no user intervention.
- 1 **Quick Tests Only** — When checked, runs only the quick tests on the device. Extended tests will not run when you select this option.
- 1 **Show Ending Timestamp** — When checked, time stamps the test log.
- 1 **Test Iterations** — Selects the number of times the test is run.
- 1 **Log output file pathname** — When checked, enables you to specify where the test log file is saved.

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Glossary

Dell™ PowerVault™ 100 Systems Hardware Owner's Manual

This section defines or identifies technical terms, abbreviations, and acronyms used in your system documents.

A — Ampere(s).

AC — Alternating current.

ACPI — Advanced Configuration and Power Interface. A standard interface for enabling the operating system to direct configuration and power management.

ambient temperature — The temperature of the area or room where the system is located.

ANSI — American National Standards Institute. The primary organization for developing technology standards in the U.S.

application — Software designed to help you perform a specific task or series of tasks. Applications run from the operating system.

ASCII — American Standard Code for Information Interchange.

asset tag — An individual code assigned to a system, usually by an administrator, for security or tracking purposes.

backup — A copy of a program or data file. As a precaution, back up your system's hard drive on a regular basis. Before making a change to the configuration of your system, back up important start-up files from your operating system.

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

beep code — A diagnostic message in the form of a pattern of beeps from your system's speaker. For example, one beep, followed by a second beep, and then a burst of three beeps is beep code 1-1-3.

BIOS — Basic input/output system. Your system's BIOS contains programs stored on a flash memory chip. The BIOS controls the following:

- 1 Communications between the processor and peripheral devices
- 1 Miscellaneous functions, such as system messages

bit — The smallest unit of information interpreted by your system.

blade — A module that contains a processor, memory, and a hard drive. The modules are mounted into a chassis that includes power supplies and fans.

BMC — Baseboard management controller.

boot routine — A program that clears all memory, initializes devices, and loads the operating system when you start your system. Unless the operating system fails to respond, you can **reboot** (also called *warm boot*) your system by pressing <Ctrl><Alt>. Otherwise, you must restart the system by pressing the reset button or by turning the system off and then back on.

bootable diskette — A diskette that is used to start your system if the system will not boot from the hard drive.

BTU — British thermal unit.

bus — An information pathway between the components of a system. Your system contains an expansion bus that allows the processor to communicate with controllers for the peripheral devices connected to the system. Your system also contains an address bus and a data bus for communications between the processor and RAM.

C — Celsius.

cache — A fast storage area that keeps a copy of data or instructions for quick data retrieval. When a program makes a request to a disk drive for data that is in the cache, the disk-cache utility can retrieve the data from RAM faster than from the disk drive.

CD — Compact disc. CD drives use optical technology to read data from CDs.

cm — Centimeter(s).

cmos — Complementary metal-oxide semiconductor.

component — As they relate to DMI, components include operating systems, computer systems, expansion cards, and peripherals that are compatible with DMI. Each component is made up of groups and attributes that are defined as relevant to that component.

COMn — The device names for the serial ports on your system.

control panel — The part of the system that contains indicators and controls, such as the power button and power indicator.

controller — A chip that controls the transfer of data between the processor and memory or between the processor and a peripheral.

conventional memory — The first 640 KB of RAM. Conventional memory is found in all systems. Unless they are specially designed, MS-DOS® programs are limited to running in conventional memory.

coprocessor — A chip that relieves the system's processor of specific processing tasks. A math coprocessor, for example, handles numeric processing.

CPU — Central processing unit. See *processor*.

DC — Direct current.

DDR — Double-data rate. A technology in memory modules that potentially doubles the output.

device driver — A program that allows the operating system or some other program to interface correctly with a peripheral. Some device drivers—such as network drivers—must be loaded from the **config.sys** file or as memory-resident programs (usually, from the **autoexec.bat** file). Others must load when you start the program for which they were designed.

DHCP — Dynamic Host Configuration Protocol. A method of automatically assigning an IP address to a client system.

diagnostics — A comprehensive set of tests for your system.

DIMM — Dual in-line memory module. See also *memory module*.

DIN — *Deutsche Industrie Norm*.

directory — Directories help keep related files organized on a disk in a hierarchical, "inverted tree" structure. Each disk has a "root" directory. Additional directories that branch off the root directory are called *subdirectories*. Subdirectories may contain additional directories branching off them.

DMA — Direct memory access. A DMA channel allows certain types of data transfer between RAM and a device to bypass the processor.

DMI — Desktop Management Interface. DMI enables the management of your system's software and hardware by collecting information about the system's components, such as the operating system, memory, peripherals, expansion cards, and asset tag.

DNS — Domain Name System. A method of translating Internet domain names, such as **www.dell.com**, into IP addresses, such as 143.166.83.200.

DRAM — Dynamic random-access memory. A system's RAM is usually made up entirely of DRAM chips.

DVD — Digital versatile disc.

ECC — Error checking and correction.

EEPROM — Electronically erasable programmable read-only memory.

EMC — Electromagnetic compatibility.

EMI — Electromagnetic interference.

ERA — Embedded remote access. ERA allows you to perform remote, or "out-of-band," server management on your network server using a remote access controller.

ESD — Electrostatic discharge.

ESM — Embedded server management.

expansion bus — Your system contains an expansion bus that allows the processor to communicate with controllers for peripherals, such as NICs.

expansion card — An add-in card, such as a NIC or SCSI adapter, that plugs into an expansion-card connector on the system board. An expansion card adds some specialized function to the system by providing an interface between the expansion bus and a peripheral.

expansion-card connector — A connector on the system board or riser board for plugging in an expansion card.

F — Fahrenheit.

FAT — File allocation table. The file system structure used by MS-DOS to organize and keep track of file storage. The Microsoft® Windows® operating systems can optionally use a FAT file system structure.

flash memory — A type of EEPROM chip that can be reprogrammed from a utility on diskette while still installed in a system; most EEPROM chips can only be rewritten with special programming equipment.

format — To prepare a hard drive or diskette for storing files. An unconditional format deletes all data stored on the disk.

FSB — Front-side bus. The FSB is the data path and physical interface between the processor and the main memory (RAM).

ft — Feet.

FTP — File transfer protocol.

g — Gram(s).

G — Gravities.

Gb — Gigabit(s); 1024 megabits or 1,073,741,824 bits.

GB — Gigabyte(s); 1024 megabytes or 1,073,741,824 bytes. However, when referring to hard-drive capacity, the term is usually rounded to 1,000,000,000 bytes.

graphics mode — A video mode that can be defined as x horizontal by y vertical pixels by z colors.

group — As it relates to DMI, a group is a data structure that defines common information, or attributes, about a manageable component.

guarding — A type of data redundancy in which a set of physical drives stores data and an additional drive stores parity data. See also *mirroring*, *striping*, and *RAID*.

h — Hexadecimal. A base-16 numbering system, often used in programming to identify addresses in the system's RAM and I/O memory addresses for devices. In text, hexadecimal numbers are often followed by *h*.

headless system — A system or device that functions without having a keyboard, mouse, or monitor attached. Normally, headless systems are managed over a network using an Internet browser.

host adapter — A host adapter implements communication between the system's bus and the controller for a peripheral device. (Hard-drive controller

subsystems include integrated host adapter circuitry.) To add a SCSI expansion bus to your system, you must install or connect the appropriate host adapter.

Hz — Hertz.

I/O — Input/output. A keyboard is an input device, and a monitor is an output device. In general, I/O activity can be differentiated from computational activity.

ID — Identification.

IDE — Integrated drive electronics. A standard interface between the system board and storage devices.

integrated mirroring — Provides simultaneous physical mirroring of two drives. Integrated mirroring functionality is provided by the system's hardware. See also *mirroring*.

internal processor cache — An instruction and data cache built into the processor.

IP — Internet Protocol.

IPX — Internet package exchange.

IRQ — Interrupt request. A signal that data is about to be sent to or received by a peripheral device travels by an IRQ line to the processor. Each peripheral connection must be assigned an IRQ number. Two devices can share the same IRQ assignment, but you cannot operate both devices simultaneously.

jumper — 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, providing a simple and reversible method of changing the circuitry in a board.

K — Kilo-; 1000.

Kb — Kilobit(s); 1024 bits.

KB — Kilobyte(s); 1024 bytes.

Kbps — Kilobit(s) per second.

KBps — Kilobyte(s) per second.

key combination — A command requiring you to press multiple keys at the same time (for example, <Ctrl><Alt>).

kg — Kilogram(s); 1000 grams.

kHz — Kiloherertz.

KMM — Keyboard/monitor/mouse.

KVM — Keyboard/video/mouse. KVM refers to a switch that allows selection of the system from which the video is displayed and for which the keyboard and mouse are used.

LAN — Local area network. A LAN is usually confined to the same building or a few nearby buildings, with all equipment linked by wiring dedicated specifically to the LAN.

lb — Pound(s).

LCD — Liquid crystal display.

LED — Light-emitting diode. An electronic device that lights up when a current is passed through it.

Linux — A UNIX-like operating system that runs on a variety of hardware systems. Linux is open source software, which is freely available; however, the full distribution of Linux along with technical support and training are available for a fee from vendors such as Red Hat Software.

local bus — On a system with local-bus expansion capability, certain peripheral devices (such as the video adapter circuitry) can be designed to run much faster than they would with a traditional expansion bus. See also *bus*.

LVD — Low voltage differential.

m — Meter(s).

mA — Milliampere(s).

MAC address — Media Access Control address. Your system's unique hardware number on a network.

mAh — Milliampere-hour(s).

Mb — Megabit(s); 1,048,576 bits.

MB — Megabyte(s); 1,048,576 bytes. However, when referring to hard-drive capacity, the term is often rounded to mean 1,000,000 bytes.

Mbps — Megabits per second.

MBps — Megabytes per second.

MBR — Master boot record.

memory address — A specific location, usually expressed as a hexadecimal number, in the system's RAM.

memory module — A small circuit board containing DRAM chips that connects to the system board.

memory — An area in your system that stores basic system data. A system can contain several different forms of memory, such as integrated memory (ROM and RAM) and add-in memory modules (DIMMs).

MHz — Megahertz.

mirroring — A type of data redundancy in which a set of physical drives stores data and one or more sets of additional drives stores duplicate copies of the data. Mirroring functionality is provided by software. See also *guarding*, *integrated mirroring*, *striping*, and *RAID*.

mm — Millimeter(s).

ms — Millisecond(s).

NAS — Network Attached Storage. NAS is one of the concepts used for implementing shared storage on a network. NAS systems have their own operating systems, integrated hardware, and software that are optimized to serve specific storage needs.

NIC — Network interface controller. A device that is installed or integrated in a system to allow connection to a network.

NMI — Nonmaskable interrupt. A device sends an NMI to signal the processor about hardware errors.

ns — Nanosecond(s).

NTFS — The NT File System option in the Windows 2000, Windows XP and Windows Vista operating systems.

NVRAM — Nonvolatile random-access memory. Memory that does not lose its contents when you turn off your system. NVRAM is used for maintaining the date, time, and system configuration information.

parity — Redundant information that is associated with a block of data.

partition — You can divide a hard drive into multiple physical sections called *partitions* with the **fdisk** command. Each partition can contain multiple logical drives. You must format each logical drive with the **format** command.

PCI — Peripheral Component Interconnect. A standard for local-bus implementation.

PDU — Power distribution unit. A power source with multiple power outlets that provides electrical power to servers and storage systems in a rack.

peripheral — An internal or external device, such as a diskette drive or keyboard, connected to a system.

PGA — Pin grid array. A type of processor socket that allows you to remove the processor chip.

pixel — A single point on a video display. Pixels are arranged in rows and columns to create an image. A video resolution, such as 640 x 480, is expressed as the number of pixels across by the number of pixels up and down.

POST — Power-on self-test. Before the operating system loads when you turn on your system, the POST tests various system components such as RAM and hard drives.

processor — The primary computational chip inside the system that controls the interpretation and execution of arithmetic and logic functions. Software written for one processor must usually be revised to run on another processor. *CPU* is a synonym for processor.

protected mode — An operating mode that allows operating systems to implement:

- 1 A memory address space of 16 MB to 4 GB
- 1 Multitasking
- 1 Virtual memory, a method for increasing addressable memory by using the hard drive

The Windows 2000 and UNIX 32-bit operating systems run in protected mode. MS-DOS cannot run in protected mode.

PS/2 — Personal System/2.

PXE — Preboot eXecution Environment. A way of booting a system via a LAN (without a hard drive or bootable diskette).

RAC — Remote access controller.

RAID — Redundant array of independent disks. A method of providing data redundancy. Some common implementations of RAID include RAID 0, RAID 1, RAID 5, RAID 10, and RAID 50. See also *guarding*, *mirroring*, and *striping*.

RAM — Random-access memory. The system's primary temporary storage area for program instructions and data. Any information stored in RAM is lost when you turn off your system.

RAS — Remote Access Service. This service allows users running the Windows operating system to remotely access a network from their system using a modem.

readme file — A text file, usually shipped with software or hardware, that contains information supplementing or updating the product's documentation.

read-only file — A read-only file is one that you are prohibited from editing or deleting.

ROM — Read-only memory. Your system contains some programs essential to its operation in ROM code. A ROM chip retains its contents even after you turn off your system. Examples of code in ROM include the program that initiates your system's boot routine and the POST.

ROMB — RAID on motherboard.

rpm — Revolutions per minute.

RTC — Real-time clock.

SAS — Serial-attached SCSI.

SATA — Serial Advanced Technology Attachment. A standard interface between the system board and storage devices.

SCSI — Small computer system interface. An I/O bus interface with faster data transmission rates than standard ports.

SDRAM — Synchronous dynamic random-access memory.

sec — Second(s).

serial port — An I/O port used most often to connect a modem to your system. You can usually identify a serial port on your system by its 9-pin connector.

service tag — A bar code label on the system used to identify it when you call Dell for technical support.

simple disk volume — The volume of free space on a single dynamic, physical disk.

SMART — Self-Monitoring Analysis and Reporting Technology. Allows hard drives to report errors and failures to the system BIOS and then display an error message on the screen.

SMP — Symmetric multiprocessing. Used to describe a system that has two or more processors connected via a high-bandwidth link and managed by an operating system, where each processor has equal access to I/O devices.

SNMP — Simple Network Management Protocol. A standard interface that allows a network manager to remotely monitor and manage workstations.

spanning — Spanning, or concatenating, disk volumes combines unallocated space from multiple disks into one logical volume, allowing more efficient use of all the space and all drive letters on a multiple-disk system.

striping — Disk striping writes data across three or more disks in an array, but only uses a portion of the space on each disk. The amount of space used by a "stripe" is the same on each disk used. A virtual disk may use several stripes on the same set of disks in an array. See also *guarding*, *mirroring*, and *RAID*.

SVGA — Super video graphics array. VGA and SVGA are video standards for video adapters with greater resolution and color display capabilities than previous standards.

system board — As the main circuit board, the system board usually contains most of your system's integral components, such as the processor, RAM, controllers for peripherals, and various ROM chips.

system configuration information — Data stored in memory that tells a system what hardware is installed and how the system should be configured for operation.

system diskette — See *bootable diskette*.

system memory — See *RAM*.

System Setup program — A BIOS-based program that allows you to configure your system's hardware and customize the system's operation by setting features such as password protection. Because the System Setup program is stored in NVRAM, any settings remain in effect until you change them again.

system.ini file — A start-up file for the Windows operating system. When you start Windows, it consults the **system.ini** file to determine a variety of options for the Windows operating environment. Among other things, the **system.ini** file records which video, mouse, and keyboard drivers are installed for Windows.

TCP/IP — Transmission Control Protocol/Internet Protocol.

termination — Some devices (such as the last device at each end of a SCSI cable) must be terminated to prevent reflections and spurious signals in the cable. When such devices are connected in a series, you may need to enable or disable the termination on these devices by changing jumper or switch settings on the devices or by changing settings in the configuration software for the devices.

TOE — TCP/IP offload engine.

UNIX — Universal Internet Exchange. UNIX, the precursor to Linux, is an operating system written in the C programming language.

uplink port — A port on a network hub or switch used to connect to other hubs or switches without requiring a crossover cable.

UPS — Uninterruptible power supply. A battery-powered unit that automatically supplies power to your system in the event of an electrical failure.

USB — Universal Serial Bus. A USB connector provides a single connection point for multiple USB-compliant devices, such as mice and keyboards. USB devices can be connected and disconnected while the system is running.

utility — A program used to manage system resources—memory, disk drives, or printers, for example.

UTP — Unshielded twisted pair. A type of wiring used to connect systems in a business or home to a telephone line.

V — Volt(s).

VAC — Volt(s) alternating current.

VDC — Volt(s) direct current.

VGA — Video graphics array. VGA and SVGA are video standards for video adapters with greater resolution and color display capabilities than previous standards.

video adapter — The logical circuitry that provides (in combination with the monitor) your system's video capabilities. A video adapter may be integrated into the system board or may be an expansion card that plugs into an expansion slot.

video driver — A program that allows graphics-mode application programs and operating systems to display at a chosen resolution with the desired number of colors. Video drivers may need to match the video adapter installed in the system.

video memory — Most VGA and SVGA video adapters include memory chips in addition to your system's RAM. The amount of video memory installed primarily influences the number of colors that a program can display (with the appropriate video drivers and monitor capabilities).

video resolution — Video resolution (800 x 600, for example) is expressed as the number of pixels across by the number of pixels up and down. To display a program at a specific graphics resolution, you must install the appropriate video drivers and your monitor must support the resolution.

W — Watt(s).

WH — Watt-hour(s).

win.ini file — A start-up file for the Windows operating system. When you start Windows, it consults the **win.ini** file to determine a variety of options for the Windows operating environment. The **win.ini** file also usually includes sections that contain optional settings for Windows application programs that are installed on the hard drive.**Windows 2000** — An integrated and complete Microsoft Windows operating system that does not require MS-DOS and that provides advanced operating system performance, improved ease of use, enhanced workgroup functionality, and simplified file management and browsing.

Windows Powered — A Windows operating system designed for use on NAS systems. For NAS systems, the Windows Powered operating system is dedicated to file service for network clients.

Windows Server® 2003 — A set of Microsoft software technologies that enable software integration through the use of XML Web services. XML Web services are small reusable applications written in XML that allow data to be communicated between otherwise unconnected sources.

