




Dell™ PowerVault™ NX1950 Systems Hardware Owner's Manual

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Model EMU01

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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About Your System

Dell™ PowerVault™ NX1950 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 LCD status messages
- 1 System messages
- 1 Warning messages
- 1 Diagnostics messages
- 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 *Rack Installation Guide* or *Rack Installation Instructions* included with your rack solution describes how to install your system into a rack.
- 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 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 the Dell Support website at 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>	Enters the System Diagnostics program. 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>	This keystroke allows access to selected Dell remote access controller (DRAC) configuration settings. See the DRAC <i>User's Guide</i> for more information on setup and use of DRAC.

Front-Panel Features and Indicators

Figure 1-1 shows the controls, indicators, and connectors located behind the optional rack bezel on the system's front panel.

Figure 1-1. Front-Panel Features and Indicators

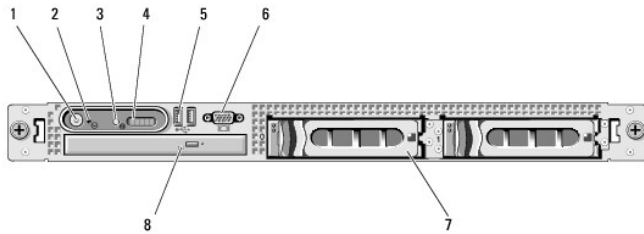


Table 1-2. Front-Panel LED Indicators, Buttons, and Connectors

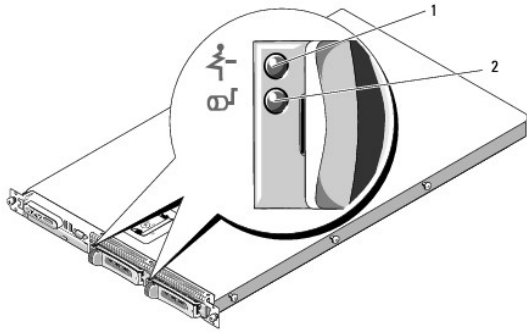
Item	Indicator, Button, or Connector	Icon	Description
1	Power-on indicator, power button		The power button controls the DC power supply output to the system. NOTE: If you turn off the system using the power button and the system is running an ACPI-compliant operating system, the system performs a graceful shutdown before the power is turned off. If the system is not running an ACPI-compliant operating system, the power is turned off immediately after the power button is pressed.
2	NMI button		Used to troubleshoot software and device driver errors when using certain operating systems. This button can be pressed using the end of a paper clip. Use this button only if directed to do so by qualified support personnel or by the operating system's documentation.
3	System identification button		The identification buttons on the front and back panels can be used to locate a particular system within a rack. When one of these buttons is pushed, the blue system status indicator on the front and back blinks until one of the buttons is pushed again.
4	LCD display		Provides system ID, status information, and system error messages. The LCD display lights during normal system operation. Both the systems management software and the identification buttons located on the front and back of the system can cause the LCD to flash blue to identify a particular system. The LCD display lights amber when the system needs attention due to a problem with power supplies, fans, system temperature, or hard drives. NOTE: If the system is connected to AC power and an error has been detected, the LCD display lights amber regardless of whether the system has been powered on.
5	USB connectors (2)		Connects USB 2.0-compliant devices to the system.
6	Video connector		Connects a monitor to the system.
7	Hard drives		Two 3.5" drives.
8	Optical drive		One slimline optical drive.

NOTE: DVD devices are data only.

Hard-Drive Indicator Codes

Your hard drives are configured with the SAS RAID daughter card. Two indicators on each of the hard-drive carriers provide information on the status of the hard drives. See [Figure 1-2](#) and [Table 1-3](#). The SAS backplane firmware controls the drive power-on/fault indicator.

Figure 1-2. Hard-Drive Indicators



1	drive-status indicator (green and amber)	2	green drive-activity indicator
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Table 1-3 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.

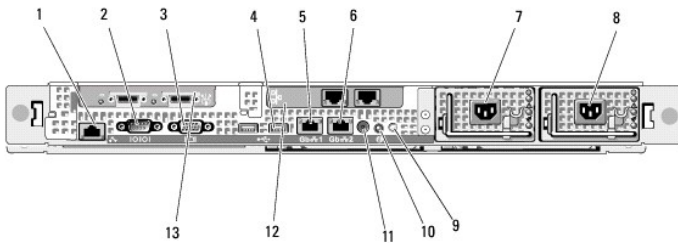
Table 1-3. Hard-Drive Indicator Patterns for RAID

Condition	Drive-Status Indicator Pattern
Identify drive/preparing for removal	Blinks green two times per second.
Drive ready for insertion or removal	Off
Drive predicted failure	Blinks green, amber, and off.
Drive failed	Blinks amber four times per second.
Drive rebuilding	Blinks green slowly.
Drive online	Steady green.
Rebuild aborted	Blinks green three seconds, amber three seconds, and off six seconds.

Back-Panel Features and Indicators

Figure 1-3 shows the controls, indicators, and connectors located on the system's back panel.

Figure 1-3. Back-Panel Features and Indicators



1	remote access controller	2	serial connector	3	video connector
4	USB connectors (2)	5	NIC1 connector	6	NIC2 connector
7	power supply 1	8	power supply 2	9	system status indicator
10	system identification button	11	system status indicator connector	12	NIC 3 and 4 connectors
13	data storage controller - SAS or FC HBA (gateway configurations)				

Connecting External Devices

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

- 1 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.
- 1 Always attach external devices while your system is turned off. Next, turn on any external devices before turning on the system (unless the documentation for the device specifies otherwise).

For information about individual connectors, see [Jumpers and Connectors](#). For information about enabling, disabling, and configuring I/O ports and connectors, see [Using the System Setup Program](#).

Power Indicator Codes

The power button on the front panel controls the power input to the system's power supplies. The power indicator can provide information on power status (see [Figure 1-1](#)). [Table 1-4](#) lists the power button indicator codes.

Table 1-4. Power Button Indicators

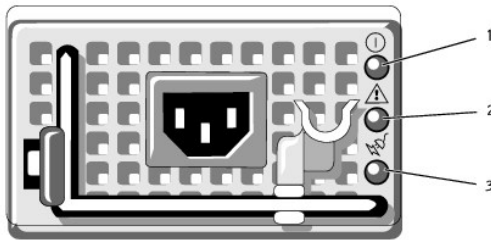
Indicator	Function
On	Indicates that power is supplied to the system and the system is operational.
Off	Indicates that no power is supplied to the system.

The indicators on the power supplies show whether power is present or whether a power fault has occurred (see [Figure 1-4](#)).

Table 1-5. Power Supply Indicators

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

Figure 1-4. Power Supply Indicators

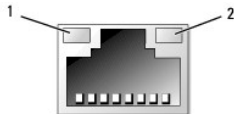


1	power supply status indicator	2	power supply fault indicator	3	AC line status indicator
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NIC Indicator Codes

Each NIC on the back panel has an indicator that provides information on network activity and link status. See [Figure 1-5](#). [Table 1-6](#) lists the NIC indicator codes.

Figure 1-5. NIC Indicators



1	link indicator	2	activity indicator
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Table 1-6. NIC Indicator Codes


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

LCD Status Messages

The system's control panel LCD provides status messages to signify when the system is operating correctly or when the system needs attention.

The LCD lights blue to indicate a normal operating condition, and lights amber to indicate an error condition. The LCD scrolls a message that includes a status code followed by descriptive text. [Table 1-7](#) lists the LCD status messages that can occur and the probable cause for each message. The LCD messages refer to events recorded in the System Event Log (SEL). For information on the SEL and configuring system management settings, see the systems management software documentation.

 **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.


 **NOTE:** If your system fails to boot, press the System ID button for at least five seconds until an error code appears on the LCD. Record the code, then see [Getting Help](#).

Table 1-7. LCD Status Messages

Code	Text	Causes	Corrective Actions
N/A	<i>SYSTEM NAME</i>	A 62-character string that can be defined by the user in the System Setup program. The <i>SYSTEM NAME</i> displays under the following conditions: <ul style="list-style-type: none"> 1 The system is powered on. 1 The power is off and active POST errors are displayed. 	This message is for information only. You can change the system string in the System Setup program. See Using the System Setup Program .
E1000	FAILSAFE, Call Support		See Getting Help .
E1114	Temp Ambient	Ambient system temperature is out of acceptable range.	See Troubleshooting System Cooling Problems .
E1116	Temp Memory	Memory has exceeded acceptable temperature and has been disabled to prevent damage to the components.	See Troubleshooting System Cooling Problems .
E12nn	xx PwrGd	Specified voltage regulator has failed.	See Getting Help .
E1210	CMOS Batt	CMOS battery is missing, or the voltage is out of acceptable range.	See Troubleshooting the System Battery .
E1211	ROMB Batt	RAID battery is either missing, bad, or unable to recharge due to thermal issues.	Reseat the RAID battery connector. See RAID Battery , and Troubleshooting System Cooling Problems .
E1229	CPU # VCORE	Processor # VCORE voltage regulator has failed.	See Getting Help .
E1310	RPM Fan ##	RPM of specified cooling fan is out of acceptable operating range.	See Troubleshooting System Cooling Problems .
E1311	RPM Fan Mod #x	RPM of fan x in the # module is out of acceptable operating range.	See Troubleshooting System Cooling Problems .
E1313	Fan Redundancy	The system is no longer fan-redundant. Another fan failure will put the system at risk of over-heating.	Check control panel LCD for additional scrolling messages. See Troubleshooting System Cooling Problems .
E1410	CPU # IERR	Specified microprocessor is reporting an internal error.	See your system's "Information Update Tech Sheet" located on support.dell.com for the most current system information. If the problem persists, see Getting Help .
E1414	CPU # Thermtrip	Specified microprocessor is out of acceptable temperature range and has halted operation.	See Troubleshooting System Cooling Problems . If the problem persists, ensure that the microprocessor heat sinks are properly installed. See Troubleshooting the Microprocessors . NOTE: The LCD continues to display this message until the system's power cord is disconnected and reconnected to the AC power source, or the SEL is cleared using either Server Assistant or the BMC Management Utility. See the <i>Dell™ OpenManage™ Baseboard Management Controller User's Guide</i> for information about these utilities.
E1418	CPU # Presence	Specified processor is missing or bad, and the system is in an unsupported configuration.	See Troubleshooting the Microprocessors .
E141C	CPU Mismatch	Processors are in a configuration unsupported by Dell.	See System Memory . Ensure that your processors match and conform to the type described in the Microprocessor Technical Specifications outlined in your system's <i>Getting Started Guide</i> .
E141F	CPU Protocol	The system BIOS has reported a processor protocol error.	See Getting Help .
E1420	CPU Bus PERR	The system BIOS has reported a processor bus parity error.	See Getting Help .
E1421	CPU Init	The system BIOS has reported a processor initialization	See Getting Help .

		error.	
E1422	CPU Machine Chk	The system BIOS has reported a machine check error.	See Getting Help .
E1610	PS # Missing	No power is available from the specified power supply; specified power supply is improperly installed or faulty.	See Troubleshooting Power Supplies .
E1614	PS # Status	No power is available from the specified power supply; specified power supply is improperly installed or faulty.	See Troubleshooting Power Supplies .
E1618	PS # Predictive	Power supply voltage is out of acceptable range; specified power supply is improperly installed or faulty.	See Troubleshooting Power Supplies .
E161C	PS # Input Lost	Power source for specified power supply is unavailable, or out of acceptable range.	Check the AC power source for the specified power supply. If the problem persists, see Troubleshooting Power Supplies .
E1620	PS # Input Range	Power source for specified power supply is unavailable, or out of acceptable range.	Check the AC power source for the specified power supply. If the problem persists, see Troubleshooting Power Supplies .
E1624	PS Redundancy	The power supply subsystem is no longer redundant. If the last supply fails, the system will go down.	See Troubleshooting Power Supplies .
E1710	I/O Channel Chk	The system BIOS has reported an I/O channel check.	See Getting Help .
E1711	PCI PERR B## D## F## PCI PERR Slot #	The system BIOS has reported a PCI parity error on a component that resides in PCI configuration space at bus ##, device ##, function ##. The system BIOS has reported a PCI parity error on a component that resides in the specified PCI slot.	Remove and reseat the PCI expansion cards. If the problem persists, see Troubleshooting Expansion Cards . If the problem persists, the riser card or system board is faulty. See Getting Help .
E1712	PCI SERR B## D## F## PCI SERR Slot #	The system BIOS has reported a PCI system error on a component that resides in PCI configuration space at bus ##, device ##, function ##. The system BIOS has reported a PCI system error on a component that resides in the specified slot.	Remove and reseat the PCI expansion cards. If the problem persists, see Getting Help . If the problem persists, the riser card or system board is faulty. See Getting Help .
E1714	Unknown Err	The system BIOS has determined that there has been an error in the system, but is unable to determine its origin.	See Getting Help .
E171F	PCIE Fatal Err B## D## F## PCIE Fatal Err Slot #	The system BIOS has reported a PCIe fatal error on a component that resides in PCI configuration space at bus ##, device ##, function ##. The system BIOS has reported a PCIe fatal error on a component that resides in the specified slot.	Remove and reseat the PCI expansion cards. If the problem persists, see Troubleshooting Expansion Cards . If the problem persists, the riser card or system board is faulty. See Getting Help .
E1810	HDD ## Fault	The SAS subsystem has determined that hard drive ## has experienced a fault.	See Troubleshooting a Hard Drive .
E1811	HDD ## Rbld Abrt	The specified hard drive has experienced a rebuild abort.	See Troubleshooting a Hard Drive . If the problem persists, see your RAID documentation.
E1812	HDD ## Removed	The specified hard drive has been removed from the system.	Information only.
E1913	CPU & Firmware Mismatch	The BMC firmware does not support the CPU.	Update to the latest BMC firmware. See the <i>BMC User's Guide</i> for more information on setup and use of BMC.
E1A14	SAS Cable A	SAS cable A is missing or bad.	Reseat the cable. If the problem persists, replace the cable. See SAS Controller Daughter Card .
E1A15	SAS Cable B	SAS cable B is missing or bad.	Reseat the cable. If the problem persists, replace the cable. See SAS Controller Daughter Card .
E1A17	Pwr Cable FB	Flex bay power cable is missing or bad.	Reseat the cable. If the problem persists, replace the cable. See SAS Controller Daughter Card .
E1A18	PDB Ctrl Cable	Flex bay control signals cable is missing or bad.	Reseat the cable. If the problem persists, replace the cable. See SAS Controller Daughter Card .
E2010	No Memory	No memory is installed in the system.	Install memory. See Installing Memory Modules .
E2011	Mem Config Err	Memory detected, but is not configurable. Error detected during memory configuration.	See Troubleshooting System Memory .
E2012	Unusable Memory	Memory is configured, but not usable. Memory subsystem failure.	See Troubleshooting System Memory .
E2013	Shadow BIOS Fail	The system BIOS failed to copy its flash image into memory.	See Troubleshooting System Memory .
E2014	CMOS Fail	CMOS failure. CMOS RAM not functioning properly.	See Getting Help .
E2015	DMA Controller	DMA controller failure.	See Getting Help .
E2016	Int	Interrupt controller failure.	See Getting Help .

	Controller		
E2017	Timer Fail	Timer refresh failure.	See Getting Help .
E2018	Prog Timer	Programmable interval timer error.	See Getting Help .
E2019	Parity Error	Parity error.	See Getting Help .
E201A	SIO Err	SIO failure.	See Getting Help .
E201B	Kybd Controller	Keyboard controller failure.	See Getting Help .
E201C	SMI Init	System management interrupt (SMI) initialization failure.	See Getting Help .
E201D	Shutdown Test	BIOS shutdown test failure.	See Getting Help .
E201E	POST Mem Test	BIOS POST memory test failure.	See Troubleshooting System Memory . If the problem persists, see Getting Help .
E201F	DRAC Config	Dell remote access controller (DRAC) configuration failure.	Check for specific error messages. Ensure that DRAC cables and connectors are properly seated. If the problem persists, see your DRAC documentation.
E2020	CPU Config	CPU configuration failure.	Check for specific error messages.
E2021	Memory Population	Incorrect memory configuration. Memory population order incorrect.	Check for specific error messages. See Troubleshooting System Memory .
E2022	POST Fail	General failure after video.	Check for specific error messages.
E2110	MBE Crd # DIMM ## & ##	One of the DIMMs in the set implicated by "## & ##" has had a memory multi-bit error (MBE). If no memory card is present, the "Crd #" string is left out of the message.	See Troubleshooting System Memory .
E2111	SBE Log Disable Crd # DIMM ##	The system BIOS has disabled memory single-bit error (SBE) logging, and will not resume logging further SBEs until the system is rebooted. "##" represents the DIMM implicated by the BIOS. If no memory riser card is present, the "Crd #" string is left out of the message.	See Troubleshooting System Memory .
E2112	Mem Spare Crd # DIMM ##	The system BIOS has spared the memory because it has determined that the memory had too many errors. "## & ##" represents the DIMM pair implicated by the BIOS. If no memory card is present, the "Crd #" string is left out of the message.	See Troubleshooting System Memory .
E2113	Mem Mirror Crd # DIMM ## & ##	The system BIOS has disabled memory mirroring because it has determined that one half of the mirror has had too many errors. "## & ##" represents the DIMM pair implicated by the BIOS. If no memory card is present, the "Crd #" string is left out of the message.	See Troubleshooting System Memory .
E2118	Fatal NB Mem CRC	One of the connections in the FBD memory subsystem link on the Northbound side has failed.	See Troubleshooting System Memory .
E2119	Fatal SB Mem CRC	One of the connections in the FBD memory subsystem link on the Southbound side has failed.	See Troubleshooting System Memory .
I1910	Intrusion	System cover has been removed.	Information only.
I1911	>3 ERRs Chk Log	LCD overflow message. A maximum of three error messages can display sequentially on the LCD. The fourth message displays as the standard overflow message.	Check the SEL for details on the events.
I1912	SEL Full	System Event Log is full of events, and is unable to log any more events.	Clear the log by deleting event entries.
W1228	ROMB Batt < 24hr	Warns predictively that the RAID battery has less than 24 hours of charge left.	Replace RAID battery. See RAID Battery .

