

# Dell™ PowerVault™ 715N Systems Service Manual

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## Notes, Notices, and Cautions



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



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



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

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# System Overview

## Dell™ PowerVault™ 715N Systems Service Manual

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## Overview

Your network attached storage (NAS) appliance enables you to easily add storage to a workgroup, small office, or small business network and offload the file management responsibilities from the server. The NAS appliance is a "headless" device, which means it has no keyboard, mouse, or monitor, but can be managed through the network or by using console redirection through a serial connection. The system offers the data security capabilities of general-purpose servers.

This document provides basic information about the system features, service features, and specifications.

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## System Features

The system offers the following major features:

- An Intel® Celeron™ microprocessor with an internal bus speed of at least 850 MHz or an Intel Pentium® III microprocessor with an internal bus speed of at least 1 GHz
- 1-U chassis
- Two DIMM slots
- Four IDE hard drives connected to four IDE master channels in a software RAID configuration
- 162-W power supply
- System cooling fan and two power-supply cooling fans
- Serial port used for console redirection
- One 32-bit, 33-MHz low-profile PCI slot
- A minimum of 256 MB (for early systems with a SN1A system board) or 384 MB (for later systems with a SN1B system board) of SDRAM system memory, upgradable by installing registered PC-133 SDRAM memory modules in the two memory module sockets
- A flash BIOS that can be upgraded through console redirection
- Two integrated Intel 82559 10/100+ NICs with RJ-45 Ethernet connectors

The following software is included in the system:

- Microsoft® Windows® Powered operating system with Service Pack 2.
- Microsoft Server Appliance (SA) kit.
- Services for UNIX®, Novell® NetWare®, and Macintosh (integrated into the Microsoft Windows Powered operating system).
- Protocol support for TCP/IP, DHCP (client support), DNS (client support), NIS (client support), IPX, CIFS, NFS, and IPV6.
- First Time Configuration support through DHCP, Dell OpenManage™ Kick-Start, or RAS serial connection (setup through serial connection in non-DHCP environments).

- Disk management through Dell OpenManage Array Manager.
  - Dell ActiveArchive™ snapshot software.
  - A [BIOS Setup utility](#) for quickly viewing and changing the system configuration information.
  - [Diagnostics](#) for evaluating your system's components and devices. For more information about using the system diagnostics, see your *Installation and Troubleshooting Guide*.
- 

## Service Features

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

- A temperature monitor that shuts down the system if the temperature exceeds the threshold setting.
- System diagnostics, which checks for hardware problems.
- PowerVault NAS Manager, which is used through a browser to monitor and manage the system.
- A chassis and system board that simplifies removing and replacing components.
- Microsoft Windows powered operating system online help (available through Terminal Services).

The system chassis simplifies removing and replacing system components. You can replace an expansion card, a microprocessor, or DIMMs without removing the system board. The midplane board and hard- drive carriers eliminate the extensive cabling and drive configuration usually required for a hard- drive subsystem.

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## Power Protection Devices

Devices are available that protect against power problems such as power surges, transients, and power failures. The following subsections describe some of the devices.

### Surge Protectors

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

### Line Conditioners

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

### Uninterruptible Power Supplies

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

UPS systems range in price from a few hundred dollars to several thousand dollars, with the more expensive units allowing you to run larger systems for a longer period of time when AC power is lost. UPS systems that provide only 5 minutes of battery power allow you to conduct an orderly shutdown of the system, but they are not intended to provide continued operation. Surge protectors should be used with all UPS systems, and the UPS system should be Underwriters

## Other Documents You Might Need

The following documentation is included with your system:

- The *User's Guide*, which describes system features, technical specifications, and the BIOS Setup utility.
- The *Installation and Troubleshooting Guide*, which provides information about installing and troubleshooting your system.
- The *System Administrator's Guide*, which provides system operation and management information.
- Dell™ PowerVault™ NAS Manager online help.
- The *System Information* document, which provides important safety and regulatory information. Warranty information might be included within this document or as a separate document.
- The *Rack Installation Guide*, which provides information for installing the system in a rack.
- Microsoft Windows Powered online help.

You might also have one or more of the following documents:

- Documentation that is included with options you purchase separately from the system. This documentation includes information that you need to configure and install these options in your system.
  - Technical information files—sometimes called "readme" or "release notes" files—that might be installed on the CDs that came with your system to provide last-minute updates about technical changes to the system or advanced technical reference material intended for experienced users or technicians.
  - Information updates that are sometimes included with the system to describe changes to the system or software documentation. Always read the updates before consulting any other documentation. The updates often contain information that supersedes the information in the other documents.
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## Technical Specifications

### Processor

Microprocessor type	Intel Celeron microprocessor with an internal bus speed of at least 850 MHz or an Intel Pentium III microprocessor with an internal bus speed of at least 1 GHz
Math coprocessor	internal to microprocessor

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### Expansion Bus

Bus types	PCI bus
Expansion slots	one 32-bit, 33-MHz slot

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### Memory

Memory module sockets	two ECC PC-133 SDRAM DIMM sockets
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Memory module capacities	128-, 256-, and 512-MB registered SDRAM DIMMs; must be rated for 133-MHz operation
Minimum RAM	256 MB for early systems with a SN1A system board, or 384 MB for later systems with a SN1B system board

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## Drives

IDE hard drives	four 1-inch, internal hard drives with capacities of at least 40 GB
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## External Ports and Connectors

Serial	one 9-pin connector UART 16550-compatible
NIC	two RJ-45 connectors for connection to internal embedded NICs (Intel 82559 10/100 Ethernet controllers)

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## Power

Wattage	one 162-W power supply
Input voltage	100- to 240-V at 47–63 Hz, autoranging
Output voltages and maximum current	+5 VDC at 15 A +3.3 VDC at 8 A +12 VDC at 8 A –12 VDC at 0.1 A +5 Vfp (volts flea power) at 1 A
Backup battery	CR2032 3-V lithium coin cell

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## Physical

Height	4.2 cm (1.6 inches)
Width	42.5 cm (16.7 inches)
Depth	46.3 cm (18.2 inches)
Weight	9.5 kg (21 lb) maximum configuration

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## Environmental

Temperature:	
Operating	10°C to 35°C (50°F to 95°F) at 10,000 feet above sea level 10°C to 40°C (50°F to 104°F) at sea level
Storage	–40°C to 65°C (–40°F to 149°F)
Relative humidity:	
Operating	20% to 80%, noncondensing
Storage	5% to 95%, noncondensing
Maximum vibration:	

Operating	bottom only tested (negative z-axis) at 0.25 G zero-to-peak, at a sweep of 3 to 200 Hz at 0.5 octave per minute
Non-operating	all six sides tested (positive and negative x, y, and z axes) at 0.5 G (sinusoidal wave) zero-to-peak, at a sweep of 3 to 200 Hz at 0.5 octave per minute

Maximum shock:

Operating half sine wave	31 G (bottom only tested) with pulse duration of 2.6 ms or less (20 inches/s [51 cm/s])
Storage (non-operating half sine wave)	71 G (all six sides tested) with pulse duration of 2 ms or less (35 inches/s [89 cm/s])

Altitude:

Operating	-15.2 to 3,048 m (-50 to 10,000 ft)
Storage	-15.2 to 10,668 m (-50 to 35,000 ft)

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# Basic Troubleshooting


## Dell™ PowerVault™ 715N Systems Service Manual

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  - [External Visual Inspection](#)
  - [Observing the Boot Routine](#)
  - [Internal Visual Inspection](#)
  - [Running System Diagnostics](#)
  - [Obtaining Technical Assistance](#)
- 

## Overview

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

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

 **NOTE:** To perform troubleshooting, you can use the console redirection function on the serial port (COM1). See the *System Administrator's Guide* for more information about console redirection.

Perform the following procedures in the order presented.

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## Initial User Contact

When you first contact a user who has a problem, ask the user to describe the problem and the conditions under which it occurs. After the user describes the problem, perform the following steps:

1. Ask the user to back up any data on the hard drive if the system's condition permits.

See the documentation provided with the operating system or applications software for information about backing up data.

2. Ask the user to duplicate the problem by repeating the operations he or she was performing at the time the problem occurred.

Can the user duplicate the problem?

**Yes.** Proceed to step 3.

**No.** Proceed to the next section, "[External Visual Inspection](#)."

3. Observe the user to determine if he or she is making an error, such as typing an incorrect key combination or entering a command incorrectly.

Is the problem a result of user error?

**Yes.** Instruct the user in the proper procedure or direct the user to the appropriate user documentation for the correct procedure.

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

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## External Visual Inspection

Improperly set switches, controls, and loose or improperly connected cables are the most likely source of problems for the system or other peripherals. A quick check of all the switches, controls, and cable connections can easily solve the problems.

The external visual inspection consists of a quick inspection of the exterior of the system and cables. While performing the visual inspection, make any necessary corrections. To perform the external visual inspection, perform the following steps:


1. Inspect the [system status LEDs](#) for an indication of component malfunction.
2. Turn off the system, including any attached peripherals.
3. If the system is connected to a power distribution unit (PDU), turn the PDU off and then on again.  
If the system is not receiving power, plug the PDU into another electrical outlet. If it still is not receiving power, try another PDU, and then reconnect the system to the electrical outlet or PDU.
4. Inspect the exterior of the system, including all controls and indicators, and all user-accessible data storage devices for any signs of physical damage.

Does the inspection reveal any problems?

**Yes.** Proceed to the appropriate procedure in "[Removing and Replacing Parts](#)."

**No.** Proceed to "[Observing the Boot Routine](#)."

## Observing the Boot Routine


 **NOTE:** To observe the boot routine, you must use the console redirection function on the serial port (COM1). See the *System Administrator's Guide* for more information about console redirection.

Looking at and listening to the system are important in determining the source of a problem. Look and listen during the system's startup routine for the indication described in Table 1.

**Table 1. Startup Routine Indications**

Look and Listen for:	Action
An error message (through console redirection)	See " <a href="#">Codes, Error Messages, and Indicators</a> ."
The hard drive activity indicators	See " <a href="#">Codes, Error Messages, and Indicators</a> ."
A series of beeps	See " <a href="#">Codes, Error Messages, and Indicators</a> ."
An unfamiliar constant scraping or grinding sound when you access a hard drive	See " <a href="#">Hard Drives</a> " in " <a href="#">Removing and Replacing Parts</a> ."


## Internal Visual Inspection

 **NOTICE:** Before you proceed with the internal visual inspection described in this section, ensure that the user has saved all open files and exited all open application programs, if possible, to prevent loss of data.

A simple visual inspection of a system's interior hardware can often lead to the source of a problem, such as a loose expansion card, cable connector, or mounting screw. When you perform the visual inspection, see "[System Features](#)" to locate components referenced in the inspection procedure.

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

1. Turn off the system, including any attached peripherals, and disconnect all the power cables from electrical outlets.

 **CAUTION:** Before beginning to work inside the system, disconnect the power supply from the power source and the power supply cables from the power supply.

2. Remove the system cover as described in "[System Cover](#)."

 **CAUTION:** The microprocessor and heat-sink assembly can get extremely hot during system operations. Be sure that it has had sufficient time to cool before touching it.

