




# Dell Precision™ R5400 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.

If you purchased a Dell™ n Series computer, any references in this document to Microsoft® Windows® operating systems are not applicable.

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Model WMTE01

June 2008 Rev. A00

# Battery

## Dell Precision™ R5400 Service Manual

### [Replacing the Battery](#)

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The computer battery is a 3.0-V, coin-cell battery.

## Replacing the Battery

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

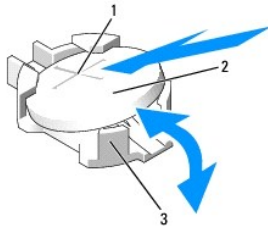
1. Perform the steps in [Before Working on Your Computer](#).

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

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

2. Remove the battery.

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



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

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

3. Install the new battery.

- Support the battery connector by pressing down firmly on the positive side of the connector.
- Hold the battery with the "+" facing up, and slide it under the securing tabs at the positive side of the connector.
- Press the battery straight down into the connector until it snaps into place.

4. Replace the computer cover (see [Replacing the Cover](#)).

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

6. Enter the system setup program to confirm that the battery is operating properly (see the *Dell Technology Guide* for information about accessing and using the system setup program).

7. Enter the correct time and date in the system setup program's **Time** and **Date** fields.

8. Exit the system setup program.

9. To test the newly installed battery, turn off the computer and disconnect it from the electrical outlet for at least an hour.
  10. After an hour, reconnect the computer to its electrical outlet and turn it on.
  11. Enter the system setup program and if the time and date are still incorrect, see [Contacting Dell](#) for instructions on obtaining technical assistance.
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## Before Working on Your Computer


Dell Precision™ R5400 Service Manual

- [Recommended Tools](#)
- [What You Need to Know For Your Safety](#)

 **CAUTION:** Only trained service technicians are authorized to remove the computer cover and access any of the components inside the computer. Before working inside the computer, read the safety information that shipped with the computer. For additional safety best practices information, see the Regulatory Compliance Homepage at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

This document provides procedures for removing and installing components in your computer. Unless otherwise noted, each procedure assumes that:

- 1 You have performed the steps in this section.
- 1 You have read the safety information that shipped with your computer.
- 1 When replacing a component, you have already removed the original, if installed.

 **NOTE:** The color of your computer and certain components may appear differently than shown in this document.

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## Recommended Tools

The procedures in this document may require the following tools:

- 1 Small flat-blade screwdriver
  - 1 Phillips screwdriver
  - 1 Small plastic scribe
  - 1 Flash BIOS update (see the Dell Support website at [support.dell.com](http://support.dell.com))
- 

## What You Need to Know For Your Safety


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

 **CAUTION:** Before you begin any of the procedures in this section, follow the safety instructions that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

- ➡ **NOTICE:** Only a certified service technician should perform repairs on your computer. Only trained service technicians are authorized to remove the computer cover and access any of the components inside the computer. Damage due to servicing that is not authorized by Dell is not covered by your warranty.
- ➡ **NOTICE:** To avoid electrostatic discharge, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface, such as a connector on the back of the computer.
- ➡ **NOTICE:** Handle components and cards with care. Do not touch the components or contacts on a card. Hold a card by its edges or by its metal mounting bracket. Hold a component such as a processor by its edges, not by its pins.
- ➡ **NOTICE:** When disconnecting a cable, pull on the cable's connector or on its strain-relief loop, not on the cable itself. For cable connectors with locking tabs, press inward on the locking tabs to release the connector. When connecting a cable, ensure that the connectors are correctly oriented and aligned to avoid damage to the connector and/or the connector's pins.

1. Shut down your computer.

- 1 In Microsoft Windows Vista®, click **Start** , click the arrow  icon, and then click **Shut Down** to turn off your computer.
- 1 In Microsoft® Windows® XP, click **Start**→**Shutdown**→**Shutdown**.


 **NOTE:** Ensure that the computer is off and not in a power management mode. If you cannot shut down the computer using the operating system, press and hold the power button for 6 seconds.

2. Disconnect your computer and all attached devices from their electrical outlets.

➡ **NOTICE:** To disconnect a network cable, first unplug the cable from your computer, and then unplug it from the network wall jack.


3. Disconnect any network cables from the computer.

4. If applicable, remove the computer from the rack (see the *Rack Installation Guide* for instructions).

 **CAUTION:** To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.

5. Remove the front bezel, if attached (see [Removing the Front Bezel](#)).

6. Remove the computer cover (see [Removing the Cover](#)).

 **NOTICE:** Before touching anything inside your computer, ground yourself by touching an unpainted metal surface, such as the metal at the back of the computer. While you work, periodically touch an unpainted metal surface to dissipate any static electricity that could harm internal components.

7. When you complete your work inside the computer, replace the computer cover and the front bezel, and reconnect your computer and peripherals to their electrical outlets.

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## Front Bezel

### Dell Precision™ R5400 Service Manual

- [Removing the Front Bezel](#)
- [Replacing the Front Bezel](#)

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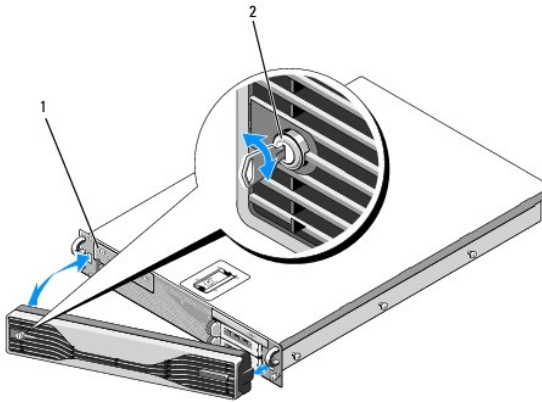
A lock on the front bezel restricts access to the power button, optical drive, two front-panel USB connectors, and the hard drive(s). An array of lights located on the front panel and accessible through the front bezel displays the computer's status.

The computer ships with the bezel unattached, and so it must be attached during initial setup of the computer.

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## Removing the Front Bezel

1. Using the bezel key, unlock the front bezel.
2. Press the tab at the left end of the bezel.
3. Rotate the left end of the bezel away from the computer to release the right end of the bezel.
4. Pull the bezel away from the computer.



1 status lights 2 front bezel lock

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## Replacing the Front Bezel

To replace the front bezel, perform the above steps in reverse.

**🔍 NOTE:** If you are installing a new replacement bezel, the bezel keys can be found clipped inside the bezel where they were stored during shipment.

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## Mid-Support Brace

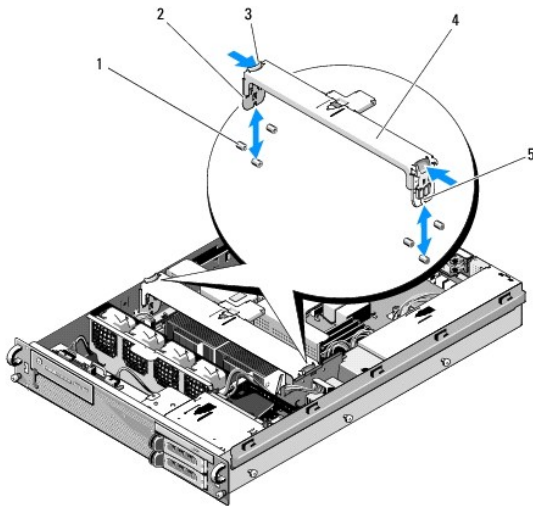
### Dell Precision™ R5400 Service Manual

- [Removing the Mid-Support Brace](#)
- [Replacing the Mid-Support Brace](#)

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## Removing the Mid-Support Brace

1. Perform the steps in [Before Working on Your Computer](#).
2. Press inward on the blue release latches at each end of the brace, and lift the brace from the computer.



1	guiding pins (6, 3 on each side of chassis)	2	vertical members (2)
	release latches (2)	4	mid-support brace
5	notch (2, one at each end of brace)		

## Replacing the Mid-Support Brace

1. Align the brace so that the vertical members slide down between the guiding pins.
2. Slide the brace down until it snaps into place.

## Expansion-Card Cages

### Dell Precision™ R5400 Service Manual

- [Removing an Expansion-Card Cage](#)
- [Replacing an Expansion-Card Cage](#)

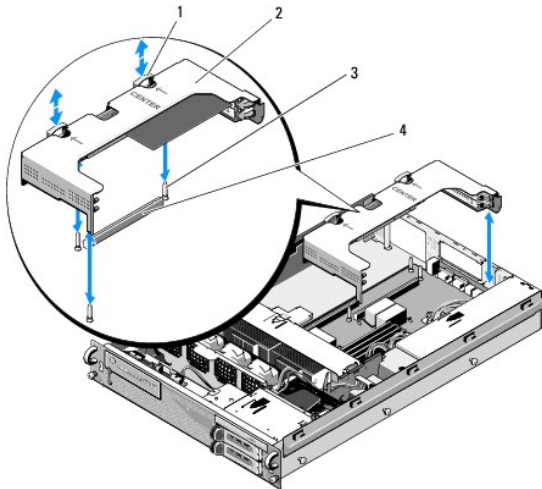
**⚠ CAUTION:** Only trained service technicians are authorized to remove the computer cover and access any of the components inside the computer. Before working inside the computer, read the safety information that shipped with the computer. For additional safety best practices information, see the Regulatory Compliance Homepage at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

Your computer has two expansion-card cages: one labeled "outer" and one labeled "center." The procedure for removing each cage is identical.

## Removing an Expansion-Card Cage

**🔧 NOTE:** You must remove all expansion cards from the expansion-card cage before removing the expansion-card cage from the computer.

1. Perform the steps in [Before Working on Your Computer](#).
2. Pull upward the two blue release latches on the expansion-card cage.

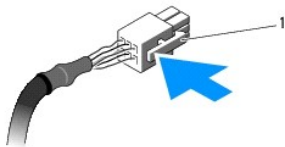


1	release latches (2)	2	expansion-card cage
3	guide posts on system board (3)	4	riser-board connector on system board

3. Lift the cage straight up, but not completely out of the chassis until you disconnect any cables attached to the expansion cards.
4. Disconnect cables attached to any expansion cards installed in the cage, and lift the cage completely out of the chassis.

**🔧 NOTE:** On the outer cage only, guide power connectors P5 and/or P6, as applicable, through the openings on one end of the cage as you lift the cage completely out of the chassis.

**🔧 NOTE:** To disconnect power cables, squeeze the release tab on the cable connector. Avoid pulling directly on the cables themselves.




1	release tab on cable connector		
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## Replacing an Expansion-Card Cage

1. Reconnect cables that attach to any expansion cards installed in the cage, if applicable.

 **NOTE:** The outer expansion-card cage has two openings on one end for threading the power cables P5 and/or P6 if required for any installed expansion cards.

2. Align the guides on each end of the expansion-card cage with the guide posts on the system board, and lower the cage.

 **NOTE:** The center expansion-card cage has three guides for three posts on the system board, and the outer card cage has only two guides for two posts on the system board.

3. Press the cage downward to seat the riser board into the riser board connector on the system board.

4. Press the blue release latches downward into the cage.

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## Expansion Cards

### Dell Precision™ R5400 Service Manual

- [Expansion Card Installation Guidelines](#)
- [Installing an Expansion Card](#)
- [Removing an Expansion Card](#)

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The computer is available with either one or two PCI Express (PCIe) cards installed in the outer expansion-card cage. The center expansion-card cage has two configuration options:

- 1 One PCIe and one PCI-X card
- 1 One PCI and one PCI-X

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## Expansion Card Installation Guidelines

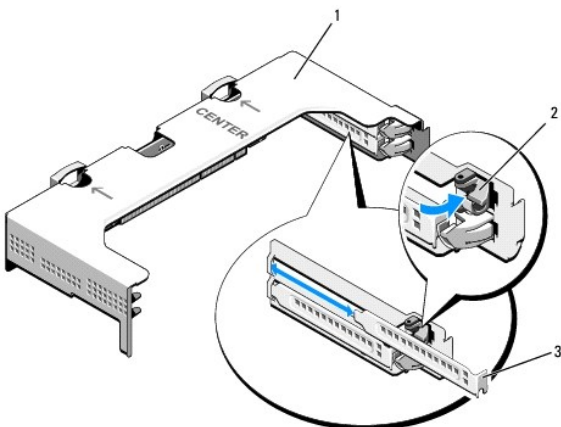
- 🔍 **NOTE:** The expansion-card slots are not hot-pluggable.
- 🔍 **NOTE:** All expansion card slots support full-length expansion cards.
- 🔍 **NOTE:** Your computer supports up to two RAID expansion cards to manage external storage.

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## Installing an Expansion Card

- 🔍 **NOTE:** The procedure for installing expansion cards into the outer and center expansion-card cages is the same.

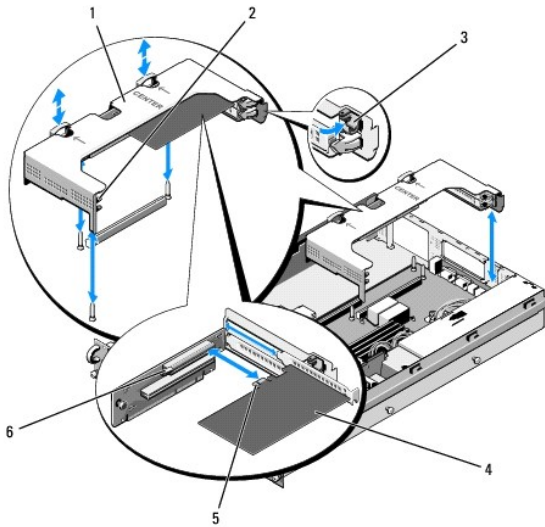
1. Perform the steps in [Before Working on Your Computer](#).
2. Unpack the expansion card and prepare it for installation.  
For instructions, see the documentation accompanying the card.
3. Remove the expansion-card cage (see [Removing an Expansion-Card Cage](#)).
4. Open the expansion-card latch and remove the filler bracket.