NOTE: For the full name of an abbreviation or acronym used in this table, see the [Glossary](#).

Solving Problems Described by LCD Status Messages

The code and text on the LCD can often specify a very precise fault condition that is easily corrected. For example, if the code E1418 CPU_1_Presence appears, you know that a microprocessor is not installed in socket 1.

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

Removing LCD Status Messages

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

- 1 Clear the SEL — You can perform this task remotely, but you will lose the event history for the system.
- 1 Power cycle — Turn off the system and disconnect it from the electrical outlet; wait approximately ten seconds, reconnect the power cable, and restart the system.

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

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

System Messages

System messages appear on the screen to notify you of a possible problem with the system. [Table 1-8](#) lists the system messages that can occur and the probable cause and corrective action for each message.

⚠ 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.

🔍 NOTE: If you receive a system message that is not listed in [Table 1-8](#), 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 1-8. System Messages


Message	Causes	Corrective Actions
Alert! Redundant memory disabled! Memory configuration does not support redundant memory.	Installed memory modules are not the same type and size; faulty memory module(s).	Ensure that all memory modules are of the same type and size and that they are properly installed. If the problem persists, see Troubleshooting System Memory .
Attempting to update Remote Configuration. Please wait...	Remote Configuration request has been detected and is being processed.	Wait until the process is complete.
BIOS Update Attempt Failed!	Remote BIOS update attempt failed.	Retry the BIOS update. If the problem persists, see Getting Help .
Caution! NVRAM_CLR jumper is installed on system board.	NVRAM_CLR jumper is installed. CMOS has been cleared.	Remove NVRAM_CLR jumper. See Figure 6-1 for jumper location.
CPUs with different cache sizes detected!	Microprocessors with different cache sizes are installed.	Ensure that all microprocessors have the same cache size and that they are properly installed. See Processors .
Decreasing available memory	Faulty or improperly installed memory modules.	See Troubleshooting System Memory .
DIMM pairs must be matched in size, speed, and technology. The following DIMM pair is mismatched: DIMM x and DIMM y.	Mismatched or unmatched DIMMs installed; faulty or improperly seated memory module(s).	Ensure that all pairs of memory modules are of the same type and size and that they are properly installed. See System Memory . If the problem persists, see Troubleshooting System Memory .
DIMMs must be populated in sequential order beginning with slot 1. The following DIMM is electrically isolated: DIMM x.	The specified DIMM is inaccessible to the system due to its location. DIMMs must be populated in sequential order, beginning with slot 1.	Populate 2, 4, 8, or 12 DIMMs sequentially beginning with slot 1. See System Memory .
DIMMs should be installed in pairs. Pairs must be matched in size, speed, and technology.	Mismatched or unmatched DIMMs installed; faulty or improperly seated memory module(s). The system will operate in a degraded mode with reduced ECC protection. Only memory installed in channel 0 will be accessible.	Ensure that all pairs of memory modules are of the same type and size and that they are properly installed. See System Memory . If the problem persists, see Troubleshooting System Memory .
Dual-rank DIMM paired with Single-rank DIMM - The following DIMM/rank has been disabled by BIOS: DIMM x Rank y	Mismatched DIMMs installed; faulty memory module(s). The system has detected a dual-rank DIMM paired with a single-rank DIMM. The second rank of the dual-rank DIMM will be disabled.	Ensure that all pairs of memory modules are of the same type and size and that they are properly installed. See System Memory . If the problem persists, see Troubleshooting System Memory .
Error: Incorrect memory configuration. DIMMs must be installed in pairs of matched memory size, speed, and technology.	Mismatched or unmatched DIMMs installed; faulty or improperly seated memory module(s).	Ensure that all pairs of memory modules are of the same type and size and that they are properly installed. See System Memory . If the problem persists, see Troubleshooting System Memory .
Error: Memory failure detected. Memory size reduced. Replace the faulty DIMM as soon as possible.	Faulty or improperly seated memory module(s).	See Troubleshooting System Memory .
!!*** Error: Remote Access Controller initialization failure*** RAC virtual USB devices may not be available...	Remote Access Controller initialization failure.	Ensure that the Remote Access Controller is properly installed. See RAC Card .
FBD training error: The following branch has been disabled: Branch x	The specified branch (channel pair) contains DIMMs that are incompatible with each other.	Ensure that only Dell-qualified memory is used. Dell recommends purchasing memory upgrade kits directly from www.dell.com or your Dell sales agent to ensure compatibility.
Gate A20 failure	Faulty keyboard controller; faulty system board.	See Getting Help .
General failure	The operating system is unable to carry out the command.	This message is usually followed by specific information. Note the information, and take the appropriate action to resolve the problem.
Invalid NVRAM configuration, Resource Re-allocated	System detected and corrected a resource conflict.	No action is required.

Keyboard Controller failure	Faulty keyboard controller; faulty system board	See Getting Help .
Manufacturing mode detected	System is in manufacturing mode.	Reboot to take the system out of manufacturing mode.
MEMBIST failure - The following DIMM/rank has been disabled by BIOS: DIMM x Rank y	Faulty memory module(s).	See Troubleshooting System Memory .
Memory address line failure at address, read value expecting value	Faulty or improperly installed memory modules.	See Troubleshooting System Memory .
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		
Memory tests terminated by keystroke.	POST memory test terminated by pressing the spacebar.	Information only.
No boot device available	Faulty or missing optical drive subsystem, hard drive, or hard-drive subsystem, or no boot disk in drive A.	Use a CD or hard drive. If the problem persists, see Troubleshooting an Optical Drive and Troubleshooting a Hard Drive . See Using the System Setup Program for information on setting the order of boot devices.
No boot sector on hard drive	Incorrect configuration settings in System Setup program, or no operating system on hard drive.	Check the hard-drive configuration settings in the System Setup program. See Using the System Setup Program . If necessary, install the operating system on your hard drive. See your operating system documentation.
No timer tick interrupt	Faulty system board.	See " Getting Help ."
Northbound merge error - The following DIMM has been disabled by BIOS: DIMM x	The specified DIMM was unable to establish a successful data link with the memory controller.	See Troubleshooting System Memory .
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 in the specified slot.	Reseat the PCIe card in the specified slot number. See Expansion-Card Riser . 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.	Reseat the PCIe card in the specified slot number. See Expansion-Card Riser . If the problem persists, see Getting Help .
PCIe Training Error: Embedded Bus#nn/Dev#nn/Funcn 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-Card Riser . If the problem persists, see Getting Help .
PCI BIOS failed to install	PCI device BIOS (Option ROM) checksum failure is detected during shadowing. Loose cables to expansion card(s); faulty or improperly installed expansion card(s).	Reseat the expansion card(s). Ensure that all appropriate cables are securely connected to the expansion card(s). If the problem persists, see Troubleshooting Expansion Cards .
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. If the problem persists, see Troubleshooting Expansion Cards .
Read fault Requested sector not found	The operating system cannot read from the diskette or hard drive, the system could not find a particular sector on the disk, or the requested sector is defective.	Replace the diskette. Ensure that the diskette and hard drive cables are properly connected. See Troubleshooting Expansion Cards , or Troubleshooting a Hard Drive for the appropriate drive(s) installed in your system.
Remote configuration update attempt failed	System unable to process Remote Configuration request.	Retry Remote Configuration.
ROM bad checksum = address	Expansion card improperly installed or faulty.	Reseat the expansion card(s). Ensure that all appropriate cables are securely connected to the expansion card(s). If the problem persists, see Troubleshooting Expansion Cards .
Sector not found Seek error Seek operation failed	Faulty diskette or hard drive.	See Troubleshooting a Hard Drive for the appropriate drive(s) installed in your system.
Shutdown failure	Shutdown test failure.	See Troubleshooting System Memory .
The amount of system memory has changed	Memory has been added or removed or a memory module may be faulty.	If memory has been added or removed, this message is informative and can be ignored. If memory has not been added or removed, check the SEL to determine if single-bit or multi-bit errors were detected and replace the faulty memory module. See Troubleshooting System Memory .
Time-of-day clock stopped	Faulty battery or faulty chip.	See Troubleshooting the System Battery .
The following DIMM pair is not compatible with the memory controller: DIMM x and DIMM y	The specified DIMM(s) are incompatible with the system.	Ensure that only Dell-qualified memory is used. Dell recommends purchasing memory upgrade kits directly from www.dell.com or your Dell sales agent to ensure compatibility.

The following DIMMs are not compatible: DIMM x and DIMM y	The specified DIMM(s) are incompatible with the system.	Ensure that only ECC FBD1 memory is used. Dell recommends purchasing memory upgrade kits directly from www.dell.com or your Dell sales agent to ensure compatibility.
Time-of-day not set - please run SETUP program	Incorrect Time or Date settings; faulty system battery.	Check the Time and Date settings. See Using the System Setup Program . If the problem persists, replace the system battery. See System Battery .
Timer chip counter 2 failed	Faulty system board.	See Getting Help .
Unsupported CPU combination	Microprocessor(s) is not supported by the system.	Install a supported microprocessor or microprocessor combination. See Processors .
Unsupported CPU stepping detected		
Utility partition not available	The <F10> key was pressed during POST, but no utility partition exists on the boot hard drive.	Create a utility partition on the boot hard drive. See the CDs that came with your system.

Warning Messages

A warning message alerts you to a possible problem and prompts you to respond before the system continues a task. For example, before you format a diskette, a message will warn you that you may lose all data on the diskette. Warning messages usually interrupt the task and require you to respond by typing **y** (yes) or **n** (no).

 **NOTE:** Warning messages are generated by either the application or the operating system. For more information, see 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.

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Running the System Diagnostics

Dell™ PowerVault™ NX1950 Systems Hardware Owner's Manual

- [Using Server Administrator Diagnostics](#)
- [System Diagnostics Features](#)
- [When to Use the System Diagnostics](#)
- [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 Server Administrator Diagnostics

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

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

System Diagnostics Features

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

- 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.
-

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 is run from the utility partition on your hard drive.

- ➔ **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).

1. As the system boots, press <F10> during POST.
2. From the utility partition main menu, select **Run System Diagnostics**, or select **Run Memory Diagnostics** if you are troubleshooting memory.

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

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

System Diagnostics Testing Options

Click the testing option in the **Main Menu** window. [Table 5-1](#) provides a brief explanation of testing options.

Table 5-1. 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.

Viewing Information and Results

The tabs in the **Customize** window provide information about the test and the test results. The following tabs are available:

- 1 **Results** — Displays the test that ran and the result.
- 1 **Errors** — Displays any errors that occurred during the test.
- 1 **Help** — Displays information about the currently selected device, component, or test.
- 1 **Configuration** — Displays basic configuration information about the currently selected device.
- 1 **Parameters** — If applicable, displays parameters that you can set for the test.

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Getting Help

Dell™ PowerVault™ NX1950 Systems Hardware Owner's Manual

- [Technical Assistance](#)
 - [Dell Enterprise Training and Certification](#)
 - [Problems With Your Order](#)
 - [Product Information](#)
 - [Returning Items for Warranty Repair or Credit](#)
 - [Before You Call](#)
 - [Contacting Dell](#)
-


Technical Assistance


If you need assistance with a technical problem, perform the following steps:

1. Complete the procedures in [Troubleshooting Your System](#).
2. Run the system diagnostics and record any information provided.
3. Make a copy of the [Diagnostics Checklist](#), and fill it out.
4. Use Dell's extensive suite of online services available at Dell™ Support at support.dell.com for help with installation and troubleshooting procedures.

For more information, see [Online Services](#).


5. If the preceding steps have not resolved the problem, call Dell for technical assistance.

 **NOTE:** Call technical support from a phone near or at the system so that technical support can assist you with any necessary procedures.

 **NOTE:** Dell's Express Service Code system may not be available in all countries.

When prompted by Dell's automated telephone system, enter your Express Service Code to route the call directly to the proper support personnel. If you do not have an Express Service Code, open the **Dell Accessories** folder, double-click the **Express Service Code** icon, and follow the directions.

For instructions on using the technical support service, see [Technical Support Service](#) and [Before You Call](#).

 **NOTE:** Some of the following services are not always available in all locations outside the continental U.S. Call your local Dell representative for information on availability.

Online Services

You can access Dell Support at support.dell.com. Select your region on the **WELCOME TO DELL SUPPORT** page, and fill in the requested details to access help tools and information.

You can contact Dell electronically using the following addresses:

- 1 World Wide Web

www.dell.com/

www.dell.com/ap/ (Asian/Pacific countries only)

www.dell.com/jp (Japan only)

www.euro.dell.com (Europe only)

www.dell.com/la (Latin American countries)

www.dell.ca (Canada only)

- 1 Anonymous file transfer protocol (FTP)

ftp.dell.com/

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

- 1 Electronic Support Service

support@us.dell.com

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

support.jp.dell.com (Japan only)

support.euro.dell.com (Europe only)

1 Electronic Quote Service

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

sales_canada@dell.com (Canada only)

AutoTech Service

Dell's automated technical support service—AutoTech—provides recorded answers to the questions most frequently asked by Dell customers about their portable and desktop computer systems.

When you call AutoTech, use your touch-tone telephone to select the subjects that correspond to your questions.

The AutoTech service is available 24 hours a day, 7 days a week. You can also access this service through the technical support service. See the contact information for your region.

Automated Order-Status Service

To check on the status of any Dell products that you have ordered, you can go to the Dell Support website at support.dell.com, or you can call the automated order-status service. A recording prompts you for the information needed to locate and report on your order. See the contact information for your region.

Technical Support Service

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

To contact Dell's technical support service, see [Before You Call](#) and then see the contact information for your region.

Dell Enterprise Training and Certification

Dell Enterprise Training and Certification is available; see www.dell.com/training for more information. This service may not be offered in all locations.

Problems With Your Order

If you have a problem with your order, such as missing parts, wrong parts, or incorrect billing, contact Dell for customer assistance. Have your invoice or packing slip available when you call. See the contact information for your region.

Product Information

If you need information about additional products available from Dell, or if you would like to place an order, visit the Dell website at www.dell.com. For the telephone number to call to speak to a sales specialist, see the contact information for your region.

Returning Items for Warranty Repair or Credit

Prepare all items being returned, whether for repair or credit, as follows:

1. Call Dell to obtain a Return Material Authorization Number, and write it clearly and prominently on the outside of the box.

For the telephone number to call, see the contact information for your region.

2. Include a copy of the invoice and a letter describing the reason for the return.
3. Include a copy of any diagnostic information (including the Diagnostics Checklist) indicating the tests you have run and any error messages reported by the system diagnostics.
4. Include any accessories that belong with the item(s) being returned (such as power cables, media such as CDs and diskettes, and guides) if the return is for credit.

- Pack the equipment to be returned in the original (or equivalent) packing materials.


You are responsible for paying shipping expenses. You are also responsible for insuring any product returned, and you assume the risk of loss during shipment to Dell. Collect-on-delivery (C.O.D.) packages are not accepted.

Returns that are missing any of the preceding requirements will be refused at our receiving dock and returned to you.

Before You Call

NOTE: Have your Express Service Code ready when you call. The code helps Dell's automated-support telephone system direct your call more efficiently.

Remember to fill out the [Diagnostics Checklist](#). If possible, turn on your system before you call Dell for technical assistance and call from a telephone at or near the computer. You may be asked to type some commands at the keyboard, relay detailed information during operations, or try other troubleshooting steps possible only at the computer system itself. Ensure that the system documentation is available.

 **CAUTION:** Before servicing any components inside your computer, see your *Product Information Guide* for important safety information.