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

3. Verify that the memory modules, expansion cards, and microprocessor and heat-sink assembly or assemblies are fully seated in their sockets or connectors.
4. To remove and reseal a microprocessor and heat-sink assembly, perform the steps described in "[Microprocessor](#)."
5. To remove and reseal a memory module, perform the steps described in "[Memory Modules](#)."



6. If you need to remove and reseat an expansion card, remove the card as described in "[Expansion Card](#)," and carefully reinsert the card in its connector until fully seated.
7. Verify that all jumpers are set correctly.  
For information about jumper settings, see "[System Board Jumpers](#)."
8. Ensure that all cable connectors inside the system are firmly attached to their appropriate connectors.
9. Replace the [system cover](#).
10. Reconnect the system and any attached peripherals to their power sources, and turn them on.


Does the problem appear to be resolved?

**Yes.** No further steps are necessary.

**No.** Proceed to "[Obtaining Technical Assistance](#)."

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## Running System Diagnostics

 **NOTE:** To run the system diagnostics, you must use the console redirection function on the serial port (COM1). See the *System Administrator's Guide* for more information about console redirection.

To enter the system diagnostics, perform the following steps:


1. Connect the client system to the system with a serial cable.
2. Turn on the client system and set up a Hyperterminal connection.
  - a. Click the **Start** button and point to **Programs® Accessories® Communications® Hyperterminal**.
  - b. Select **115200** for the bits per second, **8** for data bits, **None** for parity, **1** for stop bits, and **Xon\Xoff** for flow control.
3. Restart the appliance.
4. Press <F2> immediately after you see the following message:

Press <F2> to Enter the Function Select Menu

 **NOTE:** If you use a version of Microsoft® Windows® 2000 earlier than Service Pack 2, the function keys do not work. You must press <Esc><2>.

If you wait too long and your operating system begins to boot, allow the appliance to complete the boot, and then shut down the appliance and try again.

5. When a menu appears, press <4> to run system diagnostics.
6. When a message appears asking if you are sure you want to run diagnostics, press <Y>, and then press <Enter>.

 **NOTE:** The system diagnostics program does not start until the power-on self test (POST) completes.

For complete information about system diagnostics, See "Running System Diagnostics" in the *Installation and Troubleshooting Guide*.

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## Obtaining Technical Assistance

If none of the troubleshooting procedures in this section or the tests in the diagnostics reveals the source of the problem or leads to the proper troubleshooting steps for determining the source of the problem, see the Dell | Support website at [support.dell.com](http://support.dell.com) or call Dell for technical assistance. For instructions on contacting Dell, see "Getting Help" in the *Installation and Troubleshooting Guide*.

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# Codes, Error Messages, and Indicators

## Dell™ PowerVault™ 715N Systems Service Manual

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[System Messages](#)

[System Beep Codes](#)

[Status Indicators](#)

## Overview

This section describes beep codes, system error messages, and system status indicators that can occur during system startup or, in the case of some failures, during normal system operation. The tables in this section list faults that can cause a beep code or system error message to occur and the probable causes of the fault in each case. This section also suggests actions you can take to resolve problems indicated by a message.

If a faulty system does not emit beep codes or display system error messages to indicate a failure, run the appropriate tests in the system diagnostics to help isolate the source of the problem. See "[Running System Diagnostics](#)."

Several different types of messages can indicate when the system functions improperly:

- System messages
- System beep codes
- Status indicators


## System Messages

System messages alert you to a possible operating system problem or a conflict between the software and hardware.

To view system messages, perform the following steps:

1. Connect a client system to the appliance and enter the [BIOS Setup utility](#).
2. Select **Advanced CMOS Setup**.
3. Select **View DMI Event**, and then press <Enter>.

[Table 1](#) lists the system error messages and the probable cause for each message.

 **NOTE:** If you receive a system message that is not listed in [Table 1](#), check the documentation for the application program that is running when the message appears or the operating system documentation for an explanation of the message and recommended action.

**Table 1. System Messages**

Message	Cause	Corrective Action
HDD Controller Failure	BIOS cannot communicate with the hard-drive controller.	Check the connections to the hard drive. Reinstall the hard drive. Check the interface cable and power cable connections to the backplane board. If the problem persists, <a href="#">replace the system and midplane board</a> .
CMOS Battery Low	The battery on the system board is low.	<a href="#">Replace the system battery</a> . If the problem persists, <a href="#">replace the system and midplane board</a> .
CMOS Checksum Bad	The checksum value (CMOS RAM settings) differs from the current value.	In the BIOS Setup utility, select to autoload the optimal setting. See " <a href="#">Using the BIOS Setup Utility</a> " for information about changing this setting.
CMOS Time and Date Not Set	The BIOS does not have date and time values.	Use the BIOS Setup utility to set the time and date. See " <a href="#">Using the BIOS Setup Utility</a> " for information about changing this setting.

Pri Master HDD error	Primary hard drive is not responding.	<a href="#">Replace the primary hard drive.</a> If the problem persists, <a href="#">replace the system and midplane board.</a>
Sec Master HDD error	Secondary hard drive is not responding.	<a href="#">Replace the secondary hard drive.</a> If the problem persists, <a href="#">replace the system and midplane board.</a>
Cache Memory Error	Cache memory is defective.	Disable the cache memory in the BIOS Setup utility. See " <a href="#">Using the BIOS Setup Utility.</a> "

## System Beep Codes

When an error that cannot be reported (through a console redirection screen) occurs during a boot routine, the system may emit a series of beeps that identify the problem. The beep code is a pattern of sounds; for example, five beeps indicate a problem with the microprocessor. This information is valuable to the technical support representative if you need to call for technical assistance.

When a beep code is emitted, record it, and then look it up in [Table 2](#). If you are unable to resolve the problem by looking up the meaning of the beep code, use the system diagnostics to identify a more serious cause. See "[Running System Diagnostics.](#)"

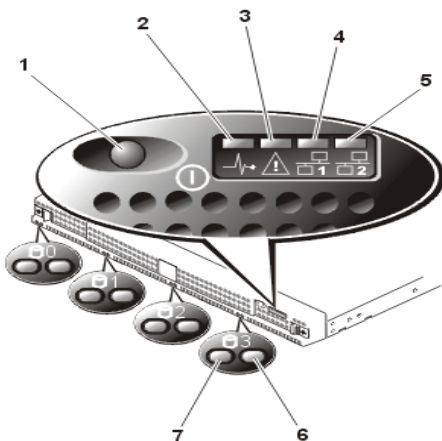
**Table 2. System Beep Codes**

Code	Cause	Corrective Action
1	The memory refresh circuitry on the system board is faulty.	<a href="#">Replace the system and midplane board.</a>
2	Base 64 KB memory failure.	Switch memory modules. <a href="#">Remove and reseal the memory modules.</a> If the problem persists, <a href="#">replace the memory modules.</a> If the problem still persists, <a href="#">replace the system and midplane board.</a>
5	Microprocessor error.	<a href="#">Remove and reseal the microprocessor.</a> If the problem persists, <a href="#">replace the microprocessor.</a> If the problem still persists, <a href="#">replace the system and midplane board.</a>
7	Microprocessor exception interrupt error.	<a href="#">Replace the system and midplane board.</a>
10	ROM checksum error.	The ROM checksum value does not match the value encoded in the BIOS. <a href="#">Replace the system board battery.</a> If the problem persists, <a href="#">replace the system and midplane board.</a>

## Status Indicators

[Figure 1](#) shows the indicators on the system's bezel.

**Figure 1. Status Indicators**



- 1 Power on/off switch
- 2 Power LED
- 3 Warning LED
- 4 LAN 1 LED
- 5 LAN 2 LED
- 6 Hard- drive activity indicator
- 7 Hard- drive operation indicator

## Power Indicators

- Green indicates normal operation.
- Flashing amber indicates a system failure.

## Warning Indicators

- Any pattern or color indicates a system error. See "[System Messages](#)" and "[System Beep Codes](#)" for more information about possible system errors.
- Off indicates normal operation.

## LAN Indicators

### LAN 1 LED

- Green indicates that the system is connected to the network through the LAN 1 port.
- Flashing green indicates that activity between the system and other devices on the network.
- Off indicates that the system is disconnected from the network or that the LAN 1 port is not working properly.

### LAN 2 LED

- Green indicates that the system is connected to the network through the LAN 2 port.
- Flashing green indicates that activity between the system and other devices on the network.
- Off indicates that the system is disconnected from the network or that the LAN 2 port is not working properly.

## Hard-Drive Indicators

Each hard drive has two LED indicators, an operation LED on the left side and an activity LED on the right side. LEDs are visible when the bezel is attached to the front of the system. The LEDs provide the following information for each drive:

- Green on the operation LED indicates that the hard drive is installed in the drive bay and working.  
Amber on this LED indicates that the hard drive is installed in the bay, but it is not working properly.
- Flashing amber on the activity LED indicates that read or write activity is occurring on the hard drive.

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# Removing and Replacing Parts

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  - [Control Panel Board](#)
  - [Cooling Fan](#)
  - [System Board and Midplane Board](#)
  - [Power Supply](#)
  - [Expansion Card](#)
  - [Riser Card](#)
  - [Memory Modules](#)
  - [Microprocessor](#)
  - [Battery](#)
- 

## Overview

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

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

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

When a replacement procedure is not provided, use the removal procedure in reverse order to install the replacement part.

## Recommended Tools

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

- #0, #1, and #2 Phillips screwdrivers
  - Wrist grounding strap
- 

## Bezel

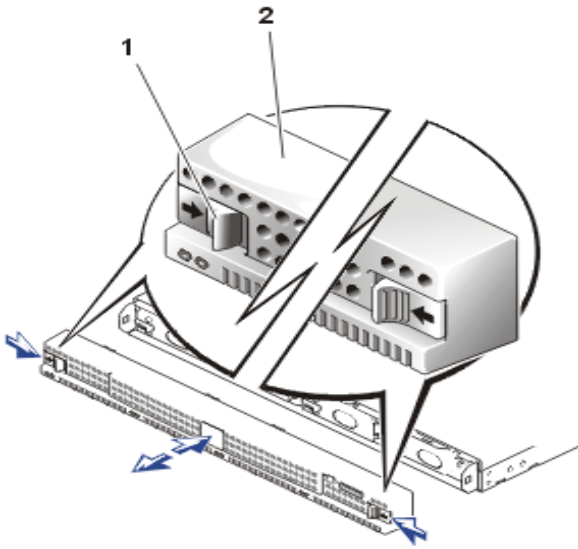
Removing the bezel provides access to the hard drives.

 **CAUTION:** See the safety instructions in your *System Information* booklet before working inside your system.

To remove the bezel, push the levers on the outside inward and pull the bezel away from the system (see [Figure 1](#)).

### Figure 1. Bezel Removal

- 1 Release levers
- 2 Bezel



To replace the bezel, push the levers inward and push the bezel onto the front of the system.

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## System Cover

The system has a cover that provides access to system board components and the PCI expansion card. To service the system, remove the cover to gain access to internal components.