XML — Extensible Markup Language. XML is a way to create common information formats and to share both the format and the data on the World Wide Web, intranets, and elsewhere.

ZIF — Zero insertion force.

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Getting Help

Dell™ PowerVault™ 100 Systems Hardware Owner's Manual

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-

Obtaining Assistance

If you experience a problem with your computer, you can complete the following steps to diagnose and troubleshoot the problem:

1. See [Troubleshooting Your System](#) for information and procedures that pertain to the problem your computer is experiencing.
2. See [Running the System Diagnostics](#) for procedures on how to run Dell Diagnostics.
3. Fill out the [Diagnostics Checklist](#).
4. Use Dell's extensive suite of online services available at Dell Support (support.dell.com) for help with installation and troubleshooting procedures. See [Online Services](#) for a more extensive list of Dell Support online.
5. If the preceding steps have not resolved the problem, see [Contacting Dell](#)

 **NOTE:** Call Dell Support from a telephone near or at the computer so that the support staff 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.

 **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 learn about Dell products and services on the following websites:

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 and Caribbean countries)

www.dell.ca (Canada only)

You can access Dell Support through the following websites and e-mail addresses:

- 1 Dell Support websites

support.dell.com

support.jp.dell.com (Japan only)

support.euro.dell.com (Europe only)

- 1 Dell Support e-mail addresses

mobile_support@us.dell.com

support@us.dell.com

la-techsupport@dell.com (Latin America and Caribbean countries only)

apsupport@dell.com (Asian/Pacific countries only)

1 Dell Marketing and Sales e-mail addresses

apmarketing@dell.com (Asian/Pacific countries only)

sales_canada@dell.com (Canada only)

1 Anonymous file transfer protocol (FTP)

ftp.dell.com

Log in as user: `anonymous`, and use your e-mail address as your password.

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. For the telephone number to call for your region, see [Contacting Dell](#).

Support Service

Dell's support service is available 24 hours a day, 7 days a week, to answer your questions about Dell hardware. Our support staff use computer-based diagnostics to provide fast, accurate answers.

To contact Dell's 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 handy when you call. For the telephone number to call for your region, see [Contacting Dell](#).

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 for your region or to speak to a sales specialist, see [Contacting Dell](#).

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 for your region, see [Contacting Dell](#).
2. Include a copy of the invoice and a letter describing the reason for the return.
3. Include a copy of the Diagnostics Checklist (see [Diagnostics Checklist](#)), indicating the tests that you have run and any error messages reported by the Dell Diagnostics (see [Running 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 Dell's 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 (see [Diagnostics Checklist](#)). If possible, turn on your computer before you call Dell for 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 itself. Ensure that the computer documentation is available.

 **CAUTION:** Before working inside your computer, follow the safety instructions in your *Product Information Guide*.

Diagnostics Checklist
Name:
Date:
Address:
Phone number:
Service Tag (bar code on the back or bottom of the computer):
Express Service Code:
Return Material Authorization Number (if provided by Dell support technician):
Operating system and version:
Devices:
Expansion cards:
Are you connected to a network? Yes No
Network, version, and network adapter:
Programs and versions:
See your operating system documentation to determine the contents of the system's start-up files. If the computer is connected to a printer, print each file. Otherwise, record the contents of each file before calling Dell.
Error message, 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:

- 1 www.dell.com
- 1 support.dell.com (support)

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.

 **NOTE:** In certain countries, support specific to Dell™ XPS™ computers is available at a separate telephone number listed for participating countries. If you do not see a telephone number listed that is specific for XPS computers, you may contact Dell through the support number listed and your call will be routed appropriately.

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.

 **NOTE:** The contact information provided was deemed correct at the time that this document went to print and is subject to change.

Country (City) International Access Code Country Code City Code	Service Type	Area Codes, Local Numbers, and Toll-Free Numbers Web and E-mail Address
Anguilla	Online Support E-mail Address Technical Support, Customer Service, Sales	support.dell.com/ai la-techsupport@dell.com toll free: 800-335-0031
Antigua and Barbuda	Online Support Technical Support, Customer Service, Sales	www.dell.com/ag la-techsupport@dell.com 1-800-805-5924
Aomen	Technical Support	toll-free: 0800-105

Country Code: 853	Customer Service (Xiamen, China)	34 160 910	
	Transaction Sales (Xiamen, China)	29 693 115	
Argentina (Buenos Aires)	Online Support	www.dell.com/ar	
	E-mail for Desktops and Portables	la-techsupport@dell.com	
International Access Code: 00	E-mail for Servers and EMC® Storage Products	la_enterprise@dell.com	
	Customer Service	toll-free: 0-800-666-0789	
Country Code: 54	Technical Support	toll-free: 0-800-222-0154	
		or toll-free: 0-800-444-0724	
City Code: 11	Sales	toll-free: 0-800-666-0789	
Aruba	Online Support	www.dell.com/aw la-techsupport@dell.com	
	Technical Support	toll-free: 800-1727	
	Customer Service and Sales	toll-free: 800-1729	
Australia (Sydney)			
International Access Code: 0011	Online Support	support.ap.dell.com support.ap.dell.com/contactus	
Country Code: 61			
City Code: 2			
	Technical Support		
	Technical Support for XPS computers only		
	Home and Home Office	toll-free: 1300 790 877	
	Medium and Large Business	toll-free: 1300-655-533	
	Small Business, Education, Local Government	toll-free: 1800-633-559	
	Customer Service	toll-free: 1800-060-889	
	Home and Home Office	toll-free: 1800-812-393 (option 3)	
	Medium and Large Business, Education, Local Government	toll-free: 1300-303-270 (option 3)	
	24-Hour Automated Order Status Service	toll-free: 1300-662-196	
Austria (Vienna)	Online Support	support.euro.dell.com tech_support_central_europe@dell.com	
	NOTE: The phone numbers in this section should be called from within Austria only.		
	Technical Support for XPS computers only	08 20 24 05 30 81	
	Large Business Support	08 20 24 05 30 55	
	Technical Support at Home	08 20 24 05 30 92	
	International Access Code: 900	Home/Small Business Sales	08 20 24 05 30 00
		Home/Small Business Fax	08 20 24 05 30 49
	Country Code: 43	Home/Small Business Customer Service	08 20 24 05 30 14
	City Code: 1	Home/Small Business Support	08 20 24 05 30 17
		Preferred Accounts/Corporate Customer Service	08 20 24 05 30 16
	Preferred Accounts/Corporate Support	08 20 24 05 30 17	
	Switchboard	08 20 24 05 30 00	
Bahamas	Online Support	www.dell.com/bs la-techsupport@dell.com	
	Technical Support	toll-free: 1-866-874-3038	
	Customer Service and Sales	toll-free: 1-866-296-9683	
Barbados	Online Support	www.dell.com/bb la-techsupport@dell.com	
	Technical Support	1-800-534-3349	
	Customer Service and Sales	1-800-534-3142	
Belgium	Online Support	support.euro.dell.com	

(Brussels)	Technical Support for XPS computers only	02 481 92 96	
International Access Code: 00	General Support	02 481 92 88	
	General Support Fax	02 481 92 95	
	Customer Service	02 713 15 65	
	Corporate Sales	02 481 91 00	
Country Code: 32	Fax	02 481 92 99	
City Code: 2	Switchboard	02 481 91 00	
Belize	Online Support	www.dell.com/bz la-techsupport@dell.com	
	Technical Support, Customer Service, Sales	811-866-686-9880 or (512) 723-0010	
Bermuda	Online Support	www.dell.com/bm la-techsupport@dell.com	
	Technical Support	1-877-890-0754	
	Customer Service and Sales	1-877-890-0751	
Bolivia	Online Support	www.dell.com/bo la-techsupport@dell.com	
	Technical Support, Customer Service, Sales	toll-free: 800-10-0238 or EEUU (512) 723-0010	
Brazil	Online Support	www.dell.com/br BR_TechSupport@dell.com	
	Technical Support	0800 970 3355	
	Technical Support Fax	51 2104 5470	
	Customer Service Fax	51 2104 5480	
	City Code: 51	Sales	0800 970 3390
British Virgin Islands	Online Support	www.dell.com/vg la-techsupport@dell.com	
	Technical Support, Customer Service, Sales	toll-free: 1-866-278-6820 or (512) 723-0010	
Brunei	Technical Support (Penang, Malaysia)	604 633 4966	
	Customer Service (Penang, Malaysia)	604 633 3101 or toll-free: 801 1012	
	Country Code: 673	24-Hour Automated Order Status Service	toll-free: 801 1044
	Transaction Sales (Penang, Malaysia)	604 633 3101 or toll-free: 801 1012	
Canada (North York, Ontario)	Online Order Status	www.dell.ca/ostatus	
	Online Support	support.ca.dell.com	
	AutoTech (automated Hardware and Warranty Support)	toll-free: 1-800-247-9362	
	Customer Service		
	Home/Home Office	toll-free: 1-800-847-4096	
	Small Business	toll-free: 1-800-906-3355	
	Medium/Large Business, Government, Education	toll-free: 1-800-387-5757	
	Hardware Warranty Phone Support		
	XPS Computers Only	toll-free: 1-866-398-8977	
	Computers for Home/Home Office	toll-free: 1-800-847-4096	
	Computers for Small/Medium/Large Business, Government	toll-free: 1-800-387-5757	
	Printers, Projectors, Televisions, Handheld, Digital Jukebox, and Wireless	1-877-335-5767	
	Sales		
	Home and Home Office Sales	toll-free: 1-800-999-3355	
	Small Business	toll-free: 1-800-387-5752	
Medium/Large Business, Government	toll-free: 1-800-387-5755		
Spare Parts and Extended Service	1 866 440 3355		
Cayman Islands	Online Support	www.dell.com/ky la-techsupport@dell.com	
	Technical Support	1-877-261-0242	
	Customer Service and Sales	1-877-262-5415	
Chile (Santiago)	Online Support	www.dell.com/cl la-techsupport@dell.com	
	Technical Support	toll-free: 800-20-20-44 (CTC) or 123-00-20-37-62 (ENTEL)	
	City Code: 2	Sales and Customer Support	toll-free: 800-20-20-44 (CTC) or 123-00-20-34-77 (ENTEL)

China (Xiamen)	Online Support	support.dell.com.cn	
	Technical Support E-mail	support.dell.com.cn/email	
	Customer Service E-mail	customer_cn@dell.com	
	Technical Support Fax	592 818 1350	
	Technical Support – XPS computers only	toll-free: 800 858 0540	
	Technical Support – Dell™ Dimension™ and Dell Inspiron™	toll-free: 800 858 2969	
	Technical Support – Dell OptiPlex™, Dell Latitude™, and Dell Precision™	toll-free: 800 858 0950	
	Technical Support – Dell PowerEdge™ and Dell PowerVault™	toll-free: 800 858 0960	
	Technical Support – Projectors, PDAs, Switches, Routers, etc.	toll-free: 800 858 2920	
	Technical Support – Printers	toll-free: 800 858 2311	
	Customer Service	toll-free: 800 858 2060	
	Country Code: 86	Customer Service Fax	592 818 1308
	City Code: 592	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 2572	
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	Online Support	www.dell.com/col la-techsupport@dell.com	
	Technical Support	01-800-915-5704	
	Customer Service and Sales	01-800-915-4755	
	Spare Parts, Software, Peripherals and Warranty Sales	toll free: 01-800-915-6158	
	Ink and Toner Sales	toll free: 01-800-915-5676	
Costa Rica	Online Support	www.dell.com/cr la-techsupport@dell.com	
	Technical Support	0800-012-0232	
	Customer Service and Sales	0800-012-0231	
Czech Republic (Prague)	Online Support	support.euro.dell.com czech_dell@dell.com	
	Technical Support	22537 2727	
	Customer Service	22537 2707	
	Fax	22537 2714	
	Country Code: 420	Technical Fax	22537 2728
Denmark (Copenhagen)	Switchboard	22537 2711	
	International Access Code: 00	Online Support	support.euro.dell.com
		Technical Support for XPS computers only	7010 0074
		Technical Support	7023 0182
		Customer Service – Relational	7023 0184
		Home/Small Business Customer Service	3287 5505
		Switchboard – Relational	3287 1200
		Country Code: 45	Switchboard Fax – Relational
Switchboard – Home/Small Business		3287 5000	
Switchboard Fax – Home/Small Business	3287 5001		
Dominica	Online Support	www.dell.com/dm la-techsupport@dell.com	
	Technical Support, Customer Service, Sales	toll-free: 1-866-278-6821 or (512) 723-0010	
Dominican Republic	Online Support	www.dell.com/do la-techsupport@dell.com	
	Technical Support	1-800-156-1834	
	Customer Service and Sales	1-800-156-1588	

Ecuador (calling from Quito and Guayaquil only)	Online Support	www.dell.com/ec la-techsupport@dell.com
	Technical Support, Customer Service, Sales (calling from Quito)	toll-free: 999-119-877-655-3355 or EEUU (512) 723-0020
	Technical Support, Customer Service, Sales (calling from Guayaquil)	toll-free: 1-800-999-119-877-655-3355
El Salvador	Online Support	www.dell.com/sv la-techsupport@dell.com
	Technical Support	toll free: 800-6100 (ANTEL) or 800-6170 (Telefonica)
	Customer Service and Sales	toll free: 800-6100 (ANTEL) or 800-6132 (Telefonica)
Finland (Helsinki) International Access Code: 990 Country Code: 358 City Code: 9	Online Support	support.euro.dell.com fi_support@dell.com
	Technical Support	0207 533 555
	Customer Service	0207 533 538
	Switchboard	0207 533 533
	Fax	0207 533 530
	Sales under 500 employees	0207 533 540
	Sales over 500 employees	0207 533 533
France (Paris) (Montpellier) International Access Code: 00 Country Code: 33 City Codes: (1) (4)	Online Support	support.euro.dell.com
	Technical Support for XPS computers only	0825 387 129
	Technical Support	0825 387 270
	Customer Service	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 Service	0825 338 339
	Switchboard	01 55 94 71 00
	Sales	01 55 94 71 00
	Fax	01 55 94 71 01
Germany (Frankfurt) International Access Code: 00 Country Code: 49 City Code: 69	Online Support	support.euro.dell.com tech_support_central_europe@dell.com
	Technical Support for XPS computers only	069 9792 7222
	Technical Support	069 9792-7200
	Technical Support at Home	069 9792-7230
	Home/Small Business Customer Service	0180-5-224400
	Global Segment Customer Service	069 9792-7320
	Preferred Accounts Customer Service	069 9792-7320
	Large Accounts Customer Service	069 9792-7320
	Public Accounts Customer Service	069 9792-7320
	Switchboard	069 9792-7000
Greece International Access Code: 00 Country Code: 30	Online Support	support.euro.dell.com
	Technical Support	00800-44 14 95 18
	Gold Service Technical Support	2108129811
	Switchboard	2108129810
	Gold Service Switchboard	2108129811
	Sales	2108129800
Fax	2108129812	

Grenada	Online Support	www.dell.com/gd la-techsupport@dell.com
	Technical Support, Customer Service, Sales	toll-free: 1-866-540-3355
Guatemala	Online Support	www.dell.com/gt la-techsupport@dell.com
	Technical Support, Customer Service, Sales	1-800-999-0136
Guyana	Online Support	la-techsupport@dell.com
	Technical Support, Customer Service, Sales	toll-free: 1-877-440-6511
Haiti	Online Support	www.dell.com/ht la-techsupport@dell.com
	Technical Support, Customer Service, Sales	toll free: 183-866-686-9849 or (512) 723-0010
Honduras	Online Support	www.dell.com/hn la-techsupport@dell.com
	Technical Support, Customer Service, Sales	toll free: 800-0123-866-686-9848 or EEUU (512) 723-0020
Hong Kong International Access Code: 001 Country Code: 852	Online Support	support.ap.dell.com support.ap.dell.com/contactus
	Technical Support – XPS computers only	00852-3416 6923
	Technical Support – Dimension and Inspiron	00852-2969 3188
	Technical Support – OptiPlex, Latitude, and Dell Precision	00852-2969 3191
	Technical Support – Servers and Storage	00852-2969 3196
	Technical Support – Projectors, PDAs, Switches, Routers, etc.	00852-3416 0906
	Customer Service	00852-3416 0910
	Large Corporate Accounts	00852-3416 0907
	Global Customer Programs	00852-3416 0908
	Medium Business Division	00852-3416 0912
Home and Small Business Division	00852-2969 3105	
India	Online Support	support.ap.dell.com
	Portable and Desktop Support	
	Portables, Desktop, and Peripherals E-mail	support.ap.dell.com/ap/en/emaildell
	Portable Support E-mail	india_support_notebook@dell.com
	Phone Numbers	080-25068032 or 080-25068034 or your city STD code + 60003355 or toll-free: 1-800-425-9046
	Server Support	
	E-mail	india_support_server@dell.com
	Phone Numbers	080-25068032 or 080-25068034 or your city STD code + 60003355 or toll-free: 1-800-425-8045
	Gold Support Only	
	E-mail	eec_ap@dell.com
	Phone Numbers	080-25068033 or your city STD code + 60003355 or toll-free: 1-800-425-9045
	XPS Support Only	
	E-mail	Indiaxps_AP@dell.com
	Phone Numbers	080-25068066 or toll-free: 1-800-425-2066
	Customer Service	
	Home and Small Business	India_care_HSB@dell.com toll-free: 1800-4254051
	Large Corporate Accounts	India_care_REL@dell.com toll-free: 1800-4252067
	Sales	
	Large Corporate Accounts	1600 33 8044
	Home and Small Business	1600 33 8046
	Online Support	support.euro.dell.com dell_direct_support@dell.com
	Technical Support	
	XPS computers only	1850 200 722
	Business computers	1850 543 543
	Home computers	1850 543 543
	At Home Support	1850 200 889