Diagnostics Checklist
Name:
Date:
Address:
Phone number:
Service Tag (bar code on the back of the computer):
Express Service Code:
Return Material Authorization Number (if provided by Dell support technician):
Operating system and version:
Peripherals:
Expansion cards:
Are you connected to a network? Yes No
Network, version, and network card:
Programs and versions:
See your operating system documentation to determine the contents of the system's start-up files. If possible, print each file. Otherwise, record the contents of each file before calling Dell.
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	Department Name or Service Area, Website and E-Mail Address	Area Codes, Local Numbers, and Toll-Free Numbers
--	--	--

Anguilla	Website: www.dell.com.ai	
	E-mail: la-techsupport@dell.com	
	Technical Support	toll-free: 800-335-0031
Antigua and Barbuda	Website: www.dell.com.ag	
	E-mail: la-techsupport@dell.com	
	Technical Support	1-800-805-5924
Aomen	Technical Support (Dell Dimension™, Dell Inspiron™, Dell OptiPlex™, Dell Latitude™, and Dell Precision™)	0800-105
	Technical Support (servers and storage)	0800-105
Argentina (Buenos Aires) International Access Code: 00 Country Code: 54 City Code: 11	Website: www.dell.com.ar	
	E-mail: la-techsupport@dell.com	
	E-mail for desktop and portable computers: la-techsupport@dell.com	
	E-mail for servers and EMC® storage products: la_enterprise@dell.com	
	Customer Care	toll-free: 0-800-444-0730
	Technical Support	toll-free: 800-222-0154
	Technical Support Services	toll-free: 0-800-444-0724
Sales	0-810-444-3355	
Aruba	Website: www.dell.com.aw	
	E-mail: la-techsupport@dell.com	
	Technical Support	toll-free: 800-1578
Australia (Sydney) International Access Code: 0011 Country Code: 61 City Code: 2	Website: support.ap.dell.com	
	E-mail: support.ap.dell.com/contactus	
	General Support	13DELL-133355
Austria International Access Code: 900	Website: support.euro.dell.com	
	E-mail: tech_support_central_europe@dell.com	
	Home/Small Business Sales	0820 240 530 00
	Home/Small Business Fax	0820 240 530 49
	Home/Small Business Customer Care	0820 240 530 14
	Preferred Accounts/Corporate Customer Care	0820 240 530 16
	Support for XPS	0820 240 530 81
	Home/Small Business Support for all other Dell computers	0820 240 530 17
	Preferred Accounts/Corporate Support	0820 240 530 17
Switchboard	0820 240 530 00	
Bahamas	Website: www.dell.com.bs	
	E-mail: la-techsupport@dell.com	
	Technical Support	toll-free: 1-866-874-3038
Barbados	Website: www.dell.com/bb	
	E-mail: la-techsupport@dell.com	
	Technical Support	1-800-534-3142
Belgium (Brussels) International Access Code: 00 Country Code: 32 City Code: 2	Website: support.euro.dell.com	
	Tech Support for XPS	02 481 92 96
	Tech Support for all other Dell computers	02 481 92 88
	Tech Support Fax	02 481 92 95
	Customer Care	02 713 15 65
	Corporate Sales	02 481 91 00
	Fax	02 481 92 99
Switchboard	02 481 91 00	
Bermuda	Website: www.dell.com/bm	
	E-mail: la-techsupport@dell.com	
	Technical Support	toll-free: 1-877-890-0754
Bolivia	Website: www.dell.com/bo	
	E-mail: la-techsupport@dell.com	
Brazil	General Support	toll-free: 800-10-0238
	Website: www.dell.com/br	
	E-mail: BR-TechSupport@dell.com	

International Access Code: 00	Customer Care and Tech Support	0800 90 3355
	Technical Support Fax	51 2104 5470
Country Code: 55	Customer Care Fax	51 2104 5480
	Sales	0800 722 3498
City Code: 51		
British Virgin Islands	General Support	toll-free: 1-866-278-6820
Brunei	Technical Support (Penang, Malaysia)	604 633 4966
	Customer Care (Penang, Malaysia)	604 633 4888
Country Code: 673	Transaction Sales (Penang, Malaysia)	604 633 4955
Canada (North York, Ontario)	Online Order Status: www.dell.ca/ostatus	
	AutoTech (automated Hardware and Warranty Support)	toll-free: 1-800-247-9362
	Customer Service (Home Sales/Small Business)	toll-free: 1-800-847-4096
	Customer Service (med./large business, government)	toll-free: 1-800-326-9463
	Customer Service (printers, projectors, televisions, handhelds, digital jukebox, and wireless)	toll-free: 1-800-847-4096
	Hardware Warranty Support (Home Sales/Small Business)	toll-free: 1-800-906-3355
	Hardware Warranty Support (med./large bus., government)	toll-free: 1-800-387-5757
	Hardware Warranty Support (printers, projectors, televisions, handhelds, digital jukebox, and wireless)	1-877-335-5767
	Sales (Home Sales/Small Business)	toll-free: 1-800-387-5752
	Sales (med./large bus., government)	toll-free: 1-800-387-5755
International Access Code: 011	Spare Parts Sales & Extended Service Sales	1 866 440 3355
Cayman Islands	E-mail: la-techsupport@dell.com	
	Technical Support	toll-free: 1-877-261-0242
Chile (Santiago)	Website: www.dell.com/cl	
	E-mail: la-techsupport@dell.com	
Country Code: 56	Sales and Customer Support	toll-free: 1230-020-4823
City Code: 2	Technical Support (CTC)	toll-free: 800730222
	Technical Support (ENTEL)	toll-free: 1230-020-3762
China (Xiamen)	Technical Support website: support.dell.com.cn	
	Technical Support E-mail: cn_support@dell.com	
	Customer Care E-mail: customer_cn@dell.com	
	Technical Support Fax	592 818 1350
	Technical Support (Dimension and Inspiron)	toll-free: 800 858 2969
	Technical Support (OptiPlex, Latitude, and Dell Precision)	toll-free: 800 858 0950
	Technical Support (servers and storage)	toll-free: 800 858 0960
	Technical Support (projectors, PDAs, switches, routers, and so on)	toll-free: 800 858 2920
	Technical Support (printers)	toll-free: 800 858 2311
	Customer Care	toll-free: 800 858 2060
	Customer Care Fax	592 818 1308
	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	Website: www.dell.com/cl	
	E-mail: la-techsupport@dell.com	
	Technical Support	toll-free: 1-800-915-5704
Costa Rica	Website: www.dell.com/cr	
	E-mail: la-techsupport@dell.com	
	Technical Support	toll-free: 800-012-0232
	Website: support.euro.dell.com	

Czech Republic (Prague) International Access Code: 00 Country Code: 420	E-mail: czech_dell@dell.com		
	Technical Support	22537 2727	
	Customer Care	22537 2707	
	Fax	22537 2714	
	Technical Fax	22537 2728	
	Switchboard	22537 2711	
Denmark (Copenhagen) International Access Code: 00 Country Code: 45	Website: support.euro.dell.com		
	Technical Support for XPS	7010 0074	
	Technical Support for all other Dell computers	7023 0182	
	Customer Care (Relational)	7023 0184	
	Home/Small Business Customer Care	3287 5505	
	Switchboard (Relational)	3287 1200	
	Switchboard Fax (Relational)	3287 1201	
	Switchboard (Home/Small Business)	3287 5000	
	Switchboard Fax (Home/Small Business)	3287 5001	
Dominica	Website: www.dell.com/dm		
	E-mail: la-techsupport@dell.com		
	General Support	toll-free: 1-866-278-6821	
Dominican Republic	Website: www.dell.com/do		
	E-mail: la-techsupport@dell.com		
	Technical Support	toll-free: 1-888-156-1834 or toll-free: 1-888-156-1584	
Ecuador	Website: www.dell.com/ec		
	E-mail: la-techsupport@dell.com		
	General Support (calling from Quito)	toll-free: 999-119-877-655-3355	
	General Support (calling from Guayaquil)	toll-free: 1800-999-119-877-655-3355	
El Salvador	Website: www.dell.com/ec		
	E-mail: la-techsupport@dell.com		
	Technical Support (Telephonica)	toll-free: 8006170	
Finland (Helsinki) International Access Code: 990 Country Code: 358 City Code: 9	Website: support.euro.dell.com		
	E-mail: fi_support@dell.com		
	Technical Support	0207 533 555	
	Customer Care	0207 533 538	
	Switchboard	0207 533 533	
	Sales under 500 employees	0207 533 540	
	Fax	0207 533 530	
	Sales over 500 employees	0207 533 533	
	Fax	0207 533 530	
France (Paris) (Montpellier) International Access Code: 00 Country Code: 33 City Codes: (1) (4)	Website: support.euro.dell.com		
	Home and Small Business		
	Technical Support for XPS	0825 387 129	
	Technical Support for all other Dell computers	0825 387 270	
	Customer Care	0825 823 833	
	Switchboard	0825 004 700	
	Switchboard (calls from outside of France)	04 99 75 40 00	
	Sales	0825 004 700	
	Fax	0825 004 701	
	Fax (calls from outside of France)	04 99 75 40 01	
	Corporate		
	Technical Support	0825 004 719	
	Customer Care	0825 338 339	
	Switchboard	01 55 94 71 00	
	Sales	01 55 94 71 00	
	Fax	01 55 94 71 01	
	Germany (Frankfurt) International Access Code: 00	Website: support.euro.dell.com	
		E-mail: tech_support_central_europe@dell.com	
		Technical Support for XPS	069 9792 7222
Technical Support for all other Dell computers		069 9792-7200	
	Home/Small Business Customer Care	0180-5-224400	

Country Code: 49 City Code: 69	Global Segment Customer Care	069 9792-7320
	Preferred Accounts Customer Care	069 9792-7320
	Large Accounts Customer Care	069 9792-7320
	Public Accounts Customer Care	069 9792-7320
	Switchboard	069 9792-7000
Greece International Access Code: 00 Country Code: 30	Website: support.euro.dell.com	
	Technical Support	00800-44 14 95 18
	Gold Service Technical Support	00800-44 14 00 83
	Switchboard	2108129810
	Gold Service Switchboard	2108129811
	Sales	2108129800
Grenada	E-mail: la-techsupport@dell.com	
	General Support	toll-free: 1-866-540-3355
Guatemala	E-mail: la-techsupport@dell.com	
	General Support	1-800-999-0136
Guyana	E-mail: la-techsupport@dell.com	
	General Support	toll-free: 1-877-270-4609
Hong Kong International Access Code: 001 Country Code: 852	Website: support.ap.dell.com	
	Technical Support E-mail: HK_support@Dell.com	
	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, and so on)	00852-3416 0906
	Customer Care	00852-3416 0910
	Large Corporate Accounts	00852-3416 0907
	Global Customer Programs	00852-3416 0908
	Medium Business Division	00852-3416 0912
India	Home and Small Business Division	00852-2969 3105
	E-mail: india_support_desktop@dell.com india_support_notebook@dell.com india_support_Server@dell.com	
	Technical Support	1600338045 and 1600448046
	Sales (Large Corporate Accounts)	1600 33 8044
	Sales (Home and Small Business)	1600 33 8046
Ireland (Cherrywood) International Access Code: 00 Country Code: 353 City Code: 1	Website: support.euro.dell.com	
	E-mail: dell_direct_support@dell.com	
	Sales	
	Ireland Sales	01 204 4444
	Dell Outlet	1850 200 778
	Online Ordering HelpDesk	1850 200 778
	Customer Care	
	Home User Customer Care	01 204 4014
	Small Business Customer Care	01 204 4014
	Corporate Customer Care	1850 200 982
	Technical Support	
	Technical Support for XPS computers only	1850 200 722
	Technical Support for all other Dell computers	1850 543 543
	General	
	Fax/Sales Fax	01 204 0103
Switchboard	01 204 4444	
U.K. Customer Care (dial within U.K. only)	0870 906 0010	
Corporate Customer Care (dial within U.K. only)	0870 907 4499	
U.K. Sales (dial within U.K. only)	0870 907 4000	
Italy (Milan)	Website: support.euro.dell.com	
	Home and Small Business	
	Technical Support	02 577 826 90
	Customer Care	02 696 821 14

International Access Code: 00	Fax	02 696 821 13
	Switchboard	02 696 821 12
Country Code: 39	Corporate	
	Technical Support	02 577 826 90
	Customer Care	02 577 825 55
	Fax	02 575 035 30
	Switchboard	02 577 821
City Code: 02		
Jamaica	E-mail: la-techsupport@dell.com	
	Technical Support (dial from within Jamaica only)	toll-free: 1-800-326-6061 or toll-free: 1-800-975-1646
Japan (Kawasaki)	Website: support.jp.dell.com	
	Technical Support (servers)	toll-free: 0120-198-498
	Technical Support outside of Japan (servers)	81-44-556-4162
	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 (PDAs, projectors, printers, routers)	toll-free: 0120-981-690
	Technical Support outside of Japan (PDAs, projectors, 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)	044-556-1465
	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	044-556-1760
Switchboard	044-556-4300	
Korea (Seoul)	E-mail: krsupport@dell.com	
	Support	toll-free: 080-200-3800
	Support (Dimension, PDA, Electronics and Accessories)	toll-free: 080-200-3801
	Sales	toll-free: 080-200-3600
	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
	SalesFax (Austin, Texas, U.S.A.)	512 728-4600 or 512 728-3772
Luxembourg	Website: support.euro.dell.com	
	Support	342 08 08 075
	Home/Small Business Sales	+32 (0)2 713 15 96
	Corporate Sales	26 25 77 81
	Customer Care	+32 (0)2 481 91 19
Country Code: 352	Fax	26 25 77 82
Macao	Technical Support	toll-free: 0800 105
	Customer Service (Xiamen, China)	34 160 910
	Transaction Sales (Xiamen, China)	29 693 115
Malaysia (Penang)	Website: support.ap.dell.com	
	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
	Customer Care	toll-free: 1800 881 306 (option 6)
	Transaction Sales	toll-free: 1 800 888 202
	Corporate Sales	toll-free: 1 800 888 213
	E-mail: la-techsupport@dell.com	

Mexico International Access Code: 00 Country Code: 52	Technical Support (TelMex)	toll-free: 1-866-563-4425
	Sales	50-81-8800 or 01-800-888-3355
	Customer Service	001-877-384-8979 or 001-877-269-3383
	Main	50-81-8800 or 01-800-888-3355
Montserrat	E-mail: la-techsupport@dell.com	
	General Support	toll-free: 1-866-278-6822
Netherlands Antilles	E-mail: la-techsupport@dell.com	
	General Support	001-800-882-1519
Netherlands (Amsterdam) International Access Code: 00 Country Code: 31 City Code: 20	Website: support.euro.dell.com	
	Technical Support for XPS	020 674 45 94
	Technical Support for all other Dell computers	020 674 45 00
	Technical Support Fax	020 674 47 66
	Home/Small Business Customer Care	020 674 42 00
	Relational Customer Care	020 674 4325
	Home/Small Business Sales	020 674 55 00
	Relational Sales	020 674 50 00
	Home/Small Business Sales Fax	020 674 47 75
	Relational Sales Fax	020 674 47 50
Switchboard	020 674 50 00	
Switchboard Fax	020 674 47 50	
New Zealand International Access Code: 00 Country Code: 64	Website: support.ap.dell.com	
	E-mail: support.ap.dell.com/contactus	
	General Support	0800 441 567
Nicaragua	E-mail: la-techsupport@dell.com	
	Technical Support	toll-free: 1-800-220-1378
Norway (Lysaker) International Access Code: 00 Country Code: 47	Website: support.euro.dell.com	
	Technical Support for XPS	815 35 043
	Technical Support for all other Dell products	671 16882
	Relational Customer Care	671 17575
	Home/Small Business Customer Care	23162298
	Switchboard	671 16800
Fax Switchboard	671 16865	
Panama	E-mail: la-techsupport@dell.com	
	Technical Support	toll-free: 1-800-507-1385
	Technical Support (CLARACOM)	toll-free: 1-866-633-4097
Peru	E-mail: la-techsupport@dell.com	
	Technical Support	toll-free: 0800-50-869
Poland (Warsaw) International Access Code: 011 Country Code: 48 City Code: 22	Website: support.euro.dell.com	
	E-mail: pl_support_tech@dell.com	
	Customer Service Phone	57 95 700
	Customer Care	57 95 999
	Sales	57 95 999
	Customer Service Fax	57 95 806
	Reception Desk Fax	57 95 998
Switchboard	57 95 999	
Portugal International Access Code: 00 Country Code: 351	Website: support.euro.dell.com	
	Technical Support	707200149
	Customer Care	800 300 413
	Sales	800 300 410 or 800 300 411 or 800 300 412 or 21 422 07 10
	Fax	21 424 01 12
Puerto Rico	E-mail: la-techsupport@dell.com	
	Technical Support	toll-free: 1-866-390-4695
	Website: www.dell.com/kn	

St. Kitts and Nevis	E-mail: la-techsupport@dell.com	
	Technical Support	toll-free: 1-866-540-3355
St. Lucia	Website: www.dell.com/lc	
	E-mail: la-techsupport@dell.com	
	Technical Support	toll-free: 1-866-464-4352
St. Vincent and the Grenadines	Website: www.dell.com/vc	
	E-mail: la-techsupport@dell.com	
	Technical Support	toll-free: 1-866-464-4353
Singapore (Singapore) International Access Code: 005 Country Code: 65	NOTE: The phone numbers in this section should be called from within Singapore or Malaysia only.	
	Website: support.ap.dell.com	
	Technical Support (Dimension, Inspiron, and Electronics and Accessories)	toll-free: 1 800 394 7430
	Technical Support (OptiPlex, Latitude, and Dell Precision)	toll-free: 1 800 394 7488
	Technical Support (PowerApp, PowerEdge, PowerConnect, and PowerVault)	toll-free: 1 800 394 7478
	Customer Care	toll-free: 1 800 394 7430 (option 6)
	Transaction Sales	toll-free: 1 800 394 7412
Corporate Sales	toll-free: 1 800 394 7419	
Slovakia (Prague) International Access Code: 00 Country Code: 421	Website: support.euro.dell.com	
	E-mail: czech_dell@dell.com	
	Technical Support	02 5441 5727
	Customer Care	420 22537 2707
	Fax	02 5441 8328
	Tech Fax	02 5441 8328
Switchboard (Sales)	02 5441 7585	
South Africa (Johannesburg) International Access Code: 09/091 Country Code: 27 City Code: 11	Website: support.euro.dell.com	
	E-mail: dell_za_support@dell.com	
	Gold Queue	011 709 7713
	Technical Support	011 709 7710
	Customer Care	011 709 7707
	Sales	011 709 7700
	Fax	011 706 0495
Switchboard	011 709 7700	
Southeast Asian and Pacific Countries	Technical Support, Customer Service, and Sales (Penang, Malaysia)	604 633 4810
Spain (Madrid) International Access Code: 00 Country Code: 34 City Code: 91	Website: support.euro.dell.com	
	Home and Small Business	
	Technical Support	902 100 130
	Customer Care	902 118 540
	Sales	902 118 541
	Switchboard	902 118 541
	Fax	902 118 539
	Corporate	
	Technical Support	902 100 130
	Customer Care	902 115 236
	Switchboard	91 722 92 00
Fax	91 722 95 83	
Sweden (Upplands Vasby) International Access Code: 00 Country Code: 46 City Code: 8	Website: support.euro.dell.com	
	Technical Support for XPS	0771 340 340
	Technical Support for all other Dell products	08 590 05 199
	Relational Customer Care	08 590 05 642
	Home/Small Business Customer Care	08 587 70 527
	Employee Purchase Program (EPP) Support	020 140 14 44
	Technical Support Fax	08 590 05 594
Sales	08 590 05 185	
Switzerland (Geneva) International Access Code:	Website: support.euro.dell.com	
	E-mail: Tech_support_central_Europe@dell.com	
	Technical Support for XPS	0848 33 88 57
	Technical Support (Home and Small Business) for all other Dell products	0844 811 411