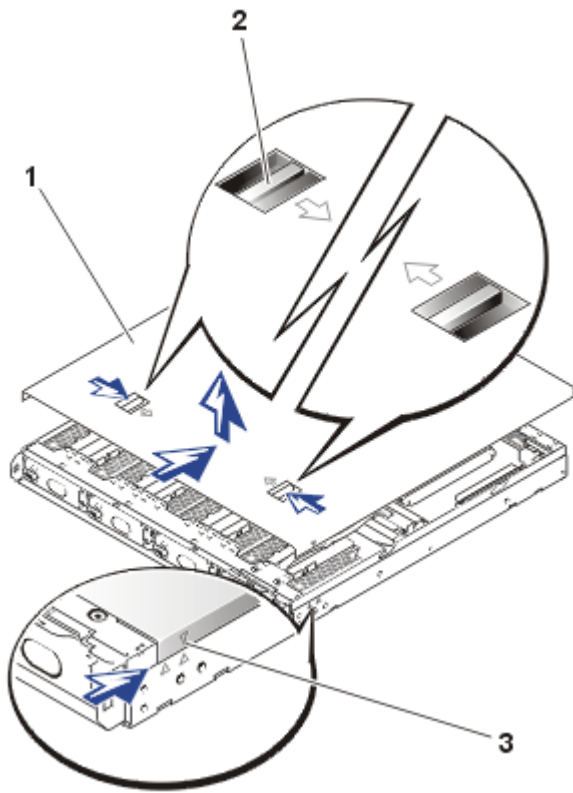
## System Cover Removal

**⚠ CAUTION:** See the safety instructions in your *System Information* booklet before working inside your system.

1. Push the latches on the top of the system inward (see [Figure 2](#)).
2. Slide the system cover backward about 16 mm (0.6 inch) until the embossed arrowheads on the sides of the cover and chassis are aligned (see [Figure 2](#)).
3. Carefully lift the cover away from the system.

### Figure 2. System Cover Removal

- 1 Cover
- 2 Latches (2)
- 3 Arrowheads aligned for removal



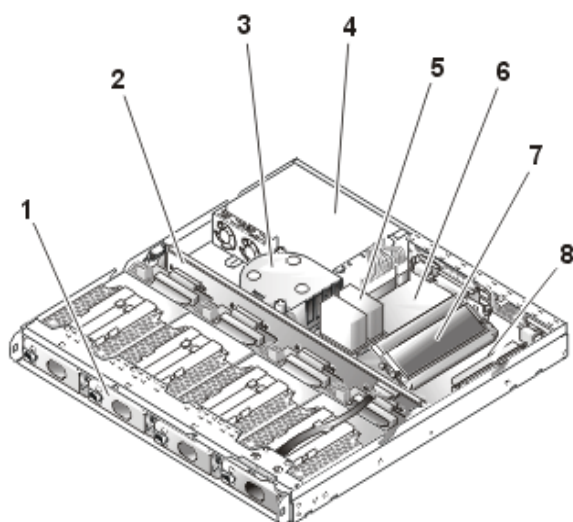
## System Cover Replacement

1. Ensure that tools, parts, or unconnected cables are not left inside the system.
2. Fit the cover over the sides of the chassis until the embossed rear arrowhead is aligned with the arrowhead on the side of the cover (see [Figure 2](#)).
3. Slide the cover forward until the latches snap into place.

## Inside the Chassis

In [Figure 3](#), the system cover and bezel are removed to provide an interior view of the system. Refer to this illustration to locate interior features and components discussed later in this manual.

**Figure 3. Inside the System**



- 1 Hard drives (4)
- 2 Midplane board
- 3 Cooling fan assembly
- 4 Power supply
- 5 Microprocessor and heat sink
- 6 System board
- 7 Memory modules (2)
- 8 PCI riser card

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 system board can accommodate one PCI expansion card.



The hard-drive bays provide space for up to four, 1-inch hard drives. The hard drives are connected to an integrated hard-drive controller on the system board through a backplane board.

Power is supplied to the backplane board, the system board, and internal peripherals through the power supply. The backplane board provides power to the hard drives.

During a service procedure, you might be required to change a jumper or switch setting. For more information about the system board jumpers, see "[Jumpers, Switches, and Connectors](#)."

## Hard Drives

Your system comes with four IDE hard drives in a RAID configuration. The drives are *not* hot swappable. Each hard drive is mounted in a hard-drive carrier.

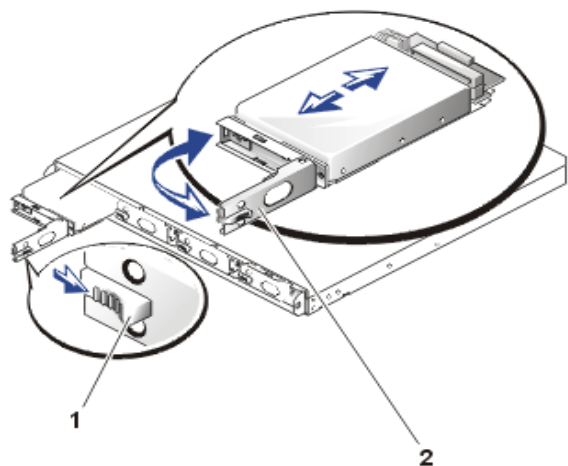
**⚠ CAUTION:** Read the safety instructions in your *System Information* document.

## Hard-Drive Removal

**⚠ CAUTION:** Read the safety instructions in your *System Information* document.

1. Shut down the system and disconnect the power cables from their outlets.
2. [Remove the bezel](#).
3. Remove the power cord from the system power input receptacle.
4. Open the drive carrier handle by pushing the release lever to the right (see [Figure 4](#)).
5. Pull open the latch and use it to pull the drive carrier out of the drive bay (see [Figure 4](#)).

**Figure 4. Hard Drive and Carrier Removal**



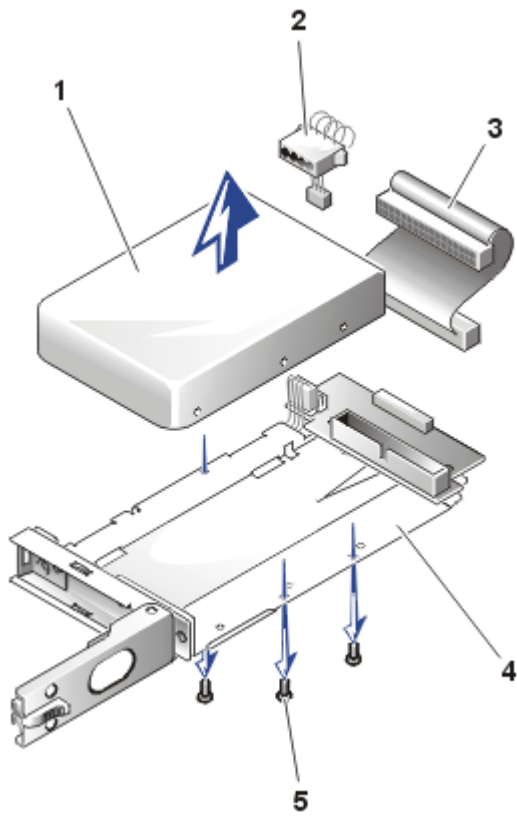
- 1 Release lever
- 2 Latch

## Hard-Drive Replacement

1. Ensure that all configuration jumpers on the replacement drive are set to the same settings as the drive you removed.
2. If your replacement hard drive is installed in its carrier, open the handle on the carrier.
3. If the replacement hard drive has no carrier, remove the faulty hard drive from its carrier:
  - a. Using a #1 Phillips screwdriver, remove the screws that secure the drive to the carrier (see [Figure 5](#)).
  - b. Remove the hard drive from the carrier.

**Figure 5. Hard-Drive Removal From Carrier**

- 1 Hard drive



- 2 Power connector
- 3 Interface cable
- 4 Hard-drive carrier
- 5 Screws (4)

4. Insert the replacement hard drive into the carrier and install the screws you removed in step 2a to secure the drive.

**NOTICE:** Ensure that the hard drive's power cables do not extend beyond the outside (left) edge of the carrier, which might cause damage to the wires.

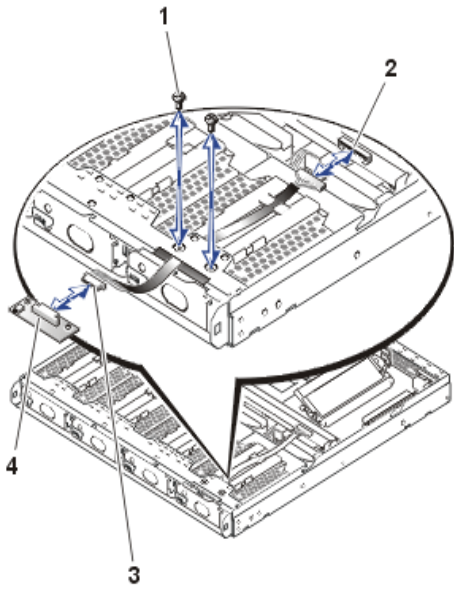
- 5. Open the handle on the carrier and install the replacement hard drive and carrier into its slot in the drive bay (see [Figure 4](#)).
- 6. Close the handle until it engages the front panel, locking the drive in place.
- 7. [Replace the bezel](#).
- 8. Run the [system diagnostics](#) to test and prepare the new drive.
- 9. Follow the appropriate procedure for restoring your data and adding mirrors in the section, "Managing Hard Drives" in the *System Administrator's Guide*.

## Control Panel Board

In [Figure 6](#), the control panel is shown removed from the system chassis.

**Figure 6. Control Panel Removal**

- 1 6-32 x 0.25-inch Phillips screw (3)
- 2 Midplane connector (JP5)
- 3 Ribbon cable connector
- 4 Control panel board



To remove the control panel assembly, perform the following steps.

**⚠ CAUTION:** Read the safety instructions in your *System Information* document.

1. Turn off the system.
  2. [Remove the bezel](#).
  3. Disconnect the system power cables from their electrical outlets.
  4. Remove the [system cover](#).
  5. Disconnect the ribbon cable from connector JP5 on the midplane board (see [Figure 6](#)).
  6. Using a #0 Phillips screwdriver, remove the two screws that secure the control panel to the chassis.
  7. Push the ribbon cable forward until the control panel comes out of the front of the system chassis.
  8. Disconnect the ribbon cable from the control panel board.
- 

## Cooling Fan

A single fan assembly is mounted beside the microprocessor and heat-sink socket. This cooling fan directs cooling air across the microprocessor and heat sink and across the memory modules and the PCI expansion card before exiting the chassis through holes in the back panel.

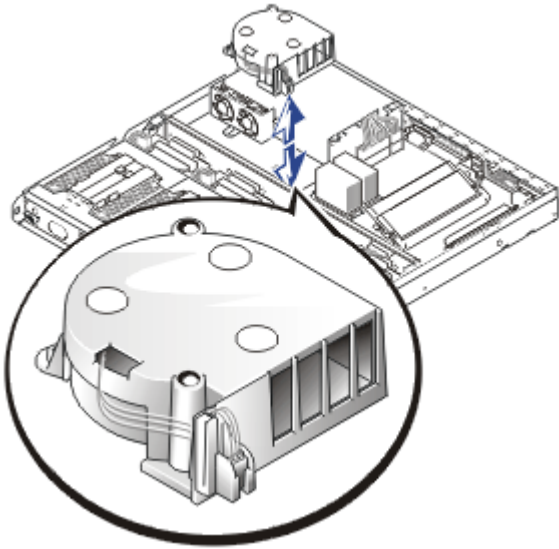
**⚠ CAUTION:** Read the safety instructions in your *System Information* document.