Ireland (Cherrywood)	Sales	
	Home	1850 333 200
	Small Business	1850 664 656
	Medium Business	1850 200 646
	Large Business	1850 200 646
	Sales E-mail	Dell_IRL_Outlet@dell.com
	Customer Service	
	Home and Small Business	01 204 4014
	Business (greater than 200 employees)	1850 200 982
	General	
	Fax/Sales Fax	01 204 0103
	Switchboard	01 204 4444
	U.K. Customer Service (dial within U.K. only)	0870 906 0010
Corporate Customer Service (dial within U.K. only)	0870 907 4499	
U.K. Sales (dial within U.K. only)	0870 907 4000	
Italy (Milan)	Online Support	support.euro.dell.com
	Home and Small Business	
	Technical Support	02 577 826 90
	Customer Service	02 696 821 14
	Fax	02 696 821 13
	Switchboard	02 696 821 12
	Corporate	
	Technical Support	02 577 826 90
	Customer Service	02 577 825 55
	Fax	02 575 035 30
Switchboard	02 577 821	
Jamaica (dial from within Jamaica only)	Online Support	www.dell.com/jm la-techsupport@dell.com
	Technical Support	toll free: 1-800-975-1646
	Customer Service and Sales	toll free: 1-800-404-9205
Japan (Kawasaki)	Online Support	support.jp.dell.com
	Technical Support – XPS computers only	toll-free: 0120-937-786
	Technical Support outside of Japan – XPS computers only	81-44-520-1235
	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 – Dell PowerApp, Dell PowerEdge, Dell PowerConnect™, and Dell PowerVault	toll-free: 0120-198-498
	Technical Support outside of Japan – PowerApp, PowerEdge, PowerConnect, and PowerVault	81-44-556-4162
	Technical Support – Projectors, PDAs, Printers, Routers	toll-free: 0120-981-690
	Technical Support outside of Japan – Projectors, PDAs, Printers, Routers	81-44-556-3468
	Faxbox Service	044-556-3490
	24-Hour Automated Order Status Service	044-556-3801
	Customer Care	044-556-4240
	Business Sales Division – up to 400 employees	044-556-3344
	Preferred Accounts Division Sales – over 400 employees	044-556-3433
	Public Sales – government agencies, educational institutions, and medical institutions	044-556-5963
	Global Segment Japan	044-556-3469
	Individual User	044-556-1657
	Individual User Online Sales	044-556-2203
Individual User Real Site Sales	044-556-4649	
Switchboard	044-556-4300	
Korea (Seoul)	Online Support	support.ap.dell.com
	Technical Support for XPS computers only	toll-free: 080-999-0283
	Technical Support	toll-free: 080-200-3800

Access Code: 001	Customer Service	toll-free: 080-999-0270
Country Code: 82	Technical Support – Dimension, PDA, Electronics, and Accessories	toll-free: 080-200-3801
	Sales	toll-free: 080-200-3600
City Code: 2	Fax	2194-6202
	Switchboard	2194-6000
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
	Sales Fax (Austin, Texas, U.S.A.)	512 728-4600 or 512 728-3772
Luxembourg	Online Support	support.euro.dell.com
	Support	342 08 08 075
International Access Code: 00	Home/Small Business Sales	+32 (0)2 713 15 96
	Corporate Sales	26 25 77 81
Country Code: 352	Customer Service	+32 (0)2 481 91 19
	Fax	26 25 77 82
Malaysia (Penang)	Online Support	support.ap.dell.com
	Technical Support – XPS computers only	toll-free: 1 800 885 784
	Technical Support – Dell Precision, OptiPlex, and Latitude	toll-free: 1 800 880 193
	Technical Support – Dimension, Inspiron, and Electronics and Accessories	toll-free: 1 800 881 306
	Technical Support – PowerApp, PowerEdge, PowerConnect, and PowerVault	toll-free: 1800 881 386
Country Code: 60	Customer Service	toll-free: 1800 881 306 (option 4)
	24-Hour Automated Order Status Service	1 800 88 4432
City Code: 4	Transaction Sales	toll-free: 1 800 888 202
	Corporate Sales	toll-free: 1 800 888 213
Mexico	Online Support	www.dell.com/mx la-techsupport@dell.com
	Technical Support	001-866-563-4425
	Sales	50-81-8800 or 001-800-725-3355
	Customer Service	001-877-384-8979 or 001-877-269-3383
	Spare Parts, Software, Peripherals and Warranty Sales	001-866-390-4629
Country Code: 52	Ink and Toner Sales	toll free 001-866-851-1754
	Main	50-81-8800 or 001-800-111-3355 or 001-866-851-1754
Montserrat	Online Support	support.dell.com.ag la-techsupport@dell.com
	Technical Support, Customer Service, Sales	toll-free: 1-866-278-6822
Netherlands Antilles	Online Support	www.dell.com/an la-techsupport@dell.com
	Technical Support, Customer Service, Sales	toll free: 001-866-379-1022
Netherlands (Amsterdam)	Online Support	support.euro.dell.com
	Technical Support for XPS computers only	020 674 45 94
	Technical Support	020 674 45 00
	Technical Support Fax	020 674 47 66
	Home/Small Business Customer Service	020 674 42 00
	Relational Customer Service	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
City Code: 20	Switchboard	020 674 50 00
	Switchboard Fax	020 674 47 50
	Online Support	support.ap.dell.com support.ap.dell.com/contactus
	Technical Support	toll-free: 0800-441-567
	Home and Home Office	toll-free: 0800-446-255

New Zealand	Business, Education, and Government	toll-free: 0800-444-617
	PowerEdge and PowerVault	toll-free: 0800-443-563
	Technical Support for XPS computers only	toll-free: 0800-335-540
International Access Code: 00	Customer Service	
Country Code: 64	Home and Small Business	toll-free: 0800-289-3355 (option 3)
	Business, Education, and Government	toll-free: 0800-941-128 (option 3)
	24-Hour Automated Order Status Service	toll-free: 0800-449-602
	Sales	toll-free: 0800 441 567
	Home and Home Office	toll-free: 0800-289-3355
	Small Business	toll-free: 0800-941-121
	Business, Education, and Government	toll-free: 0800-941-128
Nicaragua	Online Support	www.dell.com/ni la-techsupport@dell.com
	Technical Support	toll free: 001-800-220-1378
	Customer Service and Sales	toll free: 001-800-220-1377
Norway (Lysaker)	Online Support	support.euro.dell.com
	Technical Support for XPS computers only	815 35 043
International Access Code: 00	Technical Support	671 16882
	Relational Customer Service	671 17575
	Home/Small Business Customer Service	23162298
Country Code: 47	Switchboard	671 16800
	Fax Switchboard	671 16865
Panama	Online Support	www.dell.com/pa la-techsupport@dell.com
	Technical Support	toll free: 001-800-507-1385 (C&W) or 001-866-633-4097 (Clarocom)
	Customer Service, Sales	toll free: 001-800-507-1264 (C&W) or 001-866-422-7964 (Clarocom and Movistar) or 001-800-507-1786 (TC)
Paraguay (Asuncion only)	Online Support	www.dell.com/py la-techsupport@dell.com
	Technical Support, Customer Service, Sales	dial 008-11-800, then have the operator dial 866-686-9848 or EEUU (512) 723-0020
Peru	Online Support	www.dell.com/pe la-techsupport@dell.com
	Technical Support	0800-50-869
	Customer Service and Sales	0800-50-669
Poland (Warsaw)	Online Support	support.euro.dell.com pl_support_tech@dell.com
	Customer Service Phone	57 95 700
International Access Code: 011	Customer Service	57 95 999
	Sales	57 95 999
	Customer Service Fax	57 95 806
Country Code: 48	Reception Desk Fax	57 95 998
	Switchboard	57 95 999
Portugal	Online Support	support.euro.dell.com
	Technical Support	707200149
International Access Code: 00	Customer Service	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
	Online Support	www.dell.com/pr la-techsupport@dell.com
	Technical Support	toll-free: 1-866-390-4695

Puerto Rico	Spare Parts, Software, Peripherals and Warranty Sales	toll-free: 1-866-390-4691
	Ink and Toner Sales	toll-free: 1-866-851-1760
	Customer Service and Sales	1-877-537-3355
St. Kitts and Nevis	Online Support	www.dell.com/kn la-techsupport@dell.com
	Technical Support	toll-free: 1-877-441-4734
	Customer Service and Sales	toll-free: 1-866-540-3355
St. Lucia	Online Support	www.dell.com/lc la-techsupport@dell.com
	Technical Support	toll-free: 1-866-464-4352
	Customer Service and Sales	toll-free: 1-866-540-3355
St. Vincent and the Grenadines	Online Support	www.dell.com/vc la-techsupport@dell.com
	Technical Support	toll-free: 1-866-464-4353
	Customer Service and Sales	toll-free: 1-866-540-3355
Singapore (Singapore)	<p>International Access Code: 005</p> <p>Country Code: 65</p> <p>NOTE: The phone numbers in this section should be called from within Singapore or Malaysia only.</p>	
	Online Support	support.ap.dell.com
	Technical Support	
	XPS computers only	toll-free: 1 800 394 7464
	Dimension, Inspiron, and Electronics and Accessories	toll-free: 1 800 394 7430
	OptiPlex, Latitude, and Dell Precision	toll-free: 1 800 394 7488
	PowerApp, PowerEdge, PowerConnect, and PowerVault	toll-free: 1 800 394 7478
	Customer Service	toll-free: 1 800 394 7430 (option 4)
	24-Hour Automated Order Status Service	toll-free: 1 800 394 7476
	Sales	
	Transaction Sales	toll-free: 1 800 394 7412
Corporate Sales	toll-free: 1 800 394 7419	
Slovakia (Prague)	Online Support	support.euro.dell.com czech_dell@dell.com
	Technical Support	02 5750 8303
	Enterprise GOLD	02 5750 8308
	Business Support	02 5750 8301
	Customer Service	420 22537 2707
	Fax	02 5441 8328
	Tech Fax	02 5441 8328
Switchboard (Sales)	02 5441 7585	
South Africa (Johannesburg)	Online Support	support.euro.dell.com dell_za_support@dell.com
	Gold Queue	011 709 7713
	Technical Support	011 709 7710
	Customer Service	011 709 7707
	Sales	011 709 7700
	Fax	011 706 0495
City Code: 11	Switchboard	011 709 7700
Southeast Asian and Pacific Countries	Technical Support, Customer Service, and Sales (Penang, Malaysia)	604 633 4810
Spain (Madrid)	Online Support	support.euro.dell.com
	Home and Small Business	
	Technical Support	902 100 130
	Customer Service	902 118 540

International Access Code: 00	Sales	902 118 541
	Switchboard	902 118 541
	Fax	902 118 539
Country Code: 34	Corporate	
City Code: 91	Technical Support	902 100 130
	Customer Service	902 115 236
	Switchboard	91 722 92 00
	Fax	91 722 95 83
Suriname	Online Support	www.dell.com/sr la-techsupport@dell.com
	Technical Support, Customer Service, Sales	toll-free: 156-866-686-9850 or (512) 723-0010
Sweden (Upplands Vasby)	Online Support	support.euro.dell.com
	Technical Support for XPS computers only	77 134 03 40
	Technical Support	08 590 05 199
International Access Code: 00	Relational Customer Service	08 590 05 642
	Home/Small Business Customer Service	08 587 70 527
	Employee Purchase Program (EPP) Support	020 140 14 44
Country Code: 46	Technical Support Fax	08 590 05 594
City Code: 8	Sales	08 587 705 81
Switzerland (Geneva)	Online Support	support.euro.dell.com Tech_support_central_Europe@dell.com
	Technical Support for XPS computers only	0848 338 857
International Access Code: 00	Technical Support – Home and Small Business	0844 811 411
	Technical Support at Home	0848 338 860
Country Code: 41	Technical Support – Corporate	0844 822 844
City Code: 22	Customer Service – Home and Small Business	0848 802 202

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Installing System Components

Dell™ PowerVault™ 100 Systems Hardware Owner's Manual

- [Recommended Tools](#)
- [Inside the System](#)
- [Opening the System](#)
- [Front-Panel Drive Inserts](#)
- [Closing the System](#)
- [Connecting Drives](#)
- [Diskette Drive](#)
- [Optical or Tape Drives](#)
- [Hard Drives](#)
- [Cooling Shroud](#)
- [Cooling Fans](#)
- [Power Supply](#)
- [Expansion Cards](#)
- [Memory](#)
- [Microprocessor](#)
- [Installing a RAC Card](#)
- [System Battery](#)
- [Front I/O Panel \(Service-Only Parts Procedure\)](#)
- [System Board \(Service-Only Parts Procedure\)](#)

This section describes how to install the following system components:

- 1 Diskette drive
- 1 Optical and tape drives
- 1 Hard drives
- 1 Cooling Shroud
- 1 Cooling Fans
- 1 Power supply
- 1 Expansion cards
- 1 Memory
- 1 SAS controller card
- 1 Microprocessor
- 1 System battery
- 1 Front I/O panel
- 1 System board

Recommended Tools

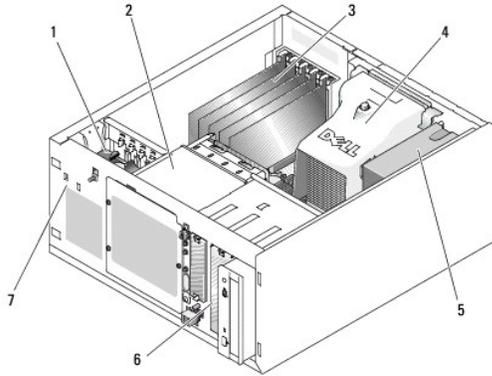
You may need the following items to perform the procedures in this section:

- 1 #2 Phillips screwdriver
- 1 Long #2 Phillips screwdriver (blade at least 6 inches long)
- 1 Small flat-blade driver
- 1 Wrist grounding strap

Inside the System

In [Figure 3-1](#), the system cover is opened and the front bezel removed to provide an interior view of the system.

Figure 3-1. Inside the System



1	front fan	2	drive cage	3	expansion cards (optional)
4	cooling shroud	5	power supply	6	5.25-inch drive bays (2)
7	chassis-intrusion switch				

The system board can accommodate a single processor, five expansion cards, and four memory modules. The hard-drive cage provides space for up to four SAS or SATA hard drives. Two 5.25-inch external drive bays in the front of the system can accommodate optical or tape drives; a single 3.25 drive can accommodate an optional diskette drive. A controller expansion card is required to use SAS hard drives. Power is supplied to the system board and internal peripherals through a single, nonredundant power supply.

Opening the System

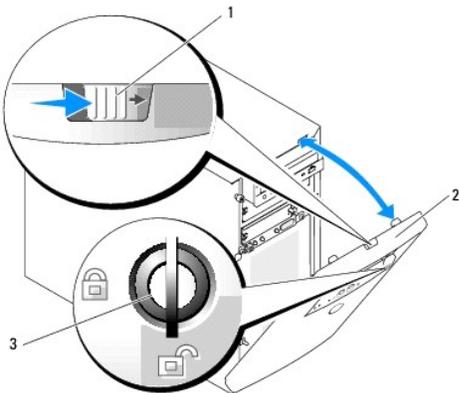
⚠ CAUTION: Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer and protecting against electrostatic discharge.

Removing the Bezel

You must remove the bezel to remove the system cover.

1. Using the system key, unlock the bezel. See [Figure 3-2](#).
2. Slide the bezel latch toward the right side of the system.
3. Swing the top of the bezel away from the system, disengage the hooks at the bottom of the bezel, and lift the bezel away from the system.

Figure 3-2. Removing the Bezel



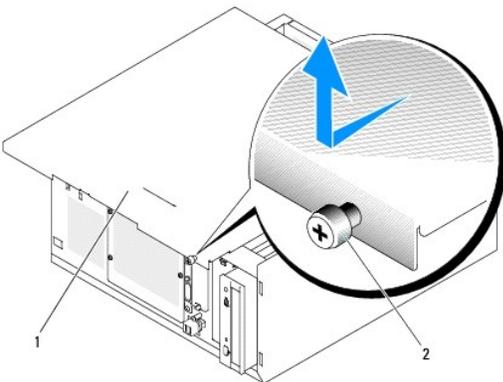
1	bezel latch	2	bezel	3	keylock
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Removing the Cover

⚠ CAUTION: Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer, and protecting against electrostatic discharge.

1. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
2. Remove the bezel. See [Removing the Bezel](#).
3. Lay the system on its right side.
4. Loosen the thumbscrew at the front of the system. See [Figure 3-3](#).
5. Slide the cover forward and grasp it at both ends.
6. Lift the front edge of the cover 2.5 cm (1 inch), slide the cover toward the top of the system, and then lift the cover away from the system.

Figure 3-3. Removing the Cover



1	system cover	2	thumbscrew
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Front-Panel Drive Inserts

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

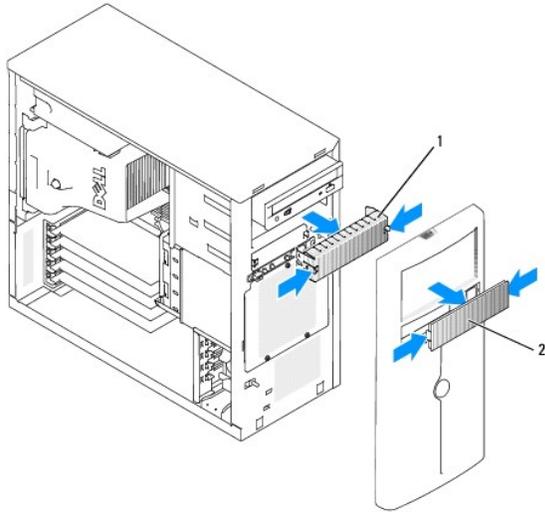
Before you install a 5.25-inch drive in an empty external drive bay, you must first remove both front-panel drive inserts. If you remove a 5.25-inch drive permanently, you must install both inserts.

Removing the Front-Panel Drive Inserts

⚠ CAUTION: Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer, and protecting against electrostatic discharge.

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](#).
3. Remove the bezel drive insert (see [Figure 3-4](#)):
 - a. From inside the bezel, press the center of the insert outward with your thumbs to loosen the tabs on the sides of the insert.
 - b. Pull the insert out of the bezel.
4. Remove the chassis drive insert (see [Figure 3-4](#)):
 - a. Press both sides of the insert to loosen the tabs on the insert.
 - b. Pull the insert out of the chassis.

Figure 3-4. Removing the Front-Panel Drive Inserts



1	chassis drive insert	2	bezel drive insert
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Installing the Front-Panel Drive Inserts

⚠ CAUTION: Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer, and protecting against electrostatic discharge.