1	expansion-card cage	2	expansion-card latch
3	filler bracket		

5. Install the expansion card:
  - a. If the expansion card is full length, align its front edge with the front card guide.

- b. Position the expansion card so that the card-edge connector aligns with the expansion-card connector on the expansion-card riser board.
- c. Insert the card-edge connector firmly into the expansion-card connector until the card is fully seated.
- d. When the card is seated in the connector, close the expansion-card latch.



1	center expansion-card cage	2	front card guide
3	expansion-card latch	4	expansion card
5	card-edge connector	6	expansion-card connector on riser board

6. Connect any expansion-card cables for the new card, as well as already- installed cards.

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

## Removing an Expansion Card

1. Perform the steps in [Before Working on Your Computer](#).
2. Remove the expansion-card cage (see [Removing an Expansion-Card Cage](#)).
3. Release the expansion card:
  - a. Open the expansion-card latch.
  - b. Grasp the expansion card by its top corners, and remove it from the expansion-card connector.
4. If you are removing the card permanently, install a metal filler bracket over the empty expansion-slot opening and close the expansion-card latch.

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

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## Computer Cover

### Dell Precision™ R5400 Service Manual

- [Removing the Cover](#)
- [Replacing the Cover](#)

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## Removing the Cover

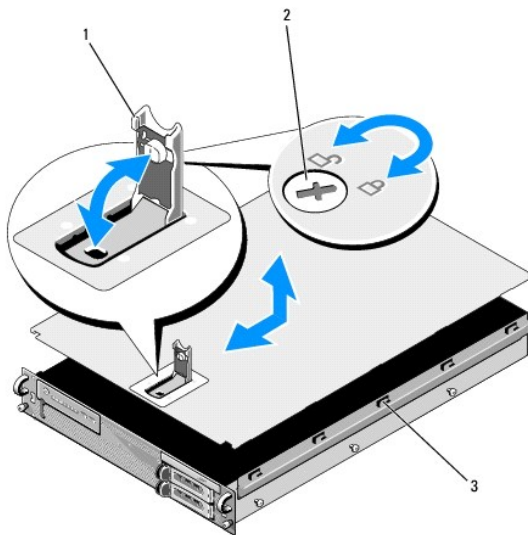
1. Turn off the computer and attached peripherals, and disconnect the computer from the electrical outlet and peripherals.
2. Remove the front bezel, if attached (see [Removing the Front Bezel](#)).
3. To remove the computer cover, turn the latch release lock counter-clockwise to the unlocked position.
4. Lift the latch on top of the computer.

**📌 NOTE:** The cover slides slightly toward the back of the computer when you lift the latch.

5. Grasp the cover on both sides and carefully lift the cover away from the chassis.

## Replacing the Cover

1. Lift up the latch on the cover.
2. Place the cover on top of the computer and offset the cover slightly back so that it clears the chassis J hooks and lays flush on the computer chassis.
3. Push down the latch to lever the cover into the closed position.
4. Rotate the latch release lock in a clockwise direction to secure the cover.
5. Replace the front bezel (see [Replacing the Front Bezel](#)).



1	latch	2	latch release lock
3	alignment J hooks		

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## Control Panel Assembly

### Dell Precision™ R5400 Service Manual

- [Removing the Control Panel Assembly](#)
- [Replacing the Control Panel Assembly](#)

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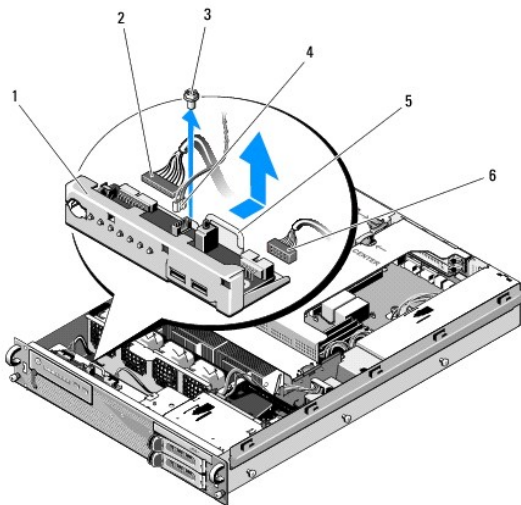
## Removing the Control Panel Assembly

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1. Perform the steps in [Before Working on Your Computer](#).
2. Disconnect the control panel cable from the control panel board.

**👉 NOTICE:** To avoid damage to the cable, pull on the connector, not the cable, to unseat the connector.

- a. Squeeze the plastic tabs on the ends of the cable connector.
  - b. Gently work the connector out of the socket.
- c. Disconnect the speaker cable from the control panel board.
  - d. Disconnect the front USB-connector cable from the control panel board.
  - e. Remove the screw that secures the control panel assembly to the computer chassis.
  - f. Grasp the metal tab/handle to slide the assembly back, and lift the assembly from the chassis.



1	control panel assembly	2	control panel cable
3	control-panel assembly securing screw	4	speaker cable
5	metal tab/handle	6	front USB-connector cable

---

## Replacing the Control Panel Assembly

1. Place the control panel assembly in the computer chassis, slide it forward until the screw holes align and the power button fits in its front-panel opening, and replace the securing screw.
2. Connect the front USB-connector cable to the control panel board.

3. Connect the control panel cable to the control panel board.
4. Connect the speaker cable to the control panel board.

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## Cooling Fans

### Dell Precision™ R5400 Service Manual

- [Removing a Fan Pair](#)
- [Replacing a Cooling Fan Pair](#)

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The computer includes four cooling fans. The fans are paired and must be removed two fans at a time; fans 1 and 2 are paired, and fans 3 and 4 are paired.

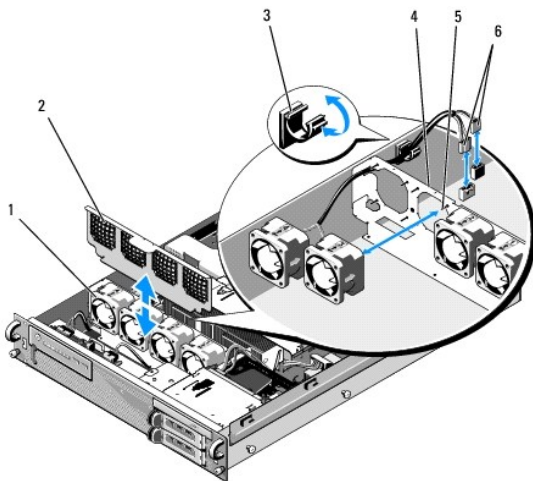
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## Removing a Fan Pair

1. Perform the steps in [Before Working on Your Computer](#).
2. Lift the removable fan bracket out of the chassis and set it aside.

**🔧 NOTE:** The fans must be removed in pairs.

3. Slide one fan horizontally toward the front of the computer, gently rocking it up and down to ease the four corners of the fan off the corner pin supports.
4. Slide the corresponding fan in the pair similarly to remove it from its pin supports.
5. Disconnect the corresponding fan cable connectors from the system board, and lift the fan pair out of the chassis.



1 fans (4)	2 fan bracket (removable)
3 cable clip	4 fan bracket (unremovable)
5 corner support pins (4 per fan)	6 fan cables connecting to system board

---

## Replacing a Cooling Fan Pair

1. Slip each fan in the pair onto the four corner-support pins for each fan.

**🔧 NOTE:** Ensure that the fan-number labels are facing upward.

2. Route the fan cable pair over the appropriate corner slot in the top of the (unremovable) fan bracket at the back of the fans, and reconnect the cable connectors to the system board.





3. Slide the removable fan bracket down into its slot in the chassis in front of the row of fans.
- 

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## Finding Information

### Dell Precision™ R5400 Service Manual

 **NOTE:** Some features or media may be optional and may not ship with your computer. Some features or media may not be available in certain countries.

 **NOTE:** Additional information may ship with your computer.

Document/Media/Label	Contents
<b>Service Tag/Express Service Code</b> The Service Tag/Express Service Code is located on your computer.	<ul style="list-style-type: none"><li>  Use the Service Tag to identify your computer when you use <b>support.dell.com</b> or contact support.</li><li>  Enter the Express Service Code to direct your call when contacting support</li></ul> <p><b>NOTE:</b> Your Service Tag/Express Service Code is located on your computer.</p>
<b>Drivers and Utilities Media</b> The <i>Drivers and Utilities</i> media is a CD or DVD that may have shipped with your computer.	<ul style="list-style-type: none"><li>  A diagnostic program for your computer</li><li>  Drivers for your computer</li></ul> <p><b>NOTE:</b> Drivers and documentation updates can be found at <b>support.dell.com</b>.</p> <ul style="list-style-type: none"><li>  Desktop System Software (DSS)</li><li>  Readme files</li></ul> <p><b>NOTE:</b> Readme files may be included on your media to provide last-minute updates about technical changes to your computer or advanced technical-reference material for technicians or experienced users.</p>
<b>Operating System Media</b> The <i>Operating System</i> media is a CD or DVD that may have shipped with your computer.	Reinstall your operating system
<b>Safety, Regulatory, Warranty, and Support Documentation</b> This type of information may have shipped with your computer. For additional regulatory information, see the Regulatory Compliance Homepage at <b>www.dell.com/regulatory_compliance</b> .	<ul style="list-style-type: none"><li>  Warranty information</li><li>  Terms and Conditions (U.S. only)</li><li>  Safety instructions</li><li>  Regulatory information</li><li>  Ergonomics information</li><li>  End User License Agreement</li></ul>
<b>Service Manual</b> The <i>Service Manual</i> for your computer can be found at <b>support.dell.com</b> .	<ul style="list-style-type: none"><li>  How to remove and replace parts</li><li>  How to configure computer settings</li><li>  How to troubleshoot and solve problems</li></ul>
<b>Dell Technology Guide</b> The <i>Dell Technology Guide</i> is available at <b>support.dell.com</b> .	<ul style="list-style-type: none"><li>  About your operating system</li><li>  Using and maintaining devices</li><li>  Understanding technologies such as RAID, Internet, Bluetooth® wireless technology, e-mail, networking, and more.</li></ul>
<b>Microsoft® Windows® License Label</b> Your Microsoft Windows License is located on your computer.	<ul style="list-style-type: none"><li>  Provides your operating system product key.</li></ul>

## Hard Drives

### Dell Precision™ R5400 Service Manual

- [Replacing a Hard Drive](#)
- [Installing a Second Hard-Drive](#)

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Your computer can accommodate up to two 3.5-inch SATA hard drives. The hard drive power cables connect to the system board through a power cable assembly.

Hard drives are installed in special drive carriers that fit in the hard-drive bays.

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

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

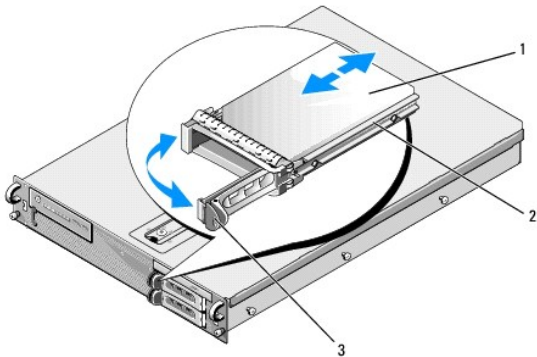
When you format a high-capacity hard drive, allow enough time for the formatting to be completed. Long format times for these drives are normal. A 9-GB hard drive, for example, can take up to 2.5 hours to format.

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## Replacing a Hard Drive

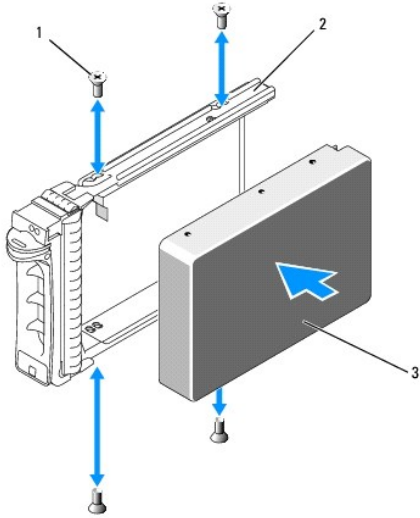
➡ **NOTICE:** The drives in your computer are not hot-pluggable. Ensure that you turn off the computer and disconnect the power cable from the AC power source before you remove a hard drive.

1. Perform the steps in [Before Working on Your Computer](#).
2. Remove the hard-drive carrier from the hard-drive bay:
  - a. Squeeze the release latch on the drive-carrier door and rotate it open.
  - b. Pull the door to slide the carrier out of the bay.



1	hard drive	2	drive carrier
3	release latch		

3. Remove the four screws from the side rails on the carrier, and separate the hard drive from the carrier.
4. Install the replacement hard drive in the carrier:
  - a. Slide the drive into the carrier, ensuring that the drive connectors are accessible at the back of the carrier.
  - b. Align the screw holes on the hard drive with the holes on the hard-drive carrier.
  - c. Attach the four screws to secure the hard drive to the carrier.



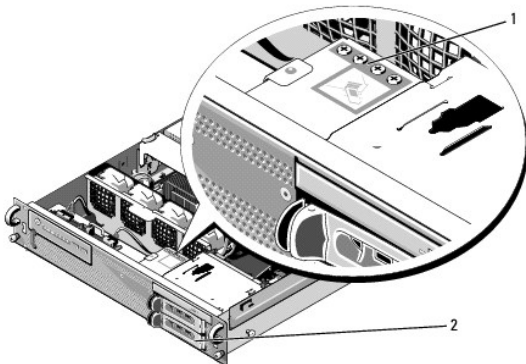
1	screws (4)	2	drive carrier
3	hard drive		

5. Insert the hard-drive carrier into the drive bay until the carrier contacts the back of the bay.
6. Close the handle to lock the drive in place.