00 Country Code: 41 City Code: 22	Technical Support (Corporate)	0844 822 844
	Customer Care (Home and Small Business)	0848 802 202
	Customer Care (Corporate)	0848 821 721
	Fax	022 799 01 90
	Switchboard	022 799 01 01
Taiwan International Access Code: 002 Country Code: 886	Website: support.ap.dell.com	
	E-mail: ap_support@dell.com	
	Technical Support (OptiPlex, Latitude, Inspiron, Dimension, and Electronics and Accessories)	toll-free: 0080 186 1011
	Technical Support (servers and storage)	toll-free: 0080 160 1256
	Customer Care	toll-free: 0080 160 1250 (option 5)
	Transaction Sales	toll-free: 0080 165 1228
Thailand International Access Code: 001 Country Code: 66	Corporate Sales	toll-free: 0080 165 1227
	Website: support.ap.dell.com	
	Technical Support (OptiPlex, Latitude, and Dell Precision)	toll-free: 1800 0060 07
	Technical Support (PowerApp, PowerEdge, PowerConnect, and PowerVault)	toll-free: 1800 0600 09
	Customer Care	toll-free: 1800 006 007 (option 7)
Trinidad/Tobago Country Code: 66	Corporate Sales	toll-free: 1800 006 009
	Transaction Sales	toll-free: 1800 006 006
	Website: www.dell.com/tt	
Turks and Caicos Islands Country Code: 66	E-mail: la-techsupport@dell.com	
	Technical Support	toll-free: 1-888-799-5908
	General Support	toll-free: 1-877-441-4735
U.K. (Bracknell) International Access Code: 00 Country Code: 44 City Code: 1344	Website: support.euro.dell.com	
	E-mail: dell_direct_support@dell.com	
	Customer Care website: support.euro.dell.com/uk/en/ECare/form/home.asp	
	Sales	
	Home and Small Business Sales	0870 907 4000
	Corporate/Public Sector Sales	01344 860 456
	Customer Care	
	Home and Small Business Customer Care	0870 906 0010
	Corporate Customer Care	01344 373 185
	Preferred Accounts (500-5000 employees)	0870 906 0010
	Global Accounts Customer Care	01344 373 186
	Central Government Customer Care	01344 373 193
	Local Government & Education Customer Care	01344 373 199
	Health Customer Care	01344 373 194
	Technical Support	
	Technical Support for XPS computers only	0870 366 4180
	Technical Support (Corporate/Preferred Accounts/PAD [1000+ employees])	0870 908 0500
Technical Support for all other products	0870 353 0800	
General		
Home and Small Business Fax	0870 907 4006	
Uruguay Country Code: 598	Website: www.dell.com/uy	
	E-mail: la-techsupport@dell.com	
	Technical Support	toll-free: 413-598-2522
	Automated Order-Status Service	toll-free: 1-800-433-9014
	AutoTech (portable and desktop computers)	toll-free: 1-800-247-9362
	Hardware and Warranty Support (Dell TV, Printers, and Projectors) for Relationship customers	toll-free: 1-877-459-7298
	Americas Consumer XPS Support	toll-free: 1-800-232-8544
	Consumer (Home and Home Office) Support for all other Dell products	toll-free: 1-800-624-9896
	Customer Service	toll-free: 1-800-624-9897
	Employee Purchase Program (EPP) Customers	toll-free: 1-800-695-8133
Financial Services website: www.dellfinancialservices.com		

U.S.A. (Austin, Texas) International Access Code: 011 Country Code: 1	Financial Services (lease/loans)	toll-free: 1-877-577-3355
	Financial Services (Dell Preferred Accounts [DPA])	toll-free: 1-800-283-2210
	Business	
	Customer Service and Support	toll-free: 1-800-456-3355
	Employee Purchase Program (EPP) Customers	toll-free: 1-800-695-8133
	Support for printers, projectors, PDAs, and MP3 players	toll-free: 1-877-459-7298
	Public (government, education, and healthcare)	
	Customer Service and Support	toll-free: 1-800-456-3355
	Employee Purchase Program (EPP) Customers	toll-free: 1-800-695-8133
	Dell Sales	toll-free: 1-800-289-3355 or toll-free: 1-800-879-3355
	Dell Outlet Store (Dell refurbished computers)	toll-free: 1-888-798-7561
	Software and Peripherals Sales	toll-free: 1-800-671-3355
	Spare Parts Sales	toll-free: 1-800-357-3355
	Extended Service and Warranty Sales	toll-free: 1-800-247-4618
	Fax	toll-free: 1-800-727-8320
	Dell Services for the Deaf, Hard-of-Hearing, or Speech-Impaired	toll-free: 1-877-DELLTTY (1-877-335-5889)
	U.S. Virgin Islands	E-mail: la-techsupport@dell.com
Technical Support		toll-free: 1-877-702-4360
Venezuela	Website: www.dell.com/ve	
	E-mail: la-techsupport@dell.com Technical Support	toll-free: 0800-100-2513

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Glossary

Dell™ PowerVault™ NX1950 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.
BIOS — Basic input/output system. Your system's BIOS contains programs stored on a flash memory chip. The BIOS controls the following: <ul style="list-style-type: none">1 Communications between the processor and peripheral devices1 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 <i>warm boot</i>) 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 <i>processor</i> .
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 <i>memory module</i> .
DIN — <i>Deutsche Industrie Norm</i> .
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 <i>subdirectories</i> . 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.
FBD — Fully buffered DIMM.
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 <i>mirroring</i> , <i>striping</i> , and <i>RAID</i> .
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 <i>h</i> .
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.
hot plug — Describes the feature of the system that enables you to swap a component of the system while the system is running.
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 <i>mirroring</i> .
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 — Kiloherzt.
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.
LGA — Land grid array. A type of processor socket. Unlike the PGA interface, the LGA interface has no pins on the chip; instead, the chip has pads that contact pins on the system board.
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 <i>bus</i> .
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 <i>guarding, integrated mirroring, striping, and RAID</i> .
mm — Millimeter(s).
ms — Millisecond(s).
MS-DOS@ — Microsoft Disk Operating System.
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 operating system.
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 <i>partitions</i> 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. <i>CPU</i> is a synonym for processor.
protected mode — An operating mode that allows operating systems to implement: <ul style="list-style-type: none"> 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 <i>guarding, mirroring, and striping</i> .
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).
SEL — System event log. Used in the system management software to record system events and errors.
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 <i>guarding</i> , <i>mirroring</i> , and <i>RAID</i> .
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 <i>bootable diskette</i> .
system memory — See <i>RAM</i> .
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.
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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Installing System Components

Dell™ PowerVault™ NX1950 Systems Hardware Owner's Manual

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- [Inside the System](#)
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- [Opening and Closing the System](#)
- [Cooling Fan Modules](#)
- [Cooling Shrouds](#)
- [Power Supplies](#)
- [SAS Controller Daughter Card](#)
- [Expansion Cards](#)
- [System Memory](#)
- [Activating the Integrated NIC TOE](#)
- [Processors](#)
- [RAC Card](#)
- [Optical Drive](#)
- [Hard Drives](#)
- [Replacing a Hard-Drive Carrier](#)
- [Expansion-Card Riser](#)
- [Backplane Board](#)
- [Sideplane Board](#)
- [System Battery](#)
- [Control Panel Assembly \(Service-Only Procedure\)](#)
- [System Board \(Service-Only Procedure\)](#)

This section describes how to install the following system components:


- 1 Cooling fan modules
- 1 Cooling shrouds
- 1 Power supplies
- 1 SAS controller daughter card or SAS RAID controller daughter card
- 1 RAID battery
- 1 RAID controller expansion card
- 1 Expansion cards
- 1 Boot drive
- 1 System memory
- 1 Processors
- 1 RAC card
- 1 Optical drive
- 1 Hard drives
- 1 SAS backplane boards
- 1 Risers
- 1 Sideplane board
- 1 System battery
- 1 Control panel assembly
- 1 System board

Recommended Tools

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

- 1 Key to the system keylock
- 1 #2 Phillips screwdriver
- 1 T10 Torx driver
- 1 Small flat-blade screwdriver
- 1 Wrist grounding strap

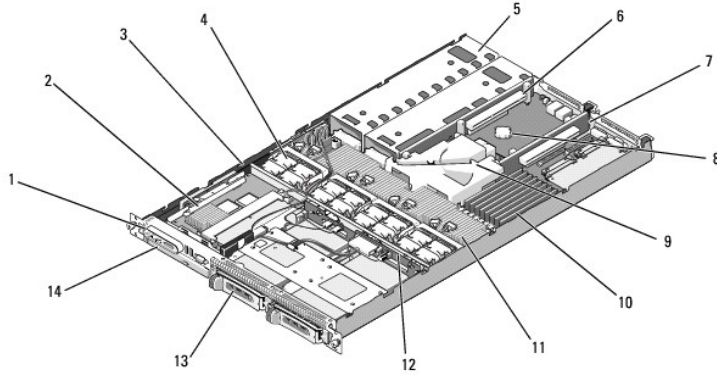
Inside the System

 **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.

 **CAUTION:** The memory modules can become extremely hot during normal operation. Allow the modules sufficient time to cool before handling.

In [Figure 3-1](#), the bezel, system cover, and memory cooling shroud are removed to provide an interior view of the system.

Figure 3-1. Inside the System



1	control panel	2	SAS RAID controller daughter card	3	sideplane
4	cooling fan modules (4)	5	power supply bays (2)	6	left riser (slot 2)
7	center riser (slot 1)	8	battery	9	system board cooling shroud
10	memory modules (8)	11	heatsink/microprocessor (2)	12	backplane
13	two 3.5-inch hard drive bays	14	optical slimline drive		

The system board holds the system's control circuitry and other electronic components. Several hardware options, such as the microprocessors and memory, are installed directly on the system board. The left and center risers each have one slot and can accommodate two half-length PCIe expansion cards. For more information, see [Expansion Cards](#).

The system provides space for one optional slimline optical drive. The optical drive tray connects to the controller on the system board through the sideplane board. For more information, see [Installing the Optical Drive Tray](#).

The hard-drive bays provide space for up to two 3.5-inch SAS/SATA hard drives. The hard drives connect to a SAS RAID controller daughter card. For more information, see [Installing a Hot-Plug Hard Drive](#).

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

NOTE: There are no hot-pluggable components inside this system except for externally accessible components, such as the power supplies and the hard drives.

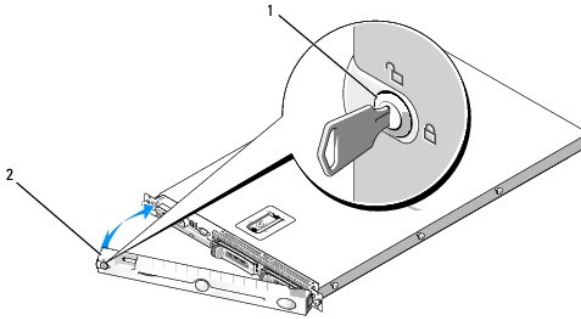
Removing and Replacing the Front Bezel

1. The system is enclosed by an optional bezel. To upgrade or troubleshoot the system, remove the bezel and cover to access the internal system components. Unless you are installing a hot-plug hard drive, turn off the system and attached peripherals, and disconnect the system from the electrical outlet and peripherals.

NOTE: You do not need to remove the front bezel to remove the system cover.

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

Figure 3-2. Removing the Bezel



1	key lock	2	bezel cover
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To replace the front bezel, perform the preceding steps in reverse.

Opening and Closing the System

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.

CAUTION: Whenever you need to lift the system, get others to assist you. To avoid injury, do not attempt to lift the system by yourself.

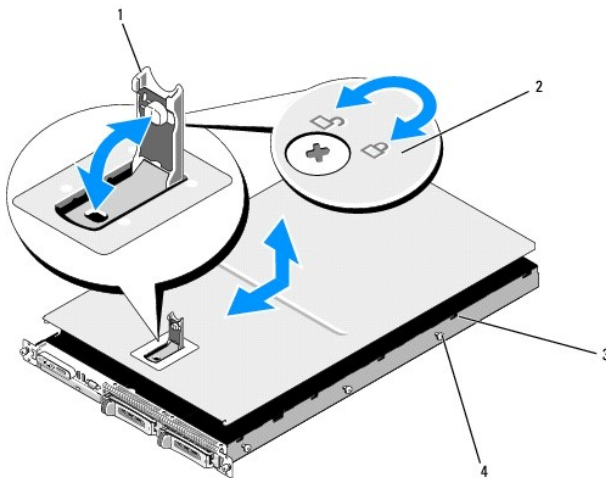
CAUTION: The memory modules can become extremely hot during normal operation. Allow the modules sufficient time to cool before handling.

Opening the System

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

1. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet and peripherals.
2. Remove the bezel. See [Removing and Replacing the Front Bezel](#).
3. To remove the system cover, rotate the latch release lock on the latch in a counter clockwise direction to the unlocked position. See [Figure 3-3](#).
4. Lift up on the latch on top of the system to guide it back and into an offset position. See [Figure 3-3](#).
5. Grasp the cover on both sides and carefully lift the cover away from the system.

Figure 3-3. Removing the Cover



1	latch	2	latch release lock	3	alignment J hooks
4	chassis tabs				

Closing the System

1. Lift up the latch on the cover.
2. Place the cover on top of the system and offset the cover slightly back so that it clears the chassis J hooks and lays flat on the system chassis. See [Figure 3-3](#).
3. Lower the cover into the closed position aligning it with the J hooks and push down on the latch to guide the cover into place.
4. Rotate the latch release lock in a clockwise direction to secure the cover.

Cooling Fan Modules

This system contains four cooling fan modules, each comprised of two dual-rotor fans, for a total of eight fans that are connected directly to the system board.

Removing a Cooling Fan Module

⚠ 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.

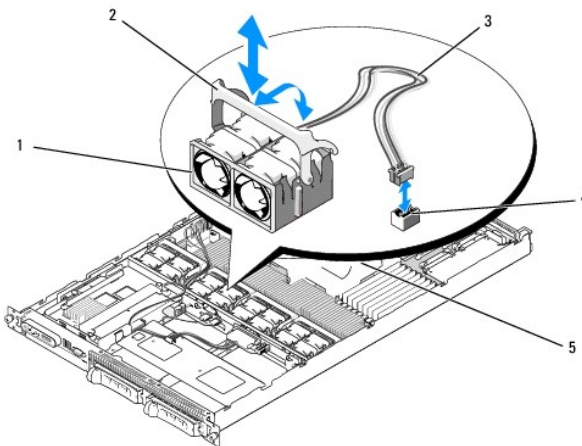
🔧 NOTE: The procedure for removing each individual fan module is the same.

1. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet and peripherals.
2. Open the system. See [Opening and Closing the System](#).

🔧 NOTE: You can remove the fan modules without removing the memory cooling shroud; however, Dell™ recommends that you remove this shroud before removing a fan module. Do not remove the system board cooling shroud. See [Removing the Memory Cooling Shroud](#).

3. Raise the fan handle, disconnect the module wire harness from the system board, and pull the fan straight up to clear the chassis. See [Figure 3-4](#).
4. Unplug the fan module connector.

Figure 3-4. Removing and Installing a Cooling Fan



1	cooling fan modules (4)	2	fan module handles	3	module wire harness
4	cooling fan module connector	5	system board cooling shroud		

Replacing a Cooling Fan Module

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

1. Ensure that the fan handle is upright and lower the fan into its retention base until the fan is fully seated. Then lower the fan handle until it snaps into place. See [Figure 3-4](#).
2. Attach the fan module connectors.
3. If you removed the memory cooling shroud to access the fan modules, replace the shroud. See [Replacing the Memory Cooling Shroud](#).
4. Close the system. See [Opening and Closing the System](#).

Cooling Shrouds

Your system contains two cooling shrouds.

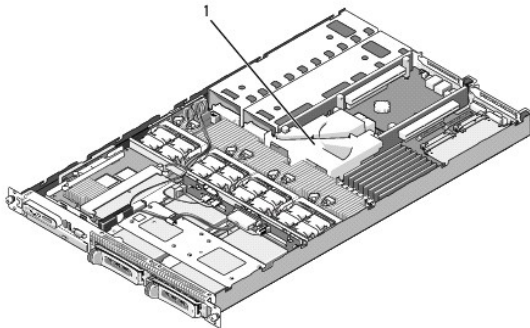
- 1 System board cooling shroud
- 1 Memory cooling shroud

System Board Cooling Shroud

The system board cooling shroud directs airflow over the system memory modules, channeling the air from the four fan modules. Your system comes with the system board cooling shroud pre-installed on the system board. See [Figure 3-6](#) and [System Board Removal](#).

NOTE: Because the system board shroud comes pre-installed on your system and does not cover any components, do not attempt to remove this shroud from the system board.

Figure 3-5. System Board Cooling Shroud



1	system board cooling shroud
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Memory Cooling Shroud

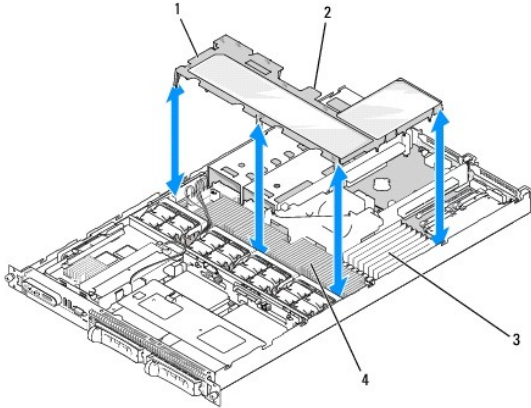
The memory cooling shroud covers both the memory modules (DIMMs) and the processors. This shroud can be removed and installed. See [Figure 3-6](#) and [System Board Removal](#).