🔔 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 tabs on the side of the insert snap into place. See [Figure 3-4](#).
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. See [Figure 3-4](#).
3. Install the bezel. See [Installing the Bezel](#).
4. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

Closing the System

Replacing the Cover

1. Ensure that all cables are connected, and fold cables out of the way.
2. Ensure that no tools or loose parts are left inside the system.
3. Fit the cover on the side of the system, and slide the cover backward.
4. Tighten the cover thumbscrew to secure the cover.

Installing the Bezel

To install the bezel, align the hooks at the bottom of the bezel, swing the top of the bezel toward the system, and press the bezel onto the system until it snaps into place. Using the system key, lock the bezel.

Connecting Drives

Interface Cables

Most 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.

Drive Cable Configurations

Your system can accommodate many different drive configurations, each with specific cable requirements. [Table 3-1](#) shows the cable requirements for common drive configurations.

Table 3-1. Drive Cable Configuration

Drives	Required Cable	Cable Connections
IDE optical drives, internal IDE and external SCSI tape drives (with optional SCSI HBA card) (See Figure 3-7 .)	80-pin IDE 2-drop cable or external SCSI cable	IDE drive and primary IDE connector on system board or external SCSI tape device (with option SCSI HBA card)
Up to four cabled SATA hard drives (non-hot-plug) (See Figure 3-9 .)	7-pin SATA hard-drive cable (one cable per drive)	SATA hard drives and SATA port connectors on the system board, or via SAS controller card
Up to four cabled (non-hot-plug) SAS hard-drives (See Figure 3-13 .)	32-pin 1- to 4-drop SAS cable	SAS hard drives connected to SAS controller card
Up to four SAS or SATA hard drives connected to the SAS backplane (hot plug) (See Figure 3-12 .)	32-pin SAS backplane cable	SAS backplane connected to the SAS controller card

DC Power Cables

Each drive must connect to a DC power cable from the system power supply. These power cables are used for the 3.5-inch diskette drive, 5.25-inch devices, and hard drives.

 **NOTICE:** To avoid electrical damage to internal system components, install a cover connector on any unused connectors on hard-drive power cables.

Diskette Drive

Removing a Diskette Drive

 **CAUTION:** Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer, and protecting against electrostatic discharge.

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](#).
3. Disconnect the power cable and the interface cable from the diskette drive. See [Figure 3-5](#).
4. Remove the two screws that secure the diskette drive in the externally accessible drive bay. See [Figure 3-5](#).
5. Slide the diskette drive forward out of the drive bay.

Installing a Diskette Drive

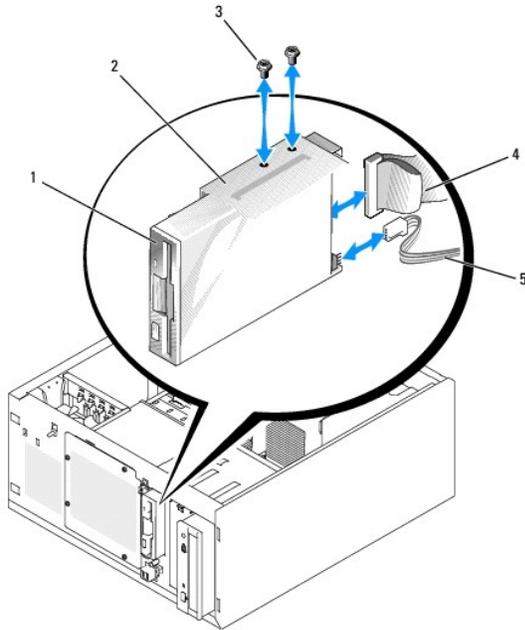
 **CAUTION:** Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer, and protecting against electrostatic discharge.

1. Unpack the drive and prepare the drive for installation.

For instructions, see the documentation that accompanied the drive.
2. Slide the diskette drive into the externally accessible drive bay.

3. Install the two screws that secure the diskette drive in the drive bay. See [Figure 3-5](#).
4. Connect the power cable and the interface cable to the diskette drive. See [Figure 3-5](#).
5. Close the system. See [Closing the System](#)."
6. Stand the system upright.
7. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

Figure 3-5. Removing or Installing a Diskette Drive



1	diskette (3.5-inch) drive	2	externally accessible drive bay	3	screws (2)
4	interface cable	5	power cable		

Optical or Tape Drives

An optical drive is standard in the first external drive bay. An additional IDE or SCSI tape drive can be installed in the second external drive bay. These drives connect either to the system board or to an optional controller card.

NOTE: Installing an additional optical drive in the second external drive bay is not supported.

Installing an Optical or Tape Drive

CAUTION: Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer, and protecting against electrostatic discharge.

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

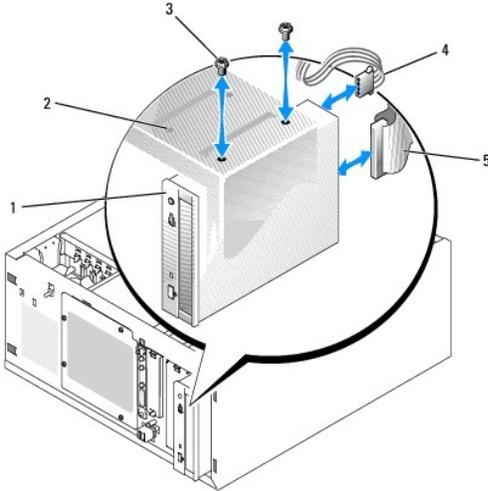
For instructions, see the documentation that accompanied the drive.

NOTE: If you are installing a SCSI tape drive, you must install an Ultra 3 SCSI controller card. The optional SAS controller card does not support a SCSI tape 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](#).

4. Remove the front-panel inserts for the empty external drive bay. See "[Removing the Front-Panel Drive Inserts](#)."
5. Slide the drive into the external drive bay.
6. Install the screws that secure the drive in the drive bay. See [Figure 3-6](#).

Figure 3-6. Installing or Removing an Optical or Tape Drive



1	5.25-inch device	2	drive bay	3	screws (2)
4	power cable	5	interface cable		

7. If a controller card was supplied with the drive, install the controller card in expansion slot 3, 4, or 5. See [Installing an Expansion Card](#).
8. Connect a power cable to the drive. See [Figure 3-6](#).
9. Connect the interface cable to the drive and to the appropriate connector on the system board or controller card (if applicable).

NOTE: See the documentation that is included with the controller card for more information.

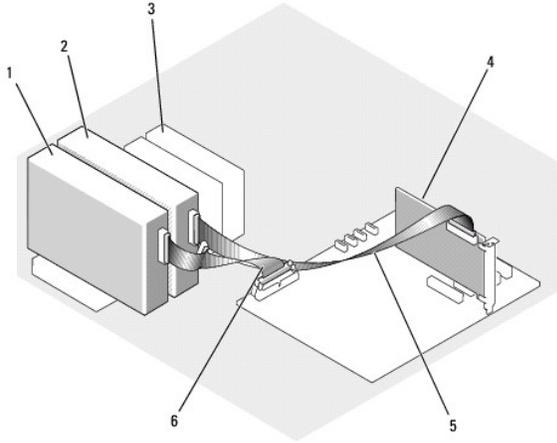
If you are installing an IDE device (such as an optical drive), connect the interface cable to the IDE device and the IDE connector on the system board. See [Figure 3-7](#).

If you are installing a SCSI device in the second drive bay (such as a tape backup device), connect the interface cable to the device and to channel A on the SCSI controller card. See [Figure 3-7](#).

See [System Board Connectors](#) to locate the system board connectors.

NOTE: A SCSI device attached to an optional SCSI controller card and an IDE device attached to the system board can be installed together as shown in [Figure 3-7](#).

Figure 3-7. Connecting a Tape Drive to a SCSI Controller Card



1	IDE device	2	optional SCSI device	3	hard drives (up to 4)
4	SCSI controller card	5	SCSI cable	6	IDE interface cable

10. Ensure that all cables are firmly connected and arranged so that they will not catch on the computer cover or block airflow inside the system.
11. Close the system. See [Closing the System](#).
12. Stand the system upright.
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 device, run the IDE devices tests in the system diagnostics to determine whether the device operates properly. See [Running the System Diagnostics](#).

If you installed a SCSI device, run the SCSI controllers test in the system diagnostics. See [Running the System Diagnostics](#).

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

Hard Drives

NOTE: The system's drive configuration must consist of only SATA hard drives or only SAS hard drives. Combining SATA and SAS drives is not supported.

Your system can contain up to four 1-inch-height SATA or SAS hard drives in either a removable fixed hard-drive bay (see [Figure 3-8](#)) or a lever-release bay (see [Figure 3-11](#)). These drives connect either to the system board, an optional controller card, or an optional SAS backplane.

SAS or SATA drives can be hot-pluggable only if they are attached to an optional SAS backplane. See [Hot-Plug SATA Hard Drives Using the SAS Backplane](#), and [Removing and Installing the Optional SAS Backplane Board](#).

Hard Drive Installation Guidelines

Use the following guidelines when installing hard drives:

- 1 You should only use drives that have been tested and approved by the system manufacturer.
- 1 Do not install a mixture of SATA and SAS hard drives. All hard drives must either be SAS drives or SATA drives.
- 1 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 documentation for information on setting up the drive.
- 1 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.
- 1 Do not turn off or reboot your system while the drive is being formatted. Doing so can cause a drive failure.

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](#)). To boot the system from a hard drive or drive array, the drive(s) must be connected to the appropriate controller:

- 1 To boot from a single SATA hard drive, the master drive (drive 0) must be connected to the SATA_0 connector on the system board. To identify system board connectors, see [System Board Jumpers](#).
- 1 To boot from a single SAS hard drive, the drive must be connected to a SAS controller card. See the documentation that accompanied the controller card.

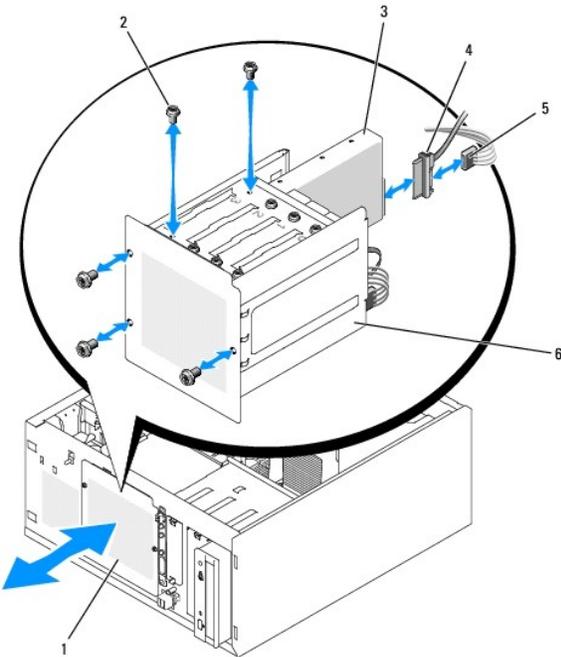
Removing a Hard Drive from the Drive Bay

⚠ CAUTION: Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer and protecting against electrostatic discharge.

If you are using the optional SAS backplane, your hard drives may be installed in a lever-release drive bay. See [Removing a Hard Drive from a Lever-Release Drive Carrier](#).

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet and, backup power.
2. Open the system. See [Opening the System](#).
3. Disconnect the interface and power cables to the hard drives in the drive bay.
4. Remove the hard-drive bay. See [Figure 3-8](#).
 - a. Remove the three screws that secure the drive bay to the system.
 - b. Slide the hard-drive bay out of the system.
5. Remove the drive from the drive bay. See [Figure 3-8](#).
 - a. Remove the screws that secure the drive in the hard-drive bay.
 - b. Slide the drive out of the drive bay.

Figure 3-8. Installing or Removing a Hard Drive



1	hard-drive bay	2	screws (4 per drive)	3	hard drive
4	drive cable	5	power cable connector	6	hard drive bay

Installing a Hard Drive in the Drive Bay

NOTE: Hot-plug capability is supported only when the SAS backplane is installed. For more information, see [Hot-Plug SATA Hard Drives Using the SAS Backplane](#).

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

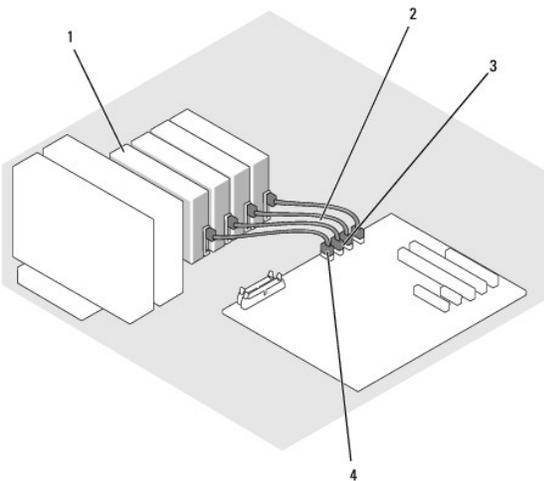
For instructions, see the documentation that accompanied the drive.

2. Install the hard drive in the hard-drive bay:
 - a. Slide the drive into the drive bay with the back of the drive toward the back of the drive bay.
 - b. Install the screws that secure the drive in the drive bay.
3. Install the hard-drive bay. (See [Figure 3-8](#)):
 - a. Slide the drive bay into the system until the drive bay contacts the system.
 - b. Install the three screws that secure the drive bay in the system.

NOTICE: To prevent damage to internal system components, ensure that a connector cap is installed on each available power connector that is not connected to a hard drive.

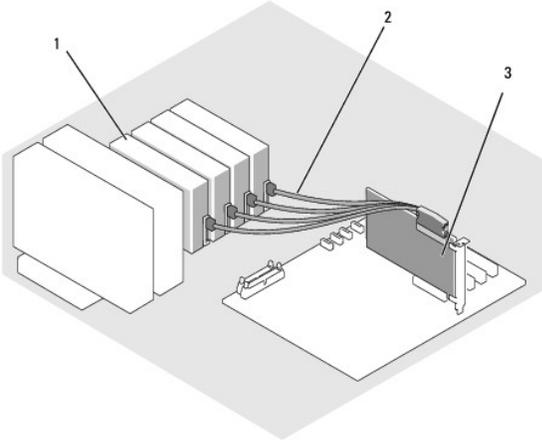
4. Connect a power cable to each hard drive. (See [Figure 3-8](#).)
5. Connect the hard-drive interface cables to each hard drive.
 - o If you are installing a *SATA* hard drive, connect the *SATA* interface cable to the hard drives and to the *SATA* ports on the system board. (See [Figure 3-9](#).)
 - o If you are installing a *SAS* drive, connect the *SAS* interface cable to the hard drives and to the optional *SAS* controller card. (See [Figure 3-10](#).)

Figure 3-9. Connecting SATA Hard Drives to the Integrated Drive Controller



1	SATA hard drive (up to four)	2	SATA interface cable	3	SATA_1 connector
4	SATA_0 connector				

Figure 3-10. Connecting SATA Drives to a SAS Controller Card (SAS backplane not installed)



1	SATA hard drive (up to four)	2	SATA interface cable)	3	SAS controller card
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6. Ensure that all cables are firmly connected and arranged so that they will not catch on the computer cover or block airflow inside the system.
7. Close the system. See [Closing the System](#).
8. Stand the system upright.
9. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.
10. Partition and logically format the hard drive. See the operating system documentation for more information.
11. Install any required device drivers.
12. Run the hard drive tests in the system diagnostics to determine whether the drive operates properly. See [Running the System Diagnostics](#).
 - o If the drive is connected to a SATA RAID controller card, see the RAID controller card documentation for information on testing the controller.
 - o If the drive is connected to a SAS controller card, run the SAS controller tests and the hard-drive tests in the system diagnostics. See [Running the System Diagnostics](#).
 - o If the hard drive fails the hard-drive tests or does not operate properly, see [Getting Help](#).

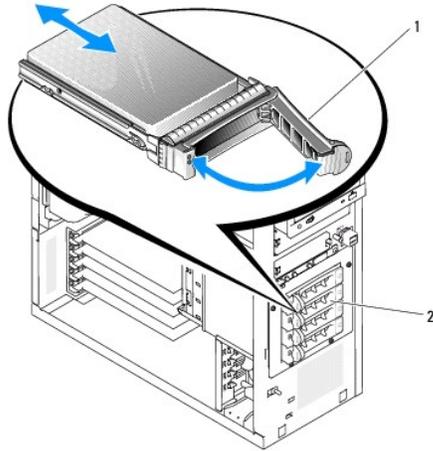
Removing a Hard Drive from a Lever-Release Drive Carrier

NOTICE: To prevent data loss, you must shut down the system before removing a drive carrier, unless a SAS controller is connected to the optional SAS backplane. See [Hot-Plug SATA Hard Drives Using the SAS Backplane](#) for information on hot-plug drive requirements and operation.

The drive bays in a system with an optional SAS backplane board provides space for up to four optional lever-release hard drives. The hard drives plug into the SAS backplane board, which is connected to the controller card (see [Figure 3-12](#)). For instructions on installing the optional SAS backplane board, see [Removing and Installing the Optional SAS Backplane Board](#).

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](#).
3. Open the hard-drive carrier handle to release the drive. See [Figure 3-11](#).
4. Slide the hard drive out until it is free of the drive bay.

Figure 3-11. Removing or Installing a SCSI Hard-Drive Carrier



1	hard-drive carrier handle	2	lever-release drive carrier
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Installing an Hard Drive in the Lever-Release Drive Carrier

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](#).
3. Open the hard-drive carrier handle. See [Figure 3-11](#).

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

4. Insert the hard-drive carrier into the drive bay. See [Figure 3-11](#).
5. Close the hard-drive carrier handle to lock it in place.
6. Install the bezel. See [Installing the Bezel](#).
7. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.
8. Install any required device drivers.
9. Run the SAS controllers tests and the hard-drive tests in the system diagnostics. See [Running the System Diagnostics](#).

If the hard drive fails the hard-drive tests or does not operate properly, see [Getting Help](#).

Hot-Plug SATA Hard Drives Using the SAS Backplane

If you are using the optional SAS backplane, the SATA hard drives you install are hot-pluggable if the backplane is attached directly to the SAS controller card on the system board (see [Figure 3-13](#)). For instructions on installing the optional SAS backplane board, see [Removing and Installing the Optional SAS Backplane Board](#).