## Installing a Second Hard-Drive

**NOTE:** Four screws for installing a hard drive in the second drive carrier are provided in their storage location on the chassis, next to the drive cage. Also, installation instructions are illustrated on the inside of the drive carrier for your convenience.

1. Perform the steps in [Before Working on Your Computer](#).
2. Remove the empty hard-drive carrier from the hard-drive bay:
  - a. Squeeze the release latch on the drive-carrier door and rotate it open.
  - b. Slide the carrier out of the bay.
3. Install the new hard drive in the carrier:
  - a. Slide the drive into the carrier, ensuring that the drive connectors are accessible at the back of the carrier.
  - b. Align the screw holes on the hard drive with the holes on the hard- drive carrier.
  - c. Remove the four screws from their storage location on the chassis, and use them to secure the drive in the carrier



1	screws for second hard drive (4)	2	second hard drive carrier
---	----------------------------------	---	---------------------------

4. Complete [step 5](#) and [step 6](#) of [Replacing a Hard Drive](#).

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## Getting Help

### Dell Precision™ R5400 Service Manual


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


## Obtaining Assistance

 **CAUTION:** If you need to remove the computer cover, first disconnect the computer power and modem cables from all electrical outlets. Follow the safety instructions that shipped with your computer.

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


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

 **NOTE:** Call Dell Support from a telephone at or near the affected computer so that the support staff can assist you with any necessary procedures.

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

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

For instructions on using the Dell Support, see [Technical Support and Customer Service](#).

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

## Technical Support and Customer Service

Dell's support service is available to answer your questions about Dell™ hardware. Our support staff uses computer-based diagnostics to provide fast, accurate answers.

To contact Dell's support service, see [Before You Call](#), and then see the contact information for your region or go to [support.dell.com](http://support.dell.com).

## DellConnect™

DellConnect is a simple online access tool that allows a Dell service and support associate to access your computer through a broadband connection, diagnose your problem and repair it all under your supervision. For more information, go to [support.dell.com](http://support.dell.com) and click **DellConnect**.

## Online Services

You can learn about Dell products and services at the following websites:

[www.dell.com](http://www.dell.com)

[www.dell.com/ap](http://www.dell.com/ap) (Asian/Pacific countries only)

[www.dell.com/jp](http://www.dell.com/jp) (Japan only)

[www.euro.dell.com](http://www.euro.dell.com) (Europe only)

[www.dell.com/la](http://www.dell.com/la) (Latin American and Caribbean countries)

[www.dell.ca](http://www.dell.ca) (Canada only)

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

- 1 Dell Support websites:

[support.dell.com](http://support.dell.com)

[support.jp.dell.com](http://support.jp.dell.com) (Japan only)

[support.euro.dell.com](http://support.euro.dell.com) (Europe only)

- 1 Dell Support e-mail addresses:

[mobile\\_support@us.dell.com](mailto:mobile_support@us.dell.com)

[support@us.dell.com](mailto:support@us.dell.com)

[la-techsupport@dell.com](mailto:la-techsupport@dell.com) (Latin America and Caribbean countries only)

[apsupport@dell.com](mailto:apsupport@dell.com) (Asian/Pacific countries only)

- 1 Dell Marketing and Sales e-mail addresses:

[apmarketing@dell.com](mailto:apmarketing@dell.com) (Asian/Pacific countries only)

[sales\\_canada@dell.com](mailto:sales_canada@dell.com) (Canada only)

- 1 Anonymous file transfer protocol (FTP):

[ftp.dell.com](ftp://ftp.dell.com) – log in as user `anonymous`, and use your e-mail address as your password

## AutoTech Service

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

When you call AutoTech, use your touch-tone telephone to select the subjects that correspond to your questions. For the telephone number to call for your region, see [Contacting Dell](#).

## Automated Order-Status Service

To check on the status of any Dell products that you have ordered, you can go to [support.dell.com](http://support.dell.com), or you can call the automated order-status service. A recording prompts you for the information needed to locate and report on your order. For the telephone number to call for your region, see [Contacting Dell](#).

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## Problems With Your Order

If you have a problem with your order, such as missing parts, wrong parts, or incorrect billing, contact Dell for customer assistance. Have your invoice or packing slip available when you call. For the telephone number to call for your region, see [Contacting Dell](#).

---

## Product Information

If you need information about additional products available from Dell, or if you would like to place an order, visit the Dell website at [www.dell.com](http://www.dell.com). For the telephone number to call for your region or to speak to a sales specialist, see [Contacting Dell](#).

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## Returning Items for Warranty Repair or Credit

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

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

For the telephone number to call for your region, see [Contacting Dell](#). Include a copy of the invoice and a letter describing the reason for the return.

2. Include a copy of the Diagnostics Checklist (see [Diagnostics Checklist](#)), indicating the tests that you have run and any error messages reported by the Dell Diagnostics (see [Contacting Dell](#)).
3. Include any accessories that belong with the item(s) being returned (power cables, software disks, guides, and so on) if the return is for credit.


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

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

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

---

## Before You Call

 **NOTE:** Have your Express Service Code ready when you call. The code helps Dell's automated-support telephone computer direct your call more efficiently. You may also be asked for your Service Tag (located on the back or bottom of your computer).

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


 **CAUTION:** Before working inside your computer, follow the safety instructions in the documentation that shipped with your computer.

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

---

## Contacting Dell

For customers in the United States, call 800-WWW-DELL (800-999-3355).

 **NOTE:** If you do not have an active Internet connection, you can find contact information on your purchase invoice, packing slip, bill, or Dell product catalog.

Dell provides several online and telephone-based support and service options. Availability varies by country and product, and some services may not be available in your area. To contact Dell for sales, technical support, or customer service issues:

1. Visit [support.dell.com](http://support.dell.com), and verify your country or region in the **Choose A Country/Region** drop-down menu at the bottom of the page.
2. Click **Contact Us** on the left side of the page, and select the appropriate service or support link based on your need.
3. Choose the method of contacting Dell that is convenient for you.

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## System Memory

### Dell Precision™ R5400 Service Manual

- [General Memory Module Installation Guidelines](#)
- [Non-Optimal Memory Configurations](#)
- [Installing Memory Modules](#)
- [Removing Memory Modules](#)

**⚠ CAUTION:** Only trained service technicians are authorized to remove the computer cover and access any of the components inside the computer. Before working inside the computer, read the safety information that shipped with the computer. For additional safety best practices information, see the Regulatory Compliance Homepage at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

You can upgrade your system memory to a maximum of 32 GB. The four memory sockets are located on the system board under the cooling shroud parallel to the power supply bay. You can purchase memory upgrade kits from Dell.

---

## General Memory Module Installation Guidelines

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

- 1 Use only qualified fully buffered DIMMs (FBDs). FBDs can be either single-ranked or dual-ranked. FBDs marked with a 1R are single-ranked and FBDs marked with a 2R are dual-ranked.
- 1 A minimum of two identical FBDs must be installed.
- 1 DIMM sockets must be populated by lowest number first.
- 1 FBDs must be installed in pairs of matched memory size, speed, and technology, and the total number of FBDs in the configuration must total two or four. For best computer performance, all four FBDs should be identical memory size, speed, and technology.

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## Non-Optimal Memory Configurations

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

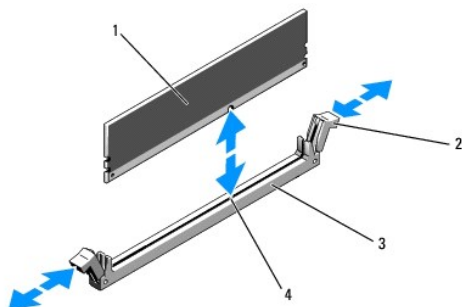
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## Installing Memory Modules

1. Perform the steps in [Before Working on Your Computer](#).
2. Remove the memory cooling shroud (see [Removing the Cooling Shroud](#).)
3. Locate the memory module sockets on the system board.


**⚠ CAUTION:** The DIMMs are hot to the touch for some time after the computer has been powered down. Allow time for the DIMMs to cool before handling them. Handle the DIMMs by the card edges and avoid touching the DIMM components.

4. Press the ejectors on the memory module socket down and out to allow the memory module to be inserted into the socket.



1	memory module	2	memory-module socket ejectors (2)
3	socket	4	alignment key

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


 **NOTE:** The memory module socket has an alignment key that allows you to install the memory module in the socket in only one way.

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

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

7. Repeat [step 3](#) through [step 6](#) of this procedure to install the remaining memory modules.

8. Replace the memory cooling shroud (see [Replacing the Cooling Shroud](#)).

 **NOTICE:** Never operate your computer with the memory cooling shroud removed. Overheating of the computer can develop quickly resulting in a shutdown of the computer and the loss of data.

9. (Optional) Enter the system setup program, and check the **System Memory** setting on the main system setup program screen (the Dell Technology Guide for instructions on accessing and using the system setup program).


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

10. If the value is incorrect, one or more of the memory modules may not be installed properly. Repeat [step 2](#) through [step 9](#) of this procedure, checking to ensure that the memory modules are firmly seated in their sockets.

11. Run the system memory test in the computer diagnostics (see [Dell Diagnostics](#)).

---


## Removing Memory Modules

 **CAUTION:** Only trained service technicians are authorized to remove the computer cover and access any of the components inside the computer. Before working inside the computer, read the safety information that shipped with the computer. For additional safety best practices information, see the Regulatory Compliance Homepage at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

1. Perform the steps in [Before Working on Your Computer](#).
2. Remove the memory cooling shroud (see [Removing the Cooling Shroud](#)).
3. Locate the memory module sockets on the system board.

 **CAUTION:** The DIMMs are hot to the touch for some time after the computer has been powered down. Allow the DIMMs to cool before handling them. Handle the DIMMs by the card edges, and avoid touching the DIMM components.

4. Press down and out on the ejectors on each end of the socket until the memory module pops out of the socket.
5. Replace the memory cooling shroud (see [Replacing the Cooling Shroud](#)).

 **NOTICE:** Never operate your computer with the memory cooling shroud removed. Overheating of the computer can develop quickly resulting in a shutdown of the computer and the loss of data.

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## Optical Drive

### Dell Precision™ R5400 Service Manual

- [Removing the Optical Drive](#)
- [Installing the Optical Drive](#)

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An optical drive is mounted on a tray that slides into the front panel and connects to the system board through a SATA data cable and power cable assembly.

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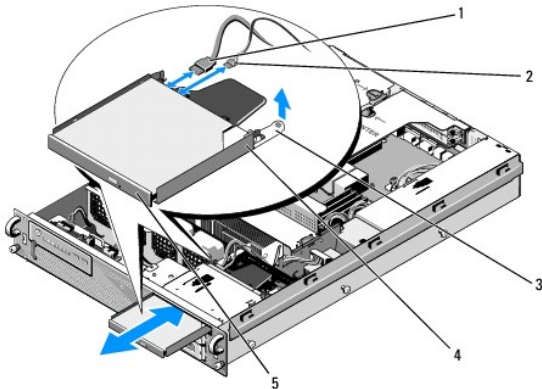
## Removing the Optical Drive

1. Perform the steps in [Before Working on Your Computer](#).
2. Disconnect the optical-drive SATA data cable.

**🔧 NOTE:** Remove the SATA data cable before you remove the power cable. Doing so makes it easier to grasp the power cable connector without straining the power cable.

**👉 NOTICE:** Ensure that you grasp only the cable connector when you disconnect the power cable. Tugging on the cable can damage it.

3. Disconnect the power cable from the back of the drive.
4. Lift the blue tray-release tab and slide the drive tray out through the front of the computer.



1	SATA data cable	2	power cable
3	tray-release tab	4	optical-drive tray
5	optical drive		

---

## Installing the Optical Drive

1. Slide the drive tray into the optical drive bay, from the front of the computer, until the tray snaps into place.
2. Connect the optical-drive SATA data cable and the power cable to the connectors on the back of the drive.

## Power Distribution Unit

### Dell Precision™ R5400 Service Manual

- [Removing the Power Distribution Unit](#)
- [Replacing the Power Distribution Unit](#)

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## Removing the Power Distribution Unit

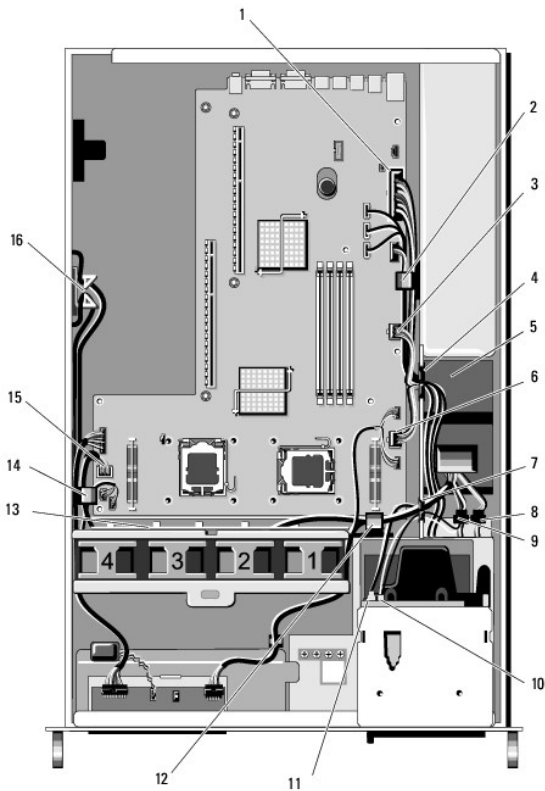
1. Perform the steps in [Before Working on Your Computer](#).

➡ **NOTICE:** Pull on the connector and not on the power cable to disconnect the connector from the back of the optical drive.

2. Disconnect the power cable connector labeled "P9" from the back of the optical drive.

3. Disconnect the hard-drive power cable(s) at the connector(s) labeled "P8" (upper hard drive) and "P7" (lower hard drive, if installed).