Removing the Memory Cooling Shroud

- 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.
- CAUTION:** The memory modules are hot to the touch for some time after the system has been powered down. Allow time for the memory modules to cool before handling them. Handle the memory modules by the card edges and avoid touching the components on the memory module.
- NOTICE:** Never operate your system with the memory cooling shroud removed. Overheating of the system can develop quickly resulting in a shutdown of the system and the loss of data.

1. To remove the cooling shroud, locate the release tab on the shroud edge that is nearest to the adjacent system board shroud. See [Figure 3-6](#).
2. Pull up on the release tab to release the memory cooling shroud.
3. Unseat the shroud from the securing tabs located on the periphery of the shroud.
4. Carefully lift the shroud straight up to disengage it from the system board, and then lift the shroud away from the system.

Figure 3-6. Memory Cooling Shroud



1	memory cooling shroud	2	memory shroud release tab	3	memory modules (8)
4	system processors (2)				

Replacing the Memory Cooling Shroud

1. To install the memory cooling shroud, align the shroud directly over the memory modules and the processors.
2. Using the interior system board cooling shroud as a guide, slowly lower the shroud straight down onto the system, directly over the processors and memory modules.
3. Gently press around the periphery of the shroud until it engages with the external tabs and snaps into place.

Power Supplies

Your system supports two power supplies rated at an output of 670 W.

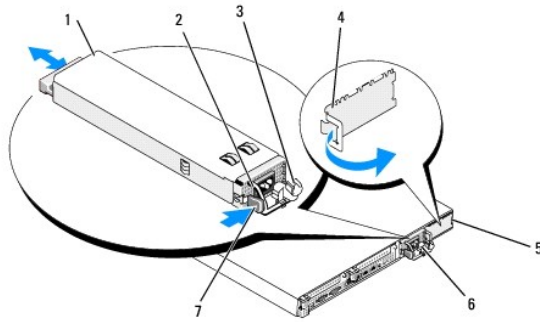
Removing a Power Supply

- ➡ **NOTICE:** The system requires one power supply for the system to operate normally. The system is in the redundant mode when two power supplies are installed and both power supplies are connected to an AC power source. Remove and replace only one power supply at a time in a system that is powered on. Operating the system with only one power supply installed and without a power supply blank installed for extended periods of time can cause the system to overheat.
- ➡ **NOTICE:** If you connect the system to a power source in the range of 120 to 220 VAC, the second power supply serves as a redundant, hot-plug power source.
- 🔧 **NOTE:** On your rack system, you may have to unlatch and lift the cable management arm if it interferes with power supply removal. For information about the cable management arm, see the system's *Rack Installation Guide*.

1. Disconnect the power cable from the power source.
2. Disconnect the power cable from the power supply and remove the cable from the cable retention bracket.
 - ➡ **NOTICE:** On a rack system, you may need to temporarily unlatch and lift the cable management arm. For information about the cable management arm, see the system's *Rack Installation Guide*.
3. Release the locking tab on the left side of the power supply by pressing in toward the right until the power supply is released from the chassis. See [Figure 3-7](#).

4. Holding the power-supply handle, pull the power supply straight out to clear the chassis.

Figure 3-7. Removing and Installing a Power Supply



1	power-supply	2	power-supply handle	3	cable retention bracket
4	power supply blank	5	power-supply bay 2	6	redundant power supply bay 1
7	locking tab				

Replacing a Power Supply

1. Holding the power-supply handle, slide the new power supply into the chassis until it is fully seated and contacts the system chassis. See [Figure 3-7](#).
 - ➔ **NOTICE:** On a rack system, you may need to temporarily unlatch and lift the cable management arm. For information about the cable management arm, see the system's *Rack Installation Guide*.
2. Insert the power cable through the cable retention bracket, connect the power cable to the power supply, and plug the cable into a power outlet.
 - 🔍 **NOTE:** For more information about the power cable retention bracket, see the *Getting Started With Your System* guide.
 - 🔍 **NOTE:** After installing a new power supply in a system with two power supplies, allow several seconds for the system to recognize the power supply and determine its status. The power-supply status indicator turns green to signify that the power supply is functioning properly (see [Figure 1-4](#)).

SAS Controller Daughter Card

Your system includes a dedicated slot on the sideplane for the SAS RAID controller daughter card. The SAS controller daughter card provides the SAS storage subsystem for your system's two optional internal hard drives.

Removing a SAS RAID Controller Daughter Card

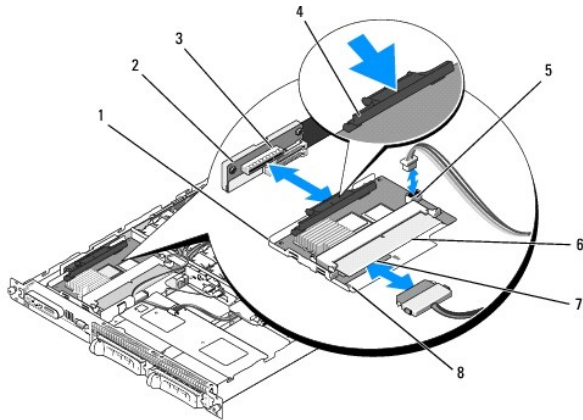
1. When removing a SAS RAID controller daughter card, disconnect the battery cable from the card by releasing the tab on the cable connector on the daughter card. See [Figure 3-23](#).
2. Pull on the release latch on the daughter card (see [Figure 3-8](#)) and slide the daughter card tray towards the hard drives.
3. Continue to hold the guide rails outward as you pull the SAS controller daughter card upward from the rails.

Replacing or Installing a SAS RAID Controller Daughter Card

- ➔ **NOTICE:** If you are installing a SAS RAID daughter card, be careful not to press on the memory module on the card (see [Figure](#)) to avoid damaging the memory module or its socket.
 - ➔ **NOTICE:** If you are installing a new or replacement SAS RAID daughter card, do not remove the card's plastic cover until you have completed installing the card.
1. Hold the metal daughter card tray by its edges with the release latch and edge connector facing the sideplane board. See [Figure 3-8](#).
 2. Align the two slots in the daughter card tray and the corresponding tabs on the chassis, then lower the card tray onto the chassis.

- Slide the daughter card tray towards the sideplane until the edge connector on the daughter card fits into the socket on the sideplane board and the release latch engages. See [Figure 3-8](#).

Figure 3-8. Installing a SAS Controller Daughter Card

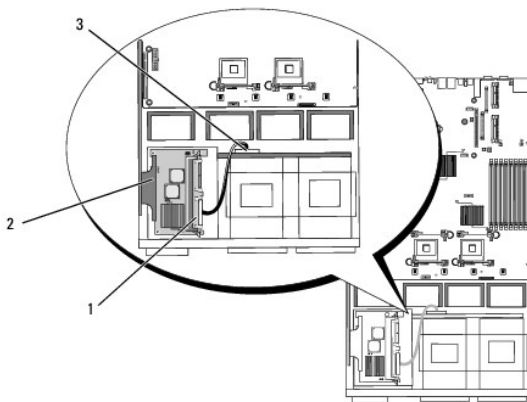


1 SAS controller daughter card and tray assembly	2 sideplane	3 daughter card socket
4 release latch	5 RAID battery connector	6 RAID memory module (DIMM)
7 SAS RAID connector 0 (to backplane SAS A)	8 alignment slots in card tray (2)	

- Attach any cables from the internal storage daughter card to the backplane, referring [Figure 3-9](#) for the cabling guidelines for your system's card and backplane configuration.

NOTICE: You must follow the cabling diagrams for connecting the hard drives to either of the internal storage daughter cards that are illustrated in the following figures to ensure proper connection. [Figure 3-9](#) illustrates the cable routing for the SAS RAID controller daughter card.

Figure 3-9. Cable Routing for the SAS RAID Controller Daughter Card



1 SAS RAID connector SAS 0	2 SAS RAID controller daughter card	3 SAS backplane connector SAS A
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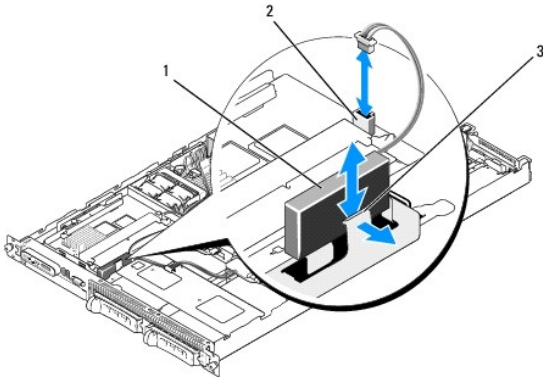
RAID Battery

Installing a RAID Battery

- Locate the RAID battery pocket on the chassis that is adjacent to hard drive bay 0. See [Figure 3-10](#).
- Insert the battery in the battery pocket.

3. Connect the battery cable to the RAID controller daughter card. See [Figure 3-10](#).

Figure 3-10. Installing a SAS RAID Battery



1	RAID battery	2	SAS RAID daughter card battery connector	3	release latch
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Removing a RAID Battery

1. Disconnect the RAID battery cable from the SAS RAID daughter card. See [Figure 3-10](#).
2. Press the release latch toward the hard-drive bays and remove the battery from the battery pocket.

Expansion Cards

PCIe Riser Board Expansion Slots

The PCIe riser configuration provides two PCI Express expansion slots with the following features:

- 1 Two PCIe risers, installed in the left and center riser connectors.
- 1 Two x8-lane PCIe expansion slots.
- 1 Support for full height/half-length PCI cards in both slots.

Expansion Card Installation Guidelines

NOTE: The expansion-card slots are not hot-pluggable.

To identify expansion slots, see [Figure 3-11](#). The two expansion card slots are on separate buses.

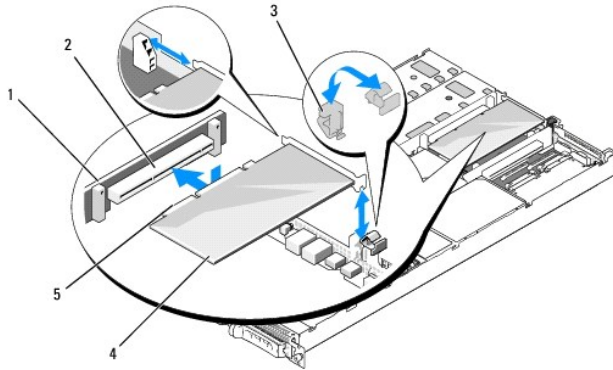
Installing an Expansion Card

CAUTION: Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. 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 accompanying 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 and Closing the System](#).
4. If you are adding a new card, open the expansion-card latch and remove the filler bracket. See [Figure 3-11](#).

5. Install the expansion card:
 - a. Position the expansion card so that the card-edge connector aligns with the expansion-card connector on the PCI riser board.
 - b. Insert the card-edge connector firmly into the expansion-card connector until the card is fully seated.
 - c. When the card is seated in the connector, close the expansion-card latch. See [Figure 3-11](#).

Figure 3-11. Installing an Expansion Card



1	PCI riser	2	expansion-card connector	3	expansion-card latch
4	expansion card	5	card-edge connector		

6. Connect any cables to the expansion card.
See the documentation that came with the card for information about its cable connections.
7. Close the system. See [Opening and Closing the System](#).

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. 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 and Closing the System](#).
3. Disconnect all cables from the card.
4. Remove the expansion card:
 - a. Open the expansion-card latch. See [Figure 3-11](#).
 - b. Grasp the expansion card by its edges, and carefully remove it from the expansion-card connector.
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.

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

6. Close the system. See [Opening and Closing the System](#).

System Memory

You can upgrade your system memory to a maximum of 8 GB, 667-MHz fully buffered (FB) DDR II memory modules (DIMMs) in sets of 1-GB modules. The eight memory sockets are located on the system board under the memory cooling shroud. You can purchase memory upgrade kits from Dell.

➡ NOTICE: If you remove your original memory modules from the system during a memory upgrade, keep them separate from any new memory modules that you may have, even if you purchased the new memory modules from Dell. Use only 667-MHz DDR II fully buffered DIMMs (FBDs).

The memory module sockets are divided into two equal branches (0 and 1). Each branch consists of two channels:

- 1 Channel 0 and channel 1 are in branch 0.
- 1 Channel 2 and channel 3 are in branch 1.

Each channel consists of two memory module sockets:

- 1 Channel 0 contains DIMM_1, DIMM_5.
- 1 Channel 1 contains DIMM_2, DIMM_6.
- 1 Channel 2 contains DIMM_3, DIMM_7.
- 1 Channel 3 contains DIMM_4, DIMM_8.

The first DIMM socket of each channel has white release tabs.

General Memory Module Installation Guidelines

To ensure optimal performance of your system, observe the following guidelines when configuring your system memory.

- 1 Use only qualified FBDs. FBDs can be either single-ranked or dual-ranked. FBDs marked with a 1R are single-ranked and modules marked with a 2R are dual-ranked.
- 1 A minimum of two identical FBDs must be installed.
- 1 DIMM sockets must be populated by lowest number first.
- 1 Memory modules must be installed in pairs of matched memory size, speed, and technology, and the total number of memory modules in the configuration must total two, four, or eight. For best system performance, all four, or eight memory modules should be identical in size, speed, and technology.
- 1 Memory sparing and memory mirroring require eight memory, and all memory modules must be of identical memory size, speed, and technology.
- 1 Memory sparing and memory mirroring cannot be implemented at the same time.

Non-Optimal Memory Configurations

System performance can be affected if your memory configuration does not conform to the preceding installation guidelines. Your system may issue an error message during startup stating that your memory configuration is non-optimal.

Memory Sparing Support

The system supports memory sparing if eight identical memory modules are installed in the system. The memory sparing feature must be enabled in the System Setup program and can be used only if memory mirroring is not enabled. (See [Using the System Setup Program](#).)

Memory sparing allocates four ranks of DIMM memory to the spare bank. These four ranks consist of the first rank of memory in DIMM sockets 1 through 4. For single-rank DIMMs, the entire capacity of the four DIMMs is allocated to sparing whereas for dual-rank DIMMs, only half of the four-DIMM capacity is allocated to sparing. [Table 3-1](#) shows how memory sparing splits the available and spared memory in each of the single- and dual-ranked memory module combinations.


Table 3-1. Memory Sparing Configurations


DIMMs	Size/Type	Total Memory	Available	Spare
8	1-GB single-rank	8 GB	4 GB	4 GB

Memory Mirroring Support

The system supports memory mirroring if eight identical memory modules are installed in the system. Mirroring must be enabled in the System Setup program and can be used only if memory sparing is not enabled. (See [Using the System Setup Program](#).) In a mirrored configuration, the total available system memory is one-half of the total installed memory.

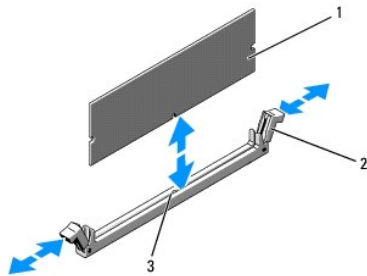
Installing Memory Modules

 **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.

 **CAUTION:** The memory modules are hot to the touch for some time after the system has been powered down. Allow time for the memory modules to cool before handling them. Handle the memory modules by the card edges and avoid touching the components on the memory module.

1. Open the system. See [Opening and Closing the System](#).
2. Remove the memory cooling shroud. See [Removing the Memory Cooling Shroud](#).
3. Locate the memory module sockets. See [Figure 6-2](#).
4. Press the ejectors on the memory module socket down and out, as shown in [Figure 3-12](#), to allow the memory module to be inserted into the socket.
5. Handle each memory module only on either card edge, ensuring not to touch the middle of the memory module.

Figure 3-12. Installing and Removing a Memory Module



1	memory module	2	memory module socket ejectors (2)	3	alignment key
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6. Align the memory module's edge connector with the alignment key of the memory module socket, and insert the memory module in the socket.

NOTE: The memory module socket has an alignment key that allows you to install the memory module in the socket in only one way.
7. Press down on the memory module with your thumbs while pulling up on the ejectors with your index fingers to lock the memory module into the socket.

When the memory module is properly seated in the socket, the ejectors on the memory module socket align with the ejectors on the other sockets that have memory modules installed.
8. Repeat [step 3](#) through [step 7](#) of this procedure to install the remaining memory modules. See [Table 3-1](#).
9. Replace the memory cooling shroud. See [Replacing the Memory Cooling Shroud](#).
10. Close the system. See [Opening and Closing the System](#).
11. 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. See your *Product Information Guide* for complete information about safety precautions, working inside the computer, and protecting against electrostatic discharge.
- CAUTION:** The memory modules are hot to the touch for some time after the system has been powered down. Allow time for the memory modules to cool before handling them. Handle the memory modules by the card edges and avoid touching the components on the memory module.
1. Open the system. See [Opening and Closing the System](#).
 2. Remove the memory cooling shroud. See [Removing the Memory Cooling Shroud](#).
 3. Locate the memory module sockets. See [Figure 6-2](#).

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 3-12](#).

Handle each memory module only on either card edge, ensuring not to touch the middle of the memory module.

5. Replace the memory cooling shroud. See [Replacing the Memory Cooling Shroud](#).
 6. Close the system. See [Opening and Closing the System](#).
-

Activating the Integrated NIC TOE

To add TCP/IP Offload Engine (TOE) functionality to the system's integrated NIC, install the TOE NIC hardware key in the TOE_KEY socket on the system board (see [Figure 6-2](#).)