The SAS backplane supports up to four hot-plug hard drives connected to the optional SAS controller card. The SAS controller card must be connected to channel A on the optional SAS controller card, or port 0 on an optional RAID controller card. For instructions on installing the optional SAS backplane board, see [Removing and Installing the Optional SAS Backplane Board](#).

Removing and Installing the Optional SAS Backplane Board

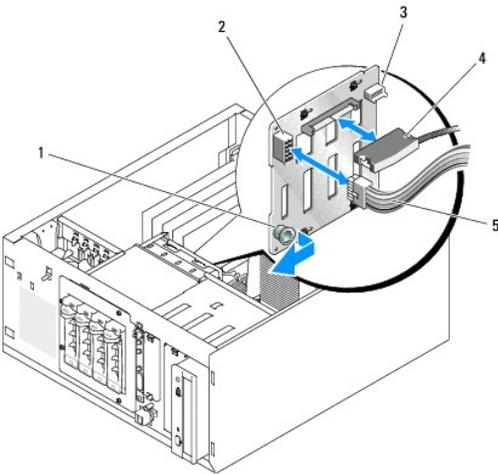
The optional SAS backplane board supports hot-plug SAS or SATA drives (if an optional SAS controller card is installed in the system).

CAUTION: Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer, and protecting against electrostatic discharge.

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](#).
3. Remove all existing hard drives from the hard drive bay. See [Removing a Hard Drive from the Drive Bay](#).
4. Install the SAS backplane:
 - a. Lower the backplane into the system and align the backplane with the retention hooks on the drive bay, then fit the backplane over the retention hooks.
 - b. Slide the backplane board toward the front fan about 12 mm (0.5 inch) until it clicks into place.

Figure 3-12. Installing the SAS Backplane Board

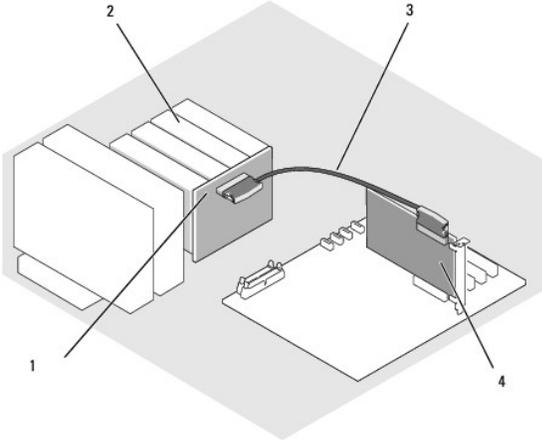


1	release tab	2	power connector	3	I2C connector
4	data cable	5	power cable		

5. Connect the power cable connector P3 to the power connector on the SAS backplane. See [Figure 3-12](#).
6. Connect the baseboard management controller (BMC) inter-IC (I2C) cable to the SAS backplane. See [Figure 3-12](#).
7. Connect the other end of the BMC I2C cable to connector BP_I2C on the system board. See [System Board Connectors](#).
8. If not already installed, install the SAS controller card.
See [Installing an Expansion Card](#) for instructions about installing the card.
9. Connect the SAS data cable to the SAS controller card, and to the SAS interface connector on the backplane. See [Figure 3-13](#) and [Figure 3-12](#).
10. Close the system. See [Closing the System](#).
11. Stand the system upright.
12. Install the hard drives into the hard-drive bay. See [Figure 3-11](#).
13. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.
14. Install any required device drivers.
15. Run the SAS controllers tests and the hard-drive tests in the system diagnostics. See [Running the System Diagnostics](#).

Installing SATA and SCSI hard drives in the same system is not supported.

Figure 3-13. SAS Backplane Connected to a SAS Controller Card



1	SAS backplane	2	SATA hard drive (up to four)	3	SAS interface cable
4	SAS controller card				

Removing a Hot-Plug SAS or SATA Hard Drive

NOTICE: Not all operating systems support hot-plug drive installation. See the operating system documentation to confirm that the operating system supports this feature.

1. Remove the bezel. See [Removing the Bezel.](#)
2. Take the hard drive offline and wait until the hard-drive indicator codes on the drive carrier signal that the drive can be removed safely. See Table 1-5 for a list of hard-drive indicator codes.

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

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

3. Remove the drive. See [Removing a Hard Drive from a Lever-Release Drive Carrier.](#)

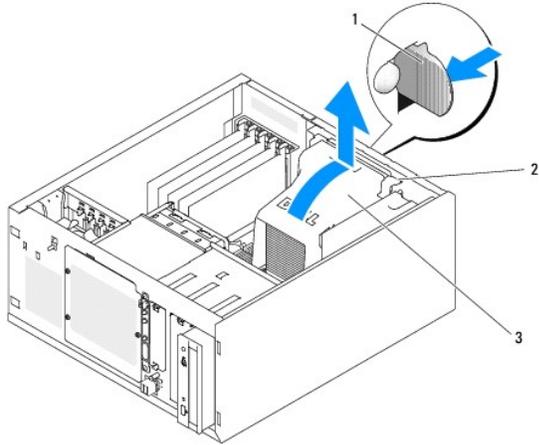
Cooling Shroud

Removing the Cooling Shroud

CAUTION: Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer, and protecting against electrostatic discharge.

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.](#)
3. Disconnect the power cables and hard-drive interface cable connectors from the SAS backplane (if applicable) or hard drives.
4. Press the shroud release tab on the back panel toward the power supply. See [Figure 3-14.](#)
5. Lift the cooling shroud out of the system. See [Figure 3-14.](#)

Figure 3-14. Removing the Cooling Shroud



1	shroud release tab	2	anchor tabs (2)	3	cooling shroud
---	--------------------	---	-----------------	---	----------------

Installing the Cooling Shroud

1. Ensure that no tools or loose parts are left inside the system.
2. Align the anchor tabs on the cooling shroud with the notches in the system chassis.
3. Reposition the SAS or SATA cables and power cables so they do not obstruct the memory modules and interfere with installing the cooling shroud.
4. Gently lower the cooling shroud until the shroud release tab on the back panel snaps into place.
5. Reconnect the power cable(s) to the SAS backplane (if applicable) or the hard drive(s).

Cooling Fans

The system includes the following cooling fans:

- 1 Front system fan (only when configured with optional SAS or RAID controller cards)
- 1 Back system fan

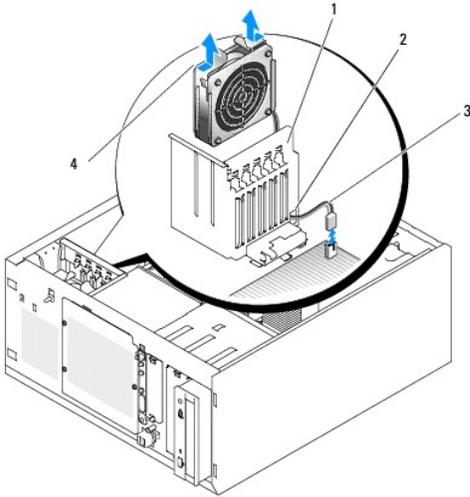
Removing the Front System Fan

⚠ CAUTION: Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer, and protecting against electrostatic discharge.

[Figure 3-15](#) illustrates the front system fan inside the system and the fan cable routing hole in the expansion-card guide bracket.

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](#).
3. Disconnect the fan power cable from the FRONT_FAN connector on the system board. See [System Board Connectors](#).

Figure 3-15. Front System Fan Power Cable



1	expansion-card guide bracket	2	cable routing hole	3	fan power cable
4	release tabs (2)				

4. Squeeze the two release tabs on the top of the fan assembly and lift the fan assembly away from the system. See [Figure 3-15](#).

Installing the Front System Fan

⚠ CAUTION: Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer, and protecting against electrostatic discharge.

1. Insert the fan power cable through the cable routing hole in the expansion- card guide bracket. See [Figure 3-15](#).
2. Align the fan assembly with the slots in the chassis and lower the assembly into the chassis. See [Figure 3-15](#).
3. Pull the fan cable through the routing hole in the expansion-card guide bracket. See [Figure 3-15](#).
4. Connect the fan cable connector to the FRONT_FAN connector on the system board.
5. Close the system. See [Connecting Drives](#).
6. Stand the system upright.
7. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

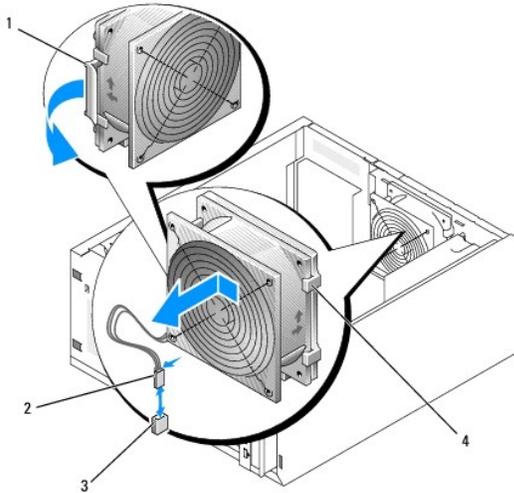
Removing the Back System Fan

⚠ CAUTION: Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer, and protecting against electrostatic discharge.

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](#).
3. Remove the cooling shroud. See [Removing the Cooling Shroud](#).
4. Disconnect the fan cable from the BACK_FAN connector on the system board. To identify system board connectors, see [System Board Connectors](#).
5. Pull the release tab on the fan assembly away from the back panel and slide the fan assembly about 0.63 cm (0.25 inch) toward the expansion-card slots. See [Figure 3-16](#).

6. Pull the fan assembly forward and lift the assembly out of the system. See [Figure 3-16](#).

Figure 3-16. Removing the Back System Fan



1	release tab	2	fan cable connector	3	BACK_FAN connector
4	back system fan				

Installing the Back System Fan

CAUTION: Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer, and protecting against electrostatic discharge.

1. Align the tabs on the fan bracket with the mounting holes in the back panel and slide the fan assembly toward the power supply about 0.63 cm (0.25 inch) until the fan bracket release tab snaps into place. See [Figure 3-16](#).
2. Connect the fan cable to the BACK_FAN connector on the system board.
To identify system board connectors, see [System Board Connectors](#).
3. Install the cooling shroud. See [Installing the Cooling Shroud](#).
4. Close the system. See [Closing the System](#).
5. Stand the system upright.
6. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

Power Supply

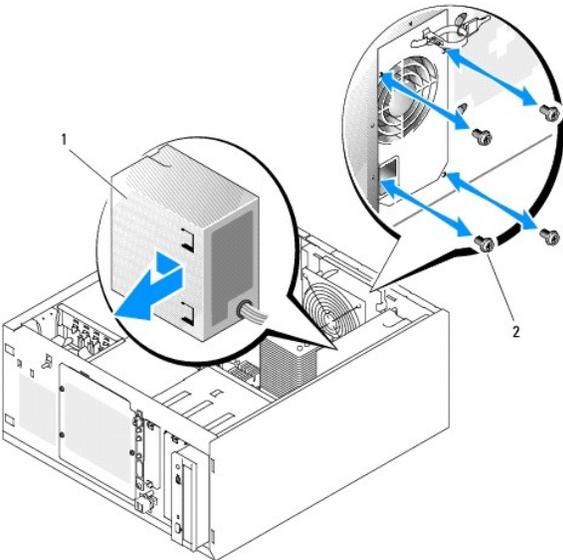
Removing the Power Supply

CAUTION: Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer, and protecting against electrostatic discharge.

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. Disconnect the DC power cables from the following components:

- 1 POWER CONN connector on the backplane board (if applicable)
 - 1 PWR_CONN and 12V connectors on the system board
 - 1 Hard drives
 - 1 Diskette drive (if applicable)
 - 1 Optical drive (if applicable)
 - 1 Tape backup drive (if applicable)
4. Remove the cooling shroud. See [Removing the Cooling Shroud](#).
 5. Remove the four screws securing the power supply to the back panel. See [Figure 3-17](#).

Figure 3-17. Removing the Power Supply



1	power supply	2	screws (4)
---	--------------	---	------------

6. Slide the power supply toward the front of the system, and then lift the power supply up and out of the system.

Replacing the Power Supply

1. Lower the power supply into the system and align the mounting holes with the holes on the back panel.
2. Install the four screws securing the power supply to the back panel.
3. Install the cooling shroud. See [Installing the Cooling Shroud](#).
4. Connect the DC power cables to the following components:
 - 1 POWER CONN connector on the backplane board (if applicable)
 - 1 PWR_CONN and 12V connectors on the system board
 - 1 Hard drives or SAS backplane.
 - 1 Diskette drive (if applicable)
 - 1 Optical drive (if applicable)
 - 1 Tape backup drive (if applicable)
5. Close the system. See [Closing the System](#).
6. Stand the system upright.
7. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

Expansion Cards

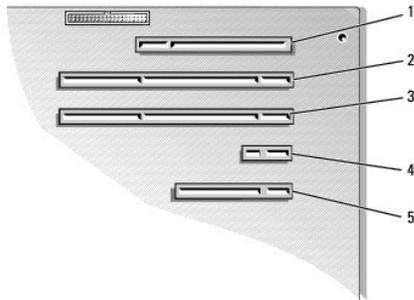
Your system supports up to five full-length expansion cards, installed in connectors on a riser card. The expansion slots are configured as follows:

- o Slot 1 is a x8 lane-width PCI-Express expansion slot.
- o Slot 2 is a x1 lane-width PCI-Express expansion slot.
- o Slots 3 and 4 are 3.3-V, 64-bit, 133-MHz PCI-X expansion slots.
- o Slot 5 is a 5-V, 32-bit, 33-MHz legacy PCI expansion slot.

[Figure 3-18](#) shows the relative locations of the expansion-card slots.

NOTICE: If you install a RAC card, it must be installed in PCI slot SLOT_5.

Figure 3-18. Expansion Slots



1	SLOT_5 - PCI 32-bit, 33-MHz (5-V)	2	SLOT_4 - PCI-X 64-bit, 133-MHz (3.3-V)	3	SLOT_3 - PCI-X 64-bit, 133-MHz (3.3-V)
4	SLOT_2 - x1 lane width PCI-Express	5	SLOT_1 - x8 lane width PCI-Express		

Installing an Expansion Card

CAUTION: Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer, and protecting against electrostatic discharge.

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](#).

4. Remove the filler bracket from the expansion slot.

5. Install the expansion card. See [Figure 3-19](#).

- a. Position the expansion card so that the card-edge connector aligns with the expansion-card connector on the system board.
- 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.

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

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

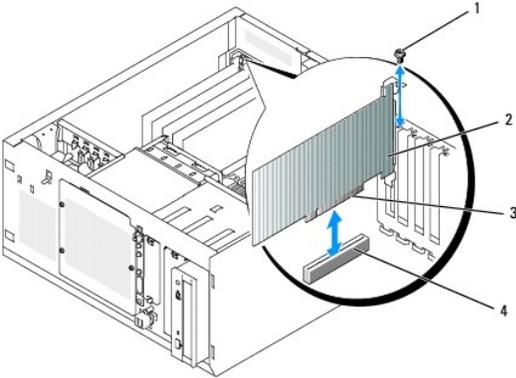
7. Close the system. See [Closing the System](#).

8. Stand the system upright.

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

10. Install any device drivers required for the card as described in the documentation for the card.

Figure 3-19. Removing and Installing an Expansion Card



1	screw	2	expansion card	3	card-edge connector
4	expansion-card connector				

Removing an Expansion Card

⚠ CAUTION: Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer, and protecting against electrostatic discharge.

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](#).
3. Disconnect any cables attached to the card.
4. Remove the expansion card (see [Figure 3-19](#)):
 - a. Remove the screw that secures the expansion-card bracket to the back panel.
 - b. Grasp the expansion card by its top corners, and carefully remove it from the expansion-card connector.

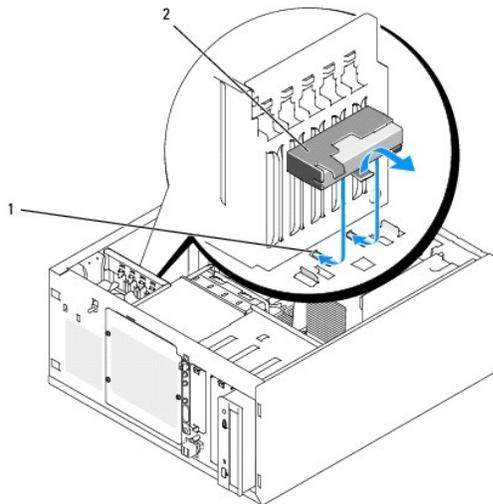
👉 NOTICE: You must install a filler bracket over an empty expansion slot to maintain Federal Communications Commission (FCC) certification of the system. The brackets also help keep dust and dirt out of the system and aid in proper cooling and airflow inside the system.

5. If you are removing the card permanently, install a metal filler bracket over the empty expansion slot opening and close the expansion-card latch.
6. Close the system. See [Closing the System](#).
7. Stand the system upright.
8. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

Replacing the SAS Controller Card Battery

1. Disconnect the battery cable from the SAS controller card.

Figure 3-20. Replacing the SAS Controller Card Battery



1	chassis notches	2	battery/battery holder
---	-----------------	---	------------------------

2. Remove the battery and battery holder from the system chassis. See [Figure 3-20](#).
3. Insert the new battery into the battery bay, ensuring that the battery is aligned and fully seated into the slots.
4. Connect the battery cable to the SAS controller card.

Memory

You can upgrade your system memory to a maximum of 8 GB by installing combinations of 512-MB, 1-GB, and 2-GB unbuffered ECC DDRII SDRAM 533-MHz or 667-MHz memory modules. The system memory is located on the system board adjacent to the power supply connectors. See [System Board Connectors](#). The memory module sockets are arranged in two banks on two channels (A and B). The memory module banks are identified as follows:

- 1 Bank 1: DIMM1_A and DIMM1_B
- 1 Bank 2: DIMM2_A and DIMM2_B

General Memory Module Installation Guidelines

- 1 If only one memory module is installed, it must be installed in socket DIMM1_A.
- 1 If two or more memory modules are installed, they must be installed in pairs of matched memory size, speed, and technology.

[Table 3-2](#) shows examples of different memory configurations.