### Removing the Fan Assembly

If you observe that a fan is not operating or if the server management application issues a fan-related error message, perform the following steps to replace the faulty fan:

1. Turn off the system.
2. [Remove the bezel](#).
3. Disconnect the system power cables from their electrical outlets.
4. [Remove the system cover](#).
5. Lift the fan assembly out of the chassis carefully, making sure that the connector disconnects from the system board (see [Figure 7](#)).

Figure 7. Fan Assembly



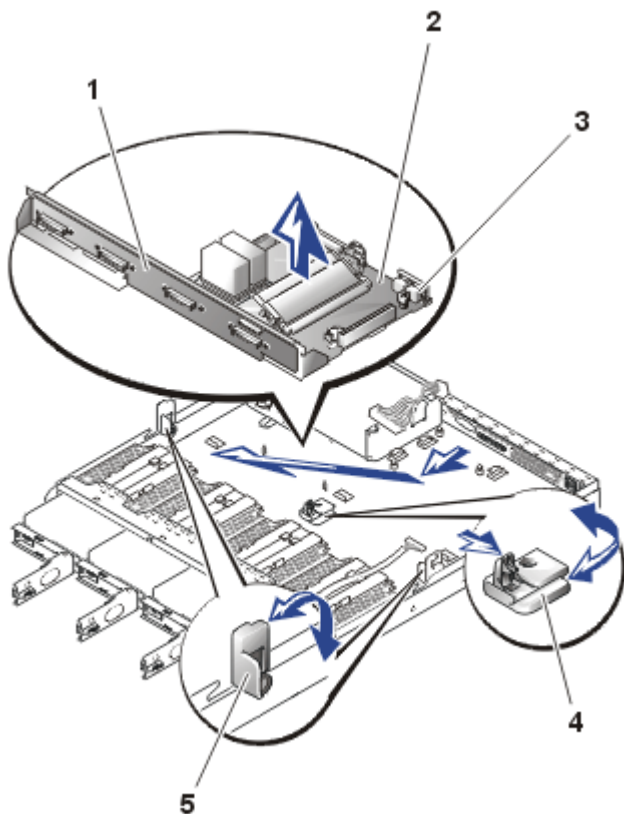
When replacing the fan assembly, ensure that the fan fits over the pegs on the chassis floor, as well as the fan power connector on the corner of the system board.

## System Board and Midplane Board

The system board and midplane board are joined together with a connector and secured to a metal bracket. Connectors on the front of the midplane board connect to the four hard drives. On the back of the midplane board is a single large connector that connects to the system board, providing control and data signals and power for the four hard drives (see Figure 8). A ribbon cable from the midplane board connects to the control panel board.

 **CAUTION:** Read the safety instructions in your *System Information* document.

Figure 8. System Board and Midplane Board Removal



- 1 Midplane board
- 2 System board
- 3 Thumbscrew
- 4 Center release latch
- 5 Side latches (2)

# System Board and Midplane Board Removal

 **CAUTION:** Read the safety instructions in your *System Information* document.

1. Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
2. [Remove the bezel.](#)
3. [Remove the system cover.](#)
4. [Remove the fan assembly.](#)
5. Pull each hard-drive carrier partially out of its slot, approximately 2.5 cm (1 inch).
6. Label and disconnect the [control panel ribbon cable attached to the midplane board \(JP5\).](#)
7. Disconnect the two [DC power cables from their power input connector on the system board.](#)
8. Remove all external peripheral cables from their connectors at the back of the system.
9. Record the locations and remove all internal cables attached to the system board.
10. [Remove the expansion card,](#) if one is installed.
11. [Remove the riser card.](#)
12. Release the [side latches on each end of the midplane board.](#)
13. Press the [center release latch tab](#) toward the midplane while pulling on the latch's right edge.  
The latch pivots away from the midplane board.
14. Unscrew the thumbscrew securing the system board to the chassis floor.
15. Slide the system board and midplane board toward the front of the system chassis about 6.3 mm (0.25 inch).
16. Carefully pivot the system board and midplane board up and out of the chassis.  
Be sure to lift the midplane board first, and when it is free of the chassis, pull the system board away from the back panel.
17. Place the system board and midplane board on a smooth, antistatic surface.
18. [Remove the microprocessor.](#)
19. Remove the [memory modules.](#)

# System Board and Midplane Board Replacement

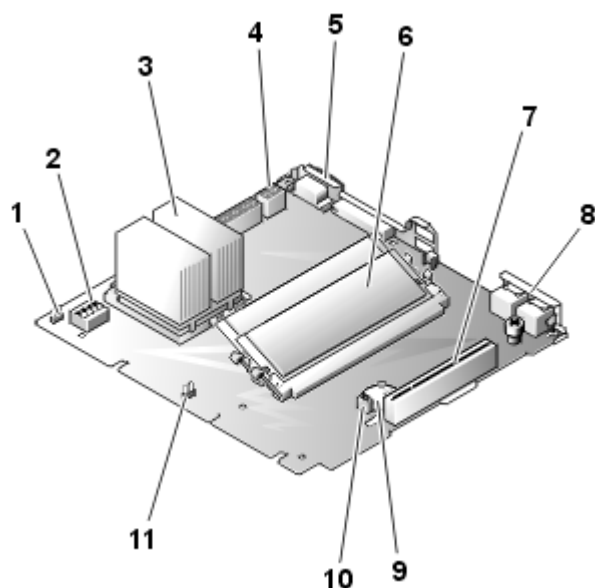
1. Pivot the system board and midplane board assembly into the chassis, first lowering the system board end, and then lowering the midplane board. When the midplane board reaches the chassis floor, slide the assembly to the rear about 6.3 mm (0.25 inch).  
The grounding pins enter their holes on the system board and the serial port connector protrudes from its opening in the back panel.
2. Tighten the thumbscrew to secure the system board to the chassis floor.
3. Lock the [side latches](#) on each end of the midplane board.
4. Pivot the center release latch tab toward the midplane until it locks in place with a click.
5. Install the [memory modules.](#)
6. [Install the microprocessor.](#)
7. Ensure that the system board jumpers and switches are set to the same settings as the board you removed.
8. Connect the two DC power cables to their [power input connectors \(CN1 and CN2\)](#) on the system board.

9. [Install the riser card.](#)
10. Install the [expansion card.](#)
11. [Install the fan assembly.](#)
12. [Replace the system cover.](#)
13. [Replace the bezel.](#)
14. Reconnect any external peripheral cables that you disconnected from their connectors at the back of the system.
15. Connect the power to the system and turn on the system.

## System Board Features

[Figure 9](#) defines the system board features. The system board labels are in parentheses. Refer to this figure when replacing your system board or components that attach to the system board.

**Figure 9. System Board Features**



- 1 Fan power connector (CPUFAN1)
- 2 DIP switch (SW3)
- 3 Microprocessor and heat sink (CPU)
- 4 Power supply connectors (CN1 and CN2)
- 5 Serial port connector (COM1)
- 6 Memory modules (DIMM1 and DIMM2)
- 7 PCI riser card slot (PCI1)
- 8 LAN connectors (LAN1 and LAN2)
- 9 Battery connector (BT1)
- 10 Clear CMOS jumper (JP1)
- 11 System version jumper (JP5)

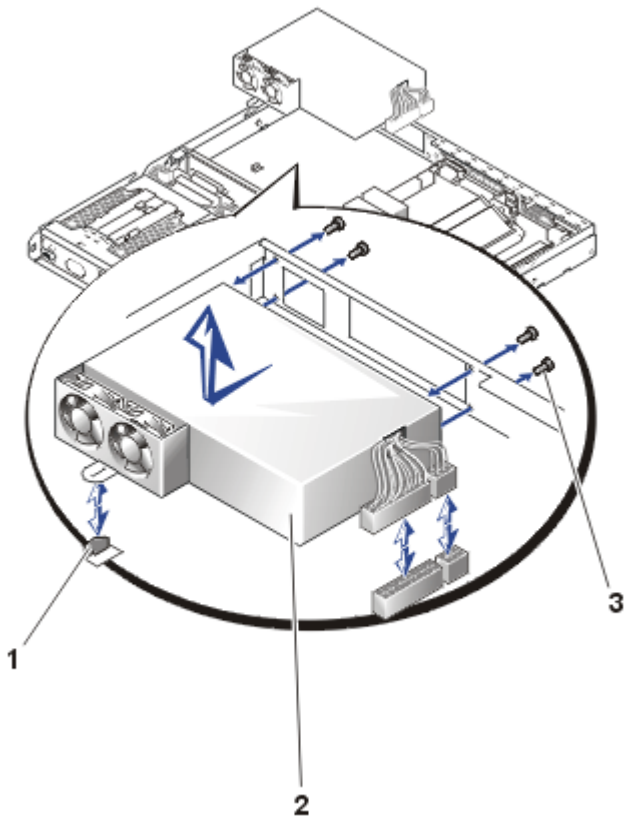
## Power Supply

Your system has a single power supply, which is secured by a locking tab and four screws (see [Figure 10](#)).

**⚠ CAUTION:** Read the safety instructions in your *System Information* document.

**Figure 10. Power Supply Removal**

- 1 Locking tab
- 2 Power supply
- 3 Screws (4)



To remove a power supply, perform the following steps.

**⚠ CAUTION:** Avoid touching the cable connectors on the power supply. Wait 10 to 20 seconds after disconnecting the power cord before removing the power supply or coming into contact with its cable connectors.

1. Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
2. [Open the bezel.](#)
3. [Remove the system cover.](#)
4. [Remove the fan assembly.](#)
5. Disconnect the two [DC power connectors](#) on the system board (see [Figure 9](#)).
6. Using a #1 Phillips screwdriver, remove the four Phillips screws securing the power supply to the back of the system chassis.
7. Push the power supply forward (and away from the back panel) about 6.3 mm (0.25 inch).  
The power supply must clear the locking tab on the floor of the chassis.
8. Lift the power supply out of the chassis.

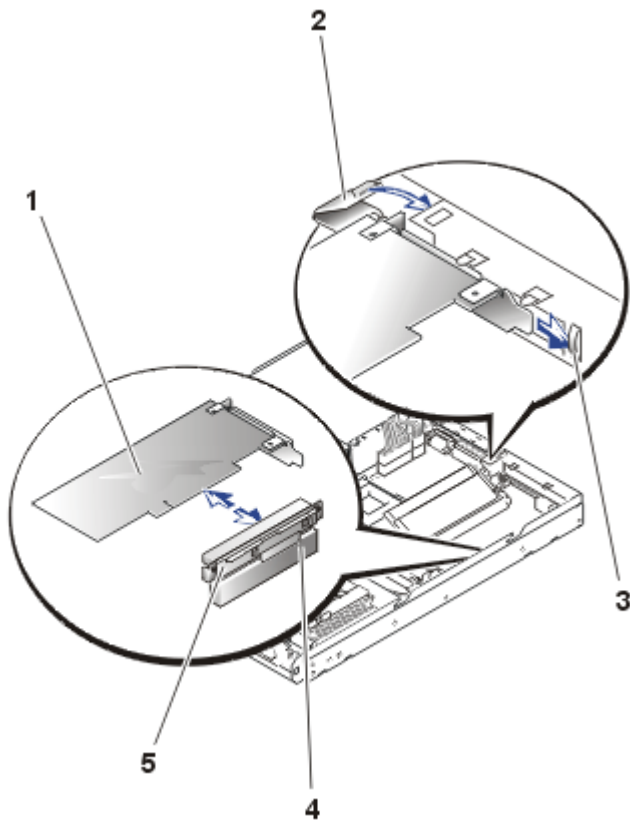
## Expansion Card

The system has a single PCI expansion-card socket that connects to the system board through a riser card (see [Figure 11](#)).