Processors

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

The following items are included in the processor upgrade kit:

- 1 Processor
- 1 Heat sink

Removing the Processor

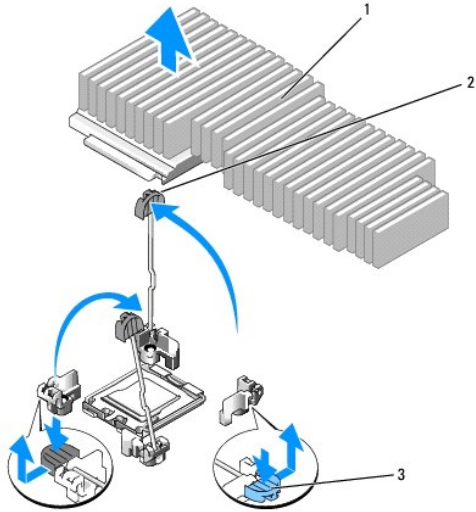
⚠ CAUTION: Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. See your *Product Information Guide* for complete information about safety precautions, working inside the computer, and protecting against electrostatic discharge.

1. Prior to upgrading your system, download the latest system BIOS version on support.dell.com.
2. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
3. Open the system. See [Opening and Closing the System](#).
4. Remove the memory cooling shroud. See [Removing the Memory Cooling Shroud](#).

- ➡ **NOTICE:** When you remove the heat sink, the possibility exists that the processor might adhere to the heat sink and be removed from the socket. It is recommended that you remove the heat sink while the processor is warm.
- ➡ **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.
- ➡ **NOTICE:** The processor and heat sink can become extremely hot. Be sure the processor has had sufficient time to cool before handling.

5. Press the blue tab on the end of one of the heat-sink retention levers to disengage the lever, then lift the lever 90 degrees. See [Figure 3-13](#).

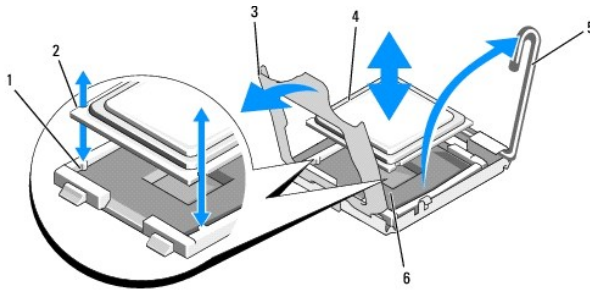
Figure 3-13. Installing and Removing the Heat Sink



1	heat sink	2	heat-sink retention lever (2)	3	retention lever latch
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6. Wait 30 seconds for the heat sink to loosen from the processor.
7. Open the other heat sink retention lever.
8. If the heat sink has not separated from the processor, carefully rotate the heat sink in a clockwise, then counterclockwise, direction until it releases from the processor. Do not pry the heat sink from the processor.
9. Lift the heat sink off of the processor and set the heat sink upside down so as not to contaminate the thermal grease.
10. Pull the socket-release lever 90 degrees upward until the processor is released from the socket. See [Figure 3-14](#).
11. Rotate the processor shield upward and out of the way.

Figure 3-14. Installing and Removing the Processor



1	socket key (2)	2	notch in processor	3	processor shield
4	processor	5	socket-release lever	6	ZIF socket

12. Lift the processor shield to release the processor, and then lift the processor out of the socket. Leave the release lever up so that the socket is ready for the new processor.

NOTICE: Be careful not to bend any of the pins on the LGA socket when removing the processor. Bending the pins can permanently damage the socket and system board.


Installing a Processor

1. Unpack the new processor.
2. Align the processor with the socket keys on the ZIF socket. See [Figure 3-14](#).

3. Install the processor in the socket.


 **NOTICE:** Positioning the processor incorrectly can permanently damage the system board or the processor when you turn the system on.

- a. If the release lever on the processor socket is not positioned all the way up, move it to that position.
- b. With the processor and the socket keys aligned, set the processor lightly in the socket.

 **NOTICE:** Do not use force to seat the processor. When the processor is positioned correctly, it engages easily into the socket.

- c. When the processor is fully seated in the socket, rotate the socket release lever back down until it snaps into place, securing the processor. See [Figure 3-14](#).
- d. Close the processor shield. See [Figure 3-14](#).

4. Install the heat sink.

 **NOTE:** If you did not receive a replacement heat sink, use the heat sink that you removed in [step 9](#).

- a. If you receive a heat sink and pre-applied thermal grease with your processor kit, remove the protective sheet from the thermal grease layer on top of the heat sink.

If you did not receive a replacement heat sink with your processor kit, do the following:

- o Using a clean lint-free cloth, remove the existing thermal grease from the heat sink you removed in [step 9](#).
- o Open the grease packet included with your processor kit and apply thermal grease evenly to the top of the processor.
- o Place the heat sink onto the processor. See [Figure 3-13](#).
- o Close one of the two heat sink retention levers until it locks. See [Figure 3-13](#).
- o Repeat for the other heat sink retention lever.

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

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


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

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

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

See [Running the System Diagnostics](#) for information about running the diagnostics.

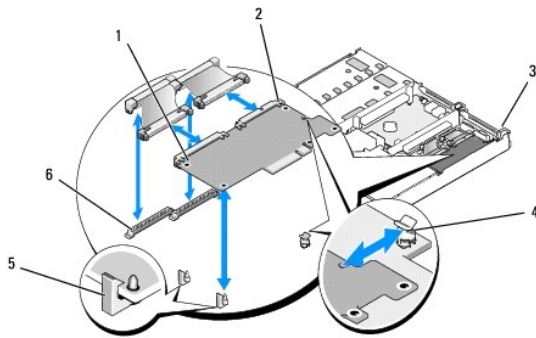
RAC Card

 **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.

The Remote Access Controller (RAC) provides a set of advanced features for managing the server remotely. The following procedure describes the steps for installing the optional RAC card.

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2. Open the system. See [Opening and Closing the System](#).
3. Remove the plastic filler plug from the system back panel. See [Figure 3-15](#).
4. Remove the center riser card from the system board. See [Expansion-Card Riser](#).
5. Angle the RAC card so that its NIC connector inserts through the back-panel RAC card opening, aligning the card with the back standoff.

Figure 3-15. Installing a RAC Card



1	RAC card	2	RAC-card connectors (2)	3	filler plug location
4	back standoff	5	front standoffs (2)	6	RAC-card cable connectors

6. Align the front edge of the RAC card with the front plastic retention standoffs, and press down the front of the card until it is fully seated. See [Figure 3-15](#).

When the front of the card is fully seated, the front plastic standoffs snap over the front edge of the card.

7. Connect the two small RAC cables to the RAC card and the connectors on the system board.
8. Replace the center riser card. See [Expansion-Card Riser](#).
9. Close the system. See [Opening and Closing the System](#).
10. Reconnect the system and peripherals to their power sources, and turn them on.


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

Optical Drive

The slimline optical drive is mounted on a tray that slides into the front panel and connects to the controllers on the system board through the sideplane board.

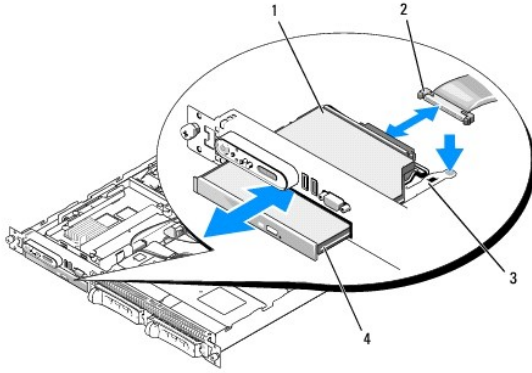
 **NOTE:** DVD devices are data only.

Removing the Optical Drive Tray

 **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.

1. Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
2. Remove the bezel. See [Removing and Replacing the Front Bezel](#).
3. Open the system. See [Opening and Closing the System](#).
4. Remove the SAS controller daughter card. See [Removing a SAS RAID Controller Daughter Card](#).
5. Disconnect the optical-drive cable from the back of the drive. See [Figure 3-16](#).
6. To remove the optical drive, press forward on the blue tray release tab and slide the drive tray out of the system. See [Figure 3-16](#).

Figure 3-16. Removing and Installing the Optical Drive Tray



1	optical -drive tray	2	optical-drive cable	3	optical-drive release tab
4	optical drive				

Installing the Optical Drive Tray

1. Align the optical drive tray with its opening in the front panel.

The optical drive opening is located directly below the SAS daughter card bay.

2. Slide in the drive tray until the tray snaps into place. See [Figure 3-16](#).
3. Connect the optical-drive cable from the back of the drive. See [Figure 3-16](#).
4. Replace the SAS controller daughter card. See [Replacing or Installing a SAS RAID Controller Daughter Card](#).
5. Close the system. See [Opening and Closing the System](#).
6. Replace the bezel. See [Removing and Replacing the Front Bezel](#).
7. Reconnect your system and peripherals to their electrical outlets, and turn on the system.

Hard Drives

This subsection describes how to install and configure SAS hard drives in the system's internal hard-drive bays. Your system features two 3.5-inch (SAS) internal hard-drive bays. All drives connect to the system board through one of two optional backplane boards.

Before You Begin

Hard drives are supplied in special hot-pluggable drive carriers that fit in the hard-drive bays.

➡ **NOTICE:** Before you attempt to remove or install a drive while the system is running, see the documentation for the optional SAS RAID daughter card to ensure that the host adapter is configured correctly to support hot-pluggable drive removal and insertion.

🔍 **NOTE:** It is recommended that you use only drives that have been tested and approved for use with the SAS backplane board.

You may need to use different programs than those provided with the operating system to partition and format SAS hard drives.

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

When you format a high-capacity hard drive, allow enough time for the formatting to be completed. Long format times for these drives are normal. A 9-GB hard drive, for example, can take up to 2.5 hours to format.

Removing a Drive Blank

➡ **NOTICE:** To maintain proper system cooling, all empty hard-drive bays must have drive blanks installed. If you remove a hard-drive carrier from the system and do not reinstall it, you must replace the carrier with a drive blank.

The process for removing a drive blank depends on whether your system is configured with 3.5-inch hard drives.

For 3.5-inch hard drive configurations:

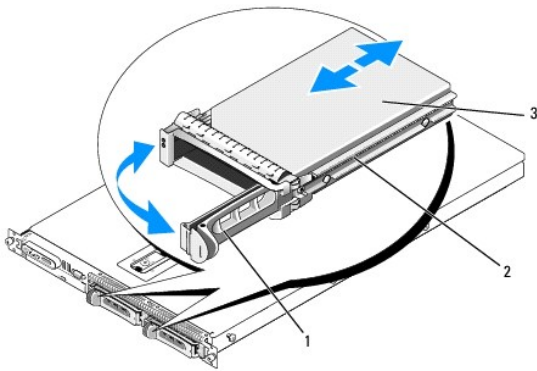
1. Remove the front bezel, if attached. See [Removing and Replacing the Front Bezel](#).
2. Insert your finger under the shrouded end of the blank and press in on the latch to eject the blank outward from the bay.
3. Pry the ends of the blank outward until the blank is free.

Installing a Hot-Plug Hard Drive

- ➔ **NOTICE:** When installing a hard drive, ensure that the adjacent drives are fully installed. Inserting a hard-drive carrier and attempting to lock its handle next to a partially installed carrier can damage the partially installed carrier's shield spring and make it unusable.
- ➔ **NOTICE:** Not all operating systems support hot-plug drive installation. See the documentation supplied with your operating system.

1. Remove the front bezel if attached. See [Removing and Replacing the Front Bezel](#).
2. If a drive blank is present in the bay, remove it. See [Removing a Drive Blank](#).
3. Install the hot-plug hard drive.
 - a. Open the hard-drive carrier handle. See [Figure 3-17](#).

Figure 3-17. Installing a Hot-Plug Hard-Drive



1	drive carrier release handle	2	drive carrier	3	hard drive
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- ➔ **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.

- b. Insert the hard-drive carrier into the drive bay until the carrier contacts the backplane. See [Figure 3-17](#).
 - c. Close the hard-drive carrier handle to lock it in place.
4. Replace the front bezel if it was removed in step 1. See [Removing and Replacing the Front Bezel](#).

Replacing a Hard-Drive Carrier

Removing a Hard Drive From a Hard-Drive Carrier

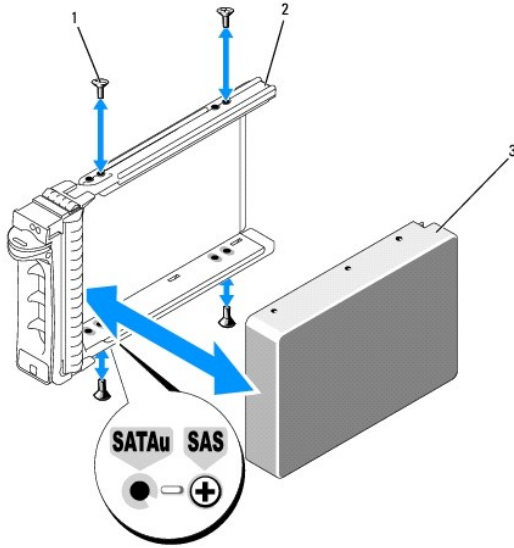
To remove a hard drive from a hard-drive carrier, remove the four screws from the slide rails on the hard-drive carrier and separate the hard drive from the carrier.

Installing a SAS Hard Drive Into a SATAu Drive Carrier

- 🔍 **NOTE:** SAS hard drives must be installed only in SATAu drive carriers. The SATAu drive carrier is labeled "SATAu" and also has marks indicating the SAS and SATA mounting screws.

1. Insert the SAS hard drive into the hard-drive carrier with the connector end of the drive at the rear. See [Figure 3-18](#).
2. Viewing the assembly as shown in [Figure 3-18](#), align the bottom rear screw hole on the hard drive with the hole labeled "SAS" on the hard drive carrier. When aligned correctly, the rear of the hard drive will be flush with the rear of the hard-drive carrier.
3. Attach the four screws to secure the hard drive to the hard-drive carrier. See [Figure 3-18](#).

Figure 3-18. Installing a SAS Hard Drive Into a Drive Carrier



1	screws (4)	2	SATAu drive carrier	3	SAS hard drive
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Expansion-Card Riser

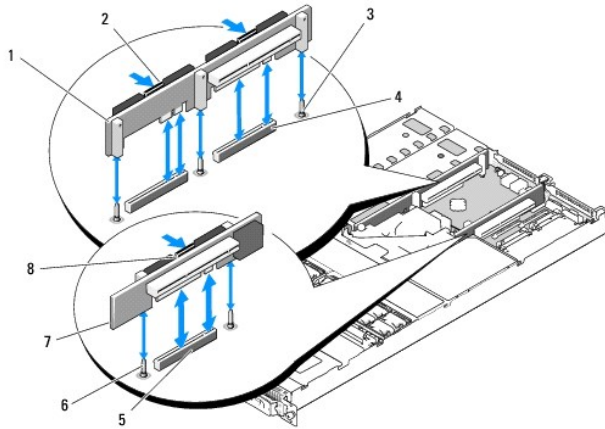
Removing an Expansion-Card Riser

⚠ 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.

1. If applicable, remove the bezel. See [Removing and Replacing the Front Bezel](#).
2. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
3. Open the system. See [Opening and Closing the System](#).
4. If applicable, remove the expansion card from the riser.
5. Press the release latch(es) on the riser board and lift the riser board straight up from the system board. See [Figure 3-19](#).

The left riser board has two release latches; the center riser board has one latch.

Figure 3-19. Expansion-Card Riser Removal



1	left riser board	2	left riser board release latches (2)	3	left riser board alignment pins (2)
4	left riser board connectors (2)	5	center riser board connector	6	center riser board alignment pins (2)
7	center riser board	8	center riser board release latch		

Installing an Expansion-Card Riser

⚠ 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.

1. Align the riser board with the alignment pins on the system board, then lower the board onto the pins.
2. Press down on the riser board until the edge connector(s) on the board is (are) fully seated in the riser board connector on the system board. See [Figure 3-19](#).
3. If applicable, install the expansion card in the expansion-card slot.
4. Close the system. See [Opening and Closing the System](#).
5. Replace the bezel. See [Removing and Replacing the Front Bezel](#).
6. Reconnect your system and peripherals to their electrical outlets, and turn on the system.

Backplane Board

Removing the Backplane Board

⚠ 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.

The removal procedure varies slightly, depending on which backplane board you have in your system.

1. If applicable, remove the bezel. See [Removing and Replacing the Front Bezel](#).
2. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
3. Open the system. See [Opening and Closing the System](#).
4. Remove the hard drives.

📌 NOTE: To properly reinstall the hard drives, ensure that you record which hard drive you remove from which bay.

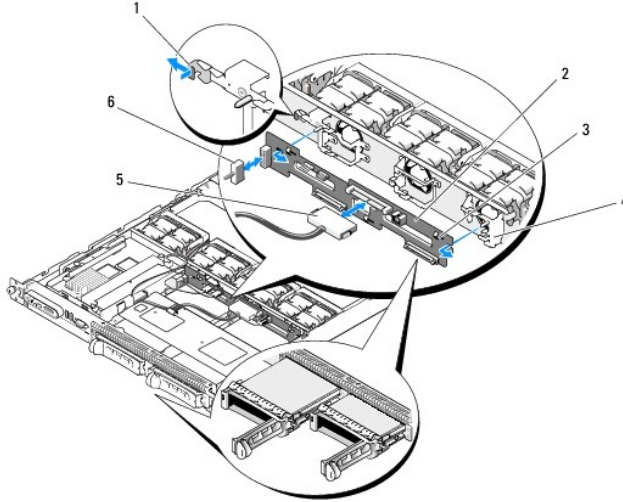
5. Disconnect the SAS cable and power cable from the backplane.