☑ **NOTE:** Do not disconnect the power cables directly from the back of the hard drives, as it is not necessary for removal of the power distribution unit.



1	power-cable connector P1	2	cable-routing clip (power cable P1)
3	power-cable connector P2	4	cable-routing portal (power cables P1, P2, and P3)
5	power distribution unit	6	power-cable connector P3
7	cable-routing portal (power cables P4, P5, and P6)	8	hard-drive (lower) power cable connector (P7)
9	hard-drive (upper) power cable	10	optical-drive power cable

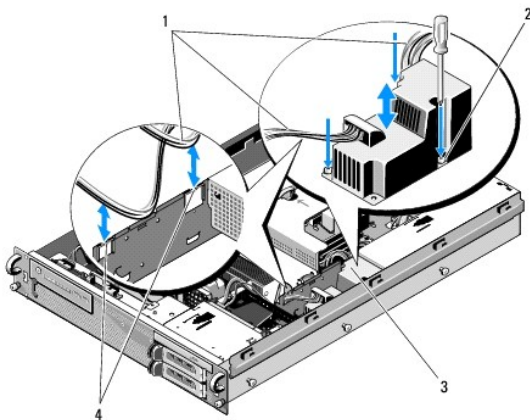
	connector (P8)		connector (P9)
11	optical-drive SATA data cable	12	cable-routing clip (power cables P4, P5, and P6)
13	cable-routing channel (power cables P4, P5, and P6)	14	cable-routing clip (power cables P4, P5, and P6)
15	power-cable connector P4	16	storage for power cables P5 and P6 (when not in use)

- Disengage the power supply and slide it partway out of the power supply bay (see [Removing the Power Supply](#)).
- Remove both expansion-card cages (see [Removing an Expansion-Card Cage](#)), ensuring that you disconnect the power cable connectors labeled "P5" and "P6" from any expansion cards installed in the card cages.

**NOTE:** If power cables P5 and P6 are not connected to any expansion card, ensure that you disengage them from their storage shelf in the side wall of the chassis.

- Remove the mid-support brace (see [Removing the Mid-Support Brace](#)).
- Remove the cooling shroud (see [Removing the Cooling Shroud](#)).
- Disconnect the power cable connectors labeled "P1," "P2," "P3," and "P4" from the system board.
- Unscrew the three captive screws on the power distribution unit that secure it to the bottom of the chassis.
- Disengage the power cables from the cable clips, cable-routing channels, and cable-routing portals on the chassis as you lift the power distribution unit out of the chassis, easing the power cables along behind it.

**NOTE:** Each portal has an arm that hinges up and down over the opening.



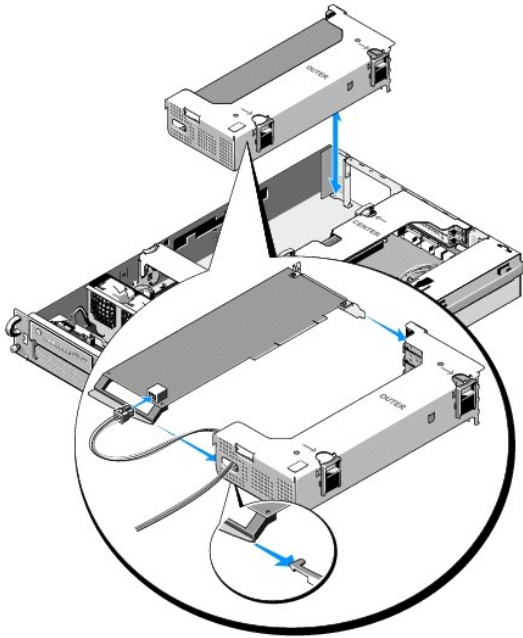
1	power cables	2	captive screws (3)
3	power distribution unit	4	cable-routing portals (2)

## Replacing the Power Distribution Unit

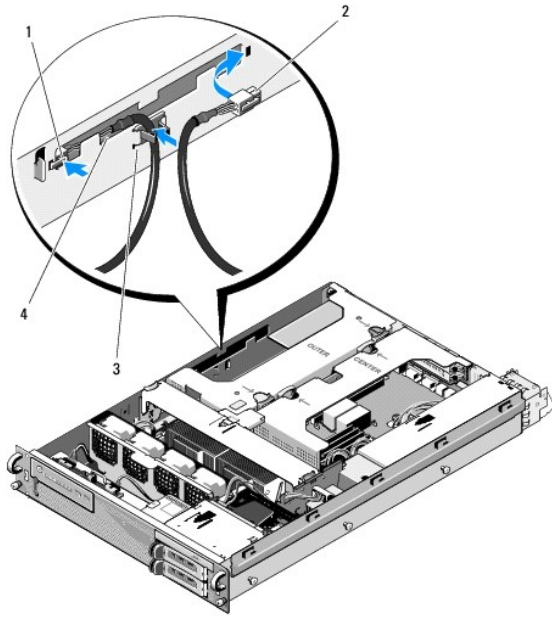
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- Lower the power distribution unit onto the screw mounts on the bottom of the chassis, and tighten the three captive screws.
- Reconnect the hard-drive power cable(s) to power-cable connector P8 (hard drive in upper bay) and connector P7 (hard drive in lower bay, if applicable).
- Reconnect the optical-drive power-cable connector P9 to the back of the optical drive.
- Tuck connectors P7 and P8 and their cables down into the space between the power distribution unit and the back of the hard drives.

5. Reroute the power cables for connectors P1, P2, and P3 into the cable-routing portal next to the power distribution unit.
6. Insert the power cable for connector P1 into the cable-routing clip beside the power supply bay.
7. Reroute the power cables for connectors P4, P5, and P6 into the:
  - 1 Remaining cable-routing portal
  - 1 Cable-routing channel alongside the four fans, at the bottom of the chassis
  - 1 Cable-routing clips on the chassis at either end of the cable-routing channel.
8. Replace the cooling shroud (see [Replacing the Cooling Shroud](#)).
9. Reconnect the power cable connectors labeled "P1," "P2," "P3," and "P4" to the system board.
10. Thread connectors P5 and P6, as applicable if being used, through the cable-routing openings in the outer expansion-card cage, and reconnect the cable(s) to the expansion cards(s), if installed.



**NOTE:** If power-cable connectors P5 and P6 are not being used, store them in the channel provided in the side of the chassis, using the cable guide to route them out of the way of the outer expansion-card cage and the mid-support brace.



1	power-cable connector P5	2	power-cable connector P6
3	cable guide	4	storage shelf for power cables P5 and P6 (when not in use)

11. Reinstall the outer expansion-card cage, followed by the center expansion- card cage (see [Replacing an Expansion-Card Cage](#)).
12. Replace the mid-support brace (see [Replacing the Mid-Support Brace](#)).
13. Reinstall the power supply (see [Replacing the Power Supply](#)).

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## Processors

### Dell Precision™ R5400 Service Manual

- [Removing a Processor](#)
- [Installing a Processor](#)

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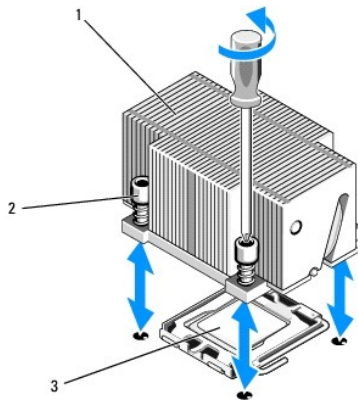
Your computer can accommodate two processors. You can upgrade your processor(s) to take advantage of future options in speed and functionality. Each processor and its associated internal cache memory are contained in a land grid array (LGA) package that is installed in a ZIF socket on the system board.

---

## Removing a Processor

1. Prior to upgrading your computer, download the latest computer BIOS version on [support.dell.com](http://support.dell.com).
2. Perform the steps in [Before Working on Your Computer](#).

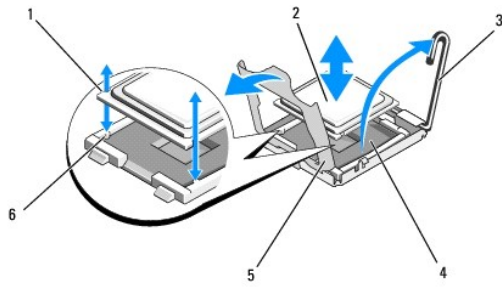
- **NOTICE:** When you remove the heat sink, the possibility exists that the processor might adhere to the heat sink and be removed from the socket. It is recommended that you remove the heat sink while the processor is still warm.
- **NOTICE:** Never remove the heat sink from a processor unless you intend to also remove the processor. The heat sink is necessary to maintain proper thermal conditions.



1	heat sink	2	retention screws (4)
3	processor		

3. Wait 30 seconds for the heat sink and thermal grease to cool enough to allow the heat sink to be loosened from the processor.
4. If the heat sink does not easily separate from the processor, carefully rotate the heat sink in a clockwise, then counterclockwise direction until it releases from the processor. Do not pry the heat sink from the processor.
5. Lift the heat sink off of the processor and set the heat sink aside.
6. Press down and outward to disengage the socket-release lever, and rotate it 90 degrees upward until the processor is released from the socket.
7. Rotate the processor shield upward and out of the way.





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

- Lift the processor out of the socket and leave the release lever up so that the socket is ready for the new processor.

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

## Installing a Processor

- Unpack the new processor.

- Install the processor in the socket.

**NOTICE:** Positioning the processor incorrectly can permanently damage the system board or the processor when you turn it on. When placing the processor in the socket, be careful not to bend the pins in the socket.

- If you are installing a second processor in a socket that was previously unoccupied, remove the black-plastic socket protector from the processor shield.
- If the release lever on the processor socket is not positioned all the way up, move it to that position.
- With the processor and the ZIF socket keys aligned, set the processor lightly into the socket.

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

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

- Install the heat sink.

**NOTE:** If you did not receive a replacement heat sink, use the heat sink that you removed in [step 5](#).

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

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

- Using a clean lint-free cloth, remove the existing thermal grease from the heat sink you removed in [step 5](#).
  - Open the grease packet included with your processor kit and apply thermal grease evenly to the top of the processor.
- Place the heat sink on the processor.
  - Tighten the retention screws on the heat sink.

- Replace the computer cover (see [Replacing the Cover](#)) and reboot the computer.

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

- Press <F2> to enter the system setup program, and check that the processor information matches the new computer configuration (see the *Dell Technology Guide* for information about accessing and using the system setup program).

- Run the computer diagnostics to verify that the new processor operates correctly.

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



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## Processors

### Dell Precision™ R5400 Service Manual

- [Removing a Processor](#)
- [Installing a Processor](#)

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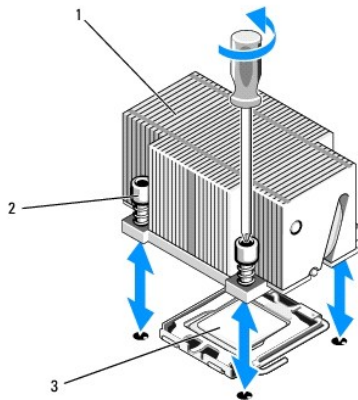
Your computer can accommodate two processors. You can upgrade your processor(s) to take advantage of future options in speed and functionality. Each processor and its associated internal cache memory are contained in a land grid array (LGA) package that is installed in a ZIF socket on the system board.

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## Removing a Processor

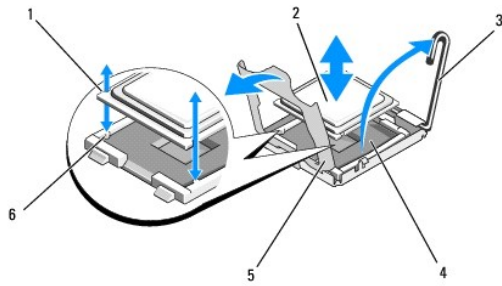
1. Prior to upgrading your computer, download the latest computer BIOS version on [support.dell.com](http://support.dell.com).
2. Perform the steps in [Before Working on Your Computer](#).

- ➡ **NOTICE:** When you remove the heat sink, the possibility exists that the processor might adhere to the heat sink and be removed from the socket. It is recommended that you remove the heat sink while the processor is still warm.
- ➡ **NOTICE:** Never remove the heat sink from a processor unless you intend to also remove the processor. The heat sink is necessary to maintain proper thermal conditions.



1	heat sink	2	retention screws (4)
3	processor		

3. Wait 30 seconds for the heat sink and thermal grease to cool enough to allow the heat sink to be loosened from the processor.
4. If the heat sink does not easily separate from the processor, carefully rotate the heat sink in a clockwise, then counterclockwise direction until it releases from the processor. Do not pry the heat sink from the processor.
5. Lift the heat sink off of the processor and set the heat sink aside.
6. Press down and outward to disengage the socket-release lever, and rotate it 90 degrees upward until the processor is released from the socket.
7. Rotate the processor shield upward and out of the way.



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

- Lift the processor out of the socket and leave the release lever up so that the socket is ready for the new processor.

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

## Installing a Processor

- Unpack the new processor.
- Install the processor in the socket.

**NOTICE:** Positioning the processor incorrectly can permanently damage the system board or the processor when you turn it on. When placing the processor in the socket, be careful not to bend the pins in the socket.

- If you are installing a second processor in a socket that was previously unoccupied, remove the black-plastic socket protector from the processor shield.
- If the release lever on the processor socket is not positioned all the way up, move it to that position.
- With the processor and the ZIF socket keys aligned, set the processor lightly into the socket.

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

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

- Install the heat sink.

**NOTE:** If you did not receive a replacement heat sink, use the heat sink that you removed in [step 5](#).

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

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

- o Using a clean lint-free cloth, remove the existing thermal grease from the heat sink you removed in [step 5](#).
- o Open the grease packet included with your processor kit and apply thermal grease evenly to the top of the processor.
- o Place the heat sink on the processor.
- o Tighten the retention screws on the heat sink.

- Replace the computer cover (see [Replacing the Cover](#)) and reboot the computer.