Table 3-2. Sample Memory Configurations

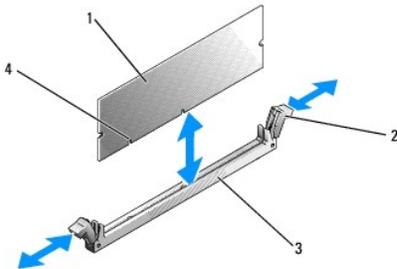
Total Memory	DIMM1_A	DIMM2_A	DIMM1_B	DIMM2_B
512 MB	512 MB	None	None	None
1 GB	512 MB	None	512 MB	None
1 GB	1 GB	None	None	None
2 GB	512 MB	512 MB	512 MB	512 MB
2 GB	1 GB	None	1 GB	None
3 GB	1 GB	512 MB	1 GB	512 MB
4 GB	1 GB	1 GB	1 GB	1 GB
4 GB	2 GB	None	2 GB	None
5 GB	2 GB	512 MB	2 GB	512 MB
6 GB	2 GB	1 GB	2 GB	1 GB
8 GB	2 GB	2 GB	2 GB	2 GB

Installing Memory Modules

⚠ CAUTION: Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer, and protecting against electrostatic discharge.

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](#).
3. Locate the memory module sockets. See [System Board Connectors](#).
4. Press the ejectors on the memory module socket down and out, as shown in [Figure 3-21](#), to allow the memory module to be inserted into the socket.

Figure 3-21. Installing and Removing a Memory Module



1	memory module	2	memory module socket ejectors (2)	3	socket
4	alignment keys (2)				

5. Align the memory module's edge connector with the alignment keys on the memory module socket, and insert the memory module in the socket.

🔍 NOTE: The memory module socket has alignment keys that ensure correct insertion of the memory module in the socket.

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

7. Repeat this procedure to install the remaining memory modules. See [Table 3-2](#) for sample memory configurations.
8. Close the system. See [Closing the System](#).
9. Stand the system upright.
10. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.
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 the System Diagnostics](#).

Removing Memory Modules

⚠ CAUTION: Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer, and protecting against electrostatic discharge.

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](#).
 3. Locate the memory module sockets. See [System Board Connectors](#).
 4. Press down and out on the ejectors on each end of the socket until the memory module pops out of the socket. See [Figure 3-21](#).
 5. Close the system. See [Closing the System](#).
 6. Stand the system upright.
-

Microprocessor

You can upgrade the system processor to take advantage of future options in speed and functionality.

A processor upgrade kit contains the following items:

- 1 Processor
- 1 Thermal grease packet and/or a replacement heat sink

If your kit does not include a replacement heat sink, you must reuse the processor heat sink currently in your system.

 **NOTICE:** If your upgrade kit included a thermal grease packet, you must use the thermal grease as instructed to ensure the proper thermal operating condition for the processor. Failure to do so will result in damage to your system.

Removing the Processor

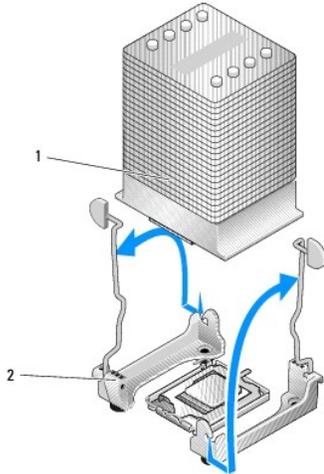
 **CAUTION:** Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer, and protecting against electrostatic discharge.

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](#).
3. Remove the cooling shroud. See [Removing the Cooling Shroud](#).

 **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.

4. Remove the heat sink. See [Figure 3-22](#).
 - a. Open one securing clip by pressing the end of the clip down and away from the retention module until it clears the securing tab on the retention module, and then lift the clip up.
 - b. Repeat [step a](#) for the remaining securing clip.
 - c. Rotate the heat sink slightly and then lift the heat sink off the processor. Do not pry the processor off the heat sink.
 - d. If you are reusing the heat sink with the new processor, clean the contact side of the heat sink and set it aside for use later in the processor installation procedure.

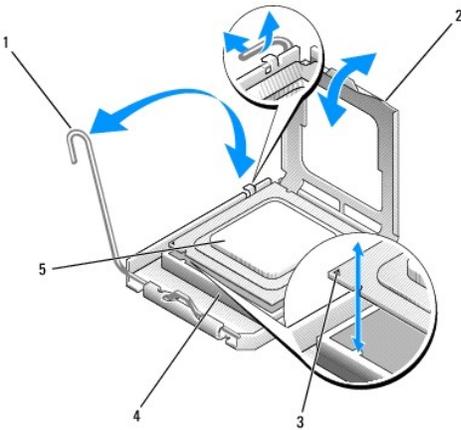
Figure 3-22. Removing the Heat Sink



1	heat sink	2	securing clips (2)
---	-----------	---	--------------------

5. Press down on the processor socket release lever, then pull the release lever upward to the fully open position. See [Figure 3-23](#).
6. Open the processor cover. See [Figure 3-23](#).
7. Lift the processor vertically out of the socket. Leave the processor cover and release lever in the open position so that the socket is ready for the new processor. See [Figure 3-23](#).

Figure 3-23. Removing/Replacing the Processor



1	processor socket release lever	2	processor cover	3	pin-1 locators
4	processor socket	5	processor		

Installing a Processor

⚠ CAUTION: Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer, and protecting against electrostatic discharge.

1. Unpack the new processor and heat sink, if provided.
2. Ensure that the processor socket release lever is in the fully open position.
3. Align the pin 1 corners of the processor and socket. See [Figure 3-23](#).

➡ **NOTICE:** You must position the processor correctly in the socket to avoid damaging the processor and the system board when you turn on the system. Be careful not to touch or bend the pins on the socket.

4. Set the processor lightly in the socket and ensure that the processor is level in the socket. When the processor is positioned correctly, press it gently to seat it in the socket.
5. Close the processor cover.
6. Rotate the release lever back down until it snaps into place, securing the processor cover.

➡ **NOTICE:** Do not operate the system without the heat sink installed. The heat sink is required to maintain proper thermal conditions.

7. Prepare the heat sink for installation:
 1. If you are reusing the heat sink from the previous processor, ensure that the contact side (bottom) of the heat sink is clean, open the thermal grease packet, and apply thermal grease to the bottom of the heat sink.
 1. If you received a replacement heat sink, remove the protective sheet from the thermal grease layer that is pre-applied to the bottom of the heat sink.
8. Lower the heat sink onto the processor. See [Figure 3-22](#).
9. Secure the heat sink to the retention module.
 - a. Gently press down on the heat sink and then press one securing clip to secure it.
 - b. Repeat [step a](#) for the remaining securing clip.
10. Ensure that the back fan connector is connected to the BACK_FAN connector on the system board. See [System Board Connectors](#).
11. Install the cooling shroud. See [Installing the Cooling Shroud](#).
12. Close the system. See [Closing the System](#).
13. Stand the system upright.
14. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.
15. Enter the System Setup program, and ensure that the processor options match the new system configuration. See [Using the System Setup Program](#).

As the system boots, it detects the presence of the new processor and automatically changes the system configuration information in the System Setup program. A message similar to the following appears:

```
One 2.8 GHz Processor, Processor Bus: 533 MHz, L2 cache 256 KB
```
16. Confirm that the top line of the system data area in the System Setup program correctly identifies the installed processor. See [Using the System Setup Program](#).
17. Exit the System Setup program.
18. Ensure that your system is running the latest BIOS version.

You can download the latest BIOS version from the Dell Support website located at support.dell.com
19. Run the system diagnostics to verify that the new processor is operating correctly.

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

Installing a RAC Card

⚠ **CAUTION:** Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer, and protecting against electrostatic discharge.

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](#).
3. Install the RAC card in PCI expansion slot SLOT_5.

See [Installing an Expansion Card](#) for information on installing the card.

4. Connect the cable from the RAC card to connector RAC_CONN on the system board. See [System Board Connectors](#).
5. Close the system. See [Closing the System](#).
6. Stand the system upright.
7. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.
8. Enter the System Setup program and verify that the setting for the RAC card has changed to reflect the presence of the card. See [Using the System Setup Program](#).

See the RAC card documentation for information on configuring and using the RAC card.

System Battery

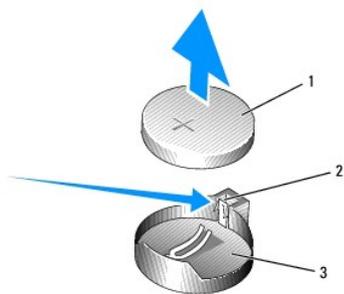
Replacing the System Battery

⚠ CAUTION: Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer, and protecting against electrostatic discharge.

1. Enter the System Setup program and record the option settings on the System Setup screens.
See [Using the System Setup Program](#).
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](#).
4. Remove the system battery. See [System Board Connectors](#) for the battery socket location on the system board.
 - a. Pull the latch away from the battery. See [Figure 3-24](#).
 - b. Lift the battery out of the battery socket.

🔄 NOTICE: You must install the new system battery with the side labeled "+" facing up. See [Figure 3-24](#).

Figure 3-24. Removing the System Battery



1	system battery	2	latch	3	battery socket
---	----------------	---	-------	---	----------------

5. To install the new system battery, hold the battery with the side labeled "+" facing up, and then press the battery straight down into the battery socket until the latch snaps into place over the edge of the battery. See [Figure 3-24](#).
6. Close the system. See [Closing the System](#).
7. Stand the system upright.
8. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

9. Enter the System Setup program to confirm that the battery operates properly.
10. From the main screen, select **System Time** to enter the correct time and date.
11. Re-enter any system configuration information that is no longer displayed on the System Setup screens, and then exit the System Setup program.
12. To test the newly installed battery, see [Troubleshooting the System Battery](#).

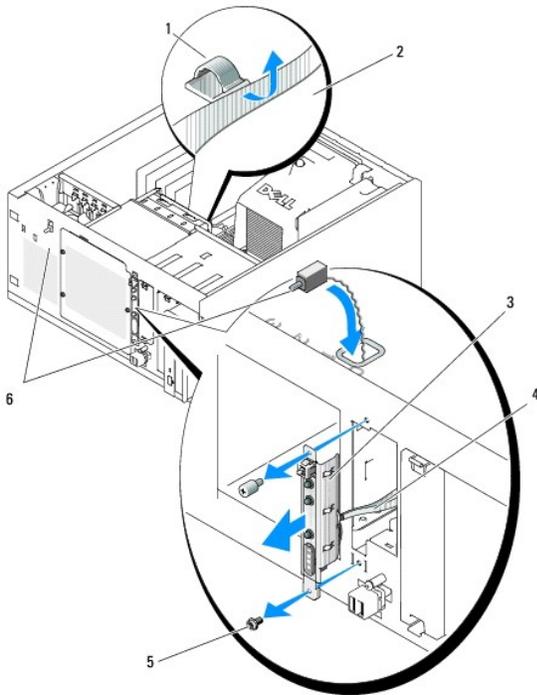
Front I/O Panel (Service-Only Parts Procedure)

Removing the Control Panel Assembly and Chassis-Intrusion Switch

⚠ CAUTION: Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer, and protecting against electrostatic discharge.

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. Disconnect the control panel assembly cable from the FRONT_PANEL connector on the system board and remove the assembly cable from its guide bracket. See [Figure 3-25](#).
4. Slide the chassis-intrusion switch upward and lift it out of its slot in the front of the chassis. Then, remove the chassis-intrusion cable from its three holding clips underneath the front lip of the system chassis.
5. Using a #2 Phillips screwdriver, remove the two screws that secure the control panel assembly to the chassis. See [Figure 3-25](#).
6. Lift the control panel assembly and the attached chassis-intrusion switch away from the system. See [Figure 3-25](#).

Figure 3-25. Removing the Control Panel Assembly



1	assembly cable guide bracket	2	chassis floor	3	control panel assembly
4	control panel assembly cable	5	mounting screws (2)	6	chassis-intrusion switch

Installing the Control Panel Assembly

1. Insert the control panel assembly cable and chassis-intrusion switch through the front of the system.
 2. Thread the chassis-intrusion switch upward through the opening above the control panel slot.
 3. Connect the control panel assembly cable connector to the FRONT_PANEL connector on the system board and insert the cable in its guide bracket.
 4. Guide the chassis-intrusion switch cable through the three holding clips underneath the front lip of the system chassis.
 5. Insert the chassis-intrusion switch into its slot in the front of the chassis, then slide the switch down into place.
 6. Using a #2 Phillips screwdriver, install the screws that secure the control panel assembly to the chassis. See [Figure 3-25](#).
 7. Close the system. See [Closing the System](#).
 8. Stand the system upright.
 9. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.
-

System Board (Service-Only Parts Procedure)

The system board and system board tray are removed and replaced as a single assembly.

⚠ CAUTION: Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer, and protecting against electrostatic discharge.

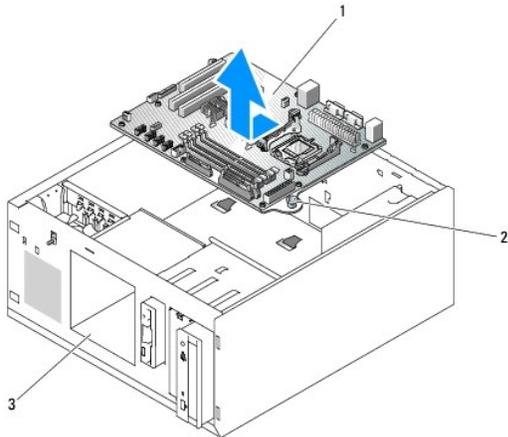
⚠ CAUTION: The processor heat sink can get hot during operation. To avoid burns, ensure that the system has sufficient time to cool before removing the system board.

Removing the System Board

1. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
2. Disconnect the cables to the I/O connectors on the back panel.
3. Open the system. See [Opening the System](#).
4. Disconnect the two power cables from connectors PWR_CONN and 12V on the system board.
5. Remove the cooling shroud. See [Removing the Cooling Shroud](#).
6. If the system has cabled SAS drives or SATA drives, note the relative location of the interface cable connections between the system board and the drives, so you can reconnect them in the proper sequence.
7. Disconnect the SAS or SATA interface cable(s) connected to the system board or optional hard-drive controller card.
8. Disconnect the power cable(s) connected to the hard drives in the drive bay, or to the optional SAS backplane.
9. Remove the screws securing the drive bay and remove the bay from the system.
10. Disconnect all remaining cables attached to the connectors on the system board:
 1. Optical-drive interface cable (PRIMARY_IDE connector)
 1. Diskette-drive cable (FDD connector)
 1. Control panel cable (FRONT_PANEL connector)
 1. Front fan cable (FRONT_FAN connector)
 1. Back fan cable (BACK_FAN connector)
 1. Any other cables attached to the system board, after recording their locations.
11. Remove the back fan. See [Removing the Back System Fan](#) in "Installing System Components."

12. Remove all PCI expansion cards from the expansion slots. See [Removing an Expansion Card](#).
13. Pull up on the system board plunger and slide the system board toward the front of the chassis about 2.5 cm (1 inch). See [Figure 3-26](#).
14. Carefully lift the system board up and out of the chassis. See [Figure 3-26](#).

Figure 3-26. Removing the System Board



1	system board	2	plunger	3	drive bay
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Installing the System Board

1. Unpack the new system board.
2. Ensure that the system board jumpers are set the same as on the board that you just removed, and change the settings if necessary. See [System Board Jumpers](#).
3. Remove the memory modules from the original system board and transfer them to the new board, being careful to install the memory modules in the same locations.
See [Installing Memory Modules](#).
4. Remove the processor from the original system board. See [Removing the Processor](#).
5. Reinstall the processor and heat sink on the new system board. See [Installing a Processor](#).
6. Making sure that no cables are trapped beneath the system board tray, lower the new system board into the chassis.
7. Position the system board in place and gently press down on the board until the plunger locks.
8. Install the back fan and connect the fan cable to the BACK_FAN connector on the system board. See [Installing the Back System Fan](#).
9. Connect the following cables to the system board. See [System Board Connectors](#).
 1. Optical-drive interface cable (PRIMARY_IDE connector)
 1. Diskette-drive cable (FDD connector)
 1. Control panel cable (FRONT_PANEL connector)
 1. Front fan cable (FRONT_FAN connector)
10. Install all expansion cards and connect any interface cables to the appropriate components in the system. See [Installing an Expansion Card](#).
11. Reinstall the drive bay and secure it with the four Phillips screws. See [Installing a Hard Drive in the Drive Bay](#).
12. Reconnect the SAS or SATA interface cable(s) to the system board or optional hard-drive controller card.
Ensure that you reattach the interface cables in their original locations.
13. Reconnect the power cables to the hard drives in the drive bay, or to the optional SAS backplane.

14. Replace the cooling shroud. See [Installing the Cooling Shroud](#).
 15. Connect the two power cables to connectors PWR_CONN and 12V on the system board.
 16. Carefully check for any remaining cables or components that are not installed or are improperly seated in their connectors on the system board.
 17. Close the system. See [Closing the System](#).
 18. Stand the system upright.
 19. Reconnect the cables to the I/O connectors on the system back panel.
 20. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.
-

[Back to Contents Page](#)

Jumpers and Connectors

Dell™ PowerVault™ 100 Systems Hardware Owner's Manual

- [System Board Jumpers](#)
- [System Board Connectors](#)
- [Disabling a Forgotten Password](#)

This section provides specific information about the system jumpers and describes the connectors on the various boards in the system.

System Board Jumpers

⚠ CAUTION: Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. See your *Product Information Guide* for complete information about safety precautions, working inside the computer, and protecting against electrostatic discharge.

[Figure 6-1](#) shows the location of the configuration jumpers on the system board. [Table 6-1](#) lists the jumper settings.

🔧 NOTE: To access the jumpers, remove the memory cooling shroud by lifting the release latch and sliding the shroud toward the front of the system. See [Figure 3-14](#).