**🔄 NOTICE:** You can only install low-profile PCI expansion cards in this system.

**⚠ CAUTION:** Read the safety instructions in your *System Information* document.

**Figure 11. Expansion-Card Replacement**



- 2 Expansion-card latch
- 3 Expansion-card bracket slot
- 4 Riser-card slot
- 5 Riser card

## Expansion-Card Removal

**⚠ CAUTION:** Read the safety instructions in your *System Information* document.

1. Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
2. [Remove the system cover.](#)
3. Release the expansion-card latch (see [Figure 11](#)).
4. Remove any cables attached to the expansion card.
5. Grasp the expansion card out and pull it away from the riser-card connector.

Ensure that the expansion card's metal bracket is free of its slot.

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



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

7. [Replace the system cover.](#)
8. Reconnect the system and peripherals to the power source, and then turn on the system.

## Expansion-Card Replacement

To install a replacement or an additional expansion card, perform the following steps:

1. Prepare the replacement expansion card for installation.

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

2. If the replacement card is an identical replacement, ensure that any jumpers or configuration switches are set in an identical manner as the expansion card you just removed.



3. If not already installed, [install the riser card](#).

➡ **NOTICE:** The riser card must be properly seated in its system board connector before attempting to install an expansion card.

4. Insert the expansion card's card-edge connector firmly into the riser card, and ensure that the mounting bracket enters its slot on the chassis back panel (see [Figure 11](#)).
5. When the card is fully seated in the connector and the card-mounting bracket is in its slot, close the expansion-card latch.
6. Connect any cables that should be attached to the card.

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

7. [Replace the system cover](#).

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## Riser Card

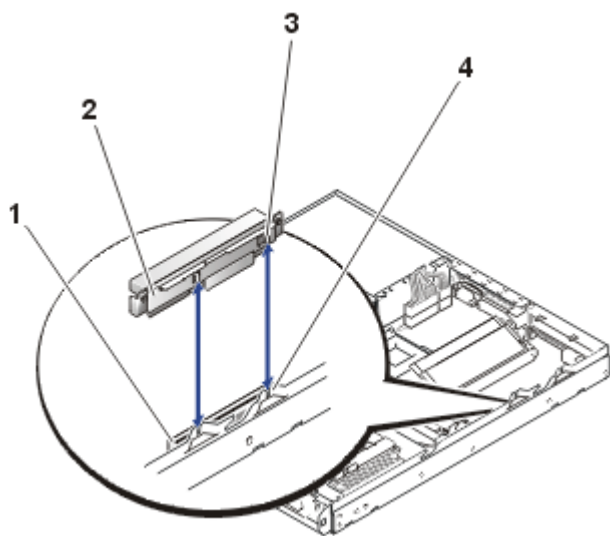
The riser card supports a single PCI expansion card and connects to the riser-card slot on the system board and the side of the system chassis (see [Figure 12](#)).

⚠ **CAUTION:** Read the safety instructions in your *System Information* document.

## Riser Card Removal

1. Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
2. [Remove the system cover](#).
3. [Remove the expansion card](#).
4. Grasp the riser card on each end and lift it out of its slot on the system board. Use care to lift it out evenly so that the metal tabs easily leave their slots on the chassis wall (see [Figure 12](#)).

**Figure 12. Riser Card Removal**



- 1 Riser-card slot
- 2 Riser card
- 3 Tabs
- 4 Slots on chassis

➡ **NOTICE:** The riser card must be properly seated in its system board connector before attempting to install an expansion card.

When installing a replacement riser card, align [the tabs on the back of the riser card](#) with the mating slots on the wall of the system chassis. When properly aligned, the card-edge connector should be properly positioned. Firmly press the riser card into its system board connector.

---


# Memory Modules

The two memory module sockets on the system board can accommodate from 256 MB to 1 GB of registered SDRAM. Memory modules installed in the sockets must be PC-133 compliant.

 **CAUTION:** Read the safety instructions in your *System Information* document.

## System Memory Upgrade Kits

You can upgrade the system memory by installing combinations of 256- or 512-MB registered memory modules. If you receive an error message stating that the maximum memory has been exceeded, see "[Codes, Error Messages, and Indicators](#)." You can purchase memory upgrade kits as needed.

 **NOTE:** The memory modules must be PC-133 compliant.

## Memory Module Installation Guidelines


 **NOTE:** Parts of this procedure require you to use the console redirection function on the serial port. See your *System Administrator's Guide* for information about connecting to the system through console redirection.

Table 1 illustrates two sample memory configurations based on these guidelines.

**Table 1. Sample DIMM Configurations**

Desired Memory	DIMM1	DIMM2
256 MB	256 MB	Open
512 MB	512 MB	Open

## Performing a Memory Upgrade

 **CAUTION:** Before you perform this procedure, you must turn off the system and disconnect it from its power source. For more information, see the safety instructions in your *System Information* document.

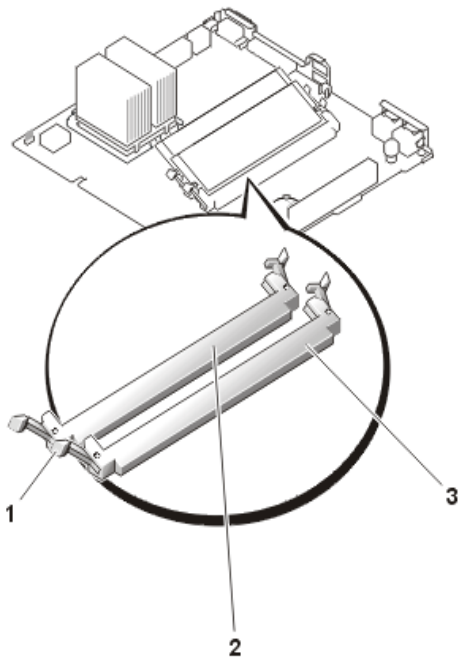
 **CAUTION:** See "Protecting Against Electrostatic Discharge" in the safety instructions in your *System Information* document.

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2. [Remove the cover](#).
3. Locate the memory module sockets in which you want to install or replace memory module pairs.


[Figure 13](#) shows the location of the memory module sockets.

**Figure 13. Memory Module Socket Locations**


- 1 Extractor lever
- 2 DIMM2
- 3 DIMM1



4. Install or replace the memory module(s) as necessary to reach the memory total you want (see "[Installing Memory Modules](#)" or "[Removing Memory Modules](#)").
5. [Replace the system cover.](#)
6. Reconnect the system to the electrical outlet, and then turn on the system.

 **NOTE:** To perform the next step, you must use the console redirection function on the serial port (COM1). See the *System Administrator's Guide* for more information about console redirection.

7. (Optional) Press <F2> to enter the [BIOS Setup utility](#), and then check the **Extd Memory** setting on the **Standard CMOS Setup** screen.

 **NOTE:** If you use a version of Windows 2000 earlier than Service Pack 2, the function keys do not work. You must press <Esc><2>.

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

8. If the **Extd Memory** value is incorrect, one or more of the memory modules might not be installed properly. Repeat steps 2–5, ensuring that the memory modules are firmly seated in their sockets.
9. Run the system memory test in the system [diagnostics](#).
10. Replace the [system cover](#).

## Installing Memory Modules

 **CAUTION:** Before you perform this procedure, you must turn off the system and disconnect it from its power source. For more information, see the safety instructions in your *System Information* document.

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

To install a memory module, perform the following steps.

 **CAUTION:** Read the safety instructions in your *System Information* document.

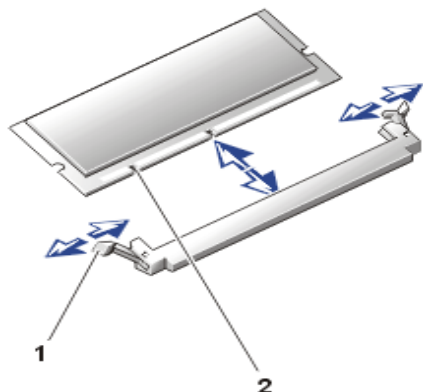
1. Turn off the system, including any attached peripherals, and disconnect the power cord from the electrical outlet.
2. Remove the [system cover](#).

3. Locate the memory module sockets in which you want to install a memory module.

[Figure 13](#) shows the location of the memory module sockets.

4. Press down and outward on the ejectors on the memory module socket, as shown in [Figure 14](#), to allow the memory module to be inserted into the socket.

**Figure 14. Adding or Removing a Memory Module**



- 1 Memory module socket ejectors (2)
- 2 Memory module

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

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

6. Press down on the memory module with your thumbs while pulling up on the ejectors with your index fingers to lock the memory module into the socket (see [Figure 14](#)).
7. 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 with memory modules installed.
8. Repeat steps 4–7 to install the remaining memory modules.
9. Perform steps 5–10 of the procedure, "[Performing a Memory Upgrade](#)."

## Removing Memory Modules

**CAUTION:** Before you perform this procedure, you must turn off the system and disconnect it from its power source. For more information, see the safety instructions in your *System Information* document.

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

1. Turn off the system, including any attached peripherals, and disconnect the power cord from its power source.
2. Remove the [system cover](#).
3. Locate the memory module sockets in which you want to remove a memory module.

[Figure 13](#) shows the location of the memory module sockets.

4. Press down and outward on the ejectors on each end of the socket until the memory module pops out of the socket (see [Figure 14](#)).

---


## Microprocessor

To take advantage of future options in speed and functionality, you can replace the microprocessor.

Each microprocessor and its associated Level 2 cache are contained in a pin grid array (PGA) package that is installed in a ZIF socket on the system board. The following subsection describes how to install or remove the microprocessor.

## Microprocessor Replacement

To replace the microprocessor, perform the following steps.


 **NOTE:** Only a technically knowledgeable person should perform this procedure.


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

 **CAUTION:** The microprocessor and heat-sink assembly can get extremely hot during system operation. Be sure the assembly has had sufficient time to cool before you touch it.