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

- Press <F2> to enter the system setup program, and check that the processor information matches the new computer configuration (see the *Dell Technology Guide* for information about accessing and using the system setup program).

- Run the computer diagnostics to verify that the new processor operates correctly.

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

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## Power Supply

Dell Precision™ R5400 Service Manual

- [Removing the Power Supply](#)
- [Replacing the Power Supply](#)

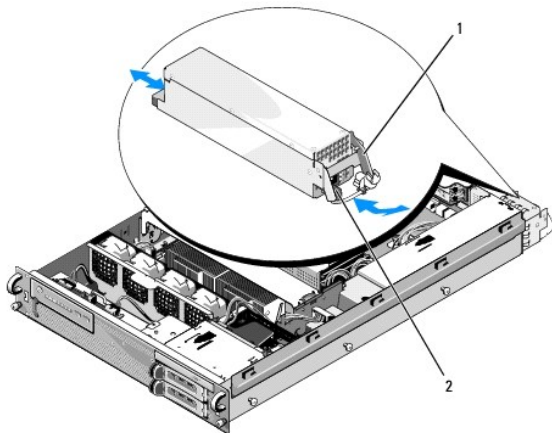
**⚠ CAUTION:** Only trained service technicians are authorized to remove the computer cover and access any of the components inside the computer. Before working inside the computer, read the safety information that shipped with the computer. For additional safety best practices information, see the Regulatory Compliance Homepage at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

Your computer supports one power supply rated at an output of 800 to 900 W.

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### Removing the Power Supply

1. Perform the steps in [Before Working on Your Computer](#).
2. Disconnect the power cable from the power supply and remove the cable from the cable retention bracket.
3. At the back of the computer, release the locking tab on the left side of the power supply by pressing in toward the right, and rotate the power-supply handle up until the power supply is released from the chassis.
4. Pull the power supply straight back to clear the chassis.



1	power-supply handle	2	locking tab
---	---------------------	---	-------------

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### Replacing the Power Supply

1. With the power-supply handle in the extended position, slide the new power supply into the chassis.
2. Rotate the handle down until it is completely flush with the power-supply faceplate and the locking tab engages.

**🔍 NOTE:** After installing a new power supply, allow several seconds for the computer to recognize the power supply and determine whether it is working properly. The power supply status indicator turns green to signify that the power supply is functioning properly.

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## Remote Access Host Card (Optional)

Dell Precision™ R5400 Service Manual

- [Installing the Host Card](#)
- [Removing a Host Card](#)

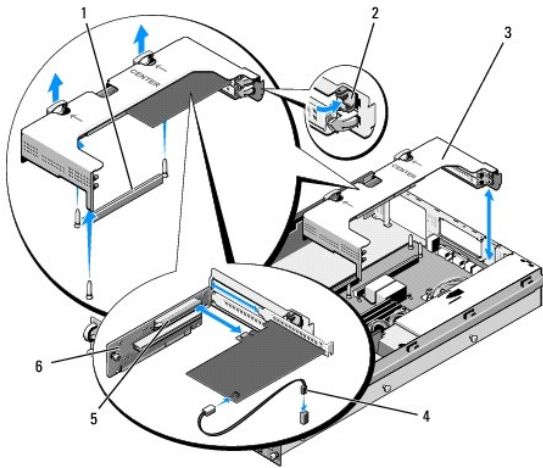
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This section describes how to install and/or remove and replace the host card and connect the two-wire cable required for the Dell remote access solution available for your computer. For instructions on configuring the host card and remote access portal that make up the complete remote access solution, see the *Setting Up the Remote Access Solution* guide that accompanied the host card.

### Installing the Host Card

**NOTE:** Install the host card in the *center* expansion-card cage only.

1. Perform the steps in [Before Working on Your Computer](#).
2. Unpack the host card and prepare it for installation.  
For instructions, see the documentation accompanying the card
3. Remove the center expansion-card cage (see [Removing an Expansion- Card Cage](#)).
4. Open the top expansion-card latch and remove the filler bracket.
5. Install the host card:
  - a. Position the card so that the card-edge connector aligns with the expansion-card connector on the riser board.
  - b. Insert the card-edge connector firmly into the connector on the riser board until the card is fully seated.
  - c. When the card is seated in the connector, close the expansion-card latch.



1	riser-board connector on system board	2	expansion-card latch
3	center expansion-card cage	4	two-wire cable
5	expansion-card connector on riser board	6	riser board


6. Connect the two-wire cable (included with the host card kit) to the card and to the system board.
7. Reconnect any expansion-card cables for already-installed expansion cards.

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


---

## Removing a Host Card

1. Perform the steps in [Before Working on Your Computer](#).
2. Remove the center expansion-card cage (see [Removing an Expansion-Card Cage](#)).

 **NOTE:** Remember to disconnect the two-wire cable from the system board.

3. Release the expansion card:
  - a. Open the expansion-card latch.
  - b. Grasp the expansion card by its top corners, and remove it from the expansion-card connector.
4. If you are removing the card permanently, install a metal filler bracket over the empty expansion-slot opening and close the expansion-card latch.

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

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## Expansion-Card Riser Board

### Dell Precision™ R5400 Service Manual

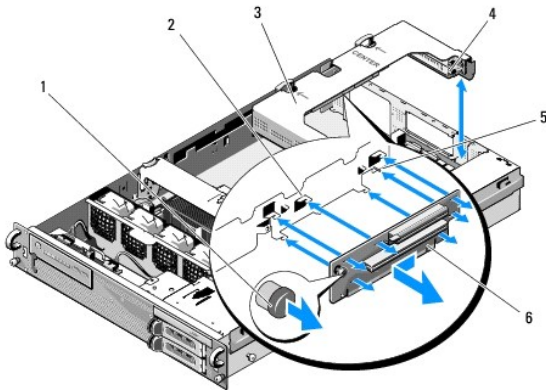
- [Removing the Center Riser Board](#)
- [Replacing the Center Riser Board](#)

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**NOTE:** The riser board can be replaced in the center expansion-card cage only, not the outer cage.

## Removing the Center Riser Board

1. Perform the steps in [Before Working on Your Computer](#).
2. Remove the center expansion-card cage from the computer (see [Removing an Expansion-Card Cage](#)).
3. Remove all expansion cards from the expansion-card riser board (see [Removing an Expansion Card](#)).
4. While lifting the blue spring-loaded release knob on the riser board, slide the board horizontally, away from the expansion-card latch end of the cage, until the riser board is freed from the five guide hooks.



1	spring-loaded release knob	2	guide hooks (5)
3	center expansion-card cage	4	expansion-card latch end of cage
5	guide pin	6	riser board

## Replacing the Center Riser Board

1. Holding the riser board by the release knob, place the board so that the guide pin fits in the corresponding hole in the board.
2. With the release knob raised, slide the board toward the expansion-card latches until the guide hooks and release knob click securely into place.
3. Replace any expansion cards that you removed in [step 3](#) of [Removing the Center Riser Board](#).

## Cooling Shroud

### Dell Precision™ R5400 Service Manual

- [Removing the Cooling Shroud](#)
- [Replacing the Cooling Shroud](#)

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**⚠ CAUTION:** The DIMMs are hot to the touch for some time after the computer has been powered down. Allow the DIMMs to cool before handling them.

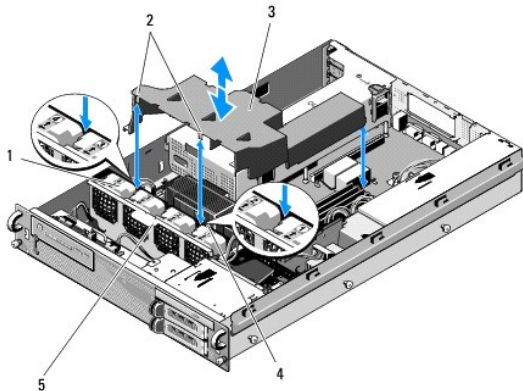
**🔒 NOTICE:** Never operate your computer with the memory cooling shroud removed. Overheating of the computer can develop quickly, resulting in a shutdown of the computer and the loss of data.

The cooling shroud produces and directs airflow over the memory modules (DIMMs).

---

## Removing the Cooling Shroud

1. Perform the steps in [Before Working on Your Computer](#).
2. Remove the mid-support brace (see [Removing the Mid-Support Brace](#)).
3. Remove the center expansion-card cage (see [Removing an Expansion-Card Cage](#)).
4. Lift the shroud upward and out of the chassis.



1	fans (4)	2	shroud hooks (2)
3	cooling shroud	4	fan bracket (unremovable)
5	fan bracket (removable)		

---

## Replacing the Cooling Shroud

1. Align the shroud above the computer so that, when installed, the hooks will hang over the fan bracket.

**🔍 NOTE:** The fans are labeled 1, 2, 3, and 4.

2. Lower the shroud straight down into the computer, with one hook centered between fan 1 and fan 2, and the other hook centered between fan 3 and fan 4.



## Speaker

### Dell Precision™ R5400 Service Manual

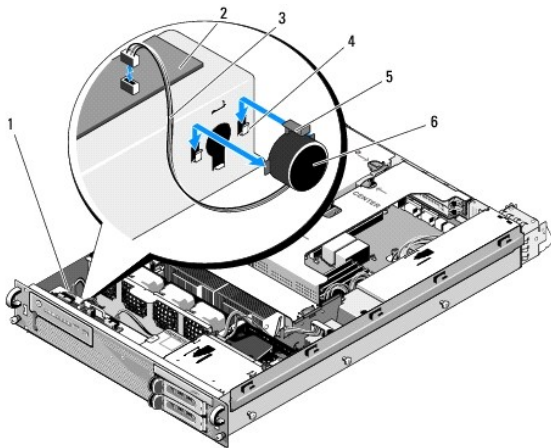
- [Removing the Speaker](#)
- [Replacing the Speaker](#)

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## Removing the Speaker

1. Perform the steps in [Before Working on Your Computer](#).
2. Disconnect the speaker cable from the control panel board.

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



1	control panel cable	2	control panel board
3	speaker cable	4	retaining brackets (2)
5	speaker release tab	6	speaker

3. To gain access to the speaker, disconnect the control panel cable from the control panel board.
4. Press back on the speaker release tab so that you can slide the speaker up out of the chassis.

## Replacing the Speaker

1. Slide the speaker down into the retaining brackets until the release tab snaps into place.
2. Connect the speaker cable to the control panel board.
3. Connect the control panel cable to the control panel board.

## System Board

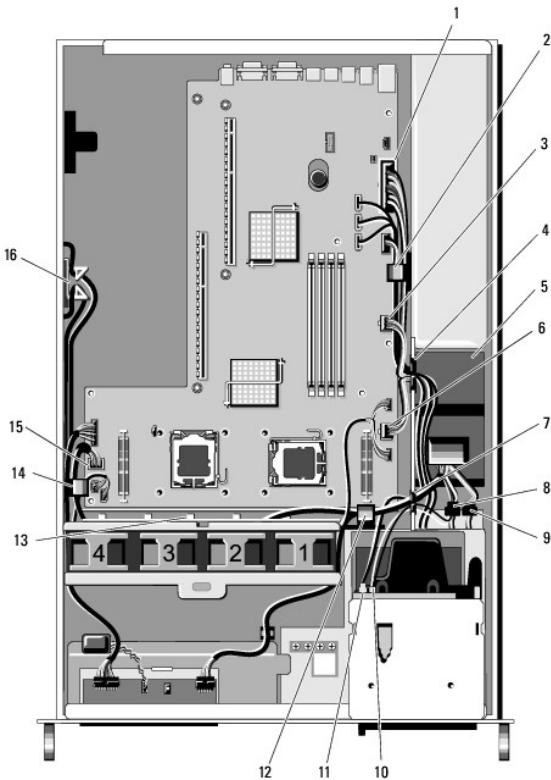
### Dell Precision™ R5400 Service Manual

- [Removing the System Board](#)
- [Installing the System Board](#)

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## Removing the System Board

1. Perform the steps in [Before Working on Your Computer](#).
2. Remove the power cable from the power supply at the back of the computer.
3. Remove both expansion-card cages (see [Removing an Expansion-Card Cage](#)), ensuring that you disconnect the power cables labeled "P5" and "P6" from any expansion cards installed in the card cages.
4. Remove the mid-support brace (see [Removing the Mid-Support Brace](#)).
5. Remove the cooling shroud (see [Removing the Cooling Shroud](#)).
6. Disconnect the power cables labeled "P1," "P2," "P3," and "P4" from the system board.



1	power-cable connector P1	2	cable-routing clip (power cable P1)
3	power-cable connector P2	4	cable-routing portal (power cables P1, P2, and P3)
5	power distribution unit	6	power-cable connector P3
7	cable-routing portal (power cables P4, P5, and P6)	8	hard-drive (upper) power cable connector (P8)
9	hard-drive (lower) power cable	10	optical-drive power cable

	connector (P7)		connector (P9)
11	SATA data cable connector	12	cable-routing clip (power cables P4, P5, and P6)
13	cable-routing channel (power cables P4, P5, and P6)	14	cable-routing clip (power cables P4, P5, and P6)
15	power-cable connector P4		storage for power cables P5 and P6

**CAUTION:** The DIMMs are hot to the touch for some time after the computer has been powered down. Allow time for the DIMMs to cool before handling them. Handle the DIMMs by the card edges and avoid touching the DIMM components.