If you are removing a 3.5-inch hard drive (two-drive) backplane, see [Figure 3-20](#).

6. Remove the backplane

If you are removing a 3.5-inch hard drive (two-drive) backplane, press the release latch at the left end of the board, slide the board to its right, and lift the backplane off of the securing tabs. See [Figure 3-20](#).

Figure 3-20. 3.5-Inch Hard Drive Backplane Board Removal and Installation



1	backplane board release latch	2	backplane board	3	securing slots
4	securing tabs	5	SAS interface cable	6	power cable

Installing the Backplane Board

⚠ 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.

1. Replace the backplane board:

When you are installing a 3.5-inch hard drive (two-drive) backplane, fit the board onto the securing tabs, press the release latch at the left end of the board and slide the board to its left. See [Figure 3-20](#).

2. Connect the SAS cable and power cable to the backplane connectors.
3. Reinstall the hard drives.

🔧 NOTE: Reinstall the hard drives in the same drive bays from which they were removed.

4. Close the system.
5. If applicable, install the bezel.

Sideplane Board

Removing the Sideplane Board

⚠ 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.

1. If applicable, remove the bezel. See [Removing and Replacing the Front Bezel](#).
2. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
3. Open the system. See [Opening and Closing the System](#).
4. Remove the SAS controller daughter card. See [Removing a SAS RAID Controller Daughter Card](#).
5. Disconnect the control panel cable and optical drive cable (if applicable) from the sideplane. See [Figure 6-3](#).
6. Press inward on the two sideplane release latches marked in blue and lift the sideplane up and away from the system board.

Installing the Sideplane Board

⚠ 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.

1. Align the guide on the end of the sideplane board with the pins on the system board, and lower the sideplane until that the sideplane connector is fully seated into the connector on the system board.
2. Connect the control panel cable and optical drive cable (if applicable) to the sideplane. See [Figure 6-3](#).
3. Replace the SAS controller daughter card. See [Replacing or Installing a SAS RAID Controller Daughter Card](#).
4. Close the system. See [Opening and Closing the System](#).
5. Replace the bezel. See [Removing and Replacing the Front Bezel](#).
6. Reconnect your system and peripherals to their electrical outlets, and turn on the system.

System Battery

The system battery is a 3.0-volt (V), coin-cell 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. See your *Product Information Guide* for complete information about safety precautions, working inside the computer, and protecting against electrostatic discharge.

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

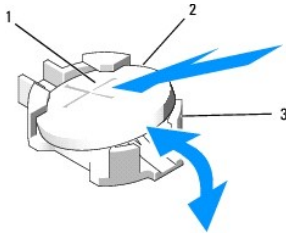
1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2. Open the system. See [Opening and Closing the System](#).
3. If an expansion card is installed in the left riser board, remove the card. See [Removing an Expansion Card](#).
4. Locate the battery socket. See [Figure 3-21](#).

➡ **NOTICE:** If you pry the battery out of its socket with a blunt object, be careful not to touch the system board with the object. Ensure that the object is inserted between the battery and the socket before you attempt to pry out the battery. Otherwise, you may damage the system board by prying off the socket or by breaking circuit traces on the system board.

➡ **NOTICE:** To avoid damage to the battery connector, you must firmly support the connector while installing or removing a battery.

5. Remove the system battery.
 - a. Support the battery connector by pressing down firmly on the positive side of the connector.
 - b. While supporting the battery connector, press the battery toward the positive side of the connector and pry it up out of the securing tabs at the negative side of the connector.

Figure 3-21. Replacing the System Battery



1	positive side of battery connector	2	system battery	3	negative side of battery connector
---	------------------------------------	---	----------------	---	------------------------------------

NOTICE: To avoid damage to the battery connector, you must firmly support the connector while installing or removing a battery.

6. Install the new system battery.
 - a. Support the battery connector by pressing down firmly on the positive side of the connector.
 - b. Hold the battery with the "+" facing up, and slide it under the securing tabs at the positive side of the connector.
 - c. Press the battery straight down into the connector until it snaps into place.
7. If you removed an expansion card in [step 3](#), replace the card now. See [Installing an Expansion Card](#).
8. Close the system. See [Opening and Closing the System](#).
9. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.
10. Enter the System Setup program to confirm that the battery is operating properly. See [Using the System Setup Program](#).
11. Enter the correct time and date in the System Setup program's **Time** and **Date** fields.
12. Exit the System Setup program.
13. To test the newly installed battery, turn off the system and disconnect it from the electrical outlet for at least an hour.
14. After an hour, reconnect the system to its electrical outlet and turn it on.
15. Enter the System Setup program and if the time and date are still incorrect, see [Getting Help](#) for instructions on obtaining technical assistance.

Control Panel Assembly (Service-Only Procedure)

Removing the Control Panel

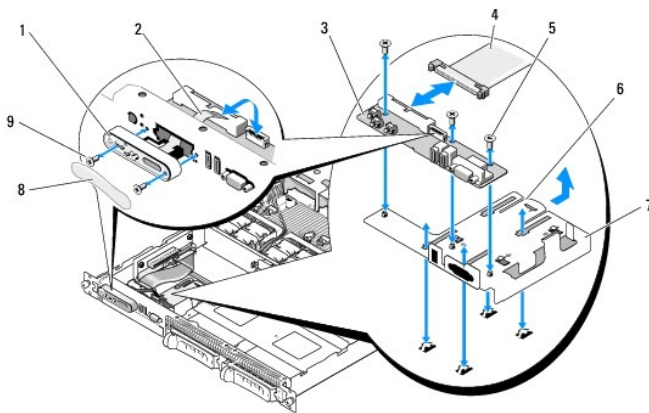
CAUTION: Only trained service technicians are authorized to remove the system cover and access any of the components inside the system. See your *Product Information Guide* for complete information about safety precautions, working inside the computer, and protecting against electrostatic discharge.

1. If applicable, remove the bezel. See [Removing and Replacing the Front Bezel](#).
2. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
3. Open the system. See [Opening and Closing the System](#).
4. Remove the SAS controller daughter card. See [Removing a SAS RAID Controller Daughter Card](#).
5. Disconnect the control panel cable at the back of the control panel board. See [Figure 3-22](#).

NOTICE: Do not pull on the cable to unseat the connector. Doing so can damage the cable.

- a. Squeeze the metal tabs on the ends of the cable connector.
 - b. Gently work the connector out of the socket.
- f. Disconnect the front panel cable from the control panel board. See [Figure 3-22](#).
- g. Lift the release tab at the back of the control panel carrier and slide the carrier towards the back of the system, then lift the carrier out of the system. See [Figure 3-22](#).
- h. Remove the three screws that secure the control panel board to the carrier and remove the board. See [Figure 3-22](#).
- i. Remove the display module:
- a. Insert the end of a paper clip into the hole on the right side of the display module and gently pry the label off.
 - b. Using a T10 Torx driver, remove the two screws that secure the display module to the system chassis. See [Figure 3-22](#).
 - c. Remove the display module from the chassis cutout.

Figure 3-22. Control Panel Removal and Installation



1	display module	2	display module LCD cable	3	control panel circuit board
4	control panel cable	5	control-panel circuit board securing screws (3)	6	control panel carrier release tab
7	control panel carrier	8	display module label	9	display module securing screws (2)

Installing the Control Panel

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.

1. Insert the display module into the chassis cutout and secure it with the two screws.
2. Affix the control panel label to the display module.
3. Install the control panel board on the carrier, and secure it with the three Phillips screws. See [Figure 3-22](#).
4. Install the carrier in the system chassis.
5. Connect the display module ribbon cable to the control panel board.
6. Connect the control panel ribbon cable to the control panel board.
7. Replace the SAS controller daughter card. See [Replacing or Installing a SAS RAID Controller Daughter Card](#).
8. Close the system. See [Opening and Closing the System](#).

9. Reconnect the system to the power source and turn on the system and attached peripherals.
 10. If applicable, install the bezel. See [Removing and Replacing the Front Bezel](#).
-

System Board (Service-Only Procedure)

Removing the System Board

⚠ 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.

1. If applicable, remove the bezel. See [Removing and Replacing the Front Bezel](#).
2. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
3. Open the system. See [Opening and Closing the System](#).
4. Disconnect any cables from the system board back panel.
5. Remove the memory cooling shroud. See [Removing the Memory Cooling Shroud](#).
6. Remove both power supplies. See [Removing a Power Supply](#).
7. Remove the sideplane from the system board. See [Removing the Sideplane Board](#).
8. Remove both the center and left risers from the system board. See [Removing an Expansion-Card Riser](#).
9. Remove the four fan modules. See [Removing a Cooling Fan Module](#).
10. If applicable, remove the RAC card. See [RAC Card](#).
11. Remove the memory modules. See [Removing Memory Modules](#).

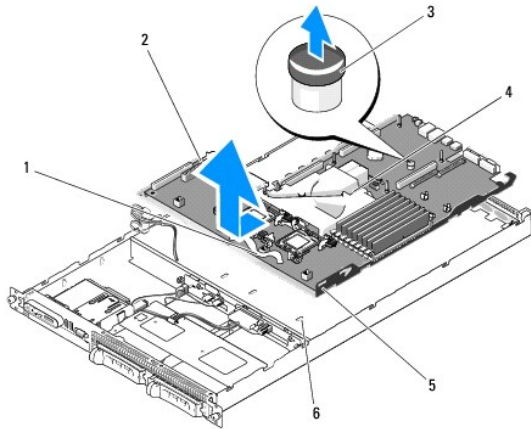
⚠ CAUTION: The memory modules are hot to the touch for some time after the system has been powered down. Allow time for the memory modules to cool before handling them. Handle the memory modules by the card edges and avoid touching the components on the memory module.

🔍 NOTE: While removing the memory modules, record the memory module socket locations to ensure proper installation.

🔍 NOTE: Your system also comes with a pre installed system board cooling shroud. Do not remove the system board cooling shroud. See [Figure 3-5](#).

12. Remove the heatsink(s) and microprocessor(s). See [Removing the Processor](#).
13. If applicable, remove the TOE key. See [Activating the Integrated NIC TOE](#).
14. Remove the system board:
 - a. Pull the system-board release pin. See [Figure 3-23](#).
 - b. While pulling the release pin, grasp the system board release handle and slide the system-board tray toward the front of the chassis.
 - c. Lift up the system-board tray and remove it from the chassis.

Figure 3-23. System Board Removal



1	system-board tray release handle	2	system board attached to system-board tray	3	system board release pin
4	system board cooling shroud	5	system-board securing tabs	6	system-board securing slots

Installing the System Board

⚠ 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.

1. Lower the system-board tray until the tray sits flat on the bottom of the chassis.
2. Ensure that all system-board securing tabs are fully inserted into the system-board securing slots. See [Figure 3-23](#).
3. Slide the system-board tray toward the back of the chassis until it locks into position.
4. If applicable, replace the RAC card. See [RAC Card](#).
5. If applicable, replace the TOE key. See [Activating the Integrated NIC TOE](#).
6. Replace the heatsink(s) and microprocessor(s).
7. Replace the memory modules. See [Installing Memory Modules](#).
8. Replace both the center and left risers. See [Installing an Expansion-Card Riser](#).
9. Replace any expansion card(s). See [Installing an Expansion Card](#).
10. Replace the sideplane board. See [Installing the Sideplane Board](#).
11. Replace the fan modules. See [Replacing a Cooling Fan Module](#).
12. Replace the memory cooling shroud. See [Replacing the Memory Cooling Shroud](#).
13. Replace the power supplies. See [Replacing a Power Supply](#).
14. Connect any cables to the system.
15. Close the system. See [Opening and Closing the System](#).
16. Replace the bezel. See [Removing and Replacing the Front Bezel](#).

Jumpers and Connectors

Dell™ PowerVault™ NX1950 Systems Hardware Owner's Manual

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

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

System Board Jumpers

[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 system board cooling shroud by lifting the release latch and sliding the shroud towards the front of the system. See [Figure 3-12](#).
- NOTE: Lift up the memory module airflow shroud for easy access to the jumpers.

Figure 6-1. System Board Jumpers

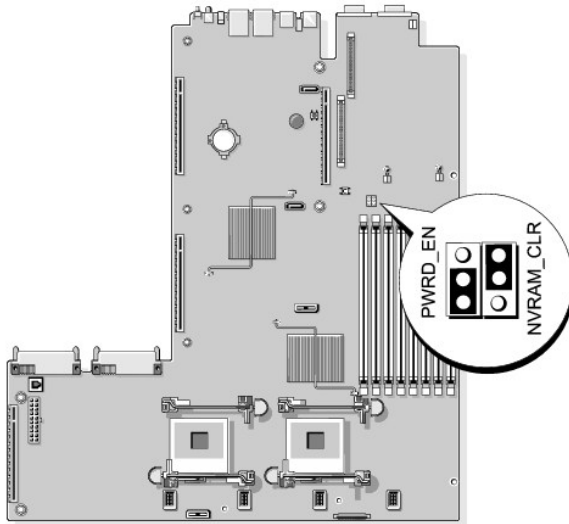






Table 6-1. System Board Jumper Settings

Jumper	Setting	Description
1 PWRD_EN	 (default)	The password feature is enabled.
		The password feature is disabled.
2 NVRAM_CLR	 (default)	The configuration settings are retained at system boot.
		The configuration settings are cleared at the next system boot. (If the configuration settings become corrupted to the point where you cannot boot the system, remove the jumper before restoring the configuration information.)

NOTE: For the full name of an abbreviation or acronym used in this table, see the [Glossary](#).

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.


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

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2. Open the system. See [Opening and Closing the System](#).
3. Lift up the memory module shroud.
4. Remove the jumper plug from the password jumper.

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

5. Close the system.
6. Reconnect your system and peripherals to their electrical outlets, and turn on the system.

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

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

7. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
8. Open the system. See [Opening and Closing the System](#).
9. Install the jumper plug on the password jumper.
10. Lower the memory module shroud.
11. Close the system.
12. Reconnect your system and peripherals to their electrical outlets, and turn on the system.
13. Assign a new system and/or setup password.

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

System Board Connectors

See [Figure 6-2](#) and [Table 6-2](#) for the location and description of system board connectors.

Figure 6-2. System Board Connectors

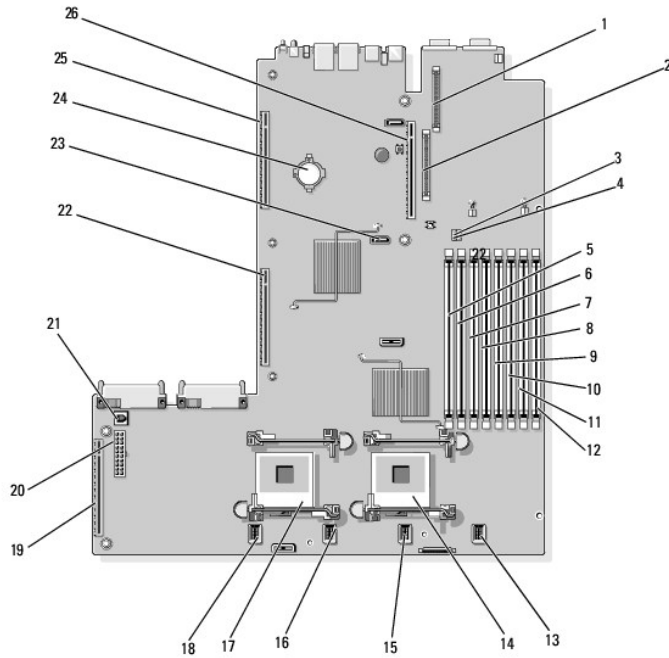


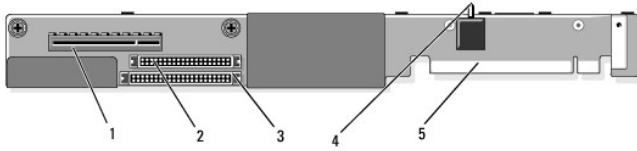
Table 6-2. System Board Connectors

	Connector	Description
1	RAC_CONN2	Connector for the remote access control connector (RAC)
2	RAC_CONN1	Connector for the remote access control connector
3	NVRAM_CLR	Configuration jumper
4	PWRD_EN	Password jumper
5	DIMM 1	Memory module connector, slot 1
6	DIMM 5	Memory module connector, slot 5
7	DIMM 2	Memory module connector, slot 2
8	DIMM 6	Memory module connector, slot 6
9	DIMM 3	Memory module connector, slot 3
10	DIMM 7	Memory module connector, slot 7
11	DIMM 4	Memory module connector, slot 4
12	DIMM 8	Memory module connector, slot 8
13	FAN_MOD4	System cooling fan module 4 connector
14	CPU1	Microprocessor connector 1
15	FAN_MOD3	System cooling fan module 3 connector
16	FAN_MOD2	System cooling fan module 2 connector
17	CPU2	Microprocessor connector 2
18	FAN_MOD1	System cooling fan module 1 connector
19	SIDEPLANE	Sideplane connector
20	BACKPLANE	Backplane power connector
21	TOE_KEY	TCP/IP offload engine key
22	LEFT PCIe RISER	Left riser board connector
23	SATA_A	SATA A connector
24	BATTERY	Connector for the 3.0-V coin battery
25	LEFT RISER	Left riser board connector (PCIe)
26	CENTER RISER	Center riser board connector (PCIe)

NOTE: For the full name of an abbreviation or acronym used in this table, see the [Glossary](#).