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

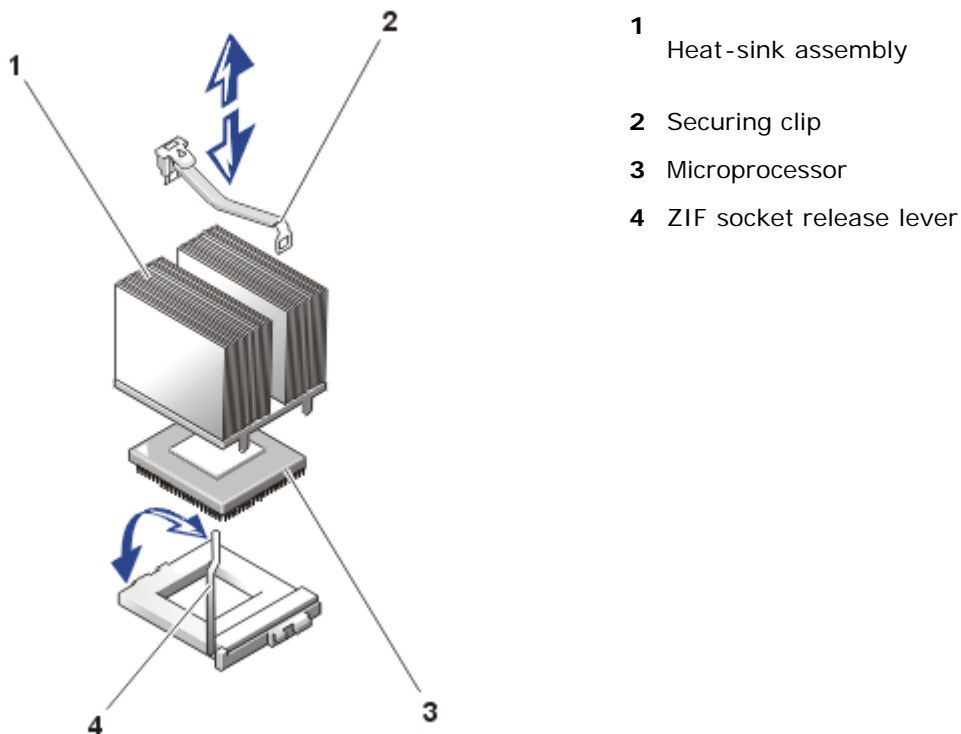
1. Turn off the system, including any attached peripherals, and disconnect the power cord from the electrical outlet.
2. Remove the [system cover](#).
3. Press down on the heat- sink securing clip to release it from the retaining tab on the ZIF socket (see [Figure 15](#)).
4. Remove the securing clip.
5. Carefully remove the heat sink and set it down with the underside of the heat sink facing up.

 **CAUTION:** Ensure that the thermal pad on the underside of the heat sink is not damaged during handling.


 **NOTE:** Observe the orientation of the heat sink with respect to the microprocessor and its ZIF socket.

6. Pull the socket release lever straight up until the microprocessor is released (see [Figure 15](#)).

**Figure 15. Microprocessor and Heat-Sink Replacement**



7. Lift the microprocessor away from the ZIF socket and leave the release lever in the upright position so that the socket is ready for the replacement microprocessor (see [Figure 15](#)).

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

8. Unpack the new microprocessor.

If any of the pins on the microprocessor appear bent, contact technical support.


9. Identify the pin-1 corner of the microprocessor by locating the tiny gold triangle that extends from one corner of the large central rectangular area.

The gold triangle points toward pin 1, which is also uniquely identified by a square pad.

 **NOTE:** Identifying the pin-1 corner is critical to positioning the microprocessor correctly.

10. Align the pin-1 corner of the microprocessor with the pin-1 corner of the microprocessor socket.

11. Install the microprocessor in the socket (see [Figure 15](#)).


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

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

With the pin-1 corners of the microprocessor and socket aligned, set the microprocessor lightly in the socket and make sure all pins are matched with the correct holes in the socket. Because the system uses a ZIF microprocessor socket, do not use force, which could bend the pins if the microprocessor is misaligned. When the microprocessor is positioned correctly, it drops down into the socket with minimal pressure.

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

12. Place the heat sink you removed in step 5 on top of the microprocessor (see [Figure 15](#)).

 **CAUTION:** Ensure that the thermal pad on the underside of the heat sink is not damaged during handling.

13. Orient the securing clip as shown in [Figure 15](#).


14. Hook the end of the clip without the heat-sink latch to the tab on the edge of the socket.

15. Push down and pivot the heat-sink latch until the hole on the clip latches onto the ZIF socket tab.

Make sure that the latches engage.

16. Replace the system cover.

17. Reconnect the system and peripherals to the power source, and then turn on the system.

 **NOTE:** To perform the next step, you must use the console redirection function on the serial port (COM1). See the *System Administrator's Guide* for more information about console redirection.


From console redirection, check to see that the presence of the new processor is listed during the POST. As the system boots, it detects the presence of the new processor and automatically changes the system configuration information in the BIOS Setup utility.

18. Run the system [diagnostics](#) to verify that the new microprocessor operates correctly.

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


---

## Battery

 **NOTE:** Parts of this procedure require you to use the console redirection function on the serial port (COM1). See your *System Administrator's Guide* for information about connecting to the system through console redirection.

The system battery maintains system configuration, date, and time information in a special section of memory when you turn off the system. The operating life of the battery ranges from 2 to 5 years, depending on how you use the system (for example, if you keep the system on most of the time, the battery gets little use and, thus, lasts longer).


You might need to replace the battery if an incorrect time or date displays during the boot routine, along with a message about wrong time, invalid configuration information, or bad CMOS checksum.

 **NOTE:** To perform this procedure, you must use the console redirection function on the serial port (COM1). See the *System Administrator's Guide* for more information about console redirection.

To determine if the battery needs replacing, perform the following steps:

1. Re-enter the time and date through the [BIOS Setup utility](#).
2. Turn off and disconnect the system from the electrical outlet for a few hours.
3. Reconnect and turn the system on again.
4. Enter the [BIOS Setup utility](#).


If the date and time are not correct in the BIOS Setup utility, replace the battery.

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

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

You can operate the system without a battery; however, the system configuration information maintained by the battery in NVRAM is erased each time you shut down the system. Therefore, you must re-enter the system configuration information and reset the options each time the system initializes, until you replace the battery. The battery is a 3.0-volt (V), coin-cell CR2032-type battery.

To remove the battery, perform the following steps.

 **CAUTION:** Before you perform this procedure, you must turn off the system and disconnect it from its power sources. For more information, see the safety precautions in your *System Information* document.

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

1. Enter the BIOS Setup utility and, if possible, make a printed copy of the BIOS Setup screens.  
See "[Using the BIOS Setup Utility](#)."
2. Shut down the system, including any attached peripherals, and disconnect the system from the electrical outlet.

 **CAUTION:** Read the safety instructions in your *System Information* document.

3. Remove the [system cover](#).
4. Remove the battery (see [Figure 9](#) for the battery location).  
Pull the tab back on the battery socket and remove the battery from its socket with your fingers.
5. Pull the tab back on the battery socket and install the new battery with the side labeled "+" facing up (see [Figure 16](#)).

## Figure 16. Battery Replacement



6. Replace the [system cover](#).
7. Reconnect the system to the electrical outlet, and then turn on the system power.
8. Enter the [BIOS Setup utility](#) to confirm that the battery operates properly.
9. Enter the correct time and date through the BIOS Setup utility's **Standard CMOS Setup** settings.

Also, re-enter any system configuration information that is no longer displayed on the BIOS Setup screens, and then exit the BIOS Setup utility.

10. To test the newly installed battery, shut down and disconnect the system from the electrical source for at least an hour.
11. After an hour, connect the system to an electrical source and turn on the power.
12. Enter the [BIOS Setup utility](#) and if the time and date are still incorrect, [replace the system board](#).

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# Jumpers, Switches, and Connectors

## Dell™ PowerVault™ 715N Systems Service Manual

[Overview](#)

[Jumpers — A General Explanation](#)

[System Board Jumpers](#)

[System Board Features](#)

## Overview

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

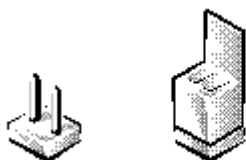
## Jumpers — A General Explanation

Jumpers provide a convenient and reversible way of reconfiguring the circuitry on a printed circuit board. When installing replacement parts or reconfiguring the system, you might need to change jumper settings on the system board. You might also need to change jumper settings on expansion cards or drives.

## Jumpers

Jumpers are small blocks on a circuit board with two or more pins emerging from them (see [Figure 1](#)). Plastic plugs containing a wire fit down over the pins. The wire connects the pins and creates a circuit. To change a jumper setting, pull the plug off its pin(s) and carefully fit it down onto the pin(s) indicated.

**Figure 1. Jumpers**



**NOTICE:** Make sure the system is turned off before you change a jumper setting. Otherwise, damage to the system or unpredictable results might occur.

A jumper is referred to as open or unjumped when the plug is pushed down over only one pin or if there is no plug at all. When the plug is pushed down over two pins, the jumper is referred to as jumped. The jumper setting is often shown in text as two numbers, such as 1-2. The number 1 is printed on the circuit board so that you can identify each pin number based on the location of pin 1.

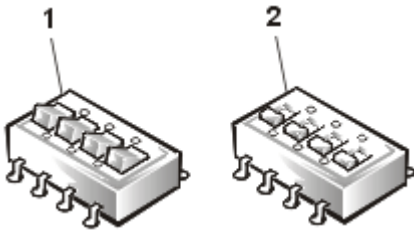
## Switches

Switches control various circuits or functions in the system. The switches that you are most likely to encounter are dual in-line-package (DIP) switches, which are normally packaged in groups of two or more switches in a plastic case. Two common types of DIP switches are slide switches and rocker switches (see [Figure 2](#)). The setting of the rocker type DIP switches at SW3 on the system board are not to be changed from their open or off setting (see [Figure 4](#)).

**NOTICE:** All DIP switch (SW3) positions must remain in the OFF position. Do not change these DIP switch settings.

**Figure 2. Switches**

- 1 Rocker switch
- 2 Slide switch



Each of the switches has two positions or settings (usually on and off). To change the setting of a slide switch, use a small pointed object such as a small screwdriver or a straightened paper clip to slide the switch to the proper position. To change the setting of a rocker switch, use the screwdriver or paper clip to press down on the appropriate side of the switch. In either case, do not use a pen, pencil, or other object that might leave a residue on the switch.

## System Board Jumpers

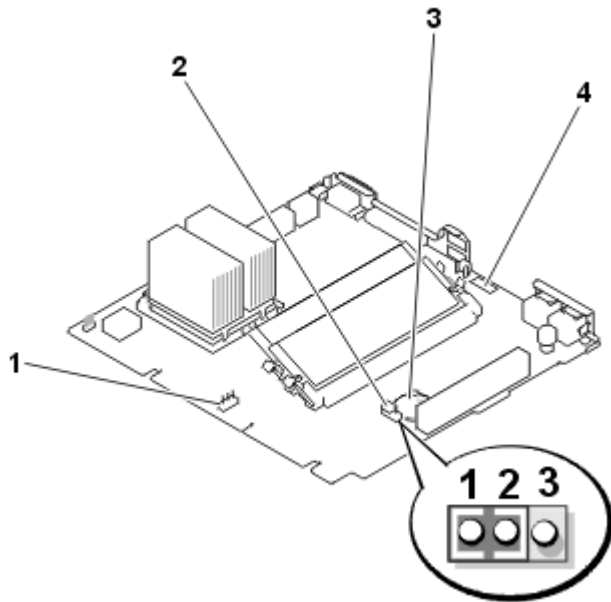
Figure 3 shows the location of the Clear CMOS jumper and the system version jumper on the system board. Table 1 lists the jumper setting information.

For instructions on using the Clear CMOS jumper to clear CMOS, see "[Clearing CMOS](#)."

Earlier systems with a system version number of SN1A have the JP5 jumper set on pins 1 and 2. Later systems with a system version number of SN1B have the JP5 jumper set on pins 2 and 3. Do not change these jumper settings.