7. Remove the memory modules (see [Removing Memory Modules](#)).

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

8. Remove the heat sink(s) and processor(s) (see [Removing a Processor](#)).

9. Disconnect the control-panel cable from the system board.

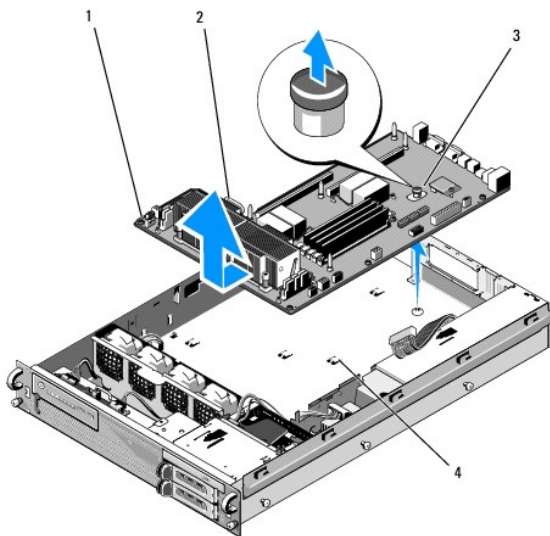
10. Disconnect the four fan connectors from the system board.

11. Disconnect the front USB cable connector from the system board.

12. Disconnect the SATA\_0, SATA\_1, and SATA\_2 data-cable connectors from the system board.

13. Remove the system board:

- Pull up on the system-board tray release knob.
- While pulling up on the release knob, use the metal tab/handle to slide the system-board tray toward the front of the chassis.
- Lift the system-board tray at a 45-degree angle as you slide the system-board tray away from the power-supply bay, and remove it from the chassis.



1	system board	2	metal tab/handle
3	release knob	4	securing tabs

## Installing the System Board

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1. Holding the system board by the blue release knob and the metal tab/handle, lower the system-board tray into the chassis at a 45-degree angle toward the power-supply bay until the tray sits flat on the bottom of the chassis.
2. Ensure that all nine system-board tray securing-tabs are fully inserted into the nine system-board securing slots on the bottom of the chassis.
3. Slide the system-board tray toward the back of the chassis until the plunger in the release knob locks into position.
4. Replace the heat sink(s) and processor(s) (see [Installing a Processor](#)).
5. Replace the memory modules (see [Installing Memory Modules](#)).
6. Reconnect the control-panel cable to the system board.
7. Reconnect the four fan connectors to the system board.
8. Reconnect the front USB cable connector to the system board.
9. Reconnect the SATA\_0, SATA\_1, and SATA\_2 data connectors to the system board.
10. Reconnect the power cables labeled "P1," "P2," "P3," and "P4" to the system board.
11. Replace the cooling shroud (see [Replacing the Cooling Shroud](#)).
12. Replace the expansion-card cages (see [Replacing an Expansion-Card Cage](#)).
13. Replace the mid-support brace (see [Replacing the Mid-Support Brace](#)).
14. Replace the computer cover (see [Replacing the Cover](#)).

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## Dell Precision™ R5400 Service Manual



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



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



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

If you purchased a Dell™ n Series computer, any references in this document to Microsoft® Windows® operating systems are not applicable.

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June 2008 Rev. A00

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## Troubleshooting

### Dell Precision™ R5400 Service Manual

- [Tools](#)
- [Dell Diagnostics](#)
- [Solving Problems](#)
- [Dell Technical Update Service](#)

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 **CAUTION:** Always unplug your computer from the electrical outlet before opening the cover.

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## Tools

### Power Lights


The power button light located on the front of the computer illuminates and blinks or remains solid to indicate different states:

- 1 If the power light is green and the computer is not responding, see [Diagnostic Lights](#).
- 1 If the power light is blinking green, the computer is in standby mode. Press a key on the keyboard, move the mouse, or press the power button to resume normal operation.
- 1 If the power light is off, the computer is either turned off or is not receiving power.
  - o Reseat the power cable into both the power connector on the back of the computer and the electrical outlet.
  - o If the computer is plugged into a power strip, ensure that the power strip is plugged into an electrical outlet and that the power strip is turned on.
  - o Bypass power protection devices, power strips, and power extension cables to verify that the computer turns on properly.
  - o Ensure that the electrical outlet is working by testing it with another device, such as a lamp.
  - o Ensure that the main power cable and front panel cable are securely connected to the system board (see [System Board](#)).
- 1 If the power light is steady amber, a device may be malfunctioning or incorrectly installed.
  - o Remove and then reinstall the memory modules (see [System Memory](#)).
  - o Remove and then reinstall any cards (see [Expansion Cards](#)).
- 1 Eliminate interference. Some possible causes of interference are:
  - o Power, keyboard, and mouse extension cables
  - o Too many devices on a power strip
  - o Multiple power strips connected to the same electrical outlet





### Diagnostic Lights

 **CAUTION:** Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage on [www.dell.com](http://www.dell.com) at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

To help troubleshoot a problem, your computer has four lights labeled 1, 2, 3, and 4 on the front panel. When the computer starts normally, the lights flash, and then turn off. If the computer malfunctions, use the sequence of the lights to help identify the problem.

 **NOTE:** After the computer completes POST, all four lights turn off before booting to the operating system.

### Diagnostic Light Codes During POST

Light Pattern	Problem Description	Suggested Resolution
   	The computer is in a normal off condition or a possible pre-BIOS failure has occurred.	Plug the computer into a working electrical outlet and press the power button.

①②③④	A possible BIOS failure has occurred; the computer is in the recovery mode.	<ul style="list-style-type: none"> <li>1 Run the BIOS Recovery utility, wait for recovery completion, and then restart the computer.</li> <li>1 If the problem persists, contact Dell (see <a href="#">Contacting Dell</a>).</li> </ul>
①②③④	A possible processor failure has occurred.	<ul style="list-style-type: none"> <li>1 Reseat the processor (see <a href="#">Processors</a>).</li> <li>1 If the problem persists, contact Dell (see <a href="#">Contacting Dell</a>).</li> </ul>
①②③④	Memory modules are detected, but a memory failure has occurred.	<ul style="list-style-type: none"> <li>1 If two or more memory modules are installed, remove the modules (see <a href="#">System Memory</a>), then reinstall one module and restart the computer. If the computer starts normally, continue to install additional memory modules (one at a time) until you have identified a faulty module or reinstalled all modules without error.</li> <li>1 If available, install working memory of the same type into your computer (see <a href="#">System Memory</a>).</li> <li>1 If the problem persists, contact Dell (see <a href="#">Contacting Dell</a>).</li> </ul>
①②③④	A possible graphics card failure has occurred.	<ul style="list-style-type: none"> <li>1 Reseat any installed graphics cards (see <a href="#">Expansion Cards</a>).</li> <li>1 If available, install a working graphics card into your computer.</li> <li>1 If the problem persists, contact Dell (see <a href="#">Contacting Dell</a>).</li> </ul>
①②③④	A possible hard drive failure has occurred.	<ul style="list-style-type: none"> <li>1 Reseat all power and data cables and restart the computer.</li> <li>1 If the problem persists, contact Dell (see <a href="#">Contacting Dell</a>).</li> </ul>
①②③④	A possible USB failure has occurred.	<ul style="list-style-type: none"> <li>1 Reinstall all USB devices, check cable connections, and then restart the computer.</li> <li>1 If the problem persists, contact Dell (see <a href="#">Contacting Dell</a>).</li> </ul>
①②③④	No memory modules are detected.	<ul style="list-style-type: none"> <li>1 If two or more memory modules are installed, remove the modules (see <a href="#">System Memory</a>), then reinstall one module and restart the computer. If the computer starts normally, continue to install additional memory modules (one at a time) until you have identified a faulty module or reinstalled all modules without error.</li> <li>1 If available, install working memory of the same type into your computer (see <a href="#">System Memory</a>).</li> <li>1 If the problem persists, contact Dell (see <a href="#">Contacting Dell</a>).</li> </ul>
①②③④	System board failure has occurred.	<ul style="list-style-type: none"> <li>1 Contact Dell (see <a href="#">Contacting Dell</a>).</li> </ul>
①②③④	Memory modules are detected, but a memory configuration or compatibility error exists.	<ul style="list-style-type: none"> <li>1 Ensure that no special requirements for memory module/connector placement exist (see <a href="#">System Memory</a>).</li> <li>1 Ensure that the memory you are using is supported by your computer (see <a href="#">System Memory</a>).</li> <li>1 If the problem persists, contact Dell (see <a href="#">Contacting Dell</a>).</li> </ul>
①②③④	A possible system board resource and/or hardware failure has occurred.	<ul style="list-style-type: none"> <li>1 See your computer's <i>Setup and Quick Reference Guide</i> for instructions on restoring the operating system.</li> <li>1 If the problem persists, contact Dell (see <a href="#">Contacting Dell</a>).</li> </ul>
①②③④	A possible expansion card failure has occurred.	<ul style="list-style-type: none"> <li>1. Determine if a conflict exists by removing an expansion card (not a graphics card) and restarting the computer (see <a href="#">Expansion Cards</a>).</li> <li>2. If the problem persists, reinstall the card you removed, then remove a different card and restart the computer.</li> <li>3. Repeat this process for each expansion card installed. If the computer starts normally, troubleshoot the last card removed from the computer for resource conflicts (see your computer's <i>Setup and Quick Reference Guide</i> for instructions on restoring the operating system).</li> <li>4. If the problem persists, contact Dell (see <a href="#">Contacting Dell</a>).</li> </ul>
①②③④	Another failure has occurred.	<ul style="list-style-type: none"> <li>1 Ensure that all hard drive and CD/DVD drive cables are properly connected to the system board (see <a href="#">System Board</a>).</li> <li>1 If there is an error message on the screen identifying a problem with a device (such as the hard drive), check the device to make sure it is functioning properly.</li> <li>1 If the operating system is attempting to boot from a device (such as the CD/DVD drive), check the system setup program (see the <i>Dell Technology Guide</i>) to ensure that the boot sequence is correct for the devices installed on your computer.</li> <li>1 If the problem persists, contact Dell (see <a href="#">Contacting Dell</a>).</li> </ul>

## Beep Codes

Your computer may emit a series of beeps during start-up if the monitor cannot display errors or problems. For example, one possible beep code may consist of three short, repeated beeps indicating that the computer has encountered a possible system board failure.

If your computer emits a series of beeps during start-up:


1. Write down the beep code.
2. Run the Dell Diagnostics to further identify the problem (see [Dell Diagnostics](#)).

Code	Cause
2 short, 1 long	BIOS checksum error
1 long, 3 short, 2 short	Memory error

1 short | F12 key pressed

Code (repetitive short beeps)	Description	Suggested Resolution
1	BIOS checksum failure. Possible system board failure.	Contact Dell (see <a href="#">Contacting Dell</a> ).
2	No memory modules are detected.	<ol style="list-style-type: none"><li>1 If two or more memory modules are installed, remove the modules (see <a href="#">System Memory</a>), then reinstall one module and restart the computer. If the computer starts normally, continue to install additional memory modules (one at a time) until you have identified a faulty module or reinstalled all modules without error.</li><li>1 If available, install working memory of the same type into your computer (see <a href="#">System Memory</a>).</li><li>1 If the problem persists, contact Dell (see <a href="#">Contacting Dell</a>).</li></ol>
3	Possible system board failure.	Contact Dell (see <a href="#">Contacting Dell</a> ).
4	RAM Read/Write failure.	<ol style="list-style-type: none"><li>1 Ensure that no special requirements for memory module/connector placement exist (see <a href="#">System Memory</a>).</li><li>1 Ensure that the memory you are using is supported by your computer (see <a href="#">System Memory</a>).</li><li>1 If the problem persists, contact Dell (see <a href="#">Contacting Dell</a>).</li></ol>
5	Real time clock failure. Possible battery or system board failure.	<ol style="list-style-type: none"><li>1 Replace the battery (see <a href="#">Replacing the Battery</a>).</li><li>1 If the problem persists, contact Dell (see <a href="#">Contacting Dell</a>).</li></ol>
6	Video BIOS Test Failure.	Contact Dell (see <a href="#">Contacting Dell</a> ).

## System Messages

 **NOTE:** If the message you received is not listed in the table, see the documentation for either the operating system or the program that was running when the message appeared.

**Alert! Previous attempts at booting this computer have failed at checkpoint [nnnn]. For help in resolving this problem, please note this checkpoint and contact Dell Technical Support —**

The computer failed to complete the boot routine three consecutive times for the same error (see [Contacting Dell](#) for assistance).

**CMOS checksum error —** Possible motherboard failure or RTC battery low. Replace the battery (see [Replacing the Battery](#) or see [Contacting Dell](#) for assistance).

**CPU fan failure —** Processor fan failure. Replace the processor fan (see [Processors](#)).

**Hard-disk read failure —** Possible hard drive failure during hard drive boot test (see [Contacting Dell](#) for assistance).

**Keyboard failure —** Keyboard failure or keyboard cable loose (see [Keyboard Problems](#)).

**No boot device available —** The computer cannot detect a bootable device or partition.

- o If the hard drive is your boot device, ensure that the cables are connected and that the drive is installed properly and partitioned as a boot device.
- o Enter the system setup program and ensure that the boot sequence information is correct (see the *Dell Technology Guide* for instructions on accessing and using the system setup program).

**No timer tick interrupt —** A chip on the system board might be malfunctioning or motherboard failure (see [Contacting Dell](#) for assistance).


**NOTICE — Hard Drive SELF MONITORING SYSTEM has reported that a parameter has exceeded its normal operating range. Dell recommends that you back up your data regularly. A parameter out of range may or may not indicate a potential hard drive problem. —**

S.M.A.R.T error, possible HDD failure. This feature can be enabled or disabled in the system setup program (see the *Dell Technology Guide* for instructions on accessing and using the system setup program).

## Hardware Troubleshooter

If a device is either not detected during the operating system setup or is detected, but incorrectly configured, you can use the Hardware Troubleshooter to resolve the incompatibility.


Windows® Vista®:

1. Click the Windows Vista start button , and click **Help and Support**.
2. Type `hardware troubleshooter` in the search field and press <Enter> to start the search.
3. In the search results, select the option that best describes the problem and follow the remaining troubleshooting steps.