SAS Sideplane Board Connectors

Figure 6-3. Side Plane Components



1	SAS daughter card connector	2	control panel connector	3	IDE/optical drive connector
4	chassis intrusion switch	5	connector to system board		

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Using the System Setup Program

Dell™ PowerVault™ NX1950 Systems Hardware Owner's Manual

- [Entering the System Setup Program](#)
- [System Setup Options](#)
- [System and Setup Password Features](#)
- [Disabling a Forgotten Password](#)
- [Baseboard Management Controller Configuration](#)

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 [System Messages](#) for an explanation of the message and suggestions for correcting errors.


 **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

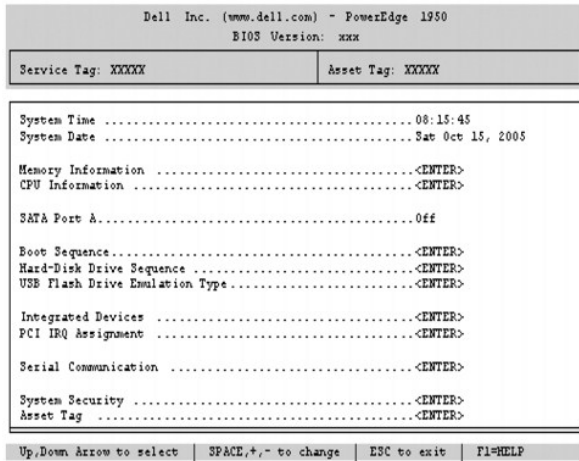


Table 2-2 lists the options and descriptions for the information fields that appear on the main System Setup program screen. For related information, see [System Security Screen Options](#).



-  **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.
Memory Information	Displays information related to installed system, video, and redundant memory, including size, type, and speed of memory modules, system memory test option status, and redundant memory status.
CPU Information	Displays information related to microprocessors (speed, cache size, and so on). See CPU Information Screen ."
SATA Port x	Displays type and capacity of drive attached to port x.
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. If you have installed a RAC, additional options, such as virtual floppy and virtual CD-ROM, may be present. 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.
USB Flash Drive 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.
Serial Communication (Off default)	Options are On with Console Redirection via COM2, and Off .
Failsafe Baud Rate (57600 default)	Displays the failsafe baud rate used for console redirection when the baud rate cannot be negotiated automatically with the remote terminal. This rate should not be adjusted.
Remote Terminal Type (VT 100/VT 220 default)	Select either VT 100/VT 220 or ANSI .
Redirection After Boot (Enabled default)	Enables or disables BIOS console redirection after your system boots to the operating system.
Embedded Server Management	Displays a screen to configure the front-panel LCD options and to set a user-defined LCD string. For more information, see the systems management software documentation that describes the features, requirements, installation, and basic operation of the embedded software.
System Security	Displays a screen to configure the system password and setup password features. See System Security Screen , 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.

CPU Information Screen

[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 processors.
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 utilize Virtualization Technology functions 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 X ID	Displays the family and model number of each processor. A submenu displays processor and core speed, amount of level 2 cache, and the number of cores.

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
Integrated SAS Controller (Enabled default)	Enables or disables the integrated SAS controller.
Embedded SATA Controller (Off default)	Allows the integrated SATA controller to be set to Off or ATA mode.
IDE CD-ROM 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 an external IDE controller is not detected. NOTE: This CD-ROM option will not appear on this menu screen if your system does not include this optional device.
User-Accessible USB Ports (All Ports On default)	Enables or disables the system's user-accessible ports. Options are All Ports On , Only Back Ports On , or All Ports Off . Disabling the USB ports makes system resources available for other devices.
Embedded Gb NIC1 (Enabled with PXE default)	Enables or disables the system's integrated NIC1. Options are Enabled without PXE , Enabled with PXE , and Disabled . PXE support allows the system to boot from the network. Changes take effect after the system reboots.
MAC Address	Displays the MAC address for NIC1. This field does not have user-selectable settings.
TOE Capability	Displays the TCP/IP Offload Engine (TOE) feature status of NIC1.
Embedded Gb NIC2 (Enabled without PXE default)	Enables or disables the system's integrated NIC2. Options are Enabled without PXE , Enabled with PXE , and Disabled . PXE support allows the system to boot from the network. Changes take effect after the system reboots.
MAC Address	Displays the MAC address for NIC2. This field does not have user-selectable settings.
TOE Capability	Displays the TCP/IP Offload Engine (TOE) feature status of NIC2.

System Security Screen

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

Table 2-5. System Security Screen Options

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Option	Description
System Password	<p>Displays the current status of your system's password security feature and allows you to assign and verify a new system password.</p> <p>NOTE: See Using the System Password for instructions on assigning a system password and using or changing an existing system password.</p>
Setup Password	<p>Restricts access to the System Setup program in the same way that you restrict access to your system using the system password feature.</p> <p>NOTE: See Using the Setup Password for instructions on assigning a setup password and using or changing an existing setup password.</p>
Password Status	<p>Setting the Setup Password option to Enabled prevents the system password from being changed or disabled at system start-up.</p> <p>To <i>lock</i> 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>.</p> <p>To <i>unlock</i> 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.</p>
Power Button	<p>Turns system's power off and on.</p> <ul 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. <p>The button is enabled in the System Setup program. When disabled, the button can only turn on system power.</p> <p>NOTE: You can still turn on the system by using the power button, even if the Power Button option is set to Disabled.</p>
NMI Button	<p>NOTICE: Use the NMI button only if directed to do so by qualified support personnel or by the operating system's documentation. Pressing this button halts the operating system and displays a diagnostic screen.</p> <p>Enables or disables the NMI feature.</p>
AC Power Recovery (Last default)	<p>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.</p>

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
- 1 Return to Setup

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. 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

Read the information in the following sections to assign or change your 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](#).

Disabling a Forgotten Password

See [Disabling a Forgotten Password](#).

Baseboard Management Controller Configuration

The Baseboard Management Controller (BMC) enables configuring, monitoring, and recovery of systems remotely. BMC provides the following features:

- 1 Uses the system's integrated NIC
- 1 Fault logging and SNMP alerting
- 1 Access to system event log and sensor status
- 1 Control of system functions including power on and off
- 1 Support is independent of the system's power or operating state
- 1 Provides text console redirection for system setup, text-based utilities, and operating system consoles

 **NOTE:** To remotely access the BMC through the integrated NIC, you must connect the network connection to integrated NIC1.

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

Entering the BMC Setup Module

1. Turn on or restart your system.
2. Press <Ctrl+E> when prompted after POST.

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

BMC Setup Module Options

For information about the BMC Setup Module options and how to configure the emergency management port (EMP), see the *BMC User's Guide*.

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Troubleshooting Your System

Dell™ PowerVault™ NX1950 Systems Hardware Owner's Manual

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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 1-1](#).

Table 4-1. Start-Up Routine Indications

Look/listen for:	Action
A status or error message displayed on the front-panel LCD.	See LCD Status Messages .
An error message displayed on the monitor.	See System Messages .
Alert messages from the systems management software.	See the systems management software documentation.
The monitor's power indicator.	See Troubleshooting the Video Subsystem .
The keyboard indicators.	See Troubleshooting the Keyboard .
The USB CD drive activity indicator.	See Troubleshooting a USB Device .
The CD 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 4-2](#) lists the IRQ assignments.

Table 4-2. 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	Reserved
IRQ7	Reserved
IRQ8	Real-time clock
IRQ9	ACPI functions (used for power management)
IRQ10	Available
IRQ11	Available
IRQ12	Available
IRQ13	Math coprocessor
IRQ14	IDE CD drive controller
IRQ15	Available

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 [Front-Panel Features and Indicators](#) and [Back-Panel Features and Indicators](#) for the front- and back-panel connectors on your system.

Troubleshooting the Video Subsystem

 **NOTE:** Using the video subsystem with your PowerVault NX1950 system is optional. You can operate your system using remote connectivity techniques.

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. Determine whether the system has monitors attached to both the front and rear video connectors.

The system supports only one monitor attached to either the front or rear video connector. When a monitor is connected to the front panel, the back-panel video connector is disabled.

If two monitors are attached to the system, disconnect one monitor. If the problem is not resolved, continue to the next step.

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

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

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

Troubleshooting the Keyboard

 **NOTE:** Using the keyboard with your PowerVault NX1950 system is optional. You can operate your system using remote connectivity techniques.


Problem

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

Action

1. Examine the keyboard and its cable for signs of damage.
2. Swap the faulty keyboard with a working keyboard.
If the problem is resolved, replace the faulty keyboard. See [Getting Help](#).
3. Enter the System Setup program and ensure that the USB ports are enabled. See [Using the System Setup Program](#).
If the problem is not resolved, see [Getting Help](#).
4. Run the appropriate online diagnostic test. See [Using Server Administrator Diagnostics](#).

Troubleshooting the Optional Mouse

 **NOTE:** Using the mouse with your PowerVault NX1950 system is optional. You can operate your system using remote connectivity techniques.

Problem

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

Action

1. Examine the mouse and its cable for signs of damage.
If the mouse is not damaged, go to [step 4](#).
 2. Enter the System Setup program and ensure that the USB ports are enabled. See [Using the System Setup Program](#).
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. If the problem is not resolved, see [Getting Help](#).
 5. Run the appropriate online diagnostic test. See [Using Server Administrator Diagnostics](#).
If the test fails, continue to the next step.
-

Troubleshooting Basic I/O Functions

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 the serial port/COM ports are configured appropriately for any applications you are using. 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 Server Administrator 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.

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.
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 [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 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 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. See Network Cable Requirements in your *Getting Started Guide*.
-

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 and Closing the System](#).
 3. Remove all expansion cards installed in the system. See [Removing an Expansion Card](#).
 4. Let the system dry thoroughly for at least 24 hours.
 5. Close the system. See [Opening and 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 Server Administrator 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 and Closing the System](#).
2. Ensure that the following components are properly installed:
 - 1 Expansion cards and risers
 - 1 Power supplies
 - 1 Processor and heatsink
 - 1 Memory modules
 - 1 Fans
 - 1 Drive-carrier connections to the SAS backplane board, if applicable
3. Ensure that all cables are properly connected.
4. Close the system. See [Opening and Closing the System](#).
5. Run the system board tests in the system diagnostics. See [Running the System 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](#).
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.
- 1 Front-panel status LCD indicates a problem with the power supplies.

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 Server Administrator Diagnostics](#).
2. Locate the faulty power supply.

The power supply's fault indicator is lit. See [Power Indicator Codes](#).

You can hot-plug the power supplies. One power supply must be installed for the system to operate. The system is in the redundant mode when two power supplies are installed. Remove and install only one power supply at a time in a system that is powered on. Operating the system for extended periods of time with only one power supply installed, without a power supply blank installed, can cause the system to overheat.

Remove the faulty power supply. See [Power Supplies](#).

3. Ensure that the power supply is properly installed by removing and reinstalling it. See [Power Supplies](#).

 **NOTE:** After installing a power supply, allow several seconds for the system to recognize the power supply and to determine if it is working properly. The power indicator turns green to signify that the power supply is functioning properly. See [Power Indicator Codes](#).

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 Ambient temperature is too high.
- 1 External airflow is obstructed.
- 1 Cables inside the system obstruct airflow.
- 1 An individual cooling fan 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 Display module LCD 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 Server Administrator Diagnostics](#).
2. Open the system. See [Opening and Closing the System](#).

 **CAUTION:** The cooling fans are not hot-pluggable. To maintain proper cooling while the system is on, only replace one fan at a time.

3. Locate the faulty fan indicated by the LCD display or diagnostic software. For the identification number of each fan, see [Removing and Installing a Cooling Fan](#).
4. Ensure that the faulty fan's power cable is firmly attached to the fan power connector. See [Cooling Fan Modules](#).

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


5. If the problem is not resolved, install a new fan. See [Cooling Fan Modules](#).
If the replacement fan is working properly, close the system. See [Opening and 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 status LCD indicates 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 Server Administrator Diagnostics](#).
2. Turn on the system and attached peripherals.
If an error message does not appear, continue to the next step.
If an error message appears, go to [step 12](#).
3. Enter the System Setup program and check the system memory setting. See [Entering the System Setup Program](#).
If the amount of memory installed matches the system memory setting, go to [step 12](#).
4. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
5. Open the system. See [Opening and Closing the System](#).
6. Remove the memory cooling shroud. See [Removing the Memory Cooling Shroud](#).
7. Reseat the memory modules in their sockets. See [Installing Memory Modules](#).
8. Replace the memory cooling shroud. See [Replacing the Memory Cooling Shroud](#).
9. Close the system. See [Opening and Closing the System](#).

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

11. 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 and Closing 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 [Opening and 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.

12. 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 and Closing the System](#).
- c. Perform step c through step f in [step 11](#) for each memory module installed.

If the problem persists, 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.

 **NOTE:** DVD devices are data only.

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. 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 Server Administrator Diagnostics](#).
4. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
5. Open or remove the bezel. See [Removing and Replacing the Front Bezel](#).
6. Open the system. See [Opening and Closing the System](#).
7. Ensure that the interface cable is securely connected to the optical drive and to the sideplane.
8. Remove the SAS controller daughter card or the SAS RAID controller daughter card, as applicable. See [Removing a SAS RAID Controller Daughter Card](#).
9. Close the system. See [Opening and Closing the System](#).
10. Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.


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


Troubleshooting 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 diagnostic test. See [Using Server Administrator Diagnostics](#).

Depending on the results of the diagnostics test, proceed as needed through the following steps.

2. Remove the bezel. See [Removing and Replacing the Front Bezel](#).
3. If you are experiencing problems with multiple hard drives, skip to [step 7](#). For a problem with a single hard drive, continue to the next step.
4. Turn off your system, reseal the hard drive, and restart the system.
5. Perform the following steps for your SAS RAID controller daughter card:
 - 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.
6. Ensure that the required device drivers for your controller daughter card are installed and are configured correctly. See the operating system documentation for more information.
7. 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 and Closing the System](#).
 - c. Verify that the cable connections between SAS backplane(s) and the SAS daughter card are correct. See [Replacing or Installing a SAS RAID Controller Daughter Card](#).
 - d. Verify that the SAS cables are securely seated in their connectors.
 - e. Verify that the power connectors on the SAS backplane(s) are securely seated in their connectors.
 - f. Close the system. See [Opening and Closing the System](#).
 - g. Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.

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


Troubleshooting a SAS RAID Controller Daughter Card

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

Problem


- 1 Error message indicates a problem with the SAS RAID controller daughter card.
- 1 SAS RAID controller daughter 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 Server Administrator Diagnostics](#).
 2. Enter the System Setup program and ensure that the SAS RAID controller daughter card is enabled. See [Using the System Setup Program](#).
 3. Restart the system and press the key sequence to enter the configuration utility program: <Ctrl><R> for a SAS RAID controller
See 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 and Replacing the Front Bezel](#).
 6. Turn off the system and attached peripherals, and disconnect the system from its electrical outlet.
 7. Open the system. See [Opening and Closing the System](#).
 8. Ensure that the controller card is firmly seated in its connector. See [SAS Controller Daughter Card](#).
 9. For your SAS RAID controller daughter card, 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 daughter card are correct. See [Replacing or Installing a SAS RAID Controller Daughter Card](#).
 11. Ensure that the cables are firmly connected to the SAS controller daughter card and the SAS backplane board.
 12. Close the system. See [Opening and Closing the System](#).
 13. Reconnect the system to its electrical outlet, and turn on the system and attached peripherals. If the problem persists, proceed as follows:
 1. For the SAS controller daughter card, see [Getting Help](#).
 1. Replace the SAS RAID daughter card battery. See [Installing a RAID Battery](#). If replacing the battery does not solve the problem, see [Getting Help](#).
-


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 Server Administrator Diagnostics](#).
2. Open or remove the bezel. See [Removing and Replacing the Front Bezel](#).
3. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
4. Open the system. See [Opening and Closing the System](#).


5. Ensure that each expansion card is firmly seated in its connector. See [Installing an Expansion Card](#).
 6. Close the system. See [Opening and 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 and Closing the System](#).
 10. Remove all expansion cards installed in the system. See [Installing an Expansion Card](#).
 11. Close the system. See [Opening and 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 and Closing the System](#).
 - c. Reinstall one of the expansion cards.
 - d. Close the system. See [Opening and Closing the System](#).
 - e. Run the appropriate diagnostic test.
If the tests fail, see [Getting Help](#).
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Troubleshooting the Microprocessors

Problem

1. Error message indicates a processor problem.
1. Front-panel status LCD indicates a problem with the processors or system board.
1. A heat sink is not installed for each 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. Run the appropriate online diagnostics test. See [Using Server Administrator Diagnostics](#).
2. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
3. Open the system. See [Opening and Closing the System](#).
4. Ensure that each processor and heat sink are properly installed. See [Removing the Processor](#).
5. Close the system. See [Opening and Closing the System](#).
6. Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.
7. Run the appropriate online diagnostic test.
If the tests fail or the problem persists, continue to the next step.

8. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
 9. Open the system. See [Opening and Closing the System](#).
 10. Remove processor 2, leaving only processor 1 installed. See [Removing the Processor](#).
If only one processor is installed, see [Getting Help](#).
 11. Close the system. See [Opening and Closing the System](#).
 12. Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.
 13. Run the appropriate online diagnostic test.
If the tests complete successfully, go to [step 19](#).
 14. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
 15. Open the system. See [Opening and Closing the System](#).
 16. Replace processor 1 with another processor of the same capacity. See [Removing the Processor](#).
 17. Close the system. See [Opening and Closing the System](#).
 18. Run the appropriate online diagnostic test.
If the tests complete successfully, replace processor 1. See [Getting Help](#).
 19. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
 20. Open the system. See [Opening and Closing the System](#).
 21. Reinstall the processor that you removed in [step 10](#). See [Removing the Processor](#).
 22. Close the system. See [Opening and Closing the System](#).
 23. Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.
If the problem persists, see [Getting Help](#).
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