**NOTICE:** All DIP switch (SW3) positions must remain in the OFF position. Do not change these DIP switch settings.

Figure 3. System Board Jumpers



- 1 System version jumper (JP5)
- 2 Clear CMOS jumper (JP1)
- 3 Battery
- 4 System version number label (SN1A = early system; SN1B = later system)

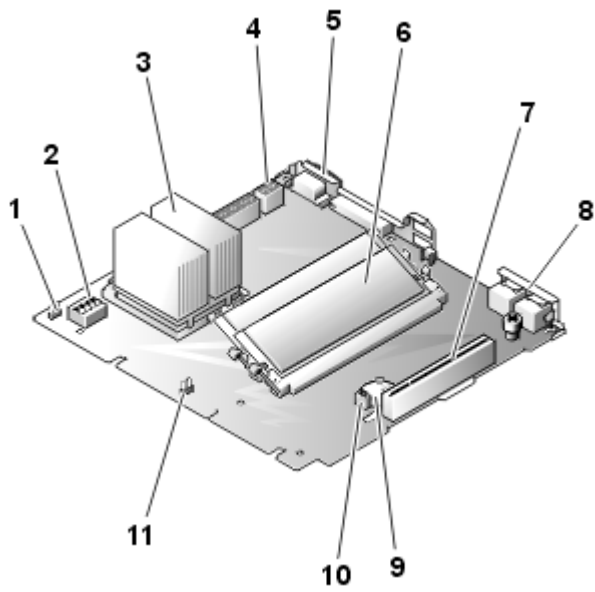
Table 1. System-Board Jumper Settings

Jumper	Setting		Description
Clear CMOS (JP1)	pins 1-2	(default)	The password feature is enabled.
	(pins 2-3)		The password feature is disabled.
System version jumper (JP5)	pins 1-2	(default for early systems)	Use in this position for <i>early</i> system boards with a version number of SN1A ( <i>do not change</i> ).
	pins 2-3	(default for later systems)	Use in this position for <i>later</i> system boards with a version number of SN1B ( <i>do not change</i> ).

## System Board Features

[Figure 4](#) defines the system board features, including switches, connectors, and labels located on the system board. The system board labels are in parentheses.

#### Figure 4. System Board Features



- 1 Fan power connector (CPUFAN1)
- 2 DIP switch (SW3)
- 3 Microprocessor and heat sink (CPU)
- 4 Power supply connectors (CN1 and CN2)
- 5 Serial port connector (COM1)
- 6 Memory modules (DIMM1 and DIMM2)
- 7 PCI riser card slot (PCI1)
- 8 LAN connectors (LAN1 and LAN2)
- 9 Battery connector (BT1)
- 10 Clear CMOS jumper (JP1)
- 11 System version jumper (JP5)


# Using the BIOS Setup Utility

## Dell™ PowerVault™ 715N Systems Service Manual

- [Entering the BIOS Setup Utility](#)
- [Disabling a Forgotten Password](#)
- [BIOS Setup Options](#)
- [Clearing CMOS](#)
- [Updating the BIOS](#)
- [Responding to Error Messages](#)

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This section describes the BIOS Setup utility, which is used to change the system configuration information stored in NVRAM on the system board. If the system detects a discrepancy, an error message may appear on the screen that identifies the incorrect configuration settings. Many of the settings are established using the BIOS Setup utility. The system then prompts you to enter the BIOS Setup utility to correct the setting.

 **NOTE:** To use the BIOS Setup utility, you must use the console redirection function on the serial port. See "[Entering the BIOS Setup Utility](#)" for information about connecting to the system through console redirection.

You can use the BIOS Setup utility as follows:

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


After you set up your system, run the BIOS Setup utility to become familiar with your system configuration information and optional settings. Print or record the information for future reference.

---

## Entering the BIOS Setup Utility

1. Using a null modem serial cable, connect the client system to the NAS system.
2. Turn on the client system and set up a Hyperterminal connection.
  - a. Click the **Start** button and point to **Programs® Accessories® Hyperterminal® Hyperterminal**.
  - b. Select **115200** for the bits per second, **8** for data bits, **None** for parity, **1** for stop bits, and **Xon/Xoff** for flow control.
3. Restart the NAS system.
4. Press <F2> immediately after you see the following message:

Press <F2> to enter the Function Select menu

 **NOTE:** If you use a version of Microsoft® Windows® 2000 earlier than Service Pack 2, the function keys do not work. You must press <Esc><2>.

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

5. When the **Function Select** menu appears, press **6** to run the BIOS Setup utility.

## Responding to Error Messages

If an error message appears on your screen while the system is booting, make a note of the message. Next, before entering the BIOS Setup utility, see "System Beep Codes" and "System Messages" in your *Installation and Troubleshooting Guide* for an explanation of the message and suggestions for correcting any errors.

## Navigating the BIOS Setup Utility

[Table 1](#) lists the basic keys used to view or change information in the screens and to exit the program. The keys used to

navigate screens in the system differ, depending on the version of operating system installed on your console redirection client system.

Because of ANSI limitations, not all keys can be used with console redirection. [Table 1](#) shows keystroke combinations used for the version of Windows on your client system.

**Table 1. BIOS Setup Navigation Keys (Normal Operation)**

Keys	Action
Down arrow	Moves to the next field.
Up arrow	Moves to the previous field.
Space bar	Cycles through the settings in a field. In many fields, you can also type the appropriate value.
<Esc>	Exits the BIOS Setup utility and reboots the system if any changes were made.  For most of the options, any changes you make are recorded but do not take effect until the next time you boot the system. For some options (as noted in the help area), the changes take effect immediately.

[Table 2](#) shows a list of keystroke combinations that you must use with versions of Windows 2000 released prior to Service Pack 2.

**Table 2. Console Redirection Keys**

Normal Keys	Keys Used for Windows 2000 Prior to Service Pack 2 and Windows XP	Keys Used for All Other Windows Operating Systems
Home	<Esc><h>	<Esc><h>
End	<Esc><k>	<Esc><k>
Insert	<Esc><+>	<Esc><+>
Delete	<Esc><->	<Esc><->
Page Up	<Esc><?>	<Page Up>
Page Down	<Esc></>	<Page Down>
F1	<Esc><1>	<F1>
F2	<Esc><2>	<F2>
F3	<Esc><3>	<F3>
F4	<Esc><4>	<F4>
F5	<Esc><5>	<Esc><5>
F6	<Esc><6>	<Esc><6>
F7	<Esc><7>	<Esc><7>
F8	<Esc><8>	<Esc><8>
F9	<Esc><9>	<Esc><9>
F10	<Esc><0>	<Esc><0>
F11	<Esc><!>	<Esc><!>
F12	<Esc><@>	<Esc><@>
Up arrow	<Esc><w>	Up arrow
Right arrow	<Esc><a>	Right arrow
Left arrow	<Esc><d>	Left arrow
Down arrow	<Esc><x>	Down arrow
<Ctrl><Alt><Delete>	<Esc><Shift><r> <Esc><r> <Esc><Shift><r> OR <Esc><Shift><b>	<Esc><Shift><r><Esc><r> <Esc><Shift><r> OR <Esc><Shift><b>

## BIOS Setup Options

This section provides information about using the BIOS Setup utility to change the default settings on your system.

### Main Screen

When the BIOS Setup utility starts, the main program screen appears. The following options or information fields appear on the main BIOS Setup screen.

The main BIOS Setup screen displays the current setup and configuration information and optional settings for your system.

- **Standard CMOS Setup** — Sets basic information, such as the date and time, the IDE devices, and the diskette drives.
- **Advanced CMOS Setup** — Enables you to make some changes to the basic operation of the system, such as primary and secondary boot device and password check.
- **Advanced Chipset Setup** — Enables you to make advanced changes to SDRAM, DRAM, and memory size.
- **Power Management Setup** — Sets parameters for power management operation.
- **PCI/Plug and Play Setup** — Sets how the system handles plug and play devices and PCI bus devices.
- **Peripheral Setup** — Sets parameters for peripheral items on the system.
- **Hardware Monitor Setup** — Sets hardware monitoring parameters so that the system can warn you when critical parameters are exceeded. You can also view your system's asset tag and service tag on this screen.
- **Change Supervisor Password** — Enables you to set a supervisor password. See "[Updating the BIOS](#)" for more information.
- **Auto Configuration with Default Settings** — Automatically assigns the optimal setting for all items in the BIOS Setup utility.
- **Save Settings and Exit** — Saves any changes that you made in the BIOS Setup utility and exits.
- **Exit Without Saving** — Exits the BIOS Setup utility and does not save any changes you made.

## Standard CMOS Setup Screen

Use this screen to view and set basic information, such as date, time, and primary or secondary drives.

- **Date and Time** — Sets the correct date and time for the system.
- **Primary/Secondary Master/Slave** — Displays the characteristics of IDE 0 and IDE 1, which are the first two drives of the system. The system automatically detects most modern hard drives using the **Auto-Detect Hard Disks** option from the main menu. See "Advanced CMOS Setup Screen" for information about how this feature works.

If the system does not automatically detect a drive, find a preset type from 1 through 46 that matches your hard drive. If a preset does not exist, set the type to **User** and enter the characteristics of the drive in the specified columns.

- **Boot Sector Virus Protection** — Provides protection against viruses that attack the boot sector of a hard drive.
- **Base/Extd Memory** — Displays the total amount of base and extended memory on your system. The fields are display only.

## Advanced CMOS Setup Screen

Use this screen to make changes to the basic operation of your system.

- **Clear DMI event logs** — When set to **Yes**, clears the DMI event log, which is a log of system events.
- **Event Logging** — Enables the DMI event log.
- **Mark DMI events as read** — Marks the events as read after you open them in the event log.
- **Memory Test** — When enabled, verifies the amount of memory on your system when you boot.
- **1st/2nd/3rd/4th Boot Device** — Determines where and in which order the system looks for a bootable operating system each time it is started.

## Advanced Chipset Setup

Use this screen to make changes to the system's memory settings.

- **DRAM Integrity Mode** — Allows BIOS to perform a parity/ECC check to the POST memory tests, when enabled.

## Power Management Setup

Use this page to set parameters for system power management operation.

- **Power Management/APM** — Allows operating systems that have advanced power management (APM) to control some of the power management operations on the system.
- **System Thermal** — When enabled, the system shuts down after exceeding the **Thermal Active Temperature** threshold of 75°C or 167°F.
- **Thermal Active Temperature** — The temperature at which the system automatically shuts down if **System Thermal** is enabled. This field is display only.
- **Restore on AC/Power Loss** — Sets the power state after a shutdown caused by an unexpected interruption of AC power. When the value is set to **ON**, the system turns back on. When the value is set to **OFF**, the system remains off after the power interruption. If the value is set to **KEEP LAST**, the system returns to the last power state.

## PCI /Plug and Play Setup


Use this screen to set how the system handles Plug and Play devices and PCI bus devices.

- **Clear NVRAM** — When set to **Yes**, this option removes information in the Non-Volatile Random Access Memory (NVRAM) about the configuration of Plug and Play devices. The system creates new configuration information the next time you boot.
- **PCI Latency Timer (PCI Clocks)** — Allows the chipset to use an embedded, 32-bit posted write buffer to support timed delay transaction cycles.