Windows XP:

1. Click **Start**→ **Help and Support**.
  2. Type `hardware troubleshooter` in the search field and press <Enter> to start the search.
  3. In the **Fix a Problem** section, click **Hardware Troubleshooter**.
  4. In the **Hardware Troubleshooter** list, select the option that best describes the problem and click **Next** to follow the remaining troubleshooting steps.
- 



## Dell Diagnostics

 **CAUTION:** Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the [Regulatory Compliance Homepage on www.dell.com at www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

### When to Use the Dell Diagnostics

If you experience a problem with your computer, perform the checks in [Solving Problems](#), and then run the Dell Diagnostics before contacting Dell for assistance.


Start the Dell Diagnostics from your hard drive or from the *Drivers and Utilities* media provided with your computer.

-  **NOTE:** The *Drivers and Utilities* media is optional and may not ship with your computer.
-  **NOTE:** The Dell Diagnostics only operate on Dell computers.


### Starting the Dell Diagnostics From Your Hard Drive

Before running the Dell Diagnostics, enter the system setup program (see the *Dell Technology Guide* for instructions) to review your computer's configuration information, and ensure that the device you want to test is displayed in the system setup program and is active.

The Dell Diagnostics is located on a separate diagnostic utility partition on your hard drive.

-  **NOTE:** If your computer does not display a screen image, contact Dell (see [Contacting Dell](#)).

1. Ensure that the computer is connected to an electrical outlet that is known to be working properly.
2. Turn on (or restart) your computer.
3. When the DELL logo appears, press <F12> immediately.

 **NOTE:** Keyboard failure may result when a key is held down for extended periods of time. To avoid possible keyboard failure, press and release <F12> in even intervals to open the Boot Device Menu.

If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft Windows desktop, then shut down your computer and try again.

4. Use the up- and down-arrow keys to select **Diagnostics** from the boot menu and then press <Enter>.

The computer runs the Pre-boot System Assessment (PSA), a series of initial tests of your system board, keyboard, display, memory, hard drive, and so on.


1. Answer any questions that appear.
1. If failures are detected, write down the error code(s) and see [Contacting Dell](#).

1. If the Pre-boot System Assessment completes successfully, the following message appears: "Booting Dell Diagnostic Utility Partition. Press any key to continue."


 **NOTE:** If you see a message stating that no diagnostics utility partition has been found, run the Dell Diagnostics from your *Drivers and Utilities* media (see [Starting the Dell Diagnostics From the Drivers and Utilities Media](#)).

5. Press any key to start the Dell Diagnostics from the diagnostics utility partition on your hard drive.

6. Press <Tab> to select **Test Computer** and then press <Enter>.

 **NOTE:** It is recommended that you select **Test Computer** to run a complete test on your computer. Selecting **Test Memory** initiates the extended memory test, which can take up to thirty minutes or more to complete. When the test completes, record the test results and then press any key to return to the previous menu.

7. At the Dell Diagnostics Main Menu, left-click with the mouse, or press <Tab> and then <Enter>, to select the test you want to run (see [Dell Diagnostics Main Menu](#)).

 **NOTE:** Write down any error codes and problem descriptions exactly as they appear and follow the instructions on the screen.

8. After all tests have completed, close the test window to return to the Dell Diagnostics Main Menu.

9. Close the Main Menu window to exit the Dell Diagnostics and restart the computer.


## Starting the Dell Diagnostics From the Drivers and Utilities Media

Before running the Dell Diagnostics, enter the system setup program (see the *Dell Technology Guide* for instructions) to review your computer's configuration information, and ensure that the device you want to test is displayed in the system setup program and is active.

1. Insert the *Drivers and Utilities* media into the optical drive.


2. Restart your computer.

3. When the DELL logo appears, press <F12> immediately.

 **NOTE:** Keyboard failure may result when a key is held down for extended periods of time. To avoid possible keyboard failure, press and release <F12> in even intervals to open the Boot Device Menu.

If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft Windows desktop, then shut down your computer and try again.

4. When the boot device list appears, use the up- or down- arrow keys to highlight **Onboard or USB CD-ROM Drive**, and then press <Enter>.

 **NOTE:** Using the one-time boot menu changes the boot sequence for the current boot only. Upon restart, the computer boots according to the boot sequence specified in the system setup program.


5. Press any key to confirm that you want to start from the CD/DVD.

If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft Windows desktop, then shut down your computer and try again.


6. Type 1 to **Run the 32 Bit Dell Diagnostics**.

7. At the **Dell Diagnostics Menu**, type 1 to select **Dell 32-bit Diagnostics for Resource CD (graphical user interface)**.

8. Press <Tab> to select **Test Computer** and then press <Enter>.

 **NOTE:** It is recommended that you select **Test Computer** to run a complete test on your computer. Selecting **Test Memory** initiates the extended memory test, which can take up to thirty minutes or more to complete. When the test completes, record the test results and then press any key to return to the previous menu.

9. At the Dell Diagnostics Main Menu, left-click with the mouse, or press <Tab> and then <Enter>, to select the test you want to run (see [Dell Diagnostics Main Menu](#)).

 **NOTE:** Write down any error codes and problem descriptions exactly as they appear and follow the instructions on the screen.

10. After all tests have completed, close the test window to return to the Dell Diagnostics Main Menu.


11. Close the Main Menu window to exit the Dell Diagnostics and restart the computer.
12. Remove the *Drivers and Utilities* media from the optical drive.

## Dell Diagnostics Main Menu

After the Dell Diagnostics loads the following menu appears:


Option	Function
Test Memory	Run the stand-alone memory test
Test Computer	Run computer diagnostics
Exit	Exit the diagnostics

Press <Tab> to select the test you want to run and then press <Enter>.

 **NOTE:** It is recommended that you select **Test Computer** to run a complete test on your computer. Selecting **Test Memory** initiates the extended memory test, which can take up to thirty minutes or more to complete. When the test completes, record the test results and then press any key to return to this menu.

After **Test Computer** is selected, the following menu appears:

Option	Function
Express Test	Performs a quick test of devices in the computer. This typically can take 10 to 20 minutes.  <b>NOTE:</b> The Express Test requires no interaction on your part. Run Express Test first to increase the possibility of tracing a problem quickly.
Extended Test	Performs a thorough check of devices in the computer. This typically can take an hour or more.  <b>NOTE:</b> The Extended Test periodically requires your input to answer specific questions.
Custom Test	Use to test a specific device or customize the tests to be run.
Symptom Tree	This option allows you to select tests based on a symptom of the problem you are having. This option lists the most common symptoms.

 **NOTE:** It is recommended that you select **Extended Test** to perform a more thorough check of devices in the computer.

For any problem encountered during a test, a message appears with an error code and a description of the problem. Write down the error code and problem description exactly as it appears and follow the instructions on the screen. If you cannot resolve the problem, contact Dell (see [Contacting Dell](#)).

 **NOTE:** When contacting Dell support, have your Service Tag ready. The Service Tag for your computer is located at the top of each test screen.

The following tabs provide additional information for tests run from the Custom Test or Symptom Tree option:


Tab	Function
Results	Displays the results of the test and any error conditions encountered.
Errors	Displays error conditions encountered, error codes, and the problem description.
Help	Describes the test and any requirements for running the test.
Configuration	Displays the hardware configuration for the selected device.  The Dell Diagnostics obtains configuration information for all devices from the system setup program, memory, and various internal tests, and displays the information in the device list in the left pane of the screen.  <b>NOTE:</b> The device list may not display the names of all components installed on your computer or all devices attached to your computer.
Parameters	Allows you to customize the test, if applicable, by changing the test settings.

## Solving Problems


Follow these tips when troubleshooting your computer:


- 1 If you added or removed a part before the problem started, review the installation procedures and ensure that the part is correctly installed.

- 1 If a peripheral device does not work, ensure that the device is properly connected.
- 1 If an error message appears on the screen, write down the exact message. This message may help support personnel diagnose and fix the problem(s).
- 1 If an error message occurs in a program, see the program's documentation.

 **NOTE:** The procedures in this document were written for the Windows default view, so they may not apply if you set your Dell™ computer to the Windows Classic view.


## Battery Problems

 **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.

 **CAUTION:** Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage on [www.dell.com](http://www.dell.com) at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).


**Replace the battery —** If you have to repeatedly reset time and date information after turning on the computer, or if an incorrect time or date displays during start-up, replace the battery (see [Replacing the Battery](#)). If the battery still does not work properly, contact Dell (see [Contacting Dell](#)).

## Drive Problems

 **CAUTION:** Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage on [www.dell.com](http://www.dell.com) at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

### Ensure that Microsoft® Windows Recognizes the drive —

*Windows Vista:*

- 1 Click the Windows Vista Start button  and click **Computer**.

*Windows XP:*

- 1 Click **Start and click My Computer**.

If the drive is not listed, perform a full scan with your antivirus software to check for and remove viruses. Viruses can sometimes prevent Windows from recognizing the drive.

### Test the drive —

- 1 Insert another disc to eliminate the possibility that the original drive is defective.
- 1 Insert a bootable disc and restart the computer.


**Clean the drive or disk —** See the *Dell Technology Guide* for instructions.

### Check the cable connections

**Run the Hardware Troubleshooter —** See [Hardware Troubleshooter](#).

**Run the Dell Diagnostics —** See [Dell Diagnostics](#).

## Optical drive problems

 **NOTE:** High-speed optical drive vibration is normal and may cause noise, which does not indicate a defect in the drive or the media.

 **NOTE:** Because of different regions worldwide and different disc formats, not all DVD titles work in all DVD drives.

### Adjust the Windows volume control —

- 1 Click the speaker icon in the lower-right corner of your screen.
- 1 Ensure that the volume is turned up by clicking the slider and dragging it up.
- 1 Ensure that the sound is not muted by clicking any boxes that are checked.

**Check the speakers and subwoofer** — See [Sound and Speaker Problems](#).

## Problems writing to an optical drive

**Close other programs** — The optical drive must receive a steady stream of data during the writing process. If the stream is interrupted, an error occurs. Try closing all programs before you write to the optical.

**Turn off standby mode in Windows before writing to a disc** — See the *Dell Technology Guide* or search for the keyword *standby* in Windows Help and Support for information on power management modes.

## Hard drive problems

### Run Check Disk —

*Windows Vista:*

1. Click **Start**  and click **Computer**.
2. Right-click **Local Disk C:**.
3. Click **Properties**→**Tools**→**Check Now**.


The **User Account Control** window may appear. If you are an administrator on the computer, click **Continue**; otherwise, contact your administrator to continue the desired action.

4. Follow the instructions on the screen.

*Windows XP:*

1. Click **Start** and click **My Computer**.
2. Right-click **Local Disk C:**.
3. Click **Properties**→**Tools**→**Check Now**.
4. Click **Scan for and attempt recovery of bad sectors and click Start**.

## E-Mail and Internet Problems

 **CAUTION:** Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the [Regulatory Compliance Homepage on www.dell.com at www.dell.com/regulatory\\_compliance](#).


 **NOTE:** Do not plug a telephone cable into the network adapter connector (see your computer's *Setup and Quick Reference Guide* for illustrations identifying the connectors on your computer).

**Check the Microsoft Outlook® Express security settings** — If you cannot open your e-mail attachments:

1. In Outlook Express, click **Tools**→**Options**→**Security**.
2. Click **Do not allow attachments** to remove the checkmark, as needed.

**Ensure that you are connected to the Internet** — Ensure that you have subscribed to an Internet provider. With the Outlook Express e-mail program open, click **File**. If **Work Offline** has a checkmark next to it, click the checkmark to remove it and connect to the Internet. For help, contact your Internet service provider.

## Error Messages

 **CAUTION:** Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the [Regulatory Compliance Homepage on www.dell.com at www.dell.com/regulatory\\_compliance](#).


If the error message is not listed, see the documentation for the operating system or the program that was running when the message appeared.

**A filename cannot contain any of the following characters: \ / : \* ? " < > |** — Do not use these characters in filenames.

**A required .DLL file was not found** — The program that you are trying to open is missing an essential file. To remove and then reinstall the program:

*Windows Vista:*



1. Click **Start**  → **Control Panel** → **Programs** → **Programs and Features**.
2. Select the program you want to remove.
3. Click **Uninstall**.
4. See the program documentation for installation instructions.

*Windows XP:*

1. Click **Start** → **Control Panel** → **Add or Remove Programs** → **Programs and Features**.
2. Select the program you want to remove.
3. Click **Uninstall**.
4. See the program documentation for installation instructions.


**drive letter :\\ is not accessible. The device is not ready** — The drive cannot read the disk. Insert a disk into the drive and try again.

**Insert bootable media** — Insert a bootable CD or DVD.

**Not enough memory or resources. Close some programs and try again** — Close all windows and open the program that you want to use. In some cases, you may have to restart your computer to restore computer resources. If so, run the program that you want to use first.

**Operating system not found** — Contact Dell (see [Contacting Dell](#)).

## IEEE 1394 Device Problems

 **CAUTION:** Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage on [www.dell.com](http://www.dell.com) at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

 **NOTE:** Your computer supports only IEEE 1394a standard.

**Ensure that the cable for the IEEE 1394 device is properly inserted into the device and into the connector on the computer**

**Ensure that the IEEE 1394 device is recognized by Windows** —

*Windows Vista:*

1. Click **Start**  → **Control Panel** → **Hardware and Sound**.
2. Click **Device Manager**.

*Windows XP:*


1. Click **Start** and click **Control Panel**.
2. Under **Pick a Category**, click **Performance and Maintenance** → **Computer** → **Computer Properties** → **Hardware** → **Device Manager**.

If your IEEE 1394 device is listed, Windows recognizes the device.

**If you have problems with a Dell IEEE 1394 device** — Contact Dell (see [Contacting Dell](#)).

**If you have problems with an IEEE 1394 device not provided by Dell** — Contact the IEEE 1394 device manufacturer.

## Keyboard Problems

 **CAUTION:** Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage on [www.dell.com](http://www.dell.com) at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).