Figure 6-1. System Board Jumpers

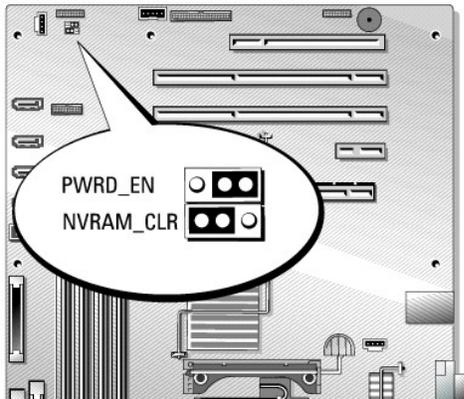


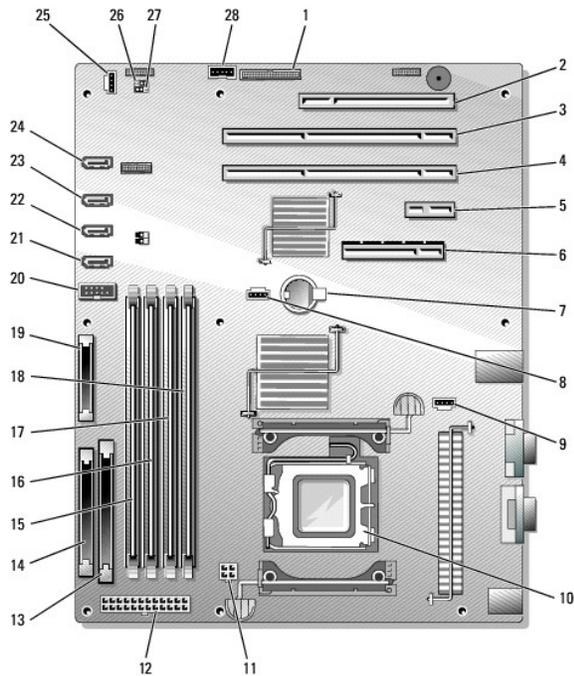
Table 6-1. System Board Jumper Settings

Jumper	Setting	Description
PWRD_EN		The password feature is enabled.
	(default)	
NVRAM_CLR		The configuration settings in NVRAM are cleared at next system boot.
	(default)	The configuration settings in NVRAM are retained at system boot.
 jumpered  unjumpered		

System Board Connectors

See Figure 6-2 and Table 6-2 for the location and description of the system board connectors.

Figure 6-2. System Board Connectors



Item	Connector	Description
1	RAC_CONN	Connector for the remote access controller (RAC)
2	SLOT_5	PCI 32-bit, 33-MHz (5-V) expansion slot connector
3	SLOT_4	PCI-X 64-bit, 133-MHz (3.3-V) expansion slot connector
4	SLOT_3	PCI-X 64-bit, 133-MHz (3.3-V) expansion slot connector
5	SLOT_2	PCI-Express (x1) expansion slot connector
6	SLOT_1	PCI-Express (x8) expansion slot connector
7	BATTERY	Connector for the 3.0-V coin battery
8	HD_ACT_CARD	Hard drive LED activity connector
9	BACK_FAN	Fan power connector
10	CPU	Processor connector
11	12V	Power connector
12	PWR_CONN	Power connector
13	IDE	IDE optical device connector
14	FDD	Diskette drive connector
15	DIMM2_B	Memory module connector
16	DIMM1_B	Memory module connector
17	DIMM2_A	Memory module connector
18	DIMM1_A	Memory module connector
19	FRONT_PANEL	Control panel connector
20	USB_CONN	USB 2.0-compliant connector
21	SATA_0	SATA connector
22	SATA_1	SATA connector
23	SATA_2	SATA connector
24	SATA_3	SATA connector
25	FRONT_FAN	Front fan power connector.
26	PWRD_EN	Password enable/disable jumper connector.
27	NVRAM_CLR	NVRAM jumper connector.

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](#). The password jumper enables these password features or disables them and clears any password(s) currently in use.

 **CAUTION:** Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer, and protecting against electrostatic discharge.

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 the memory cooling shroud by lifting the release latch and sliding the shroud toward the front of the system. See [Figure 3-14](#).
4. Remove the password jumper plug.

See [Figure 6-1](#) to locate the password jumper on the system board.

5. Replace the memory cooling shroud.
6. Close the system. See [Closing the System](#).
7. Reconnect the system to the electrical outlet, and turn on the system.

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

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

8. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
9. Open the system.
10. Remove the memory cooling shroud.
11. Reinstall the password jumper plug in its original position to enable the password protection feature.
12. Reinstall the memory cooling shroud.
13. Close the system, reconnect the system to the electrical outlet, and turn on the system.
14. Assign a new system and/or setup password.

To assign a new password using the System Setup program, see [Using the System Setup Program](#).

Using the System Setup Program

Dell™ PowerVault™ 100 Systems Hardware Owner's Manual

- [Entering the System Setup Program](#)
- [System Setup Options](#)
- [System and Setup Password Features](#)

After you set up your system, run the System Setup program to familiarize yourself with your system configuration and optional settings. Record the information for future reference.

You can use the System Setup program to:

- 1 Change the system configuration stored in NVRAM after you add, change, or remove hardware
- 1 Set or change user-selectable options—for example, the time or date
- 1 Enable or disable integrated devices
- 1 Correct discrepancies between the installed hardware and configuration settings

Entering the System Setup Program

1. Turn on or restart your system.
2. Press <F2> immediately after you see the following message:

<F2> = System Setup

If your operating system begins to load before you press <F2>, allow the system to finish booting, and then restart your system and try again.

 **NOTE:** To ensure an orderly system shutdown, see the documentation that accompanied your operating system.

Responding to Error Messages

You can enter the System Setup program by responding to certain error messages. If an error message appears while the system is booting, make a note of the message. Before entering the System Setup program, see [About Your System](#) for an explanation of the message and suggestions for correcting errors. Also, the system emits a series of beeps during POST if an error is encountered but cannot be reported. For more information, see [System Beep Codes](#) for more information.

 **NOTE:** After installing a memory upgrade, it is normal for your system to send a message the first time you start your system.

Using the System Setup Program

[Table 2-1](#) lists the keys that you use to view or change information on the System Setup program screens and to exit the program.

Table 2-1. System Setup Program Navigation Keys

Keys	Action
Up arrow or <Shift><Tab>	Moves to the previous field.
Down arrow or <Tab>	Moves to the next field.
Spacebar, <+>, <->, left and right arrows	Cycles through the settings in a field. In many fields, you can also type the appropriate value.
<Esc>	Exits the System Setup program and restarts the system if any changes were made.
<F1>	Displays the System Setup program's help file.

 **NOTE:** For most of the options, any changes that you make are recorded but do not take effect until you restart the system.

System Setup Options

Main Screen

When you enter the System Setup program, the main System Setup program screen appears (see [Figure 2-1](#)).

Figure 2-1. Main System Setup Program Screen

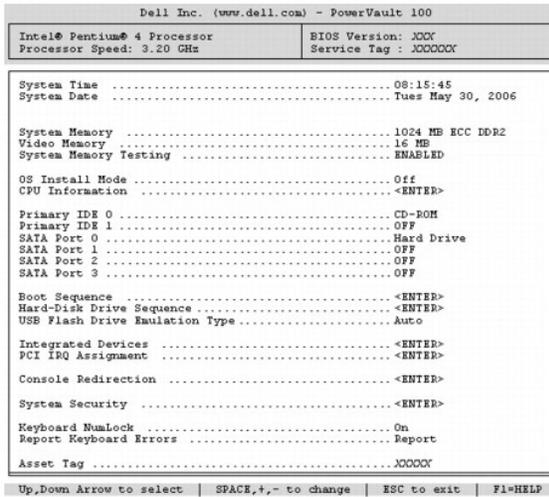


Table 2-2 lists the options and descriptions for the information fields that appear on the main System Setup program screen.

-  **NOTE:** The options for the System Setup program change based on the system configuration.
-  **NOTE:** The System Setup program defaults are listed under their respective options, where applicable.

Table 2-2. System Setup Program Options

Option	Description
System Time	Resets the time on the system's internal clock.
System Date	Resets the date on the system's internal calendar.
System Memory	Displays information related to installed system, video, and redundant memory, including size, type, and speed of memory modules, system video memory size, system memory test option, and redundant memory status.
Video Memory	Displays the amount of video memory. This option does not have user-selectable settings.
System Memory Testing	Determines if memory is being tested during POST.
OS Install Mode (Off default)	Determines the maximum amount of memory available to the operating system. On sets the maximum memory to 256 MB. Off makes all of the system memory available to the operating system. Some operating systems cannot install with more than 2 GB of system memory. Enable this option (On) during operating system installation and disable (Off) after installation.
CPU Information	Displays information related to microprocessors (speed, cache size, and so on). Enable or disable Hyper-Threading technology by changing the setting of the Logical Processor option. See Table 2-3 .
Primary IDE 0	Enables (Auto) or disables (Off) the IDE device in Drive 0 (optical drive).
Primary IDE 1	Enables (Auto) or disables (Off) the IDE device in Drive 1 (tape backup unit).
SATA Port 0	Enables (Auto) or disables (Off) the SATA hard drive in Port 0.
SATA Port 1	Enables (Auto) or disables (Off) the SATA hard drive in Port 1.
SATA Port 2	Enables (Auto) or disables (Off) the SATA hard drive in Port 2.
SATA Port 3	Enables (Auto) or disables (Off) the SATA hard drive in Port 3.
Boot Sequence	Determines the order in which the system searches for boot devices during system startup. Available options can include the diskette drive, CD drive, hard drives, and network. NOTE: System boot is not supported from an external device attached to a SAS or SCSI adapter. See support.dell.com for the latest support information about booting from external devices.
Hard-Disk Drive Sequence	Determines the order in which the system searches the hard drives during system startup. The selections depend on the hard drives installed in your system.
USB Flash Drive Emulation Type (Auto default)	Determines the emulation type for a USB flash drive. Hard disk allows the USB flash drive to act as a hard drive. Floppy allows the USB flash drive to act as a removal diskette drive. Auto automatically chooses an emulation type.
Integrated Devices	See Integrated Devices Screen .
PCI IRQ Assignment	Displays a screen to change the IRQ assigned to each of the integrated devices on the PCI bus, and any installed expansion cards that require an IRQ.
Console Redirection	Displays a screen to configure serial communication, external serial connector, fail-safe baud rate, remote terminal type, and redirection after boot.
System Security	Displays a screen to configure the system password and setup password features. See Using the System Password and Using the Setup Password for more information.

Keyboard NumLock (On default)	Determines whether your system starts up with the NumLock mode activated on 101- or 102-key keyboards (does not apply to 84-key keyboards).
Report Keyboard Errors (Report default)	Enables or disables reporting of keyboard errors during the POST. Select Report for host systems that have keyboards attached. Select Do Not Report to suppress all error messages relating to the keyboard or keyboard controller during POST. This setting does not affect the operation of the keyboard itself if a keyboard is attached to the system.
Asset Tag	Displays the customer-programmable asset tag number for the system if an asset tag number has been assigned.

CPU Information Screens

[Table 2-3](#) lists the options and descriptions for the information fields that appear on the **CPU Information** screen.

Table 2-3. CPU Information Screen

Option	Description
Bus Speed	Displays the bus speed of the processor(s).
Logical Processor (Enabled default)	Displays when the processors support HyperThreading. Enabled permits all logical processors to be used by the operating system. Only the first logical processor of each processor installed in the system is used by the operating system if Disabled is selected.
Virtualization Technology (Disabled default)	Displays when the processor(s) support Virtualization Technology. Enabled permits virtualization software to use Virtualization Technology incorporated in the processor design. This feature can only be used by software that supports Virtualization Technology.
Adjacent Cache Line Prefetch (Enabled default)	Enables or disables optimal use of sequential memory access. Disable this option for applications that require high use of random memory access.
Hardware Prefetcher (Enabled default)	Enables or disables the hardware prefetcher.
Demand-Based Power Management (Disabled default)	Enables or disables demand-based power management. When enabled, the CPU Performance State tables will be reported to the operating system; when disabled, the CPU Performance State tables will not be reported to the operating system. If any of the CPUs do not support demand-based power management, the field will become read-only, and automatically set to Disabled .
Processor 1 ID	Displays the family, model number, and details for each processor. A submenu displays: <ul style="list-style-type: none"> o Core Speed o Level 2 Cache o Number of Cores o 64-bit Technology

Integrated Devices Screen

[Table 2-4](#) lists the options and descriptions for the information fields that appear on the **Integrated Devices** screen.

Table 2-4. Integrated Devices Screen Options

Option	Description
IDE Controller (Auto default)	Enables the integrated IDE controller. When set to Auto , each channel of the integrated IDE controller is enabled if IDE devices are attached to the channel and the external IDE controller is not detected.
SATA Controller (ATA default)	Allows the integrated SATA controller to be set to Off or ATA Mode . Off disables the SATA subsystem. ATA Mode sets the SATA subsystem to Native IDE mode.
USB Controller (On with BIOS support default)	Enables or disables the system's USB ports. Options are On with BIOS support , On without BIOS support , or Off . Disabling the USB ports makes system resources available for other devices.
Embedded Gb NIC (Enabled with PXE default)	Enables or disables the system's integrated NIC. Options are Enabled with PXE and Disabled . PXE support allows the system to boot from the network. Changes take effect after the system reboots.
MAC Address	Displays the MAC address for the integrated 10/100/1000 NIC. This field does not have user-selectable settings.
Diskette Controller	Enables or disables the system's diskette drive controller. When Auto is selected, the system turns off the controller when necessary to accommodate a controller card installed in an expansion slot. You can also configure the drive as Read-Only , or Off . When using the Read-Only setting, the drive cannot be used to write to a disk.
Serial Port (COM1 default)	<p>Serial Port options are COM1, COM3, BMC Serial, BMC NIC, COM1/BMC, and Off. If an optional remote access controller (RAC) is installed in the system, RAC is an additional option.</p> <p>Serial Port shares three usage models. For standard usage, Serial Port attempts to use COM1 first, and then COM3. For BMC usage, serial port 1 uses the COM1 address and communication can be either via the serial port or the integrated shared NIC. RAC control uses only the COM1 address.</p> <p>The COM1/BMC setting allows you to toggle the system between a COM1 setting and BMC Serial setting. In this mode, press <ESC> to enter the BMC Serial setting and press <ESC><q> to return to the COM1 setting.</p> <p>Off and COM3 are not available options when Console Redirection is set to use Serial Port 1.</p>
Speaker (On default)	Enables or disables the system internal speaker.

Console Redirection Screen

[Table 2-5](#) lists the options and descriptions for the information fields that appear on the **Console Redirection** screen.

Table 2-5. Console Redirection Screen Options

Option	Description
Console Redirection (Off default)	Sets the console redirection feature to Serial Port or Off .
Failsafe Baud Rate (11520 default)	Displays if the failsafe baud rate is used for console redirection.
Remote Terminal Type (VT 100/VT 220 default)	Select either VT 100/VT 220 or ANSI .
Redirection After Boot (Enabled default)	Enables or disables console redirection after your system restarts.

System Security Screen

[Table 2-6](#) lists the options and descriptions for the information fields that appear on the **System Security** screen.

Table 2-6. System Security Screen Options

Option	Description
System Password	Displays the current status of your system's password security feature and allows you to assign and verify a new system password. NOTE: See Using the System Password for instructions on assigning a system password and using or changing an existing system password.
Setup Password	Restricts access to the System Setup program in the same way that you restrict access to your system using the system password feature. NOTE: See Using the Setup Password for instructions on assigning a setup password and using or changing an existing setup password.
Password Status	Setting the Setup Password option to Enabled prevents the system password from being changed or disabled at system start-up. To lock the system password, assign a setup password in the Setup Password option and then change the Password Status option to Locked . In this state, you cannot change the system password using the System Password option and cannot be disabled at system start-up by pressing <Ctrl><Enter>. To unlock the system password, enter the setup password in the Setup Password field and then change the Password Status option to Unlocked . In this state, you can disable the system password at system start-up by pressing <Ctrl><Enter> and then change the password using the System Password option.
Front-Bezel Chassis Intrusion	Enables or disables the chassis-intrusion detection feature.
Power Button	Turns system's power off and on. <ol style="list-style-type: none">1 If you turn off the system using the power button and the system is running an ACPI-compliant operating system, the system can perform an orderly shutdown before power is turned off.1 If the system is not running an ACPI-compliant operating system, power is turned off immediately after the power button is pressed. The button is enabled in the System Setup program. When disabled, the button can only turn on system power. NOTE: You can still turn on the system by using the power button, even if the Power Button option is set to Disabled .
AC Power Recovery (Last default)	Determines how the system reacts when power is restored to the system. If system is set to Last , the system returns to the last power state. On turns on the system after power is restored. When set to Off , the system remains off after power is restored.

Exit Screen

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

- 1 Save Changes and Exit
- 1 Discard Changes and Exit

System and Setup Password Features

- ➔ **NOTICE:** The password features provide a basic level of security for the data on your system. If your data requires more security, use additional forms of protection, such as data encryption programs.
- ➔ **NOTICE:** Anyone can access the data stored on your system if you leave the system running and unattended without having a system password assigned or if you leave your system unlocked so that someone can disable the password by changing a jumper setting.

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

To change or delete an existing password, you must know the password (see [Deleting or Changing an Existing System Password](#)). If you forget your password, you cannot operate your system or change settings in the System Setup program until a trained service technician changes the password jumper setting to disable the passwords, and erases the existing passwords. This procedure is described in [Disabling a Forgotten Password](#).

Using the System Password

After a system password is assigned, only those who know the password have full use of the system. When the **System Password** option is set to **Enabled**, the system prompts you for the system password after the system starts.

Assigning a System Password

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

When a system password is assigned, the setting shown for the **System Password** option is **Enabled**. If the setting shown for the **Password Status** is **Unlocked**, you can change the system password. If the **Password Status** option is **Locked**, you cannot change the system password. When the system password feature is disabled by a jumper setting, the system password is **Disabled**, and you cannot change or enter a new system password.

When a system password is not assigned and the password jumper on the system board is in the enabled (default) position, the setting shown for the **System Password** option is **Not Enabled** and the **Password Status** field is **Unlocked**. To assign a system password:

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

You can use up to 32 characters in your password.

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

The password assignment is not case-sensitive. However, certain key combinations are not valid. If you enter one of these combinations, the system beeps. To erase a character when entering your password, press <Backspace> or the left-arrow key.

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

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

The setting shown for the **System Password** changes to **Enabled**. Exit the System Setup program and begin using your system.

6. Either reboot your system now for your password protection to take effect or continue working.

 **NOTE:** Password protection does not take effect until you reboot the system.

Using Your System Password to Secure Your System

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

When the **Password Status** option is set to **Unlocked**, you have the option to leave the password security enabled or to disable the password security.