## Peripheral Setup

Use this screen to set parameters for peripheral items on the system.

- **Onboard Serial Port 1 and Serial Port 2** — Disables the serial ports or assigns a port address and name to the ports. Dell recommends that you set the items to **Auto** so the system can dynamically assign port addresses and names.
- **Onboard IDE** — Enables or disables the primary and secondary IDE channels installed on the system board.
- **Console Redirect** — Enables and selects the serial port for console redirection. Select **C.R. Baud Rate** to set a specific baud rate for the serial port and select **C.R. Mode** to assign the console redirection function to work only on POST or runtime mode.


 **NOTE:** Console redirection is enabled by default. However, if you disable it in the BIOS Setup utility, you can re-enable it only by pressing the console redirection button on the system board. See your *Installation and Troubleshooting Guide* for information about enabling console redirection.

## Hardware Monitor Setup

This screen, which is display only, shows the hardware monitoring parameters and the system's asset tag and service tag number. The system warns you when the monitoring parameters are exceeded.

## Change Supervisor Password

Use this screen to set a supervisor password for the BIOS Setup utility. A supervisor has access to all features in the BIOS Setup utility.

 **NOTE:** The supervisor password is disabled by default. Because the password is required to enter the BIOS Setup utility, you should not enable it unless security is a concern.

To change a supervisor password, perform the following steps:

1. Highlight **Change Supervisor Password**, and then press <Enter>.
2. Enter a password in the dialog box that appears.

You can enter no more than six letters or numbers.

3. Press <Enter>.
4. To confirm, enter the password again in the dialog box that appears.
5. Press <Enter>.

The password is required when the system boots or when the user enters the BIOS Setup utility.

## Auto Configuration With Default Settings

To install default settings for all features in the BIOS Setup utility, highlight this menu item and press <Enter>. When asked if you want to install default settings for all items in the BIOS Setup utility, press <Y>, and then press <Enter> to install the settings.

## Save Settings and Exit

Highlight this item and press <Enter> to save any changes that you have made in the BIOS Setup utility and exit. When asked if you want to save the changes, press <Y> to save the changes and exit, or press <N> to return to the main menu.

## Exit Without Saving

Highlight this item and press <Enter> to discard any changes you made in the BIOS Setup utility and exit. When asked if you want to discard the changes, press <Y> to discard changes and exit, or press <N> to return to the main menu.

---

## Updating the BIOS

There are two methods of updating the BIOS:

- Downloading and copying the latest BIOS file to the NAS system using a Microsoft Windows-based utility.
- Downloading the latest BIOS file to a client system, connecting to the NAS system via a serial cable, and then transferring the BIOS file to the NAS system.

## Downloading and Copying BIOS to the NAS System


To update the BIOS, you must be logged into the NAS Manager as an administrator. You can log in only if the NAS system is on the network or if the client system is connected directly to the NAS system with a serial cable (see the *User's Guide* for complete instructions in setting up a HyperTerminal connection).

Because the NAS system does not use a monitor, keyboard, or diskette drive, you must download the compressed BIOS file using a Windows-based client system on the network. To update the BIOS, you must first copy the BIOS file to the NAS system and then update it using Terminal Services.

 **NOTE:** See the Dell | Support website at [support.dell.com](http://support.dell.com) for the latest BIOS updates for your system.

Before updating your BIOS, perform the following steps to copy the BIOS to your NAS system:

1. Using a Web browser, connect to the Dell™ PowerVault™ NAS Manager and create a shared folder on the NAS system (see your system *Administrator's Guide*).
2. From a Windows 2000 client system, map the share you created in step 1.

 **NOTE:** If you are using a Windows-based client system other than Windows 2000, see your operating system documentation for information about how to map and disconnect a network drive.

- a. Right-click **My Computer** and select **Map Network Drive**.
- b. Specify the drive letter and folder for the connection and click **OK**.
- c. Enter the name of the NAS system and the name of the share you created in step 1 and click **OK**.



- d. In the **Map Network Drive** window, click **different user name**.  
The **Connect As...** window is displayed.
  - e. Enter a user name and password to connect to the NAS system with administrator privileges.
  - f. Click **OK**.
  - g. Click **Finish**.
3. Copy the latest BIOS file from **support.dell.com** to the share.
  4. Disconnect the share from the client system.
    - a. Right-click **My Computer** and select **Disconnect Network Drive**.
    - b. Select the share that you want to disconnect and click **OK**.

To log in to the NAS Manager and run the BIOS Update Utility, perform the following steps:


1. Open a Web browser.

The NAS Manager is compatible with clients running Microsoft Internet Explorer 5.01 or later (or for Red Hat Linux only, Netscape Navigator 6.1 or later).


2. Type in the name of the NAS system in the URL box, and then press <Enter>.

The default system name is Dellxxxxxxx, where xxxxxx is the system's service tag number. For example, if your service tag number is 1234567, enter DELL1234567. You can find the service tag number on the top cover of your NAS system.

The NAS Manager is served on port 1279 and is accessed by the URL **https://system\_name:1279**, where *system\_name* is *DELLservice\_tag*. For example, if your service tag number is 1234567, you would enter **https://DELL1234567:1279**. Port 1279 uses secured socket layers (SSL) to encrypt data going to and coming from the NAS system to provide data security.

 **NOTICE:** Although port 1278 can be used, it uses plain text authentication, which can be a significant security risk. Therefore, using port 1278 is not recommended.

3. When the **Enter Network Password** window displays, type a user name and password and then click **OK** to log in as the administrator.

 **NOTE:** The NAS Manager default administrator user name is `administrator` and the default password is `powervault`.

4. Click the **Administer This Server Appliance** link.
5. When the **Enter Network Password** window appears again, enter the same user name and password that you entered in step 2, and then click **OK**.

You are now logged in to the NAS Manager.

6. On the NAS Manager primary menu, click **Maintenance**.
7. Click **Terminal Services**.
8. Log in to the **Terminal Services** session as administrator.
9. If the **Advanced Administration Menu** is open, click **Exit**, and then **OK** to close it.
10. Open the Windows Explorer, and expand the directory **C:\Dell\BIOS Update Utility**.
11. Double-click the **WinSFI.exe** file.

This is the BIOS Update Utility.

12. In the **WinSFI\_AMI WinFlash** window, ensure that only the boxes for **Boot Block Programming** and **NVRAM Programming** are checked.


13. In the **File** pull-down menu, select **Load BIOS and Flash**.
14. When the **Open** window appears, use the folder's navigation icons to move to the NAS system's desktop, and select the share folder in which you placed the downloaded BIOS file.
15. Click **Open**.  
A **Load BIOS** window appears.
16. Select **Load BIOS**.  
This message appears:  
`Are You Sure?`
17. Click **Yes**.  
The utility erases the current BIOS, opens the new updated BIOS file, and programs the system to accept the new BIOS file (a status bar at the bottom of the window provides progress information).  
The message appears:  
`Flash ROM update complete. Please restart your system.`
18. Click **OK**.
19. Restart your NAS system.

## Transferring BIOS From the Client

You should occasionally check the Dell | Support website at [support.dell.com](http://support.dell.com) to see whether an updated BIOS is available for your system.

To update the BIOS, perform the following steps:

1. Download the most recent BIOS from [support.dell.com](http://support.dell.com).
2. Using a null modem serial cable, connect the client system to the NAS system.
3. Turn on the client system and set up a Hyperterminal connection.
  - a. Click the **Start** button and point to **Programs® Accessories® Hyperterminal® Hyperterminal**.
  - b. In the program group, double-click **Hyperterminal**.
  - c. Select **115200** for the bits per second, **8** for data bits, **None** for parity, **1** for stop bits, and **Xon/Xoff** for flow control.
4. Restart the NAS system.
5. Press <F2> immediately after you see the following message:  
`Press <F2> to enter the Function Select menu`

 **NOTE:** If you use a version of Windows 2000 earlier than Service Pack 2, the function keys do not work. You must press <Esc><2>.

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

6. When the **Function Select** menu appears, press **5** to update the BIOS Flash ROM.
7. When a message appears asking you to confirm the selection, press <Y>.

The message `Flash System BIOS` appears.

8. In the **HyperTerminal** window, click **Transfer**, and then select **Send File**.

9. When the **Send File** dialog appears, click **Browse**, and then select the downloaded BIOS file.

10. Select **XModem** on the **Protocol** menu, and then click **Send**.

The client system sends the file to the NAS system and automatically updates the BIOS. The NAS system beeps four times and then reboots.

---

## Disabling a Forgotten Password

If you forget your supervisor password, you cannot operate your system or change settings in the BIOS Setup utility until a trained service technician opens the system chassis, changes the password jumper setting to disable the password, and erases the existing password.

To disable the password, perform the following steps.

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

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2. Remove the cover, and then remove the battery.

See your *Installation and Troubleshooting Guide* for more information about removing the battery.

3. Remove the jumper plug from jumpers 1-2, move it to jumpers 2-3, and leave the jumper plug on jumpers 2-3 for at least 5 seconds.

The jumpers are located next to the battery, with jumper 1 the closest to the battery and jumper 3 the farthest from the battery.

4. Move the jumper plug back to jumpers 1-2.
5. Replace the battery and system cover.
6. Reconnect the system to an electrical outlet and to the client system.
7. Turn on the system .

The system beeps twice to indicate that the password has been cleared.

8. If you want, enter a new supervisor password.

For information about assigning a password, see "[Change Supervisor Password](#)."

---

## Clearing CMOS

Clearing the CMOS memory allows you to clear a forgotten password or re-enable console redirection. If the administrator forgets the supervisor password, you cannot operate the system or change settings in the BIOS Setup utility until you change the password jumper setting to disable the passwords and erase the existing passwords.

To clear the CMOS, perform the following steps.


 **CAUTION:** Read the safety instructions in your *System Information* document.

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2. Remove the [system cover](#).
3. [Remove the battery](#).
4. Locate the [password jumper \(labeled "JP1"\) on the system board](#).

Jumper JP1 is located beside the system battery.


5. Remove the JP1 jumper plug from pins 1-2, move it to jumpers 2-3, and leave the jumper plug on jumpers 2-3 for at least 5 seconds.

6. Move the jumper plug back to jumpers 1-2.
7. Replace the battery.
8. Replace the [system cover](#), and then reconnect the system to an electrical outlet and turn it on.  
The system beeps twice to indicate that the password has been cleared.
9. If you want, enter a new supervisor password.


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

---


## Responding to Error Messages

 **NOTE:** To view error messages, you must use the console redirection function on the serial port (COM1). See the *System Administrator's Guide* for more information about console redirection.

If an error message appears on your monitor screen while the system boots, make a note of the message. Then, before entering the BIOS Setup utility, see "System Beep Codes" and "System Messages" in "[Codes, Error Messages, and Indicators](#)" for an explanation of the message and suggestions for correcting any errors.

 **NOTE:** It is normal to receive an error message the first time you boot your system after installing a memory upgrade. In that situation, do not see "System Beep Codes" and "System Messages." Instead, follow the instructions for performing a memory upgrade in "[Performing a Memory Upgrade](#)."

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

 **NOTE:** If you use a version of Windows 2000 earlier than Service Pack 2, the function keys do not work. You must press <Esc><1> or <Esc><2>.

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