**Check the keyboard cable** —

1. Ensure that the keyboard cable is firmly connected to the computer.
1. Shut down the computer (see [Before Working on Your Computer](#)), reconnect the keyboard cable as shown on the setup diagram for your computer, and then restart the computer.
1. Ensure that the cable is not damaged or frayed and check cable connectors for bent or broken pins. Straighten any bent pins.
1. Remove any keyboard extension cables and connect the keyboard directly to the computer.

**Test the keyboard** — Connect a properly working keyboard to the computer, then try using the keyboard.

Run the Hardware Troubleshooter — See [Hardware Troubleshooter](#).

## Lockups and Software Problems


 **CAUTION:** Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage on [www.dell.com](http://www.dell.com) at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

### The computer does not start up

Check the diagnostic lights — See [Diagnostic Lights](#).

Ensure that the power cable is firmly connected to the computer and to the electrical outlet

### The computer stops responding

 **NOTICE:** You may lose data if you are unable to perform an operating system shutdown.


**Turn the computer off** — If you are unable to get a response by pressing a key on your keyboard or moving your mouse, press and hold the power button for at least 8 to 10 seconds (until the computer turns off), and then restart your computer.

### A program stops responding

End the program —

1. Press <Ctrl><Shift><Esc> simultaneously to access the Task Manager.
2. Click the **Applications** tab.
3. Click to select the program that is no longer responding.
4. Click **End Task**.

### A program crashes repeatedly

 **NOTE:** Most software includes installation instructions in its documentation or on a CD or DVD.


Check the software documentation — If necessary, uninstall and then reinstall the program.

### A program is designed for an earlier Windows operating system

Run the Program Compatibility Wizard —

*Windows Vista:*

The Program Compatibility Wizard configures a program so that it runs in an environment similar to non-Windows Vista operating system environments.

1. Click **Start**  → **Control Panel** → **Programs** → **Use an older program with this version of Windows**.
2. In the welcome screen, click **Next**.
3. Follow the instructions on the screen.

*Windows XP:*

The Program Compatibility Wizard configures a program so that it runs in an environment similar to non-XP operating system environments.

1. Click **Start** → **All Programs** → **Accessories** → **Program Compatibility Wizard** → **Next**.
2. Follow the instructions on the screen.

### A solid blue screen appears

**Turn the computer off** — If you are unable to get a response by pressing a key on your keyboard or moving your mouse, press and hold the power button for at least 8 to 10 seconds (until the computer turns off), and then restart your computer.

## Other software problems

**Check the software documentation or contact the software manufacturer for troubleshooting information** —


- 1 Ensure that the program is compatible with the operating system installed on your computer.
- 1 Ensure that your computer meets the minimum hardware requirements needed to run the software. See the software documentation for information.
- 1 Ensure that the program is installed and configured properly.
- 1 Verify that the device drivers do not conflict with the program.
- 1 If necessary, uninstall and then reinstall the program.

**Back up your files immediately**

**Use a virus-scanning program to check the hard drive, CDs, or DVDs**

**Save and close any open files or programs and shut down your computer through the Start menu**

## Memory Problems

 **CAUTION:** Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage on [www.dell.com](http://www.dell.com) at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).


**If you receive an insufficient memory message** —

- 1 Save and close any open files and exit any open programs you are not using to see if that resolves the problem.
- 1 See the software documentation for minimum memory requirements. If necessary, install additional memory (see [System Memory](#)).
- 1 Reseat the memory modules (see [System Memory](#)) to ensure that your computer is successfully communicating with the memory.
- 1 Run the Dell Diagnostics (see [Dell Diagnostics](#)).

**If you experience other memory problems** —

- 1 Reseat the memory modules (see [System Memory](#)) to ensure that your computer is successfully communicating with the memory.
- 1 Ensure that you are following the memory installation guidelines (see [System Memory](#)).
- 1 Ensure that the memory you are using is supported by your computer. For more information about the type of memory supported by your computer, see [System Memory](#).
- 1 Run the Dell Diagnostics (see [Dell Diagnostics](#)).

## Mouse Problems

 **CAUTION:** Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage on [www.dell.com](http://www.dell.com) at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

**Check the mouse cable** —

- 1 Ensure that the cable is not damaged or frayed and check cable connectors for bent or broken pins. Straighten any bent pins.
- 1 Remove any mouse extension cables, and connect the mouse directly to the computer.
- 1 Verify that the mouse cable is connected as shown on the setup diagram for your computer.

**Restart the computer** —

1. Simultaneously press <Ctrl><Esc> to display the **Start** menu.
2. Press <u>, press the up- and down-arrow keys to highlight **Shut down** or **Turn Off**, and then press <Enter>.
3. After the computer turns off, reconnect the mouse cable as shown on the setup diagram.
4. Turn on the computer.

**Test the mouse** — Connect a properly working mouse to the computer, then try using the mouse.

**Check the mouse settings** —

*Windows Vista:*

1. Click **Start**  → **Control Panel** → **Hardware and Sound** → **Mouse**.
2. Adjust the settings as needed.


Windows XP

1. Click **Start** → **Control Panel** → **Mouse**.
2. Adjust the settings as needed.

**Reinstall the mouse driver** — See the *Dell Technology Guide* for instructions on manually installing a device driver.

**Run the Hardware Troubleshooter** — See [Hardware Troubleshooter](#).

## Network Problems

 **CAUTION:** Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage on [www.dell.com](http://www.dell.com) at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

**Check the network cable connector** — Ensure that the network cable is firmly inserted into the network connector on the back of the computer and the network jack.


**Check the network lights on the back of the computer** — If the link integrity light is off, no network communication is occurring. Replace the network cable.

**Restart the computer and log on to the network again**

**Check your network settings** — Contact your network administrator or the person who set up your network to verify that your network settings are correct and that the network is functioning.

**Run the Hardware Troubleshooter** — See [Hardware Troubleshooter](#).

## Power Problems

 **CAUTION:** Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage on [www.dell.com](http://www.dell.com) at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

**If the power light is green and the computer is not responding** — See [Diagnostic Lights](#).

**If the power light is blinking green** — The computer is in standby mode. Press a key on the keyboard, move the mouse, or press the power button to resume normal operation.

**If the power light is off** — The computer is either turned off or is not receiving power.

1. Reseat the power cable in the power connector on the back of the computer and the electrical outlet.
1. Bypass power strips, power extension cables, and other power protection devices to verify that the computer turns on properly.
1. Ensure that any power strips being used are plugged into an electrical outlet and are turned on.
1. Ensure that the electrical outlet is working by testing it with another device, such as a lamp.
1. Ensure that the main power cable and control panel cable are securely connected to the system board.

**If the power light is blinking amber** — The computer is receiving electrical power, but an internal power problem may exist.

Ensure that all components and cables are properly installed and securely connected to the system board.


**If the power light is steady amber** — A device may be malfunctioning or incorrectly installed.


1. Remove and then reinstall all memory modules (see [System Memory](#)).
1. Remove and then reinstall any expansion cards, including graphics cards (see [Expansion Cards](#)).

**Eliminate interference** — Some possible causes of interference are:

- 1 Power, keyboard, and mouse extension cables
- 1 Too many devices connected to the same power strip
- 1 Multiple power strips connected to the same electrical outlet

## Printer Problems

 **CAUTION:** Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage on [www.dell.com](http://www.dell.com) at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

 **NOTE:** If you need technical assistance for your printer, contact the printer's manufacturer.

**Check the printer documentation** — See the printer documentation for setup and troubleshooting information.

**Ensure that the printer is turned on**


**Check the printer cable connections** —

- 1 See the printer documentation for cable connection information.
- 1 Ensure that the printer cables are securely connected to the printer and the computer.

**Test the electrical outlet** — Ensure that the electrical outlet is working by testing it with another device, such as a lamp.

**Verify that the printer is recognized by Windows** —

*Windows Vista:*


1. Click **Start**  → **Control Panel** → **Hardware and Sound** → **Printer**.
2. If the printer is listed, right-click the printer icon.
3. Click **Properties and click Ports**.
4. Adjust the settings, as needed.


*Windows XP:*

1. Click **Start** → **Control Panel** → **Printers and Other Hardware** → **View installed printers or fax printers**.
2. If the printer is listed, right-click the printer icon.
3. Click **Properties** → **Ports**. For a parallel printer, ensure that the **Print to the following port(s)**: setting is **LPT1 (Printer Port)**. For a USB printer, ensure that the **Print to the following port(s)**: setting is **USB**.

**Reinstall the printer driver** — See the printer documentation for information on reinstalling the printer driver.

## Scanner Problems

 **CAUTION:** Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage on [www.dell.com](http://www.dell.com) at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

 **NOTE:** If you need technical assistance for your scanner, contact the scanner's manufacturer.

**Check the scanner documentation** — See the scanner documentation for setup and troubleshooting information.

**Unlock the scanner** — Ensure that your scanner is unlocked (if the scanner has a locking tab or button).


**Restart the computer and try the scanner again**

**Check the cable connections** —

- 1 See the scanner documentation for information on cable connections.
- 1 Ensure that the scanner cables are securely connected to the scanner and the computer.

**Verify that the scanner is recognized by Microsoft Windows** —

*Windows Vista:*


1. Click **Start**  → **Control Panel** → **Hardware and Sound** → **Scanners and Cameras**.
2. If the scanner is listed, Windows recognizes the scanner.

*Windows XP:*

1. Click **Start** → **Control Panel** → **Printers and Other Hardware** → **Scanners and Cameras**.
2. If your scanner is listed, Windows recognizes the scanner.

**Reinstall the scanner driver** — See the scanner documentation for instructions.

## Sound and Speaker Problems

 **CAUTION:** Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage on [www.dell.com](http://www.dell.com) at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

### No sound from speakers

**Ensure that the subwoofer and the speakers are turned on** — See the setup diagram supplied with the speakers. If your speakers have volume controls, adjust the volume, bass, or treble to eliminate distortion.

**Adjust the Windows volume control** — Click or double-click the speaker icon in the lower-right corner of your screen. Ensure that the volume is turned up and that the sound is not muted.

**Disconnect headphones from the headphone connector** — Sound from the speakers is automatically disabled when headphones are connected to the computer's front-panel headphone connector.

**Test the electrical outlet** — Ensure that the electrical outlet is working by testing it with another device, such as a lamp.

**Eliminate possible interference** — Turn off nearby fans, fluorescent lights, or halogen lamps to check for interference.

**Run the speaker diagnostics**

**Reinstall the sound driver** — See your computer's *Setup and Quick Reference Guide* for instructions on reinstalling software.


**Run the Hardware Troubleshooter** — See [Hardware Troubleshooter](#).


### No sound from headphones

**Check the headphone cable connection** — Ensure that the headphone cable is securely inserted into the headphone connector (see your computer's *Setup and Quick Reference Guide* for illustrations identifying each connector).


**Adjust the Windows volume control** — Click or double-click the speaker icon in the lower-right corner of your screen. Ensure that the volume is turned up and that the sound is not muted.

## Video and Monitor Problems

 **CAUTION:** Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage on [www.dell.com](http://www.dell.com) at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

 **NOTICE:** If your computer came with a PCI graphics card installed, removal of the card is not necessary when installing additional graphics cards; however, the card is required for troubleshooting purposes. If you remove the card, store it in a safe and secure location. For information about your graphics card, go to [support.dell.com](http://support.dell.com).

### The screen is blank

 **NOTE:** For troubleshooting procedures, see the monitor's documentation.

## The screen is difficult to read

### Check the monitor cable connection —

1. Ensure that the monitor cable is connected to the correct graphics card (for dual graphics card configurations).
1. If you are using the optional DVI-to-VGA adapter, ensure that the adapter is correctly attached to the graphics card and monitor.
1. Ensure that the monitor cable is connected as shown on the setup diagram for your computer.
1. Remove any video extension cables and connect the monitor directly to the computer.
1. Swap the computer and monitor power cables to determine if the monitor's power cable is defective.
1. Check the connectors for bent or broken pins (it is normal for monitor cable connectors to have missing pins).

### Check the monitor power light —

1. If the power light is lit or blinking, the monitor has power.
1. If the power light is off, firmly press the button to ensure that the monitor is turned on.
1. If the power light is blinking, press a key on the keyboard or move the mouse to resume normal operation.

**Test the electrical outlet —** Ensure that the electrical outlet is working by testing it with another device, such as a lamp.

**Check the diagnostic lights —** See [Diagnostic Lights](#).

**Check the monitor settings —** See the monitor documentation for instructions on adjusting the contrast and brightness, demagnetizing (degaussing) the monitor, and running the monitor self-test.


**Move the subwoofer away from the monitor —** If your speaker system includes a subwoofer, ensure that the subwoofer is positioned at least 60 centimeters (2 feet) away from the monitor.

**Move the monitor away from external power sources —** Fans, fluorescent lights, halogen lamps, and other electrical devices can cause the screen image to appear *shaky*. Turn off nearby devices to check for interference.

**Rotate the monitor to eliminate sunlight glare and possible interference**

### Adjust the Windows display settings —

*Windows Vista:*

1. Click **Start**  → **Control Panel** → **Hardware and Sound** → **Personalization** → **Display Settings**.
2. Adjust **Resolution** and **Colors settings**, as needed.

*Windows XP:*

1. Click **Start** → **Control Panel** → **Appearance and Themes**.
2. Click the area you want to change or click the **Display** icon.
3. Try different settings for **Color quality** and **Screen resolution**.

## 3D image quality is poor

**Check the graphics card power cable connection —** Ensure that the power cable for the graphics card(s) is correctly attached to the card.

**Check the monitor settings —** See the monitor documentation for instructions on adjusting the contrast and brightness, demagnetizing (degaussing) the monitor, and running the monitor self-test.

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## Dell Technical Update Service

The Dell Technical Update service provides proactive e-mail notification of software and hardware updates for your computer. The service is free and can be customized for content, format, and how frequently you receive notifications.

To enroll for the Dell Technical Update service, go to [support.dell.com/technicalupdate](https://support.dell.com/technicalupdate).

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