To leave the password security enabled:

1. Turn on or reboot your system by pressing <Ctrl><Alt>.

2. Type your password and press <Enter>.

To disable the password security:

1. Turn on or reboot your system by pressing <Ctrl><Alt>.
2. Type your password and press <Ctrl><Enter>.

When the **Password Status** option is set to **Locked** whenever you turn on your system or reboot your system by pressing <Ctrl><Alt>, type your password and press <Enter> at the prompt.

After you type the correct system password and press <Enter>, your system operates as usual.

If an incorrect system password is entered, the system displays a message and prompts you to re-enter your password. You have three attempts to enter the correct password. After the third unsuccessful attempt, the system displays an error message showing the number of unsuccessful attempts and that the system has halted and will shut down. This message can alert you to an unauthorized person attempting to use your system.

Even after you shut down and restart the system, the error message continues to be displayed until the correct password is entered.

 **NOTE:** You can use the **Password Status** option in conjunction with the **System Password** and **Setup Password** options to further protect your system from unauthorized changes.

Deleting or Changing an Existing System Password

1. When prompted, press <Ctrl><Enter> to disable the existing system password.
If you are asked to enter your setup password, contact your network administrator.
2. Enter the System Setup program by pressing <F2> during POST.
3. Select the **System Security** screen field to verify that the **Password Status** option is set to **Unlocked**.
4. When prompted, type the system password.
5. Confirm that **Not Enabled** is displayed for the **System Password** option.

If **Not Enabled** is displayed for the **System Password** option, the system password has been deleted. If **Enabled** is displayed for the **System Password** option, press the <Alt> key combination to restart the system, and then repeat steps 2 through 5.

Using the Setup Password

Assigning a Setup Password

You can assign (or change) a setup password only when the **Setup Password** option is set to **Not Enabled**. To assign a setup password, highlight the **Setup Password** option and press the <+> or <-> key. The system prompts you to enter and verify the password. If a character is illegal for password use, the system beeps.

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

You can use up to 32 characters in your password.

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

The password assignment is not case-sensitive. However, certain key combinations are not valid. If you enter one of these combinations, the system beeps. To erase a character when entering your password, press <Backspace> or the left-arrow key.

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

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

Operating With a Setup Password Enabled

If **Setup Password** is set to **Enabled**, you must enter the correct setup password before you can modify most of the System Setup options. When you start the System Setup program, the program prompts you to enter a password.

If you do not enter the correct password in three attempts, the system lets you view, but not modify, the System Setup screens—with the following exception: If **System Password** is not set to **Enabled** and is not locked through the **Password Status** option, you can assign a system password (however, you cannot disable or change an existing system password).

 **NOTE:** You can use the **Password Status** option in conjunction with the **Setup Password** option to protect the system password from unauthorized changes.

Deleting or Changing an Existing Setup Password

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

The setting changes to **Not Enabled**.

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

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Dell™ PowerVault™ 100 Systems Hardware Owner's Manual



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



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



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

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August 2007 P/N CX393 Rev. A00

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Troubleshooting Your System

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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: Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer and protecting against electrostatic discharge.

Start-Up Routine

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

Look/listen for:	Action
A status or error message displayed on the monitor.	See System Messages .
A series of beeps emitted by the system.	See System Beep Codes .
Diagnostic indicator lights indicate a problem.	See Diagnostics Indicator Codes .
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 device activity indicator.	See Troubleshooting a USB Device .
The diskette drive activity indicator.	See Troubleshooting a Diskette Drive .
The optical drive activity indicator.	See Troubleshooting an Optical Drive .
The hard-drive activity indicator.	See Troubleshooting a Hard Drive .
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 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 5-2](#) lists the IRQ assignments.

Table 5-2. IRQ Assignment Defaults

IRQ Line	Assignment
IRQ0	System timer
IRQ1	Keyboard controller

IRQ2	Interrupt controller 1 to enable IRQ8 through IRQ15
IRQ3	Available
IRQ4	Serial port 1 (COM1 and COM3)
IRQ5	Remote access controller
IRQ6	Diskette drive controller
IRQ7	Available
IRQ8	Real-time clock
IRQ9	ACPI functions (used for power management)
IRQ10	<i>Available</i>
IRQ11	<i>Available</i>
IRQ12	PS/2 mouse port unless the mouse is disabled through the System Setup program
IRQ13	Math coprocessor
IRQ14	IDE optical drive controller
IRQ15	<i>Available</i>

Troubleshooting the Video Subsystem

Problem

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

Action

1. Check the system and power connections to the monitor.
2. Determine whether the system has an expansion card with a video output connector.

In this system configuration, the monitor cable should normally be connected to the connector on the expansion card, *not* to the system's integrated video connector.

To verify that the monitor is connected to the correct video connector, turn off the system and wait for 1 minute, then connect the monitor to the other video connector and turn the system on again.

3. Run the appropriate online diagnostic test. See [Running the System Diagnostics](#).

If the tests run successfully, the problem is not related to video hardware.

If the tests fail, see [Getting Help](#).

Troubleshooting the Keyboard

Problem

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

Action

1. If you are using a USB keyboard, enter the System Setup program and ensure that the USB ports are enabled. See [Using the System Setup Program](#).
2. 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](#).

4. Run the appropriate online diagnostic test. See [Using Dell PowerVault Diagnostics](#).

If the problem is not resolved, see [Getting Help](#).

Troubleshooting the Mouse

Problem

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

Action

1. Run the appropriate online diagnostic test. See "Using Server Administrator Diagnostics" in "Running the 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."
If the problem is not resolved, see [Getting Help](#).
-

Troubleshooting Serial I/O Problems

Problem

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

Action

1. Enter the System Setup program and ensure that the serial port is enabled and configured correctly for your application. See [Using the System Setup Program](#).
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 Dell PowerVault Diagnostics](#).
If the tests run successfully but the problem persists, see [Troubleshooting a Serial I/O Device](#).

Troubleshooting a Serial I/O Device

Problem

- 1 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

- 1 System message indicates a problem with a USB device.
- 1 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."
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

- 1 NIC cannot communicate with network.

Action

1. Run the appropriate online diagnostic test. See "Using Server Administrator Diagnostics" in "Running the System Diagnostics."
2. Check the appropriate indicator on the NIC connector. See [NIC Indicator Codes](#).

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

- 1 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.

- 1 Change the autonegotiation setting, if possible.
- 1 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."
 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.
-

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 1-2](#) for the back-panel connectors on your system.

Troubleshooting a Wet System

Problem

- 1 Liquid spilled on the system.
- 1 Excessive humidity.

Action

⚠ CAUTION: Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer and protecting against electrostatic discharge.

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 [Installing an Expansion Card](#).
 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](#).
 8. Run the appropriate online diagnostic test. See [Using Dell PowerVault Diagnostics](#).
If the tests fail, see [Getting Help](#).
-

Troubleshooting a Damaged System

Problem

- 1 System was dropped or damaged.

Action

 **CAUTION:** Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer and protecting against electrostatic discharge.

1. Open the system. See [Opening the System](#).
 2. Ensure that the following components are properly installed:
 - 1 Expansion cards
 - 1 Power supplies
 - 1 Fans
 - 1 Processors and heat sinks
 - 1 Memory modules
 - 1 Drive-carrier connections to the 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 [Using Dell PowerVault Diagnostics](#).
If the tests fail, see [Getting Help](#).
-

Troubleshooting the System Battery

Problem

- 1 System message indicates a problem with the battery.
- 1 System Setup program loses system configuration information.
- 1 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

1. Re-enter the time and date through the System Setup program. See "Using the System Setup Program."
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 Components."

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

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

Action

 **CAUTION:** Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer and protecting against electrostatic discharge.

1. Run the appropriate online diagnostics test. See [Using Dell PowerVault 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 power supply is properly installed by removing and reinstalling it. See [Power Supply](#).

 **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.

5. If the problem is resolved, close the system. See [Closing the System](#).
If the problem persists, remove the faulty power supply. See [Power Supply](#).
 6. Install a new power supply. See [Power Supply](#).
If the problem persists, see [Getting Help](#).
-

Troubleshooting System Cooling Problems

Problem

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

Action

Ensure that none of the following conditions exist:

1. System cover, cooling shroud, drive blank, or front or back filler panel is removed.
1. Ambient temperature is too high.
1. External airflow is obstructed.
1. Cables inside the system obstruct airflow.
1. An individual cooling fan is removed or has failed. See [Troubleshooting a Fan](#).

Troubleshooting a Fan

Problem

1. System-status indicator is amber.
1. Systems management software issues a fan-related error message.
1. Fan status indicator indicates a problem with the fan.

Action

 **CAUTION:** Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer and protecting against electrostatic discharge.

1. Run the appropriate diagnostic test. See [Using Dell PowerVault Diagnostics](#).

2. Open the system. See [Opening the System](#).

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

3. Ensure that the faulty fan's power cable is firmly attached to the fan power connector. For a hot-plug fan, remove and reseat the fan. See [Cooling Fans](#).

 **NOTE:** Wait 30 seconds for the system to recognize the fan and determine whether it is working properly.

4. If the problem is not resolved, install a new fan. See [Cooling Fans](#).

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

1. Faulty memory module.
1. Faulty system board.
1. Front-panel diagnostic lights indicate a problem with system memory.

Action

 **CAUTION:** Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer and protecting against electrostatic discharge.

1. Run the appropriate online diagnostic test. See [Using Dell PowerVault Diagnostics](#).
2. Turn on the system and attached peripherals.
If an error message does not appear, continue to the next step.
If an error messages appears, go to [step 10](#).
3. Enter the System Setup program and check the system memory setting. See [Using the System Setup Program](#).
If the amount of memory installed matches the system memory setting, go to [step 10](#).

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. Reseat the memory modules in their sockets. See [Installing Memory Modules](#).

7. Close the system. See [Closing the System](#).

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

9. Enter the System Setup program and check the system memory setting. See [Using the System Setup Program](#).

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](#).

 **NOTE:** Several configurations for memory modules exist; see [General Memory Module Installation Guidelines](#).

- c. Swap the memory module in socket 1 with another of the same capacity. See [Installing Memory Modules](#).
- d. Close the system. See [Closing the System](#).
- e. Reconnect the system to its electrical outlet, and turn on the system and attached peripherals.

- f. As the system boots, observe the monitor screen and the indicators on the keyboard.
10. 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. Perform step d through step f in step 9 for each memory module installed.

If the problem persists, see [Getting Help](#).

Troubleshooting a Diskette Drive

Problem

- 1 Error message indicates a diskette drive problem.

Action

 **CAUTION:** Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer and protecting against electrostatic discharge.

1. Enter the System Setup program and verify that the diskette drive is configured correctly. See [Using the System Setup Program](#).
2. Remove the bezel. See [Removing the Bezel](#).
3. Run the appropriate online diagnostic test. See [Using Dell PowerVault Diagnostics](#).
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 diskette drive interface cable is securely connected to the diskette drive and the system board.
7. Ensure that a 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. Run the appropriate online diagnostic test to see whether the diskette drive works correctly.
11. Turn off the system and attached peripherals, and disconnect the system from its electrical outlet.
12. Open the system. See [Opening the System](#).
13. Remove all expansion cards installed in the system. See [Removing an Expansion Card](#).
14. Close the system. See [Closing the System](#).
15. Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.
16. 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](#).
17. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
18. Open the system. See [Opening the System](#).
19. Reinstall one of the expansion cards you removed in [step 13](#). See [Installing an Expansion Card](#).

20. Close the system. See [Closing the System](#).
 21. Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.
 22. Run the appropriate online diagnostic test to see whether the diskette drive works correctly.
 23. Repeat [step 17](#) 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 an Optical Drive

Problem

1. System cannot read data from a CD or DVD in an optical drive.
1. Optical drive indicator does not blink during boot.

Action

 **CAUTION:** Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer and protecting against electrostatic discharge.

1. To ensure that the problem is not media-related, try using a different CD or DVD that you know works properly.
 2. Enter the System Setup program and ensure that the drive's IDE controller is enabled. See [Using the System Setup Program](#).
 3. Run the appropriate online diagnostic test. See [Using Dell PowerVault Diagnostics](#).
 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 interface cable is securely connected to the optical drive and to the controller.
 7. Ensure that a 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.
- If the problem is not resolved, see [Getting Help](#).
-

Troubleshooting an External SCSI Tape Drive

Problem

1. Defective tape drive
1. Defective tape cartridge
1. Missing or corrupted tape-backup software or tape drive device driver
1. 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.

3. 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.

4. Run the appropriate online diagnostics tests. See [Using Dell PowerVault Diagnostics](#).
5. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
6. Open the system. See [Opening the System](#).

 **CAUTION:** Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer and protecting against electrostatic discharge.

7. Ensure that the SCSI controller card is firmly seated in its connector. See [Installing an Expansion Card](#).
 8. Ensure that the tape drive's data and power cables are properly connected to the tape drive and SCSI controller card.
 9. Close the system. See [Closing the System](#).
 10. Reconnect the system to its electrical outlet and turn on the system, including attached peripherals.
 11. If the problem is not resolved, see the documentation for the tape drive for additional troubleshooting instructions.
 12. Reinstall the tape backup software as instructed in the tape backup software documentation.
 13. If you cannot resolve the problem, see [Getting Help](#) for information on obtaining technical assistance.
-

Troubleshooting a Hard Drive

Problem

1. Device driver error.
1. One or more hard drives not recognized by the system.

Action

 **CAUTION:** Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer and protecting against electrostatic discharge.

 **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 diagnostics test. See [Using Dell PowerVault Diagnostics](#).
Depending on the results of the diagnostics test, proceed as needed through the following steps.
2. If your system has a SAS RAID controller, perform the following steps.
 - a. Restart the system and press <Ctrl><R> to enter the host adapter configuration utility program.
See the documentation supplied with the host adapter for information about the configuration utility.
 - b. Ensure that the hard drive has been configured correctly for the RAID.
 - c. Exit the configuration utility and allow the system to boot to the operating system.
3. Ensure that the required device drivers for your SAS controller card or SAS RAID controller are installed and are configured correctly. See the operating system documentation for more information.
4. Verify that the controller is enabled and the drives appear in system setup.
5. Check the 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 cable connections between the hard drive(s) and the drive controller are correct, whether the connections are to the SATA connectors on the system board (see [Figure 3-12](#)) or a SAS expansion card (see [Figure 3-13](#)).
- d. Verify that the SAS or SATA cables are securely seated in their connectors.
- e. Close the system. See [Closing the System](#).
- f. Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.

If the problem persists, see [Getting Help](#).

Troubleshooting SATA Hard Drives

Troubleshooting a SATA Hard Drive

Problem

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

Action

 **CAUTION:** Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer and protecting against electrostatic discharge.

 **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."
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 [System Board Connectors](#).
6. If the hard drive is the boot drive, ensure that the drive is configured and connected properly. See [Configuring the Boot Drive](#)."
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. 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 SATA Hard Drive in a RAID Configuration

Problem

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

Action

 **CAUTION:** Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer and protecting against electrostatic discharge.

 **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 Dell PowerVault Diagnostics](#).
2. Ensure that the required device drivers are installed and are configured correctly. See the RAID controller's documentation.
3. Restart your system and enter the RAID configuration utility (Ctrl+R) to verify that the controller is configured properly. See the RAID controller documentation.
4. If the problem persists, continue to the next step.
5. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
6. Open the system. See [Opening the System](#).
7. If the hard drive is the boot drive, ensure that the drive is configured and connected properly. See [Configuring the Boot Drive](#).
8. 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.
9. Ensure that the power cable is properly connected to the drive.
10. Close the system. See [Closing the System](#).
11. Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.
If the problem persists, continue to the next step.
12. Format and partition the hard drive. See the operating system documentation.
13. If possible, restore the files to the drive.
If the problem persists, see [Getting Help](#).

Troubleshooting a SAS RAID Controller

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

Problem

- 1 Error message indicates a problem with the SAS RAID controller.
- 1 SAS RAID controller performs incorrectly or not at all.

Action

 **CAUTION:** Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer and protecting against electrostatic discharge.

1. Run the appropriate online diagnostic test. See [Using Dell PowerVault Diagnostics](#).
2. Enter the System Setup program and ensure that the SAS RAID controller is enabled and drivers are loaded. See [Using the System Setup Program](#).

3. Restart the system and press the applicable key sequence to enter the configuration utility program:
 - 1 <Ctrl><C> for a SAS controller
 - 1 <Ctrl><R> for a SAS RAID controllerSee the controller's documentation for information about configuration settings.
 4. Check the configuration settings, make any necessary corrections, and restart the system.

If the problem is not resolved, continue to the next step.
 5. Remove the bezel. See [Removing the Bezel](#).
 6. Turn off the system and attached peripherals, and disconnect the system from its electrical outlet.
 7. Open the system. See [Opening the System](#).
 8. Ensure that the controller card is firmly seated into the system board connector.
 9. If you have a SAS RAID controller, ensure that the following RAID components are properly installed and connected:
 - 1 Memory module
 - 1 Battery
 10. Verify that the cable connections between the SAS backplane(s) and the SAS controller are correct. See [Removing a Hot-Plug SAS or SATA Hard Drive](#).
 11. Ensure that the cables are firmly connected to the SAS controller, the SAS backplane board and, if applicable, the 1x2 expansion backplane.
 12. Close the system. See [Closing the System](#).
 13. Reconnect the system to its electrical outlet, and turn on the system and attached peripherals. If the problem persists, see [Getting Help](#).
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Troubleshooting Expansion Cards

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

Problem

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

Action

 **CAUTION:** Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer and protecting against electrostatic discharge.

1. Run the appropriate online diagnostic test. See [Using Dell PowerVault Diagnostics](#).
2. Open or remove the bezel. See [Removing the Bezel](#).
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 each expansion card is firmly seated in its connector. See [Installing an Expansion 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, go 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 all expansion cards installed in the system. See "Removing an Expansion Card" in "Installing System Components."
 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 fail, see [Getting Help](#).
 14. For each expansion card you removed in [step 10](#), 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](#).
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Troubleshooting the Microprocessor

Problem

1. Error message indicates a microprocessor problem.
1. A heat sink is not installed for the processor.

Action

 **CAUTION:** Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. Before performing any procedure, see your *Product Information Guide* for complete information about safety precautions, working inside the computer and protecting against electrostatic discharge.

1. If possible, run the appropriate online diagnostics test.
 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 processor and heat sink are properly installed. See [Installing a Processor](#).
 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, see [Getting Help](#).
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